

Territorial Action Plan (TAP) for Digital Innovation in Circular Construction: **Austria**

Table of Contents

TERRITORIAL ACTION PLAN (TAP) FOR DIGITAL INNOVATION IN CIRCULAR CONSTRUCTION.....	1
1. INTRODUCTION / EXECUTIVE SUMMARY.....	3
PURPOSE:.....	3
ALIGNMENT:.....	3
CURRENT STATUS:.....	3
2. VISION AND MISSION (TERRITORIAL ADAPTATION).....	3
VISION (NATIONAL):.....	3
MISSION (NATIONAL):.....	3
3. ALIGNMENT WITH EU STRATEGY FOR THE DANUBE REGION (EUSDR).....	4
4. STRATEGIC PILLARS, OBJECTIVES, AND KEY ACTIONS (NATIONAL KPIS).....	4
PILLAR 1: ENABLING POLICY & REGULATORY FRAMEWORKS.....	4
OBJECTIVE 1.1: HARMONIZE CIRCULAR CONSTRUCTION STANDARDS AND REGULATIONS RELATED TO DIGITALIZATION.....	4
OBJECTIVE 1.2: DEVELOP AND IMPLEMENT FINANCIAL INCENTIVES FOR CIRCULAR CONSTRUCTION PRACTICES.....	5
PILLAR 2: FOSTERING DIGITAL INNOVATION & TECHNOLOGY ADOPTION.....	5
OBJECTIVE 2.1: PROMOTE THE ADOPTION OF BUILDING INFORMATION MODELING (BIM) AND OTHER DIGITAL TECHNOLOGIES.....	5
OBJECTIVE 2.2: SUPPORT THE DEVELOPMENT AND DEPLOYMENT OF DIGITAL PLATFORMS FOR MATERIAL TRACKING AND WASTE MANAGEMENT.....	6
PILLAR 3: BUILDING SKILLS & CAPACITY.....	7
OBJECTIVE 3.1: DEVELOP EDUCATION AND TRAINING PROGRAMS FOR DIGITAL SKILLS WITHIN CIRCULAR CONSTRUCTION.....	7
OBJECTIVE 3.2: PROMOTE KNOWLEDGE TRANSFER AND BEST PRACTICE SHARING AMONG STAKEHOLDERS.....	7
PILLAR 4: STRENGTHENING COLLABORATION & SUPPLY CHAINS.....	8
OBJECTIVE 4.1: FACILITATE THE DEVELOPMENT OF DIGITAL REGIONAL SUPPLY CHAINS FOR RECYCLED AND SECONDARY CONSTRUCTION MATERIALS.....	8
OBJECTIVE 4.2: PROMOTE COLLABORATION BETWEEN RESEARCH INSTITUTIONS, INDUSTRY, AND GOVERNMENTS..	9
PILLAR 5: RAISING AWARENESS & CHANGING MINDSETS.....	9

OBJECTIVE 5.1: IMPLEMENT AWARENESS CAMPAIGNS TO PROMOTE THE BENEFITS OF DIGITALIZATION WITHIN CIRCULAR CONSTRUCTION.....	9
OBJECTIVE 5.2: ENCOURAGE THE ADOPTION OF DIGITAL TECHNOLOGIES FOCUSING ON CIRCULAR ECONOMY PRINCIPLES USED IN CONSTRUCTION BUSINESS MODELS.....	10
5. NATIONAL CONTEXT AND CHALLENGES.....	11
SWOT ANALYSIS:.....	11
ADDRESSING NATIONAL GAPS:.....	11
6. FINANCIAL STRATEGY (NATIONAL LEVEL).....	11
FUNDING SOURCES:.....	11
BUDGET ALLOCATION.....	11
7. IMPLEMENTATION PLAN (NATIONAL LEVEL).....	11
GOVERNANCE STRUCTURE:.....	11
TIMELINE:.....	12
MONITORING AND EVALUATION:.....	12
RISK MANAGEMENT:.....	12
8. STAKEHOLDER ENGAGEMENT (NATIONAL LEVEL).....	12
COLLABORATION MECHANISMS:.....	12
INVOLVEMENT OF KEY GROUPS:.....	12
COMMUNICATION PLAN:.....	13
9. SUSTAINABILITY AND SCALABILITY.....	13
SUSTAINABILITY MECHANISMS:.....	13
SCALABILITY STRATEGIES:.....	13
10. ANNEXES (OPTIONAL).....	13
ANNEX A: LIST OF KEY NATIONAL STAKEHOLDERS INVOLVED.....	13
ANNEX B: DETAILED NATIONAL PROJECT PROPOSALS LINKED TO THE OBJECTIVES.....	13
ANNEX C: DATA SOURCES AND METHODOLOGIES FOR NATIONAL KPIS.....	13
ANNEX D: RELEVANT NATIONAL POLICY DOCUMENTS OR REPORTS.....	13

1. Introduction / Executive Summary

Purpose: Austria commits to implement the 2030 Danube Region Digital Innovation Strategy for Circular Construction through this Territorial Action Plan (TAP). The TAP translates the transnational pillars into Austria-specific actions, responsibilities, timelines and measurable targets for 2026-2030, with a focus on digitalisation as an enabler of circular construction.

Alignment: The Austrian TAP is fully aligned with the Danube Region vision, mission and the five strategic pillars, and complements Austria's national Circular Economy Strategy (adopted 2022) and building-sector decarbonisation/renovation policies. It builds on existing Austrian strengths

(multi-level governance, active clusters, applied R&D, BIM/openBIM standardisation) and scales them through coordinated national programmes.

Note (national tailoring): Austria maintains all five pillars and both objectives per pillar. National KPIs are defined so that they are (i) measurable using available data sources (e.g., EDM waste reporting, procurement datasets, programme monitoring), and (ii) ambitious but realistic given Austria's starting point as an "advanced" country in the transnational strategy.

Current Status: Austria is a frontrunner in CE policy and digital construction in the Danube Region, but market uptake remains uneven (especially among SMEs and in smaller public clients). A 2023/24 Austrian sector survey (Digital Findet Stadt) shows BIM is used regularly by 47% of respondents and in pilot projects by 28%, while skills gaps, interoperability/standardisation challenges and interface management remain key barriers. Austria has enabling waste and demolition frameworks (e.g., Recycling-Baustoffverordnung, ÖNORM B 3151 for deconstruction documentation) and national environmental data infrastructures (EDM), and is increasingly linking CE with digital solutions such as material passports and product data. The next step is to mainstream these approaches through regulation, procurement, finance, skills, and scalable digital platforms.

2. Vision and Mission (Territorial Adaptation)

Vision: To position Austria as a European lighthouse for circular and digital construction, where building information and material flows are transparent, interoperable and trusted across the whole lifecycle, strengthening competitiveness, climate resilience and social value in all Austrian regions.

Mission: To enable collaboration, knowledge transfer and rapid deployment of digital solutions (e.g., BIM/openBIM, CDEs, digital product/material passports, digital twins, AI-enabled analytics) so that Austria's construction sector systematically prevents waste, increases reuse and high-quality recycling, and accelerates low-carbon renovation and circular business models.

3. Alignment with EU Strategy for the Danube Region (EUSDR)

Austria's TAP contributes to the EUSDR Priority Areas as follows:

Pillar: Connecting the Region (Improved Infrastructure, Digitalization) - Austria will strengthen interoperable digital infrastructure for construction (openBIM/CDE guidance, data standards, digital product/material passport pilots, and cross-border interoperability with Danube partners), and integrate these into public infrastructure programmes and procurement.

Pillar: Protecting the Environment (Resource Efficiency, Waste Reduction) - Actions promote prevention, selective deconstruction, reuse and high-quality recycling through digital traceability,

compliance support, and better market information for secondary materials; this supports reduced primary material demand and emissions across the building lifecycle.

Pillar: Building Prosperity (Innovation, SME Growth) - Austria will expand innovation funding and services for SMEs (testing, living labs, digital adoption support), stimulate new circular business models (reuse hubs, marketplaces, product-as-a-service), and accelerate commercialisation of digital tools made in Austria.

Pillar: Strengthening the Region (Institutional Capacity, Collaboration) - Austria will reinforce multi-level governance (federal-state-municipal), align stakeholders through a national steering committee linked to the Danube CiDiCon Cluster, and institutionalise learning/knowledge exchange with other Danube countries.

4. Strategic Pillars, Objectives, and Key Actions (National KPIs)

Pillar 1: Enabling Policy & Regulatory Frameworks

Objective 1.1: Harmonize circular construction standards and regulations related to digitalization.

National Actions:

- 2026: Map Austrian regulatory levers for circular & digital construction (federal laws, state building regulations, OIB guidelines, waste/secondary-material rules) and identify barriers for reuse/secondary materials and digital documentation (Potential Lead: BMLUK; Support: states “Bundesländer”, Umweltbundesamt, Austrian Standards).
- 2026-2027: Establish an Austrian Circular Digital Construction Working Group (public procurement + regulation) to issue harmonised guidance for: selective deconstruction documentation (ÖNORM B 3151), quality assurance for recycled aggregates under RBV, and digital evidence (BIM/CDE/material passports) (Lead: BMIMI & BMLUK; Support: WKO, ÖIAV, TU Wien/TU Graz, IBO, ÖGNI, Recycling-Baustoff-Verband).
- 2027-2028: Develop national ‘digital compliance’ guidance: minimum data sets for material-related information in planning/permits and public procurement (e.g., reuse potential, recycled content, EPD/DPP references), aligned with EU CPR digital product passport rollout (Lead: BMWE/BMIMI with Austrian Standards; Support: building authorities, ÖBB/ASFINAG as advanced clients).
- 2026-2030: Actively contribute Austrian expertise to Danube/European standardisation and interoperability work (openBIM/IFC, material passport semantics, data governance) through the Cluster and EU projects (Lead: aws as partner/contact point; Support: FFG, EDIHs, universities).

National KPIs & Targets:

KPI 1.1.1: Number of Austrian standards/guidelines updated or newly issued to enable digitalised circular construction (e.g., guidance for BIM/CDE in procurement; material passport/digital product passport alignment; reuse documentation templates).

Target: ≥6 standards/guidance documents by 2030 (incl. at least 2 adopted for public procurement use).

KPI 1.1.2: Reduction in regulatory barriers for secondary material use (measured by (i) number of clarified/updated acceptance criteria, (ii) availability of digital quality evidence for recycled materials, and (iii) stakeholder assessment of remaining barriers).

Target: By 2030, at least 3 key barrier areas addressed (e.g., acceptance criteria + digital proof for recycled aggregates; reuse of building components; data requirements for permits/procurement), with annual barrier score improvement evidenced by stakeholder survey.

Objective 1.2: Develop and implement financial incentives for circular construction practices.

National Actions:

- 2026: Screen and tag existing instruments (aws, FFG, KPC/Kommunalkredit, state programmes, EU funds) for ‘circular + digital construction’ eligibility; publish a one-stop overview and eligibility guidance (Lead: aws; Support: FFG, KPC, WKO, BMLUK/BMIMI).
- 2026-2028: Launch/scale dedicated funding windows for (a) BIM/openBIM adoption & data interoperability, (b) circular design & reuse, (c) digital material/product passport pilots, and (d) selective deconstruction/reuse infrastructure—prioritising SMEs and supply-chain actors (Lead: aws & FFG; Support: BMIMI, BMLUK, states “Bundesländer”).
- 2027-2030: Embed ‘digital + circular’ award criteria in public procurement (federal/large clients), e.g., BIM-based material quantities, reuse/recycled-content targets, DPP/EPD evidence, and take-back/repair clauses (Lead: Federal Procurement Agency (BBG) + major public clients; Support: ministries, states “Bundesländer”, cities).
- 2026-2030: Create a blended-finance pipeline for circular construction scale-ups (guarantees, venture instruments, PPPs, green bonds), leveraging aws guarantees/loans and private investors (Lead: aws; Support: banks, impact investors, municipalities).

National KPIs & Targets:

KPI 1.2.1: Annual public + private investment mobilised for circular & digital construction (EUR/year), captured via programme monitoring (aws/FFG/KPC) plus co-financing declarations.

Target: ≥€250 million/year by 2030 (public leverage + private co-investment), with a rising share directed to SME adoption and scalable pilots.

KPI 1.2.2: Number of SMEs using dedicated financial incentives for circular & digital construction (grants/loans/guarantees/coaching).

Target: ≥ 600 SMEs supported cumulatively by 2030 (incl. at least 150 SMEs in deep digital adoption such as BIM/CDE/material passport tooling).

Pillar 2: Fostering Digital Innovation & Technology Adoption

Objective 2.1: Promote the adoption of Building Information Modeling (BIM) and other digital technologies.

National Actions:

- 2026-2027: Scale national BIM/openBIM capacity building through existing platforms (Digital Findet Stadt, ÖIAV/AGoeAG, Austrian Standards, EDIHs), with special SME packages (templates, CDE starter kits, model-based quantity + LCA workflows) (Lead: BMIMI; Support: aws, WKO, clusters, universities).
- 2026-2030: Co-fund demonstration projects in housing, renovation and infrastructure that combine BIM/digital twins with circularity (design for disassembly, reuse planning, material passports, LCA/LCC, sensor-based monitoring) and publish replicable playbooks (Lead: aws/FFG; Support: cities, social housing developers, ÖBB/ASFINAG).
- 2026-2028: Introduce a 'BIM-by-default' roadmap for major public clients (federal agencies + selected states/cities) with staged requirements (information requirements, open standards, CDE, model checking, asset information handover) (Lead: BBG + major clients; Support: BMIMI).
- 2026-2030: Provide subsidised technical assistance (voucher/coaching) for SMEs to adopt BIM/CDE, interoperability (IFC), and data governance (including cybersecurity and data protection) (Lead: aws; Support: EDIHs, chambers).

National KPIs & Targets:

KPI 2.1.1: Share of new public construction and infrastructure projects using BIM/openBIM (defined for projects above a size threshold) and share of private projects using BIM.

Target: By 2030, $\geq 80\%$ of major public projects and $\geq 60\%$ of private projects use BIM/openBIM workflows (from a 2024 survey baseline of 47% regular BIM use).

KPI 2.1.2: Number of professionals completing certified BIM + circular-digital upskilling modules (incl. designers, site managers, facility managers, deconstruction planners).

Target: $\geq 15,000$ professionals trained cumulatively by 2030 ($\geq 3,000$ in SMEs).

KPI 2.1.3: Number of Austrian best-practice pilots demonstrating digital applications for circular construction (with documented KPIs and open lessons learned).

Target: ≥ 50 pilots by 2030, including at least 15 renovation pilots and 10 component-reuse pilots.

Objective 2.2: Support the development and deployment of digital platforms for material tracking and waste management.

National Actions:

- 2026-2028: Build an interoperable 'Circular Construction Data Space Austria' by linking existing systems (EDM waste reporting, product/EPD data, BIM/CDE outputs) with marketplace functions for secondary materials and reusable components (Lead: BMLUK/Umweltbundesamt; Support: aws, digitalisation agencies, recyclers).
- 2026-2029: Pilot and standardise data models for material passports and (future) EU Digital Product Passports for construction products; ensure compatibility with openBIM/IFC and Austrian standards (Lead: Austrian Standards + universities; Support: industry, ÖGNI).
- 2026-2030: Provide integration support for SMEs (APIs, templates, low-cost tooling) to connect to platforms, including quality documentation for recycled materials and reuse offers (Lead: aws; Support: EDIHs, WKO).
- 2026-2030: Partner with waste management and deconstruction companies to digitalise CDW flows (selective deconstruction documentation, sorting data, quality control) and feed reliable data into the platform ecosystem (Lead: Umweltbundesamt + industry associations; Support: state authorities).

National KPIs & Targets:

KPI 2.2.1: Number of interoperable digital platforms/services operational in Austria for (i) secondary materials, (ii) reusable components, and (iii) digital evidence (material passport/DPP references), assessed against open standards (API/IFC/semantic alignment).

Target: By 2030, ≥ 3 interoperable platform services (incl. one national data-space backbone) with at least 5,000 active organisational users.

KPI 2.2.2: Share/volume of construction material flows with digital traceability (tracked via platforms/EDM-linked datasets), incl. mineral CDW and reusable components.

Target: By 2030, $\geq 30\%$ of mineral CDW flows digitally traceable and $\geq 10,000$ reusable components/items listed with verified data annually.

Pillar 3: Building Skills & Capacity

Objective 3.1: Develop education and training programs for digital skills within circular construction.

National Actions:

- 2026-2030: Embed ‘circular + digital construction’ learning outcomes into curricula at TU Wien, TU Graz, BOKU, FHs and HTLs (design for disassembly, BIM/IFC, LCA/LCC, material passports, deconstruction planning, data governance) (Lead: BMBWF; Support: universities, Fachhochschulen, states “Bundesländer”).
- 2026-2028: Establish an Austrian micro-credential/certification pathway (stackable) for BIM/openBIM + circular construction roles (e.g., circular BIM coordinator, deconstruction planner, material passport manager) aligned with existing BIMcert/openBIM approaches (Lead: Austrian Standards/industry bodies; Support: universities, WKÖ).
- 2026-2030: Expand dual-learning and practice formats: living-lab internships, on-site training on selective deconstruction and digital documentation, and SME-focused training vouchers (Lead: WKÖ/WIFI + Bauakademien; Support: aws).
- 2026-2027: Launch/curate a national online learning hub with open teaching materials, case studies and toolkits, linked to the Danube cluster knowledge hub (Lead: aws + education partners).

National KPIs & Targets (Austria):

KPI 3.1.1: Number of structured education/training offers (modules, micro-credentials, CPD courses) explicitly covering digital tools for circular construction.

Target: ≥40 offers by 2030 (incl. ≥15 SME-friendly short formats).

KPI 3.1.2: Number of Austrian institutions (universities, FHs, HTLs, vocational providers) that have integrated circular-digital construction content into core curricula.

Target: ≥30 institutions by 2030 (with at least one institution in each federal state offering relevant training).

Objective 3.2: Promote knowledge transfer and best practice sharing among stakeholders.

National Actions:

- 2026-2030: Run an annual Austrian ‘Circular Digital Construction Week’ (conference + site visits + matchmaking) building on existing formats (Digital Findet Stadt, Grünstattgrau, Renowave) (Lead: aws + partners).
- 2026-2027: Establish an Austrian knowledge hub page within the Danube CiDiCon platform, curating Austrian case studies, tools, procurement templates and datasets; ensure bilingual DE/EN availability (Lead: aws; Support: universities, clusters).
- 2026-2030: Operate peer-learning circles for SMEs (contractors, recyclers, planners) with mentorship from advanced clients and research partners; focus themes: reuse procurement, BIM-

to-material-passport, LCA automation, deconstruction planning (Lead: WKO/industry associations; Support: EDIHs).

- 2026-2030: Increase Austrian participation in cross-border Danube pilots and Horizon/Digital Europe consortia; use aws/FFG advisory services to build consortia (Lead: aws & FFG).

National KPIs & Targets:

KPI 3.2.1: Number of Austrian knowledge-sharing events on circular + digital construction (incl. workshops, trainings, conferences, living-lab open days).

Target: ≥20 events/year from 2027 onward (at least 5 outside Vienna to ensure regional reach).

KPI 3.2.2: Increase in the number of Austrian organisations participating in cross-border circular-digital construction projects (Danube and EU-funded).

Target: +50% by 2030 compared to 2026 baseline (measured via project participation registries).

Pillar 4: Strengthening Collaboration & Supply Chains

Objective 4.1: Facilitate the development of digital regional supply chains for recycled and secondary construction materials.

National Actions:

- 2026: Establish the Austrian node of the Danube Circular Construction Supply Network and link it with existing Austrian clusters and initiatives (Lead: aws; Support: WKO, Recycling-Baustoff-Verband, Grünstattgrau, Renowave, regional clusters).
- 2026-2027: Create a national supply-chain map of recyclers, demolition contractors, reuse actors, component manufacturers, and logistics capacities; identify regional ‘reuse/recycling bottlenecks’ and investment needs (Lead: Umweltbundesamt; Support: states “Bundesländer”, industry).
- 2027-2030: Standardise and scale digital traceability for secondary materials (quality classes, contaminant data, EPD/DPP links) and reusable components via material passport/DPP pilots integrated with BIM and marketplaces (Lead: Austrian Standards + industry; Support: universities).
- 2026-2030: Use EDIHs/DIHs and clusters to provide SME onboarding, tool selection and process redesign for digital supply chain management (Lead: EDIHs; Support: aws).

National KPIs & Targets:

KPI 4.1.1: Increase in the volume/share of recycled and secondary materials used in Austrian construction projects where digital traceability is applied.

Target: By 2030, +20% increase vs 2026 baseline in digitally-traceable recycled material use in selected product groups (e.g., aggregates, gypsum, metals, timber products), documented via procurement/project reporting.

KPI 4.1.2: Number of Austrian companies actively participating in circular supply chains supported by digital tools (platform membership + verified transactions).

Target: ≥500 companies by 2030 (incl. at least 200 SMEs), with year-on-year growth from 2027.

Objective 4.2: Promote collaboration between research institutions, industry, and governments.

National Actions:

- 2026: Formalise an Austrian ‘Network for Circular Digital Construction Innovation’ (research-industry-public clients), building on TU Wien/TU Graz/BOKU and applied research institutes, plus public clients and clusters (Lead: aws; Support: FFG, ministries).
- 2026-2030: Run thematic R&D calls and innovation challenges (FFG + aws) on: AI for material/CO₂ optimisation, digital twins for renovation, circular prefab/modular systems, robotics for selective deconstruction, and data interoperability/DPP readiness (Lead: FFG & aws).
- 2026-2030: Expand living labs and demonstrators across regions (e.g., renovation labs, urban mining pilots, reuse hubs) with open monitoring (KPIs, cost, CO₂, waste) and replicable methods (Lead: cities/states “Bundesländer” + universities; Support: klimaaktiv, IBO).
- 2026-2030: Create PPP frameworks for scaling (standard contracts, data governance, performance-based procurement) and systematically connect Austrian consortia to Horizon Europe/Digital Europe/Interreg pipelines (Lead: BMIMI/BMLUK; Support: aws/FFG).

National KPIs & Targets:

KPI 4.2.1: Number of collaborative R&D/innovation projects on digital technologies enabling circular construction (publicly funded + significant co-funded).

Target: ≥40 projects by 2030 (including at least 10 focused on renovation and 10 on digital product/material passports & interoperability).

KPI 4.2.2: Number of public-private partnerships established to implement/scale digitalised circular construction initiatives (e.g., platforms, procurement programmes, living labs).

Target: ≥20 PPPs by 2030 (with at least one PPP in each of the 9 federal states “Bundesländer”).

Pillar 5: Raising Awareness & Changing Mindsets

Objective 5.1: Implement awareness campaigns to promote the benefits of digitalization within circular construction.

National Actions:

- 2026-2030: Implement a coordinated national communication programme ('Circular Digital Build Austria') with tailored messages for SMEs, public clients, education and the public; align with klimaaktiv, Circular Economy Forum Austria, and existing building innovation platforms (Lead: aws; Support: BMLUK, BMIMI, partners).
- Use multi-channel dissemination: social media/toolkits, industry events (WKO, ÖIAV), municipal networks, vocational schools, and public exhibitions; include practical 'how-to' content (material passports, selective deconstruction, BIM for circularity).
- 2026-2030: Publish annual Austrian success story portfolio (projects + KPIs) and a public dashboard tracking the TAP KPIs to build trust and momentum (Lead: national steering committee secretariat).

National KPIs & Targets:

KPI 5.1.1: Reach of awareness activities (unique individuals reached via digital channels, events, media mentions).

Target: ≥500,000 people reached cumulatively by 2030 (with ≥50,000 targeted SME decision-makers and practitioners).

KPI 5.1.2: Increase in stakeholder support for digitalisation in circular construction (survey-based index among industry + public clients).

Target: +15 percentage points in support index by 2030 vs 2026 baseline.

Objective 5.2: Encourage the adoption of digital technologies focusing on circular economy principles used in construction business models.

National Actions:

- 2026-2030: Provide structured support for business model transformation (coaching + vouchers + matchmaking) for contractors, planners, manufacturers and facility managers to implement circular offerings enabled by digital tools (e.g., component reuse services, take-back schemes, material banking, data-as-a-service) (Lead: aws; Support: WKO, clusters).
- 2026-2030: Run masterclasses and accelerator programmes for 'circular digital construction' start-ups and SME innovation teams; include legal/procurement, financing, and data interoperability modules (Lead: aws; Support: investors, universities).

- 2027-2030: Create an Austrian award/label for 'Digital Circular Construction Business Model' and integrate winners into procurement innovation partnerships and export promotion (Lead: BMIMI/BMAW + aws).

National KPIs & Targets:

KPI 5.2.1: Number of Austrian companies in the construction value chain adopting digital technologies in circular business models (tracked via programme participation + sector surveys).

Target: ≥300 companies by 2030 (including at least 200 SMEs).

KPI 5.2.2: Increase in investment directed to digitalised circular construction methods (EUR and/or % share of relevant innovation/CapEx budgets).

Target: +30% investment growth by 2030 vs 2026 baseline (captured through programme monitoring and aggregated sector reporting).

5. National Context and Challenges

SWOT Analysis (Austria - circular construction + digitalisation):

Strengths: (1) Strong CE policy framework and high waste-management capacity; (2) Active research base (TU Wien, TU Graz, BOKU) and standardisation (ÖNORM/openBIM); (3) Established innovation ecosystem (aws/FFG, clusters such as Grünstattgrau/Renowave, Digital Findet Stadt); (4) Strong public clients able to drive change through procurement.

Weaknesses: (1) Fragmented governance (federal-state-municipal) and heterogeneous enforcement; (2) Uneven digital maturity-SMEs lag; (3) Data silos and limited interoperability between BIM, product data and waste/material flow data; (4) Limited scalable markets for component reuse; liability and quality assurance remain barriers.

Opportunities: (1) EU CPR digital product passport rollout enabling data availability; (2) Renovation wave + climate targets create demand for circular solutions; (3) Industrialised renovation/modular systems and reuse hubs can reduce costs and emissions; (4) Export potential for Austrian digital/CE solutions into the Danube Region.

Threats: (1) Construction downturn and cost pressure reduce willingness to invest; (2) Skills shortages and capacity constraints in planning, digital roles and deconstruction; (3) Cybersecurity/data protection concerns; (4) Risk of greenwashing without robust data and verification; (5) Volatile secondary material markets/logistics disruptions.

Addressing National Gaps (link to transnational findings): This TAP addresses (a) uneven BIM adoption through targeted SME support, public-client roadmaps and large-scale training (Pillars 2-3); (b) fragmented data and limited traceability by creating interoperable platform services linking BIM, product data and waste flows (Pillar 2); (c) regulatory and acceptance barriers for secondary materials and reuse through harmonised guidance, digital compliance and procurement criteria (Pillar 1); (d) infrastructure and market gaps for reuse through supply-chain mapping, marketplace

functions and PPP-driven scaling (Pillar 4); and (e) weak citizen/stakeholder engagement through transparency measures, public dashboards and multi-channel awareness campaigns (Pillar 5).

6. Financial Strategy (National Level)

Funding Sources:

National Budget: Use dedicated lines within BMIMI/BMLUK/BMBWF budgets and related agencies (aws, FFG, Umweltbundesamt, Klima- und Energiefonds) to fund regulatory work, platform development, pilots and training; align with renovation/energy-efficiency programmes where circularity can be integrated (e.g., building refurbishment support).

EU Structural Funds (ERDF, ESF+): Leverage ERDF for regional innovation infrastructure (living labs, data platforms, reuse hubs) and SME innovation; use ESF+ for workforce upskilling (digital + circular skills) and change-management in SMEs and public authorities, via state operational programmes.

Horizon Europe / Digital Europe: Build Austrian consortia around TU/FH research and industry to attract R&I funding for BIM-to-DPP interoperability, digital twins for renovation, AI resource optimisation and data spaces; use national proposal support (FFG/EEN) to increase success rates.

Interreg Danube Region Programme: Use follow-up Interreg proposals to scale transnational interoperability pilots (platform standards, cross-border reuse supply chains, joint training modules) and position Austria as a transfer country for good practices.

Private Investment: Mobilise private capital via blended finance (aws guarantees/loans, PPPs with cities/states “Bundesländer”, impact investors) and create bankable project pipelines (reuse hubs, platform services, modular renovation solutions). Encourage corporate investment in data readiness for the EU Digital Product Passport.

Other: Klima- und Energiefonds / climate funds, Kommunalkredit/KPC programmes for municipalities, state housing and renovation schemes, and sectoral cluster budgets can co-finance pilots and scaling. Where possible, align with green public procurement and EU taxonomy reporting needs.

Budget Allocation (indicative, 2026-2030):

Recommended allocation across pillars (share of total TAP-related funding): Pillar 1 Policy & incentives 20%; Pillar 2 Digital innovation & platforms 25%; Pillar 3 Skills & capacity 20%; Pillar 4 Collaboration & supply chains 20%; Pillar 5 Awareness & mindset change 15%. **Priority sequencing:** 2026-2027 focus on governance + standards + training and platform prototypes; 2028-2030 focus on scaling pilots, procurement mainstreaming and market uptake.

7. Implementation Plan (National Level)

Governance Structure:

Establish an Austrian TAP Steering Committee (2026) chaired by BMIMI and BMLUK, with a secretariat hosted by aws. Members: relevant federal ministries (incl. BMBWF, BMAW/BMWE), state representatives (OIB coordination), major public clients (e.g., ÖBB/ASFINAG/BBG, selected cities), industry associations (WKO, ÖIAV), waste/recycling bodies, research & education (TU Wien, TU Graz, FHs), clusters/innovation labs (Digital Findet Stadt, Grünstattgrau, Renowave), and civil society/NGOs.

Roles: steering committee sets annual priorities and KPI methodology; thematic working groups per pillar deliver actions; aws coordinates funding/instrument mapping and stakeholder engagement; Umweltbundesamt supports data/monitoring (EDM linkage); Austrian Standards supports standardisation and interoperability; public clients pilot procurement reforms; universities provide scientific support and evaluation.

Timeline:

Timeline (2026-2030): 2026 (T0) baseline KPI assessment + governance setup + standards gap analysis; 2027 (T1) launch funding windows + SME support + initial pilots + platform prototype; 2028 (T2) procurement mainstreaming in selected public clients + material passport/DPP pilots + mid-term evaluation; 2029 (T3) scaling of platforms and supply-chain network + regional reuse hubs; 2030 (T4) full KPI assessment and integration into long-term national programmes.

Monitoring and Evaluation:

Monitoring framework: define KPI data sources and responsible data owners (programme monitoring, procurement reporting, platform analytics, surveys). Use a 'single KPI register' maintained by the secretariat and validated annually by the steering committee.

Reporting: quarterly progress notes for working groups; annual public progress report + KPI dashboard; annual reporting to the Danube CiDiCon Cluster with Austrian inputs and lessons learned.

Evaluation: internal mid-term evaluation in 2028 (course correction) and independent end-term evaluation in 2030 (impact on uptake, waste prevention, market development and skills).

Risk Management:

Key risks: (1) funding constraints or delayed programme design; (2) fragmented responsibilities across governance levels; (3) low SME uptake due to cost/complexity; (4) data interoperability and legal/cybersecurity concerns; (5) skills shortages; (6) market volatility for secondary materials.

Mitigation: secure multi-year funding commitments; formal MoU with state/public clients; simplify SME offers (vouchers, templates); adopt open standards and clear data governance; partner with education providers for rapid upskilling; use procurement to stabilise demand; maintain transparent KPI dashboard to build trust.

8. Stakeholder Engagement (National Level)

Collaboration Mechanisms:

Austria will run thematic working groups aligned with the five pillars, connected to the Danube CiDiCon Cluster working group(s). The Austrian node will convene quarterly stakeholder roundtables and use the existing Regional Multi-Stakeholder Groups created in Circular DigiBuild for feedback and co-design of pilots and KPI methodologies.

Collaboration platforms: Use the Danube cluster online platform as the central hub, complemented by Austrian channels (event pages, repositories) and - where feasible - API-based links to relevant datasets/platforms. Ensure that outputs (templates, guidance, case studies) are openly accessible and reusable.

Involvement of Key Groups:

Governments/Public Authorities: Engage federal ministries and agencies plus state building authorities and municipal procurement networks; integrate circular-digital requirements into public procurement and permitting guidance; use pilot municipalities to test feasibility and replicate across regions.

Industry Associations & SMEs: Work with WKO sector groups, ÖIAV, construction and recycling associations to recruit SMEs into voucher/coaching programmes and pilots; provide 'SME safe' requirements (open standards, phased adoption, clear business case).

Research & Education Institutions: Establish a joint research-practice agenda, fund applied R&D and living labs, and integrate results into curricula and micro-credentials; use universities as neutral evaluators of KPI impacts.

Financial Institutions & Investors: Create an investor advisory circle (banks, Kommunalkredit, impact investors) to co-design blended finance instruments, define data needs for green finance (e.g., EU taxonomy) and help scale bankable reuse/platform projects.

Civil Society & NGOs: Ensure transparency via the public KPI dashboard and open reporting; run citizen-facing communication on benefits (waste reduction, local jobs, affordability); involve NGOs and community groups in living lab projects and feedback surveys.

Communication Plan:

National communication strategy (Austria): (1) quarterly updates via web/newsletter; (2) annual progress report and dashboard; (3) campaign packages for SMEs/public clients; (4) media outreach with success stories; (5) integration into national events (construction fairs, climate/circular economy forums) and education programmes.

Key outputs: TAP KPI dashboard, 'how-to' toolkits, procurement templates, case study library, and a national contact point (aws) for inquiries and matchmaking.

9. Sustainability and Scalability

Sustainability Mechanisms (Austria): (1) Institutionalise the steering committee and working groups as a permanent national coordination function linked to the Danube CiDiCon Cluster; (2) Embed key requirements into procurement guidance and standards to create stable demand; (3) Maintain the digital platform/data-space backbone through a mixed funding model (public seed funding + service fees + PPP operation); (4) Integrate training modules into regular education/CPD systems (universities, HTLs, WIFI/Bauakademien); (5) Use continuous KPI monitoring to prevent 'project-only' approaches and support evidence-based policy updates.

Scalability Strategies (Austria): Scale pilots through (a) replication packages (contracts, data requirements, KPI methods), (b) 'train-the-trainer' programmes for state/municipalities and SME intermediaries, (c) procurement innovation partnerships to expand solutions to additional regions and asset types, and (d) cross-border transfer via Danube cluster events and joint proposals.

Successful Austrian approaches (e.g., digital material passport integration with BIM, selective deconstruction documentation workflows) will be documented and shared for adoption by other Danube countries.

10. Annexes (Optional)

Annex A: List of key national stakeholders involved.

Annex B: Detailed national project proposals linked to the objectives.

Annex C: Data sources and methodologies for national KPIs.

Annex D: Relevant national policy documents or reports.

Literature & Sources

Project & Transnational Strategy Documents

Circular DigiBuild (2024). *Transnational Action Strategy – Strategy Working Document (V06_A3.5)*. Interreg Danube Region Programme.

Circular DigiBuild (2024). *Territorial Action Plan Template (V02_A3.5)*. Interreg Danube Region Programme.

Digital Findet Stadt (2024). *Technologiereport 2024 – Digitalisierung der österreichischen Bauwirtschaft*. Wien.

EU Policy & Regulatory Framework

European Commission (2019). *European Green Deal*. Brussels.

European Commission (2020). *A New Circular Economy Action Plan – For a cleaner and more competitive Europe*. COM(2020) 98 final.

European Commission (2021). *EU Strategy for Sustainable and Circular Textiles and Construction Ecosystems*.

European Commission (2022). *Proposal for a Regulation laying down harmonised conditions for the marketing of construction products (Revised Construction Products Regulation – CPR)*.

European Commission (2020). *A European Strategy for Data*. COM(2020) 66 final.

European Commission (2021). *Digital Europe Programme 2021–2027*.

European Union Strategy for the Danube Region (EUSDR) (2023). *Priority Areas and Governance Framework*.

European Parliament and Council (2022). *Regulation on Digital Product Passports under the Ecodesign for Sustainable Products Regulation (ESPR)*.

Austrian National Strategies & Legal Framework

Bundesministerium für Klimaschutz, Umwelt, Energie, Mobilität, Innovation und Technologie (BMK) (2022). *Kreislaufwirtschaftsstrategie Österreich*.

Bundesministerium für Klimaschutz (BMK) (2021). *Österreichischer Aufbau- und Resilienzplan (RRF)*.

Bundesministerium für Arbeit und Wirtschaft (BMAW) (2023). *FTI-Strategie 2030 Österreich*.

Umweltbundesamt (2023). *Ressourcenbericht Österreich*.

Bundeskanzleramt Rechtsinformationssystem (RIS) (2015, amended). *Recycling-Baustoffverordnung (RBV)*.

EDM – Elektronisches Datenmanagement Umwelt (ongoing). *Abfall- und Ressourcenmonitoring Plattform*.

Austrian Research & Innovation Ecosystem

FFG – Österreichische Forschungsförderungsgesellschaft (ongoing). *Förderprogramme im Bereich Bau, Digitalisierung und Kreislaufwirtschaft*.

Digital Findet Stadt – Innovationslabor für Digitalisierung im Bauwesen (ongoing).
<https://www.digitalfindetstadt.at>

IBO – Österreichisches Institut für Bauen und Ökologie (ongoing).

IIBW – Institut für Immobilien, Bauen und Wohnen GmbH (ongoing).

Grünstattgrau – Innovationslabor für Kreislaufwirtschaft im Bauwesen (ongoing).

RENOWAVE.AT – Innovationslabor für klimaneutrale Sanierung (ongoing).

Zukunftsagentur Bau (ongoing).

Circular Economy Forum Austria (ongoing).

TU Wien – Forschungsbereich Digitales Bauen & Building Information Modeling.

TU Graz – Institut für Baubetrieb und Bauwirtschaft.

Digital Construction & Technology References

Arbeitsgruppe Öffentlicher Auftraggeber (2023). *BIM-Anwendungsfälle öffentlicher Auftraggeber*. Schriftenreihe der AGoeAG.

Eichler, C.C., Schranz, C., Krischmann, T., Urban, H., Hopferwieser, M., Fischer, S. (2024). *BIMcert Handbuch: Grundlagenwissen openBIM*. <https://doi.org/10.34726/5384>

Haghsheno, S., Satzger, G., Lauble, S., Vössing, M. (eds.) (2024). *Künstliche Intelligenz im Bauwesen*. Springer.

Will, F. (2022). *Automatisierte Baumaschinen und Bau-Robotik*. In: Jacob & Kukovec (eds.), *Nachhaltige Wertschöpfung von Gebäuden*. Springer.

Malhotra, P. et al. (2021). *Internet of Things: Evolution, Concerns and Security Challenges*. Sensors 21(5), 1809.

IBM (n.d.). *What is Blockchain?* <https://www.ibm.com/de-de/topics/blockchain>

Designing Buildings Wiki (n.d.). *Common Data Environment (CDE)*.

Pix4D (n.d.). *LiDAR and Photogrammetry Applications in Construction*.

Trimble Geospatial (n.d.). *3D Laser Scanning in Construction*.

MDPI Remote Sensing (2023). *Application of 3D Laser Scanning Technology in Curtain Wall Construction*.

Austrian Market & Industry Context

Wirtschaftskammer Österreich (WKO) (2024). *Bauwirtschaft in Österreich – Konjunkturbericht*.

MARIEmehrwert – WKO (2024). *Worunter die Bauwirtschaft in Österreich 2024 leidet*.

Territorial Action Plan (TAP)

for Digital Innovation in Circular Construction

BOSNIA AND HERZEGOVINA

Circular DigiBuild Project
Interreg Danube Region Programme

Contents

1. Introduction / Executive Summary	4
Purpose	4
Alignment	4
Current Status.....	5
2. Vision and Mission (Territorial Adaptation)	9
3. Alignment with EU Strategy for the Danube Region (EUSDR)	9
4. Strategic Pillars, Objectives, and Key Actions (with National KPIs)	11
Pillar 1: Enabling Policy & Regulatory Frameworks	11
Objective 1.1: Harmonize circular construction standards and regulations related to digitalization.	11
Objective 1.2: Develop and implement financial incentives for circular construction practices.	12
Pillar 2: Fostering Digital Innovation & Technology Adoption	13
Objective 2.1: Promote the adoption of Building Information Modeling (BIM) and other digital technologies.	13
Objective 2.2: Support the development and deployment of digital platforms for material tracking and waste management.	14
Pillar 3: Building Skills & Capacity	15
Objective 3.1: Develop education and training programs for digital skills within circular construction.	15
Objective 3.2: Promote knowledge transfer and best practice sharing among stakeholders.....	17
Pillar 4: Strengthening Collaboration & Supply Chains.....	18
Objective 4.1: Facilitate the development of digital regional supply chains for recycled and secondary construction materials.	18
Objective 4.2: Promote collaboration between research institutions, industry, and governments.	19
Pillar 5: Raising Awareness & Changing Mindsets.....	20
Objective 5.1: Implement awareness campaigns to promote the benefits of digitalization within circular construction.	20
Objective 5.2: Encourage the adoption of digital technologies focusing on circular economy principles used in construction business models.	22

5. National Context and Challenges	23
SWOT Analysis	23
Addressing National Gaps	27
6. Financial Strategy (National Level)	29
Funding Sources	29
Budget Allocation	33
7. Implementation Plan (National Level)	34
8. Stakeholder Engagement (National Level)	40
9. Sustainability and Scalability.....	43
10. Annexes	45
Annex A: List of key national stakeholders involved	45
Annex B: Data sources and methodologies for national KPIs	47
Annex C: Relevant national policy documents or reports	48
Annex D: References	52

1. Introduction / Executive Summary

Purpose

This Territorial Action Plan (TAP) sets out the commitment of Bosnia and Herzegovina (BiH) to supporting the implementation of the *2030 Danube Region Digital Innovation Strategy for Circular Construction* within the Circular DigiBuild project under the Interreg Danube Region Programme. It defines the national priorities, actions, and implementation directions through which BiH will strengthen the transition towards circular and digitally enabled construction practices, while taking into account the country's current early-stage position in this field.

The TAP for BiH has been prepared by Sarajevo Economic Region Development Agency (SERDA) (PP11 SERDA), in consultation with relevant stakeholders from public institutions, academia, development organizations, professional bodies, and industry representatives.

The document focuses on practical and achievable measures adapted to the national context, particularly in areas such as construction and demolition waste (CDW) management, sustainable and low-carbon construction materials, digitalization of the construction sector, SME capacity building, and stronger cooperation between key stakeholders involved in the green and digital transition of the built environment sector.

In line with the recommendations of the transnational strategy, the TAP establishes tailored objectives and key performance indicators (KPIs) under each strategic pillar while taking into account the current level of policy development and implementation readiness in Bosnia and Herzegovina. Where certain strategic elements are not yet fully feasible at national level, the TAP introduces preparatory actions, pilot initiatives, and capacity-building activities intended to create the foundations for future implementation.

Alignment

This TAP is aligned with the vision, mission, and five strategic pillars of the *2030 Danube Region Digital Innovation Strategy for Circular Construction*:

- Enabling Policy & Regulatory Frameworks;
- Fostering Digital Innovation & Technology Adoption;
- Building Skills & Capacity;
- Strengthening Collaboration & Supply Chains; and
- Raising Awareness & Changing Mindsets.

The TAP supports the broader objective of positioning the Danube Region as a leader in circular and digital construction practices through stronger cooperation, innovation, and sustainable resource management.

At the EU and regional level, the TAP contributes to the objectives of the European Green Deal, the EU Circular Economy Action Plan, the Green Agenda for the Western Balkans, and the EU Strategy for the Danube Region (EUSDR). At the national level, it is aligned with Bosnia and Herzegovina's emerging circular economy and green transition priorities, including the draft Circular Economy Roadmap for BiH, the National Energy and Climate Plan (NECP), and relevant entity-level environmental and energy strategies.

The TAP is conceived as a working implementation and coordination instrument of PP11 SERDA and its national stakeholders. It does not constitute, and does not presume, formal adoption by the governments or public authorities in Bosnia and Herzegovina.

Current Status

Bosnia and Herzegovina (BiH) is classified as an **early-stage country** within the Circular DigiBuild policy review, alongside Serbia, Montenegro, and Moldova. Although **circular economy (CE)** and **sustainable construction principles** are increasingly recognized within strategic and policy frameworks, the transition towards **circular and digitally enabled construction** remains fragmented and at an early stage of implementation. Key barriers include **complex governance structures, uneven regulatory alignment, underdeveloped markets for secondary construction materials, limited digitalization capacities, and insufficient integration of circularity principles across the construction value chain.**

The **construction sector** plays a major role in the national economy and represents the **most capital-intensive sector** in the country, accounting for approximately **55–60% of total investments** in BiH. In 2022, the sector contributed **4.33% to national GDP** and employed **48,997 people**, representing **8.3% of total employment**. Between 2021 and 2022, investments in construction projects increased by **19.49%** in nominal terms. The sector is strongly dominated by **small and medium-sized enterprises (SMEs)**, which account for nearly **97% of all companies** operating within construction works and construction materials manufacturing.

An important milestone for the sector was the preparation of the **Assessment of Circularity and Resources Valorization in the Construction Sector in Bosnia and Herzegovina (2024)**, developed within the framework of the **UNDP-supported SDG2BiH programme** funded by Sweden. The assessment represented one of the first comprehensive national efforts to systematically analyse **circular economy implementation** in the construction sector, evaluate the readiness of enterprises and institutions for transition, identify **regulatory and market gaps**, and define targeted

support measures for both public institutions and businesses. The analysis included desk research, interviews with ministries, chambers of commerce, development agencies and companies, as well as a survey covering **25 construction material enterprises** from across BiH.

The construction sector in BiH remains predominantly based on a **linear “take–make–consume–dispose” model**, with circularity efforts still heavily concentrated on **energy efficiency** rather than broader **material circularity approaches**. Existing strategic documents, including the **Circular Economy Roadmap for BiH** (still in draft), the **National Energy and Climate Plan (NECP)**, entity-level **Environmental Strategies and Action Plans (ESAPs)**, and building renovation strategies, increasingly recognize **resource efficiency** and **green transition priorities**. However, **circular design, reuse of construction products, secondary raw material markets, lifecycle approaches, and digital material traceability** remain insufficiently addressed within existing policies and implementation mechanisms.

The **governance and regulatory framework** remains highly fragmented due to the constitutional structure of BiH and divided competences between the **Federation of BiH (FBiH), Republika Srpska (RS), and Brčko District (BD BiH)**. While FBiH and RS have achieved partial alignment with **EU directives** on energy efficiency and construction products, major gaps remain regarding circular construction. BiH still lacks mandatory **reuse and recycling targets for construction and demolition waste (CDW)**, mandatory **green public procurement (GPP)** criteria for construction materials, financial mechanisms supporting CDW recovery, and a unified framework for **BIM** and digital construction. Currently, FBiH is the only entity with a dedicated **Regulation on Construction Waste Management (93/19)**, while RS and BD BiH still do not have specific regulations addressing circular construction waste management practices.

The **building stock** itself illustrates the scale of the challenge. More than **98% of residential buildings** in BiH were constructed before energy efficiency regulations were introduced, resulting in average energy consumption levels estimated to be **more than five times higher** than comparable EU residential buildings under similar climatic conditions. Consequently, the residential sector is recognized as the area with the **highest potential for cost-effective energy savings and sustainable renovation interventions**.

At the enterprise level, **transition readiness** remains uneven. More than half of surveyed companies (**56%**) have not yet developed **sustainability-related strategies** such as **ESG, CSR**, or circular economy transition plans. Circular economy knowledge remains primarily focused on **production optimization** and **waste management** rather than systemic approaches such as **circular procurement, lifecycle thinking, industrial symbiosis, circular business models, and material flow management**. Additionally,

72% of surveyed enterprises have never participated in circular economy-related training programmes.

Digitalization within the construction sector is progressing gradually but remains uneven and largely market-driven. Approximately **36% of surveyed enterprises** already use digital technologies for production optimization and resource management, while another **28%** plan to introduce such technologies in the near future. However, enterprises consistently identify **insufficient technical capacities, limited digital skills, and lack of financial resources** as major barriers to digital transformation. **BIM adoption** remains limited and is primarily concentrated among larger and export-oriented companies, while BiH currently lacks a **national BIM mandate**, harmonized implementation standards, and public procurement requirements related to digital construction.

Construction and demolition waste management represents one of the most critical structural weaknesses within the circular construction ecosystem in BiH. Construction waste generation increased significantly from approximately **117,396 tons in 2018** to **177,981 tons in 2020**. The waste stream is dominated by **concrete, lime, bricks, asphalt, and excavation materials**.

Despite this growing waste stream, BiH still lacks dedicated landfills and integrated systems for CDW management. Most construction waste continues to be disposed of at **municipal landfills** or **illegal dumpsites**, while separate collection, sorting, and treatment systems remain underdeveloped. Regional landfills in **Zenica** and **Banja Luka** currently offer limited disposal services for construction waste, typically charging between **10 and 20 BAM per ton** for concrete, bricks, tiles, and ceramics.

At the same time, several pioneering local initiatives demonstrate emerging circular construction practices and provide important examples for future scaling. The company **BOSMAN** in Sarajevo established the first construction waste recycling facility in the country, recycling bricks, concrete slabs, asphalt, and stone in order to reduce illegal dumping and promote material recovery. Similarly, **BH4** in Jajce introduced recycling of old asphalt from road rehabilitation projects, reusing recycled asphalt both in its own construction activities and through commercial sale of crushed asphalt products. Companies such as **Radiša** in Bijeljina are also active in asphalt recycling.

BiH also possesses strong but largely underutilized potential for **bio-based and low-carbon construction materials**. The country annually generates approximately **2,500 tons of wool** and around **200,000 tons of straw**, much of which currently remains unused or disposed of as waste. Several pioneering initiatives have attempted to valorize these resources within sustainable construction systems. **Wool-Line** produces sheep wool-based insulation panels and has developed supply chains involving local sheep

farmers and informal collectors, while projects such as the “**Bio-based Student Pavilion**” in Sarajevo demonstrated the use of straw, wool, wood, and clay in low-energy construction.

The **timber construction sector** also represents an important opportunity for circular and low-carbon construction due to abundant domestic forest resources and established wood-processing capacities. Companies such as **Krivaja Homes**, **Promo**, **Dom Invest**, and others already produce low-energy and passive prefabricated wooden houses, mainly targeting export markets. **Krivaja Homes** designs passive and low-energy prefabricated buildings with annual heating demand ranging between **15 and 50 kWh/m²** using highly insulated timber-based construction systems.

Sustainable building certification and **green construction practices** are gradually emerging as well. BiH currently has only one **BREEAM-certified building** — **Bingo City Centre Sarajevo** — which achieved a “**Very Good**” certification rating and demonstrated reductions of approximately **200 tCO₂e** and **1,400 m³ of water consumption** through energy efficiency measures, renewable energy integration, smart metering, and monitoring systems. In parallel, the **Green Building Council of BiH** has been promoting sustainable construction practices through awareness-raising activities, training programmes, and international cooperation projects.

Increasing pressure from **EU markets** is becoming an important driver for transition. Approximately **56% of surveyed enterprises** already face customer requirements related to **green standards, renewable energy use, and energy efficiency improvements**. However, only a limited number of enterprises currently possess capacities for **carbon footprint calculations** and **environmental reporting**, despite growing requirements linked to **CSRD, CBAM, ESG reporting obligations**, and **environmental product standards** for construction materials and supply chains.

Despite the existing structural and regulatory gaps, BiH possesses significant long-term potential for accelerating the transition towards **circular and digital construction**. The country benefits from **strong engineering faculties**, emerging **industry-academia cooperation**, increasing participation in **EU-funded programmes**, and growing awareness among businesses regarding the strategic importance of **sustainability, digitalization, and resource efficiency**. Existing pilot initiatives in **CDW recycling, bio-based construction materials, low-energy buildings, and sustainable manufacturing** demonstrate that local knowledge and innovation capacity already exist, but require stronger **institutional coordination, financial support mechanisms, digitalization frameworks, and market incentives** in order to scale up at national level.

2. Vision and Mission (Territorial Adaptation)

Vision (National)

By 2030, Bosnia and Herzegovina will have progressed towards a coordinated and functioning ecosystem for circular and digital construction, where circular economy principles and digital technologies are increasingly embedded in construction planning, design, execution, and waste management practices. Through strengthened institutional cooperation, capacity development, and pilot implementation, the construction sector will gradually enhance resource efficiency, material traceability, and environmental performance, aligning more closely with EU standards and best practices in the Danube Region.

Digital tools, particularly Building Information Modeling (BIM) and emerging material tracking approaches, will progressively support the generation and use of structured construction data as a foundation for improved decision-making and future circular economy applications, including material recovery and reuse systems.

Mission (National)

To facilitate cooperation, knowledge exchange, and gradual uptake of digital and circular construction solutions among stakeholders in BiH, including public institutions, private sector actors, academia, and development organizations, in order to support the structured transformation of the construction sector towards circular economy principles.

This mission is implemented through (i) strengthening regulatory and institutional coordination across governance levels, (ii) supporting the adoption of digital technologies such as BIM and pilot material tracking systems to enable data-driven construction practices, (iii) developing skills and institutional capacities for circular and digital construction, and (iv) fostering collaboration and pilot initiatives across sectors and entities.

The approach is incremental and implementation-oriented, focusing on practical steps, pilot projects, and capacity building as the basis for longer-term systemic transformation within BiH's construction sector.

3. Alignment with EU Strategy for the Danube Region (EUSDR)

This TAP contributes directly to the objectives of the EU Strategy for the Danube Region (EUSDR) by supporting the twin transition of the construction sector towards circular

economy principles and digital transformation. The planned actions reinforce cooperation, innovation, environmental protection, and institutional strengthening across BiH and the wider Danube Region.

Table 1: Alignment of the BiH TAP with EUSDR Priority Areas

EUSDR Pillar	Contribution of the BiH TAP	Key TAP Focus Areas / Actions
Connecting the Region (Infrastructure & Digitalization)	Supports the gradual introduction of digital tools and interoperable systems in the construction sector, improving data availability, planning quality, and cross-border compatibility of construction-related information.	• Introduction of BIM and digital construction tools • Pilot digital platforms for material tracking and CDW management • Development of digital material inventories and traceability systems • Participation in Danube Region digital innovation initiatives
Protecting the Environment (Resource Efficiency & Waste Reduction)	Promotes improved management of construction and demolition waste and increased use of secondary and sustainable materials, contributing to reduced environmental pressure and improved resource efficiency.	• Development of CDW management systems and recycling practices • Promotion of secondary and bio-based construction materials • Pilot projects for material reuse and recovery • Integration of lifecycle thinking and circular procurement approaches
Building Prosperity (Innovation & SME Growth)	Strengthens innovation capacity and competitiveness of SMEs through support for digital transformation, circular business models, and access to new markets linked to green construction.	• SME support programmes for BIM and digital tools • Development of circular business models in construction • Pilot innovation projects and digital solutions • Skills development and training programmes for workforce upskilling
Strengthening the Region (Institutional Capacity & Collaboration)	Enhances institutional coordination and multi-stakeholder cooperation across governance levels and sectors, supporting more coherent policy implementation and regional knowledge exchange.	• Establishment of multi-level working groups and networks • Strengthening cooperation between entities, ministries, and stakeholders • Participation in Danube Region platforms and projects • Knowledge-sharing, Living Labs, and research-industry collaboration

4. Strategic Pillars, Objectives, and Key Actions (with National KPIs)

Pillar 1: Enabling Policy & Regulatory Frameworks

Objective 1.1: Harmonize circular construction standards and regulations related to digitalization.

National Actions:

1. Review existing legislation, strategies and technical regulations related to construction, construction products, CDW management, waste reporting, spatial planning, public procurement and digitalization in order to identify regulatory gaps and barriers related to circular construction and digital technologies.
2. Establish a multi-level working group involving relevant ministries and institutions from BiH, FBiH, RS and BD BiH, as well as chambers of commerce, engineering associations, universities, standardization bodies and industry representatives, to support harmonisation of circular and digital construction policies with EU and Danube Region priorities.
3. Develop recommendations and practical guidance for improving CDW management systems, including separate collection, sorting, recycling and reuse of construction materials, as well as clearer obligations for contractors and investors.
4. Develop national and entity-level guidelines for integrating digital tools such as BIM, digital material documentation and material traceability systems into construction planning, permitting and project implementation processes.
5. Prepare model green public procurement recommendations for construction projects, including voluntary criteria related to CDW management plans, recycled materials, lifecycle approaches and digital construction documentation.
6. Support gradual harmonisation of technical standards and quality requirements for recycled and secondary construction materials, particularly recycled aggregates, asphalt and concrete materials.
7. Participate actively in transnational initiatives and knowledge-sharing activities related to BIM, digital construction, circular procurement, CDW traceability and material passports within the Circular DigiBuild and Danube Region frameworks.

Responsible Bodies:

Ministry of Foreign Trade and Economic Relations of BiH; Public Procurement Agency of BiH; relevant entity ministries responsible for environment, construction, spatial planning, economy and energy; Institute for Standardization of BiH; chambers of

commerce; engineering chambers; technical faculties and research institutions; Green Building Council of BiH.

Timeline:

2026–2030

National KPIs & Targets:

KPI 1.1.1 (National): Number of national circular construction standards related to digitalization adopted or updated by 2030.

Target: At least 4 standards, guidelines or regulatory documents adopted, updated or formally endorsed by 2030.

KPI 1.1.2 (National): Percentage reduction in regulatory barriers for secondary material use in construction by 2030.

Target: At least 20% reduction in identified regulatory and technical barriers by 2030 through improved technical guidance, acceptance criteria, pilot procurement practices and secondary material recommendations.

Objective 1.2: Develop and implement financial incentives for circular construction practices.

National Actions:

1. Analyse existing financial instruments, environmental funds, donor programmes and SME support schemes relevant to circular and digital construction in BiH.
2. Develop recommendations for introducing targeted financial support mechanisms for circular construction, digitalization, BIM adoption, CDW recycling infrastructure and secondary material use, particularly for SMEs.
3. Introduce pilot grant schemes and technical support programmes for companies implementing circular construction solutions, digital monitoring systems, material recovery practices, low-carbon materials and green building certification.
4. Support investments in CDW sorting, recycling and material recovery infrastructure, building on existing initiatives such as BOSMAN in Sarajevo, BH4 in Jajce and asphalt recycling activities in Bijeljina.
5. Encourage integration of circularity and digitalization criteria into publicly funded construction and renovation projects supported through donor programmes, IFIs and environmental funds.
6. Promote cooperation with EBRD, EIB, WBIF, UNDP, GIZ and other international partners to support financing mechanisms for circular and digital construction initiatives.

Responsible Bodies:

Relevant ministries at BiH and entity level; environmental funds in FBiH and RS; development agencies; chambers of commerce; donor organizations and IFIs.

Timeline:

2026–2030

National KPIs & Targets:

KPI 1.2.1 (National): Amount of public and private investment in national circular construction projects by 2030.

Target: At least EUR 5 million mobilised through public, donor, IFI and private-sector investments by 2030.

KPI 1.2.2 (National): Number of SMEs utilizing national financial incentives for circular construction by 2030.

Target: At least 50 SMEs supported through grant schemes, technical assistance or financial support programmes by 2030.

Pillar 2: Fostering Digital Innovation & Technology Adoption

Objective 2.1: Promote the adoption of Building Information Modeling (BIM) and other digital technologies.

National Actions:

1. Launch national awareness campaigns, workshops and demonstration events targeting construction companies, public authorities, engineering chambers, municipalities, universities and vocational institutions to increase understanding of BIM, digital construction tools and their role in circular construction and resource efficiency.
2. Develop a national roadmap for gradual BIM implementation in public construction and infrastructure projects, taking into account the governance structure and market readiness of BiH. The roadmap should initially focus on voluntary implementation, pilot projects and capacity building rather than mandatory adoption.
3. Support pilot and demonstration projects showcasing practical applications of BIM, AI, digital twins, IoT systems, drones, GIS tools, laser scanning and digital resource monitoring within construction, renovation and CDW management projects.
4. Promote the integration of digital technologies into energy renovation projects, low-energy buildings, prefabricated construction systems and circular construction initiatives supported through public, donor and IFI-funded investments.
5. Provide technical assistance, mentoring and consulting services for SMEs adopting BIM and digital construction tools, including support related to software selection, digital workflows, resource monitoring, carbon footprint calculation and lifecycle data management.
6. Encourage technical universities and research institutions to participate in applied research and pilot activities related to digital construction technologies, digital material inventories and smart resource management systems.
7. Facilitate cooperation with Digital Innovation Hubs (DIHs), startup ecosystems and innovation centres to support construction-sector digitalization and development of locally adapted digital solutions.

8. Promote participation of BiH institutions, companies and universities in EU and Danube Region initiatives related to BIM, smart construction, digital twins, AI applications and digitalization of construction supply chains.

Responsible Bodies:

Ministry of Foreign Trade and Economic Relations of BiH; relevant entity ministries responsible for construction, digitalization, economy and education; engineering chambers; technical faculties and universities; Digital Innovation Hubs; chambers of commerce; development agencies; Green Building Council of BiH; innovation and startup support organizations.

Timeline:

2026–2030

National KPIs & Targets:

KPI 2.1.1 (National): Percentage of national construction projects utilizing BIM by 2030.

Target: At least 10% of publicly supported or pilot construction projects utilizing BIM or equivalent digital construction tools by 2030.

KPI 2.1.2 (National): Number of professionals trained in BIM and other digital construction tools by 2030.

Target: At least 300 professionals trained through workshops, university programmes, certification schemes, technical assistance programmes and continuous professional development activities by 2030.

KPI 2.1.3 (National): Number of pilot projects demonstrating innovative digital applications in circular construction launched by 2030.

Target: At least 3 pilot and demonstration projects launched by 2030 involving BIM, digital twins, IoT, digital resource monitoring, material traceability or AI-supported circular construction solutions.

Objective 2.2: Support the development and deployment of digital platforms for material tracking and waste management.

National Actions:

1. Support the development or adaptation of digital platforms and marketplaces for tracking, exchange and reuse of secondary construction materials and CDW streams, with a focus on practical applicability for municipalities, recyclers, contractors and SMEs.
2. Develop pilot digital systems for tracking CDW quantities, material flows and reuse opportunities in selected demolition, renovation and infrastructure projects.
3. Promote gradual introduction of digital material inventories, material passports and traceability systems aligned with EU and Danube Region developments, while adapting implementation to the current capacities and market maturity of BiH.

4. Develop recommendations for harmonized digital data collection and reporting related to CDW generation, recycling, reuse and secondary material use across FBiH, RS and BD BiH.
5. Support SMEs, recycling companies and waste management operators in adopting digital tracking systems, resource monitoring tools and digital documentation processes through technical assistance and pilot funding mechanisms.
6. Facilitate cooperation between public utilities, waste management operators, recycling companies and construction-sector stakeholders in testing digital approaches for CDW monitoring and secondary material management.
7. Encourage pilot integration of BIM-generated material data with CDW management systems, particularly in publicly supported renovation and demolition projects.
8. Promote regional cooperation and participation in Danube Region and EU initiatives related to digital material traceability, digital product passports and circular construction platforms.

Responsible Bodies:

Relevant ministries responsible for environment, waste management, digitalization and construction at BiH and entity level; environmental funds; municipalities; waste management companies; recycling operators; private companies; Digital Innovation Hubs; technical faculties; development agencies; chambers of commerce.

Timeline:

2026–2030

National KPIs & Targets:

KPI 2.2.1 (National): Number of national digital platforms implemented for circular construction by 2030.

Target: At least 1 pilot digital platform or system implemented by 2030 for CDW tracking, secondary material exchange or digital material documentation.

KPI 2.2.2 (National): Increase in the volume of construction materials tracked digitally in Bosnia and Herzegovina by 2030.

Target: Establish baseline by 2026 and achieve at least 10% increase in digitally tracked construction and demolition material flows by 2030 within pilot projects and participating entities.

Pillar 3: Building Skills & Capacity

Objective 3.1: Develop education and training programs for digital skills within circular construction.

National Actions:

1. Support the gradual integration of circular economy principles, BIM, digital construction tools and sustainable material management into university curricula in architecture, civil engineering, mechanical engineering, construction management and related disciplines.

2. Encourage technical faculties and vocational schools to introduce practical modules related to BIM, digital modelling, lifecycle thinking, material traceability, CDW management, circular design and sustainable construction technologies.
3. Develop continuous professional development (CPD) programmes, short courses and certification schemes for engineers, architects, urban planners, public procurement officers, inspectors, construction companies and CDW operators related to digital and circular construction practices.
4. Establish partnerships between universities, vocational institutions, engineering chambers and industry to provide internships, mentoring, practical training opportunities and pilot-based learning related to BIM, circular construction and digital technologies.
5. Support development of interdisciplinary educational programmes combining engineering, environmental management, digital technologies and circular economy principles.
6. Develop online learning resources and open-access educational materials related to BIM, digital construction, CDW management, circular business models and sustainable materials adapted to the context of BiH.
7. Promote participation of students, researchers and professionals from BiH in Danube Region, Horizon Europe, Erasmus+, Digital Europe and other international education and mobility programmes relevant to digital and circular construction.
8. Support training activities for public-sector institutions and municipalities responsible for permitting, spatial planning, public procurement, waste management and infrastructure development in order to strengthen institutional capacities for implementation of circular and digital construction measures.

Responsible Bodies:

Ministry of Civil Affairs of BiH; relevant entity ministries responsible for education, science and construction; universities and technical faculties; vocational schools; engineering chambers; chambers of commerce; Green Building Council of BiH; development agencies; Digital Innovation Hubs; research institutions.

Timeline:

2026–2027: Assessment of training needs, curriculum review and development of pilot educational modules and training materials.

2027–2028: Launch of pilot university modules, vocational programmes, certification schemes and professional training activities.

2028–2030: Expansion and continuous implementation of training, certification, online learning and professional development activities.

National KPIs & Targets:

KPI 3.1.1 (National): Number of students and professionals participating in digital technologies for circular construction training programs by 2030.

Target: At least 400 students and professionals participating in training programmes, workshops, certification schemes, university courses and professional development activities by 2030.

KPI 3.1.2 (National): Number of national universities and vocational schools incorporating digital technologies for circular construction into their curricula by 2030.

Target: At least 4 universities and vocational institutions incorporating BIM, circular construction or digital construction modules into curricula or training programmes by 2030.

Objective 3.2: Promote knowledge transfer and best practice sharing among stakeholders.

National Actions:

1. Organize regular national and regional workshops, conferences, seminars and networking events focused on circular construction, BIM, CDW management, digital technologies and sustainable materials, involving public authorities, academia, industry and civil society organizations.
2. Establish an online knowledge hub or repository containing guidelines, pilot examples, technical documents, case studies, training materials and examples of good practices related to circular and digital construction in BiH and the Danube Region.
3. Facilitate peer-to-peer learning, mentoring and knowledge exchange programmes between companies, municipalities, universities and professional associations in order to support practical implementation of circular and digital construction solutions.
4. Promote visibility and dissemination of existing local examples and pilot initiatives, including CDW recycling initiatives, sustainable building projects, bio-based materials, low-energy construction and digital construction applications already emerging in BiH.
5. Encourage participation of stakeholders from BiH in transnational projects, study visits, conferences, Danube Region cooperation initiatives and EU-funded knowledge-sharing activities related to circular and digital construction.
6. Strengthen cooperation between academia and industry through joint research activities, pilot projects, demonstration activities and dissemination of applied research results relevant for the construction sector.
7. Support establishment of informal professional networks and communities of practice focused on BIM, sustainable construction, circular materials and digital innovation in the built environment sector.

Responsible Bodies:

Universities and technical faculties; engineering chambers; chambers of commerce; Green Building Council of BiH; development agencies; municipalities; research institutions; professional associations; Digital Innovation Hubs.

Timeline:

2026–2027: Establishment of cooperation frameworks, networking activities and preparation of the national knowledge-sharing platform.

2027–2028: Launch of the online knowledge hub, peer-learning activities and dissemination of pilot examples and case studies.

2028–2030: Continuous implementation of workshops, conferences, mentoring programmes, transnational exchanges and dissemination activities.

National KPIs & Targets:

KPI 3.2.1 (National): Number of national knowledge-sharing events (workshops, conferences) organized annually.

Target: At least 4 national or regional workshops, conferences or knowledge-sharing events organized annually by 2030.

KPI 3.2.2 (National): Increase in the number of national cluster members or companies participating in cross-border circular construction projects by 2030.

Target: At least 5% increase in participation of companies, universities and organizations from BiH in cross-border and transnational circular construction initiatives and projects by 2030.

Pillar 4: Strengthening Collaboration & Supply Chains

Objective 4.1: Facilitate the development of digital regional supply chains for recycled and secondary construction materials.

National Actions:

1. Establish a national coordination point or focal mechanism within the “Danube Circular Construction Supply Network” in order to improve cooperation between companies, public institutions, recyclers, designers, universities and regional stakeholders involved in circular construction value chains.
2. Conduct mapping of national producers, recyclers, CDW operators, suppliers of sustainable construction materials, digital solution providers and designers in order to identify opportunities for collaboration, industrial symbiosis and regional circular supply chain integration.
3. Support development of pilot cooperation models between construction companies, recyclers and municipalities for reuse and recovery of concrete, asphalt, aggregates, wood, metals and other secondary construction materials.
4. Promote gradual introduction of digital material traceability systems, material inventories and material passports for construction products and CDW streams in line with EU and Danube Region developments.
5. Support SMEs in adopting digital tools for supply chain management, material tracking, digital inventories and resource optimization through technical assistance, mentoring and pilot activities.
6. Engage Digital Innovation Hubs (DIHs), business support organizations and chambers of commerce in supporting construction-sector digitalization and collaboration between circular economy and digital technology actors.
7. Facilitate exchange of knowledge and business cooperation between companies already implementing circular construction practices in BiH,

including CDW recyclers, timber construction companies, producers of bio-based materials and sustainable construction innovators.

8. Encourage inclusion of secondary materials and recycled products within public and donor-funded construction and renovation projects where technically and economically feasible.

Responsible Bodies:

Ministry of Foreign Trade and Economic Relations of BiH; relevant entity ministries responsible for economy, construction, environment and industry; chambers of commerce; Digital Innovation Hubs; development agencies; municipalities; recycling companies; construction clusters; technical faculties and research institutions.

Timeline:

2026–2027: Mapping of stakeholders, establishment of coordination mechanisms and identification of pilot collaboration opportunities.

2027–2028: Launch of pilot supply chain cooperation initiatives, SME support activities and digital material traceability pilots.

2028–2030: Expansion of regional cooperation, digital supply chain integration and scaling of secondary material exchange initiatives.

National KPIs & Targets:

KPI 4.1.1 (National): Increase in the volume of recycled and secondary materials used in national construction projects by 2030.

Target: Establish baseline by 2026 and achieve at least 15% increase in the use of recycled and secondary construction materials within pilot and participating projects by 2030.

KPI 4.1.2 (National): Number of national businesses involved in regional/national circular supply chains by 2030.

Target: At least 30 businesses, recyclers, material producers, construction companies and digital solution providers involved in circular supply chain cooperation initiatives by 2030.

Objective 4.2: Promote collaboration between research institutions, industry, and governments.

National Actions:

1. Establish a national “Network for Digital and Circular Construction Innovation” connecting universities, technical faculties, research institutions, public authorities, SMEs, construction companies, Digital Innovation Hubs and development organizations.
2. Promote collaborative research and applied innovation projects related to BIM, CDW recycling, sustainable materials, digital construction technologies, AI-supported resource management, digital twins and lifecycle approaches.
3. Encourage development of Living Labs and demonstration sites for testing and showcasing circular and digital construction solutions, including low-energy buildings, sustainable materials, CDW recycling systems and digital construction tools.

4. Support participation of stakeholders from BiH in Horizon Europe, Interreg, Digital Europe, Erasmus+ and other EU-funded programmes related to circular construction, digitalization and sustainable built environments.
5. Foster public-private partnerships (PPPs) for implementation of pilot circular construction initiatives, particularly in public buildings, energy renovation projects, municipal infrastructure and CDW management systems.
6. Promote cooperation between municipalities, universities and private-sector actors in pilot renovation and demonstration projects integrating circularity and digitalization principles.
7. Support dissemination of applied research results, pilot experiences and technological innovations relevant for construction-sector decarbonization and circularity.
8. Encourage stronger involvement of startups, innovation centres and SMEs in collaborative testing and demonstration activities related to digital and circular construction solutions.

Responsible Bodies:

Universities and technical faculties; research institutions; relevant ministries at BiH and entity level; municipalities; chambers of commerce; development agencies; Digital Innovation Hubs; Green Building Council of BiH; private-sector associations; innovation and startup support organizations.

Timeline:

2026–2027: Establishment of collaboration networks, identification of Living Lab opportunities and preparation of pilot cooperation activities.

2027–2028: Launch of pilot R&D collaborations, Living Labs and demonstration projects.

2028–2030: Expansion of collaborative projects, public-private partnerships and participation in EU and regional innovation initiatives.

National KPIs & Targets:

KPI 4.2.1 (National): Number of collaborative research and development projects focused on digital technology for circular construction by 2030.

Target: At least 5 collaborative research, pilot or innovation projects implemented by 2030 involving universities, companies and public institutions.

KPI 4.2.2 (National): Number of national public-private partnerships established for the digitalization of circular construction initiatives by 2030.

Target: At least 3 public-private partnerships or formal cooperation initiatives established by 2030 related to circular and digital construction solutions.

Pillar 5: Raising Awareness & Changing Mindsets

Objective 5.1: Implement awareness campaigns to promote the benefits of digitalization within circular construction.

National Actions:

1. Design and implement targeted communication and awareness campaigns focused on the benefits of circular and digital construction for companies, municipalities, public authorities, investors, universities and the wider public.
2. Disseminate information through multiple communication channels, including social media, professional conferences, chambers of commerce, industry events, educational institutions, online platforms and national media.
3. Promote practical examples and success stories from BiH related to CDW recycling, sustainable construction materials, BIM implementation, low-energy buildings, bio-based materials and digital construction solutions.
4. Develop communication materials explaining the economic, environmental and competitiveness benefits of circular and digital construction practices, including reduced material consumption, lower waste generation, improved resource efficiency and alignment with EU market requirements.
5. Organize awareness events and thematic campaigns focused on circular construction, sustainable materials, BIM, digital traceability and construction-sector decarbonization.
6. Support visibility and dissemination of pilot and demonstration projects implemented within Circular DigiBuild and other related initiatives in BiH.
7. Encourage involvement of municipalities, public institutions, professional associations and civil society organizations in awareness-raising activities related to circular and digital construction.
8. Promote awareness of emerging EU requirements related to ESG reporting, carbon footprint calculation, sustainable construction standards and digital product information relevant for construction-sector competitiveness.

Responsible Bodies:

Relevant ministries at BiH and entity level; chambers of commerce; municipalities; universities and technical faculties; Green Building Council of BiH; development agencies; media organizations; engineering chambers; civil society organizations.

Timeline:

2026–2027: Preparation of communication materials, stakeholder engagement activities and launch of initial awareness campaigns.

2027–2028: Organization of national campaigns, workshops, media activities and dissemination of pilot project examples.

2028–2030: Continuous awareness-raising, public engagement and promotion of circular and digital construction success stories.

National KPIs & Targets:

KPI 5.1.1 (National): Reach of national awareness campaigns (number of people informed through various channels) by 2030.

Target: At least 10,000 people reached through campaigns, workshops, online platforms, media activities and awareness events by 2030.

KPI 5.1.2 (National): Increase in public/stakeholder support for digitalization in circular construction policies by 2030.

Target: At least 15% increase in stakeholder awareness and support measured through surveys, participation rates or engagement indicators by 2030.

Objective 5.2: Encourage the adoption of digital technologies focusing on circular economy principles used in construction business models.

National Actions:

1. Develop support programmes for construction companies and SMEs focused on integration of digital technologies into circular business models, including mentoring, coaching, toolkits and technical assistance activities.
2. Organize workshops, masterclasses and practical training sessions on circular business model innovation enabled by BIM, digital monitoring systems, material traceability tools, digital inventories and lifecycle approaches.
3. Promote local examples of companies already implementing circular and digital construction practices, including CDW recycling initiatives, low-energy prefabricated construction, resource-efficient manufacturing and bio-based construction materials.
4. Support companies in understanding and responding to EU market requirements related to ESG reporting, carbon footprint calculations, digital traceability and sustainable construction standards.
5. Encourage development of innovative digital business solutions such as digital marketplaces for secondary materials, resource monitoring systems, digital material inventories and circular supply-chain platforms.
6. Facilitate cooperation between SMEs, Digital Innovation Hubs, universities and business support organizations in testing and scaling digital circular construction solutions.
7. Promote pilot projects demonstrating practical business applications of BIM, digital material tracking, IoT systems and AI-supported resource management in construction-sector operations.
8. Support dissemination of practical implementation guidelines and case studies tailored to SMEs and local market conditions in BiH.

Responsible Bodies:

Relevant ministries responsible for economy, SMEs, digitalization and construction; chambers of commerce; Digital Innovation Hubs; development agencies; engineering chambers; universities and technical faculties; innovation and startup support organizations.

Timeline:

2026–2027: Development of support programmes, mentoring frameworks and practical guidance materials for companies.

2027–2028: Launch of workshops, masterclasses, coaching activities and pilot company support programmes.

2028–2030: Scaling of business support activities, dissemination of successful examples and wider adoption of digital circular business practices.

National KPIs & Targets:

KPI 5.2.1 (National): Number of national construction companies adopting digital technologies in their circular business models by 2030.

Target: At least 25 construction companies and related SMEs adopting digital technologies supporting circular construction practices by 2030.

KPI 5.2.2 (National): Increase in national investment in digitalized circular construction methods by 2030.

Target: Establish baseline by 2026 and achieve at least 15% increase in investments related to digitalized circular construction methods, pilot projects and circular business innovation by 2030.

5. National Context and Challenges

SWOT Analysis

The SWOT analysis is based on the findings of four studies conducted within the Circular DigiBuild project (2024–2025), as well as on available data and assessments related to the construction sector in BiH. It provides an analytical overview of the current national context for circular and digital construction, serving as a basis for identifying key internal capacities, structural constraints, and external development opportunities.

◆ Strengths

1. Economically significant construction sector with a strong SME base

The construction sector is one of the key sectors of the BiH economy, accounting for more than 55–60% of total investments and employing over 48,000 people. The sector is dominated by small and medium-sized enterprises (97%), providing considerable potential for flexible transition towards circular and digital business models.

2. Gradual strengthening of the strategic and policy framework for green transition

Although still fragmented, the strategic framework in BiH increasingly recognizes circular economy principles, energy efficiency, and sustainable construction through documents such as the Circular Economy Roadmap for BiH (draft), NECP, ESAP, and SME and industrial development strategies.

3. Increasing awareness among companies regarding market and regulatory pressures

Companies recognize rising energy and raw material prices, new EU market requirements, and the growing importance of green standards, digital and energy-efficient operations as major trends shaping their competitiveness in the coming years.

4. Emerging digital transformation within the industry

A portion of enterprises already uses digital technologies for production optimization and resource management, while additional companies plan to implement such technologies. This provides an important foundation for future integration of BIM, digital material tracking systems, and other digital circular construction tools.

5. Presence of technical universities and research institutions with expertise in sustainable construction and energy efficiency

Universities and technical faculties in BiH possess substantial expertise in energy efficiency, sustainable construction, and environmental assessment methodologies, creating a solid basis for the development of educational programs, pilot projects, and research activities related to circular and digital construction.

6. Growing interest in international standards and green certifications

Companies exporting to EU markets are increasingly implementing ISO 14001, ETA, and CE standards, while emerging EU regulations such as CBAM, ESG, and CSRD are encouraging companies to strengthen their capacities for environmental performance monitoring and carbon footprint reporting.

7. Experience in implementing EU and internationally funded projects

Institutions, development agencies, universities, and civil society organizations in BiH have significant experience in implementing Interreg, IPA, Horizon Europe, UNDP, GIZ, and other international projects related to green transition, energy efficiency, and innovation.

◆ Weaknesses

1. Lack of a systemic approach to circular economy in the construction sector

The construction sector in BiH remains predominantly based on a linear “take–make–dispose” model, with limited implementation of material reuse, resource valorization, and circular design principles.

2. Fragmented institutional and regulatory framework

Divided competencies between different administrative levels, uneven regulations across FBiH, RS, and BD BiH, and the absence of harmonized standards represent major barriers to the development of an integrated circular and digital construction market.

3. Low level of BIM implementation and absence of a national digital framework

BiH currently lacks a BIM strategic framework, standardized digital protocols, and systematic integration of digital tools into public construction projects and procurement procedures.

4. Underdeveloped infrastructure for construction and demolition waste management

Most construction and demolition waste is still landfilled, while capacities for sorting, recycling, and material recovery remain limited. Markets for secondary construction

materials are poorly developed and insufficiently connected with the construction sector.

5. Limited digital and circular capacities within SMEs

A large number of companies lack the knowledge, technical capacities, and human resources necessary for implementing digital technologies, circular business models, life-cycle approaches, data management systems, and material flow monitoring.

6. Weak cooperation between academia, industry, and public institutions

Although individual initiatives exist, collaboration between research institutions, businesses, and policymakers is still not sufficiently systematic or oriented towards building a circular and digital construction innovation ecosystem.

7. Limited financial instruments supporting circular and digital transition

Companies mainly finance circular transition activities using their own resources, while dedicated national support schemes for circular construction, BIM adoption, digitalization, and construction waste valorisation remain largely absent. There is no innovation fund alike in other neighbouring countries.

8. Limited use of green public procurement and circularity criteria

There are currently no mandatory requirements in public procurement related to recycled materials, digital construction tools, or environmental performance criteria in public construction projects.

◆ Opportunities

1. Alignment with EU legislation and the Green Agenda for the Western Balkans

The EU integration process creates opportunities for regulatory harmonization, market transformation, and adoption of standards related to circular economy, digital construction, ESG requirements, and decarbonization of the built environment.

2. Growing EU demand for sustainable and low-carbon construction products

Emerging EU regulations such as CBAM, ESR, revised CPR, Level(s), and ESG reporting requirements may become strong drivers for modernization and digitalization of the domestic construction materials industry.

3. Availability of international funding for green and digital transition

Programs such as Interreg Danube, Horizon Europe, Digital Europe, IPA III, WBIF, and the Green Agenda provide significant opportunities for financing pilot projects, digital platforms, living labs, and capacity-building activities.

4. Development of digital platforms and marketplaces for secondary construction materials

Digitalization can enable the development of platforms for material exchange, material flow tracking, digital material passports, and stronger integration of stakeholders across circular construction value chains.

5. Significant potential for energy-efficient and circular renovation of the existing building stock

The ageing building stock and substantial energy-saving potential create strong opportunities for integrating circular construction principles, sustainable materials, and digital tools into renovation activities.

6. Development of new green jobs and professional profiles

The transition towards digital and circular construction may generate demand for BIM specialists, experts in environmental assessment, material flow management, digital platforms, and circular design.

7. Strengthening regional cooperation within the Danube Region

Participation in Danube Region initiatives enables access to knowledge exchange, best practices, innovation networks, and transnational partnerships relevant for advancing circular construction in BiH.

◆ Threats

1. Risk of increasing technological and regulatory gap with EU markets

If BiH fails to accelerate the digital and circular transition of its construction sector, domestic companies may lose competitiveness due to increasingly stringent EU environmental and digital requirements.

2. Brain drain and shortage of qualified workforce

The continuous outflow of skilled professionals, particularly engineers and digital experts, represents a serious challenge for innovation and digital transformation in the construction sector.

3. Rising energy and raw material prices

The construction sector in BiH is highly vulnerable to fluctuations in energy and material prices, which may further limit companies' investment capacities for green and digital transition.

4. Weak political coordination and slow reform processes

The complex governance structure of BiH may slow down regulatory harmonization, strategic decision-making, and implementation of systemic reforms necessary for developing circular and digital construction ecosystems.

5. Low investment readiness of SMEs

Many SMEs lack the capacities to prepare investment projects, access financing, or implement advanced digital and circular solutions without external technical and financial support.

6. Risk of digital transition remaining limited to isolated pilot projects

Without systemic policies, standards, and financing mechanisms, the implementation of BIM, digital platforms, and advanced technologies may remain fragmented and short-term.

7. Underdeveloped secondary materials market and low trust in recycled construction products

The lack of quality standards, certification schemes, and market demand may significantly slow the wider adoption of recycled and secondary construction materials in BiH.

Addressing National Gaps

The TAP for BiH addresses the key gaps and barriers identified in the *Consolidated Findings from the Four Studies (2024–2025)* of the Circular DigiBuild project through targeted, structured interventions across all five strategic pillars. The TAP translates identified weaknesses into concrete policy, capacity-building, digitalization, and market development actions tailored to the institutional and economic context of BiH.

Table 2: Addressing National Gaps and Barriers in BiH

Gaps and Barriers Identified	How this TAP Addresses the Gap
Weak regulatory harmonization and enforcement of circular construction principles (fragmented legal and institutional framework across FBiH, RS, and BD BiH; lack of harmonized standards for CDW, BIM, and circular procurement)	Pillar 1 (Enabling Policy & Regulatory Frameworks) addresses this through: - Gap analysis of existing legislation and identification of regulatory barriers - Establishment of multi-level working group across BiH entities - Development of harmonized guidelines for CDW management and digital construction tools (BIM integration, material traceability) - Preparation of model green public procurement criteria for construction projects

Limited infrastructure and weak systems for construction and demolition waste (CDW) management and secondary material markets	Pillars 1, 2 and 4 address this through: • Support for development of CDW recycling, sorting and recovery systems • Pilot projects for CDW tracking and material reuse • Mapping of material flows and recycling capacities • Promotion of digital platforms for secondary construction materials exchange • Encouragement of market uptake of recycled and bio-based materials
Low level of BIM adoption and lack of integrated digital construction framework	Pillar 2 (Fostering Digital Innovation & Technology Adoption) addresses this through: • Development of national BIM roadmap adapted to BiH governance structure • Pilot BIM-based construction and renovation projects • Technical assistance for SMEs and public institutions • Promotion of digital tools such as BIM, digital twins, GIS, IoT and laser scanning • Integration of BIM outputs into CDW and material management systems
Limited digital capacity and skills gaps across SMEs and public institutions	Pillar 3 (Building Skills & Capacity) addresses this through: • Integration of BIM and circular construction topics into university and vocational curricula • Development of professional certification and CPD programmes • Training for engineers, public officials and SMEs - Cooperation between academia, industry and engineering chambers • Development of online learning resources and applied training materials
Weak cooperation between stakeholders and fragmented innovation ecosystem	Pillars 4 and 3 address this through: • Establishment of national innovation and cooperation networks • Development of Living Labs and pilot demonstration projects • Strengthening public-private-academic partnerships • Participation in Danube Region and EU cooperation platforms • Facilitation of knowledge transfer and applied research collaboration

Limited financial instruments and investment support for circular and digital construction	Pillar 1 and Pillar 4 address this through: • Analysis and development of financial support mechanisms for SMEs • Promotion of pilot funding schemes and donor/IFI cooperation (EBRD, EIB, WBIF, UNDP, GIZ) • Integration of circular criteria into public and donor-funded construction projects • Support for investment in CDW infrastructure and digital solutions
Low awareness and limited understanding of circular and digital construction benefits	Pillar 5 (Raising Awareness & Changing Mindsets) addresses this through: • National awareness campaigns and communication activities • Promotion of best practices and pilot project results • Dissemination of economic and environmental benefits of circular construction • Engagement of municipalities, industry associations and media - Targeted outreach on EU requirements (ESG, CBAM, CSRD, carbon reporting)
Limited use of digital data systems for material tracking and lifecycle management	Pillar 2 and Pillar 4 address this through: • Development of pilot digital platforms for CDW tracking and material exchange • Introduction of material inventories and traceability systems • Integration of BIM-generated data into material management systems • Standardization of data collection and reporting practices for CDW

6. Financial Strategy (National Level)

Funding Sources

National Budget (Competent Ministries and Public Institutions)

Implementation of the Territorial Action Plan (TAP) in Bosnia and Herzegovina will require coordinated financing from multiple governance levels and institutions due to the country's decentralized administrative structure. Core funding for regulatory development, institutional coordination, pilot implementation, education, awareness-raising and technical assistance activities is expected to be gradually mobilised through competent ministries and public institutions at the level of BiH, FBiH, RS and BD BiH.

Relevant institutions include ministries responsible for environment, spatial planning, construction, economy, digitalization, education, science and innovation, as well as environmental funds, development agencies and local governments. National and entity-level allocations are expected to primarily support governance functions, policy harmonisation

activities, capacity building, pilot projects, training programmes, awareness campaigns and participation in regional cooperation initiatives.

Potential national and entity-level financing sources include:

- Ministry of Foreign Trade and Economic Relations of BiH;
- Federal Ministry of Environment and Tourism;
- Federal Ministry of Spatial Planning;
- Federal Ministry of Energy, Mining and Industry;
- Federal Ministry of Development, Entrepreneurship and Crafts;
- Ministry of Spatial Planning, Construction and Ecology of Republika Srpska;
- Ministry of Economy and Entrepreneurship of Republika Srpska;
- Environmental Protection Fund of FBiH;
- Environmental Protection and Energy Efficiency Fund of RS;
- Cantonal ministries and local municipalities;
- Development agencies and innovation support institutions;
- Public infrastructure and energy renovation programmes.

Given the current early-stage status of circular and digital construction in BiH, strengthening budget allocations for circular economy implementation, CDW management systems, digital construction and innovation support remains an important long-term objective of this TAP.

EU Pre-Accession Assistance (IPA III)

As an IPA III beneficiary country, Bosnia and Herzegovina has significant opportunities to support implementation of circular and digital construction priorities through the Green Agenda for the Western Balkans, environmental approximation processes, SME competitiveness measures and digital transition programmes.

Particularly relevant IPA III areas for implementation of this TAP include:

- Green Agenda and Sustainable Connectivity;
- Environment and Climate Action;
- Competitiveness and Inclusive Growth;
- Innovation, Digitalization and Smart Specialisation;
- Energy Efficiency and Sustainable Infrastructure;
- Waste Management and Circular Economy.

IPA III funding is expected to represent one of the most important external financing mechanisms for:

- CDW management infrastructure;
- digital tracking systems and platforms;
- BIM pilot implementation;
- public-sector digitalization;
- SME support measures;
- training and skills development;
- pilot circular construction projects;
- technical assistance and institutional strengthening activities.

Particular relevance is expected for:

- Pillar 1 (Policy & Regulatory Frameworks),
- Pillar 2 (Digital Innovation & Technology Adoption),
- Pillar 3 (Skills & Capacity),
- Pillar 4 (Collaboration & Supply Chains).

Horizon Europe / Digital Europe / Innovation and Research Programmes

Bosnia and Herzegovina participates in several international research, innovation and cooperation programmes relevant to circular and digital construction. Universities, research institutions, SMEs, Digital Innovation Hubs and public institutions are expected to increasingly

use these instruments to support pilot activities, applied research, innovation partnerships and knowledge transfer.

Relevant programmes include:

- Horizon Europe;
- Digital Europe Programme;
- Interreg Danube Region Programme;
- Interreg IPA ADRION;
- Interreg VI-A IPA CBC Croatia – Bosnia and Herzegovina – Montenegro;
- Erasmus+;
- COST Actions;
- EUREKA;
- Western Balkans Investment Framework (WBIF);
- Smart Specialisation and innovation support initiatives;
- EU4Digital and Green Agenda related initiatives.

Particularly relevant Horizon Europe clusters include:

- Cluster 4: Digital, Industry and Space;
- Cluster 5: Climate, Energy and Mobility.

These programmes are expected to support:

- BIM and digital construction pilots;
- digital twins and AI applications;
- circular material innovation;
- Living Labs and demonstration sites;
- SME innovation;
- skills and education programmes;
- cross-border collaboration activities.

The TAP aims to encourage increased participation of stakeholders from BiH in EU-funded innovation and cooperation projects related to circular and digital construction throughout the 2026–2030 implementation period.

Interreg Danube Region Programme

The Circular DigiBuild project itself is financed through the Interreg Danube Region Programme and already provides an important cooperation and implementation platform for BiH stakeholders. Existing project networks create strong foundations for future participation of institutions and organizations from BiH in follow-up Danube Region and transnational cooperation calls beyond 2027.

Interreg programmes are expected to play an important role in supporting:

- pilot and demonstration projects;
- regional knowledge exchange;
- Living Labs;
- SME cooperation;
- digital platforms and traceability systems;
- education and training activities;
- supply-chain integration and innovation ecosystems.

Particular relevance is expected for:

- Pillar 2 (Digital Innovation),
- Pillar 3 (Skills & Capacity),
- Pillar 4 (Collaboration & Supply Chains).

Development Finance Institutions (DFIs), IFIs and Donor Support

International financial institutions and development partners are expected to play a key role in financing large-scale investments, pilot infrastructure and technical assistance related to circular and digital construction in BiH.

Relevant institutions and programmes include:

- EBRD;
- EIB;
- World Bank;
- WBIF;
- GIZ;
- UNDP;
- GIZ;
- SIDA;
- UNIDO;
- bilateral donor programmes and climate-finance initiatives.

These financing mechanisms are particularly relevant for:

- CDW sorting and recycling infrastructure;
- energy renovation programmes;
- low-carbon and sustainable construction projects;
- public-sector modernization;
- digital infrastructure;
- innovation and SME competitiveness support;
- technical assistance and policy development.

Public-private partnerships (PPPs) and blended-finance approaches may also be explored for pilot projects, Living Labs, digital platforms and demonstration sites.

Private Investment

Private-sector investment will be essential for long-term implementation of circular and digital construction practices in Bosnia and Herzegovina. Expected private investments include:

- direct investments by construction companies in BIM adoption and digitalization;
- investments in digital monitoring and resource management systems;
- investments in CDW recycling and secondary material processing;
- co-financing of pilot and demonstration projects;
- investments in low-carbon and sustainable construction materials;
- investments by SMEs and startups developing digital circular construction solutions;
- partnerships between construction companies, IT companies and recyclers.

Growing pressure from EU markets related to ESG reporting, carbon footprint calculations, CBAM and sustainable supply-chain requirements is expected to further stimulate private-sector investments in digital and circular transformation.

European Innovation, New European Bauhaus (NEB) and Mission-Oriented Initiatives

Bosnia and Herzegovina increasingly participates in European innovation and mission-oriented initiatives relevant to sustainable built environments, circular economy and digital transformation. These initiatives provide important opportunities for pilot implementation, Living Labs, demonstration projects, citizen engagement and interdisciplinary innovation related to circular and digital construction.

Particularly relevant initiatives include:

- European Institute of Innovation and Technology (EIT) Community initiatives;
- New European Bauhaus (NEB);
- EU Missions related to Climate-Neutral and Smart Cities;
- EU Mission “A Soil Deal for Europe”;
- Climate adaptation and sustainable built-environment initiatives;
- EIT Climate-KIC and EIT Community NEB programmes;
- Smart Communities and digital innovation initiatives.

These initiatives are particularly relevant for:

- demonstration projects and Living Labs;
- sustainable renovation and low-carbon buildings;
- bio-based and circular construction materials;
- citizen engagement and behavioural change;
- digital innovation ecosystems;
- startup and SME support;
- interdisciplinary cooperation between engineering, architecture, environment and digital sectors.

Participation in these initiatives can support implementation of:

- Pillar 2 (Digital Innovation & Technology Adoption),
- Pillar 3 (Skills & Capacity),
- Pillar 4 (Collaboration & Supply Chains),
- Pillar 5 (Awareness & Changing Mindsets).

In particular, New European Bauhaus and EIT-supported initiatives provide strong opportunities for integrating sustainability, aesthetics, inclusion and digital innovation into future circular construction pilot activities and public-space transformation projects in Bosnia and Herzegovina.

Budget Allocation

Total TAP-related investment over the 2026–2030 period is indicatively estimated at approximately **EUR 5–10 million** in mobilised public, donor, IFI and private-sector resources combined. This estimate reflects the early-stage status of circular and digital construction development in BiH, as well as current institutional and market capacities.

As this TAP is not an official government budgeting document, the indicative funding shares below represent estimated priority areas for potential financing and investment mobilisation rather than formal budget allocations.

TAP Pillar	Indicative Share (%)
Pillar 1: Policy & Regulatory Frameworks	15%
Pillar 2: Digital Innovation & Technology Adoption	30%
Pillar 3: Skills & Capacity	20%
Pillar 4: Collaboration & Supply Chains	25%
Pillar 5: Awareness & Changing Mindsets	10%

The highest indicative allocation is foreseen for Pillar 2 due to expected investments related to BIM pilots, digital infrastructure, digital tracking systems, pilot technologies and innovation support activities. Significant resources are also expected to be required

under Pillar 4 for supply-chain development, collaboration mechanisms, Living Labs and pilot cooperation initiatives.

7. Implementation Plan (National Level)

Governance Structure

The implementation of the BiH TAP will be coordinated through a multi-stakeholder national coordination mechanism involving representatives of relevant institutions, industry organizations, academia, civil society, and innovation support actors engaged in circular and digital construction activities within the Circular DigiBuild project and related Danube Region initiatives.

The coordination mechanism should include representatives of:

- Ministry of Foreign Trade and Economic Relations of BiH;
- relevant entity ministries responsible for construction, spatial planning, environment, economy, digitalization, education and public procurement;
- chambers of commerce and engineering chambers;
- universities, technical faculties and research institutions;
- Digital Innovation Hubs (DIHs);
- municipalities and development agencies;
- private-sector representatives, SMEs, recyclers and civil society organizations.

The governance structure will support coordination, monitoring, stakeholder engagement, exchange of information, and alignment of activities related to circular and digital construction across different administrative levels in BiH.

PP11 SERDA, as the national partner involved in the Circular DigiBuild project and member of the emerging Danube circular construction cooperation network, will support coordination of TAP implementation activities, facilitate stakeholder cooperation, contribute to monitoring and reporting activities, and encourage participation of national stakeholders in Danube Region knowledge-sharing and pilot initiatives.

The TAP represents a voluntary coordination and implementation framework and does not constitute a formally adopted governmental strategy or legally binding policy document.

Timeline

The implementation timeline foresees gradual development of regulatory, institutional, technical, and market capacities for circular and digital construction between 2026 and 2030. Activities are expected to evolve progressively from initial coordination, pilot actions and capacity building towards broader implementation, regional cooperation and scaling of good practices.

Pillar	Objective	KPI	2026	2027	2028	2029	2030
Pillar 1: Enabling Policy & Regulatory Frameworks	Objective 1.1 Harmonize circular construction standards and regulations related to digitalization	KPI 1.1.1: Number of standards, guidelines or regulatory documents adopted or updated by 2030	●	●	●	●	●
		KPI 1.1.2: Reduction in regulatory and technical barriers for secondary material use	●	●	●	●	●
	Objective 1.2 Develop and implement financial incentives for circular construction practices	KPI 1.2.1: Amount of public and private investment mobilised for circular construction projects	●	●	●	●	●
		KPI 1.2.2: Number of SMEs supported through financial incentives and technical assistance		●	●	●	●
Pillar 2: Fostering Digital Innovation &	Objective 2.1 Promote BIM and digital technologies	KPI 2.1.1: Share of pilot/public projects utilizing	●	●	●	●	●

Technology Adoption		BIM or equivalent digital tools					
		KPI 2.1.2: Number of professionals trained in BIM and digital construction tools		●	●	●	●
		KPI 2.1.3: Number of pilot projects demonstrating digital applications in circular construction		●	●	●	●
	Objective 2.2 Develop digital platforms for material tracking and waste management	KPI 2.2.1: Number of digital platforms or systems implemented for CDW tracking and material exchange	●	●	●	●	●
		KPI 2.2.2: Increase in digitally tracked construction and demolition material flows			●	●	●
Pillar 3: Building Skills & Capacity	Objective 3.1 Develop education and training programmes	KPI 3.1.1: Number of students and professionals participating in training programmes	●	●	●	●	●
		KPI 3.1.2: Number of universities and vocational institutions incorporating circular/digital		●	●	●	●

		construction modules					
	Objective 3.2 Promote knowledge transfer and best-practice sharing	KPI 3.2.1: Number of workshops, conferences and knowledge-sharing events organized annually	●	●	●	●	●
		KPI 3.2.2: Increase in participation in cross-border and transnational projects		●	●	●	●
Pillar 4: Strengthening Collaboration & Supply Chains	Objective 4.1 Facilitate circular supply chains for secondary materials	KPI 4.1.1: Increase in recycled and secondary materials used in construction projects		●	●	●	●
		KPI 4.1.2: Number of businesses involved in circular supply-chain initiatives	●	●	●	●	●
	Objective 4.2 Promote collaboration between research, industry and government	KPI 4.2.1: Number of collaborative R&D and innovation projects implemented	●	●	●	●	●
		KPI 4.2.2: Number of public-private partnerships established		●	●	●	●

Pillar 5: Raising Awareness & Changing Mindsets	Objective 5.1 Implement awareness campaigns	KPI 5.1.1: Number of people reached through awareness campaigns and events	●	●	●	●	●
		KPI 5.1.2: Increase in stakeholder awareness and support for circular and digital construction			●	●	●
	Objective 5.2 Encourage digital circular business models	KPI 5.2.1: Number of companies adopting digital technologies supporting circular construction		●	●	●	●
		KPI 5.2.2: Increase in investments related to digitalized circular construction methods			●	●	●

Monitoring and Evaluation

The implementation progress of the BiH TAP will be monitored through a national coordination and reporting framework aligned with the objectives, actions and KPIs defined under the five strategic pillars of the Circular DigiBuild initiative. Monitoring activities will support continuous assessment of progress related to circular construction, digitalization, BIM uptake, CDW management, stakeholder cooperation and capacity-building activities in BiH.

The monitoring framework will include:

- Regular collection of data related to national KPIs and implementation activities;

- Annual progress reviews involving key national stakeholders;
- Exchange of implementation progress and lessons learned within the Danube Region cooperation framework;
- Identification of implementation barriers, corrective measures and opportunities for scaling pilot initiatives;
- Continuous alignment of implementation activities with evolving EU and Danube Region priorities related to circular economy, digitalization and sustainable construction.

Progress reporting mechanisms may include:

- Annual implementation reports prepared at national level;
- Periodic progress updates discussed within the national coordination structure and Danube CiDiCon Cluster activities;
- Contributions to transnational monitoring and knowledge-sharing activities within the Circular DigiBuild project framework;
- Mid-term internal review of implementation progress and achieved KPIs;
- Final evaluation of the TAP implementation impact, including assessment of institutional, economic, environmental and capacity-building outcomes.

The monitoring framework should remain flexible and adaptive, taking into account the institutional structure of Bosnia and Herzegovina, evolving regulatory developments, availability of funding and the gradual maturity of the circular and digital construction ecosystem.

Risk Management

The implementation of the TAP in BiH may face several institutional, financial, technical and market-related risks that could affect the pace and effectiveness of the transition towards circular and digital construction practices.

Potential Risks	Risk Level	Proposed Mitigation Measures
Fragmented governance structure and slow regulatory harmonization between FBiH, RS and BD BiH	High	Strengthen multi-level coordination through the national steering structure, working groups and continuous stakeholder dialogue involving all administrative levels

Limited political support or changing institutional priorities	High	Align TAP activities with existing EU integration priorities, Green Agenda objectives, energy transition strategies and international donor programmes
Insufficient financial resources and delays in funding availability	High	Diversify financing sources through EU programmes, IFIs, donor organizations, environmental funds and private-sector partnerships
Low adoption of BIM and digital technologies among SMEs	Medium	Provide technical assistance, awareness campaigns, pilot projects, mentoring programmes and targeted SME support schemes
Lack of qualified professionals and digital skills shortages	High	Strengthen university programmes, vocational education, certification schemes and continuous professional development activities
Weak market demand for recycled and secondary construction materials	Medium	Promote pilot procurement practices, awareness activities, technical guidance and development of quality standards for secondary materials
Limited cooperation between academia, industry and public institutions	Medium	Support establishment of national innovation networks, Living Labs, collaborative pilot projects and knowledge-sharing platforms
Risk of digital and circular initiatives remaining limited to isolated pilot projects	Medium	Encourage gradual institutional integration of successful pilot solutions into public procurement practices, strategic documents and investment programmes
Limited availability of reliable data related to CDW flows, recycling and material tracking	Medium	Support development of digital tracking systems, pilot databases, harmonized reporting approaches and material traceability initiatives

8. Stakeholder Engagement (National Level)

Collaboration Mechanisms

Stakeholder engagement and cooperation within BiH will be supported through a multi-level coordination approach involving public institutions, industry representatives,

academia, development organizations, civil society and international partners participating in the Circular DigiBuild initiative and related Danube Region activities.

Communication, coordination and exchange of experiences will be facilitated through national stakeholder meetings, thematic working groups and participation in the Regional Multi-Stakeholder Groups (RMSGs) established within the Circular DigiBuild project framework.

The Circular DigiBuild B2B platform and other online collaboration tools will serve as spaces for:

- sharing knowledge, pilot examples and good practices;
- dissemination of project results and guidance materials;
- stakeholder networking and cooperation;
- exchange of feedback and implementation experiences;
- promotion of transnational collaboration opportunities.

Participation in Danube Region and EU-level events, workshops and knowledge-sharing activities will further strengthen regional cooperation and support transfer of good practices relevant to circular and digital construction.

Involvement of Key Groups

Governments/Public Authorities: Relevant institutions at BiH, entity, cantonal and local level will be engaged through consultations, working groups, workshops and coordination meetings focused on regulatory harmonization, circular economy policies, BIM implementation, CDW management and integration of circular construction priorities into strategic and investment frameworks.

Industry Associations & SMEs: Construction companies, SMEs, chambers of commerce, engineering chambers and business support organizations will be involved through pilot activities, technical workshops, awareness campaigns, mentoring programmes and collaborative initiatives aimed at promoting practical implementation of circular and digital construction solutions.

Research & Education Institutions: Universities, technical faculties, vocational institutions and research organizations will contribute scientific expertise, educational support and applied research activities related to BIM, digital construction technologies, circular economy approaches, sustainable materials and lifecycle assessment methodologies. Their involvement will support curriculum development, professional training and pilot innovation activities.

Financial Institutions & Investors: Dialogue with environmental funds, IFIs, donor organizations, development banks and private investors will support exploration of financing mechanisms for circular and digital construction projects, including pilot investments, SME support programmes and infrastructure development related to CDW management and digitalization.

Civil Society & NGOs: Civil society organizations and NGOs active in sustainability, environmental protection and circular economy will contribute to awareness-raising activities, dissemination of information, stakeholder engagement and promotion of transparency and public participation in the transition towards circular and digital construction practices.

Note: Key national stakeholders participating in the implementation process are identified in Annex A.

Communication Plan

A national communication approach will support transparency, visibility and continuous dissemination of activities, progress and results related to the implementation of the BiH TAP.

Communication activities may include:

- dissemination of implementation updates, pilot activities and good practices through project websites, online platforms and social media channels;
- participation in communication and visibility activities within the Danube CiDiCon Cluster and Circular DigiBuild framework;
- organization of workshops, conferences, stakeholder forums and awareness events related to circular and digital construction;
- preparation of newsletters, informational materials, technical guidance documents and case studies;
- promotion of successful pilot examples, innovation initiatives and SME experiences;
- media outreach activities targeting both professional audiences and the wider public;
- use of digital collaboration platforms and online repositories for sharing knowledge, methodologies and educational resources.

9. Sustainability and Scalability

Sustainability Mechanisms

The long-term sustainability of the BiH TAP will be ensured through a combination of institutional integration, market development, capacity building and continuous stakeholder cooperation within the quad-helix framework (public authorities, industry, academia and civil society), as well as through active participation in Danube Region cooperation structures such as the Danube CiDiCon Cluster.

Key sustainability mechanisms include:

- **Institutional embedding of policy measures:** Gradual integration of TAP-related recommendations into national and entity-level strategies, regulations and technical guidelines will ensure that circular and digital construction principles become part of standard planning, procurement and construction practices in BiH.
- **Strengthening regulatory continuity:** Outputs such as guidelines on CDW management, BIM integration, material traceability and green public procurement are intended to be progressively institutionalised through relevant ministries and agencies, ensuring continuity beyond project cycles.
- **Education and skills integration:** Circular economy principles, BIM methodologies and digital construction tools will be progressively incorporated into university curricula, vocational education and professional training programmes, ensuring the development of a sustained pipeline of qualified professionals.
- **Market-driven adoption and SME engagement:** As awareness increases and pilot projects demonstrate feasibility, adoption of digital and circular solutions is expected to grow through market mechanisms, particularly among SMEs responding to EU market requirements, ESG reporting obligations and competitiveness pressures.
- **Networking and institutional cooperation:** The continuation of collaboration between ministries, municipalities, chambers of commerce, engineering associations, universities and development agencies will support the emergence of a stable innovation ecosystem for circular construction.
- **Leveraging external funding and programmes:** Sustainability will be supported through continued access to EU programmes (Interreg, Horizon Europe, IPA III, Digital Europe), IFI financing (EBRD, EIB, WBIF) and donor initiatives supporting green and digital transition.

Scalability Strategies

Scalability of TAP outcomes in BiH will be ensured through a phased and replication-oriented approach, allowing successful pilot initiatives to be expanded across different administrative levels and integrated into broader regional cooperation frameworks.

Key scalability approaches include:

- **Replication of pilot projects:** Successful demonstrative initiatives (e.g., BIM pilot projects, CDW tracking systems, recycling and reuse models, digital platforms for material flows) will be replicated in additional municipalities, cantons and entities, adapting implementation to local conditions and capacities.
- **Integration into public procurement and investment practices:** Proven solutions will be progressively introduced into public procurement criteria and publicly funded construction and renovation projects, ensuring wider systemic uptake.
- **Knowledge transfer and dissemination:** Lessons learned, technical guidelines, case studies and pilot results will be systematically shared through national workshops, training programmes, publications and online platforms.
- **Use of digital collaboration platforms:** The Circular DigiBuild B2B platform, Danube CiDiCon Cluster networks and other digital knowledge-sharing tools will support dissemination of results and enable replication across the Danube Region.
- **Strengthening regional cooperation:** Active participation of BiH stakeholders in transnational projects and Danube Region initiatives will enable exchange of experiences, alignment of methodologies and joint development of scalable solutions for circular and digital construction.
- **Institutional scaling through policy alignment:** As regulatory frameworks evolve, successful pilot approaches will be incorporated into strategic documents, enabling transition from project-based interventions to systemic implementation at national level.

Through these mechanisms, the TAP aims not only to deliver short-term pilot results, but to establish a scalable foundation for long-term transformation of the construction sector in Bosnia and Herzegovina towards circular and digital practices.

10. Annexes

Annex A: List of key national stakeholders involved

Institution / Organisation	Relevance to TAP	Relevant Pillars	Web / Contact
PUBLIC SECTOR AND REGULATORY BODIES			
Ministry of Foreign Trade and Economic Relations of Bosnia and Herzegovina (MOFTER BiH)	National coordination body for environment, energy, EU alignment and circular economy policies; key for Danube Region cooperation	1, 2, 4, 5	mofter.gov.ba
Public Procurement Agency of BiH	Development of procurement frameworks; key for green and circular public procurement integration	1, 5	javnenabavke.gov.ba
Federal Ministry of Energy, Mining and Industry	Industrial policy, SME development, energy efficiency in industry and construction materials sector	1, 2, 4, 5	fmeri.gov.ba
Federal Ministry of Spatial Planning	Construction regulation, spatial planning frameworks, building permitting systems	1, 2	fmpu.gov.ba
Federal Ministry of Environment and Tourism	Environmental policy, waste management and circular economy-related legislation	1, 2, 4	fmoit.gov.ba
Ministry of Spatial Planning, Construction and Ecology of Republika Srpska	Entity-level construction regulation, environmental protection and CDW policy	1, 2	mpugie.vladars.rs
Institute for Standardization of Bosnia and Herzegovina (ISBIH)	Development of technical standards including recycled materials and construction norms	1, 2	bas.gov.ba
PROFESSIONAL AND BUSINESS ORGANISATIONS			
Foreign Trade Chamber of Bosnia and Herzegovina	Industry coordination, export support, SME engagement and EU market alignment	2, 4, 5	komorabih.ba
Chamber of Economy of Federation of BiH	SME support, policy dialogue, capacity building and industry networking	2, 3, 4, 5	kfbih.com

Chamber of Commerce and Industry of Republika Srpska	Industry representation, SME support, training and innovation dissemination	2, 3, 4, 5	pkrs.org
Association of Engineering Chambers (BiH level and entity chambers)	Professional certification, BIM training, technical capacity building for engineers and architects	2, 3	(various entity chambers)
Green Building Council of Bosnia and Herzegovina	Promotion of sustainable construction, green certification and awareness raising	2, 5	gbc.ba
ACADEMIC AND RESEARCH INSTITUTIONS			
-University of Sarajevo – Faculty of Civil Engineering and Mechanical Engineering -University of Banja Luka – Civil Engineering and Mechanical Engineering	Leading academic institution in construction engineering, structural design, BIM applications, sustainable construction and digital transformation of the built environment/Expertise in industrial engineering, materials, manufacturing processes, energy systems and digitalisation supporting circular and resource-efficient construction sector	2, 3, 4	gf.unsa.ba/ mef.unsa.ba agf.unibl.org/ mf.unibl.org
University of Mostar – Faculty of Civil Engineering	Education and applied research in construction and infrastructure	2, 3, 4	gf.sum.ba
University of Zenica – Faculty of Engineering	Industrial engineering, materials, manufacturing and digital transformation	2, 3, 4	tf.unze.ba
DIGITAL INNOVATION AND SUPPORT ECOSYSTEM			
Digital Innovation Hub (DIH) BiH / FABLAB Sarajevo	SME digital transformation, prototyping, BIM and digital construction innovation support	2, 3, 4, 5	fablab.ba
CENER 21	Sustainability research, circular economy projects, capacity building and policy support	1, 2, 3, 5	cener21.ba
Development agencies (FBiH, RS, BD BiH)	Project implementation, SME support, pilot financing and EU project coordination	1, 2, 4, 5	various
FINANCIAL INSTITUTIONS AND INVESTORS			

Development Bank of the Federation of BiH	Financing SME investment in green and digital transformation	1, 4	rbfbih.ba
Investment-Development Bank of Republika Srpska	Loans and financing instruments for industrial modernization and infrastructure	1, 4	irbrs.org
European Bank for Reconstruction and Development (EBRD) – BiH	Green infrastructure financing, SME support and circular economy investment	1, 4	ebd.com/bosnia-and-herzegovina
European Investment Bank (EIB)	Financing of infrastructure, energy efficiency and climate-related investments	1, 4	eib.org
UNDP Bosnia and Herzegovina	Technical assistance, pilot projects, green transition and capacity building	1, 2, 3, 5	ba.undp.org
CIVIL SOCIETY AND NGOs			
Center for Energy, Environment and Resources - CENER 21	Circular economy advocacy, climate and energy transition projects	5	cener21.ba
Green Council BiH	Environmental policy advocacy and awareness raising	5	greencouncil.ba
Aarhus Centre BiH	Environmental transparency, public participation and awareness	5	aarhus.ba
Local environmental NGOs and networks	Awareness raising, citizen engagement and local circular initiatives	5	various

Annex B: Data sources and methodologies for national KPIs

The national KPIs presented in this TAP are based on an integrated analysis of BiH's strategic policy framework, entity-level development strategies, sectoral action plans, and relevant statistical and institutional data sources, as outlined in national documents and reports (Annex C). This approach ensures that KPIs reflect both policy priorities and practical implementation realities across Bosnia and Herzegovina, the Federation of BiH, Republika Srpska, and Brčko District.

Annec C: Relevant national policy documents or reports

Planning instrument (plans, strategies, programs, actions, and roadmaps) / Institution responsible for implementation	Key targets / objectives / measures relevant to circular and digital construction
BiH	
National Energy and Climate Plan (NECP) until 2030 -(Draft) / Ministry of Foreign Trade and Economic Relations of Bosnia and Herzegovina (MOFTER)	• Decarbonization and energy efficiency measures across buildings and industry • Financial incentives and legislative frameworks for industrial energy efficiency • Building renovation strategy implementation • Promotion of eco-labelling and energy-efficient technologies • Support for research, innovation and competitiveness
Public Procurement Strategy 2024 - 2028 / Public Procurement Agency of BiH	• Development of green public procurement guidelines • Introduction of green and socially responsible procurement criteria • Preparation of regulatory framework for green procurement • Alignment of procurement practices with sustainability principles
Framework Energy Strategy of Bosnia and Herzegovina until 2035 / Ministry of Foreign Trade and Economic Relations of Bosnia and Herzegovina (MOFTER)	• Energy efficiency improvements in buildings and industry • Public awareness and education on energy efficiency • Promotion of green jobs and sustainable economic activities • Development of financing mechanisms for energy efficiency projects
Circular economy roadmap for BiH (Draft) / Ministry of Foreign Trade and Economic Relations of Bosnia and Herzegovina (MOFTER)	• Promote best practice frameworks such as EU LEVEL(s) for assessing and reporting on the sustainability performance of buildings throughout their entire life cycle. • Advocate for the use of green building standards, such as LEED. • Design that anticipates building reuse, longevity, flexibility, and deconstruction (dismantling individual building components for reuse). • Utilize Building Information Modeling (BIM) and material passports to transform buildings into material banks. • Change material production and usage practices by: - Supporting prefabrication, modular design, additive manufacturing/3D printing (e.g., reusable modular concrete components). - Substituting conventional materials with high carbon intensity with low-carbon materials, including renewable-based materials (e.g., promoting the use of timber over concrete).

Planning instrument (plans, strategies, programs, actions, and roadmaps) / Institution responsible for implementation	Key targets / objectives / measures relevant to circular and digital construction
	• Enhance resource efficiency for energy, water, and materials during construction and operation by introducing renewable energy, energy efficiency, and lean methodologies. • Collaborate, further train and refine skills, and strengthen the capacities of local construction material manufacturers, equipment suppliers, interior design engineers, structural engineers, and architects, governmental and academic institutions, and research centers to contribute through sustainable design, procurement, construction, and operational methods. • Implement legal and regulatory changes (e.g., updating environmental protection laws, waste management, spatial planning and construction regulations, public procurement, design regulations, permit issuance procedures, and inspections for constructing new and renovating existing facilities/buildings). • Provide financial incentives for implementing circular practices within the life cycle of construction projects and infrastructure development projects. • Encourage the use of available resources from landfills as input materials in manufacturing processes.
FBiH	
FBiH Building Renovation Strategy until 2050 (Draft) / Federal Ministry of Spatial Planning	• Energy refurbishment of existing buildings • Promotion of Nearly Zero Energy Buildings (NZEB) • Adoption of smart technologies in construction • Harmonization with EU energy efficiency legislation • Integration of circular economy principles into urban development
Development Strategy for Small Business in the Federation of Bosnia and Herzegovina 2022-2027 – Strategic Platform - Draft ¹ / Federal Ministry of Development, Entrepreneurship and Crafts	Competitive small industry based on innovations, digitalization and green circular economy : • Through the promotion of the principles and advantages of circular economy and supporting programs for improving energy efficiency and the use of renewable energy sources, create the conditions for the green transition of small business entities with an emphasis on the “greening” production. Special emphasis is placed on promoting the importance of acquiring “green skills”.
Development Strategy for Construction Materials Industry in	• Development of the construction materials and non-metal industry based on sustainable development principles, including rational energy use with the recycling and reuse mechanism, utilizing

¹ According to the representative of the Ministry, adoption of the Strategy is planned for the year 2024.

Planning instrument (plans, strategies, programs, actions, and roadmaps) / Institution responsible for implementation	Key targets / objectives / measures relevant to circular and digital construction
the Federation of Bosnia and Herzegovina for the period 2016-2025 / Federal Ministry of Energy, Mining and Industry	domestic resources and enhancement of the environmental protection. • Harmonization with EU technical legislation • Strengthening institutional and investment support for construction sector development
Environmental Strategy and Action Plan of FBiH (ESAP 2030 +) / Federal Ministry of Environment and Tourism	• Development of construction waste recycling systems • Establishment of recycling yards and CDW landfills • Guidelines for green and sustainable construction • Promotion of material reuse and resource efficiency
RS	
Development Strategy of the Industry of RS for the period 2021-2027 / Ministry of Economy and Entrepreneurship of Republika Srpska	• Transition towards circular economy in industry • Resource efficiency and waste management improvements • Industrial energy efficiency measures
Development Strategy for Small and Medium-sized Enterprises in RS for the period 2021-2027 / Ministry of Economy and Entrepreneurship of Republika Srpska	• Support for green innovations and SME modernization • Promotion of energy efficiency and renewable energy • Expansion of energy efficiency networks
Strategy for Energy Development of RS until 2035 / Ministry of Energy and Mining of Republika Srpska	• Implementation of the Long-Term Strategy for the Renovation of the Housing Sector. Renovation of public buildings, with the assistance of donors and technical assistance projects. • Increasing the energy efficiency of industrial processes (fuel replacement, combustion optimization, frequency regulation of pumps, compressors, and fans, replacement of old and oversized pumps, etc.). • Promotion of cogeneration. • Introduction of energy management in industrial facilities. • Mandatory energy audits for large consumers (over 10 GWh annually). • Promotion of the introduction of energy management in small and medium-sized enterprises.

Planning instrument (plans, strategies, programs, actions, and roadmaps) / Institution responsible for implementation	Key targets / objectives / measures relevant to circular and digital construction
Waste Management Plan of RS for period 2019 – 2029 / Ministry of Spatial Planning, Construction and Ecology of Republika Srpska	• Encourage manufacturers and importers of products to use clean technologies that ensure the rational use of natural resources, materials, and energy. • Promote separate collection and preparation for treatment or material or energy recovery of separately collected specific types of waste. • Construct facilities for treating separately collected specific types of waste.
Environmental Strategy and Action Plan of RS (ESAP 2030 +) / Ministry of Spatial Planning, Construction and Ecology of Republika Srpska	• Establishment of construction and demolition waste management systems • Promotion of material reuse from demolition activities • Development of construction material registries • Guidelines for sustainable and circular construction
BD BiH	
Sustainable Energy Action Plan (SEAP) of the Brčko District BiH / Government of Brčko District BiH	• Reduction of CO₂ emissions in the building sector • Removal of barriers to energy management • Co-financing mechanisms for energy efficiency measures
Development Strategy of the Brčko District of BiH for the period 2021-2027 / Government of Brčko District BiH	• Improvement of energy efficiency in public infrastructure • Reduction of energy dependency and emissions • Support for business digitalization and innovation • Strengthening support for export-oriented sectors
Environmental Strategy and Action Plan of BD BiH (ESAP 2030 +)/ Government of Brčko District BiH	• Development of CDW collection and recycling systems • Establishment of recycling infrastructure • Promotion of sustainable construction and material reuse • Development of guidelines for green construction practices
Development Strategy 2021–2027 / Government of Brčko District BiH	• Support for the economy's business operations and recovery from crisis effects • Systematic support for youth entrepreneurship and women's entrepreneurship • Support for innovations and digitalization of companies • Support for export-oriented sectors and companies • Alignment and improvement of the business environment

Annex D: References

- UNDP. 2024. [Assessment of circularity and resource valorisation in construction sector in Bosnia and Herzegovina](#).
- Circular DigiBuild, "2030 Danube Region Digital Innovation Strategy for Circular Construction," V06, February 2026. Project document.
- Circular DigiBuild, "Policy Review (D.2.4.2) – Consolidated Report," 2025. BiH: 'early-stage' category.
- Circular DigiBuild, "Common Report (D.2.2.2): Possible Applicable Solutions," 2025. Serbia contributed 12 PASs (RS-1 to RS-12).
- Circular DigiBuild, "Cross-Sectoral Opportunities (D.2.3.2)," 2024–2025.
- Agency for Statistics of Bosnia and Herzegovina. 2022. [Gross Domestic Product by Production, Income and Expenditure Approach](#).
- SERDA. 2023. [Public call announcement for SMEs in the wood and metal processing sector in the Sarajevo Canton regarding energy transition](#).
- Agency for Statistics of Bosnia and Herzegovina. 2021. [Structural Business Statistics](#).
- Agency for Statistics of Bosnia and Herzegovina. 2010. [Structural Business Statistics](#).
- UNDP. (n.d.) [Decarbonization of residential sector in BiH](#).
- EBRD. 2021. [Sustainability Report 2021](#).
- Green council. (n.d.). [Smarter finance for families](#).
- Green council. (n.d.). [Wool potential in BiH](#).
- Centre for Policy and Governance. 2022. [Case Study Implementation of Circular Economy Business Models in BiH](#).
- UNDP. 2010. [Wool Feasibility Study](#).
- Association of architects in BiH. (n.d.). [About pavilion](#).
- Hrastovic Inzenjering. (n.d.). [First passive house in BiH](#).
- [Krivaja Homes website](#)
- Green Homes. (n.d.). [Solutions](#).
- Asocijacija arhitekata u Bosni i Hercegovini. (n.d.). [Student pavilion](#).
- Korak. (n.d.). [Utilisation of natural materials and innovative solutions](#).
- Agency for statistics of BiH. 2018. [Waste from production and service activities](#).
- Agency for statistics of BiH. 2020. [Waste from production and service activities](#).
- Veljko Đukić. 2012. [Construction waste management possibility in Republika Srpska](#).
- Agency of Statistics of BiH. (2013). [Waste statistics – construction and demolition waste](#).
- Poslovne novine. (n.d.). [Company Radisa recycling construction waste](#).
- Akta. (n.d.). [BH4 recycling initiative](#).
- M-Kvadrat. (n.d.). [Bosman recycling construction waste](#).
- Poslovne novine. (n.d.). [Bosman recycling initiative](#).
- Circular Economy Beacons. 2022. [Bosnia and Herzegovina on the road to the circular economy](#).
- Inovacije. (n.d.). [Rekaz for innovations and circular economy](#).
- Faculty of Mechanical Engineering of University of Sarajevo. (n.d.). [Master program on circular economy](#).

Territorial Action Plan (TAP)

for Digital Innovation in Circular Construction

BULGARIA

Circular DigiBuild Project
Interreg Danube Region Programme

Lead Partner: BAA – Business Agency Association, Bulgaria (LP01)
April 2026

Table of Contents

Table of Contents.....	2
1. Introduction / Executive Summary.....	4
Purpose.....	4
Alignment.....	4
Current Status.....	4
2. Vision and Mission (Territorial Adaptation).....	5
Vision (National).....	5
Mission (National).....	5
3. Alignment with EU Strategy for the Danube Region (EUSDR).....	5
4. Strategic Pillars, Objectives, and Key Actions (National KPIs).....	6
Pillar 1: Enabling Policy & Regulatory Frameworks.....	6
Objective 1.1: Harmonize circular construction standards and regulations related to digitalization.....	6
Objective 1.2: Develop and implement financial incentives for circular construction practices.....	7
Pillar 2: Fostering Digital Innovation & Technology Adoption.....	7
Objective 2.1: Promote the adoption of BIM and other digital technologies.....	7
Objective 2.2: Support the development and deployment of digital platforms for material tracking and waste management.....	8
Pillar 3: Building Skills & Capacity.....	9
Objective 3.1: Develop education and training programs for digital skills within circular construction.....	9
Objective 3.2: Promote knowledge transfer and best practice sharing among stakeholders.....	9
Pillar 4: Strengthening Collaboration & Supply Chains.....	10
Objective 4.1: Facilitate the development of digital regional supply chains for recycled and secondary construction materials.....	10
Objective 4.2: Promote collaboration between research institutions, industry, and governments.....	10
Pillar 5: Raising Awareness & Changing Mindsets.....	11
Objective 5.1: Implement awareness campaigns to promote the benefits of digitalisation within circular construction.....	11
Objective 5.2: Encourage the adoption of digital technologies focusing on circular economy principles in construction business models.....	11
5. National Context and Challenges.....	12
SWOT Analysis.....	12
Addressing National Gaps.....	12

6. Financial Strategy (National Level).....	13
Funding Sources.....	13
Budget Allocation.....	13
7. Implementation Plan (National Level).....	14
Governance Structure.....	14
Timeline.....	14
Monitoring and Evaluation.....	15
Risk Management.....	15
8. Stakeholder Engagement (National Level).....	15
Collaboration Mechanisms.....	15
Involvement of Key Groups.....	16
Communication Plan.....	16
9. Sustainability and Scalability.....	16
Sustainability Mechanisms.....	16
Scalability Strategies.....	17

1. Introduction / Executive Summary

Purpose

This Territorial Action Plan (TAP) outlines Bulgaria's commitment and national strategy to implement the “2030 Danube Region Digital Innovation Strategy for Circular Construction.” It defines specific national actions, targets, responsible bodies, and measurable Key Performance Indicators (KPIs) to achieve the transnational strategy's vision within Bulgaria, taking into account the country's specific context, institutional capacity, and development trajectory.

Alignment

This TAP is fully aligned with the overall vision, mission, and five strategic pillars of the 2030 Danube Region Digital Innovation Strategy for Circular Construction. It translates the transnational objectives into nationally actionable measures, reflecting Bulgaria's Innovation Strategy for Smart Specialisation (ISSS) 2021–2027, the National Development Programme BULGARIA 2030, the Strategy for digitalization of Construction sector 2030 and the Roadmap for its implementation, and the Strategy for Transition to a Circular Economy 2022–2027. All five pillars are addressed, with objectives and KPIs calibrated to Bulgaria's emerging status and institutional readiness.

Current Status

Bulgaria is classified as an “emerging” country in the Circular DigiBuild policy review (D.2.4.2), indicating that foundational policy frameworks exist but implementation, enforcement, and technology adoption remain at an early to intermediate stage. The construction sector accounts for a significant share of GDP and employment, yet circular economy practices and digital tool adoption lag behind EU frontrunners.

Key characteristics of the current landscape include:

- Construction and demolition waste (CDW) recycling rate of approximately 24%, well below the EU target of 70%. The majority of CDW continues to be landfilled due to insufficient treatment facilities and sorting infrastructure.
- Limited adoption of Building Information Modelling (BIM): no national BIM mandate exists, and uptake is confined to a small number of larger firms and internationally funded projects.
- Legislative progress through the Strategy for Transition to a Circular Economy (2022–2027), current legislative update in the Spatial planning law and the respective regulations and ordinances, updated Waste Management Act, and new ordinances on construction waste management, though enforcement capacity remains a challenge.
- The establishment of the European Digital Innovation Hub in the Construction Sector (EDIHCS) in Sofia, bringing together 11 Bulgarian partner organisations from the fields of construction, digital technologies, innovation

and education, and providing nationwide coverage as a key platform for digitalisation support.

- The ISSS 2021–2027 recognises “Clean technology, circular and low-carbon economy” as both a horizontal and vertical priority, creating strategic alignment for this TAP.
- Low awareness among SMEs, local authorities, and the general public regarding the benefits of digital tools and circular practices in construction.

2. Vision and Mission (Territorial Adaptation)

Vision (National)

To establish Bulgaria as a proactive and competitive participant in circular and digital construction practices within the Danube Region by 2030, fostering sustainable economic growth, environmental resilience, and social well-being through the modernisation of the national construction sector.

Mission (National)

To mobilise national stakeholders - government institutions, industry associations, research and educational bodies, SMEs, and civil society - towards the collaborative transformation of Bulgaria’s construction sector, by promoting the adoption of digital technologies and circular economy principles, strengthening institutional capacity, and leveraging transnational cooperation within the Danube Region.

3. Alignment with EU Strategy for the Danube Region (EUSDR)

The actions outlined in this TAP contribute to the EUSDR Priority Areas as follows:

- **Connecting the Region (Improved Infrastructure, Digitalization):** Bulgaria’s actions under Pillars 2 and 4 directly support the digitalisation of the construction sector through BIM adoption roadmaps, digital platform deployment for material tracking, and integration into the Danube Circular Construction Supply Network. The EDIHCS serves as a national hub for supporting digitalisation of the SMEs and public authorities via capacity building and technical support services.
- **Protecting the Environment (Resource Efficiency, Waste Reduction):** Pillar 1 actions on regulatory harmonisation and Pillar 4 actions on circular supply chains aim to increase CDW recycling from the current 24% towards the 70% EU target, reduce landfilling, and promote the reuse of materials. Digital material passports and digital tracking will enhance traceability and waste reduction.
- **Building Prosperity (Innovation, SME Growth):** Pillars 2, 3, and 5 foster innovation through pilot projects, SME support programmes, and financial

incentives for circular business models. Training programmes and BIM certification will increase workforce competitiveness and open new market opportunities for Bulgarian construction firms.

- **Strengthening the Region (Institutional Capacity, Collaboration):** The establishment of a national steering committee, cross-border project participation, and active engagement in the DANUBE CiDiCon Cluster strengthen Bulgaria's institutional capacity and its role in regional governance for circular construction.

4. Strategic Pillars, Objectives, and Key Actions (National KPIs)

This section details Bulgaria's country-specific implementation for each of the five strategic pillars defined in the Danube Region strategy.

Pillar 1: Enabling Policy & Regulatory Frameworks

Objective 1.1: Harmonize circular construction standards and regulations related to digitalization

National Actions:

- Conduct a comprehensive review of national construction regulations (Spatial Planning Act, Waste Management Act, Construction Products Regulation transposition) to identify gaps and barriers for circularity and digitalisation.
- Establish a National Steering Committee for Circular Digital Construction (NSC-CDC) including part of the RMSG members to propose regulatory updates and coordination with the policy bodies to propose regulatory amendments aligning with EU directives and Danube Region best practices.
- Develop national guidelines for integrating digital tools (BIM, digital material passports, digital waste tracking) into regulatory compliance and building permit procedures.
- Participate actively in transnational standard-harmonisation initiatives through the DANUBE CiDiCon Cluster and other initiatives.

Lead institutions: to be determined at a later stage.

National KPIs & Targets:

KPI	Target	Timeline
KPI 1.1.1: Number of national circular construction standards related to digitalization adopted or updated	At least 1 standard or regulatory amendment adopted	By 2029
KPI 1.1.2: Reduction in regulatory barriers for secondary material use in construction	Qualitative assessment: adoption of new certification schemes for recycled aggregates; at least 1 revised	By 2030

	regulation removing barriers	
--	------------------------------	--

Objective 1.2: Develop and implement financial incentives for circular construction practices

National Actions:

- Analyse existing national and EU funding instruments (OP Competitiveness and Innovation 2021–2027, OP Research, innovation and digitalisation for smart growth, Horizon Europe, LIFE Programme) for their suitability to support circular and digital construction.
- Develop targeted national grant schemes and/or tax incentives for circular construction projects and digital adoption, with priority access for SMEs, through the Ministry of Economy and Industry / Ministry of innovation and digital transformation.
- Integrate circularity and digitalisation criteria into public procurement policies for construction projects, building on Bulgaria's Circular Public Procurement Action Plan (2021).
- Establish a dedicated support programme for green and digital construction start-ups and SMEs, in cooperation with EDIHCS.

Lead institutions: to be determined at a later stage.

National KPIs & Targets:

KPI	Target	Timeline
KPI 1.2.1: Amount of public and private investment in national circular construction projects	EUR 1 million cumulative	By 2030
KPI 1.2.2: Number of SMEs utilising national financial incentives for circular construction	At least 10 SMEs	By 2030

Pillar 2: Fostering Digital Innovation & Technology Adoption

Objective 2.1: Promote the adoption of BIM and other digital technologies

National Actions:

- Launch national awareness campaigns and workshops targeting construction companies, public authorities, and educational institutions on the benefits and practical application of BIM.
- Support at least 2 demonstration/pilot projects showcasing BIM, AI-assisted design, digital twins, and IoT applications in circular construction by 2029.

- Develop a national BIM implementation roadmap for public construction projects, with phased mandatory adoption beginning with large-scale public infrastructure.
- Provide technical assistance and consulting services to SMEs adopting digital technologies.

Lead institutions: to be determined at a later stage.

National KPIs & Targets:

KPI	Target	Timeline
KPI 2.1.1: Number of projects utilising BIM	At least 5 pilot projects implemented	By 2030
KPI 2.1.2: Number of professionals trained in BIM and other digital construction tools	At least 250 professionals	By 2030
KPI 2.1.3: Number of best practices / pilot projects demonstrating innovative digital applications in circular construction	At least 2 best practices adopted	By 2029

Objective 2.2: Support the development and deployment of digital platforms for material tracking and waste management

National Actions:

- Invest in the development or adoption of a national digital platform/marketplace for tracking and exchanging secondary construction materials, building on existing waste management information systems.
- Implement national data standards and digital material passports consistent with EU and Danube Region guidelines.
- Provide technical support for SMEs to integrate digital tracking systems.
- Pilot testing of applicability of financial and tax incentives to the SMEs.
- Collaborate with licensed waste management companies to integrate digital solutions for CDW tracking and reporting.

Lead institutions: to be determined at a later stage.

National KPIs & Targets:

KPI	Target	Timeline
KPI 2.2.1: Number of national digital platforms implemented for circular construction	At least 1 operational national platform with proven interoperability	By 2029
KPI 2.2.2: Increase in the volume of construction materials tracked digitally	5% increase over baseline (T0)	By 2030

Pillar 3: Building Skills & Capacity

Objective 3.1: Develop education and training programs for digital skills within circular construction

National Actions:

- Integrate circular economy principles and digital construction modules (BIM, IoT, digital twins, digital material passports) into university curricula and into vocational education and training (VET) programmes.
- Develop national certification programmes for professionals in circular and digital construction.
- Establish partnerships between educational institutions and construction industry firms for internships, practical training, and dual education models.
- Develop new skills and curricula

Lead institutions: to be determined at a later stage.

National KPIs & Targets:

KPI	Target	Timeline
KPI 3.1.1: Number of education and training programmes in digital technologies for circular construction	At least 2 programmes (university and VET/CPD)	By 2030
KPI 3.1.2: Number of universities and VET schools incorporating digital technologies for circular construction into their curricula	At least 2 institutions	By 2029

Objective 3.2: Promote knowledge transfer and best practice sharing among stakeholders

National Actions:

- Organise at least 1 national workshop, conference or seminar annually on circular and digital construction, coordinated by the DANUBE CiDiCon Cluster.
- Establish a national online knowledge hub for best practices, case studies, research findings, and training resources, linked to the Danube Region cluster platform.
- Facilitate national peer-to-peer learning networks and mentorship programmes for construction companies, particularly SMEs.
- Actively participate in and promote transnational knowledge-sharing events organised through the DANUBE CiDiCon Cluster.

Lead institutions: to be determined at a later stage.

National KPIs & Targets:

KPI	Target	Timeline
KPI 3.2.1: Number of national knowledge-sharing events organised annually	At least 1 event per year	Annually from 2027
KPI 3.2.2: Increase in national cluster members participating in cross-border circular construction projects	At least 3% increase over baseline	By 2030

Pillar 4: Strengthening Collaboration & Supply Chains

Objective 4.1: Facilitate the development of digital regional supply chains for recycled and secondary construction materials

National Actions:

- The DANUBE CiDiCon Cluster to act as a Bulgarian national focal point for the Danube Circular Construction Supply Network
- Map national producers, recyclers, and designers of secondary construction materials to identify collaboration potential and supply chain gaps.

Lead institutions: to be determined at a later stage.

National KPIs & Targets:

KPI	Target	Timeline
KPI 4.1.1: Increase in the volume of recycled and secondary materials used in national construction projects	5% increase over baseline (T0)	By 2030
KPI 4.1.2: Number of national companies involved in circular supply chains	At least 8 companies	By 2030

Objective 4.2: Promote collaboration between research institutions, industry, and governments

National Actions:

- Launch or participate in at least 1 collaborative R&D project focusing on advanced recycled materials, AI-driven resource management, and digital twin technologies in construction.
- Foster public-private partnerships and support Bulgarian entities in participating in EU programmes such as Horizon Europe and Digital Europe.

Lead institutions: to be determined at a later stage.

National KPIs & Targets:

KPI	Target	Timeline
KPI 4.2.1: Number of	At least 1 project	By 2030

collaborative R&D projects focused on digital technology for circular construction		
KPI 4.2.2: Number of national public-private partnerships established for digitalisation of circular construction	At least 1 partnership	By 2030

Pillar 5: Raising Awareness & Changing Mindsets

Objective 5.1: Implement awareness campaigns to promote the benefits of digitalisation within circular construction

National Actions:

- Design and execute targeted national communication campaigns for construction companies, policymakers, local authorities, and the general public, utilising social media, industry events, national media, and educational programmes.
- Highlight Bulgarian success stories and the economic and environmental benefits of circular and digital practices.
- Ensure broad geographic coverage of awareness activities, including in smaller cities and municipalities.

Lead institutions: to be determined at a later stage.

National KPIs & Targets:

KPI	Target	Timeline
KPI 5.1.1: Reach of national awareness campaigns (number of people informed)	At least 10,000 people reached cumulatively	By 2030
KPI 5.1.2: Increase in public support for digitalisation in circular construction policies	5% increase in survey-measured awareness levels	By 2030

Objective 5.2: Encourage the adoption of digital technologies focusing on circular economy principles in construction business models

National Actions:

- Provide support programmes (coaching, mentorship, toolkits) for construction companies to integrate digital solutions (BIM, digital material passports, waste management platforms) into their business models.
- Organise workshops and masterclasses on circular business model innovation enabled by digital tools, with a focus on SME participation.
- Showcase successful national and regional examples of companies adopting digitalised circular business models at annual conferences and through the national knowledge hub.

Lead institutions: to be determined at a later stage.

National KPIs & Targets:

KPI	Target	Timeline
KPI 5.2.1: Number of national construction companies adopting digital technologies in their circular business models	At least 5 companies	By 2030

5. National Context and Challenges

SWOT Analysis

STRENGTHS ISSS 2021–2027 recognises clean technology and circular economy as a priority EDIHCS uniting the expertise and knowledge of 11 partners representing construction, academia, innovation and digital technology sectors, with nationwide coverage in Bulgaria Strategy for Transition to Circular Economy (2022–2027) in place Strong academic base (UACEG, Technical University of Sofia) Active participation in Circular DigiBuild as Lead Partner (BAA) Circular Public Procurement Action Plan (2021) with initial criteria for construction	WEAKNESSES Low CDW recycling rate (~24%), far below the EU 70% target No national BIM mandate; very limited BIM adoption across the industry Insufficient CDW treatment facilities and recycling infrastructure Weak enforcement capacity for existing environmental and waste regulations Low awareness among SMEs and local authorities about circular and digital practices Skills gap in digital construction tools among the workforce
OPPORTUNITIES EU Structural Funds 2021–2027 (around EUR 11 billion for Bulgaria under the Partnership Agreement) Horizon Europe, Digital Europe, and Interreg Danube Region funding National Recovery and Resilience Plan investments in digitalisation Transfer of best practices from Danube Region frontrunners (AT, DE, SI) Growing EU regulatory push (CPR revision, Circular Economy Act) BUS-GoCircular and other international partnerships for training	THREATS Political instability and frequent government changes may delay policy adoption Low private-sector investment appetite in circular construction innovation Competition from traditional (linear) construction methods with lower upfront costs Risk of brain drain: skilled professionals leaving the construction sector or the country Slow pace of EU fund absorption may limit project implementation capacity Fragmented stakeholder landscape with limited civil society engagement

Addressing National Gaps

This TAP specifically addresses the gaps and barriers identified in the Consolidated Findings from the Four Studies as they pertain to Bulgaria:

- **Weak enforcement of CE policies:** Pillar 1 actions include establishing an NSC-CDC including part of the RMSG members and developing national guidelines to strengthen regulatory implementation and compliance monitoring.
- **Insufficient recycling infrastructure:** Pillar 4 actions focus on mapping national CDW flows, establishing circular supply chains, and deploying digital tracking platforms to improve waste management efficiency.
- **Limited BIM adoption:** Pillar 2 provides a phased national BIM roadmap, starting with public projects, supported by EDIHCS-led training and demonstration services.
- **Skills shortage:** Pillar 3 targets curricula integration at universities and VET institutions, professional certification, and continuous professional development programmes.
- **Low citizen engagement:** Pillar 5 campaigns and the Regional Multi-Stakeholder Groups will ensure broader public involvement and awareness, including in smaller municipalities.
- **Fragmented stakeholder communication:** The national knowledge hub (Pillar 3) and collaboration mechanisms (Pillar 4) will improve information flow across the quadruple helix.

6. Financial Strategy (National Level)

Funding Sources

- **National Budget:** National budget available from different sources
- **EU Structural Funds (ERDF, ESF+):** Bulgaria's Operational Programmes 2021–2027 provide significant resources for digitalisation, green transition, and SME support. The OP Competitiveness and Innovation and OP Research, innovation and digitalisation for smart growth are the primary channels for circular and digital construction investments.
- **Horizon Europe / Digital Europe:** Bulgarian entities will be supported in submitting proposals for collaborative R&D, pilot projects, and digital innovation actions.
- **Interreg Danube Region Programme:** Continued participation in transnational cooperation projects, including follow-up actions to the Circular DigiBuild project, supporting knowledge exchange and joint pilot initiatives.
- **Private Investment:** Strategies for attracting corporate investment and venture capital through public-private partnerships, financial de-risking instruments, and EDIHCS-facilitated matchmaking.

Budget Allocation

Indicative allocation across the five pillars, reflecting Bulgaria's priority needs:

Pillar	Indicative Share	Indicative Amount (EUR)	Priority Focus
Pillar 1: Policy & Regulatory Frameworks	15%	150,000	Regulatory reform, public procurement criteria
Pillar 2: Digital Innovation & Technology	30%	300,000	BIM roadmap, pilot projects, digital platforms
Pillar 3: Skills & Capacity	25%	250,000	Training, curricula, knowledge hub
Pillar 4: Collaboration & Supply Chains	20%	200,000	Supply network, R&D, Living Lab
Pillar 5: Awareness & Mindsets	10%	100,000	Campaigns, SME support, showcasing
Total	100%	1,000,000	Aligned with KPI 1.2.1 (EUR 1 million by 2030)

Amounts are indicative and correspond to the EUR 1 million investment target set in KPI 1.2.1. Main expected sources: Pillar 1 – national budget and technical assistance; Pillar 2 – OP Competitiveness and Innovation in Enterprises and Digital Europe; Pillar 3 – OP Research, Innovation and Digitalisation for Smart Growth and ESF+; Pillar 4 – Horizon Europe and Interreg Danube Region Programme; Pillar 5 – Interreg and national communication budgets.

7. Implementation Plan (National Level)

Governance Structure

A National Steering Committee for Circular Digital Construction (NSC-CDC) will be established.

The NSC-CDC will meet twice a year to review progress, resolve bottlenecks, and coordinate national actions. BAA will serve as the Secretariat and national contact point for the DANUBE CiDiCon Cluster.

Timeline

Phase	Key Milestones
2026	Establish NSC-CDC; complete regulatory gap analysis; launch first awareness campaign; baseline (T0) data collection for all KPIs
2027	Launch BIM roadmap and first pilot projects; integrate CE/digital modules into UACEG curricula; establish national knowledge hub; map CDW supply chain
2028	Deploy national digital platform for material tracking; launch SME support programme; establish Living Lab; mid-term evaluation (T2)

2029	Scale pilot projects; adopt first regulatory amendments; expand training programmes to VET institutions; internal review of KPI progress (T3)
2030	Final evaluation (T4); publish results and lessons learned; prepare sustainability plan for post-2030 continuation

Monitoring and Evaluation

- T0 baselines: values already available (e.g. the CDW recycling rate of about 24%) serve as baselines; the remaining T0 values will be collected by the end of 2026 from NSI data, Ministry of Environment and Water waste data, the MRDPW construction permits database and a stakeholder survey.
- Quarterly progress reports from responsible bodies to the NSC-CDC.
- Annual consolidated report submitted to the DANUBE CiDiCon Cluster.
- Mid-term evaluation (2028) assessing progress against T0 baselines and recommending adjustments.
- End-term external evaluation (2030) assessing impact, effectiveness, and sustainability.
- National KPI dashboard maintained on the Bulgarian knowledge hub, updated semi-annually.

Risk Management

Risk	Likelihood	Mitigation Measure
Funding delays or low EU fund absorption	High	Early project preparation; dedicated EU fund application support via EDIHCS; co-financing from national budget
Lack of political will or government instability	Medium–High	Anchor TAP in existing national strategies (BULGARIA 2030, ISSS); multi-party engagement through NSC-CDC
Low industry uptake and SME resistance	Medium	Financial incentives; demonstration projects showing ROI; peer mentorship programmes
Skills shortages / insufficient training capacity	Medium	Leverage international partnerships (BUS-GoCircular); online learning platforms; train-the-trainer approach
Weak enforcement of new regulations	Medium	Capacity building for inspectorates; digital compliance tools; regular monitoring through NSC-CDC

8. Stakeholder Engagement (National Level)

Collaboration Mechanisms

The existing Regional Multi-Stakeholder Group (RMSG) established under the Circular DigiBuild project will be enlarged to the NSC-CDC and will establish thematic working groups on: (a) regulatory reform, (b) digital innovation, (c)

education and skills, and (d) circular supply chains. BAA will coordinate a national online collaboration platform linked to the Danube Region cluster platform, ensuring continuous information exchange and stakeholder feedback.

Involvement of Key Groups

- **Governments / Public Authorities:** MRDPW, Ministry of Environment and Water, and local municipalities will be engaged through the NSC-CDC and RMSG to align policies, streamline construction permit processes, and integrate circularity criteria into public procurement.
- **Industry Associations & SMEs:** KSB will lead industry engagement. EDIHCS will provide digitalisation services to SMEs. Targeted financial incentives and demonstration projects will lower adoption barriers.
- **Research & Education Institutions:** UACEG and Technical University of Sofia will lead curricula development, applied research, and Living Lab operations. Joint projects with industry will ensure market relevance.
- **Financial Institutions & Investors:** Bulgarian Development Bank and commercial banks will be engaged to design green construction financing instruments. EDIHCS will support via the access-to-finance services for SMEs.
- **Civil Society & NGOs:** Environmental NGOs and community organisations will be included in awareness campaigns and the NSC-CDC to ensure transparency, citizen perspective, and broad public support.

Communication Plan

A national communication strategy will ensure visibility and transparency throughout the TAP's implementation:

- Semi-annual updates on the national knowledge hub and online platform.
- Annual national conference on circular and digital construction.
- Social media campaigns and media outreach targeting both industry professionals and the general public.
- Participation in the Danube Region cluster's communication activities and events.

9. Sustainability and Scalability

Sustainability Mechanisms

Long-term sustainability of the TAP's outcomes will be ensured through:

- Institutionalisation of regulatory reforms: adopted standards and regulatory amendments will become permanent features of the national legal framework.
- Embedding circular and digital construction in educational curricula ensures a continuous pipeline of skilled professionals beyond the project lifecycle.

- The EDIHCS, as an EU-funded hub with a sustainability plan, will continue providing digitalisation support to the construction sector.
- Market-driven adoption: as pilot projects demonstrate ROI and business benefits, private-sector demand for circular and digital practices is expected to become self-sustaining.
- The DANUBE CiDiCon Cluster provides a long-term governance and cooperation framework that outlasts individual project funding cycles.

Scalability Strategies

Successful national pilot projects and initiatives will be scaled through:

- Replication of Living Lab results across different Bulgarian regions, starting with major urban and expanding to secondary cities.
- Development of standardised toolkits and guidelines based on pilot experience, distributable to municipalities and construction firms nationwide.
- Sharing of lessons learned and best practices with other Danube Region countries through the cluster platform, bilateral exchanges, and transnational project proposals.
- Progressive expansion of BIM requirements from public to private construction projects, informed by the phased roadmap experience.

CIRCULAR DIGIBUILD
Interreg Danube Region

TERRITORIAL ACTION PLAN

for Digital Innovation in Circular Construction

CROATIA

Date: April 2026 | Time frame: 2026–2030
Project document – model and recommendation for construction sector stakeholders

<i>List of Abbreviations.....</i>	<i>2</i>
<i>List of Tables.....</i>	<i>4</i>
<i>1. Introduction and Executive Summary.....</i>	<i>5</i>
<i>2. Vision and Mission (Territorial Adaptation).....</i>	<i>8</i>
<i>3. Alignment with Relevant Strategic Frameworks.....</i>	<i>9</i>
<i>4. Strategic Pillars, Objectives and Recommended Actions with KPIs.....</i>	<i>11</i>
<i>5. National Context and SWOT Analysis.....</i>	<i>23</i>
<i>6. Financial Strategy (National Level).....</i>	<i>24</i>
<i>7. Implementation Plan (National Level).....</i>	<i>25</i>
<i>8. Stakeholder Engagement (National Level).....</i>	<i>27</i>
<i>9. Sustainability and Scalability.....</i>	<i>28</i>
<i>10. Annexes.....</i>	<i>29</i>
<i>A. References and Source Quality Assessment.....</i>	<i>32</i>
<i>B. References.....</i>	<i>34</i>

List of Abbreviations

Croatia Territorial Action Plan for Digital Innovation in Circular Construction | Circular DigiBuild, Interreg Danube Region

Abbreviation	Full name (English)	Croatian original name
TECHNOLOGY & SECTOR TERMS		
AI	Artificial Intelligence	–
BIM	Building Information Modelling	–
CDW	Construction and Demolition Waste	–
CE	Circular Economy	–
CPD	Continuous Professional Development	–
GDP	Gross Domestic Product	–
GPP	Green Public Procurement	–
IoT	Internet of Things	–
KPI	Key Performance Indicator	–
NGO	Non-Governmental Organisation	–
PPP	Public-Private Partnership	–
R&D	Research and Development	–
ROI	Return on Investment	–
SME	Small and Medium-sized Enterprise	–
SWOT	Strengths, Weaknesses, Opportunities, Threats	–
TAP	Territorial Action Plan	–
VET	Vocational Education and Training	–
EU & INTERNATIONAL ORGANISATIONS / PROGRAMMES		
EBRD	European Bank for Reconstruction and Development	–
ECSO	European Construction Sector Observatory	–
EDIH	European Digital Innovation Hub	–
ERDF	European Regional Development Fund	–
ESF+	European Social Fund Plus	–
EU	European Union	–
EUR	Euro	–
EUSDR	EU Strategy for the Danube Region	–
NDS	National Development Strategy of Croatia to 2030	Nacionalna razvojna strategija RH do 2030.
NRRP	National Recovery and Resilience Plan	Nacionalni plan oporavka i otpornosti (NPOO)

RMSG	Regional Multi-Stakeholder Group	–
WWF	World Wide Fund for Nature	–
CROATIAN INSTITUTIONS & BODIES		
ASHE	Agency for Science and Higher Education	Agencija za znanost i visoko obrazovanje (AZVO)
AVEC	Agency for Vocational Education and Adult Education	Agencija za strukovno obrazovanje i obrazovanje odraslih (ASOO)
CAA	Croatian Chamber of Architects	Hrvatska komora arhitekata (HKA)
CACE	Croatian Chamber of Civil Engineers	Hrvatska komora inženjera građevinarstva (HKAIG)
CBS	Croatian Bureau of Statistics	Državni zavod za statistiku (DZS)
CBRD	Croatian Bank for Reconstruction and Development	Hrvatska banka za obnovu i razvitak (HBOR)
CCE	Croatian Chamber of Economy	Hrvatska gospodarska komora (HGK)
CEA	Croatian Employers' Association	Hrvatska udruga poslodavaca (HUP)
CENA	Croatian Environment and Nature Agency	Agencija za zaštitu okoliša i prirode (HAOP)
CFCA	Central Finance and Contracting Agency	Središnja agencija za financiranje i ugovaranje (SAFU)
CSF	Croatian Science Foundation	Hrvatska zaklada za znanost (HRZZ)
CSI	Croatian Standards Institute	Hrvatski zavod za norme (HZN)
EPEEF	Environmental Protection and Energy Efficiency Fund	Fond za zaštitu okoliša i energetske učinkovitost (FZOEU)
EPR	Environmental Pollution Registry	Registar onečišćavanja okoliša (ROO)
FCAG	Faculty of Civil Engineering, Architecture and Geodesy, University of Split	Fakultet građevinarstva, arhitekture i geodezije Split (FGAG)
FCE	University of Zagreb Faculty of Civil Engineering, ~~University of Zagreb~~	Sveučilište u Zagrebu Građevinski fakultet ~~Zagreb~~ (GFZ)
FMEF	University of Zagreb Faculty of Mechanical Engineering and Naval Architecture, ~~Zagreb~~	Sveučilište u Zagrebu Fakultet strojarstva i brodogradnje ~~Zagreb~~ (FSB)
FEEC	University of Zagreb Faculty of Electrical Engineering and Computing	Sveučilište u Zagrebu Fakultet elektrotehnike i računarstva (FER)
HAMAG-BICRO	Croatian Agency for SMEs, Innovation and Investments	HAMAG-BICRO
MESD	Ministry of Economy and Sustainable Development	Ministarstvo gospodarstva i održivog razvoja (MINGOR)
MPPCA	Ministry of Physical Planning, Construction and State Assets	Ministarstvo prostornoga uređenja, graditeljstva i državne imovine (MPGI)
MRDEF	Ministry of Regional Development and EU Funds	Ministarstvo regionalnoga razvoja i fondova EU (MRRFEU)
MSEY	Ministry of Science, ~~and~~ Education and Youth	Ministarstvo znanosti, ~~i~~ obrazovanja i mladih (MZOM)

RBI	Rudjer Boskovic Institute	Institut Ruđer Bošković (IRB)
------------	---------------------------	-------------------------------

All abbreviations in this document are derived from English names. The third column provides the Croatian original name for reference, with the corresponding Croatian-derived abbreviation shown in parentheses where applicable.

List of Tables

Croatia Territorial Action Plan for Digital Innovation in Circular Construction- | - Circular DigiBuild, Interreg Danube Region

Table No.	Table title
Table 1	Diagnostic Overview of the Sector in Croatia – Baseline Context for KPIs
Table 2	Key Findings and Implications for the TAP
Table 3	Vision and Mission (Territorial Adaptation)
Table 4	EUSDR Priority Areas – Alignment with TAP Actions
Table 5	Alignment with Croatia's National Strategic Framework
Table 6	Pillar 1 – Banner: Enabling Policy & Regulatory Frameworks
Table 7	KPI Table – Objective 1.1: Harmonise circular construction standards
Table 8	KPI Table – Objective 1.2: Financial incentives for circular construction
Table 9	Pillar 2 – Banner: Fostering Digital Innovation & Technology Adoption
Table 10	KPI Table – Objective 2.1: Promote BIM and digital technologies adoption
Table 11	KPI Table – Objective 2.2: Digital platforms for material tracking
Table 12	Pillar 3 – Banner: Building Skills & Capacity
Table 13	KPI Table – Objective 3.1: Education and training programmes
Table 14	KPI Table – Objective 3.2: Knowledge transfer and best practice sharing
Table 15	Pillar 4 – Banner: Strengthening Collaboration & Supply Chains
Table 16	KPI Table – Objective 4.1: Digital regional supply chains
Table 17	KPI Table – Objective 4.2: R&D collaboration across sectors
Table 18	Pillar 5 – Banner: Raising Awareness & Changing Mindsets
Table 19	KPI Table – Objective 5.1: Awareness campaigns on ~~digitalisation~~ digitalization
Table 20	KPI Table – Objective 5.2: Digital technologies in circular business models
Table 21	SWOT Analysis
Table 22	Financial Strategy – Indicative Funding Sources
Table 23	Implementation Timeline 2026–2030
Table 24	Risk Register
Table 25	Key Stakeholder Groups

Table 26

Key Stakeholders Relevant to TAP Implementation

1. Introduction and Executive Summary

Purpose and nature of the document: This Territorial Action Plan (TAP) is a project document developed within the Circular DigiBuild project (Interreg Danube Region). It represents a model and set of recommendations for construction sector stakeholders in Croatia – businesses, research institutions, professional organisations and public actors – who wish to contribute to the implementation of the 2030 Danube Region Digital Innovation Strategy for Circular Construction. The TAP is not a formal government document nor is it adopted by any public body; it serves as a framework and stimulus for concrete project initiatives, pilot actions and partnerships that stakeholders can launch.

Contextual position of Croatia: Croatia is categorised in the transnational strategy as an 'emerging' country, alongside Romania, Slovakia, Hungary, the Czech Republic and Bulgaria. This means that certain foundations for circular and digital practices exist, but significant regulatory, capacity and institutional gaps remain, which this TAP seeks to address through recommendations and project proposals.

1.1 Diagnostic Overview of the Sector in Croatia – Baseline Context for KPIs

The transnational strategy '2030 Danube Region Digital Innovation Strategy for Circular Construction' was developed for 13 partner countries and necessarily reflects the average state of the region. Since Croatia differs in its level of development in this area from frontrunner countries such as Austria or Germany, as well as from early-stage countries such as Serbia or Moldova, this section provides a Croatia-specific diagnostic overview. The data form the basis for the T0 baseline estimates of KPIs presented in Chapter 4.

Table 1 Diagnostic Overview of the Sector in Croatia – Baseline Context for KPIs

Thematic Area	Current Status in Croatia (estimate 2024/2025)	Comparison with EU / Region
Construction sector – general indicators	~7% of GDP; ~120,000 employed; ~15,000 active companies (predominantly SMEs with < 10 employees)	EU average: ~9% of GDP / 18 million employed. Croatia has a slightly lower share but high sector fragmentation
CDW recycling (Construction and Demolition Waste)	Recycling rate ~20–25% of total CDW generated. Estimated ~5–6 million tonnes of CDW annually; a large share goes to landfill or is unregistered	EU target: 70% CDW recycling. Average for EU emerging countries: 30–40%. Croatia is in the lower quartile
BIM technology adoption	Estimate: BIM is actively used in 15–20% of projects, mainly in companies with > 50 employees	EU average (maturing countries): 30–40% of projects. Frontrunners (AT, DE): 60–80%. Croatia is below

	and in EU co-funded public projects. No mandatory BIM standards in public procurement	the average for the "emerging" category
Digital platforms for material tracking	No national platform for tracking CDW flows exists. The Environmental Pollution Registry (EPR) and the e-waste system exist but are not integrated with the construction sector. Material digital passports – no examples	Only 3–4 EU countries (NL, DK, FI, DE) have functional sector-level material platforms. Most 'emerging' countries are at a similar starting position
Education and skills – CE and digital construction	2–3 universities have individual BIM-related courses (Zagreb, Split). VET programmes lack standardised modules for CE and digital construction. Estimate: < 500 active BIM-certified professionals	EU benchmark: 10–15% of engineers and architects in 'emerging' countries have BIM competencies. Croatia is at the lower boundary
R&D and innovation in circular construction	Few R&D projects specifically focused on circular construction (estimate: 1–3 active projects per year). Weak commercialisation of research results. RBI and FCAG Split have capacity, but industry collaboration is limited	EU average R&D investment in CE in construction: ~0.3–0.5% of total R&D budget. Croatia is below the European average for this category
Regulatory framework for circular construction	The Construction Act, Waste Management Act and CDW Ordinance exist but are not mutually aligned to support circular practices. No mandatory requirements for recycled material content in public construction. Green Public Procurement (GPP) criteria for construction are in early-stage application	Directive 2008/98/EC as amended by 2018/851/EU; CDW Regulation in preparation. Frontrunners have integrated recycled content requirements in public procurement (AT, NL). Croatia still needs to align with upcoming EU regulation
Financing and investment in green/digital construction	NRRP: ~EUR 800 million for building energy renovation. EPEEF annual budget: ~EUR 200–250 million (energy + environment). No specific instruments for circular digital construction – covered within broader green programmes	EU trends: growing green bonds and dedicated CE funds. Croatia still needs to develop dedicated instruments

Data note: The estimates above are based on available public sources (CBS, MESD/CENA annual reports, CCE surveys, EU Building Stock Observatory, Eurostat) and findings from the Circular DigiBuild project studies (2024–2025). Precise TO measurement for all KPIs should be conducted at the start of TAP implementation, following the KPI measurement methodology to be developed as a separate project deliverable by the Danube CiDiCon cluster. The values shown in this table represent baseline estimates for setting realistic target values.

1.2 Key Findings and Implications for the TAP

Four key findings emerge from the diagnostic overview that shape the priorities and ambitions of this TAP.

Table 2 Key Findings and Implications for the TAP

01	Realistic BIM potential is medium-term The baseline BIM adoption level (~15–20%) and lack of mandatory standards means that ambitious targets such as 70%+ are not achievable by 2030. A realistic target for Croatia is 40–45% – which still represents a considerable leap requiring systematic effort.
02	CDW recycling is the most critical gap The gap between ~20–25% (Croatia) and ~70% (EU target) is the largest across all dimensions. Without digitalisation of tracking and a market platform for secondary materials this gap cannot be bridged. Pillars 2 and 4 are therefore critical.
03	SMEs are both the problem and the solution Sector fragmentation (predominantly SMEs) is both a barrier (lack of resources for digitalisation) and an opportunity (many stakeholders that can be mobilised). Financial instruments and collective support models are a priority.
04	The regulatory window is opening The arrival of EU regulatory requirements (CDW Regulation, EU Taxonomy, revision of the Construction Products Regulation) creates both pressure and legitimacy for the advocacy activities envisaged in this TAP. The timing is favourable for recommendations towards public actors.

2. Vision and Mission (Territorial Adaptation)

Table 3 Vision and Mission (Territorial Adaptation)

✦ VISION

TERRITORIAL ADAPTATION

To position Croatia as a recognised participant in circular and digital construction within the Danube Region, fostering collaboration among sector stakeholders on the path towards more sustainable and resource-efficient construction.

✓ MISSION

TERRITORIAL ADAPTATION

To foster knowledge exchange, pilot initiatives and stakeholder collaboration in Croatia to contribute to the transformation of the construction sector towards a circular economy, using digital tools such as BIM, digital twins and material tracking platforms.

3. Alignment with Relevant Strategic Frameworks

3.1 EU Strategy for the Danube Region (EUSDR)

The recommended actions contained in this TAP are aligned with the following EUSDR priority areas, facilitating stakeholders' positioning of project proposals towards relevant EU funding programmes:

Table 4 EUSDR Priority Areas – Alignment with TAP Actions

Connecting the Region	Digitalisation of public procurement, BIM infrastructure, interoperable digital platforms for CDW tracking
Protecting the Environment	Increasing CDW recycling rates, digital waste tracking, reducing the carbon footprint of construction
Building Prosperity	Strengthening SME capacity, green jobs, innovation ecosystem in construction
Strengthening the Region	Institutional capacities, standardisation harmonisation, transnational cooperation through the Danube CiDiCon cluster (Trans-Danubian Cluster for Circular Digitalized Construction; hereafter “Danube CiDiCon”)

3.2 Alignment with Croatia's National Strategic Framework

Although this TAP is not a formal government document, the recommended actions and indicators directly build on Croatia's existing strategic priorities. This alignment ensures the realism of the proposed framework and makes it easier for stakeholders to argue the relevance of initiatives to funding instruments and public partners.

Table 5 Alignment with Croatia's National Strategic Framework

Strategic Document	Relevant Priority Area	Link to TAP Actions
National Recovery and Resilience Plan (NRRP 2021–2026)	Green transition and climate resilience; Digital transformation	Pillars 1 and 2 – financial instruments for SMEs, BIM pilot projects, digital platforms for CDW; Pillar 5 – circular business innovations
Low-Carbon Development Strategy of the Republic of Croatia until 2030, with a view to 2050	Reduction of emissions in construction; increasing building energy efficiency	Pillars 1 and 4 – regulatory harmonisation, digital supply chains for secondary materials; Pillar 2 – digital twins for emissions tracking
Waste Management Plan of Croatia 2023–2028	Increasing CDW recycling rate; waste prevention in construction	Pillar 2 – digital platform for CDW flow tracking; Pillar 4 – circular supply chain network; KPI 4.1.1 – digitally tracked recycled volume
Smart Specialisation Strategy S3 Croatia (to 2029)	Thematic Area: Sustainable construction and energy; digitalization of industry	Pillars 2 and 4 – R&D projects, Living Labs, innovation ecosystem; Pillar 3 – curricula reforms and sectoral training
National Development Strategy	Strategic goal 3: Green	All 5 pillars – circular and digital

of Croatia to 2030 (NDS 2030)	Croatia; SG 5: Digitally transformed Croatia	transformation of construction directly contributes to the NDS green and digital transition goals
Digital Croatia Strategy 2032	Digitalisation of public services and business processes; development of digital competencies	Pillar 2 – interoperable digital platforms and BIM; Pillar 3 – digital skills in construction; Pillar 5 – digital business models

Note: The documents listed do not oblige the implementation of this TAP, but confirm that the recommended actions are aligned with recognised Croatian priorities. Stakeholders developing project proposals can use this table to argue the relevance of initiatives to funders, public partners and the media.

4. Strategic Pillars, Objectives and Recommended Actions with KPIs

This section details the recommended actions and initiatives for each of the five strategic pillars of the transnational strategy, adapted to the Croatian context. For each objective, concrete activities are proposed along with relevant stakeholders who could act as leads or partners, and indicative KPIs with target values for 2027 and 2030. Values are estimated on the basis of available data and project analyses – precise T0 measurement should be conducted at the start of implementation. Important note on baselines: all T0 values marked as “~ Estimated” or “X Weak” in Annex A are provisional planning assumptions, not verified national statistics. They must be replaced with measured values before the first formal progress review.

PILLAR 1: ENABLING POLICY & REGULATORY FRAMEWORKS

Table 6 Pillar 1 – Banner: Enabling Policy & Regulatory Frameworks

□ BASELINE SNAPSHOT <i>Current state in Croatia – basis for T0 KPI values</i>	
BIM in public procurement	No mandatory BIM standards for public projects; no BIM requirement in public procurement legislation
CDW regulatory framework	Construction Act, Waste Act and CDW Ordinance exist but are not mutually aligned to support circular practices
Recycled content requirements	No mandatory requirements for recycled material content in public construction contracts
Green Public Procurement (GPP)	GPP criteria for construction in early-stage application; not yet systematically enforced
Financial instruments for CE	No dedicated instruments for circular digital construction; covered within broader green programmes (NRRP, EPEEF)
Regulatory barriers	Assessed as HIGH – fragmented rules, lack of digital traceability standards, no secondary material certification scheme

Objective 1.1: Harmonise circular construction standards and regulations related to digitalisation

This objective targets the regulatory fragmentation shown in the Pillar baseline, focusing stakeholder efforts on BIM standardisation and digital CDW traceability as the two priority areas for advocacy.

Recommended actions and initiatives:

- Analysis of existing regulation (Construction Act, Waste Act, CDW Ordinances) and identification of regulatory gaps for circular practices and digitalisation – as a basis for advocacy activities and policy recommendations
- Initiative to establish a working group (involving MPPCA, MESD, CCE, the academic community) to prepare recommendations and legislative amendment proposals
- Development of sector guidelines and handbooks for integrating BIM and material digital passports into project documentation
- Recommendation for the gradual introduction of BIM in public projects above EUR 5 million (from 2027) – lobbying and advocacy towards relevant bodies. Note: the EUR 5 million threshold is derived from comparable EU member state BIM mandates (e.g. Czech Republic’s phased BIM obligation for public contracts above CZK 150 million, and Hungary’s pilot BIM

requirements for major infrastructure) and is a starting point for stakeholder discussion, not a binding figure.

- Active participation in transnational standard harmonisation initiatives within the Danube CiDiCon cluster

Relevant stakeholders who can take initiative:

- MPPCA, MESD – key public actors whose engagement would give these initiatives the greatest impact
- CCE Construction Sector, CAA – professional organisations as initiators and leaders of advocacy activities
- Academic institutions (technical institutes, universities) – research and expert support

Indicative KPIs and recommended targets

Table 7 KPI Table – Objective 1.1: Harmonise circular construction standards

KPI	Indicator description	T0 Baseline (2025)	Target T2 (2027)	Target T4 (2030)	Data source
KPI 1.1.1	Number of national circular construction standards related to digitalisation adopted/updated	0 standards (2025)	2 standards / guidelines	5+ standards / regulations	MPPCA, CSI
KPI 1.1.2	KPI 1.1.2a: Qualitative assessment of regulatory barrier level (perception-based; source: annual stakeholder survey) KPI 1.1.2b: Number of regulations/ordinances revised to support circular construction (count; source: MPPCA, MESD official gazette)	High barrier level (2025)	Medium + 2 revised ordinances	Low + 5+ revised regulations	MPPCA, MESD

Objective 1.2: Develop and implement financial incentives for circular construction practices

Building on the absence of dedicated CE financial instruments identified in the Pillar baseline, this objective aims to direct existing funding mechanisms (NRRP, EPEEF, HAMAG-BICRO) towards circular and digital construction.

Recommended actions and initiatives:

- Analysis and mapping of existing financial instruments and assessment of their applicability for circular and digital construction
- Preparation of policy recommendations for the development of dedicated grant schemes, tax incentives or credit programmes for SMEs in the sector (addressed to EPEEF, HAMAG-BICRO, MRDEF)
- Advocacy for the integration of circularity and digitalisation criteria into public procurement regulations for construction projects
- Launch of a pilot financial support programme in cooperation with CCE and HAMAG-BICRO for SMEs introducing BIM or digital material tracking platforms

Relevant stakeholders who can take initiative:

- MRDEF, EPEEF – key actors for directing EU funds and NRRP towards the sector
- HAMAG-BICRO, Ministry of Finance – SME support instruments
- CCE, professional associations – drivers of advocacy initiatives and channels for reaching SMEs

Indicative KPIs and recommended targets

Table 8 KPI Table – Objective 1.2: Financial incentives for circular construction

KPI	Indicator description	T0 Baseline (2025)	Target T2 (2027)	Target T4 (2030)	Data source
KPI 1.2.1	Amount of public and private investment in national circular construction projects (EUR/year)	~EUR 10 million estimate (2025)	≥ EUR 30 million	≥ EUR 80 million	MRDEF, EPEEF, CBS
KPI 1.2.2	Number of SMEs using national financial incentives for circular construction	< 50 SMEs (2025)	≥ 100 SMEs	≥ 300 SMEs	HAMAG-BICRO, CCE register

PILLAR 2: FOSTERING DIGITAL INNOVATION & TECHNOLOGY ADOPTION

Table 9 Pillar 2 – Banner: Fostering Digital Innovation & Technology Adoption

□ BASELINE SNAPSHOT <i>Current state in Croatia – basis for T0 KPI values</i>	
BIM adoption rate	~15–20% of projects actively using BIM; mainly larger companies (> 50 employees) and EU co-funded public projects
Digital twins & AI awareness	Extremely low among SMEs; limited to a handful of research projects; no commercial deployments identified
CDW tracking platforms	No national digital platform for CDW flow tracking; existing systems (e-waste, EPR) not integrated with the construction sector
Material digital passports	No examples of material passport use in Croatia; no national data standard aligned with upcoming EU requirements
IoT / smart construction	Very limited adoption; confined to a few large infrastructure projects; absent among SMEs
Pilot / demo projects	0–1 projects per year demonstrating innovative digital applications specifically in circular construction context

Objective 2.1: Promote the adoption of BIM and other digital technologies

Given the ~15-20% BIM adoption rate and near-zero SME awareness of advanced digital tools identified in the Pillar baseline, this objective focuses on demonstration initiatives and structured capacity support to accelerate uptake.

Recommended actions and initiatives:

- Development of a proposal for a National BIM Roadmap for Croatia with clear indicative milestones 2025–2030 – as expert input to relevant institutions
- Launch of pilot demonstration initiatives showcasing the application of BIM, AI and digital twins in circular construction (target: min. 2 projects by 2027, within project consortia)
- Organisation of workshops and awareness campaigns for construction companies, public contracting authorities and educational institutions
- Establishment of a technical support and advisory network for SMEs wishing to introduce digital technologies – in cooperation with EDIH Croatia

Relevant stakeholders who can take initiative:

- CCE Construction Sector – organisational support and company network
- EDIH Croatia / BICRO – SME digital transition, technical support
- Civil engineering and architecture faculties (Zagreb, Split) – pilot projects and research
- **MPPCA** – potential public partner for BIM roadmap advocacy

Indicative KPIs and recommended targets

Table 10 KPI Table – Objective 2.1: Promote BIM and digital technologies adoption

KPI	Indicator description	T0 Baseline (2025)	Target T2 (2027)	Target T4 (2030)	Data source
KPI 2.1.1	Percentage of construction projects using the BIM	~15% (2025)	≥ 25%	≥ 45%	CCE survey, MPPCA

	ecosystem in Croatia				project database
KPI 2.1.2	Number of professionals trained in BIM and other digital tools for circular construction	~500 (2025)	≥ 1,500	≥ 4,000	CAA, CACE, CCE, educational institutions
KPI 2.1.3	Number of pilot projects demonstrating innovative digital applications in circular construction	0–1 (2025)	≥ 3	≥ 8	MPPCA, university project registries

Objective 2.2: Support the development and deployment of digital platforms for material tracking and waste management

Addressing the complete absence of CDW tracking platforms and material passports noted in the Pillar baseline, this objective prioritises a feasibility study and pilot platform as the first concrete step.

Recommended actions and initiatives:

- Conduct a feasibility study for a pilot digital platform / marketplace for tracking and exchanging secondary construction materials
- Development of a digital platform prototype for tracking CDW flows in cooperation with utility companies and recycling centres (target: pilot by 2027)
- Preparation of recommendations for national data standards and material digital passports aligned with EU guidelines
- Project for financial and technical support to SMEs for integrating digital tracking systems – proposal for EU funds

Relevant stakeholders who can take initiative:

- MESD / CENA – key partners for alignment with waste regulation and CDW tracking
- EPEEF, utility companies (Čistoća d.o.o. etc.) – practical partners for pilot
- CCE Construction Sector, EDIH Croatia – technical development and wider application

Indicative KPIs and recommended targets

Table 11 KPI Table – Objective 2.2: Digital platforms for material tracking

KPI	Indicator description	T0 Baseline (2025)	Target T2 (2027)	Target T4 (2030)	Data source
KPI 2.2.1	Number of national digital platforms implemented for circular construction with proven interoperability	0 (2025)	1 pilot platform	2–3 functional platforms	MESD, CENA, EDIH
KPI 2.2.2	Increase in volume of construction materials tracked digitally (tonnes/m ³ per year)	Negligible (2025)	≥ 50,000 t/year	≥ 200,000 t/year	MESD / CENA CDW reports

PILLAR 3: BUILDING SKILLS & CAPACITY

Table 12 Pillar 3 – Banner: Building Skills & Capacity

□ BASELINE SNAPSHOT <i>Current state in Croatia – basis for TO KPI values</i>	
BIM-certified professionals	Estimated < 500 active BIM-certified professionals nationally; no unified certification scheme exists
University programmes	2–3 universities with individual BIM-related courses (Zagreb, Split); CE modules only in early development
VET / vocational training	No standardised VET modules for CE and digital construction; AVEC programmes do not yet cover this area
Continuous professional dev.	No sector-wide CPD platform; scattered workshops by professional chambers (CAA, CACE) with limited reach
Knowledge-sharing events	1–2 relevant events per year in Croatia; low cross-border participation in Danube Region knowledge exchanges
Cross-border project participation	~5 Croatian organisations active in transnational circular construction projects (Danube CiDiCon baseline)

Objective 3.1: Develop education and training programmes for digital skills in circular construction

With fewer than 500 BIM-certified professionals and no standardised VET modules in Croatia (Pillar baseline), this objective focuses on embedding CE and digital skills into both university and vocational education systems.

Recommended actions and initiatives:

- Proposal for the integration of CE and digital construction modules into university curricula in civil engineering, architecture and geodesy – as an expert recommendation to MSE and university bodies
- Launch of pilot vocational programmes (VET) with emphasis on BIM, IoT and circular construction in cooperation with the Agency for Vocational Education (AVEC)
- Initiative to establish sector certification programmes for professionals in circular and digital construction
- Encouraging partnerships between educational institutions and companies for internships and practical training on real projects
- Platform for continuous professional development – online and hybrid formats, available to cluster stakeholders

Relevant stakeholders who can take initiative:

- MSE, AVEC – institutions whose engagement is critical for systemic curriculum change
- Civil engineering and architecture faculties (Zagreb, Split, Rijeka, Osijek) – direct agents of change
- CAA, CACE – certification programmes and professional development

Indicative KPIs and recommended targets

Table 13 KPI Table – Objective 3.1: Education and training programmes

KPI	Indicator description	T0 Baseline (2025)	Target T2 (2027)	Target T4 (2030)	Data source
KPI 3.1.1	Number of students and professionals participating in digital/circular construction programmes annually	~300–400 (2025)	≥ 1,000 per year	≥ 2,500 per year	MSEY, AVEC, university reports
KPI 3.1.2	Number of universities and vocational schools integrating digital technologies for circular construction into their curricula	2–3 institutions (2025)	≥ 8 institutions	≥ 15 institutions	MSEY, AVEC, ASHE

Objective 3.2: Promote knowledge transfer and best practice sharing among stakeholders

The fragmented communication landscape identified in the Pillar baseline – only 1-2 relevant events annually and ~5 organisations active cross-border – makes structured knowledge-sharing infrastructure the priority here.

Recommended actions and initiatives:

- Organisation of an annual thematic event / conference on circular and digital construction in Croatia ('CircDigiBuild HR') – organised by cluster stakeholders
- Establishment of an online repository of good practices, case studies and research findings – as a national node within the Danube CiDiCon platform
- Peer-to-peer learning networks and mentoring programmes for companies – pilot within the CCE network
- Encouraging and organising participation of Croatian stakeholders in transnational knowledge-sharing events

Relevant stakeholders who can take initiative:

- CCE Construction Sector – conference organisation, peer networks and communication channels towards companies
- RBI, technical faculties – knowledge repository and research support
- Danube CiDiCon cluster – transnational coordination and platform

Indicative KPIs and recommended targets

Table 14 KPI Table – Objective 3.2: Knowledge transfer and best practice sharing

KPI	Indicator description	T0 Baseline (2025)	Target T2 (2027)	Target T4 (2030)	Data source
KPI 3.2.1	Number of knowledge-sharing events (workshops, conferences) organised annually	1–2 (2025)	≥ 4 per year	≥ 6 per year	CCE, academic institutions
KPI 3.2.2	Increase in the number of cluster members / companies participating in cross-border circular construction projects	~5 org. (2025)	≥ 15 org.	≥ 30 org.	Danube CiDiCon register

PILLAR 4: STRENGTHENING COLLABORATION & SUPPLY CHAINS

Table 15 Pillar 4 – Banner: Strengthening Collaboration & Supply Chains

□ BASELINE SNAPSHOT <i>Current state in Croatia – basis for T0 KPI values</i>	
CDW recycling rate	~20–25% of total CDW generated; well below EU target of 70%; large share goes to landfill or is unregistered
Secondary materials registry	No national registry of secondary construction materials; no market platform for their exchange exists
Digital supply chain tools	Absent among SMEs; no digital system supports cross-sector exchange of recycled materials and related data
Companies in circular networks	~20–30 companies estimated to participate in any form of circular construction supply arrangement nationally (weak estimate based on project-level stakeholder mapping; no official register – to be confirmed at T0)
R&D collaboration (industry-academia)	1–2 active R&D projects per year with joint academia-industry focus on circular construction; weak commercialisation
Public-private partnerships (PPP)	0 formalised PPPs specifically targeting circular digitalisation of construction identified at national level

Objective 4.1: Facilitate the development of digital regional supply chains for recycled and secondary construction materials

The combination of a low CDW recycling rate (~20–25%) and the complete absence of a secondary materials registry or digital exchange platform (Pillar baseline) makes this objective the most critical operational gap to address.

Recommended actions and initiatives:

- Establishment of a coordination point in Croatia for the Danube Circular Construction Supply Network – within the project consortium
- Mapping of existing producers, recyclers and designers working with secondary materials – as a basis for a future digital platform
- Preparation of recommendations for data standards and material digital passports aligned with EU guidelines
- Engagement of EDIHs and clusters as intermediaries helping SMEs adopt digital tools for supply chain management
- Development of a market platform prototype for the exchange of secondary materials – as a pilot project by 2027, in cooperation with the recycling industry

Relevant stakeholders who can take initiative:

- MESD / CENA – partners for alignment with CDW regulation and tracking
- CCE (Recycling Section), EPEEF – industrial and financial partners
- EDIH Croatia, cluster organisations in the construction sector – technical support and networking

Indicative KPIs and recommended targets

Table 16 KPI Table – Objective 4.1: Digital regional supply chains

KPI	Indicator description	T0 Baseline (2025)	Target T2 (2027)	Target T4 (2030)	Data source
KPI 4.1.1	CDW recycling rate achieved through digital tracking and circular supply chain tools (% of total CDW generated nationally)	~20–25% CDW recycled (2025)	≥ 35% + pilot digital tracking	≥ 55% + scaling of digital traceability	MESD/CENA annual reports
KPI 4.1.2	Number of companies involved in regional/national circular supply chains in construction	~20–30 companies (2025)	≥ 80 companies	≥ 200 companies	CCE register, Danube CiDiCon

Objective 4.2: Promote collaboration between research institutions, industry and government

With only 1-2 active industry-academia R&D projects annually and zero formalised PPPs in the sector (Pillar baseline), this objective targets the structural collaboration deficit that limits innovation uptake.

Recommended actions and initiatives:

- Launch of an initiative to establish an informal network for digital innovation in circular construction – connecting academia, industry and interested public actors
- Preparation and submission of R&D project proposals to Horizon Europe / Digital Europe calls, focused on advanced materials, AI resource management and digital twins
- Establishment of demonstration sites (Living Labs) in Zagreb and/or Split for testing and **showcasing good practice – in cooperation with university campuses or the city**
- Encouraging the formation of project consortia for public-private partnerships in the circular digitalisation of construction

Relevant stakeholders who can take initiative:

- CSF (Croatian Science Foundation) – R&D funding, relevant calls
- RBI, technical faculties, university laboratories – research core of consortia
- CCE, CEA – industry coordination and PPP initiatives

Indicative KPIs and recommended targets

Table 17 KPI Table – Objective 4.2: R&D collaboration across sectors

KPI	Indicator description	T0 Baseline (2025)	Target T2 (2027)	Target T4 (2030)	Data source
KPI 4.2.1	Number of collaborative R&D projects focused on digital technology for circular construction	1–2 (2025)	≥ 5	≥ 12	CSF, MSE, EU Open Data
KPI 4.2.2	Number of public-private partnerships established for the digitalisation of circular construction initiatives	0 (2025)	≥ 3 PPPs	≥ 8 PPPs	Government databases, CCE

PILLAR 5: RAISING AWARENESS & CHANGING MINDSETS

Table 18 Pillar 5 – Banner: Raising Awareness & Changing Mindsets

□ BASELINE SNAPSHOT <i>Current state in Croatia – basis for TO KPI values</i>	
Awareness campaign reach	< 10,000 people reached annually by CE construction-related campaigns; fragmented, no coordinated national effort
Stakeholder support for CE policies	~30% positive stakeholder sentiment (weak estimate from limited project consultations; no nationally representative survey – replace with TO measurement); low awareness especially among SMEs and the public
Companies with CE business models	~20–30 construction companies estimated to have integrated any circular principles into their operations (weak estimate based on project-level stakeholder mapping only; no official register – replace with TO survey)
Digital CE business model adoption	Very limited; digital passports, BIM-enabled CE workflows and circular platform participation near absent in SMEs
Investment in circular digital methods	~EUR 5 million estimated annual investment in digitalised circular construction methods (primarily large firms)
Civil society & NGO engagement	Low; CE construction topic poorly represented in NGO agendas compared to energy or biodiversity themes

Objective 5.1: Implement awareness campaigns on the benefits of digitalisation in circular construction

The low baseline awareness levels and limited NGO engagement identified in the Pillar baseline confirm that communication and visibility are necessary preconditions before other Pillar actions can gain traction.

Recommended actions and initiatives:

- Design and implementation of targeted communication campaigns for construction companies, public contracting authorities and the wider public – through cluster stakeholder channels
- Use of multiple channels: social media, sector media, trade fairs, educational platforms
- Highlighting domestic success stories and economic / environmental benefits of circular and digital practices
- Partnership with media and environmental NGOs (Zelena akcija etc.) for broader promotion of circular construction

Relevant stakeholders who can take initiative:

- CCE, CACE, professional associations – campaign drivers and communication channels towards the sector
- MESD, MPPCA – public actors whose participation increases initiative credibility
- Zelena akcija, WWF Adria etc. – partner for reaching the wider public

Indicative KPIs and recommended targets

Table 19 KPI Table – Objective 5.1: Awareness campaigns on digitalisation

KPI	Indicator description	T0 Baseline (2025)	Target T2 (2027)	Target T4 (2030)	Data source
KPI 5.1.1	Reach of national awareness campaigns (number of people informed through various channels)	< 10,000 (2025)	≥ 50,000	≥ 200,000	Web/social media analytics, event registrations
KPI 5.1.2	Increase in public/stakeholder support for digitalisation policies in circular construction (surveys)	~30% positive (estimate, 2025)	≥ 45%	≥ 60%	Annual CCE / MPPCA surveys

Objective 5.2: Encourage the adoption of digital technologies in circular construction business models

With only ~20-30 companies currently operating any CE principles and investment estimated at ~EUR 5 million annually (Pillar baseline), this objective focuses on concrete coaching and peer examples to trigger wider business model change.

Recommended actions and initiatives:

- Support programmes (coaching, mentoring, toolkits) for construction companies wishing to integrate digital solutions into circular business models – in cooperation with CCE and HAMAG-BICRO
- Organisation of workshops and masterclasses on circular business model innovation with digital support
- Collection and dissemination of domestic examples of companies that have already adopted digitalised circular business models – as inspiration and proof of feasibility
- Proposal to include this topic in entrepreneurial support programmes (incubators, accelerators) operating in the construction sector

Relevant stakeholders who can take initiative:

- CCE – Construction Sector and Entrepreneurship Centre – programme driver and organiser
- HAMAG-BICRO, MESD – support and co-financing instruments
- Incubators and accelerators in the sector – channels for reaching innovative SMEs

Indicative KPIs and recommended targets

Table 20 KPI Table – Objective 5.2: Digital technologies in circular business models

KPI	Indicator description	T0 Baseline (2025)	Target T2 (2027)	Target T4 (2030)	Data source
KPI 5.2.1	Number of national construction companies that have adopted digital technologies in circular business models	~20-30 companies (2025)	≥ 80 companies	≥ 250 companies	CCE survey, HAMAG-BICRO
KPI 5.2.2	Increase in investment in	~EUR 5	≥ EUR 15	≥ EUR 50	CBS, EPEEF,

	digitalised circular construction methods in Croatia (EUR per year)	million (estimate 2025)	million	million	MRDEF reports
--	---	-------------------------	---------	---------	---------------

5. National Context and SWOT Analysis

The SWOT analysis is based on the findings of four studies conducted within the Circular DigiBuild project (2024–2025), as well as on available data on the state of the Croatian construction sector. It serves as a starting point for understanding the context in which stakeholders can operate, rather than as a formal national assessment.

Table 21 SWOT Analysis

STRENGTHS	WEAKNESSES
• Strong tradition of civil engineering and technical education • Developed university programmes in construction and architecture • Access to EU funds (Cohesion, ERDF, ESF+) • Growing number of companies interested in BIM • Active Environmental Protection and Energy Efficiency Fund (EPEEF) • Adopted National Recovery and Resilience Plan (NRRP)	• Low CDW recycling rate (~20–25% vs EU average ~70%) • Lack of mandatory BIM standards in public procurement • Limited adoption of digital tools in SMEs • Fragmented regulation for secondary materials • Shortage of certified professionals in CE + BIM • Weak cross-sector academia–industry collaboration
OPPORTUNITIES	THREATS
• NRRP – EUR 5.1 billion for green and digital transition • EU Taxonomy promotes green investment in construction • Interreg Danube Region – transnational projects • Horizon Europe – R&D for circular innovations • Growing demand for energy-efficient renovations • Strengthening of the Danube CiDiCon cluster network	• Slow adoption of secondary legislation for CE • Insufficient political will for construction regulation reform • Risk of slow EU funds absorption • Brain drain of professionals in construction • High costs of introducing digital technologies for SMEs • Insufficient public awareness of circular construction

Addressing identified gaps: This TAP addresses the identified weaknesses through concrete recommendations: low BIM adoption → Pillar 2 initiatives and pilot demonstrations; fragmented regulation for secondary materials → Pillar 1 advocacy activities and policy recommendations; skills shortage → Pillar 3 training programmes; weak cross-sector collaboration → Pillars 4 and 5. Opportunities linked to the NRRP and EU funds are addressed in Pillar 1 and the financial strategy, with emphasis on concrete project proposals that stakeholders can develop.

6. Financial Strategy (National Level)

This section provides an overview of potential funding sources relevant to the implementation of the recommended actions in this TAP. Stakeholders wishing to launch concrete initiatives can use these instruments as a reference for preparing project proposals. The TAP has no budget of its own – each initiative requires separate elaboration and securing of funding.

Table 22 *Financial Strategy – Indicative Funding Sources*

Funding Source	Responsible Actor	Purpose	Share (%)
National budget	MPPCA, MESD, MSE	Regulatory reform, working groups, coordination	~5-10% of total
NRRP (NextGenEU)	CFCA / MRDEF	Green construction, energy renovation, SME digitalisation	~30-35%
ERDF / ESF+ (2021–2027)	Croatian Structural Funds	Capacity building, BIM training, research, pilot projects	~30-35%
Horizon Europe	Research institutions	R&D projects, Living Labs, digital twins	~10-15%
Interreg Danube Region	Project consortia	Transnational cooperation, platforms, knowledge exchange	~5-10%
Private investment / PPP	Industry, banks	Pilot projects, scaling, BIM infrastructure	~10-15%

Note: Since this TAP is not a formal government document, the indicative funding shares represent an estimate of the possible origin of funds for the recommended activities, not a budget allocation. Priority should be given to activities that can be launched within existing stakeholder capacities (event organisation, working groups, advocacy initiatives), while pilot projects and R&D require separate project financing.

7. Implementation Plan (National Level)

7.1 Recommended Coordination Structure

For effective coordination of the recommended actions, the establishment of an informal coordination platform is proposed, involving sector stakeholders and operating within the Danube CiDiCon cluster. A formal government governance structure is not a prerequisite – the initiative can be taken by professional organisations, academic institutions or stakeholder consortia.

Indicative composition of the coordination platform:

- CCE Construction Sector (coordination and platform secretariat)
- Academic community representatives (technical faculties – rotation)
- Industry representatives (SMEs, larger companies, recyclers)
- EDIH Croatia (digital transformation)
- Interested public actors (MPPCA, MESD – by invitation, not necessarily as permanent members)
- NGO / civil society (1 representative)

The Danube CiDiCon cluster acts as the transnational coordinator and ensures the link to partner countries and the transnational strategy.

7.2 Timeline with Key Milestones

Table 23 Implementation Timeline 2026–2030

Year / Milestone	Key activities and deliverables
2026 (Q2–Q4)	Endorsement of TAP by coordination platform; stakeholder mapping completed; regulatory gap analysis initiated; T0 KPI baseline measurement conducted
2027	Launch of National BIM Roadmap proposal; establishment of thematic working groups; first training programmes launched; 2 pilot projects initiated; mid-term review (T2)
2028	Revision of secondary materials regulations (advocacy); establishment of pilot digital CDW tracking platform; 3 new R&D projects submitted; extension of training to VET level
2029	Integration of CE criteria in public procurement (recommendation); Living Lab operational in Zagreb and/or Split; progress evaluation; adjustment of measures based on T2 findings
2030	Scaling of successful pilot projects across Croatia; final TAP evaluation (T4); report on achieved KPI targets; transfer of governance to systemic institutions

7.3 Monitoring, Evaluation and Risk Management

- KPI monitoring and reporting to coordination platform stakeholders (semi-annual)
- Annual progress reviews with the possibility of adjusting recommended activities
- Independent assessment at mid-term (2027) and end (2030) – preferably with participation of the transnational cluster

Table 24 Risk Register

Risk	Level	Mitigation measure
------	-------	--------------------

Slow adoption of laws / regulations	High	Early lobbying; inclusion of MRDEF and MPPCA in the governance structure
Low EU funds absorption	Medium	Pre-prepared project proposals; technical assistance to SMEs
Shortage of qualified BIM professionals	High	Training scholarships; partnership with CCE and CACE
Low SME participation	Medium	Targeted financial instruments; mentoring programmes
Industry resistance to change	Medium	Pilot projects with visible ROI; dissemination of success stories
Lack of cross-sector coordination	High	Formalisation of the national coordination platform; regular thematic forums
Insufficient or inconsistent KPI baseline data availability	Medium	Conduct T0 measurement survey at implementation start; designate a named data owner per KPI at first coordination platform meeting; do not rely on estimated baselines beyond 2026 Q3

8. Stakeholder Engagement (National Level)

Collaboration Mechanisms

For coordinated implementation of recommended actions, the Regional Multi-Stakeholder Group (RMSG) established in the Circular DigiBuild project will be used, along with the formation of thematic working groups for priority areas: green construction, digitalisation, waste valorisation, education and policy harmonisation. These structures function as networks of interested stakeholders, not as formal governing bodies.

Key Stakeholder Groups

Table 25 Key Stakeholder Groups

Public sector	MPPCA, MESD, MRDEF, MSE, CENA, EPEEF, LGUs (major cities)
Industry and SMEs	CCE Construction Sector, CACE, CAA, construction companies, recyclers
Research and education	Universities (Zagreb, Split, Rijeka, Osijek), RBI, HRČAK research network
Financial institutions	CBRD, HAMAG-BICRO, private banks, venture capital funds
Civil society and NGOs	Zelena akcija, WWF Adria, consumer associations, local communities

Communication Plan

- Regular progress reports and digital dashboards for KPI monitoring (semi-annual)
- Construction sector newsletters through the CCE network (quarterly)
- Public campaigns and media releases on circular construction progress (annual)
- Central online platform for information, good practice exchange and participation opportunities

9. Sustainability and Scalability

Sustainability mechanisms: The long-term sustainability of initiatives launched through this TAP is ensured through market-driven adoption of digital tools, self-sustaining cluster networks, integration of CE competencies into standard curricula and advocacy activities towards relevant institutions. The Danube CiDiCon cluster takes on the role of monitoring and results dissemination coordinator after the end of the project, without the need for a formal government structure.

Scalability strategies: Successful pilot projects (e.g. Living Labs, CDW digital platform prototype) can be scaled across Croatia through replication models and sharing of experience with other Danube Region partner countries. It is particularly important to document and publish the results of pilot initiatives so they serve as proof of feasibility for future funding and broader application.

Key sustainability and scalability mechanisms

Mechanism	Responsible actor	Timeframe
Integration of CE and BIM competencies into standard university and VET curricula	MSE, AVEC, universities (Zagreb, Split, Rijeka, Osijek)	2027–2030 (systemic change)
Danube CiDiCon cluster as self-sustaining coordination and dissemination body post-project	Danube CiDiCon cluster secretariat; CCE as national node	From 2028 onwards (post project end)
Market-driven adoption: commercial viability of digital CDW platform and material exchange marketplace	Platform operators, EDIH Croatia, private sector investors	2028–2030 (pilot to commercial)
Regulatory embedding: advocacy for mandatory BIM and recycled content standards secures long-term demand	MPPCA, MESD, CCE (advocacy); coordination platform (monitoring)	2027–2030 (advocacy) / ongoing post-2030
Replication: documenting pilot results for uptake by other Danube Region partner countries	Project consortium, Danube CiDiCon communications team	Continuous from 2027; final synthesis report 2030

10. Annexes

Annex A – Key Stakeholders Relevant to TAP Implementation

The table shows institutions and organisations identified as key stakeholders for implementing the recommended actions of this TAP. The division is by stakeholder type; the pillars listed indicate in which strategic pillars the engagement of each stakeholder is particularly relevant. Contact details refer to general institutional channels, not individual persons.

Table 26 Key Stakeholders Relevant to TAP Implementation

Institution / Organisation	Relevance to TAP	Relevant Pillars	Web / Contact
PUBLIC SECTOR AND REGULATORY BODIES			
Ministry of Physical Planning, Construction and State Assets (MPPCA)	Key body for construction regulation, BIM policy, standards and public procurement in construction	1, 2	mpgi.gov.hr
Ministry of Economy and Sustainable Development (MESD)	Responsible for circular economy, CDW regulation, climate policy and EDIH coordination	1, 2, 4	mingor.gov.hr
Ministry of Regional Development and EU Funds (MRDEF)	Management of EU structural funds and NRRP; critical for financing pilot projects and digital initiatives	1, 5	mrrfeu.gov.hr
Ministry of Science and Education (MSE)	Curriculum reforms, R&D funding (CSF calls), higher education policy	3, 4	mzom.gov.hr
Croatian Environment and Nature Agency (CENA)	CDW flow database, environmental monitoring, technical support for digital waste tracking	2, 4	haop.hr
Environmental Protection and Energy Efficiency Fund (EPEEF)	Dedicated fund for co-financing green and circular projects; potential financial instrument for SMEs	1, 2, 5	fzoeu.hr
Croatian Agency for SMEs, Innovation and Investments (HAMAG-BICRO)	SME support instruments (grants, guarantees, loans); critical for sector digitalisation	1, 5	hamagbicro.hr
PROFESSIONAL AND BUSINESS ORGANISATIONS			
Croatian Chamber of Economy – Construction and Utilities Sector (CCE)	The umbrella representative body of industry; organisation of conferences, surveys, sectoral networks and advocacy initiatives	1, 2, 3, 4, 5	hgk.hr/ komora/ sektori/ graditeljstvo
Croatian Chamber of Architects (CAA)	Certification programmes for architects, professional development, representation of the architectural profession in BIM and CE initiatives	2, 3	arhitekti.hr
Croatian Chamber of Civil Engineers (CACE)	Certification programmes for engineers, professional development, link between academia and industry in digital construction	2, 3	hkaig.hr
Croatian Employers'	Representation of the private sector in	1, 4	hup.hr

Association (CEA)	dialogue with the Government; relevant for PPP initiatives and financial instruments		
Association for Consumer Protection and Sustainable Development (example NGO partner)	Raising public awareness, engaging civil society in circular practices, advocacy towards policies	5	zelena-akcija.hr
ACADEMIC AND RESEARCH INSTITUTIONS			
Faculty of Civil Engineering, University of Zagreb (FCE)	Leading research institution in construction; capacities for BIM research, Living Lab initiatives and curriculum innovations	2, 3, 4	grad.unizg.hr
Faculty of Civil Engineering, Architecture and Geodesy, University of Split (FCAG)	Research capacities in civil engineering and geodesy; pilot projects for digital construction in the Adriatic context	2, 3, 4	gradst.unist.hr
Faculty of Mechanical Engineering and Naval Architecture, Zagreb (FMEF)	Capacities for industrial digitalisation, IoT and digital twins; relevant for cross-sector collaboration	2, 4	fsb.unizg.hr
University of Zagreb Faculty of Electrical Engineering and Computing	Capacities in artificial intelligence, machine learning and optimization for smart buildings, smart grids and green energy	2.4	fer.unizg.hr
Ruđer Bošković Institute (RBI)	Leading research institution in Croatia; capacities for R&D projects in materials, circular chemistry and digital technologies	4	irb.hr
Croatian Science Foundation (CSF)	R&D project funding; calls relevant for circular construction and digital innovations	4	hrzz.hr
Agency for Vocational Education and Adult Education (AVEC)	Development of vocational curricula (VET); critical for integrating CE and BIM modules into vocational education	3	asoo.hr
European Digital Innovation Hub Croatia (EDIH CR)	Support for SME digital transformation; testing new technologies, consulting and networking	2, 4, 5	edih.hr
FINANCIAL INSTITUTIONS AND INVESTORS			
Croatian Bank for Reconstruction and Development (CBRD)	Development bank; credit instruments for green and digital projects; potential partner for circular financial instruments	1, 4	hbor.hr
European Bank for Reconstruction and Development (EBRD) – Croatia office	Financing of green infrastructure and digitalisation projects; experience in regional SME programmes	1, 4	ebrd.com/croatia
TRANSNATIONAL PARTNERS AND NETWORKS			
Danube CiDiCon Cluster (Trans-	Transnational cluster coordinating	1, 2, 3, 4,	circulardigibuil

Danubian Cluster for Circular Digitalized Construction)	strategy implementation; TAP governance, stakeholder networking, good practice exchange across 13 partner countries	5	d.eu
Interreg Danube Region Programme – Managing Authority	Funding source for transnational projects; relevant for project consortia in which Croatia participates	1, 4	interreg-danube.eu
European Construction Sector Observatory (ECSO) – European Commission	Monitoring of the construction sector state in the EU; source of comparative data for KPI benchmarking	1, 2	ec.europa.eu/growth/sectors/construction

Note: The table shows institutions relevant to the coordination and implementation of the TAP. Web addresses are provided as institutional contacts; for specific collaboration, direct contact through the Danube CiDiCon cluster or the CCE Construction Sector is recommended, as they act as coordination points in Croatia. The list is not exhaustive – stakeholders wishing to be involved can contact the project consortium.

A. References and Source Quality Assessment

Croatia TAP for Digital Innovation in Circular Construction | Circular DigiBuild, Interreg Danube Region

This document provides an annotated bibliography of sources underpinning the quantitative claims and baseline data in the TAP, together with a quality assessment of each data category. All figures in the TAP marked as 'estimates' reflect best available data at the time of writing (Q2 2026). Precise T0 measurement should be conducted at the start of implementation.

A. Data Quality Assessment by Claim Type

Data claim	Source quality	Notes
CDW recycling rate ~20–25% (Croatia)	~ Estimated	Supported by Eurostat waste statistics (2020 ref. year) and confirmed by academic review (Moschen-Schimek et al., 2023). Croatia is in the lower quartile among EU Member States. Precise current figure requires HAOP national waste report.
BIM adoption ~15–20% of projects	~ Estimated	No official national BIM statistics exist in Croatia. Estimate based on Circular DigiBuild project analysis (2024–2025), ECSO data, and comparison with Eurostat structural business statistics. Requires T0 survey validation.
Construction sector ~7% of GDP, ~120,000 employed	✓ Strong	Based on Eurostat structural business statistics and Croatian Bureau of Statistics (CBS/DZS) national accounts. Standard industry data, annually updated.
EU CDW target of 70%	✓ Strong	Legally binding target under EU Waste Framework Directive 2008/851/EC, Art. 11(2)(b). Confirmed by European Commission monitoring reports.
<500 BIM-certified professionals	~ Estimated	Derived from HKA and HKAIG membership and certification data. No single national register. Estimate consistent with Circular DigiBuild country analysis for Croatia (2024).
NRRP: ~EUR 800M for building renovation	✓ Strong	Directly from Croatia's National Recovery and Resilience Plan (NPOO), officially adopted and published by the Government of Croatia (2021).
~5–6 million tonnes CDW annually	~ Estimated	Estimate based on HAOP annual environmental reports and Eurostat waste generation data per GDP unit, cross-referenced with construction sector output (CBS).
R&D investment ~0.3–0.5% of budget for CE in construction	~ Estimated	EU-level benchmark from European Commission R&D scoreboard. Croatia-specific figure not directly reported; derived by proportion from HRZZ funding data.

~20-30 companies in circular networks	✗ Weak	Project-level estimate only, based on Circular DigiBuild stakeholder mapping (2024). No official register of CE-active construction firms in Croatia exists.
~30% positive stakeholder sentiment	✗ Weak	Indicative project estimate based on limited stakeholder consultations. No nationally representative survey conducted. Should be replaced by T0 measurement.

Legend: ✓ Strong = official statistics or legally binding documents; ~ Estimated = best available data, requires T0 validation; ✗ Weak = project-level estimate, replace at implementation start.

B. References

EU & International Sources

- [1] European Commission (2024). EU Building Stock Observatory – Database and Factsheets. European Climate, Infrastructure and Environment Executive Agency (CINEA). Last updated December 2025. https://energy.ec.europa.eu/topics/energy-efficiency/energy-performance-buildings/eu-building-stock-observatory_en
- [2] Eurostat (2024). Waste statistics – Construction and demolition waste. Data extracted September 2024. https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Waste_statistics
- [3] Eurostat (2023). Structural Business Statistics – Construction sector. European Commission. <https://ec.europa.eu/eurostat/web/structural-business-statistics>
- [4] European Commission (2018). Directive 2008/98/EC of the European Parliament and of the Council on waste (Waste Framework Directive), as amended by Directive (EU) 2018/851. <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32018L0851>
- [5] European Commission (2020). A New Circular Economy Action Plan – For a Cleaner and More Competitive Europe. COM(2020) 98 final. <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=COM:2020:98:FIN>
- [6] European Construction Sector Observatory (ECSO) (2023). Country Profile: Croatia. European Commission, DG GROW. https://ec.europa.eu/growth/sectors/construction/observatory_en
- [7] Moschen-Schimek, J., Kasper, T. & Huber-Humer, M. (2023). Critical review of the recovery rates of construction and demolition waste in the European Union. Waste Management, 167, 150–164. <https://doi.org/10.1016/j.wasman.2023.05.020>
- [8] Interreg Danube Region Programme (2023). EU Strategy for the Danube Region (EUSDR) – Priority Areas. <https://www.interreg-danube.eu/about-dtp/eu-strategy-for-the-danube-region>

Circular DigiBuild Project Sources

- [9] Circular DigiBuild Project Consortium (2024). Cross-sectoral Opportunities for CE Solutions – Analysis Study. Interreg Danube Region Programme, January 2024 – June 2026. <https://interreg-danube.eu/projects/circular-digibuild>
- [10] Circular DigiBuild Project Consortium (2025). 2030 Danube Region Digital Innovation Strategy for Circular Construction. Interreg Danube Region Programme. <https://www.circulardigibuild.eu/>
- [11] Circular DigiBuild Project Consortium (2024–2025). Croatia Country Analysis – Barriers to Digitalisation-Led Circular Economy Transition in Construction. Internal project deliverable. <https://www.circulardigibuild.eu/>

Croatian National Sources

- [12] Government of the Republic of Croatia (2021). National Recovery and Resilience Plan (NRRP / NPOO) 2021–2026. Zagreb: Government of Croatia. <https://planoporavka.gov.hr/dokumenti-113/113>
- [13] Ministry of Economy and Sustainable Development – MINGOR (2021). Low-Carbon Development Strategy of Croatia to 2030 (with a view to 2050). Zagreb: MINGOR. <https://mingor.gov.hr/o-ministarstvu-1065/djelokrug-4925/klima/strategije-planovi-i-programi-1915/strategija-niskouglijicnog-razvoja-hrvatske/1930>
- [14] Government of the Republic of Croatia (2023). Waste Management Plan of Croatia 2023–2028. Official Gazette No. 84/2023. https://narodne-novine.nn.hr/clanci/sluzbeni/2023_07_84_1334.html

-
- [15] Ministry of Science and Education – MZO / Smart Specialisation (2023). Smart Specialisation Strategy S3 Croatia to 2029. Adopted December 2023. <https://mzom.gov.hr/vijesti/usvojena-strategija-pametne-specijalizacije-s3-do-2029/5920>
- [16] Croatian Parliament (2021). National Development Strategy of the Republic of Croatia to 2030. Official Gazette No. 13/2021. https://narodne-novine.nn.hr/clanci/sluzbeni/2021_02_13_230.html
- [17] Ministry of Physical Planning, Construction and State Assets – MPPI (2022). Digital Croatia Strategy 2032. Zagreb: MPPI. <https://mpudt.gov.hr/strategija-digitalne-hrvatske-za-razdoblje-do-2032/29168>
- [18] Croatian Bureau of Statistics – CBS (2024). Statistical Yearbook of the Republic of Croatia 2024. Zagreb: DZS. <https://www.dzs.hr/>
- [19] Croatian Environment and Nature Agency – HAOP/CENA (2024). Report on the State of the Environment in Croatia 2024. Zagreb: HAOP. <https://www.haop.hr/>
- [20] Croatian Agency for SMEs, Innovation and Investments – HAMAG-BICRO (2024). Annual Report 2023. Zagreb: HAMAG-BICRO. <https://www.hamagbicro.hr/>

Note: References [9]–[11] (Circular DigiBuild internal deliverables) will be publicly accessible on the project website upon completion. References marked with ~ or X in the quality assessment should be re-validated through T0 measurement at the start of TAP implementation (Q2–Q3 2026).

Territorial Action Plan (TAP) for Digital Innovation in Circular Construction: Czech Republic

Table of Contents

TERRITORIAL ACTION PLAN (TAP) FOR DIGITAL INNOVATION IN CIRCULAR CONSTRUCTION: CZECH REPUBLIC.....

- 1. INTRODUCTION / EXECUTIVE SUMMARY.....**
- 2. VISION AND MISSION (TERRITORIAL ADAPTATION).....**
- 3. ALIGNMENT WITH EU STRATEGY FOR THE DANUBE REGION (EUSDR).....**
- 4. STRATEGIC PILLARS, OBJECTIVES, AND KEY ACTIONS (NATIONAL KPIS).....**
 - PILLAR 1: ENABLING POLICY & REGULATORY FRAMEWORKS.....**
 - OBJECTIVE 1.1: HARMONIZE CIRCULAR CONSTRUCTION STANDARDS AND REGULATIONS RELATED TO DIGITALIZATION.....
 - OBJECTIVE 1.2: DEVELOP AND IMPLEMENT FINANCIAL INCENTIVES FOR CIRCULAR CONSTRUCTION PRACTICES.....
 - PILLAR 2: FOSTERING DIGITAL INNOVATION & TECHNOLOGY ADOPTION.....**
 - OBJECTIVE 2.1: PROMOTE THE ADOPTION OF BUILDING INFORMATION MODELING (BIM) AND OTHER DIGITAL TECHNOLOGIES.....
 - OBJECTIVE 2.2: SUPPORT THE DEVELOPMENT AND DEPLOYMENT OF DIGITAL PLATFORMS FOR MATERIAL TRACKING AND WASTE MANAGEMENT.....
 - PILLAR 3: BUILDING SKILLS & CAPACITY.....**
 - OBJECTIVE 3.1: DEVELOP EDUCATION AND TRAINING PROGRAMS FOR DIGITAL SKILLS WITHIN CIRCULAR CONSTRUCTION.....
 - OBJECTIVE 3.2: PROMOTE KNOWLEDGE TRANSFER AND BEST PRACTICE SHARING AMONG STAKEHOLDERS.....
 - PILLAR 4: STRENGTHENING COLLABORATION & SUPPLY CHAINS.....**
 - OBJECTIVE 4.1: FACILITATE THE DEVELOPMENT OF DIGITAL REGIONAL SUPPLY CHAINS FOR RECYCLED AND SECONDARY CONSTRUCTION MATERIALS.....
 - OBJECTIVE 4.2: PROMOTE COLLABORATION BETWEEN RESEARCH INSTITUTIONS, INDUSTRY, AND GOVERNMENTS.....
 - PILLAR 5: RAISING AWARENESS & CHANGING MINDSETS.....**
 - OBJECTIVE 5.1: IMPLEMENT AWARENESS CAMPAIGNS TO PROMOTE THE BENEFITS OF DIGITALIZATION WITHIN CIRCULAR CONSTRUCTION.....
 - OBJECTIVE 5.2: ENCOURAGE THE ADOPTION OF DIGITAL TECHNOLOGIES FOCUSING ON CIRCULAR ECONOMY PRINCIPLES USED IN CONSTRUCTION BUSINESS MODELS.....
- 5. NATIONAL CONTEXT AND CHALLENGES.....**
- 6. FINANCIAL STRATEGY (NATIONAL LEVEL).....**

FUNDING SOURCES:.....	
7. IMPLEMENTATION PLAN (NATIONAL LEVEL).....	
GOVERNANCE STRUCTURE:.....	
TIMELINE:.....	
MONITORING AND EVALUATION:.....	
RISK MANAGEMENT:.....	
8. STAKEHOLDER ENGAGEMENT (NATIONAL LEVEL).....	
COLLABORATION MECHANISMS:.....	
INVOLVEMENT OF KEY GROUPS:.....	
COMMUNICATION PLAN:.....	
9. SUSTAINABILITY AND SCALABILITY.....	

1. Introduction / Executive Summary

Purpose:

In this document, PP5 INCIEN aims to translate the shared Territorial Action Plan (TAP) template into Czech context with relevant priorities, actions, and responsibilities that support the transition of the Czech construction sector towards circularity, digitalisation, and climate neutrality.

In the Czech context, the implementation of circular construction is anchored in several strategic frameworks and policy instruments, including the [Strategic Framework Circular Czechia 2040](#), [Circular Czechia Action Plan for 2022-2027](#), [National Research and Innovation Strategy for Smart Specialisation \(RIS3\)](#), [Zero Carbon Roadmap for Buildings](#) (including its [2026 status report](#)), National Building Renovation Plan (under development), [Strategic documents mapped by ClimArchiBase LIFE project](#), [Waste Management Plan 2025-2035](#) and Secondary Raw Materials Policy (update pending in Q2 2026). Together, these frameworks provide the policy foundation for improving resource efficiency, increasing the reuse and recycling of construction materials, reducing lifecycle emissions of buildings, and strengthening the role of circular principles within the construction value chain.

The TAP also reflects ongoing national initiatives and RIS3 strategies aimed at accelerating digital and sustainable transformation in the construction sector. These include the [progressive implementation of Building Information Modeling \(BIM\) in public procurement](#) (through the [2017 BIM implementation strategy](#), [updated in June 2024](#) and the [2025 BIM Act](#)), the development of buildings sustainability assessment methodologies such as [SBToolCZ](#), and participation in international research and innovation projects focused on circular construction and digitalisation, including [Circular DigiBuild](#), [BUS-GoCircular](#), [CirCon4Climate](#), [INDICATE](#), [ReBuilt](#), [ClimArchiBase](#) and [RECONMATIC](#). At the same time, PP5 INCIEN has initiated the

development of voluntary agreement models aimed at strengthening cross-sector collaboration in the construction sector ([Partnership for Construction of Apartment Buildings from Low-emission Materials](#)). The first agreement is designed to promote the development of low-emission construction, with a strong emphasis on circular economy principles and the integration of digital tools. These initiatives contribute to strengthening technological readiness, knowledge transfer, and cross-sectoral collaboration within the Czech construction ecosystem.

Through this TAP, PP5 INCIEN will aim to monitor national policies, research activities, and industry practices that are relevant for the strategic pillars of the Danube Region initiative.

Alignment:

At the strategic level, the TAP reflects the shared regional ambition to strengthen innovation capacity, strengthen cross-sector collaboration, and accelerate the uptake of digital tools and circular economy practices in construction value chains. In this context, the Czech Republic contributes to the strategy's vision of establishing the Danube Region as a leading stakeholder for the circular and digital construction sector through the integration of national policy frameworks, research initiatives, and pilot projects that advance sustainable building practices and material efficiency.

The alignment is further reinforced through the Czech Republic's national innovation and sustainability frameworks, particularly the aforementioned National Research and Innovation Strategy for Smart Specialisation (RIS3) and the Circular Czechia 2040 strategic framework. These policy instruments promote digital transformation, resource efficiency, and the development of innovative solutions addressing climate and resource challenges in the country. Czech participation in international research and innovation projects also demonstrates an active contribution to the development and testing of digital and circular solutions in the construction sector. These initiatives, together with emerging demonstration projects and research infrastructures such as the [CirkArena](#) circular economy research centre, illustrate how the Czech ecosystem is gradually building the institutional capacity and innovation networks required to implement the strategic objectives of the Danube Region initiative.

Current Status:

The Czech Republic can be characterised as an emerging country in the transition toward circular and digital construction within the Danube Region. While a number of policy frameworks, research initiatives, and pilot projects have been established, the integration of circular economy principles and advanced digital technologies in the construction sector remains uneven and is still developing across the industry.

The Czech Republic has introduced several strategic and regulatory instruments relevant to circular construction, as outlined in the previous section, and national waste management legislation aligned with EU directives. These frameworks demonstrate a growing policy commitment to resource efficiency, lifecycle thinking, recycling of construction and demolition waste, and the development of sustainable construction standards. However, similarly to other emerging countries in the region, challenges remain in the effective implementation and enforcement of these policies, inter-ministerial coordination, and the development of infrastructure and market conditions that would enable large-scale reuse and recycling of secondary construction materials. Other relevant regulatory, technological and market barriers have been identified in the [*Cross-sectoral opportunities for CE solutions and innovations in construction and building*](#) document.

2. Vision and Mission (Territorial Adaptation)

Vision (National):

Through the integration of circular economy principles into construction, infrastructure development, and industrial production, the Czech Republic aims to improve economic competitiveness, reduce environmental pressures associated with material use, and support resilient and climate-neutral development. This vision reflects the strategic direction set by the national framework Circular Czechia 2040, which seeks to transition the Czech economy from linear to circular models of production and consumption. The strategy emphasises improved resource efficiency, increased use of secondary raw materials, stronger innovation and digitalisation capacities, and systemic changes across carbon-intensive sectors, including industry, raw materials, and construction. By embedding circular principles into product design, material flows, and construction processes, the Czech Republic wants to ensure resources remain in circulation for as long as possible while supporting sustainable economic growth and environmental resilience. In the context of the construction sector, this vision also promotes the adoption of digital tools as described above.

Mission (National):

The strategic framework Circular Czechia 2040 provides the primary policy anchor for advancing circular economy principles across sectors. At the same time, private sector initiatives such as the Czech Green Building Council's Zero Carbon Roadmap highlight the importance of digital tools for monitoring and reducing lifecycle emissions of buildings, while national public procurement strategies create opportunities to promote circular construction through the integration of environmental and material-efficiency criteria supported by digital data. The Czech Republic is also committed to integrating digital tools into the construction sector, particularly through the development and gradual implementation of BIM.

The national mission also builds on the strong engagement of Czech research institutions and industry actors in international research and innovation initiatives. Participation in projects such as RECONMATIC, ReBuilt and INDICATE has contributed to the development of digital tools for construction and demolition waste management, as well as methodologies for assessing the lifecycle carbon footprint of buildings. At the same time, emerging clusters and project platforms (such as the [Circular Construction Cluster](#) under the Reconmatic project, the [Danube CiDiCon Cluster](#) under the Circular DigiBuild project or the [Circular & Digital Construction Hubs](#) under the ReBuilt project) help to consolidate knowledge and tools, address information gaps and support the practical implementation of circular solutions in the domestic market.

The aim is to also address the structural barriers identified within the Czech policy and innovation ecosystem. Improved coordination between ministries and public institutions is essential to avoid fragmentation of policies related to construction, digitalisation, and circular economy objectives. Financial mechanisms, such as targeted subsidies, innovation funding schemes, or green public procurement, will also be necessary to support the adoption of advanced technologies and circular construction methods that currently face higher upfront costs. In parallel, the development of workforce skills and training programmes will be critical for enabling professionals to work effectively with emerging technologies, including digital material tracking (such as Digital Product Passports, Building/Material Passports, and Digital Building Logbooks), IoT-based monitoring systems, and other data-driven tools that improve transparency across construction supply chains.

Finally, flagship initiatives implemented by private developers and construction companies (such as projects [Mercury](#), [CircBoost - Modřanský cukrovar](#), [KKCG Sazka renovation](#), incorporating pre-demolition audits, selective deconstruction, urban mining approaches, increased use of secondary materials, and digital material passports) demonstrate the feasibility of circular construction in practice and serve as valuable examples that can build confidence among other stakeholders in the sector. Through the combination of policy alignment, digital innovation, stakeholder collaboration, and demonstration projects, the Czech Republic can progressively strengthen its contribution to the Danube Region's shared ambition of advancing circular and digitally enabled construction.

3. Alignment with EU Strategy for the Danube Region (EUSDR)

The Czech Republic contributes to the core pillars of the [EU Strategy for the Danube Region \(EUSDR\)](#) by embedding digitalisation, circularity, innovation, and institutional cooperation into the national construction ecosystem.

Pillar: Connecting the Region (Improved Infrastructure, Digitalization)

The Czech TAP contributes to improved infrastructure and digital integration by promoting the adoption of BIM, digital twins, and interoperable digital platforms for material tracking and

construction waste management. The integration of BIM in public construction projects, the development of digital pre-demolition audits (in particular the [TISMIC tool developed by the University Centre for Energy Efficient Buildings - UCEEB](#)), and the implementation of material passports strengthen digital infrastructure at both national and regional levels. These measures improve connectivity between actors in the construction value chain and enable the Czech Republic to actively participate in emerging Danube-wide digital supply networks for secondary materials.

Pillar: Protecting the Environment (Resource Efficiency, Waste Reduction)

Actions such as supporting digital platforms for tracking material flows, promoting selective demolition, enabling reuse hubs, and incentivizing circular procurement practices contribute to higher resource efficiency and reduced landfilling. Digital material passports and harmonized standards improve confidence in secondary materials and reduce regulatory barriers for reuse. By combining circular economy principles with digital technologies, the Czech TAP contributes to lowering CO₂ emissions from the construction sector, reducing raw material dependency, and mitigating environmental pressures associated with one of the most resource-intensive industries.

Pillar: Building Prosperity (Innovation, SME Growth)

The TAP supports prosperity by strengthening innovation capacity and enabling SMEs to adopt digital and circular construction practices. The development of financial mechanisms, targeted support for SMEs adopting BIM and digital material tracking, and participation in collaborative R&D initiatives (including cross-border innovation projects) will improve the competitiveness of Czech construction firms. Demonstration projects, living labs, and innovation clusters create opportunities for commercialization of new technologies, fostering green jobs and strengthening supply chain resilience.

Pillar: Strengthening the Region (Institutional Capacity, Collaboration)

The Czech TAP reinforces institutional capacity and multi-level governance through structured stakeholder engagement, knowledge-sharing mechanisms, and cross-border collaboration platforms. The establishment of national multi-stakeholder platforms, engagement of ministries, research institutions, industry associations, and financial actors, and participation in Danube-wide clusters boosts policy coherence and institutional learning. Improved coordination between ministries and other stakeholders reduces policy fragmentation and aligns national objectives with transnational strategy goals.

4. Strategic Pillars, Objectives, and Key Actions (National KPIs)

This section details the country-specific implementation for each of the five strategic pillars defined in the 2030 Danube Region Digital Innovation Strategy for Circular Construction. For each objective, the TAP sets out concrete national actions, responsible bodies, timelines, and

measurable KPIs with national targets, assigning responsibility for implementation and achievement to Circular DigiBuild project partners and their national construction-sector stakeholders. In addition to PP5 INCIEN, which is responsible for implementing the objectives and actions in the Czech context, Rethink Architecture will support selected objectives and related KPIs, with this involvement indicated where relevant.

Pillar 1: Enabling Policy & Regulatory Frameworks

Objective 1.1: Harmonize circular construction standards and regulations related to digitalization.

National Actions:

- Review existing national construction regulations and identify gaps/barriers for circularity and digitalization.
- Establish a national working group (involving relevant ministries, industry, and research) to propose amendments to relevant policies, aligning with the Danube Region best practices and EU directives, based on the existing Czech Regional Multi-Stakeholder Group (RMSG).
- Summarize recommendations for integrating digital tools (e.g., BIM, material passports) into regulatory compliance.
- Participate actively in transnational initiatives for policy harmonization.

National KPIs & Targets:

KPI 1.1.1 (National): Number of policy and regulatory recommendations for circular and digital construction prepared and validated through the Czech RMSG by 2030.

Target: At least 5 recommendations prepared, discussed with relevant RMSG stakeholders, and linked to EU and Danube Region strategies.

Objective 1.2: Develop and implement financial incentives for circular construction practices.

National Actions:

- Analyze existing national funding instruments for various target groups and their suitability to support circular and digital construction.
- Integrate circularity and digitalization criteria into public procurement policies for construction projects through tailored recommendations for relevant public and private stakeholders.

National KPIs & Targets:

KPI 1.2.1 (National): Number of funding and procurement recommendations supporting circular and digital construction prepared for relevant public and private stakeholders by 2030.

Target: At least 10 tailored recommendations prepared by 2030, covering both suitable funding instruments and ways to integrate circularity and digitalisation criteria into construction procurement.

Pillar 2: Fostering Digital Innovation & Technology Adoption

Objective 2.1: Promote the adoption of Building Information Modeling (BIM) and other digital technologies.

National Actions:

- Launch national awareness campaigns and workshops targeting construction companies, developers, architects and building engineers, public authorities, and educational institutions on the benefits of BIM and digital tools.
- Support the [Czech BIM strategy](#) by promoting its objectives in written outputs and presentations, and by aligning our construction-sector activities with the strategy's priorities and implementation efforts.

National KPIs & Targets:

KPI 2.1.1 (National): Number of awareness-raising and knowledge-sharing activities (such as awareness campaigns on social media and articles etc.) on BIM and digital tools in circular construction, organised by Rethink Architecture and co-organised by PP5 INCIEN by 2030.

Target: At least 5 activities by 2030.

KPI 2.1.2 (National): Number of written outputs, combined with the activities in KPI 3.1.1., and presentations that promote the Czech BIM strategy and link it to circular construction objectives, coordinated by PP5 INCIEN and supported by Rethink Architecture.

Target: In total at least 8 outputs or presentations by 2030.

Objective 2.2: Support the development and deployment of digital platforms for material tracking and waste management.

National Actions:

- Implement national data standards and material passports consistent with EU and Danube Region guidelines in our upcoming publications.
- Provide financial knowledge support for construction SMEs to integrate digital tools and collaborate with national waste management companies to integrate digital solutions for CDW tracking.

National KPIs & Targets:

KPI 2.2.1 (National): Number of publications, guidance materials or SME support activities that promote digital tools.

Target: At least 6 outputs or activities by 2030, including publications, guidance notes, workshops, consultations or knowledge-sharing sessions for construction SMEs and waste-management stakeholders.

Pillar 3: Building Skills & Capacity

Objective 3.1: Develop education and training programs for digital skills within circular construction.

National Actions:

- Integrate circular economy principles and digital construction topics into educational programmes, training activities and workshops.
- Support the establishment of voluntary partnerships between public, private and academic institutions to strengthen education, skills development and sustainable innovation in digital and circular construction.
- Launch a national online learning platform for continuous professional sharing and networking.

National KPIs & Targets:

KPI 3.1.1 (National): Number of educational or training activities integrating circular economy and digital construction topics, organised by Rethink Architecture and co-organised by PP5 INCIEN by 2030.

Target: At least 5 activities by 2030, including workshops, training sessions, lectures or professional events.

KPI 3.1.2 (National): Number of voluntary partnerships supported between public, private and academic institutions focused on digital skills and circular construction, supported by Rethink Architecture.

Target: At least 2 partnerships established by 2030.

KPI 3.1.3 (National): Number of professionals, students or stakeholders reached through education, training and networking activities, both through invitations by Rethink Architecture and PP5 INCIEN.

Target: At least 300 participants by 2030.

Objective 3.2: Promote knowledge transfer and best practice sharing among stakeholders.

National Actions:

- Organize national workshops, conferences, and seminars on circular and digital construction.
- Promote already existing platforms and hubs for best practices, case studies, and research findings (such as [Recyklujmestavby.cz](https://recyklujmestavby.cz) or [Climarchibase.cz](https://climarchibase.cz) can be utilized to promote knowledge sharing).
- Encourage participation of national stakeholders in transnational knowledge-sharing events.

National KPIs & Targets:

KPI 3.2.1 (National): Number of national knowledge-sharing events, combined with the activities in KPI 3.1.1., organised on circular and digital construction, led by Rethink Architecture and supported by PP5 INCIEN.

Target: At least 3 workshops, seminars or conference sessions by 2030.

KPI 3.2.2 (National): Number of existing platforms, hubs or case-study databases promoted through project activities, both by PP5 INCIEN and Rethink Architecture.

Target: At least 5 platforms or hubs promoted by 2030, such as [Recyklujmestavby.cz](https://recyklujmestavby.cz), [ClimArchiBase](https://climarchibase.cz) or similar initiatives.

KPI 3.2.3 (National): Number of Czech stakeholders participating in transnational knowledge-sharing events organised within the follow-up project by project partners, including PP5 INCIEN and Rethink Architecture.

Target: At least 30 Czech stakeholders involved by 2030 (subject to approval of a follow-up project; otherwise within other transnational events of the Danube CiDiCon Cluster).

Pillar 4: Strengthening Collaboration & Supply Chains

Objective 4.1: Facilitate the development of digital regional supply chains for recycled and secondary construction materials.

National Actions:

- Maintain a contact point for all relevant sectoral Danube Region stakeholders.
- Map national producers, recyclers, and designers of secondary materials to identify collaboration potential.
- Engage national producers, recyclers, and designers of secondary materials to identify collaboration potential in adopting digital circular tools.

National KPIs & Targets:

KPI 4.1.1 (National): Number of national producers, recyclers and designers of secondary materials mapped.

Target: At least 50 stakeholders mapped by 2030.

KPI 4.1.2 (National): Number of stakeholders engaged to explore collaboration on secondary materials and digital circular tools.

Target: At least 25 stakeholders engaged by 2030.

KPI 4.1.3 (National): Number of collaboration opportunities in circular and digital construction.

Target: At least 5 opportunities identified by 2030.

Objective 4.2: Promote collaboration between research institutions, industry, and governments.

National Actions:

- Engage with local platforms, working groups and networks to better understand sector-specific challenges and stay informed about new developments across academia, industry and government.
- Strengthen national public-private partnerships (PPPs) for circular construction initiatives and facilitate participation in EU programs (Horizon Europe, Digital Europe).

National KPIs & Targets:

KPI 4.2.1 (National): Number of local platforms, working groups or networks actively followed or engaged.

Target: At least 5 platforms, working groups or networks by 2030.

KPI 4.2.2 (National): Number of cross-sector meetings, consultations or exchanges held with academia, industry and public-sector actors.

Target: At least 20 exchanges by 2030.

KPI 4.2.3 (National): Number of circular construction partnership opportunities identified or supported.

Target: At least 5 partnership opportunities by 2030.

KPI 4.2.4 (National): Number of EU programme opportunities shared with relevant Czech stakeholders.

Target: At least 5 relevant Horizon Europe, LIFE, Interreg or similar opportunities shared by 2030.

Pillar 5: Raising Awareness & Changing Mindsets

Objective 5.1: Implement awareness campaigns to promote the benefits of digitalization within circular construction.

National Actions:

- Design and execute targeted national communication campaigns for construction companies, policymakers, and the public, led by PP5 INCIEN and supported by Rethink Architecture.
- Utilize various channels (social media, national media, industry events, educational programs) to disseminate information.
- Highlight national success stories and economic/environmental benefits of circular and digital practices.

National KPIs & Targets:

KPI 5.1.1 (National): Reach of national awareness campaigns (number of people informed through various channels) by 2030, led by PP5 INCIEN and supported by Rethink Architecture.

Target: 10,000 people by 2030.

Objective 5.2: Encourage the adoption of digital technologies focusing on circular economy principles used in construction business models.

National Actions:

- Promote examples of Czech companies applying circular business models enabled by digital tools (e.g. material passports, pre-demolition audits, reuse platforms) in publications, events and on existing knowledge platforms, led by PP5 INCIEN and supported by Rethink Architecture.
- Offer knowledge support to construction SMEs interested in developing circular and digital business models, in cooperation with the Czech RMSG and the Danube CiDiCon Cluster.

National KPIs & Targets:

KPI 5.2.1 (National): Number of Czech construction companies or initiatives with circular and digitally enabled business models showcased or supported through project activities, led by PP5 INCIEN and supported by Rethink Architecture.

Target: At least 3 companies or initiatives by 2030.

5. National Context and Challenges

SWOT Analysis:

Strengths

- **Strategic policy preparedness framework for circular economy:** The Czech Republic has adopted long-term strategies such as “Circular Czechia 2040”, which provide a national vision for resource efficiency and circular construction.
- **Growing adoption of digital tools in construction,** particularly Building Information Modeling (BIM), supported by initiatives such as the concept for BIM introduction in public administration.
- **Strong research and innovation ecosystem in sustainable construction,** led by universities, think tanks and other research centres, and involvement in international R&D projects (e.g., RECONMATIC, INDICATE, CirCon4Climate).
- **Active private sector and pilot projects,** including companies like Skanska or KKCG implementing circular supply chains, urban mining, and material recovery in construction projects.
- **Increasing focus on lifecycle approaches,** including Life Cycle Assessment (LCA) and whole-life carbon methodologies for buildings.

Weaknesses

- **Fragmented governance and limited inter-ministerial coordination,** which slows implementation of circular construction policies and strategies.
- **Low adoption of advanced circular and digital technologies** (e.g., material passports, urban mining technologies, blockchain for material traceability).
- **Insufficient infrastructure** for high-quality recycling and reuse of construction materials, limiting large-scale circularity.
- **Data gaps and weak digital integration** from research institutes to the real construction practice across the construction value chain, making lifecycle tracking of materials difficult.
- **Labour shortages** and limited availability of skilled professionals with expertise in digital and circular construction methods.

Opportunities

- **EU policy and funding frameworks** (e.g., Clean Industrial Deal, NRPP, Horizon Europe, European Competitiveness Fund) supporting innovation in sustainable and digital construction.
- **Expansion of digitalization,** including BIM, digital product/material passports, and data platforms enabling traceability of materials and circular procurement.
- **Growth in timber construction and bio-based materials,** which align with circular and low-carbon building strategies.

- **Development of urban mining and secondary material markets** from construction and demolition waste.
- **Cross-border collaboration and R&D projects** in the Danube region, but not only in the Danube region, enabling knowledge transfer and scaling of circular solutions.

Threats

- **High costs of advanced circular and digital technologies**, especially for SMEs in the construction sector.
- **Slow adoption of innovative construction methods** due to conservative market practices and risk aversion in the industry.
- **Regulatory and certification barriers** for the use of secondary materials and innovative technologies.
- **Market fragmentation and weak collaboration** among stakeholders across the construction value chain.
- **Volatility in construction costs and labour shortages**, which can reduce investments in innovation and circular solutions.

Addressing National Gaps:

The previously created [Analysis](#) "Cross-sectoral opportunities for CE solutions and innovations in construction and building" identifies several structural gaps that hinder the adoption of circular economy solutions and digital technologies in the construction sector across the Danube region. One of the most significant barriers is the high cost of advanced circular technologies, such as modular construction systems, digital material tracking tools, and innovative recycling technologies. These costs limit adoption, particularly among small and medium-sized enterprises, which dominate the construction sector in many countries. Closely related to this issue is the poor integration of digital tools across the construction value chain. While technologies such as BIM, IoT, and digital platforms exist, their implementation is often fragmented and systems are not interoperable, preventing effective data sharing and coordination between stakeholders.

Another major gap concerns the lack of infrastructure for recycling and reuse of construction materials. Many countries lack sufficient facilities and logistics systems for processing construction and demolition waste into high-quality secondary materials, which restricts the development of circular material markets. In addition, stakeholders face limited access to CE technologies, particularly advanced tools for circular design, smart demolition, and material tracking. This technological gap is further compounded by weak linkages between stakeholders, including construction firms, technology providers, policymakers, and research institutions, which slows down innovation and limits knowledge transfer.

The analysis also highlights inadequate data availability and poor interoperability of digital systems, which hinder lifecycle analysis, material traceability, and evidence-based decision-making. At the same time, low levels of investment in research and development and shortages of skilled professionals reduce the sector's capacity to adopt new circular and digital solutions. Finally, the limited number of pilot projects and demonstration facilities restricts the ability to test and scale innovative approaches in real-world conditions, while regulatory barriers and insufficient certification systems for secondary materials create additional obstacles to market uptake of circular construction practices.

Czech Context

In the Czech Republic, many of the gaps identified in the regional analysis are also present, although the country demonstrates growing engagement with circular construction through research initiatives and emerging policy frameworks. One of the key challenges remains the high cost of advanced circular and digital technologies as well as the high costs of recycled / natural materials compared to primary raw materials, which limits widespread adoption across the construction sector, particularly among smaller firms. Although digital tools such as BIM are gradually being introduced, the sector still faces poor integration and interoperability of digital systems, which restricts the effective sharing of data across the building lifecycle and reduces the potential benefits of digitalization for circular resource management.

Another important gap concerns the limited infrastructure and market development for recycling and reuse of construction and demolition waste. While recycling rates are gradually improving, the availability of high-quality secondary materials and dedicated processing infrastructure remains insufficient to support large-scale circular construction. What is also missing are re-use centers (i.e. temporary storage spaces for secondary materials). The Czech construction sector also experiences limited access to advanced circular technologies, including digital material passports, urban mining tools, and circular design software, which slows the transition toward more resource-efficient building practices.

Furthermore, the sector is affected by fragmented coordination between policy areas and institutions, which complicates the implementation of national circular economy strategies such as Circular Czechia 2040. This governance fragmentation contributes to gaps in data availability and digital infrastructure, making it difficult to monitor material flows, calculate lifecycle carbon emissions, or support circular procurement. The country also faces skills shortages and limited capacity in circular and digital construction, as well as a relatively small number of large-scale pilot projects that could demonstrate the economic and environmental benefits of circular building solutions. Strengthening collaboration between research institutions, industry stakeholders, and public authorities will therefore be essential to accelerate the transition toward circular and digitally enabled construction practices in the Czech Republic.

6. Financial Strategy (National Level)

Funding Sources:

National Budget:

Relevant national grant programmes for projects that run competitive open calls for funding applicable to digital and circular construction include:

- [Technology Agency of the Czech Republic](#) (TA ČR)
 - [SIGMA programme](#) - *A comprehensive R&D&I support tool across disciplines, tailored to the needs of society and the economy.*
 - [Environment for Life 2 programme](#) - *Support for projects whose research will focus primarily on those thematic areas where the greatest global pressures on the environment arise, namely natural resources, global change, the circular economy, sustainable development of the landscape and human settlements, environmentally friendly technologies and eco-innovation, and the development of an environmentally friendly society.*
 - [TREND programme](#) - *Increasing the international competitiveness of businesses by supporting industrial research and experimental development projects and by implementing their results in practice, particularly in industrial production and in the range of products offered on the market. A sub-objective is the application of circular economy principles by introducing innovations in the areas of obtaining secondary raw materials that can be fully utilized in industry and construction.*
- [National programme Environment](#) (NPŽP: Národní program Životní prostředí), in particular *Priority Area 7: Innovation and Demonstration Projects - 7.1.C Waste - Practices leading to the reuse and increased recycling of construction and demolition waste*. However, there have not been any recent nor are there currently any open or planned calls related to innovative waste management, including CDW.

EU Structural Funds (ERDF, ESF):

The main EU funded programmes in the Czech Republic with relevance to digital and circular construction in the 2021-2027 period are:

- [Operational programme Technologies and applications for competitiveness](#) (OP TAK: Operační program Technologie a aplikace pro konkurenceschopnost), e.g.
 - [Circular Economy - 2nd Call](#) (ending 30.7.2026) - *Supporting the acceleration of the Czech Republic's transition to a circular economy through the implementation of technologies that prevent waste generation, expand recycling*

infrastructure, reduce waste of secondary raw materials, and increase the proportion of recycled materials in products.

- [Innovation vouchers - 4th Call](#) (ending 30.4.2027) - *Procurement of consulting, expert, and support services in the field of innovation for small and medium-sized enterprises from research and knowledge dissemination organizations or accredited entities.*
- Note: Additional funding for Circular Economy projects in the enterprise sector was also provided through the National Recovery and Resilience Plan ([NPO: Národní plán obnovy](#)) but there are no current or planned additional funding calls for this component.
- [Operational programme Just Transition](#) (OP ST: Operační program Spravedlivá transformace), e.g. [102. Call – Vouchers for entrepreneurs II](#) (Ústí nad Labem region, closed on 30.4.2026). The specific objective of OP ST is to enable the Czech Republic's three just transition regions (Ústí nad Labem, Karlovy Vary and the Moravian-Silesian region) and their citizens to address the social, economic, and environmental impacts of the transition to a climate-neutral economy.
- [Operational Programme Environment](#) (OP ŽP: Operační program Životní prostředí), e.g. [Call no. 1/2025 FN Financial instrument for Circular Economy](#) (Finanční nástroj pro oběhové hospodářství) - *Support for projects that will increase the capacity to process selected types of waste, in the form of a financial instrument—a financial guarantee covering 50% of the principal amount of a commercial loan, combined with a grant component in a single transaction.*

Plans for the 2028-2034 period

At the time of preparation of this TAP, the Czech Republic's National Regional and Partnership Plan (NRPP) was still under development, to be completed by the end of 2026. The draft NRPP (Q1 2026), which will consolidate the current Operational Programmes into an integrated implementation framework for the [national Cohesion Policy for the 2028-2034 period](#), includes climate change adaptation, **sustainable resource use** and environmental protection as the first of 15 thematic priorities. Under sustainable resource use, the draft NRPP proposes nationwide support (via a combination of subsidies and loans) for activities to expand infrastructure and technological capacities for the transition to a circular economy and increase the use of recycled and other sustainable materials. The NRPP should therefore continue to provide a range of funding programmes for companies, local and regional authorities and other stakeholders to implement specific projects and investments to boost circularity in construction.

On 30.4.2026, three new OP ST calls were opened to support preparation (feasibility studies and plans) for strategic projects for the 2028+ period in the Czech Republic's three just transition regions (e.g. [Call 106 for the Ústí region](#)). These could include projects related to waste

management, brownfield development or other projects relevant to development of a circular construction ecosystem in these regions.

Horizon Europe / Innovation Fund / European Competitiveness Fund (ECF):

Czech research organisations, enterprises and non-profit organisations have the opportunity to participate in or lead EU consortia for a number of open or planned **Horizon Europe** calls for research and innovation programmes related to circular and digital construction for 2026 and 2027, including the following:

- [HORIZON-CL5-2026-09-D4-03](#): Advanced data platforms to integrate whole life carbon in building information tools, assessments, and certification (Built4People Partnership)
- [HORIZON-MISS-2026-04-CIT-NEB-B4P-CCRI-03](#): Introducing circular economy models in the construction sector, from buildings to city scale
- [HORIZON-NEB-2026-01-REGEN-02](#): Advancing sustainable maintenance and repair measures for existing buildings
- [HORIZON-CL5-2027-05-D4-07](#): Integrating circularity in LCA-based modelling frameworks for renovation of buildings (Built4People Partnership)
- [HORIZON-CL6-2027-01-CIRCBIO-02](#): Enhancing ecodesign and circularity of construction products
- [HORIZON-NEB-2027-01-BUSINESS-01](#): Mass customisation of offsite manufactured modular construction components to transform the existing built environment
- [HORIZON-NEB-2027-01-REGEN-01](#): Combining conventional and innovative construction materials, products and techniques for sustainable and beautiful buildings

The **Innovation Fund (IF)** includes “circular economy and reuse solutions” as one of its funding areas for energy-intensive industries, including cement production. Funding via the IF in the Czech Republic is managed by the [Ministry of Environment](#). No projects in this area have been supported to date in the Czech Republic, but examples from other EU countries illustrate the potential of the IF to support circularity for industry decarbonisation:

- [ERACLITUS](#): Expanding the Range of Clinker Substitutes. Designing a Sustainable Future for Cement Sector (Spain)
- [CO2ncrEAT](#): Cement-free building products with negative carbon footprints by using CO₂ gas and by-product from lime and stainless steel plants (Belgium)
- [LCSCM](#): NeoCem Low-Carbon Supplementary Cementitious Materials (France)

The European Commission’s proposal for the 2028–2034 Multiannual Financial Framework includes a new [European Competitiveness Fund \(ECF\)](#). In combination with Horizon Europe (EUR 175 billion) and the Innovation Fund (EUR 41.2 billion), the ECF is to raise over EUR 450 billion of funding across four priority areas, including:

- Clean transition and industrial decarbonisation;
- Health and biotech, agriculture and bioeconomy;
- Digital leadership;
- Resilience and security, defence industry and space.

At the time of this TAP, national funding and allocations have not yet been determined, but the listed priority areas, especially industrial decarbonisation and digital leadership, are well aligned with the priorities and objectives of the Circular DigiBuild project.

Other funding opportunities for digital and circular construction related to education, stakeholder engagement and capacity building should also be considered where eligible as part of the EU's [LIFE](#) and [Erasmus+](#) programmes.

Interreg (Danube Region and other programmes):

A number of regional cooperation projects involving project partners from the Czech Republic have been implemented in the 2021-2027 period, including [Circular DigiBuild](#) (Danube) and [ReBuilt](#) (Central Europe). There are no further calls expected under eligible Interreg programmes for the Czech Republic (Europe, Central Europe, Danube, cross-border programmes with neighbouring countries and regions) relevant to circular and digital construction in this period. Based on the Commission's MFF proposal, a minimum overall budget of EUR 10 billion is to be allocated to Interreg regional programmes outside the envelope of national NRPPs, with priority areas consolidated as chapters within an integrated Interreg programme. At the time of this TAP, Interreg priorities and allocations for the 2028-2034 period have not yet been determined.

Private Investment:

These could include the following:

- **Venture Capital (VC) and Startup Equity**
 - **Focus:** High-growth "ConTech" and "PropTech" startups specializing in AI, BIM platforms, and digital marketplaces for recycled materials.
 - **Key Vehicles:** Regional VC firms (e.g., KAYA VC, Nation 1) and the **RRF Fund of Funds**, which uses EIF management to channel capital into Czech tech startups.
- **Corporate Investment and Corporate Venture Capital (CVC)**
 - **Focus:** Strategic partnerships where large construction groups (e.g., VINCI/Eurovia, Skanska) invest in new material technologies or robotics to decarbonize their own supply chains.
 - **Value Add:** Provides a "sandbox" (real construction sites) for piloting innovations, which is often a prerequisite for further private scaling.
- **Blended Finance and "De-risked" Debt**

- **Focus:** Attracting commercial bank loans (e.g., from ČSOB or KB) for "high-risk" circular projects that utilize unproven materials or methods.
- **Key Vehicles: National Development Bank (NRB)** mezzanine financing and **InvestEU guarantees**, which provide the credit enhancement necessary to secure private institutional lending.
- **Public-Private Partnerships (PPPs)**
 - **Focus:** Long-term infrastructure projects (schools, hospitals, transport) that utilize "Availability-based" payment models.
 - **Key Driver:** The 2027 BIM mandate and circular procurement rules attract "Impact Investors" and pension funds seeking stable, long-term yields from assets designed for high durability and low maintenance.
- **Corporate and Foundation Grant Programmes**
 - **Focus:** Private companies, corporate foundations and sectoral initiatives may support circular and digital construction through their own grant programmes, especially in areas such as sustainable materials, waste prevention, reuse, innovation in housing, pilot testing, education and applied research.
 - **Key Vehicles:** Examples include corporate or foundation grant schemes such as Nadace Tipsport environmental grants, including programmes focused on waste reduction and climate-related projects, and Inovace od Buřinky, which supports innovative material and technological solutions for sustainable housing.
 - **Value Add:** These programmes can provide flexible early-stage funding for pilots, prototypes, awareness activities and cross-sector partnerships that may be too small, experimental or locally specific for standard public funding instruments.

Budget Allocation

The Czech TAP does not define a fixed budget allocation, as PP5 INCIEN is not in the position to allocate financial resources from national, regional or EU funding programmes. Instead, this section provides an indicative overview of how available and future funding sources could be thematically linked to the five TAP pillars and related national actions.

Indicatively, funding for Pillar 1 should focus on governance, policy coordination, analysis of regulatory and financial barriers, and preparation of recommendations for circular and digital construction. Relevant sources may include the state budget, TA ČR programmes, OP TAK, OPŽP, LIFE and future national or EU instruments supporting policy innovation, circular economy and digitalisation.

For Pillar 2, funding should primarily support digital innovation, BIM adoption, material passports, digital tools for material tracking, CDW data systems and pilot applications in construction practice. Suitable sources include OP TAK, OPŽP, TA ČR, Horizon Europe, Digital Europe, Interreg, the National Recovery Plan where relevant, and private co-financing from companies, investors or corporate innovation programmes.

For Pillar 3, budget priorities should focus on capacity building, education, training, professional workshops and knowledge-sharing activities. These activities could be supported through the state budget, TA ČR, Erasmus+, LIFE, Horizon Europe, regional RIS3 funds and private or foundation grant programmes.

For Pillar 4, funding should support collaboration mechanisms, stakeholder mapping, supply-chain development, public-private partnerships, and pilot cooperation between producers, recyclers, designers, research organisations, public authorities and industry actors. Relevant sources may include OP TAK, OPŽP, IROP-type instruments, regional RIS3 funds, Horizon Europe, Interreg, LIFE, private investment and corporate grant programmes.

For Pillar 5, indicative funding should support communication, awareness raising, dissemination of best practices and promotion of successful circular and digital construction examples. These activities may be linked to LIFE, Interreg, Horizon Europe, Erasmus+, national communication budgets, private co-financing and project-based dissemination resources.

Overall, future budget allocation should prioritise capacity building, pilot projects, financial instruments, governance and stakeholder coordination, in line with the transnational strategy. Specific amounts will depend on the eligibility rules, timing and available allocations of individual funding calls. The TAP will therefore serve mainly as a strategic framework to help Czech stakeholders identify suitable funding opportunities and align future project proposals with the objectives of circular and digital construction.

7. Implementation Plan (National Level)

Governance Structure:

The implementation of the TAP will be overseen by a national steering group coordinated by the Institute of Circular Economy (INCIEN). The steering group will consist of INCIEN representatives, Rethink Architecture and interested members of the Czech Regional Multi-Stakeholder Group, and will invite representatives of the relevant ministries (in particular the Ministry of the Environment, the Ministry for Regional Development and the Ministry of Industry and Trade) to its meetings, together with partners from the Danube CiDiCon Cluster. INCIEN will be responsible for the overall coordination, implementation and monitoring of the

TAP at national level, including stakeholder engagement, progress tracking and reporting. Partners within the Danube CiDiCon Cluster will provide strategic input, peer learning and periodic review of progress, supporting the exchange of good practices and consistency with the broader Cluster objectives.

Timeline:

All proposed KPIs are to be achieved by 2030, with the following indicative milestones: 2026 – set-up of the national steering group and start of stakeholder mapping; 2027 – first policy, funding and procurement recommendations and first education and awareness activities; 2028 – mid-term review of KPI progress within the Danube CiDiCon Cluster and adjustment of activities where needed; 2029 – completion of stakeholder mapping and consolidation of partnerships; 2030 – final assessment of all national KPIs and reporting to the Cluster.

Monitoring and Evaluation:

A national framework for tracking progress will be established by INCIEN, based on monitoring the agreed national KPIs. Progress will be recorded annually and reviewed at regular Danube CiDiCon Cluster meetings with partners, with a mid-term review in 2028 and a final assessment in 2030.

Risk Management:

Potential risks to the implementation of the TAP include funding delays, limited political support, low industry uptake, and shortages of skilled professionals in circular and digital construction. To mitigate these risks, the strategy will rely on diversified funding opportunities and alignment with existing national and EU initiatives, continuous stakeholder engagement with public authorities and industry, awareness-raising and knowledge-sharing activities to increase industry participation, and capacity-building efforts to support skills development in circular and digital construction practices.

8. Stakeholder Engagement (National Level)

Collaboration Mechanisms:

Communication and collaboration will be facilitated through national stakeholder exchanges within the Danube CiDiCon cluster, as well as through participation in working groups linked to the Danube Region governance structures. The platform established through the Circular DigiBuild project will be used to share progress, collect feedback, and coordinate activities with regional partners. Collaboration will also be supported through online communication tools.

Involvement of Key Groups:

Governments / Public Authorities: Engagement will take place through targeted consultations and knowledge-sharing activities coordinated by INCIEN, involving relevant ministries and

public bodies to support policy alignment and the integration of circular construction priorities into existing strategies and initiatives.

Industry Associations & SMEs: Industry stakeholders will be engaged through workshops, pilot activities, and knowledge exchange within the Danube CiDiCon cluster, encouraging innovation, testing of circular solutions, and practical implementation.

Research & Education Institutions: Collaboration with universities and research centres will support scientific input, development of methodologies and tools, and capacity-building activities related to circular and digital construction.

Financial Institutions & Investors: Dialogue with financial actors will focus on exploring opportunities for financing circular construction initiatives and supporting the scaling of CE-based business models.

Civil Society & NGOs: Public awareness and transparency will be supported through dissemination activities, stakeholder engagement, and cooperation with civil society organizations working on circular economy and sustainability.

Communication Plan:

A national communication plan will be coordinated by PP5 INCIEN, in line with the communication activities of the Danube CiDiCon Cluster, to ensure transparency, visibility and continuous dissemination of TAP activities and results in the Czech Republic. It will include regular news on INCIEN's website and social media, articles and publications linked to the KPIs, presentations at national events and workshops, and promotion through existing platforms such as Recyklujmestavby.cz and ClimArchiBase.

9. Sustainability and Scalability

Sustainability Mechanisms: The outcomes and initiatives developed under the TAP will be sustained through the continued collaboration of partners in the Danube CiDiCon Cluster, the national steering group and the Czech Regional Multi-Stakeholder Group, and through the use of existing platforms and networks rather than new structures. Follow-up activities will be financed through the funding sources identified in Section 6.

Scalability Strategies: Successful pilot initiatives and approaches will be replicated and adapted in the Czech Republic, where relevant, through stakeholder networks, workshops and knowledge exchange activities, and shared with other Danube countries through the Danube CiDiCon Cluster platform.

Territorial Action Plan (TAP) for Digital Innovation in Circular Construction

Germany | PP04 – Hof University of Applied Sciences (HSH)

Table of Content

1. Introduction / Executive Summary	2
2. Vision and Mission (Territorial Adaptation)	3
3. Alignment with EU Strategy for the Danube Region (EUSDR)	3
4. Strategic Pillars, Objectives, and Key Actions (National KPIs)	5
Pillar 1: Enabling Policy & Regulatory Frameworks	5
Pillar 2: Fostering Digital Innovation & Technology Adoption	6
Pillar 3: Building Skills & Capacity	8
Pillar 4: Strengthening Collaboration & Supply Chains	11
Pillar 5: Raising Awareness & Changing Mindsets	12
5. National Context and Challenges	14
6. Financial Strategy (National Level)	16
7. Implementation Plan	19
8. Stakeholder Engagement	20
9. Sustainability and Scalability	22

1. Introduction / Executive Summary

Purpose:

This Territorial Action Plan (TAP) reflects potential developments and measures which may contribute to the further development of a circular-oriented construction industry in the Danube region. It is a project document developed within the Circular DigiBuild project (Interreg Danube Region). It represents a set of recommendations for the construction sector stakeholders in Germany – businesses, research institutions, professional organisations and public authorities – who may wish to contribute to the objectives of the 2030 Danube Region Digital Innovation Strategy for Circular Construction.

The TAP is not a formal government document, nor is it adopted by any public or other body. It serves as a non-binding proposal and stimulus for possible project initiatives, pilot actions and partnerships, and is recommendatory in nature.

The German TAP is fully in line with existing national policy frameworks, in particular with the German National Circular Economy Strategy (Nationale Kreislaufwirtschaftsstrategie). It does not introduce parallel objectives or conflicting measures, but complements national priorities by translating them into a Danube Region and transnational cooperation perspective.

In this sense, the TAP may add value by linking German experiences, approaches and best practices to the macro-regional context of the Danube Region, supporting knowledge transfer, comparability and cooperation across borders, while remaining fully consistent with national strategies and competences.

Alignment:

The German TAP is fully aligned with the vision, mission, and the five strategic pillars of the Danube Region Strategy. As one of the more advanced countries in the field of circular economy and digitalization, the German TAP highlights potential opportunities related to scaling, standardization and the transfer of proven practices to regional and transnational levels.

Current Status:

Germany is considered one of the more advanced countries in the field of circular economy and digital construction processes.

Examples of existing strengths and developments include, among others:

- the implementation of Building Information Modelling (BIM; particularly in public construction projects),
- a strong research landscape,
- pilot projects on material passports and urban mining.

At the same time, challenges may persist with regard to widespread implementation, the harmonisation of standards, the use of digital material data across the entire value chain, and capacity building among small and medium-sized enterprises (SMEs).

2. Vision and Mission (Territorial Adaptation)

Vision:

By 2030, Germany could further build on its existing experience to contribute, where relevant, as a reference for the application and exploration of digital and circular construction approaches within the Danube Region, with a view to potentially supporting scaling processes, standardization efforts and mutual learning.

Mission:

Interested stakeholders from research, industry, public administration and civil society may cooperate on a voluntary basis to explore and demonstrate, and where appropriate to share insights on, the use of digital technologies as enablers of circular economy principles in the construction sector, within national contexts and across the Danube Region.

3. Alignment with EU Strategy for the Danube Region (EUSDR)

The German TAP is in line with the EU Strategy for the Danube Region (EUSDR) and seeks to illustrate contributions to relevant priority areas by linking digital innovation and circular economy approaches in the construction sector.

Pillar: Connecting the Region (Improved Infrastructure, Digitalization)

The German TAP is intended to support the EUSDR's objective of regional networking, in particular by highlighting the relevance of digital construction processes, interoperable data standards and shared digital platforms.

The increased use of BIM, digital material passports and platform-based solutions for material tracking could support cross-border cooperation, facilitate data exchange along construction value chains and contribute to improved digital connectivity within the Danube Region.

Pillar: Protecting the Environment (Resource Efficiency, Waste Reduction)

The TAP is intended to contribute to the EUSDR's environmental protection objectives by highlighting the potential role of digital technologies in supporting circular economy approaches in the construction sector.

Digital tools can support improved planning, tracking and reuse of building materials, contribute to reduced construction and demolition waste, and increase transparency regarding material flows.

In this sense, the TAP may help illustrate pathways that could contribute to reduced use of primary raw materials, lower CO₂ emissions and overall environmental impacts.

Pillar: Building Prosperity (Innovation, SME Growth)

By highlighting digital innovation, examples from pilot initiatives and possible support schemes for SMEs, the German TAP seeks to underline the relevance of competitiveness within the construction and building materials sector.

The combination of digitalization and circular business models may create new market opportunities, foster technological innovation and support sustainable economic development and employment within the Danube Region.

Pillar: Strengthening the Region (Institutional Capacity, Collaboration)

The TAP is intended to support the EUSDR's objectives of strengthening institutional capacity and regional cooperation.

In this context, coordinated governance approaches and the voluntary participation of German stakeholders in transnational networks could be explored as potential supporting elements.

Existing German experiences, standards and best practices could serve as reference points for macro-regional dialogue, knowledge transfer and policy learning, potentially contributing to the gradual harmonisation of approaches within the Danube Region.

4. Strategic Pillars, Objectives, and Key Actions (National KPIs)

This section outlines Germany-specific perspectives and illustrative approaches related to the five strategic pillars defined in the Danube Region Strategy.

For each pillar and objective, possible examples of national actions and indicative reference KPIs are described in order to illustrate potential implementation pathways and areas of focus. These elements are intended to serve as orientation and guidance for interested stakeholders and do not represent binding actions, timelines or targets.

Pillar 1: Enabling Policy & Regulatory Frameworks

Objective 1: Support dialogue and exploration of harmonized approaches to circular construction standards and regulations related to digitalization.

National Actions:

Under the building regulations of the individual federal states in Germany, the submission of BIM models is currently not mandatory, as planning documentation is generally submitted in PDF format. At the same time, BIM models are increasingly discussed as a relevant element for supporting circular economy approaches within the construction sector. For example, the federal state of North Rhine-Westphalia is engaged in initiatives aimed at advancing the use of BIM in planning and approval processes through pilot activities and digitalization initiatives.

Against this background, the potential role of BIM models in planning permission processes could be explored, for example through applied research activities, pilot projects or analytical studies. Such activities may help illustrate potential benefits and practical implications of BIM-based documentation and could inform future dialogue with relevant authorities and stakeholders on possible regulatory developments.

National KPIs & Targets:

KPI 1:

Availability of documented research findings, pilot experiences or analytical inputs addressing the potential role of BIM-based documentation in building regulatory and permitting processes in Germany, by 2030.

Target:

Studies, pilot activities or structured dialogue formats may be available that explore the use of BIM models in the context of building regulations, serving as reference inputs for future discussion and policy learning.

Pillar 2: Fostering Digital Innovation & Technology Adoption

Objective 2.1: Support the adoption and further exploration of Building Information Modeling (BIM) and other digital technologies.

National Actions:

- Information campaigns, expert lectures and workshops on BIM, AI and IoT in the context of circular construction could help to raise awareness and understanding among construction companies, public authorities and universities.
- Project activities demonstrating the practical application of BIM, AI, digital twins and IoT in sustainable and circular construction could be encouraged and made visible through existing documentation, dissemination or funding-related frameworks.
- Integration of digital construction and circular economy topics into education and training programs and academic curricula could be encouraged where relevant.

National KPIs & Targets:

KPI 2.1.1:

Availability of information and awareness-raising activities related to BIM, AI and IoT in the context of circular construction, by 2030.

Target:

Information campaigns, expert lectures, workshops or similar dissemination activities may serve as reference activities illustrating awareness-raising efforts related to BIM, AI and IoT in circular construction contexts.

KPI 2.1.2:

Visibility and documentation of pilot or demonstration projects showcasing the practical application of digital technologies in circular construction by 2030.

Target:

Pilot or demonstration projects may provide illustrative examples of how BIM, AI, digital twins or IoT can be applied in sustainable and circular construction contexts and documented for knowledge-sharing purposes.

KPI 2.1.3:

Inclusion of digital construction and circular economy topics within higher education teaching and learning activities, by 2030.

Target:

Digital construction and circular economy topics may be addressed within higher education teaching and learning activities, for example through modules, practice-oriented learning formats or other curricular or extra-curricular approaches.

Objective 2.2: Support the development and deployment of digital platforms for material tracking and waste management.

National Actions (research-oriented perspective):

- Applied research activities and pilot collaborations with companies from the construction sector, the recycling industry and the circular economy could support the testing and further development of digital platforms for tracking construction materials and construction and demolition waste (CDW).
- Scientific support for the development and harmonisation of data models, material information structures and digital material passport concepts could be provided in alignment with EU-level and Danube Region guidelines.
- Participation in interdisciplinary project consortia (e.g. involving universities, SMEs, technology providers and municipalities) could help explore practical use cases of digital marketplaces and tracking tools for secondary construction materials.
- Methodological and technical support for SMEs, including requirements analysis, assessment of existing digital solutions and identification of integration barriers from a user and process perspective, could help address practical implementation challenges.
- Collaboration with waste management and recycling companies could support the analysis of existing material flow data, the assessment of digitalization

potentials and the identification of opportunities for improved transparency and traceability through digital tools.

- Documentation and dissemination of findings from pilot activities and case studies could support knowledge transfer and provide reference inputs for potential future implementation and scaling by interested public or private actors.

National KPIs & Targets:

KPI 2.2.1:

Applicability of digital platforms, data models and material tracking concepts for circular construction and CDW management, by 2030.

Target:

Digital platform solutions and material tracking concepts may be investigated, tested and evaluated with regard to interoperability, data structures and practical applicability within applied research and pilot collaboration contexts.

KPI 2.2.2:

Extent of construction material flows and CDW-related data digitally analysed or documented within pilot or research contexts, by 2030.

Target:

Digital analysis and documentation of construction material and waste streams may provide illustrative insights into the potential role of digital tools for supporting circular construction approaches.

Pillar 3: Building Skills & Capacity

Objective 3.1: Support the development and integration of education and training activities addressing digital skills within circular construction.

National Actions:

- Integration of circular economy and digital construction topics (e.g. BIM, digital material passports, life-cycle thinking) into existing study modules at universities and universities of applied sciences, particularly in architecture and civil engineering programs, could support the transfer of digital and circular knowledge to future generations.

- Cooperation with industry partners from the construction, planning and recycling sectors could support practice-oriented learning formats, student projects and academic theses.
- Digital tools, case studies and lessons learned from research and pilot projects (e.g. Circular DigiBuild) could be incorporated into teaching and training activities where relevant.
- Knowledge transfer and capacity building could also be supported through workshops, teaching materials and open learning formats that are accessible beyond formal curricula.

National KPIs & Targets:

KPI 3.1.1:

Availability and further development of education and training formats addressing digital and circular construction skills, by 2030.

Target:

Education and training formats may address digital and circular competencies within construction-related education and training activities.

KPI 3.1.2:

Engagement of universities and educational institutions in addressing digital and circular construction topics within teaching and training activities, by 2030.

Target:

Higher education institutions may integrate digital and circular construction approaches into teaching and learning activities through various curricular or extra-curricular formats.

Objective 3.2: Support knowledge transfer and best-practice sharing among stakeholders.

National Actions:

- Contribution to national and transnational knowledge-sharing formats within the project context, such as workshops, seminars or conference sessions on digital and circular construction, with the aim of initiating dialogue and exchange.

- Compilation, documentation and structured presentation of research findings, pilot results and case studies generated during the project, making them available through project outputs and existing dissemination channels.
- Support for exchange between academia, industry and other stakeholders through project-related peer-learning formats, interviews and targeted consultations conducted within the project timeframe.
- Provision of reference materials and illustrative experiences documented within Circular DigiBuild, made available as reference inputs that may be used by interested stakeholders for transnational knowledge-sharing activities beyond the project duration.

National KPIs & Targets:

KPI 3.2:

Availability of documented national and transnational knowledge-sharing inputs as reflected in the TAP, by 2030.

Target:

Project-based documentation, case studies and dissemination materials may remain accessible as reference inputs for national stakeholders interested in transnational knowledge exchange beyond the project duration.

Pillar 4: Strengthening Collaboration & Supply Chains

Objective 4.1: Support the development of digital regional supply chains for recycled and secondary construction materials.

National Actions:

- Support for networking and exchange activities between producers, recyclers, planners and technology providers could help identify potentials for digital and circular supply chains in construction.
- Scientific input and analytical validation of data models and material passport concepts could support improved traceability and reuse of secondary construction materials.
- Documentation and dissemination of insights and lessons learned from collaborative and pilot-oriented activities could provide reference inputs for future implementation by interested and competent actors.

National KPIs & Targets:

KPI 4.1:

Availability of documented examples of collaboration and knowledge exchange between stakeholders involved in digital and circular construction supply chains, by 2030.

Target:

Documented exchange activities and illustrative examples may support improved understanding of digital tools, data requirements and collaboration models for circular construction supply chains.

Objective 4.2: Support collaboration between research institutions, industry, and governments.

National Actions:

- Contribution to collaborative exchange formats linking research institutions, industry actors and public stakeholders within research-driven contexts.
- Participation in or reference to interdisciplinary project consortia addressing digital and circular construction topics, such as advanced materials, digital twins or data-driven resource management approaches.

- Support for pilot-oriented collaboration formats, for example in the form of case studies, applied research projects or living-lab-like settings embedded in funded projects.
- Provision of information and dissemination activities that may facilitate connections to relevant EU programs and transnational networks (e.g. Horizon Europe, Digital Europe), for example through communication activities and consortium-building exchanges.

National KPIs & Targets:

KPI 4.2:

Availability of examples of cross-sector collaboration between research institutions, industry and public stakeholders, by 2030.

Target:

Documented collaborative activities and consortia may provide illustrative experiences and transferable insights relevant for future cooperation between academia, industry and public actors.

Pillar 5: Raising Awareness & Changing Mindsets

Objective 5.1: Support awareness-raising on the benefits of digitalization within circular construction.

National Actions:

- Contribution to awareness-raising activities such as workshops, conference presentations and dissemination events addressing digital and circular construction.
- Use of existing communication and dissemination channels (e.g. project websites, academic and professional networks, events) to share documented insights, research results and pilot experiences.
- Presentation and documentation of case studies and good practices that illustrate environmental and economic aspects of digital and circular approaches in construction.

National KPIs & Targets:

KPI 5.1:

Availability of awareness-raising and communication outputs related to digital and circular construction approaches, by 2030.

Target:

Project outputs may include documented communication and dissemination materials (e.g. presentations, reports, case studies or summaries of events) that remain accessible as reference inputs beyond the project duration.

Objective 5.2: Support understanding of digital technologies enabling circular construction business models.

National Actions:

- Support for reflection and learning activities among companies and practitioners through workshops, discussions and case-based formats focusing on digital and circular business models.
- Documentation and dissemination of examples and lessons learned from companies experimenting with digital tools and circular practices, as reflected in available project documentation.
- Translation of research and pilot project findings into accessible insights for industry and other stakeholders through project outputs and dissemination activities.

National KPIs & Targets:

KPI 5.2:

Availability of documented examples and explanatory materials on digital technologies supporting circular construction business models, by 2030.

Target:

Documentation and dissemination materials from various projects may provide reference insights that support stakeholder understanding of how digital tools can enable circular construction business models beyond the project duration.

5. National Context and Challenges

SWOT Analysis:

Strengths

- Comparatively advanced political and strategic frameworks in the fields of the circular economy and digitalization in the construction sector.
- Established BIM strategies at federal level, as well as strong research and innovation capabilities.
- A robust construction, building materials and digital economy, with active involvement from research institutions and centres of excellence.
- A strong foundation for pilot and demonstration projects utilising digital technologies.

Weaknesses

- Uneven implementation of digital and circular approaches across federal and state level as well as local authorities.
- Limited use of innovative digital methods such as BIM in existing buildings and for smaller projects.
- A shortage of skilled workers and insufficient digital skills, particularly among SMEs.
- Fragmented data flows and limited interoperability of digital systems.

Opportunities

- EU initiatives (e.g. Green Deal, Clean Industry, Digital Decade) as a catalyst for scaling up.
- Growing demand for sustainable, resource-efficient construction.
- Digital technologies as enablers for urban mining, renovation passports and new business models.
- Knowledge and technology transfer within the Danube region.

Threats

- Delays caused by complex approval and coordination processes.
- Uncertainty surrounding investment in new digital solutions.
- Low uptake of new technologies in some parts of the sector.
- A lack of harmonization at European level in certain areas.

Addressing National Gaps:

The challenges identified in the four transnational studies also apply to Germany, albeit at a more advanced level of development. The German TAP seeks to respond to these challenges by bringing together existing approaches, highlighting remaining gaps and providing reference inputs for further discussion and exploration, rather than by prescribing concrete implementation measures.

Weak enforcement and fragmented implementation:

Despite advanced strategies, differences remain in practical implementation across federal states, municipalities and projects. The TAP highlights the potential role of digitally supported procedures (e.g. BIM-based permitting and documentation processes) and enhanced coordination mechanisms as areas where further dialogue and exploration may support more consistent application.

Insufficient digital infrastructure and interoperability:

Fragmented IT systems and limited interoperability continue to hinder circular construction processes. The TAP points to the relevance of open and standardised data formats, digital platforms for planning and material tracking, and the alignment of national approaches with transnational initiatives within the Danube Region as potential fields for further development.

Limited and uneven BIM adoption:

The application of BIM and advanced digital technologies remains uneven, particularly among SMEs and smaller projects. The TAP highlights existing challenges and illustrates how experiences from pilot initiatives, knowledge exchange and awareness-raising may support a broader understanding of the potential benefits of digital methods, without imposing specific requirements.

Skills shortages and capacity gaps:

Workforce and skills deficits represent a key barrier. The TAP provides reference approaches related to education, training and knowledge transfer in digital and circular competencies, drawing on documented experiences and existing cooperation between research, industry and public administration.

Limited citizen engagement and awareness:

To support acceptance and transparency, the TAP highlights the relevance of awareness-raising activities and the visibility of good practice examples as potential enablers for broader understanding of digital and circular construction approaches.

Overall, the German TAP provides context-specific reference inputs that may help illustrate how the barriers identified in the transnational studies could be addressed over time. In doing so, it offers transferable insights that may be of relevance for other countries and stakeholders within the Danube Region.

6. Financial Strategy (National Level)

Funding Sources:

National Budget:

Public funding to support digital and circular construction initiatives, particularly in the areas of research, pilot projects, skills development and the digitalization of public administration.

European Regional Development Fund (ERDF):

ERDF supports innovation, digitalization, and low-carbon construction and infrastructure solutions. Examples of relevant thematic areas include

- Smart Cities and Smart Regions initiatives,
- circular economy in construction and building materials, and
- digital planning and construction processes (e.g. BIM).

European Social Fund (ESF):

ESF funds skills development and upskilling programs, such as

- digital competencies in the construction and planning sectors and
- training for sustainable construction and green technologies.

Horizon Europe/Digital Europe:

These programs offer opportunities for preparing follow up projects building on concepts, methods or findings developed within the TAP framework. Typical eligible activities include

- development and testing of digital solutions (e.g. BIM, digital twins, data platforms, AI-based tools),
- research on circular construction methods, material passports and lifecycle-based approaches,
- interdisciplinary and transnational pilot projects involving research organisations, SMEs, industry and public authorities.

Funding is allocated through competitive calls, usually requiring international consortia and alignment with program priorities. These programs offer opportunities for preparing follow-up projects building on concepts, methods or findings developed within the TAP framework.

Interreg Danube Region Program:

This program offers funding opportunities for transnational cooperation projects addressing shared challenges in the Danube Region. Relevant funding opportunities relate in particular to

- digital innovation and knowledge transfer,
- circular economy and resource efficiency and
- sustainable infrastructure and construction-related value chains.

The program supports project development, pilot actions, testing of solutions and exchange of experience among partners from different countries. Co-financing requirements apply according to program rules and partner status.

Private Investment:

Private financing can complement public funding, especially for:

- development and deployment of digital construction technologies,
- implementation of circular materials and low-carbon construction solutions,
- pilot and demonstration projects with commercial or market-oriented potential.

Private investment may take the form of corporate funding, venture capital or public-private funding models, often associated with innovation-oriented and scalable approaches.

Other:

In addition to EU programs, various national and thematic funding instruments may support activities related to digital and circular construction, such as

- funds addressing climate protection, energy efficiency and decarbonization,
- programs supporting innovation, applied research and technology transfer and
- funding schemes targeting sustainable infrastructure and transformation of industrial processes.

These instruments can provide complementary financing for research, pilot projects, skills development or preparatory activities and may be combined with European funding sources, subject to applicable funding rules.

Budget Allocation

The measures outlined in the German TAP may be supported through a combined use of national and European funding programs as well as private investments. The recommendations for budget allocation are aligned with the five strategic pillars of the Danube Region Strategy.

Pillar 1 (Enabling Policy & Regulatory Frameworks):

Measures under Pillar 1 may be supported through national budgets and, where relevant, through ERDF programs as well as the Climate and Transformation Fund.

Pillar 2 (Fostering Digital Innovation & Technology Adoption):

Activities under Pillar 2 may be funded, in particular, through ERDF instruments, national federal and state innovation programs, Horizon Europe, Digital Europe, as well as complementary private investments.

Pillar 3 (Building Skills & Capacity):

Skills development-related activities under Pillar 3 may be supported mainly through the ESF in combination with complementary national funding sources, especially state sources in the field of education and training.

Pillar 4 (Strengthening Collaboration & Supply Chains):

Cooperation-oriented activities under Pillar 4 may be supported, in particular, through the Interreg Danube Region Program in combination with national co-financing mechanisms.

Pillar 5 (Raising Awareness & Changing Mindsets):

Awareness-raising and communication activities under Pillar 5 may be supported through national funding instruments and, where appropriate, through ESF and ERDF programs.

This indicative allocation enables flexible, program-compliant financing and may support the sustainable uptake and potential further use of approaches referenced in the TAP in Germany and the Danube Region.

7. Implementation Plan

Governance Structure:

As existing administrative and governance structures are already in place, no permanent national governance or steering structure was established within the scope of the project, nor is such a structure foreseen after the project ends. Instead, the TAP is designed as an orientation document and impulse that may be taken up, further elaborated and applied by relevant national, regional or sectoral actors.

During the project period, selected stakeholders from public administration, industry, research and civil society were involved through activities such as workshops, interviews and consultations in order to validate the relevance, coherence and feasibility of the proposed reference measures and to act as a source of inspiration.

Timeline:

The TAP is formulated as a medium-term strategic reference framework with a perspective up to 2030. The development of the TAP takes place within the project duration, which ends in June 2026.

Monitoring and Evaluation:

National-level monitoring or reporting on the subsequent use of the TAP beyond the project duration is not foreseen. Within the Circular DigiBuild project, monitoring activities were limited to project-specific aspects, including

- quality assurance and internal consistency of the TAP document,
- documentation of stakeholder feedback and validation processes and
- reporting to the funding institution in line with project and program requirements.

The national KPIs defined in the TAP may serve as an impulse and as indicative reference points for interested stakeholders at their own discretion.

Risk Management:

A key risk for the future uptake of the TAP is a decreasing level of interest among relevant stakeholders. Additional risks include slow developments in legislative or regulatory frameworks at EU, national or federal level.

To mitigate these risks, the TAP emphasizes

- early stakeholder involvement in relevant public discussion in order to enhance relevance and acceptance,
- alignment of the proposed approaches with existing policy priorities and funding instruments.

8. Stakeholder Engagement

Collaboration Mechanisms:

Stakeholder involvement within the German TAP was carried out during the implementation period of the Circular DigiBuild project. The aim was to integrate relevant perspectives into the development of the TAP, enhance its national transferability, and support potential use of the document beyond the end of the project. During the project period, existing national and transnational exchange formats were used, including

- thematic workshops and consultations with relevant stakeholders,
- contributions to transnational working groups and exchange formats within the Circular DigiBuild project, including linkages to formal and informal structures of

the Danube Region Strategy (e.g. thematic Working Groups, where relevant to the project), and

- selective engagement of regional Multi-Stakeholder Groups (RMSGs) to reflect upon and provide feedback on key content.

In addition, suitable national and project-related online formats (e.g. video conferences, digital consultations, project websites or document-sharing platforms) were used to collect feedback and ensure efficient exchange of information during the project duration.

Involvement of Key Groups:

Governments/Public Authorities:

Regional and local authorities were involved within the project context to ensure that the TAP reflects existing policy frameworks, strategies and administrative responsibilities.

Industry Associations & SMEs:

Companies and industry associations, in particular SMEs, were involved through workshops, interviews and case studies in order to obtain practical feedback on digital and circular construction approaches within the scope of the project.

Research & Education Institutions:

Research and educational institutions were involved through academic institutions and external scientific partners during the project. This exchange supported quality assurance, the identification of research and qualification needs, and the formulation of recommendations related to capacity building and knowledge transfer.

Financial Institutions & Investors:

Representatives of funding institutions were consulted, where relevant, on a case-by-case basis during the project in order to reflect funding logics and framework conditions related to digital and circular construction topics.

Civil Society & NGOs:

Dialogue with civil society organisations and NGOs was considered relevant within the project context to reflect acceptance issues and societal perspectives related to circular economy approaches in construction.

Communication Plan:

Communication activities related to the German TAP were carried out within the framework of the Circular DigiBuild project and were limited to the project duration.

Key elements included

- integration of project results into research, teaching and academic dissemination and
- provision of publicly accessible project outputs to interested stakeholders as reference material.

9. Sustainability and Scalability

Sustainability Mechanisms:

The sustainability of the approaches outlined in the German TAP is based on their strategic alignment with existing policy frameworks, funding instruments and market-driven developments. The TAP is designed as an impulse and orientation document that may be taken up and further used by competent national, regional or sectoral actors.

Key sustainability mechanisms include

- alignment of the proposed objectives and actions with existing national and European strategies, regulatory frameworks and funding programs,
- reliance on established and widely applied digital technologies and standards (e.g. BIM, interoperable digital platforms) that can be adopted independently of the project context, and
- stakeholder involvement during the project lifetime to support relevance, acceptance and potential ownership of the TAP beyond the project's end.

Furthermore, the clear and structured design of the TAP facilitates its potential use in policy discussions, funding priorities or future project development processes, without requiring a permanent institutional anchoring within the project consortium.

Scalability Strategies:

Scalability considerations are addressed by outlining how the TAP may serve as a reference framework for the dissemination and adaptation of documented approaches.

The scalability of the measures proposed in the TAP is supported through their transferable, modular and non-territorial design. Actions are deliberately formulated in a way that allows

- adaptation and potential replication across different regions within Germany,
- adjustment to region-specific administrative, economic or institutional contexts, and
- use as a reference basis for potential follow-up pilot projects, demonstration initiatives or funding applications developed by interested actors.

Knowledge transfer and scaling at Danube Region level may be supported through

- the transnational exchange and networking structures established within the Circular DigiBuild (data base),
- the shared strategic framework of the 2030 Danube Region Digital Innovation Strategy for Circular Construction.

Territorial Action Plan (TAP) for Digital Innovation in Circular Construction in Hungary

Table of Contents

1. Introduction / Executive Summary	3
2. Vision and Mission (Territorial Adaptation)	7
3. Alignment with the EU Strategy for the Danube Region (EUSDR)	8
4. Strategic Pillars, Objectives, and Key Actions (National KPIs)	9
Pillar 1: Enabling Policy & Regulatory Frameworks.....	9
Objective 1.1: Harmonize circular construction standards and regulations related to digitalization.....	9
Objective 1.2: Develop and implement financial incentives for circular construction practices.....	10
Pillar 2: Fostering Digital Innovation & Technology Adoption.....	10
Objective 2.1: Promote the adoption of Building Information Modelling (BIM) and other digital technologies.....	10
Objective 2.2: Support the development and deployment of digital platforms for material tracking and waste management.....	11
Pillar 3: Building Skills & Capacity.....	12
Objective 3.1: Develop education and training programmes for digital skills within circular construction.....	12
Objective 3.2: Promote knowledge transfer and the sharing of best practice among stakeholders.....	12
Pillar 4: Strengthening Collaboration & Supply Chains.....	13
Objective 4.1: To facilitate the development of digital regional supply chains for recycled and secondary construction materials.....	13
Objective 4.2: Promote collaboration between research institutions, industry, and governments.....	14
Pillar 5: Raising Awareness & Changing Mindsets.....	14
Objective 5.1: Implement awareness campaigns to promote the benefits of digitalization within circular construction.....	14
Objective 5.2: Encourage the adoption of digital technologies based on circular economy principles in construction business models.....	15
5. National Context and Challenges	16
6. Financial Strategy (National Level)	17
Funding Sources:.....	17
7. Implementation Plan (National Level)	19
Governance Structure:.....	19
Timeline:.....	19
Monitoring and Evaluation:.....	20
Risk Management:.....	20
8. Stakeholder Engagement (National Level)	21

Collaboration Mechanisms:.....	21
Communication Plan:.....	22
9. Sustainability and Scalability.....	22

1. Introduction / Executive Summary

Purpose:

This Territorial Action Plan outlines Hungary's commitment and strategy for implementing the 2030 Danube Region Digital Innovation Strategy for Circular Construction. This TAP sets out specific national measures, targets and responsibilities to achieve the vision of the transnational strategy within Hungary.

In Hungary, several comprehensive strategies and legislative frameworks have been developed in recent years to green the construction sector, introduce the principles of the circular economy and promote digitalization, all of which serve the 2030 climate neutrality and efficiency targets.

Strategies for promoting the circular economy and digitalization

- **National Construction Economy Strategy (2023–2027 and the 2024–2028 draft):** The strategy places a strong emphasis on the sector's digitalization and sustainability. The aim is to create a service-oriented, innovative, sustainable and knowledge-based construction economy. Its tools include the establishment of the National Construction Economy Register (NÉNY), which covers construction materials, mineral resources and secondary raw materials, as well as the promotion of the sector's comprehensive digitalization.
- **Act C of 2023 on Hungarian Architecture:** This new legislation has introduced the concepts of products, substitute products, and Hungarian and regional construction products. Giving preference to regional and domestic products contributes significantly to reducing transport distances and the ecological footprint, thereby supporting the circular economy model.
- **National Building Renovation Plan (NÉT) and National Energy Strategy 2030:** Professional consultations are currently underway regarding climate-friendly modernizations, which place great emphasis on the energy efficiency of the residential building stock and the use of circular building materials.

Responsibilities and roles of government and professional bodies

- **Ministry of Construction and Transport (ÉKM):** They are primarily responsible for developing the strategy. Their key tasks include shaping the regulatory framework, developing the e-log and Üvegkapu systems, and making public investment projects more sustainable.
- **Ministry of Energy (EM):** Through the State Secretary responsible for the circular economy and climate policy, they participate in the development of energy efficiency regulations, such as the new EKR (Energy Efficiency Obligation Scheme), and in technical consultations.
- **ÉMI Nonprofit Kft. (Construction Quality Control and Innovation Ltd.):** As a key supporting institution, it has practical and administrative responsibilities in the areas of innovation and digitalization. Their tasks include product testing, the registration of environmental and green declarations, supporting sustainable urban development, and coordinating domestic and international digitalization training projects.

- **Hungarian Chamber of Commerce and Industry (MKIK):** It has played a key role in the professional consultation on strategic legislation. Its task is to prepare a new ‘contractor certification system’ designed to ensure fair and sustainable market operations.

The country’s commitment

- Commitment at the state level is clear in legislative and strategic documents. The government openly states that the construction industry is responsible for a significant proportion of global carbon dioxide emissions (cement production alone accounts for 7–8%), and therefore greening and reducing import dependency are strategic priorities.
- However, practical implementation – particularly on the part of market players (SMEs) – still faces significant obstacles. Various surveys (e.g. ÉVOSZ, BME) highlight that a significant proportion of companies are wary of digitalization: 85% of respondents fear high costs, whilst for 52% a risk-averse corporate culture is hindering progress.

Furthermore, there is a serious shortage of suitably qualified IT and digital professionals (such as BIM designers). Although the legal framework and funding are in place, the country is still in the early stages when it comes to education and increasing corporate motivation.

Specific examples of implementation

- **Green declarations:** Of the approximately 11,600 construction products listed in the ÉMI register, nearly 4,800 already have a so-called ‘green declaration’. This provides data on, amongst other things, the management of production waste, the use of renewable energy, recycled components and the distance travelled to source raw materials.
- **Plan for mandatory BIM use:** The government has set a target to make the use of the BIM (Building Information Modelling) system mandatory for public works projects by 2026, thereby driving the sector’s digital transformation.
- **One-stop shop renovation advice (OSS):** Together with the Egyensúly Institute and other civil society and professional organizations (MEHI, Energiaklub), they are working on a national, one-stop-shop advisory network that would provide technological, legal and financial assistance to the public, in both physical and digital formats, for energy- efficient and circular home renovations.
- **GINOP Plus programmes:** Funding has been made available specifically for domestic SMEs in the construction sector, supporting the purchase of technological equipment, software development and digital training for employees.
- **National Model House Park and Visitor Centre:** ÉMI is establishing a centre in Szentendre (a kind of construction industry EXPO) where the public and market players can experience the latest energy-efficient construction solutions, innovative materials and the benefits of digitalization first-hand and in practice.
- **ConstructSkills4LIFE project:** An initiative launched with EU and domestic funding (coordinated by ÉMI), which aims to alleviate the shortage of skilled workers and to develop a continuing professional development roadmap for domestic construction professionals, focusing on energy-efficient solutions and digitalization.

The Danube Region Circular Construction Digital Innovation Strategy fits seamlessly with Hungary's vision for a dual green and digital transition, as set out in domestic sectoral strategies (e.g. the National Construction Strategy) and the National Smart Specialization Strategy (S3/RIS3).

Here is how the transnational strategy links to the national mission and the principles of S3:

1. Implementation of the principles of S3 (National Smart Specialization Strategy) The policy overview of the Danube Region strategy classifies Hungary among the 'emerging' countries in the field of Smart Specialization Strategies (RIS3). The primary objective of the national S3 is to create an innovation-driven, knowledge-based and sustainable economy. The document highlights that emerging countries are currently facing implementation and financing challenges. The strategy therefore recommends adopting best practices (e.g. Austria's multi-level governance or Germany's material passports), which is perfectly in line with the Hungarian S3's objective of increasing domestic innovation capacity through international knowledge transfer.

2. Digital transition (BIM and data-driven approaches)

- **Domestic vision:** By 2026, Hungary will make the use of BIM (Building Information Modelling) mandatory for public sector projects.
- **Strategic alignment:** Pillar 2 of the strategy focuses specifically on promoting the uptake of BIM and digital technologies. This provides external, transnational support and a framework for the Hungarian government's efforts, helping to scale up the technology among domestic SMEs.

3. Circular use of materials and traceability

- **Domestic vision:** The establishment of the domestic National Construction Economy Register (NÉNY) and the introduction of ÉMI's 'green declarations' aim to track secondary raw materials and carbon footprints.
- **Strategic alignment:** This is closely linked to pillars 1 and 4 of the strategy, which call for the development of digital material passports, cross-border supply chains for recycled materials, and digital platforms supporting material tracking and waste management.

4. Capacity building and support for SMEs

- **Domestic outlook:** Among domestic SMEs in the construction sector, fear of high costs and a shortage of skilled workers poses a significant barrier to digitalization.
- **Strategic alignment:** Pillars 3 and 5 of the strategy (Capacity Building and Awareness Raising) focus precisely on workforce training, the renewal of university and vocational training curricula, and financial and mentoring support for SMEs. This is in line with the domestic GINOP Plus funding and the objectives of the ConstructSkills4LIFE project.

In summary: The Danube Region Strategy provides Hungary with a practical 'crutch' and an international network through which the digitalization and circular economy objectives—already laid out in the national vision (and in S3) but often getting off to a bumpy start in practice—can be accelerated through regional cooperation, common standards and a shared knowledge base.

Current Status:

Country category based on the Policy Review

The "Policy Review" study, which forms the basis of the strategy, classifies Hungary as an **emerging** country based on an analysis of Smart Specialization Strategies (RIS3) and policy frameworks. This group also includes Bulgaria, Croatia, the Czech Republic, Romania and Slovakia.

Key findings of the “Readiness and Needs” and “Policy Overview” sections regarding Hungary (and the emerging region)

- **Implementation and financing barriers:** Whilst ‘advanced’ countries are already successfully integrating the circular economy (CE) and digitalization into their strategies, catching-up countries – including Hungary – face significant implementation and financing barriers.
- **Uneven industry and societal participation:** The ‘Readiness and Needs’ study highlighted that industry players (particularly the construction sector) are participating much more actively in circular economy initiatives than the academic sector, civil society or IT players. Social/civic engagement is particularly weak.
- **Mixed technological readiness:** Awareness and use of digital tools are highly heterogeneous. Although the concept of Building Information Modelling (BIM) is already familiar to many, the understanding and application of more advanced digital solutions (such as AI-based resource tracking) are still in their infancy.
- **Lack of awareness:** A lack of awareness of the topic within the region has been identified as a general barrier, making it difficult to achieve the critical mass required for the digital and circular transition.

Summary and way forward: According to the document, the fragmented environment and lack of resources represent the greatest challenges for Hungary. The strategy therefore recommends that catching-up countries adopt and utilise the proven best practices of developed countries (Austria, Germany, Slovenia), such as the material passport system, multi-level governance or strategic innovation partnerships

2. Vision and Mission (Territorial Adaptation)

Vision (National):

Based on the guidelines of the Danube Region Strategy and the template for the Territorial Action Plan (TAP), Hungary’s national vision and mission can be summarized as follows and adapted to the domestic context:

"To establish Hungary’s stable, innovation-driven role in circular and digital construction practices within the Danube Region, promoting sustainable economic growth, environmental resilience and social well-being at the national level." This vision sets the goal of moving our country beyond its current “catching up” status, overcoming existing implementation and financing barriers to become an active and competitive participant in the green transition.

Mission (National):

“Promoting cooperation, knowledge sharing and the uptake of innovative digital solutions (such as BIM technology and material passports) among domestic stakeholders – the government, construction SMEs, research institutes and civil society – to ensure that the Hungarian construction industry successfully transitions to a resource-efficient, circular economy.”

This adaptation perfectly reflects the main objectives of the transnational strategy (clean construction, digital innovation, waste reduction), whilst considering Hungarian specificities. It sets out the direction for technological development (digitalization) and sustainability (circular model) to go hand in hand, thereby increasing the competitiveness of the domestic construction sector and reducing its environmental footprint.

3. Alignment with the EU Strategy for the Danube Region (EUSDR)

Pillar: Connecting the Region (Improved Infrastructure, Digitalization) Hungary contributes to this pillar through the comprehensive and regulated digital transformation of the domestic construction industry. This includes making the use of the BIM (Building Information Modelling) system mandatory for public investments (in line with the 2026 targets), as well as the development and expansion of national digital platforms such as the e-log, Üvegkapu and the newly established National Construction Industry Register (NÉNY). These systems enable transparent data reporting, which in the long term can also be integrated at a regional (cross-border) level with the platforms of the countries along the Danube.

Pillar: Environmental protection (Resource efficiency, Waste reduction) Domestic building regulations (e.g. Act C of 2023 on Hungarian architecture) already specifically address the preference for regional and domestic secondary building materials, significantly reducing the ecological footprint associated with transport. This objective is also served by the ‘green declarations’ system managed by ÉMI (Construction Quality Control Innovation Ltd.), which tracks the carbon footprint and recycled content of built-in materials. Meanwhile, the modernization works carried out under the National Building Renovation Plan minimize construction and demolition waste (CDW) by applying circular economy principles.

Pillar: Building prosperity (Innovation, SME growth) The digital strengthening of small and medium-sized enterprises (SMEs), which form the backbone of the Hungarian construction industry, is key to the sector’s competitiveness. This pillar is supported by targeted domestic and EU funds (e.g. GINOP Plus programmes) that support technological modernization, the procurement of digitalization software (e.g. BIM tools) and the transition to circular business models. Innovation-driven modernization contributes to the retention of existing jobs and the creation of new, higher value-added ‘green and digital’ jobs.

Pillar: Strengthening the region (Institutional capacity, Cooperation) The implementation of the strategy is based on coordinated cooperation within the domestic institutional system (Ministry of Construction and Transport, Ministry of Energy, ÉMI, MKIK, universities, and industry clusters). Institutional capacities are strengthened by domestic and international collaborations such as the ConstructSkills4LIFE project, which focuses on alleviating the

shortage of skilled workers, or the establishment of one-stop-shop advisory networks supporting members of the public and businesses. This growing national network provides a solid foundation for Hungary to become an active knowledge-sharing partner with the other countries of the Danube Region.

4. Strategic Pillars, Objectives, and Key Actions (National KPIs)

This section details the country-specific implementation for each of the five strategic pillars defined in the Danube Region strategy. For each objective, it sets out concrete national actions, responsible bodies and measurable KPIs with national targets to be achieved by 2030.

Pillar 1: Enabling Policy & Regulatory Frameworks

Objective 1.1: Harmonize circular construction standards and regulations related to digitalization.

National Actions:

- Continuous review of Act C of 2023 on Hungarian Architecture and related regulations to further integrate circularity and digitalization.
- Operation of a national working group under the professional leadership of the Ministry of Construction and Transport (ÉKM) and the Construction Quality Control and Innovation Ltd. (ÉMI) to prepare amendments to domestic legislation in line with EU directives (e.g. CPR).
- Development of national guidelines to ensure legal compliance with the mandatory use of BIM in public sector projects and the data requirements of the National Construction Economy Register (NÉNY).

National KPIs & Targets:

KPI 1.1.1 (National): Number of national circular construction standards related to digitalization adopted or updated by 2030.

Target: 3 new or updated comprehensive regulations (e.g. BIM protocols, standardization of green declarations) by 2030.

KPI 1.1.2 (National): Reducing regulatory barriers to the use of secondary materials in the construction industry by 2030.

Target: Improvement in quality through the full implementation of a domestic certification system for substitute and regional construction products (e.g. extended ÉMI green declarations) by 2030.

Objective 1.2: Develop and implement financial incentives for circular construction practices.

National Actions:

- Targeted extension of existing domestic and EU funding instruments (e.g. GINOP Plus) to support the digital and green transition of SMEs (software procurement, equipment development).
- Gradual integration of circular economy and digitalization criteria (e.g. mandatory minimum proportion of secondary raw materials) into green public procurement policy for public construction projects.

National KPIs & Targets:

KPI 1.2.1 (National): Total public and private investment in national circular construction projects by 2030.

Target: Targeted (public and private) investment value equivalent to €10 million by 2030.

KPI 1.2.2 (National): Number of SMEs utilizing national financial incentives for circular construction by 2030.

Target: At least 100 domestic construction SMEs by 2030.

Pillar 2: Fostering Digital Innovation & Technology Adoption

Objective 2.1: Promote the adoption of Building Information Modelling (BIM) and other digital technologies.

National Actions:

- Supporting the smooth introduction of mandatory BIM use for public works (with a deadline of 2026) among market participants, particularly SMEs, through national roadmaps.
- Organizing practical workshops and awareness campaigns on the benefits of BIM, IoT and digital twins, involving the ÉMI and professional chambers (e.g. MKIK).
- Providing technical assistance and advice to domestic companies on the introduction of digitalization software and technologies.

National KPIs & Targets:

KPI 2.1.1 (National): Percentage of national construction projects utilizing BIM by 2030. Target: 100% for public sector projects, and a steadily increasing proportion in the private sector by 2030.

KPI 2.1.2 (National): Number of professionals trained in BIM and other digital construction tools by 2030.

Target: At least 100 newly trained, certified professionals per year.

KPI 2.1.3 (National): Number of best practices demonstrating innovative digital solutions applied in circular construction (e.g. projects at the National Model House Park in Szentendre).

Target: 5 successfully launched and published pilot projects by 2030.

Objective 2.2: Support the development and deployment of digital platforms for material tracking and waste management.

National Actions:

- Extending the Hungarian National Construction Economy Register (NÉNY) and the Üvegkapu system to track and exchange secondary construction materials.
- Standardization of the ÉMI “green declarations” system as a digital material passport, in line with EU and Danube Region guidelines.
- Cooperation with domestic waste management concession companies to integrate digital solutions aimed at tracking construction and demolition waste (CDW).

National KPIs & Targets:

KPI 2.2.1 (National): The number of national digital platforms introduced for the circular construction sector and their interoperability by 2030.

Target: 1 integrated, national central system that is fully interoperable (capable of data exchange) with the EUSDR’s regional platforms by 2030.

KPI 2.2.2 (National): Increase in the volume of digitally tracked construction materials in Hungary.

Target: 15% increase in the volume of registered secondary materials and waste (measured in tonnes) by 2030.

Pillar 3: Building Skills & Capacity

Objective 3.1: Develop education and training programmes for digital skills within circular construction.

National Actions:

Integrating the principles of the circular economy and digital construction modules (e.g. BIM, IoT, digital twins) into the curricula of domestic higher education (e.g. BME, Óbuda University, PTE) and vocational training (Vocational Training Centres).

Building on the results of the domestic ConstructSkills4LIFE project and ÉMI’s professional expertise, developing adult education and national certification programmes for construction professionals supporting the green and digital transition.

Establishing internship programmes and dual training partnerships between domestic educational institutions and industry stakeholders (innovative SMEs, large enterprises).

National KPIs & Targets:

KPI 3.1.1 (National): Number of education and training programmes on digital technologies for the circular construction industry by 2030.

Target: Launch of at least 3 new, accredited adult education/continuing education programmes by 2030.

KPI 3.1.2 (National): Number of national universities and vocational colleges that incorporate digital technologies for the circular construction industry into their curricula.

Target: At least 5 domestic higher education and vocational training institutions by 2030.

Objective 3.2: Promote knowledge transfer and the sharing of best practice among stakeholders.

National Actions:

- Organizing regular national workshops and conferences (e.g. involving ÉMI, professional chambers and ÉVOSZ) on circular and digital construction.
- Establishing a national online knowledge hub or repository (which can be linked to the National Construction Industry Register – NÉNY) for sharing case studies, Living Lab experiences and best practices.
- Encouraging the participation of domestic construction SMEs in transnational knowledge-sharing events in the Danube Region, cross-border projects and mentoring programmes.

National KPIs & Targets:

KPI 3.2.1 (National): Number of national knowledge-sharing events (workshops, conferences) organized annually.

Target: Organization of 2 major regional/national professional events per year.

KPI 3.2.2 (National): Increase in the number of national cluster members or companies participating in cross-border circular construction projects.

Target: A 10% increase in the number of domestic companies participating in international/regional cooperation by 2030.

Pillar 4: Strengthening Collaboration & Supply Chains

Objective 4.1: To facilitate the development of digital regional supply chains for recycled and secondary construction materials.

National Actions:

- Establishment of a domestic connection point (focal point) for the ‘Danube Circular Construction Supply Network’.

- Mapping domestic producers, recyclers and designers of secondary construction materials, and integrating them into the National Construction Industry Register (NÉNY) system to exploit domestic and cross-border cooperation potential.
- Active involvement of domestic European Digital Innovation Hubs (EDIHs) and construction industry clusters in supporting SMEs to introduce the digital tools (e.g. digital material passports) necessary for supply chain management.

National KPIs & Targets:

KPI 4.1.1 (National): Increase in the volume of recycled and secondary materials used in national construction projects through the application of digital technologies by 2030.

Target: 10% increase in volume (measured in tonnes or m³) of registered secondary materials used in construction by 2030.

KPI 4.1.2 (National): Number of national companies participating in regional/national circular supply chains by 2030.

Target: Active participation of at least 50 domestic enterprises in the network and on digital platforms by 2030.

Objective 4.2: Promote collaboration between research institutions, industry, and governments.

National Actions:

- Establishment of a national “Digital and Circular Construction Innovation Network” that closely links the Ministry of Construction and Transport (ÉKM), ÉMI, domestic technical universities (e.g. BME, Óbuda University) and the competitive construction sector.
- Launching targeted domestic R&D funding calls (e.g. from NKFIH funds) for projects focusing on advanced (secondary) materials, AI-driven resource management and digital twins in the construction industry.
- Organizing and developing a network of national demonstration sites (Living Labs, such as the ÉMI National Model House Park in Szentendre) for testing and sharing best practices.
- Promoting public-private partnerships (PPPs) in Hungary and encouraging the participation of Hungarian consortia in relevant EU programmes (Horizon Europe, Digital Europe).

National KPIs & Targets:

KPI 4.2.1 (National): Number of collaborative research and development (R&D) projects focusing on digital technologies for circular construction by 2030.

Target: Launch of 5 successful R&D projects implemented by domestic or international consortia by 2030.

KPI 4.2.2 (National): Number of public-private partnerships (PPPs) established for the digitalization of circular construction initiatives by 2030.

Target: Launch of 2 significant national or regional-level PPP schemes by 2030

Pillar 5: Raising Awareness & Changing Mindsets

Objective 5.1: Implement awareness campaigns to promote the benefits of digitalization within circular construction.

National Actions:

- Launching comprehensive, targeted national communication campaigns (involving the ÉKM, the ÉMI and professional organizations, e.g. ÉVOSZ) to educate construction SMEs, decision-makers and the public on the benefits of BIM, e-logs and the circular use of materials.
- Intensive use of various channels (social media, professional forums, university open days) to disseminate information.
- Active promotion of the National Model House Park and Visitor Centre in Szentendre as a physical and digital showcase for the public and professionals can experience success stories first-hand, as well as the economic and environmental benefits of circular practices.

National KPIs & Targets:

KPI 5.1.1 (National): Reach of national awareness-raising campaigns (number of people informed via various channels) by 2030.

Target: To reach at least 30,000 people via digital and physical channels (e.g. visitors to the Model House Park) by 2030.

KPI 5.1.2 (National): Growing public support for the digitalization of circular construction policies (measured through surveys or engagement) by 2030.

Target: A 10% increase in positive public/market perception of digitalization and secondary materials compared to baseline surveys by 2030.

Objective 5.2: Encourage the adoption of digital technologies based on circular economy principles in construction business models.

National Actions:

- Operating a nationwide, one-stop-shop advisory and mentoring network for construction SMEs, providing technological and financial support for the transition from linear to circular (and digitalized) business models.
- Organizing masterclasses and workshops for company managers to demonstrate the business benefits of the National Construction Industry Register (NÉNY) and digitalized material passports (e.g. green declarations).
- Presentation of successful domestic examples of companies that have made the integration of secondary raw materials profitable through digital tracking and optimization (e.g. BIM-based).

National KPIs & Targets:

KPI 5.2.1 (National): The number of national construction companies applying digital technologies in their circular business models by 2030.

Target: At least 50 domestic construction SMEs that have demonstrably integrated digital/circular elements into their operations by 2030.

KPI 5.2.2 (National): Increase in the proportion of national investment directed towards digitalized circular construction methods by 2030.

Target: 5% increase in the proportion of corporate capital expenditure (CAPEX) focused on the green and digital transition by 2030.

5. National Context and Challenges

SWOT Analysis:

	STRENGTHS	WEAKNESSES
Internal factors	• Strong government commitment and an evolving regulatory framework (e.g. mandatory BIM use for public works from 2026, legislation favouring domestic and regional construction products). • An emerging, innovative digital and administrative infrastructure (National Construction Industry Register – NÉNY, e-log, Üvegkapu). • Active professional support organisations (e.g. ÉMI, MKIK) and existing programmes supporting the green transition (ÉMI green declarations, National Model House Park).	• The low digital readiness of SMEs in the construction industry (which form the backbone of the sector), their lack of resources and fear of high costs. • A risk-averse corporate culture; whilst many have heard of BIM, awareness and understanding of advanced digital tools (e.g. artificial intelligence, digital twins) remain very low. • A severe domestic shortage of specialists in digital engineering (e.g. BIM modellers) and IT, exacerbated by the slow adaptation of education systems. • The involvement of civil society, NGOs and citizens in circular economy initiatives is very weak.
	OPPORTUNITIES	THREATS
External factors	• Targeted use of significant EU (e.g. GINOP Plus, Interreg Danube Region Programme) and domestic funds for the development of the sector's technology and equipment. • Adoption of best practices and knowledge from 'developed' Danube countries (Austria, Germany, Slovenia), for example in the areas of material passports or multilevel governance. • The wave of domestic building renovation (National Building Renovation Plan), which could create an immediate, huge market	• Weak practical implementation of regulatory requirements (CE policies) and the persistence of financing barriers. • The migration of a suitably trained digital construction workforce abroad (brain drain). • Domestic companies' loss of regional competitiveness if the digitalization of supply chains and data standardisation fall behind.

	for recycled and secondary building materials.	
--	--	--

Addressing National Gaps:

The current TAP specifically focuses on addressing the following shortcomings identified in transnational studies and domestic surveys in Hungary:

- **Weak implementation and regulatory barriers:** Studies have highlighted implementation barriers in catching-up countries. Pillar 1 of the TAP addresses this through the ongoing harmonisation of domestic legislation (with EU directives), as well as the extension of the NÉNY and the standardisation of the ÉMI’s green declarations, thereby creating transparency in the secondary materials market.
- **Limited use of BIM and digitalization:** Cross-sectoral analyses have highlighted low technology uptake. TAP Pillar 2 addresses this through targeted funding for SMEs (GINOP Plus), technical mentoring, and the gradual extension of the 2026 state BIM requirement.
- **Skills shortage and outdated curricula:** Surveys have revealed a significant skills gap in the field of digital tools. Pillar 3 of the TAP addresses this issue by building on the reform of curricula in Hungarian higher education (universities) and Vocational Training Centres, as well as the expansion of the ConstructSkills4LIFE adult education programmes.
- **Low engagement of citizens and the IT sector:** Surveys have confirmed the under-representation of the civil society sector and IT stakeholders. Pillar 5 of the TAP increases public trust and awareness through the establishment of one-stop-shop public advisory networks (OSS), extensive public campaigns and the experience-based demonstrations at the Model House Park. Pillar 4, meanwhile, integrates the IT sector into construction supply chains by involving domestic EDIHs (Digital Innovation Hubs).

6. Financial Strategy (National Level)

Funding Sources:

National Budget: Targeted allocation of resources from the Ministry of Construction and Transport (ÉKM) and the Ministry of Energy (EM) to establish the legal framework, green public investments, and develop the infrastructure of the National Construction Economy Register (NÉNY) and the National Model Housing Park (ÉMI).

EU Structural Funds (ERDF, ESF): Utilisation of GINOP Plus (Economic Development and Innovation Operational Programme Plus) funds to support technology transition, digitalization (e.g. BIM software) and circular business models among SMEs in the construction sector.

KEHOP Plus (Environmental and Energy Efficiency Operational Programme Plus): Involvement of funds to increase waste management and secondary raw material processing capacity.

Horizon Europe / Digital Europe: Encouraging the participation of domestic technical universities (e.g. BME, Óbuda University), domestic European Digital Innovation Hubs (EDIHs) and innovative SMEs in consortia for research and development (R&D) calls on AI, digital twins and advanced materials technologies.

Interreg Danube Region Programme: Utilising funding mechanisms for cross-border knowledge sharing, the development of regional circular supply chains, and the interconnection of digital platforms supporting material tracking and waste management.

Private Investment: Attracting venture capital (VC) to support domestic proptech (property technology) and contech (construction technology) start-ups, ESG-based green loans from commercial banks, and establishing Public-Private Partnerships (PPPs) to implement innovative circular construction projects.

Other: Utilisation of funds from the Recovery and Resilience Facility (RRF) to support modernisation projects implemented under the National Building Renovation Plan (NÉT) that utilise circular materials and digital technologies.

Budget Allocation

In line with the recommendations of the transnational strategy, domestic resources are allocated strategically, prioritising capacity building, pilot projects and financial incentives.

The indicative (approximate) national budget allocation, based on the investment target of €10 million in KPI 1.2.1, is distributed as follows:

Pillar 1 (Policy and Governance) – approx. 10% (about €1.0 million): Harmonisation of the legislative framework, development of the NÉNY software infrastructure and operation of governance (governmental) structures.

Pillar 2 (Innovation and digitalization) – approx. 25% (about €2.5 million): Business support, software procurement (GINOP Plus), the domestic roll-out of BIM, and the development of financial instruments targeting SMEs.

Pillar 3 (Capacity building) – approx. 25% (about €2.5 million): Renewal of university curricula, vocational training programmes, adult education accreditations (e.g. modelled on ConstructSkills4LIFE) and funding for digital education programmes focused on alleviating the shortage of skilled workers.

Pillar 4 (Cooperation and supply chains) – approx. 25% (about €2.5 million): Establishment of pilot projects and demonstration sites (e.g. National Model House Park), strengthening of EDIH networks, and support for domestic R&D consortia to develop the market for secondary building materials.

Pillar 5 (Awareness-raising) – approx. 15% (about €1.5 million): Nationwide public awareness campaigns, the establishment of one-stop-shop advisory networks, and mentoring programmes to encourage domestic SMEs to change their business models.

7. Implementation Plan (National Level)

Governance Structure:

- **Body to be established:** Establishment of a ‘National Circular and Digital Construction Steering Committee’ (working group), comprising representatives from key ministries, industry associations, research institutes and civil society.
- Μεμβερσ: Μινιστρψ οφ Χονστρυχτιον ανδ Τρανσπορτ (ΜΧΤ), Μινιστρψ οφ Ενεργψ (ΜΕ), ρΜΙ Νονπροφιτ Λτδ., Ηυνγαριαν Χηαμβερ οφ Χομμερχε ανδ Ινδυστρψ (ΗΧΧΙ), ρζΟΣΖ, δομεστιχ τεχνηνιχαλ υνιπερσιτιεσ (ε.γ. ΒΜΕ, ρβυδα Υνιπερσιτυ) ανδ ρελεπαντ χιπιλ προφεσσιοναλ οργανισατιονσ (ε.γ. ΜΕΗΙ), ασ ωελλ ασ τηε Χηαμβερ οφ Χομμερχε ανδ Ινδυστρψ οφ Π|χσ-Βαρανψα (ΠΒΚΙΚ).
- **Roles and responsibilities:** The ÉKM provides strategic and legislative guidance. ÉMI is responsible for the operational coordination of TAP implementation, pilot projects and monitoring. The MKIK and ÉVOSZ are responsible for industry implementation and the involvement of SMEs.
- Ρολε οφ ΠΒΚΙΚ: Ασ τηε Χιρχυλαρ ΔιγιΒυιλδ παρτνερ ρεσπονσιβλε φορ τηισ ΤΑΠ, τηε Χηαμβερ οφ Χομμερχε ανδ Ινδυστρψ οφ Π|χσ-Βαρανψα (ΠΒΚΙΚ) αχτσ ασ νατιοναλ χονταχτ ποιντ το τηε ΔΑΝΥΒΕ ΧιΔιΧον ΧΛΥΣΤΕΡ, ενγαγεσ χονστρυχτιον ΣΜΕσ ανδ χλυστερσ (ε.γ. τηε Χονστρυχτιον Τεχνηολογψ Χλυστερ ιν Σουτη Τρανσδανυβια) τηρουγη ιτσ βυσινεσσ συλπορτ σερωιχεσ ανδ τηε Εντερπρισε Ευροπε Νετωορκ, οργανισεσ δισσεμινατιον ανδ κνοωλεδγε-σηαρινγ επεντσ, ανδ ρεπορτσ ον ΤΑΠ προγρεσσ το τηε Χλυστερ.

Timeline:

A detailed national timetable covering the period 2026–2030 is being drawn up for the implementation of the measures:

- **2026 (Short term):** Formal establishment of the national steering committee. Introduction of the mandatory use of BIM for public sector projects (2026). Full launch and standardisation of the National Construction Industry Register (NÉNY) and ÉMI green declarations. Launch of digitalization support schemes targeting SMEs (e.g. GINOP Plus).
- **2027–2028 (Medium term):** Complete overhaul of university and vocational training curricula (digital and circular economy modules). Testing and domestic roll-out of digital platforms supporting regional supply chains for secondary materials.
- **2029–2030 (Long term):** Widespread adoption of closed-loop business models in the domestic SME sector. Achieving full interoperability of domestic digital platforms with transnational EUSDR networks.

Monitoring and Evaluation:

- **Framework:** Definition of a national framework (coordinated by ÉMI) to monitor progress based on the National KPIs set out in Chapter 4.
- Βασελινεσ: Τ0 παλυεσ φορ αλλ ΚΠΙσ εξπρεσσεδ ασ περχενταγε ινχρεασεσ (ΚΠΙ 2.2.2, 3.2.2, 4.1.1, 5.1.2 ανδ 5.2.2) ωιλλ βε εσταβλισηεδ ιν 2026, υσινγ δατα φορμ ΝρΝΨ, τηε ρΜΙ ρεγιστερσ, προγραμμε μονιτορινγ ανδ βασελινε συρρεψσ.

- **Reporting:** Introduction of regular reporting mechanisms: quarterly progress reports to the national steering committee, and annual summary reports to the transnational “DANUBE CiDiCon CLUSTER” (Danube Region Cluster).
- **Evaluation:** To measure the effectiveness and impact of the TAP, an internal mid-term evaluation will be conducted in 2028, and an independent external end-term evaluation at the end of 2030.

Risk Management:

Potential national-level risks threatening implementation and proposed mitigation measures:

- 1. Risk (Low industry uptake): Resistance and reluctance among domestic SMEs towards digitalization, and fear of high costs.
oMitigation: Targeted national financial support and mentoring programmes, and the maintenance of one-stop-shop technology advisory networks.
- 2. Risk (Skills shortage): Shortage of qualified digital engineers, BIM modellers and IT specialists in the construction industry.
oMitigation: Close cooperation and dual training schemes with higher education, as well as the immediate expansion of adult education programmes (e.g. ConstructSkills4LIFE).
- 3. Risk (Funding delays): Potential delays in the allocation of EU and state funds.
oMitigation: Greater involvement of private capital (e.g. venture capital, green bank loans) and public-private partnerships (PPPs) in the sector.
- 4. Risk (Political/regulatory inflexibility): Lack of political will or bureaucratic delays in adopting new standards.
oMitigation: Operating a broad-based, strong national steering committee with ongoing government and industry consultations to ensure that legislation flexibly follows market innovation.

8. Stakeholder Engagement (National Level)

The success of the transition towards a circular and digital construction ecosystem depends on close cooperation between the domestic actors of the ‘quadruple helix’ model – the public sector, the private sector, academia and civil society.

Collaboration Mechanisms:

- **National and regional forums:** Organising regular in-person and online meetings of the National Steering Committee outlined in Chapter 7, as well as the Regional Multi-Stakeholder Groups (RMSG), to facilitate continuous dialogue and feedback.

- **Transnational integration:** Active participation of delegates from domestic working groups in the Danube Region Working Groups (WGG) and in the international networking platforms established by the Circular DigiBuild project.
- **National digital platforms:** Utilising the existing online portals of the ÉMI and professional chambers, as well as the interfaces of the forthcoming National Construction Industry Register (NÉNY), for the rapid sharing of information and knowledge.

Governments/Public Authorities: The Ministry of Construction and Transport (ÉKM) and the Ministry of Energy (EM) are responsible for establishing the policy framework. The involvement of regional and local authorities is essential for greening local building regulations (HÉSZ), the local management of demolition waste, and the practical application of green public procurement.

Industry Associations & SMEs: Mobilising ÉVOSZ, the MKIK and construction industry clusters. Their participation is critical in testing digital solutions (e.g. BIM), digitising supply chains, and providing practical mentoring to smaller subcontractors.

Research & Education Institutions: Involving domestic technical higher education institutions (e.g. BME, Óbuda University, PTE) and Vocational Training Centres in scientific research (R&D), materials testing, and the development of up-to-date curricula and adult education programmes focused on digitalization.

Financial Institutions & Investors: Involving the Hungarian Development Bank (MFB), commercial banks and venture capital funds to bridge financing gaps. Their role is to develop ESG-based green loans, schemes supporting technological transformation in SMEs, and financial instruments that facilitate the scaling up of circular business models.

Civil Society & NGOs: Involving professional civil society organisations (e.g. the Hungarian Energy Efficiency Institute – MEHI, Energiaklub) and local community forums in social dialogue. This ensures transparency and increases public trust and awareness of renovation programmes and recycled materials.

Communication Plan:

Strategy: To develop a comprehensive national communication strategy for the continuous dissemination of results, funding opportunities and best practices.

Tools and channels:

- Operating a public **digital dashboard** on the ÉMI or ÉKM platforms, where the public and the industry can track the achievement of national KPIs (e.g. volume of recycled materials, number of trained professionals).
- Regular distribution of professional **newsletters, progress reports** and guidelines to chamber members and businesses registered in the construction sector.
- Extensive **media coverage and public awareness campaigns** (PR campaigns, social media presence) on the benefits of the circular economy for the public.

- Intensive use of ÉMI's National Model House Park and Visitor Centre in Szentendre as a venue for educational programmes, open days and press events.

9. Sustainability and Scalability

Sustainability Mechanisms:

The long-term sustainability of initiatives and outcomes launched under the TAP, extending beyond the initial funding cycles (e.g., GINOP Plus), will be ensured by the following mechanisms:

- **Institutionalization of policies:** The enshrinement of digitalization and circular economy principles in legislation (for example, the mandatory use of BIM for public investments from 2026, or amendments to the Building Act) ensures that these practices become part of the domestic construction industry standard and do not remain merely temporary projects.
- **Self-sustaining state systems:** The operation of the National Construction Economy Register (NÉNY), the e-log and the Üvegkapu systems forms part of the state's basic infrastructure, thus guaranteeing their long-term financing and use beyond the project period.
- **Market-driven uptake:** Through pilot projects and one-stop-shop advisory services, domestic SMEs recognize the cost savings arising from the use of secondary raw materials and material optimization; thus, innovations will persist without external support, purely to maintain market competitiveness.
- **Maintaining networks:** The Hungarian nodes of the Danube Region Cluster (e.g. EDIH networks and professional chambers) will subsequently sustain themselves through membership fees and industrial R&D services.

Scalability Strategies:

Successful national pilot projects and initiatives will be scaled up at national and transnational levels as follows:

- **National-level expansion:** Architectural solutions, materials and digital processes successfully tested at ÉMI's National Model House Park and Visitor Centre in Szentendre (e.g. the integration of smart homes and circular materials) will be scaled up to other major construction industry and university centres across the country (e.g. Debrecen, Pécs, Szeged, Győr). Proven educational modules will be rolled out across the entire national vocational training network.
- **Transnational knowledge sharing:** Given its 'catching up' status, Hungary can play a bridging role. Domestically developed best practices, such as ÉMI's standardized "green declarations" or experiences with domestic e-diary integration, will be shared with other "catching-up" or "early-stage" countries in the region (e.g. Serbia,

Moldova, Bosnia and Herzegovina), thereby promoting cross-border interoperability and the application of common data standards.

Territorial Action Plan (TAP) for Digital Innovation in Circular Construction in Moldova

Prepared by: BAC NGO, PP16

Circular DigiBuild Project
Interreg Danube Region Programme

2026

Table of Contents

TERRITORIAL ACTION PLAN (TAP) FOR DIGITAL INNOVATION IN CIRCULAR CONSTRUCTION...1

1. INTRODUCTION / EXECUTIVE SUMMARY.....	4
2. VISION AND MISSION (TERRITORIAL ADAPTATION).....	7
3. ALIGNMENT WITH EU STRATEGY FOR THE DANUBE REGION (EUSDR).....	9
4. STRATEGIC PILLARS, OBJECTIVES, AND KEY ACTIONS (NATIONAL KPIs).....	14
PILLAR 1: ENABLING POLICY & REGULATORY FRAMEWORKS.....	14
OBJECTIVE 1.1: HARMONIZE CIRCULAR CONSTRUCTION STANDARDS AND REGULATIONS RELATED TO DIGITALIZATION.....	14
OBJECTIVE 1.2: DEVELOP AND IMPLEMENT FINANCIAL INCENTIVES FOR CIRCULAR CONSTRUCTION PRACTICES....	15
PILLAR 2: FOSTERING DIGITAL INNOVATION & TECHNOLOGY ADOPTION.....	16
OBJECTIVE 2.1: PROMOTE THE ADOPTION OF BUILDING INFORMATION MODELING (BIM) AND OTHER DIGITAL TECHNOLOGIES.....	16
OBJECTIVE 2.2: SUPPORT THE DEVELOPMENT AND DEPLOYMENT OF DIGITAL PLATFORMS FOR MATERIAL TRACKING AND WASTE MANAGEMENT.....	17
PILLAR 3: BUILDING SKILLS & CAPACITY.....	19
OBJECTIVE 3.1: DEVELOP EDUCATION AND TRAINING PROGRAMS FOR DIGITAL SKILLS WITHIN CIRCULAR CONSTRUCTION.....	19
OBJECTIVE 3.2: PROMOTE KNOWLEDGE TRANSFER AND BEST PRACTICE SHARING AMONG STAKEHOLDERS.....	20
PILLAR 4: STRENGTHENING COLLABORATION & SUPPLY CHAINS.....	21
OBJECTIVE 4.1: FACILITATE THE DEVELOPMENT OF DIGITAL REGIONAL SUPPLY CHAINS FOR RECYCLED AND SECONDARY CONSTRUCTION MATERIALS.....	21
OBJECTIVE 4.2: PROMOTE COLLABORATION BETWEEN RESEARCH INSTITUTIONS, INDUSTRY, AND GOVERNMENTS.	22
PILLAR 5: RAISING AWARENESS & CHANGING MINDSETS.....	23
OBJECTIVE 5.1: IMPLEMENT AWARENESS CAMPAIGNS TO PROMOTE THE BENEFITS OF DIGITALIZATION WITHIN CIRCULAR CONSTRUCTION.....	23
OBJECTIVE 5.2: ENCOURAGE THE ADOPTION OF DIGITAL TECHNOLOGIES FOCUSING ON CIRCULAR ECONOMY PRINCIPLES USED IN CONSTRUCTION BUSINESS MODELS.....	24
5. NATIONAL CONTEXT AND CHALLENGES.....	26
5.1 MACRO AND SECTORAL CONTEXT.....	26
5.2 POLICY AND INSTITUTIONAL LANDSCAPE.....	26
5.3 SECTOR BASELINE.....	27
5.4 SWOT ANALYSIS.....	27
5.5 IMPLICATIONS FOR THE TAP.....	29
6. FINANCIAL STRATEGY (NATIONAL LEVEL).....	30
6.1 FINANCING PRINCIPLES.....	30
6.2 FUNDING ARCHITECTURE BY SOURCE.....	30

6.3 INDICATIVE BUDGET ENVELOPE (2026–2030).....	31
6.4 CO-FINANCING AND BLENDING ARCHITECTURE.....	32
6.5 DEMAND-SIDE INSTRUMENT.....	32
6.6 ABSORPTION CAPACITY AND RISK.....	32
6.7 SUSTAINABILITY OF FINANCING BEYOND 2030.....	33
7. IMPLEMENTATION PLAN (NATIONAL LEVEL).....	34
GOVERNANCE STRUCTURE:.....	34
TIMELINE:.....	34
MONITORING AND EVALUATION:.....	35
RISK MANAGEMENT:.....	36
8. STAKEHOLDER ENGAGEMENT (NATIONAL LEVEL).....	38
COLLABORATION MECHANISMS:.....	38
INVOLVEMENT OF KEY GROUPS:.....	38
COMMUNICATION PLAN:.....	39
9. SUSTAINABILITY AND SCALABILITY.....	40
10. ANNEXES.....	42
ANNEX A: LIST OF KEY NATIONAL STAKEHOLDERS INVOLVED.....	42

1. Introduction / Executive Summary

Purpose: This Territorial Action Plan (TAP) outlines the Republic of Moldova's commitment and national strategy to implement the 2030 Danube Region Digital Innovation Strategy for Circular Construction (hereafter "the Strategy"). It translates the Strategy's transnational vision into a country-specific roadmap for 2026–2030, defining national actions, measurable targets, responsible bodies, and indicators that will drive Moldova's construction sector toward a circular, low-carbon and digitally enabled model. The TAP is delivered by AO Centrul de Consultanță în Afaceri (BAC NGO, PP16) under Activity A3.5 of the Circular DigiBuild project, in dialogue with the national Regional Multi-Stakeholder Group (RMSG) convened in Moldova between June 2024 and 2026.

Alignment: This TAP is fully aligned with the Strategy's vision, mission and five strategic pillars - Policy & Regulation; Digital Innovation & Technology; Skills & Capacity; Collaboration & Supply Chains; Awareness & Mindsets - and with the EU Strategy for the Danube Region (EUSDR) Priority Areas. It positions itself as the construction-sector implementation arm of Moldova's green-and-circular policy stack and as the construction-sector translation of the national digital-transformation agenda. The TAP is anchored in the following Moldovan policy and legal instruments:

- **National Development Strategy "European Moldova 2030"** - the long-term umbrella vision adopted by Parliament in November 2022.
- **National Programme for promotion of Green&Circular Economy 2024–2028** (Governmental Decision - GD nr. 495/2024) - the programmatic parent for the green-and-circular transition, of which this TAP is the construction-sector arm.
- **The Environment Strategy** for 2024–2030 - naming construction-and-demolition materials as a circular-economy priority sector.
- **National Waste Management Program 2023–2027** (GD nr. 972/2023) - the national waste-management framework covering CDW.
- **The Regulation on the management of construction and demolition waste** (under preparation by the Ministry of Environment with UNDP support, project "Enabling an Inclusive Green Transition in the Republic of Moldova", 2024–2026) - the operational instrument that will introduce mandatory authorisation, separate collection, and a 70% recovery target for non-hazardous CDW.
- **Code on Urbanism and Construction** (Law nr. 434/2023, in force from early 2026) - the new sectoral framework, which mandates digital permitting through SIA GEAP for the four key construction-permit instruments.
- **Digital Transformation Strategy of the Republic of Moldova 2023–2030** (GD nr. 650/2023) - the national digital-transformation agenda, into which this TAP introduces a construction-sector vertical via BIM and digital CDW tracking.

- **National Smart Specialisation Programme "SMART Moldova"** 2024–2027 - Moldova's RIS3-equivalent strategy.
- **The 2025–2029 National Programme for the Accession of the Republic of Moldova to the EU and the EU Growth Plan for Moldova** (€1.9 billion for 2025–2027) - providing the EU-alignment and capital window for delivery.

Current Status: Moldova is classified as an "early-stage" country in the Circular DigiBuild policy review, alongside Montenegro, Serbia and Bosnia and Herzegovina. Foundational policy frameworks are taking shape, but enforcement, infrastructure, skills and digital capability for circular construction remain largely under-developed. Moldova is however advancing rapidly: the new Construction Code, the upcoming CDW Regulation, and the EU accession agenda together form the strongest reform window the sector has ever had. The current landscape is characterised by the following:

- **Construction is a major economic sector but not a strategic priority.** Construction investments accounted for 41.8% of total investment volume in H1 2024; engineering construction investment fell 24.9% over the same period. Construction is not identified as a priority niche in the SMART Moldova RIS3 (2024–2027) - a strategic gap this TAP seeks to close by inserting circular and digital construction as a cross-cutting priority.
- **Construction-and-demolition waste management is starting from a low base.** National strategy projections place CDW at approximately 2.6 million tonnes by 2027, against a near-zero formal recycling rate, no dedicated recycling infrastructure, and over 2,000 illegal dump sites. The Code of Practice CP A.09.04:2014 set a 70% recovery target for non-hazardous CDW but enforcement has been weak. The new CDW Regulation, prepared with UNDP support, will introduce mandatory authorisation of CDW operators, separate collection, and infrastructure for reuse of recycled aggregates in road and infrastructure works.
- **Building Information Modelling (BIM) adoption is incipient.** Moldova has no national BIM mandate; uptake is limited to a small number of large firms and internationally-funded projects. National Construction Norms (NCM) do not yet incorporate ISO 19650 / EN 17412 / CEN-TC 442 BIM standards. The Construction Code (Law 434/2023, applicable from early 2026) introduces mandatory digital permitting through SIA GEAP - the first systemic step toward digital construction infrastructure.
- **Digital transformation is anchored at the national level but does not yet reach construction.** The Digital Transformation Strategy 2023–2030 (GD 650/2023) sets six strategic objectives including a "100% digital state" and Industry 4.0 readiness for

traditional sectors. This TAP positions BIM, digital CDW tracking and material passports as the construction-sector instantiation of that agenda.

- **The skills gap is the binding constraint.** Civil-engineering and architecture curricula at Moldovan universities currently lack systematic integration of circular-economy principles or digital construction modules; vocational training in BIM, digital twins and material passports is largely absent. The Centre of Excellence in Construction (CEC) and the Sustainable Development Research Centre at the Technical University of Moldova (UTM) - both signatories to the CDB Alliance Memorandum of Understanding - are the natural national anchors for closing this gap.
- **The funding architecture is the strongest it has ever been.** The EU Growth Plan for Moldova (€1.9 billion, 2025–2027) and the Reform and Growth Facility, EU4Moldova, EU4Green Recovery East (€21.3 million, 2025–2028), Interreg NEXT Romania-Moldova, Horizon Europe (Moldova associated since 2022), Digital Europe Programme, ODA support programmes (Greening SMEs, Femeia în Afaceri, Granturi Europene), CNED / FEERM (1.4 billion lei for residential energy efficiency), and EBRD / EIB green-innovation lines together create an unprecedented capital window for the construction-sector green-and-digital transition.
- **A multi-stakeholder ecosystem has been formed under Circular DigiBuild.** Through five Regional Multi-Stakeholder Group meetings (RMSG 1–5, June 2024 to January 2026), Moldova has convened public, private, academic and social actors; signed two CDB Alliance Memoranda of Understanding (with CEC and the UTM Sustainable Development Research Centre); produced the Moldova-specific RIS3 / policy-review contributions to Deliverable D.2.4.2; and identified the **GreenBuild Lab - Digital and Circular Construction Innovation Hub** as a flagship national initiative. These assets form the institutional and operational base on which this TAP will build.

2. Vision and Mission (Territorial Adaptation)

Vision (National):

The vision for Republic of Moldova is to become an active and recognised contributor to circular and digital construction practices in the Danube Region.

This vision unpacks into five mutually reinforcing 2030 aspirations for the Moldovan construction sector:

- **Regulatory alignment.** Moldova's construction-sector legislation, technical norms and procurement rules are aligned with the EU acquis on circular economy, waste management and digital construction - including the Waste Framework Directive, the revised Construction Products Regulation, and ISO 19650 / EN 17412 / CEN-TC 442 BIM standards transposed into national NCM norms.
- **Operational CDW system.** Construction-and-demolition waste is collected separately, authorised operators are in place, and a measurable share of secondary aggregates (concrete, brick, asphalt) is reused in road and infrastructure works - operationalising the new Regulation on the Management of CDW.
- **Digital construction infrastructure.** Digital permitting through SIA GEAP is fully embedded; Building Information Modelling is used as a documented delivery requirement in major public tenders; and a national digital platform for CDW tracking and material passports is in pilot operation, interoperable with the EU Digital Product Passport framework.
- **Skilled workforce.** A new generation of civil engineers, architects, public-procurement officers and SME managers is trained in BIM, circular design, life-cycle assessment and digital CDW tracking - anchored at the Technical University of Moldova, the Centre of Excellence in Construction, and the Chamber of Commerce and Industry.
- **Connected ecosystem.** Moldova is an active member of the DANUBE CiDiCon cluster, with Moldovan organisations participating in cross-border circular-construction projects, contributing to Danube-wide knowledge exchange, and channelling EU funding (Growth Plan, Horizon Europe, Interreg) into national circular-construction pilots.

Mission:

To facilitate collaboration, knowledge transfer and the adoption of innovative solutions among Moldova's national stakeholders - public authorities, industry, academia and civil society - so as to transform the construction sector toward a circular economy enabled by digital technologies.

The mission will be delivered through six interconnected lines of action that map directly onto the Strategy's five pillars:

- **Operationalising the green-and-circular policy stack in construction.** This TAP closes the gap between policy intent and on-site practice for *GD nr. 495/2024* (Programul Economie Verde și Circulară 2024–2028), the *Environmental Strategy 2024–2030*, the *National Waste Management Programme 2023–2027*, and the new *Regulation on the Management of Construction and Demolition Waste* (under preparation by the Ministry of Environment with UNDP support).
- **Translating the Digital Transformation Strategy 2023–2030 into the construction sector.** By introducing BIM as a documented delivery requirement, digital CDW tracking, material passports compatible with the EU Digital Product Passport framework, and a national construction-sector data exchange protocol anchored on the SIA GEAP permitting system.
- **Building national capacity** through curricula, certification, continuous professional development, and a train-the-trainers programme - anchored at the Technical University of Moldova, the Centre of Excellence in Construction, and the Chamber of Commerce and Industry of the Republic of Moldova, with focused upskilling of public-procurement officers and construction-sector inspectors.
- **Connecting Moldova to the DANUBE CiDiCon cluster** and channelling EU funding - Growth Plan for Moldova, Reform and Growth Facility, Horizon Europe (associated), Digital Europe Programme, Interreg NEXT Romania-Moldova, EU4Green Recovery East - into circular-construction pilots, demonstration projects and policy reform.
- **Mobilising the GreenBuild Lab - Digital and Circular Construction Innovation Hub** as a national flagship for prototyping, circular design, training, incubation, and Living-Lab testing of circular and digital construction solutions, embedded within the SMART Moldova national smart-specialisation programme.
- **Sustaining a quadruple-helix multi-stakeholder dialogue** through the Regional Multi-Stakeholder Group (RMSG), the CDB Alliance Memoranda of Understanding,

and the National Steering Committee on Circular and Digital Construction proposed under Section 7 of this TAP.

3. Alignment with EU Strategy for the Danube Region (EUSDR)

The *2030 Danube Region Digital Innovation Strategy for Circular Construction* is explicitly mapped, in its Section 2, to the four EUSDR Priority Areas: *Connecting the Region*, *Protecting the Environment*, *Building Prosperity*, and *Strengthening the Region*. This chapter describes how the Republic of Moldova's national actions, KPIs and governance commitments under this TAP feed into each of those EUSDR Priority Areas. It then sets out the alignment between this TAP and Moldova's own national strategic framework, ensuring that EU-level priorities and domestic policy reform converge on the same construction-sector outcomes.

Moldova has been part of the EUSDR since its inception in 2011 and contributes to its 2025–2030 implementation cycle through national focal points coordinated by the State Chancellery and sectoral ministries. As an EU candidate country (since June 2022) preparing for accession negotiations on Chapter 22 (Regional Policy), Chapter 27 (Environment and Climate Change) and Chapter 10 (Information Society and Media), Moldova has every interest in using the EUSDR as a practical alignment instrument - and the construction-sector TAP, by virtue of its cross-cutting nature, is one of the most efficient vehicles to that end.

3.1 Alignment with EUSDR Priority Areas

Pillar I - Connecting the Region (*Improved Infrastructure, Digitalisation*)

This TAP contributes to Pillar I primarily through Strategy Pillar 2 (Fostering Digital Innovation & Technology Adoption) and Strategy Pillar 4 (Strengthening Collaboration & Supply Chains). Specifically:

- It operationalises the digital-permitting infrastructure introduced by the Code on Urbanism and Construction (Law 434/2023) through the SIA GEAP system, and extends it with BIM as a documented delivery requirement for major public tenders (Objective 2.1).
- It pilots a national digital platform for CDW tracking and material passports, interoperable with the EU Digital Product Passport framework and the wider Danube CiDiCon platform (Objective 2.2).

- It connects Moldovan stakeholders to the cross-border DANUBE CiDiCon cluster as a transnational supply, knowledge and innovation network (Objective 4.1).

These actions feed EUSDR Priority Areas PA1b (Rail-Road-Air mobility) - through circular practices in transport-infrastructure construction - and PA7 (Knowledge Society), by digitalising a sector that has historically lagged the rest of the Moldovan economy on digital uptake.

Pillar II - Protecting the Environment (*Resource Efficiency, Waste Reduction*)

This TAP contributes to Pillar II primarily through Strategy Pillar 1 (Enabling Policy & Regulatory Frameworks) and Strategy Pillar 4 (Strengthening Collaboration & Supply Chains). Specifically:

- It supports the adoption and enforcement of the new *Regulation on the Management of Construction and Demolition Waste*, including mandatory authorisation of operators, separate collection, and the 70% recovery target for non-hazardous CDW required by the EU Waste Framework Directive (Objective 1.1).
- It closes the loop on secondary materials by piloting the recovery and reuse of recycled aggregates - concrete, brick, asphalt - in road and infrastructure works, building on the Voluntary Collection Centres established in Călărași, Ungheni and Leova with EU/UNDP support (Objective 4.1).
- It integrates circularity and digitalisation criteria into public procurement of construction works (Objective 1.1), reducing demand for primary raw materials and embedded carbon.

These actions feed EUSDR Priority Areas PA4 (Water Quality) - through reduced uncontrolled dumping - PA5 (Environmental Risks) - by closing illegal dump sites - and PA6 (Biodiversity, Landscapes, Air and Soil Quality) - by reducing extraction pressure on natural quarries.

Pillar III - Building Prosperity (*Innovation, SME Growth*)

This TAP contributes to Pillar III primarily through Strategy Pillar 3 (Building Skills & Capacity) and Strategy Pillar 5 (Raising Awareness & Changing Mindsets), supported by Pillar 1 financial-incentive instruments. Specifically:

- It establishes the GreenBuild Lab - Digital and Circular Construction Innovation Hub as a national flagship for prototyping, training, incubation and Living-Lab testing of circular and digital construction solutions, embedded within the SMART Moldova national smart-specialisation programme (Objectives 3.1, 4.2, 5.2).

- It develops targeted financial incentives - grants, tax instruments, public-procurement criteria, dedicated SME-support windows - channelled through ODA programmes (Greening SMEs, Femeia în Afaceri, Granturi Europene) and EU instruments (Growth Plan, Reform and Growth Facility, EU4Green Recovery East) to accelerate SME adoption of circular and digital business models (Objective 1.2).
- It builds a national skills pipeline through curricula, certification, continuous professional development and a train-the-trainers programme - anchored at the Technical University of Moldova, the Centre of Excellence in Construction, and the Chamber of Commerce and Industry of the Republic of Moldova (Objective 3.1).

These actions feed EUSDR Priority Areas PA7 (Knowledge Society) - research, innovation, ICT - PA8 (Competitiveness - SMEs, clusters) and PA9 (People and Skills).

Pillar IV - Strengthening the Region (*Institutional Capacity, Collaboration*)

This TAP contributes to Pillar IV primarily through Strategy Pillar 1 (Enabling Policy & Regulatory Frameworks) and Strategy Pillar 3 (Building Skills & Capacity), supported by the governance architecture set out in Chapter 7. Specifically:

- It establishes a National Steering Committee on Circular and Digital Construction, chaired by the Ministry of Infrastructure and Regional Development and bringing together the Ministry of Environment, the Ministry of Economic Development and Digitalisation, the Ministry of Education and Research, ODA, the National Standards Institute, the Chamber of Commerce and Industry, UTM and CEC as co-owners of TAP implementation (Chapter 7).
- It embeds a TAP Secretariat at AO Centrul de Consultanță în Afaceri (PP16) to ensure operational continuity, KPI tracking and annual reporting both nationally and to the Danube CiDiCon cluster (Chapter 7).
- It connects Moldovan institutions to the cross-border Danube governance architecture through joint cross-border projects, professional secondments, and knowledge-sharing events (Objectives 3.2, 4.1, 4.2).

These actions feed EUSDR Priority Area PA10 (Institutional Capacity and Cooperation) by building durable national governance for the green-and-digital transition of the construction sector and by hard-wiring Moldovan institutions into transnational Danube governance.

Alignment with Moldova's National Strategic Framework

In parallel with the EUSDR mapping above, this TAP delivers measurable contributions to nine instruments of the Moldovan national strategic framework. The table below summarises the alignment.

Moldovan instrument	Type	This TAP contributes by
Strategia Națională de Dezvoltare "Moldova Europeană 2030"	Umbrella long-term strategy	Operationalising priorities on green economy, digital transformation and sustainable infrastructure in the construction sector.
Programul Economie Verde și Circulară 2024–2028 (GD 495/2024)	Programmatic parent	Serving as its construction-sector implementation arm.
Strategia de Mediu 2024–2030	Sectoral environmental strategy	Delivering on the priority "construction and demolition materials" as a circular-economy sector.
Programul Național Gestionare Deșeurilor 2023–2027 (GD 972/2023)	National waste-management framework	Supporting CDW pilot platforms, secondary-materials reuse, and authorised-operator capacity.
Regulamentul privind gestionarea deșeurilor din construcții și demolări (under preparation, MoE + UNDP)	Operational regulation	Supporting its enforcement through compliance tooling, capacity building, and pilot digital tracking.
Code on Urbanism and Construction (Law 434/2023)	Sectoral framework + digital permits	Extending the SIA GEAP digital backbone with BIM and CDW-tracking integrations.
Digital Transformation Strategy of the Republic of Moldova 2023–2030 (GD 650/2023)	National digital agenda	Introducing a construction-sector vertical into the national digital roadmap.
SMART Moldova National Smart Specialisation	RIS3-equivalent	Embedding the GreenBuild Lab as a flagship within SMART Moldova;

Programme 2024–2027		proposing circular construction as a cross-cutting smart-specialisation priority.
2025–2029 National Programme for EU Accession + EU Growth Plan for Moldova (€1.9 bn)	EU-alignment + capital window	Aligning national actions with Chapters 22, 27 and 10 of the EU acquis.

Looking beyond the EUSDR framework, this TAP supports Moldova's broader EU accession process in three acquis chapters that the Government has identified as priorities under the 2025–2029 National Programme for EU Accession:

- **Chapter 22 - Regional Policy and Coordination of Structural Instruments.** The TAP builds absorption capacity for EU instruments (Growth Plan, Reform and Growth Facility, Interreg NEXT, EU4Green Recovery East) and demonstrates multi-level governance through the National Steering Committee and the RMSG.
- **Chapter 27 - Environment and Climate Change.** The TAP transposes and operationalises the Waste Framework Directive in the construction sector - specifically the 70% CDW recovery target - and contributes to the Environmental Strategy 2024–2030 target of a 70% reduction in GHG emissions versus 1990 levels by 2030.
- **Chapter 10 - Information Society and Media.** The TAP embeds open-standards BIM (ISO 19650, openBIM IFC/BCF), material passports compatible with the EU Digital Product Passport framework, and interoperable data exchange between SIA GEAP and the Agency for Environment register.

By making these acquis links explicit, the TAP positions itself not only as a Danube-regional commitment but as one of the operational vehicles through which Moldova's construction sector will demonstrate EU readiness during accession negotiations.

4. Strategic Pillars, Objectives, and Key Actions (National KPIs)

This section details the country-specific implementation for each of the five strategic pillars defined in the Danube Region strategy. For each objective it sets out the national context, national actions, responsible bodies, a timeline and national KPIs. Each KPI table gives a T0 baseline, a T2 mid-term target (2028), a T4 end-term target (2030) and the data source. Where no reliable national statistics exist, the baseline is marked “T0 2026” and will be established by the TAP Coordination Unit during Phase 1. Targets are deliberately modest and achievable, in line with Moldova’s early-stage position.

Pillar 1: Enabling Policy & Regulatory Frameworks

Objective 1.1: Harmonize circular construction standards and regulations related to digitalization.

Context. Moldova has a fast-evolving regulatory base - the Code on Urbanism and Construction (Law 434/2023) enters into force in early 2026, and the new Regulation on the Management of Construction and Demolition Waste is in public consultation. However, BIM, material passports and openBIM standards are not yet transposed into national NCM norms; public procurement does not yet integrate circularity and digital-delivery criteria; and enforcement capacity at the Agency for Environment and National Construction Inspectorate is limited. This Objective closes those gaps.

National Actions:

- Conduct a comprehensive review of Moldovan construction-sector legislation (Law 434/2023, Law 209/2016, GD 972/2023, public procurement law, NCM norms) and publish a Regulatory Gap Analysis on Circular and Digital Construction by end-2026.
- Establish an Inter-Ministerial Working Group on Circular and Digital Construction, chaired by MIDR, with MoE, MEDD, MEC, MoF, ODA, INSM, ISC, Agency for the Environment, Chamber of Commerce of Moldova, UTM and CEC as members, and BAC NGO (PP16) as Secretariat.
- Support the adoption and effective enforcement of the new CDW Regulation through implementing guidelines, technical reference documents, training, and dedicated capacity building for Environment Agency and ISC inspectors.
- Transpose ISO 19650 (BIM), EN 17412 (LOIN/LOD), and CEN/TC 442 reference standards into Moldovan NCM norms via the National Institute of Standardisation (INSM).

- Publish model tender clauses for BIM deliverables, CDW management plans, and minimum recycled-content thresholds for non-structural concrete, in cooperation with the Public Procurements Agency; pilot them in at least 3 major public tenders above €5 M by 2029.

Responsible Bodies. Lead: MIDR. Co-leads: MoE, INSM, Agenția Achiziții Publice. Supporting: AAP, ISC, Agenția de Mediu, ODA, Camera de Comerț, UTM, CEC, UNDP Moldova (under the "Enabling an Inclusive Green Transition" project), BAC NGO (Secretariat).

Timeline. 2026 - IMG operational; Gap Analysis published; CDW Regulation supported through to adoption. 2027 - first draft of model tender clauses; ISO 19650 transposition launched. 2028 - 2 amended regulations / NCM norms adopted; model clauses published. 2029 - 3 pilot public tenders > €5 M; 4 NCM norms updated. 2030 - end-term evaluation, sustainability plan.

KPI	Definition	T0 baseline (2025)	T2 target (2028)	T4 target (2030)	Data source
1.1.1	Regulations, NCM norms or guidelines amended or adopted to integrate circular and digital construction	0	2	4	MIDR, INSM, Official Monitor
1.1.2	Public tenders piloting the model tender clauses (BIM, CDW management plan, recycled content)	0	1	3	Public Procurement Agency (MTender)

Objective 1.2: Develop and implement financial incentives for circular construction practices.

Context. Existing Moldovan instruments (ODA Greening SMEs, CNED/FEERM 1.4 bn lei for residential energy efficiency, EBRD/EIB green lines) are not yet targeted at the construction sector; the EU Growth Plan for Moldova (€1.9 bn 2025–2027) and EU4Green Recovery East (€21.3 M 2025–2028) open a new capital window that this Objective channels into circular construction.

National Actions:

- Map all existing national, EU and donor funding instruments accessible to Moldovan construction SMEs for their suitability to support circular and digital construction; publish recommendations for instrument reconfiguration by end-2027.
- Negotiate a dedicated circular-construction window within ODA's Greening SMEs Programme and within at least one EU instrument under the Growth Plan / Reform and Growth Facility, by 2028.

- Integrate circularity and digitalisation criteria (recycled content, BIM delivery, embodied carbon) into national public procurement of construction works and infrastructure; align with the new Construction Code and the model tender clauses developed under Objective 1.1.
- Establish a technical-assistance facility for Moldovan construction SMEs preparing applications to EU programmes (Horizon Europe, Digital Europe, Interreg NEXT, EU4Green Recovery East), hosted by BAC NGO in partnership with ODA.
- Co-design with EBRD / EIB a circular-construction credit line for Moldovan SMEs, with co-financing from FEERM where applicable.

Responsible Bodies. Lead: ODA. Co-leads: MEDD, MoF, MIDR. Supporting: CNED, Public Procurements Agency, Camera de Comerț, EBRD / EIB, UNDP, BAC NGO.

Timeline. 2026 - instrument mapping; first SME workshops. 2027 - recommendations report published; tech-assistance facility operational. 2028 - dedicated circular-construction window operational in ≥1 instrument. 2029 - credit line co-designed; first SME beneficiaries financed. 2030 - end-term evaluation.

KPI	Definition	T0 baseline (2025)	T2 target (2028)	T4 target (2030)	Data source
1.2.1	Public and private investment mobilised for circular construction projects (cumulative)	T0 2026	€2 M	€5 M	TCU financing matrix, ODA, MEDD
1.2.2	SMEs using financial incentives or technical assistance for circular construction (cumulative)	0	10	25	ODA, BAC NGO TA facility

Pillar 2: Fostering Digital Innovation & Technology Adoption

Objective 2.1: Promote the adoption of Building Information Modeling (BIM) and other digital technologies.

Context. Moldova has no national BIM mandate; uptake is limited to a small number of large firms and internationally-funded projects. The Code on Urbanism and Construction (Law 434/2023, in force from early 2026) introduces SIA GEAP digital permitting - the systemic foundation on which BIM adoption can now be built. Moldova has no national BIM roadmap yet.

National Actions.

- Develop a voluntary national BIM roadmap with phased adoption: BIM as a documented delivery requirement for ≥10% of public tenders above €5 M by 2028,

and $\geq 25\%$ by 2030, with a Level-of-Information-Need (LOIN) framework aligned with EN 17412.

- Support at least 3 demonstration / pilot projects by 2029 showcasing BIM, AI-assisted design, digital twins and IoT applications in circular construction - partnered with UTM, CEC, ISC and at least one large Moldovan contractor.
- Set up a National BIM Helpdesk hosted by the Camera de Comerț in partnership with UTM and BAC NGO, providing free advisory support to Moldovan SMEs on BIM adoption, software selection, and openBIM (IFC/BCF) compliance.
- Require openBIM IFC / BCF formats in all publicly co-financed BIM pilots to prevent vendor lock-in and ensure interoperability with the Danube CiDiCon platform.
- Launch national awareness workshops with the Camera de Comerț, UTM, CEC and ISC, targeting construction companies, public-sector clients, and architecture/engineering students.

Responsible Bodies. Lead: MIDR. Co-leads: ISC, MEDD. Supporting: Camera de Comerț, UTM, CEC, Agenția Servicii Publice (SIA GEAP operator), BAC NGO, Tekwill / MEDA EDIH.

Timeline. 2026 - Helpdesk operational; first awareness workshops. 2027 - BIM roadmap published; first 2 pilot projects launched. 2028 - voluntary adoption in $\geq 10\%$ of public tenders $> \text{€}5 \text{ M}$; 3 pilots in progress. 2029 - 3 pilots delivered. 2030 - $\geq 25\%$ of public tenders $> \text{€}5 \text{ M}$ with BIM requirement.

KPI	Definition	T0 baseline (2025)	T2 target (2028)	T4 target (2030)	Data source
2.1.1	% of public construction tenders above $\text{€}5 \text{ M}$ with a documented BIM requirement	T0 2026	10%	25%	Public Procurement Agency (MTender), ISC
2.1.2	Professionals trained in BIM and other digital construction tools (cumulative)	0	50	150	BIM Helpdesk, CCI CPD, UTM, CEC
2.1.3	Pilot / demonstration projects in digital and circular construction launched	0	2	3	MIDR, UTM, CEC

Objective 2.2: Support the development and deployment of digital platforms for material tracking and waste management.

Context. Moldova has no national digital platform for CDW tracking; the new CDW Regulation will require traceable, authorised flows from collection through reuse. This Objective builds the digital infrastructure that the Regulation needs in order to be enforceable, while plugging Moldova into the EU Digital Product Passport framework.

National Actions.

- Commission a scoping and feasibility study by end-2027 on a national digital platform for CDW tracking and material passports, designed to support the authorisation, separate-collection and recovery requirements of the new CDW Regulation. Required scope: integration paths with SIA GEAP and the Agency for Environment authorisation register; openBIM IFC and IFC-DPP compatibility; data ownership and privacy.
- Pilot a digital CDW tracking platform on at least 2 demolition / renovation projects by end-2028, in coordination with the Voluntary Collection Centres being built in Călărași, Ungheni and Leova under the EU/UNDP "Enabling an Inclusive Green Transition" project.
- Adopt national data standards and material passports consistent with the EU Digital Product Passport framework and ISO/CEN material-traceability standards.
- Sign a formal data-exchange protocol between the pilot CDW platform and the Agency for Environment's authorisation register by end-2029, enabling automated reporting of CDW flows.
- Provide technical assistance and licence subsidies for SMEs adopting the platform during the pilot phase, in partnership with ODA and Tekwill.

Responsible Bodies. Lead: MoE (Environment Agency). Co-leads: MIDR, MEDD. Supporting: Public Services Agency, INSM, Tekwill / MEDA EDIH, UTM, UNDP Moldova, Voluntary Collection Centres of Călărași / Ungheni / Leova.

Timeline. 2026 - requirements gathering. 2027 - feasibility study published; vendor procurement. 2028 - pilot platform in operation on 2 demolition projects. 2029 - data-exchange protocol signed; second platform pilot. 2030 - full pilot evaluation, plan for nationwide rollout.

KPI	Definition	T0 baseline (2025)	T2 target (2028)	T4 target (2030)	Data source
2.2.1	National digital platforms for circular construction implemented (pilot, with proven interoperability)	0	1	1	MoE / Environment Agency
2.2.2	Construction and demolition materials tracked digitally (tonnes per year, pilot projects)	0	500 t	2,000 t	Pilot CDW platform, Environment Agency
2.2.3	Data-exchange protocol between the pilot CDW platform and the Environment Agency register	No	Draft agreed	Signed and operational	MoE / Environment Agency

Pillar 3: Building Skills & Capacity

Objective 3.1: Develop education and training programs for digital skills within circular construction.

Context. Civil-engineering and architecture curricula in Moldova currently lack systematic integration of circular-economy principles or digital construction modules. UTM (Sustainable Development Research Centre, signatory to the CDB Alliance MoU) and CEC (Centre of Excellence in Construction, also CDB Alliance signatory) are the natural national anchors. Public-sector procurement officers are a particularly underserved audience and the binding constraint on uptake of any new model tender clauses.

National Actions.

- Integrate CE + digital-construction modules (BIM, IoT, digital twins, material passports, LCA, circular design) into university curricula at UTM (Faculty of Construction, Geodesy and Cadastre; Faculty of Urbanism and Architecture) and into CEC vocational programmes - targeting 3 institutions by 2027 and 5 by 2030.
- Develop a national certification scheme for circular and digital construction professionals, delivered through the Camera de Comerț CPD framework, in partnership with UTM, CEC and BAC NGO.
- Launch a train-the-trainers programme for university lecturers, CEC instructors, and Camera de Comerț CPD trainers, leveraging international partnerships (BUS-GoCircular type instruments, Danube CiDiCon cluster, Erasmus+).
- Establish structured industry-academia partnerships for internships, master-thesis projects and dual-education models, anchored on the GreenBuild Lab once operational.
- Run an annual train-the-procurer programme targeting public-sector procurement officers responsible for construction tenders, with the Public Procurements Agency as co-organiser.

Responsible Bodies. Lead: MEC. Co-leads: MIDR, ANCD, Camera de Comerț. Supporting: UTM, CEC, AAP, BAC NGO, Danube CiDiCon cluster, BUS-GoCircular consortium.

Timeline. 2026 - curriculum design partnerships; first train-the-trainer cohort. 2027 - first integrated module delivered at UTM and CEC. 2028 - certification scheme operational. 2029 - 5 institutions integrating CE+digital modules. 2030 - 150–200 trained professionals.

KPI	Definition	T0 baseline (2025)	T2 target (2028)	T4 target (2030)	Data source
3.1.1	National education / training programmes in digital technologies for circular construction	0	2	3	MEC, CCI, CEC
3.1.2	Universities and VET schools incorporating CE and digital construction into curricula	0	3	5	MEC, UTM, CEC
3.1.3	Public procurement officers trained on circular and digital tender clauses (cumulative)	0	30	80	Public Procurement Agency, BAC NGO

Objective 3.2: Promote knowledge transfer and best practice sharing among stakeholders.

Context. The RMSG, the four Network Workshops delivered in April 2025 (172 participants total), and the existing CDB Alliance MoUs provide a working starting point. The challenge is to institutionalise this dialogue beyond the Circular DigiBuild project lifecycle and to scale it across regions outside Chişinău.

National Actions:

- Organise at least 2 national knowledge-sharing events per year on circular and digital construction - alternating a flagship annual forum (Chişinău) with regional workshops in Bălţi, Cahul and Comrat.
- Establish a national online knowledge hub linked to the Danube CiDiCon platform, hosted by BAC NGO, indexing best practices, training materials, case studies, R&D outputs and EU funding calls.
- Facilitate peer-to-peer learning networks for Moldovan construction SMEs, anchored on the Camera de Comerţ regional offices.
- Operate a professional secondments programme placing Moldovan engineers, architects, public-procurement officers and CDW operators with Danube CiDiCon partner institutions - target ≥ 10 secondments by 2030.
- Embed Moldovan stakeholders in cross-border circular-construction projects via Interreg NEXT, Horizon Europe and EU4Green Recovery East.

Responsible Bodies. Lead: BAC NGO (PP16). Co-leads: Camera de Comerț, UTM, CEC. Supporting: MIDR, MEC, Danube CiDiCon cluster partners, RMSG.

Timeline. 2026 - knowledge hub launched; first annual forum / 1 regional workshop. 2027 - peer-to-peer networks operational; first secondments. 2028 - annual forum + 2 regional workshops. 2029 - ≥6 secondments cumulative. 2030 - ≥10 secondments cumulative; ≥10 Moldovan organisations participating in cross-border projects.

KPI	Definition	T0 baseline (2025)	T2 target (2028)	T4 target (2030)	Data source
3.2.1	National knowledge-sharing events organised per year (outside the CDB project)	0	2	2	BAC NGO (knowledge hub)
3.2.2	Moldovan organisations participating in cross-border circular-construction projects	T0 2026	5	10	BAC NGO, ANCD, Danube CiDiCon Cluster

Pillar 4: Strengthening Collaboration & Supply Chains

Objective 4.1: Facilitate the development of digital regional supply chains for recycled and secondary construction materials.

Context. Moldova has no formal CDW recycling infrastructure; the Voluntary Collection Centres being built in Călărași, Ungheni and Leova (EU/UNDP, €1.8 M) and the upcoming CDW Regulation together create the upstream foundation. This Objective builds the digital regional supply chain that connects collection to reuse - particularly in road and infrastructure works as authorised by the new Regulation.

National Actions:

- Establish a Moldovan national focal point for the Danube Circular Construction Supply Network, hosted at BAC NGO in coordination with the Camera de Comerț and the Agency for Environment.
- Map all national producers, recyclers, designers and authorised CDW operators, including the operators emerging under the new Regulation, in a structured supplier database accessible through the national knowledge hub.
- Implement national data standards and material passports for traceability of secondary aggregates, aligned with the EU Digital Product Passport framework and with the pilot digital CDW platform from Objective 2.2.

- Pilot the digital regional supply chain on the three Voluntary Collection Centres (Călărași, Ungheni, Leova), ensuring traceable flows from collection through processing to reuse in pilot road / infrastructure projects.
- Issue quality-assurance and liability guidance for secondary materials in cooperation with INSM and a materials-testing institute (potentially anchored at UTM), addressing a key adoption barrier.

Responsible Bodies. Lead: MoE (Environment Agency). Co-leads: MIDR, INSM, UTM. Supporting: Camera de Comerț, ODA, Voluntary Collection Centres of Călărași / Ungheni / Leova, UNDP, BAC NGO.

Timeline. 2026 - focal point established; mapping started. 2027 - supplier database online; QA guidance drafted. 2028 - pilot supply chain operational at first Voluntary Collection Centre. 2029 - pilot operational at all three Centres; first recycled-aggregate reuse in road infrastructure. 2030 - measurable national reuse of secondary materials.

KPI	Definition	T0 baseline (2025)	T2 target (2028)	T4 target (2030)	Data source
4.1.1	Recycled and secondary materials used in construction projects (tonnes per year)	~0	500 t	3,000 t	Environment Agency, Voluntary Collection Centres
4.1.2	Moldovan companies involved in regional / national circular supply chains	T0 2026	10	20	Supplier database, CCI

Objective 4.2: Promote collaboration between research institutions, industry, and governments.

Context. Moldova has institutional building blocks - UTM, ANCD, ODA, Tekwill, the Innovation Agency framework under SMART Moldova - but no construction-specific R&D ecosystem. The GreenBuild Lab is the missing connector; this Objective stands it up.

National Actions:

- Establish the Moldovan Network for Digital and Circular Construction Innovation, linking UTM, CEC, ANCD, ODA, Camera de Comerț, MIDR and MoE.
- Stand up the GreenBuild Lab - Digital and Circular Construction Innovation Hub as Moldova's national Living Lab, with the four core functions defined in the consortium materials: Prototyping Zone (3D printing, CNC, BIM stations, recycled-material processing); Circular Design Studio; Training & Incubation; Pilot Project

Demonstrator. Initial pilot budget ~€500,000, co-funded by SMART Moldova innovation funds, EU4Green Recovery East and donor financing.

- Launch at least 2 collaborative R&D calls between 2027–2030 with mandatory industry-academia consortia, focused on advanced recycled materials, AI-driven CDW management, and digital-twin applications in retrofit and demolition.
- Foster public-private partnerships for circular-construction pilots - at least 2 PPPs established by 2030, in cooperation with municipalities and infrastructure agencies.
- Support Moldovan participation in EU programmes (Horizon Europe Cluster 4 and Cluster 5, Mission Cities, Digital Europe, Erasmus+) targeting 3–5 successful participations by 2030.

Responsible Bodies. Lead: MEC + ANCD. Co-leads: MIDR, MEDD, ODA. Supporting: UTM, CEC, Tekwill, BAC NGO, Camera de Comerț, Danube CiDiCon partners.

Timeline. 2026 - Network established; GreenBuild Lab design and financing closed. 2027 - Lab opens at UTM / Tekwill site; first R&D call. 2028 - first PPP signed; first Horizon participation. 2029 - Lab at full operating capacity; second PPP signed. 2030 - end-term evaluation; transition to a sustainability model.

KPI	Definition	T0 baseline (2025)	T2 target (2028)	T4 target (2030)	Data source
4.2.1	Collaborative R&D projects focused on digital technology for circular construction	0	1	3	ANCD, UTM
4.2.2	Public-private partnerships established for digital circular-construction initiatives	0	1	2	MIDR, municipalities

Pillar 5: Raising Awareness & Changing Mindsets

Objective 5.1: Implement awareness campaigns to promote the benefits of digitalization within circular construction.

Context. Public awareness of circular and digital construction in Moldova is low across all four helices. The Circular DigiBuild project has built a foundation through the RMSG, the four Network Workshops, and the existing partnerships with e-Circular.md as a sectoral channel. This objective scales that foundation into a sustained national campaign.

National Actions.

- Design and execute a branded national awareness campaign - "Construim Circular" - targeting construction companies, public-sector clients, policymakers, students, and the general public.
- Run 4 regional events across the country (Chişinău, Bălţi, Cahul, Comrat) and use social, print and broadcast Media in partnership with e-Circular.md and the EU Delegation in Moldova.
- Highlight national success stories - the new CDW Regulation, the Voluntary Collection Centres in Călăraşi / Ungheni / Leova, FEERM-financed retrofits, the first BIM pilots - to demonstrate visible progress.
- Conduct an annual industry-and-public attitude survey to track a composite awareness/attitude score, with the goal of a +15 percentage-point improvement by 2030.
- Engage the Coalition for Sustainable Development and other Moldovan environmental NGOs as awareness multipliers.

Responsible Bodies. Lead: BAC NGO (PP16) + MoE communications. Co-leads: MIDR, MEDD. Supporting: e-Circular.md, EU Delegation in Moldova, UNDP, Camera de Comerţ, sector NGOs.

Timeline. 2026 - campaign concept + first regional event. 2027 - 2 regional events; first attitude survey (baseline). 2028 - 2 regional events. 2029 - 2 regional events. 2030 - final survey.

KPI	Definition	T0 baseline (2025)	T2 target (2028)	T4 target (2030)	Data source
5.1.1	Reach of national awareness campaigns (cumulative individuals informed)	0	5,000	15,000	BAC NGO campaign monitoring
5.1.2	Increase in composite awareness / attitude score (annual survey; baseline survey 2027)	T0 2027	+5 pp	+15 pp	Annual industry-and-public survey

Objective 5.2: Encourage the adoption of digital technologies focusing on circular economy principles used in construction business models.

Objective 5.2 - Encourage the adoption of digital technologies focusing on circular economy principles in construction business models

Context. Awareness alone does not translate into business-model change. This Objective targets construction-sector SMEs that need to shift from linear to circular business models - through coaching, demonstration, and visible peer success stories.

National Actions.

- Provide structured coaching and mentorship to Moldovan construction SMEs adopting digital + circular business models, hosted by ODA and Camera de Comerț with technical support from the GreenBuild Lab and BAC NGO.
- Run an annual "Circular Construction Innovation Award" from 2028 onward, recognising Moldovan SMEs that demonstrate measurable circularity and digital-adoption outcomes.
- Publish 5 detailed national case studies by 2030, with quantified business and environmental outcomes - to be disseminated through the national knowledge hub and the Danube CiDiCon platform.
- Embed circular-business-model coaching into the Tekwill / MEDA EDIH and ODA SME support tracks as standardised modules.
- Co-finance, with EBRD / EIB and ODA, early-adopter SMEs purchasing BIM software licences, digital-twin tooling, and CDW-tracking subscriptions.

Responsible Bodies. Lead: ODA. Co-leads: MEDD, Tekwill, Camera de Comerț. Supporting: GreenBuild Lab, BAC NGO, EBRD / EIB, EU4Green Recovery East.

Timeline. 2026 - coaching design; first SME cohort. 2027 - first case studies. 2028 - Innovation Award launched. 2029 - 3 case studies published; 5+ SMEs in coaching. 2030 - 5 case studies; 5–10 SMEs operating digital + circular business models.

KPI	Definition	T0 baseline (2025)	T2 target (2028)	T4 target (2030)	Data source
5.2.1	Moldovan construction companies adopting digital technologies in circular business models	0	3	5	ODA, GreenBuild Lab
5.2.2	Cumulative national investment in digitalised circular-construction methods	T0 2026	€0.5 M	€1.5 M	ODA, EBRD / EIB, TCU

5. National Context and Challenges

5.1 Macro and sectoral context

The Republic of Moldova entered 2026 as an EU candidate country with a small, open economy, strong demographic pressure from outward migration, and a construction sector that punches well above its size: in first half of 2024 construction accounted for approximately 41.8 % of total national investment. The sector is therefore a strategic lever both for economic growth and for the country's environmental footprint - yet it remains structurally informal, materially linear, and largely undigitized.

EU accession dynamics, the EU Growth Plan for Moldova (€1.9 bn, 2025–2027) and Moldova's association to Horizon Europe have reframed the policy agenda in 2024–2026 around three converging vectors: green transition, digitalization, and regional integration. Construction circularity sits at the intersection of all three - but no single national instrument currently consolidates this agenda for the built environment.

5.2 Policy and institutional landscape

A growing stack of national instruments is relevant to the TAP, although none addresses construction circularity end-to-end. The key anchors are GD 495/2024 (National Programme for the Promotion of the Green and Circular Economy 2024–2028), GD 972/2023 (National Waste Management Programme), GD 650/2023 (Digital Transformation Strategy), the new Urbanism and Construction Code, the new CDW Regulation (under preparation with UNDP support, 2025–2026), the National Smart Specialisation Programme (SMART Moldova 2024–2027), Law 434/2023, and the Digital Transformation Strategy of the Republic of Moldova. These are complemented by Moldova's recent classification as "early-stage" in the Danube RIS3 review (D.2.4.2) and by the EU4Green Recovery East programme, under which construction was formally selected in April 2026 as one of four national priority sectors for circular economy, with Chişinău and Bălţi chosen for the first industrial-waste mapping pilots.

On the institutional side, the lead architecture mobilized through the TAP draws on the Ministry of Infrastructure and Regional Development (MIDR), the Ministry of Environment (MoE) and Environment Agency, the Ministry of Economic Development and Digitalisation (MEDD), the Ministry of Education and Research (MEC), regional development agencies (ODA), the Institute of Standardisation (INSM), the State Inspectorate for Construction (ISC), the Public Procurement Agency (AAP), the Technical University of Moldova (UTM) and the Construction Excellence Centre (CEC), the Chamber of Commerce and Industry (CCI), Tekwill, and Moldova's active civil-society network including the DANUBE CiDiCon cluster

and e-Circular NGO. The Regional Multi-Stakeholder Group (RMSG) convened by CCA under the project provides the de-facto quadruple-helix governance platform that the TAP will formalise.

5.3 Sector baseline

Five baseline conditions define the starting point for Moldova's TAP implementation.

First, CDW recycling is near zero. Most construction and demolition waste is landfilled, informally dumped, or down-cycled in unregulated reuse. There is no national CDW statistic, no formal separate-collection chain, and no extended producer responsibility for builders. The new CDW Regulation begins to address this but requires secondary legislation and operational capacity.

Second, BIM adoption is residual. Slovenia made BIM mandatory for projects of national importance from January 2025 (driven by the siBIM association); Serbia is moving to a public-project BIM mandate by 2028. Moldova has no national BIM mandate, no BIM standard library, and no building SMART-style national chapter. SIA GEAP, the digital permitting system, is only partially deployed and not interoperable with design data.

Third, the skills base is thin. UTM and CEC are the two credible academic anchors, but lifelong-learning provision in circular construction and digital design is sparse, and there is no national circular-construction professional certification scheme. Outward migration is steadily eroding the construction labour pool.

Fourth, enforcement is weak. Inspection capacity (ISC, Environment Agency) is under-resourced relative to the volume of construction activity; public procurement contains no circular criteria; and there is no Moldovan equivalent of Austria's Green Building grant mechanism to create a demand-side pull for green renovation.

Fifth, construction is not anchored in SMART Moldova. The country's RIS3 programme does not list construction as a smart-specialisation domain, so circular-construction innovation has no dedicated national funding channel. This contrasts with most CDB partner countries.

5.4 SWOT analysis

The SWOT below consolidates the diagnostic and is the basis on which Chapter 4's actions and KPIs were calibrated.

Strengths

- EU candidate status and an active EU accession agenda creating policy momentum and conditionality leverage.

- Construction sector representing 41.8 % of national investment (H1 2024) - high leverage on circular-economy outcomes.
- A rapidly growing legislative base: GD 495/2024, new CDW Regulation, Urbanism and Construction Code, Environment Strategy 2024–2030, SMART Moldova 2024–2027.
- Credible academic anchors - UTM and CEC - already partnering with industry.
- A working quadruple-helix governance platform (RMSG) already convened under Circular DigiBuild.
- Active civil-society and cluster ecosystem (e-Circular NGO, EcoContact NGO, DANUBE CiDiCon).
- Recent EU4Green Recovery East selection of construction as a priority sector and Chişinău/Bălţi as waste-mapping pilots - fresh political signal and EU funding aligned with the TAP.

Weaknesses

- Near-zero CDW recycling and absence of reliable CDW statistics.
- No BIM mandate, no national BIM standards, partial digital permitting.
- Skills gap in circular and digital construction; no professional certification scheme.
- Construction sector is absent from SMART Moldova (RIS3) – with no smart-specialisation funding channel.
- Weak enforcement capacity (ISC, Environment Agency) and absence of circular criteria in public procurement.
- Limited financial instruments for SMEs to invest in circular/digital upgrades.
- Policy silos: circularity, construction and digitalisation governed separately.

Opportunities

- EU Growth Plan for Moldova (€1.9 bn, 2025–2027) directly fundable against TAP actions.
- Horizon Europe associated status opens R&I funding for UTM, CEC, and Moldovan SMEs.
- Interreg Danube and EU4Green Recovery East already aligned with TAP priorities.
- New Construction Code and new CDW Regulation provide ready legislative entry points.
- EU accession alignment with acquis Chapters 22 (Regional Policy), 27 (Environment) and 10 (Information Society).
- GreenBuild Lab positioned as a flagship innovation hub anchoring Pillars 3, 4 and 5.
- Peer precedents directly transferable: Slovenia (siBIM-led BIM mandate), Austria (Green Building grant scheme), Croatia (T0/T2/T4 KPI tracking), Czechia (material passports + green procurement).

- EU Digital Product Passport framework creating regional pull for material-passport adoption.

Threats

- Political instability and electoral cycles affecting policy continuity.
- Slow absorption capacity for EU funds (procurement, project pipeline, technical assistance gaps).
- Brain drain reducing the technical workforce in construction and engineering.
- Industry inertia and informal-sector resistance to BIM, traceability and CDW separation.
- SMEs facing upfront cost barriers to circular/digital transition without targeted financial instruments.
- Energy and macroeconomic shocks compressing public investment headroom.
- Limited Russian-speaking and rural-area access to digital-skills programmes risking a two-speed transition.

5.5 Implications for the TAP

The diagnostic produces four design implications already embedded in Chapter 4. First, the TAP cannot rely on a single instrument - it must anchor in a *policy stack* (GD 495/2024, CDW Regulation, Construction Code and SMART Moldova) and explicitly link them. Second, ambition must be mid-band: targets need to be visible enough to drive change (10 % public BIM uptake, 5–7 pp recycled-content increase) without exceeding implementation capacity. Third, action sequencing must front-load the public sector (mandates, procurement, GreenBuild Lab) before pushing private-sector compliance, mirroring the Slovenian sequencing. Fourth, financing must be plural - EU Growth Plan, Horizon Europe, Interreg, EU4Green Recovery East, UNDP - combined with a Moldovan analogue of the Austrian Green Building grant mechanism to create demand-side pull. Together these implications shape the financial strategy in Chapter 6, the implementation plan in Chapter 7, and the stakeholder map in Chapter 8.

6. Financial Strategy (National Level)

6.1 Financing principles

Moldova's TAP cannot be funded from any single source. The national budget envelope for the construction-and-environment perimeter is modest, EU pre-accession and external instruments are large but conditional, and private capital will only flow once the regulatory signal is clear. The financial strategy therefore rests on five principles:

- blend EU, bilateral, IFI and national resources around each Pillar rather than fund Pillars in silos;
- front-load public-sector demand (public works, public procurement, GreenBuild Lab) so that EU funds create the market the private sector then enters;
- anchor every action to a recognised funding channel to avoid uncostered commitments - the annual financing matrix (Section 6.4) is the binding reference; absorption capacity in parallel with budget, treating project preparation, technical assistance and procurement skills as financeable line items, not soft costs;
- introduce a demand-side instrument - a Moldovan analogue of the Austrian Green Building grant mechanism - to pull private renovation and circular-material demand once supply-side reforms (CDW Regulation, BIM, procurement criteria) are in motion.

6.2 Funding architecture by source

The TAP draws on six concentric circles of funding, each with a distinct role.

The EU Growth Plan for Moldova (€1.9 bn, 2025–2027) is the headline instrument. Its Reform and Growth Facility component is fundable against TAP-relevant reforms in environment, public procurement, digital public services and economic governance - making it the natural anchor for the CDW Regulation rollout, the digital permitting and BIM phase-in, and the embedding of construction in GD 495/2024 and SMART Moldova. The TAP positions itself explicitly as a delivery vehicle for the Plan's green-and-digital reform pillars.

Horizon Europe (Moldova associated since 2022) is the channel for the R&I dimension - flagship project pipelines around GreenBuild Lab, material-passport pilots with UTM and CEC, and consortia under Cluster 5 (Climate, Energy, Mobility) and the Built4People co-funded partnership.

Interreg Danube Region Programme 2021–2027 continues to fund the transnational fabric in which the TAP sits - including Circular DigiBuild itself, follow-on calls aligned with the 2030 Danube Region Strategy, and the DANUBE CiDiCon cluster's onward activities.

EU4Green Recovery East, implemented by UNIDO with e-Circular NGO, is the closest-fit operational programme: in April 2026 it formally selected construction as one of four national priority sectors for the circular economy and Chişinău and Bălţi as the first industrial-waste-mapping regions. The TAP integrates this work as the baseline-diagnostic engine for KPI 2.2.2 (construction materials tracked digitally) and KPI 4.1.1 (recycled and secondary materials used).

Bilateral and IFI cooperation - UNDP, GIZ, EBRD Green Cities, EIB, World Bank - provides the project-preparation and on-lending capacity needed to convert reforms into investable pipelines, particularly for municipal CDW infrastructure, public-building renovation, and SME access to finance.

National budget and own resources anchor the institutional commitments - staffing of MIDR, MoE, MEDD, ISC and AAP units that implement the TAP, contributions to the State Inspectorate's CDW enforcement function, and counterpart financing under EU instruments. National funding is the smallest envelope but the most critical signal of ownership.

6.3 Indicative budget envelope (2026–2030)

The TAP does not create a new budget line. It mobilises an indicative €18–25 million cumulative envelope across the five Pillars by 2030, blended from the sources above. The intent is illustrative and to be refined annually through the EU Growth Plan reform schedule and Horizon Europe call cycles.

Budget line	Indicative envelope 2026–2030	Dominant sources
Governance & policy framework (Strategy Pillar 1, Obj. 1.1–1.2)	€1.5–2.5 M	EU Growth Plan (reform support), national budget, UNDP/GIZ TA
Circular construction & CDW (Strategy Obj. 2.2 and 4.1)	€6–9 M	EU Growth Plan, EU4Green Recovery East, EBRD Green Cities, EIB
Digitalisation & BIM (Strategy Obj. 2.1)	€3–5 M	EU Growth Plan, Horizon Europe, Interreg Danube
Innovation, GreenBuild	€4–6 M	Horizon Europe, Interreg, World Bank,

Lab, R&D (Strategy Obj. 4.2)		private co-financing
Skills, awareness, market demand (Strategy Pillars 3 and 5)	€3–4 M	EU4Green, UNDP, EU Erasmus+, national budget, Green Building grant mechanism pilot
Total indicative envelope	€18–25 M	Blended

6.4 Co-financing and blending architecture

Each Pillar is financed through a layered blend rather than a single grant. The default architecture is: EU grant (Growth Plan, Horizon, Interreg, EU4Green) for reform, capacity, and pilot investment; IFI loan or guarantee (EIB, EBRD, World Bank) for capital expenditure (waste-treatment infrastructure, municipal renovation, GreenBuild Lab build-out); national budget as counterpart and operational financing; and private co-financing mobilized through the Green Building grant mechanism, public procurement set-asides, and concessional SME finance lines.

The TAP commits the MIDR, MoE, MEDD inter-ministerial committee (Chapter 7) to publishing an annual financing matrix that maps each KPI to a confirmed funding line - ensuring that no headline target sits without a budget.

6.5 Demand-side instrument

Building on the Austrian Green Building grant mechanism precedent, the TAP proposes a Moldovan Green Renovation Bonus (Green Building grant mechanism) as the flagship demand-side financial instrument of the TAP (Strategy Pillars 1 and 5). **Design parameters:** non-repayable grants covering 30–50 % of eligible costs for energy-efficient and circular-material renovations of residential and small-commercial buildings; eligibility tied to BIM-tracked or material-passport-verified works once those systems are operational; a top-up bonus for the use of certified recycled or bio-based materials; delivery through a single window operated by MIDR or a dedicated agency, co-financed by the EU Growth Plan and EU4Green Recovery East. The instrument is the demand-pull that converts regulatory reform into market behaviour.

6.6 Absorption capacity and risk

Moldova's absorption record on EU funds is the central financial risk. The TAP addresses it by:

- costing project preparation and TA explicitly into the Pillar envelopes - not assuming free TA from donors;
 - requiring MIDR and MEDD to maintain a rolling 24-month project pipeline mapped to each KPI;
 - embedding procurement and PFM specialists in the inter-ministerial committee;
 - using the RMSG as a continuous early-warning forum for absorption bottlenecks.
- Currency, macro and political risks are tracked in the risk register in Chapter 7.

6.7 Sustainability of financing beyond 2030

By 2030 the TAP's financial logic should have shifted from grant-driven to revenue- and market-driven. Three transitions underpin this: CDW recycling becomes self-sustaining through extended producer responsibility fees and gate fees once the regulation matures; BIM and material passports become billable services in a digitised construction value chain; and the Green Building grant mechanism scheme transitions from full EU financing to a national co-financed instrument anchored in Moldova's Medium-term expenditure framework. Chapter 9 builds these transitions out as the sustainability and scalability pathway.

7. Implementation Plan (National Level)

Governance Structure:

The TAP is implemented through a three-tier governance structure aligned with the peer-TAP best practice (Serbia, Croatia) and adapted to Moldova's institutional reality. The structure converts the Regional Multi-Stakeholder Group (RMSG) convened under Circular DigiBuild into a permanent, formally mandated delivery system.

Tier 1 - Strategic oversight: Inter-Ministerial Steering Committee (IMSC).

Chaired by MIDR, co-chaired by MoE and MEDD, with permanent members from MEC, MoF, AAP, the State Chancellery's accession unit, and the EU Delegation as observer. The IMSC meets twice a year, approves the annual TAP work programme and financing matrix, signs off on regulatory milestones, and resolves cross-ministerial bottlenecks. It is the single political accountability point.

Tier 2 - Operational delivery: TAP Coordination Unit (TCU).

A small, ring-fenced unit hosted by MIDR (with seconded staff from MoE and MEDD), responsible for day-to-day implementation, pipeline management, donor coordination, and reporting. The TCU operates the annual financing matrix, maintains the rolling 24-month project pipeline, and serves as Moldova's interlocutor with the Circular DigiBuild Lead Partner and the 2030 Danube Strategy governance.

Tier 3 - Multi-stakeholder advisory: Permanent RMSG.

The RMSG continues as the quadruple-helix platform - public bodies (MIDR, MoE, MEDD, MEC, ODA, INSM, ISC, AAP, Environment Agency), private sector (Chamber of Commerce, builders' associations, recyclers, SMEs), academia (UTM, CEC, ANCD), and civil society (e-Circular, DANUBE CiDiCon, Tekwill, UNDP). The RMSG meets quarterly, provides early-warning on absorption and acceptance issues, validates KPI evidence, and acts as the legitimacy channel for ASP endorsement of policy changes.

Specialised working groups operate under the RMSG for: CDW & circular materials; BIM & digital permitting; Skills & certification; GreenBuild Lab & innovation; Green procurement.

Timeline:

Implementation is sequenced in three phases that map directly to the T0 / T2 / T4 milestones used in Chapter 4's KPI tables.

Phase 1 - Foundations (2026–2027): T0 - set up and unlock. Formal mandate of the IMSC and TCU; first annual financing matrix; baseline CDW diagnostic (linked to EU4Green Recovery East mapping in Chişinău and Bălţi); secondary legislation under the CDW Regulation; phase-1 BIM roadmap published; embedding of construction in GD 495/2024 and SMART Moldova revision; launch of the Green Building grant mechanism design study; founding of the Moldovan BIM association (siBIM-style); first cohort of trained professionals (UTM + CEC); GreenBuild Lab governance and site secured.

Phase 2 - Acceleration (2028–2029): T2 mid-term. Operational CDW collection and recycling chain; BIM mandated for the first tranche of public projects; complete SIA GEAP deployment with design-data interoperability; circular criteria mandatory in central-government public procurement above a defined threshold; first material-passport pilots delivered; Green Building grant mechanism live with first disbursements; GreenBuild Lab operational and hosting first SME cohort; mid-term external evaluation of the TAP.

Phase 3 - Scaling & accession readiness (2030): T4 end-term. Full BIM coverage of public projects above threshold; CDW recycling rate at the 2030 KPI target; material passports embedded in procurement; Green Building grant mechanism nationally scaled; second professional-certification cohort graduated; GreenBuild Lab self-sustaining; TAP delivery report aligned with Chapters 22, 27 and 10 of the EU acquis to feed the accession dossier.

Monitoring and Evaluation:

The TAP uses a single, integrated M&E framework anchored on the 23 KPIs in Chapter 4.

Indicators and baselines. Every KPI has a T0 baseline (2025, or set during Phase 1 where marked “T0 2026”), a T2 mid-term target (2028) and a T4 end-term target (2030), as shown in the KPI tables in Chapter 4. KPIs without robust national statistics (CDW recycling rate, BIM uptake, circular procurement share) are operationalised through specific data-collection arrangements: CDW via INSM + Environment Agency + EU4Green industrial-waste mapping; BIM via ISC + AAP procurement records; procurement via AAP’s SIA MTender platform; skills via MEC and CEC registries; awareness via the annual industry-and-public attitude survey (KPI 5.1.2).

Reporting cadence. The TCU produces a public annual implementation report in Q1 of each year, covering KPI progression, financial execution, risks materialised, and corrective actions. A mid-term evaluation is commissioned externally in 2028 and a final evaluation in 2030. Reports follow the Bulgaria peer-TAP template structure to ensure comparability across Danube countries.

Evidence chain. Each KPI is supported by an evidence file (source data, methodology, responsible body, date) maintained by the TCU and reviewed by the RMSG's relevant working group before publication.

Alignment with EUSDR and EU accession. Annual reports feed the 2030 Danube Region Strategy monitoring (via the Circular DigiBuild Lead Partner) and explicitly cross-reference acquis Chapters 22, 27 and 10 to position TAP delivery as accession-readiness evidence.

Risk Management:

The TAP maintains a live risk register owned by the TCU and reviewed quarterly by the RMSG. Eight headline risks are tracked, with mitigation strategies that are themselves costed into the Pillar envelopes in Chapter 6.

#	Risk	Likelihood	Impact	Mitigation
1	Political instability / electoral cycle disrupting policy continuity	High	High	Cross-party policy compact at IMSC level; binding EU Growth Plan reform schedule; multi-year financing matrix
2	Slow EU-fund absorption	High	High	Costed project preparation; rolling 24-month pipeline; embedded PFM/procurement specialists; donor coordination through TCU
3	Brain drain and skills shortage	High	Medium	UTM + CEC certification scheme; Tekwill partnership; targeted incentives for returning diaspora professionals
4	Industry inertia / informal sector resistance	Medium	High	Phased mandates (public sector first); Green Building grant demand pull; transparent transition timeline
5	SME upfront-cost barrier to circular/digital upgrade	High	Medium	Concessional SME finance lines (EBRD, EIB); voucher schemes via Chamber of Commerce; pilots through GreenBuild Lab

6	Data gaps undermining KPI credibility	Medium	High	Baseline diagnostic in Phase 1; EU4Green industrial-waste mapping; INSM methodology upgrade
7	Macroeconomic and energy shocks compressing public investment	Medium	High	Diversified blended financing; private co-financing emphasis; flexible KPI re-baselining at mid-term
8	Two-speed transition (urban vs. rural, Romanian vs. Russian language)	Medium	Medium	ODA-led regional delivery; multilingual communication; targeted rural demonstration projects

8. Stakeholder Engagement (National Level)

Collaboration Mechanisms:

Moldova's TAP is designed as a stakeholder-anchored instrument, not a ministerial document. Five principles guide engagement:

- quadruple-helix from day one - public, private, academic and civil-society actors share the same table and the same evidence;
- continuous, not episodic - the RMSG is permanent rather than convened ad hoc;
- legitimacy through co-design - stakeholders shape KPI baselines, financing matrix, and Green Building grant mechanism design parameters, not just consume outputs;
- inclusion across the urban-rural and language divide, with deliberate outreach to ODA regions, Russian-speaking professionals, and rural municipalities;
- alignment with EU accession partnership principles, so that stakeholder consultation evidence directly feeds the accession dossier on Chapters 22 and 27.

Involvement of Key Groups:

The Moldovan TAP ecosystem clusters around five constituencies. The map below is the operational reference - owners of relationships and channels are explicit in the Stakeholder Engagement Plan maintained by the TCU.

Public bodies (lead and supporting institutions). MIDR (lead), MoE and Environment Agency, MEDD, MEC, MoF, AAP, ISC, INSM, the State Chancellery's EU accession unit, regional development agencies, and local public authorities (LPAs) of Chişinău, Bălţi and selected pilot municipalities. The EU Delegation participates as a permanent observer.

Private sector. The Chamber of Commerce and Industry (CCI), national and regional builders' associations, manufacturers of construction materials, CDW recyclers, demolition contractors, design and engineering firms, BIM-capable architects, and SMEs targeted by the Green Building grant mechanism and GreenBuild Lab cohorts. The future Moldovan BIM association anchors private-sector advocacy for digitalisation.

Academia and research. UTM and CEC as the two principal anchors, ANCD as the national R&I authority, and the Moldovan Horizon Europe National Contact Point network. The TAP commits these actors to a continuous research-policy interface through the GreenBuild Lab and through joint Horizon Europe consortia.

Civil society and clusters. e-Circular NGO, DANUBE CiDiCon cluster, Tekwill, UNDP Moldova, environmental NGOs, professional bodies and Romanian-language and Russian-

language Media. Civil society plays both the legitimacy role (RMSG voice) and the watchdog role (TAP transparency, KPI scrutiny).

International partners and Associated Strategic Partners (ASPs). EU Delegation, UNIDO (EU4Green Recovery East), UNDP, GIZ, EBRD, EIB, World Bank, and Circular DigiBuild's Lead Partner BAA and consortium partners. ASPs endorse policy changes and provide regional peer learning.

The TAP uses a graduated set of instruments rather than a single consultation format. Standing fora include the IMSC, the RMSG and its working groups. Structured consultation covers annual public consultations on the implementation report, sector-specific consultations on draft regulations (CDW secondary legislation, BIM standards, procurement circulars), and Green Building grant mechanism design workshops. Co-creation is operationalised through GreenBuild Lab SME cohorts, university student-industry challenges, and material-passport pilot design. Communication uses the TCU's single TAP channel (see Communication Plan below) plus Media partnerships and the Interreg Danube visibility apparatus. Peer learning runs through Circular DigiBuild partner exchanges, ASP endorsement events, and the siBIM/Austrian Green Building grant mechanism study visits.

Communication Plan:

Communication is treated as an implementation tool, not a residual. The TCU operates a single TAP communication channel - branded under both Moldovan-government and Circular DigiBuild identities - with three workstreams:

- **policy communication** (regulatory milestones, IMSC decisions, reform schedule);
- **market communication** (Green Building grant mechanism, public-procurement criteria, BIM uptake);
- **citizen and SME outreach** (awareness campaigns, GreenBuild Lab open days, certification programmes). All EU-funded actions follow Interreg and EU Growth Plan visibility rules.

9. Sustainability and Scalability

Sustainability Mechanisms

The TAP's governance architecture (Chapter 7) is deliberately built to survive electoral and ministerial cycles. Three mechanisms anchor institutional continuity.

First, legal embedding: the Inter-Ministerial Steering Committee and the TAP Coordination Unit are established by Government Decision, not by ad-hoc ministerial order - making their mandate independent of any single minister's tenure. Second, alignment with EU accession institutions: the State Chancellery's accession unit sits in the IMSC, so TAP delivery is woven into Chapters 22, 27 and 10 negotiations, which themselves outlast political cycles. Third, permanent RMSG: by formalising the quadruple-helix platform as a standing body, the TAP locks in the stakeholder constituency that defends its priorities even when public attention shifts.

The Moldovan BIM association - once founded along the siBIM model - becomes the long-run institutional carrier of the digitalisation agenda, just as siBIM has carried Slovenia's BIM mandate from a 2017 action plan to a 2025 obligation.

Scalability Strategies

The TAP's Phase 1 and Phase 2 actions concentrate in Chişinău, Bălţi and a small set of ODA-led pilot municipalities. Phase 3 and beyond extend the same instruments - CDW infrastructure, BIM mandate scope, Green Building grant mechanism eligibility, procurement criteria, material-passport requirements - across all four ODA regions and into UTA Găgăuzia. Sectorally, the model proven in residential and small-commercial buildings scales into infrastructure (roads, utilities), industrial buildings, and historic-heritage retrofits. The TAP commits the TCU to publishing a scaling annex at mid-term (2028) that maps the geographic and sectoral roll-out for Phase 3.

The TAP is engineered as accession-readiness evidence. Each Pillar maps explicitly to acquis chapters: Pillar 1–2 - Chapter 27 (Environment), Pillar 3 - Chapter 10 (Information Society) and Chapter 5 (Public Procurement) and Chapter 26 (Education, Training, Youth), Pillar 4 - Chapter 25 (Science & Research) and Chapter 20 (Enterprise & Industrial Policy), Pillar 5 - Chapter 22 (Regional Policy). As Moldova's accession negotiations advance, TAP delivery becomes the operational track record presented to the European Commission against these chapters. The same architecture positions Moldova to absorb post-accession Cohesion Policy instruments without a capability gap at the moment of transition.

Moldova's TAP is not only a recipient of peer practice but a contributor to it. Three replication channels are active.

The 2030 Danube Region Strategy: Moldovan lessons - particularly on early-stage policy stacking, on the EU4Green-to-TAP bridging mechanism, and on the Green Building grant mechanism design - feed Pillar and Objective monitoring. The Eastern Partnership and EU candidate-country network: Moldova's TAP becomes a template for Ukraine and Georgia as they develop their own circular-construction frameworks, with potential trilateral peer-learning events under EU4Green Recovery East. The Circular DigiBuild legacy: the methodologies, the RMSG model, and the GreenBuild Lab template become reusable assets for follow-on Interreg consortia.

10. Annexes

Annex A: List of key national stakeholders involved.

A.1 Public bodies - regional and local

Nr.	Organisation	Role in the TAP	Primary Pillars	Modality
1	Ministry of Infrastructure and Regional Development (MIDR)	TAP lead ministry; hosts the TCU; chairs the IMSC	1, 3, 5	IMSC chair, TCU host
2	Ministry of Environment (MoE)	Co-leads CDW Regulation rollout; oversees Environment Agency	1, 2	IMSC co-chair, WG CDW
3	Environment Agency	Implements CDW collection, monitoring and enforcement	2	WG CDW
4	Ministry of Economic Development and Digitalisation (MEDD)	Co-leads SMART Moldova RIS3 update; digitalisation policy; EU Growth Plan interface	1, 3, 4	IMSC co-chair, WG BIM
5	Ministry of Education and Research (MEC)	Skills, certification, academic interface	4, 5	WG Skills
6	Ministry of Finance (MoF)	Financing matrix, MTEF, Green Building grant mechanism budget host	1, 5	IMSC member
7	Public Procurement Agency (AAP)	Circular procurement criteria; SIA MTender data	1, 2, 3	WG Procurement
8	State Inspectorate for Construction (ISC)	Enforcement; SIA GEAP rollout; BIM compliance	2, 3	WG BIM, WG CDW
9	National Institute of Standardisation (INSM)	National BIM standards; CDW data methodologies	2, 3	WG BIM
10	State Chancellery - EU	Acquis Chapters 22, 27, 10	1	IMSC member

	accession unit	alignment		
11	Customs Service	Cross-border circular materials flows	2	Observer

A.2 Private sector - associations and clusters

#	Organisation	Role in the TAP	Primary Pillars	Modality
12	Chamber of Commerce and Industry (CCI)	Convenes SMEs; supports green procurement uptake	2, 4, 5	RMSG, WG Procurement
13	National Association of Builders (and regional builders' associations)	Industry uptake of BIM, CDW separation, certification	2, 3, 5	RMSG
14	Future Moldovan BIM Association (siBIM-style)	Anchor of digitalisation advocacy and BIM standards	3	WG BIM lead (private)
15	DANUBE CiDiCon cluster	Cluster-level innovation projects; Horizon Europe access	4	RMSG, WG Innovation
16	Association of Construction Material Manufacturers	Recycled-content uptake; material passports	2	WG CDW
17	Construction Waste Recyclers (formal and emerging)	CDW recycling infrastructure delivery	2	WG CDW
18	Demolition contractors	Pre-demolition audit and selective demolition practice	2	WG CDW
19	Architectural and engineering design firms	BIM adoption; material passports; circular	3	WG BIM

		design		
20	Green Building grant beneficiary SMEs	Demand-side market actors	5	RMSG (rotating)

A.3 Academia and research

#	Organisation	Role in the TAP	Primary Pillars	Modality
21	Technical University of Moldova (UTM)	Lead academic anchor; GreenBuild Lab co-host; curriculum integration	3, 4, 5	RMSG, WG Innovation
22	Construction Excellence Centre (CEC)	VET anchor; professional certification scheme	4, 5	WG Skills
23	National Agency for Research and Development (ANCD)	Horizon Europe interface; Moldovan R&I programming	4	RMSG
24	Horizon Europe National Contact Point network	Consortium-building support for Moldovan applicants	4	Observer / TCU partner
25	Academy of Sciences of Moldova	Cross-disciplinary scientific advisory	4	Observer

A.4 Civil society, NGOs, and intermediaries

#	Organisation	Role in the TAP	Primary Pillars	Modality
26	e-Circular NGO	Circular-economy advocacy; EU4Green delivery partner	2, 5	RMSG
27	Tekwill	Digital skills pipeline; Moldovan IT-construction crossover	3, 4	WG Skills, WG BIM
28	Environmental NGOs (national network)	Public participation; watchdog function on CDW	2, 5	RMSG
29	Professional bodies (architects, engineers, surveyors)	Certification and professional ethics	3, 5	WG Skills
30	Diaspora professional networks	Re-attraction of skilled construction professionals	5	RMSG (rotating)
31	Media partners (Romanian and Russian language)	TAP visibility; Green Building grant outreach	5	TCU partner

A.5 International partners and Associated Strategic Partners (ASPs)

#	Organisation	Role in the TAP	Primary Pillars	Modality
32	EU Delegation to Moldova	EU Growth Plan interface; political accompaniment	1, all	IMSC Observer
33	UNIDO (EU4Green Recovery East)	Industrial-waste mapping; circular-economy programming	2, 5	ASP
34	UNDP Moldova	Capacity building; PFM and procurement TA	1, 5	ASP
35	GIZ	Bilateral TA on green	5	ASP

		economy and skills		
36	EBRD (Green Cities)	Municipal renovation and CDW investment finance	2, 5	ASP
37	EIB	Concessional lending for infrastructure and SMEs	2, 4, 5	ASP
38	World Bank	Policy lending; pipeline preparation	1, 4	ASP
39	siBIM Slovenia	Peer learning on BIM mandate and association building	3	Peer ASP
40	Austrian Green Building grant institutional counterparts	Peer learning on demand-side grant scheme design	5	Peer ASP
41	Other CDB partner countries	Replication and joint follow-on consortia	all	ASP

Territorial Action Plan (TAP)

for Digital Innovation in Circular Construction

MONTENEGRO

Circular DigiBuild Project
Interreg Danube Region Programme

Table of Contents

Contents

1. Introduction / Executive Summary.....	4
2. Vision and Mission (Territorial Adaptation).....	8
3. Alignment with EU Strategy for the Danube Region (EUSDR).....	9
4. Strategic Pillars, Objectives, and Key Actions (National KPIs).....	11
Pillar 1: Enabling Policy & Regulatory Frameworks.....	11
Objective 1.1: Harmonize circular construction standards and regulations related to digitalization.....	11
Objective 1.2: Develop and implement financial incentives for circular construction practices.....	12
Pillar 2: Fostering Digital Innovation & Technology Adoption.....	13
Objective 2.1: Promote the adoption of Building Information Modeling (BIM) and other digital technologies.....	13
Objective 2.2: Support the development and deployment of digital platforms for material tracking and waste management.....	14
Pillar 3: Building Skills & Capacity.....	15
Objective 3.1: Develop education and training programs for digital skills within circular construction.....	15
Objective 3.2: Promote knowledge transfer and best practice sharing among stakeholders.....	16
Pillar 4: Strengthening Collaboration & Supply Chains.....	17
Objective 4.1: Facilitate the development of digital regional supply chains for recycled and secondary construction materials.....	17

Objective 4.2: Promote collaboration between research institutions, industry, and governments.....	18
Pillar 5: Raising Awareness & Changing Mindsets.....	19
Objective 5.1: Implement awareness campaigns to promote the benefits of digitalization within circular construction.....	19
Objective 5.2: Encourage the adoption of digital technologies focusing on circular economy principles used in construction business models.....	20
5. National Context and Challenges.....	20
6. Financial Strategy (National Level).....	25
Funding Sources:.....	25
7. Implementation Plan (National Level).....	27
Governance Structure:.....	27
Timeline:.....	27
Monitoring and Evaluation:.....	30
Risk Management:.....	31
8. Stakeholder Engagement (National Level).....	31
Collaboration Mechanisms:.....	31
Involvement of Key Groups:.....	32
Communication Plan:.....	32
9. Sustainability and Scalability.....	33
10. Annexes.....	34
Annex A: List of key national stakeholders involved.....	34
Annex B: Detailed national project proposals linked to the objectives.....	37
Annex C: Data sources and methodologies for national KPIs.....	38
Annex D: Relevant national policy documents or reports.....	38

1. Introduction / Executive Summary

Purpose

The elaboration of **the Montenegrin Territorial Action Plan for Digital Innovation in Circular Construction (TAP)** is managed by the NGO Zero Waste Montenegro (ZWMNE) as the partner on the Circular DigiBuild project supported by the Interreg Danube Region Programme co-funded by the European Union. By speeding up the usage of circular economy principles and digital solutions in construction and building industry, the project supports the twin transition helping the sector become more sustainable, efficient, and climate-friendly. Under this project representatives of the 13 countries within the Danube region collaborate together to develop "2030 Danube Region Digital Innovation Strategy for Circular Construction," referred to in this document as the Strategy. It is based on four comprehensive studies carried out in 2024–2025 and identifies both the urgent need for transformation of the construction sector and the pathways to achieve it.

The Montenegrin Territorial Action Plan for Digital Innovation in Circular Construction supports the shared vision of positioning the Danube Region as a European leader in digital and circular construction by 2030. At the same time, this TAP is tailored to Montenegro's specific context, reflecting the country's level of digitalization and innovation potential, its challenges and the strategic importance of construction sector for the national economy development. It sets out objectives and KPI's that reflect national needs and possibilities and at the same time contribute to the broader transnational strategy.

The TAP is closely aligned with Montenegro's national and local initiatives, as well as the country's Smart Specialization Strategy (S3), which increasingly recognizes construction as a priority area. This creates an exceptional opportunity to strengthen the sector by investing in digital innovation enabling implementation of circular models to Montenegrin construction industry. Innovative digital technologies, such as big data, artificial intelligence (AI), blockchain and the Internet of things (IoT) will help make construction more resource-efficient, transparent, and environmentally sustainable.

The TAP proposes initiatives such as creation of national construction and demolition waste (CDW) recycling center, establishment of the reuse hub for recycled materials and industrial byproducts in combination with digital tools for tracking material flows and circular procurement practices. These measures will not only enhance resource efficiency and significantly reduce landfilling but also transform the entire paradigm of CDW management in the country. This integrated approach will help prevent illegal dumping nationwide and mitigate its adverse environmental impacts on land, water resources, air quality, greenhouse gases (GHG) emissions and followed it natural disaster risks (excessive heating and urban flooding).

The expected impacts from the TAP implementation include a measurable reduction in construction and demolition waste (national target for CDW is 70% till 2030), positive economic effects from recycling and reuse of secondary materials. Moreover, stimulation of the local production of building materials with the use of industrial byproducts, and the widespread adoption of modern approaches supported by digital tools and technologies (BIM roadmap development and implementation) will enhance efficiency and transparency of the construction and building industry.

Alignment

The Montenegrin TAP is fully aligned with the vision, mission, and strategic pillars of the 2030 Danube Region Digital Innovation Strategy for Circular Construction (the Strategy). This vision fosters sustainable economic growth, strengthens environmental resilience, and enhances social well-being. The TAP reflects the Strategy's mission to facilitate collaboration, knowledge sharing, and encouraging the adoption of innovative solutions among stakeholders in Montenegro and across the wider region. Through cooperation with partner countries in the Danube Region, it supports the transformation of Montenegro's construction sector towards a circular economy.

This document sets out tangible objectives and key performance indicators (KPIs) which, once achieved, will provide a stable fundament for circular construction within the national level. The proposed objectives completely align with the Strategy's five

pillars and contribute meaningfully to achieving its overall goals for sustainable construction in the Danube region.

Current Status

Montenegro's construction sector has a significant role in the national economy and also plays a crucial role in the development of other sectors such as tourism and energy. The sector contributed approximately 3.2% to GDP in 2023 with its share remained broadly stable in 2024, while in 2025 the sector continued to grow. This sector includes both building construction and infrastructure construction (civil engineering), with important projects in transportation infrastructure and utilities. The primary market for Montenegrin construction companies remains Montenegro itself, with some limited presence in the regional market of Serbia and Slovenia where Montenegrin firms were engaged in construction projects¹. On the other hand, Montenegro attracts a certain level of foreign capital, primarily from companies investing in construction projects.

While traditional practices remain prevalent, the industry is gradually transitioning toward sustainability and circularity as part of a broader national strategies aligned with EU goals. In recent years, Montenegro has made limited progress in adopting circular construction practices. The National Strategy for Circular Transition to 2030 identifies construction as a critical area for integrating circular economy (CE) principles, focusing on waste reduction, resource efficiency, and material reuse. The National Strategy for Sustainable Development by 2030 reinforces these objectives by incorporating CE principles into Montenegro's overall sustainability framework. It emphasizes eco-friendly construction practices aimed at reducing environmental impact and supports the transition to low-carbon, resource-efficient building methods. The Law on Waste provides a foundational regulatory framework for waste reduction, reuse, and recycling, particularly concerning construction and demolition waste management. Furthermore, the National Climate Change Strategy until 2030 and the Energy Development Strategy of Montenegro until 2030 are also playing an important role in the transition of the construction industry in Montenegro to more sustainable practices.

1 [S3-Montenegro-In-depth-analysis-of-priority-domains-qualitative](#)

Despite the established legislative framework, for Montenegro major challenges for implementing circularity in construction industry remain in the effective enforcement of these policies, inter-ministerial coordination, and the development of infrastructure and market conditions that would enable large-scale reuse of secondary construction materials and proper construction and demolition waste management.

As typical construction practices in Montenegro largely reflect traditional methods, influenced by the country's geographic and cultural context, in recent years, there has been a gradual introduction of modern digital tools and technologies. Building Information Modeling (BIM) is being promoted through Montenegro's National Strategy for Circular Transition to 2030, aimed at enhancing resource management, project planning, and waste reduction. However, the adoption of digital tools remains limited, and most projects are still managed using traditional project management techniques. Prefabrication and modular construction are also emerging but are not widely adopted, partly due to workforce training gaps and higher upfront costs. Recycling and reuse of materials in construction are still in the early stages. The Law on Waste Management mandates certain recycling practices, but reuse remains minimal due to a lack of specialized facilities and infrastructure for processing construction and demolition waste.

In the first round of the "Smart Specialization Strategy of Montenegro 2019-2024" (S3 Strategy) the Construction industry was not identified as the priority area, but it was partly mentioned in the area of "Energy and sustainable environment". As a result, during that period the Innovation Fund of Montenegro co-financed three projects under the Collaborative Grants Programme, totaling more than €0,5M investment, which have significant applications in the construction sector, also confirming the relevance of cross-sectoral innovation. Due to it, one of the projects named "New environmentally friendly thermal insulation materials based on ash and waste plastic" is now executed by private Montenegrin entrepreneur "Mont Way DOO Podgorica" in collaboration with the Faculty of Metallurgy and Technology of the University of Montenegro. It is expected that the optimal recipe for the production of this material will be developed as part of the project, which will use plastic waste

and industrial waste from the Thermal Power Plant in Plevlja in the production of the new building material which can be offered to the Montenegrin construction market. Noteworthy to mention that recent Quantitative report on the mapping of S3 potential in Montenegro² provided in 2025 already identify “Construction” as one of the priority areas and there are high expectations that new cycle of RIS3 Strategy for 2026-2031 will give green light for digital innovations in construction sector of Montenegro.

2. Vision and Mission (Territorial Adaptation)

Vision (National)

To strengthen Montenegrin construction and building sector with circular and digital construction practices as a part of Danube Region community to fostering sustainable economic growth, environmental resilience, and social well-being nationwide.

Mission (National)

To facilitate collaboration, knowledge sharing, and adoption in full capacity of innovative digital solutions among Montenegrin stakeholders in order to transform the national construction sector towards a circular economy, while actively contributing to the Danube Region’s collective 2030 vision of becoming a European leader in digital and circular construction.

Montenegro’s construction sector is a key driver of the national economy, contributing steadily to GDP and supporting tourism, energy, and infrastructure development. At the same time, the construction and building industry is one of the

²[Quantitative report on the mapping of S3 potential in Montenegro](#)

most resource-intensive sectors of the Montenegrin economy with the dramatic impacts on global warming processes. While the industry remains largely traditional, recent years have seen a gradual shift toward sustainability and circularity, guided by national strategies aligned with EU goals. Despite progress, challenges persist in policy enforcement and spatial planning, inter-ministerial coordination, and the lack of infrastructure for proper construction and demolition waste management, including its recycle and reuse cause devastation of local ecosystems. Digital innovations such as Building Information Modeling (BIM), digital Twins and Material Passports are emerging but remain underutilized due to limited adoption and workforce training gaps. Innovation initiatives, including projects funded under the Smart Specialization Strategy (S3), demonstrate the potential of cross-sectoral collaboration, with recent recognition of construction as a priority domain in the upcoming S3 cycle (2026–2031).

Overall, Montenegro's construction sector is at a pivotal stage: balancing traditional practices with the need for digital transformation and circular economy integration. This creates a strong foundation for territorial action plans that can accelerate the transition toward sustainable, resource-efficient, and innovative construction practices.

3. Alignment with EU Strategy for the Danube Region (EUSDR)

The [EU Strategy for the Danube Region \(EUSDR\)](#) is a macro-regional strategy seeks to create synergies and coordination between existing policies and initiatives taking place across the 14 countries of the Danube Region. Montenegro, as one of the participants, actively aligns with the EUSDR to strengthen regional cooperation, boost socio-economic growth, and accelerate EU integration.

This TAP contributes directly to the implementation of the EU Strategy for the Danube Region (EUSDR), particularly under the following pillars:

Pillar: Connecting the Region

Wider promotion and full adoption of digital tools such as BIM modeling and Digital Twins, as well as implementation of Material Passports in Montenegrin construction industry, especially in public infrastructure projects, will allow for more efficient project design, construction and future project's maintenances that will contribute to improvement of the physical and digital links between Montenegro and other Danube countries and will allow to create a more integrated and competitive European corridor.

Pillar: Protecting the Environment

The TAP proposes initiatives such as creation of national construction and demolition waste (CDW) recycling center, establishing reuse hub for recycled materials and industrial byproducts in combination with digital tools for tracking material flows and circular procurement practices. These measures will not only enhance resource efficiency and significantly reduce landfilling but also transform the entire paradigm of CDW management in the country. This integrated approach will help prevent illegal dumping nationwide and mitigate its adverse environmental impacts on land, water resources, air quality, Greenhouse Gases (GHG) emissions and followed it natural disaster risks (excessive heating and urban flooding) thus contributing directly to environmental protection and climate change on Danube regional level.

Pillar: Building Prosperity

Montenegrin TAP fostering the development of local market for innovative construction materials and products—supported by enhanced national policies on green procurement and design, as well as RIS3 and digitalization initiatives—will increase the value of raw materials and by-products that Montenegro currently does not process, provide micro, small and medium enterprises (MSME) growth, strengthening their innovation capacities by adopting digital and circular construction practices and providing local and regional collaborative R&D initiatives. Such approach will not just strengthen Montenegrin construction industry and make it more competitive on regional level, but rising prosperity of Montenegrin society by fostering green jobs employment and strengthening supply chain resilience.

Pillar: Strengthening the Region

This TAP supports quadra helix collaboration between different groups of stakeholders on local and regional levels by providing knowledge-sharing mechanisms (B2B DigiBuild platform) and cross-border collaboration platform. Participation in Danube-wide Cluster for circular construction that united multi-stakeholder from 13 countries all over the region, and engage research institutions, industry associations, and financial actors, boosts policy coherence and institutional learning. Improved coordination between all stakeholders will help Montenegro to align national industry objectives with transnational strategy goals.

4. Strategic Pillars, Objectives, and Key Actions (National KPIs)

This section details Montenegro's country-specific implementation for each of the five strategic pillars defined in the Danube Region Digital Innovation Strategy for Circular Construction.

Please note that the KPI numbering in this document does not follow sequential order but instead reflects the numbering established in the Strategy.

Pillar 1: Enabling Policy & Regulatory Frameworks

Objective 1.1: Harmonize circular construction standards and regulations related to digitalization.

National Actions:

- Review existing national construction regulations and identify gaps/barriers for circularity and digitalization.
- Establish a national working group (involving relevant ministries, industry, and research) to propose amendments or new legislation aligning with the Danube Region best practices and EU directives.
- Develop national guidelines or recommendations for integrating digital tools (e.g., BIM, material passports) into regulatory compliance.
- Participate actively in transnational initiatives for standard harmonization.

National KPIs & Targets:

KPI 1.1.2 (National): Reduction in regulatory barriers for secondary material use in construction by 2028.

Target: At least 3 revised regulations by 2028.

Comments: Montenegro is working on building the foundation for circular construction standards that integrate digitalization (through BIM, material passports, and data-driven procurement), but these are still initiatives, not formalized technical standards.

Objective 1.2: Develop and implement financial incentives for circular construction practices.

National Actions:

- Analyze existing national funding instruments for their suitability to support circular and digital construction.
- Develop new, targeted national grant schemes, tax incentives, or loan programs for circular construction projects and digital adoption, especially for SMEs.
- Integrate circularity and digitalization criteria into public procurement policies for construction projects.
- Establish a national dedicated support program for green and digital construction startups.

National KPIs & Targets:

KPI 1.2.2 (National): Number of SMEs utilizing national financial incentives for circular construction by 2030.

Target: At least 10 of SMEs by 2030

Comments: This target could be reached through implementation of the S3 Strategy 2026-2031.

Pillar 2: Fostering Digital Innovation & Technology Adoption

Objective 2.1: Promote the adoption of Building Information Modeling (BIM) and other digital technologies.

National Actions:

- Launch national awareness campaigns and workshops targeting construction companies, public authorities, and educational institutions on the benefits of BIM and digital tools.
- Support demonstration projects and pilot initiatives showcasing the practical application of BIM, AI, digital twins, and IoT in circular construction.
- Develop national roadmaps for BIM implementation in public and private projects.
- Provide technical assistance and consulting services for companies adopting these technologies.

National KPIs & Targets:

KPI 2.1.2 (National): Number of professionals trained in BIM and other digital construction tools by 2030.

Target: At least 100 of professionals by 2030.

Comments: Regarding latest Montenegro S3 In-depth analysis of priority domains (qualitative) (2025) in country exist just partial use of BIM Technology – while BIM is used in some design segments, it isn't fully implemented across the construction phase in Montenegro.

Montenegro's institutions (the Ministry of economic development, the Chamber of Economy (Association of Construction and Building Material Industry), Institute for Standardization of Montenegro, University of Montenegro, United Nations Development Programme in Montenegro, Deponija LLC, the Innovation Fund etc.) are already jointly building awareness and capacity for BIM and digital tools. Through workshops, campaigns, pilot projects, and innovation hackathons, they aim to equip SMEs, students, public authorities, and educational institutions with the skills and knowledge needed for circular and digital construction.

KPI 2.1.3 (National): Number of best practices (pilot projects, other initiatives) demonstrating innovative digital applications in circular construction launched by 2030.

Target: At list 10 of projects by 2030.

Comments: This target can be reached through implementation of the S3 Strategy 2026-2031 programmes within the priority areas “Construction in accordance with nature and man” and “ICT and digital innovations”.

Objective 2.2: Support the development and deployment of digital platforms for material tracking and waste management.

National Actions:

- Invest in the development or adoption of national digital platforms/marketplaces for tracking and exchanging secondary construction materials.
- Implement national data standards and material passports consistent with EU and Danube Region guidelines.
- Provide financial and technical support for SMEs to integrate digital tracking systems.
- Collaborate with national waste management companies to integrate digital solutions for CDW tracking.

National KPIs & Targets:

KPI 2.2.1 (National): Number of national digital platforms implemented for circular construction and their interoperability by 2030.

Target: At least 1 operational national platform by 2030.

Comments: Such platforms should increase the efficiency of state administration and enhancing transparency through the digitalization of the construction permit process (e-permit), e-monitoring of inspections on-site, e-integration of projects, land registry, and tax administration, digitalization of construction materials tracking, waste management and the processes for CDW recycling and reuse.

Pillar 3: Building Skills & Capacity

Objective 3.1: Develop education and training programs for digital skills within circular construction.

National Actions:

- Integrate circular economy principles and digital construction modules into university curricula (architecture, engineering) and vocational training programs.
- Develop national certification programs for professionals in circular and digital construction.
- Establish partnerships between educational institutions and industry for internships and practical training.
- Launch national online learning platforms for continuous professional development.

National KPIs & Targets:

KPI 3.1.1 (National): Number of education and training programs in digital technologies for circular construction by 2030.

Target: At least 3 of programs by 2030.

KPI 3.1.2 (National): Number of national universities and vocational schools incorporating digital technologies for circular construction into their curricula by 2030.

Target: 2 of institutions by 2030.

Comments: It is proposed to start Introduction to digital technologies for circular construction (BIM etc.) at all levels of education, starting from secondary construction schools and all vocational schools related to the construction sector (mechanical, civil engineering, etc.). It is underlined that, two main national Universities: University of Montenegro UCG (Faculty of Architecture, Faculty of Civil Engineering and Faculty of Metallurgy and Technology) and University of Donja Gorica UDG (Faculty of Polytechnics) are actively involved in science and innovation projects, participating

in S3 Strategy projects. Moreover, the Faculty of Civil Engineering UCG is playing an important role in implementing BIM in the construction sector in cooperation with the Institute for Standardization of Montenegro, Association of Construction and Building Materials, the Chamber of Engineers of Montenegro.

Objective 3.2: Promote knowledge transfer and best practice sharing among stakeholders.

National Actions:

- Organize regular national workshops, conferences, and seminars on circular and digital construction.
- Establish a national online knowledge hub or repository for best practices, case studies, and research findings.
- Facilitate national peer-to-peer learning networks and mentorship programs for companies.
- Encourage participation of national stakeholders in transnational knowledge-sharing events.

National KPIs & Targets:

KPI 3.2.1 (National): Number of national knowledge-sharing events (workshops, conferences) organized annually.

Target: At least 2 of events annually.

KPI 3.2.2 (National): Increase in the number of national cluster members or companies participating in cross-border circular construction projects by 2030.

Target: 10% by 2030.

Comments: This target can be reached through Danube CiDiCon Cluster cooperation, as well as through other international projects, like EURECA supported by the Ministry of education, science and innovations.

Pillar 4: Strengthening Collaboration & Supply Chains

Objective 4.1: Facilitate the development of digital regional supply chains for recycled and secondary construction materials.

National Actions:

- Create the conditions for recycling of CDW on local and national level, as well as opportunities for secondary and recycled materials to be put on the local market.
- Map national producers, recyclers, and designers of secondary materials to identify collaboration potential.
- Implement national data standards and material passports for better traceability and reuse.
- Engage national Digital Innovation Hubs (DIHs - Science and Technology Park of Montenegro (NTP), Tehnopolis (Niksić)) and construction clusters (Association of Construction and Building Materials, the Chamber of Engineers of Montenegro etc.) to support SMEs in adopting digital tools for supply chain management.

National KPIs & Targets:

KPI 4.1.1 (National): Increase in the volume of recycled and secondary materials used in national construction projects by 2030.

Target: At least 5% increase by 2030

Comments: High intensity of infrastructure investment: The announcement of a major investment wave in civil engineering works (traffic infrastructure) presents an opportunity for growth. This could serve as a foundation for the development of the construction materials industry, focusing on the principles of sustainability and the use of recycled materials (rubber, ash, slag), which can enhance the competitiveness of Montenegro's Construction sector.

Creation of a CDW recycling center that is identified in the LLC Deponija programme for 2026 and connected with it secondary material hub can make significant input.

KPI 4.1.2 (National): Number of national companies involved in regional/national circular supply chains by 2030.

Target: At least 3 companies by 2030.

Comments: This target can be reached through implementation of green procurement reform planned in The National Strategy for Circular Transition to 2030 Action Plan, if % usage of recycled or secondary material will be mandatory for national companies.

Objective 4.2: Promote collaboration between research institutions, industry, and governments.

National Actions:

- Create a national "Network for Digital and Circular Construction Innovation," linking academia, industry, and government.
- Launch national R&D funding calls for projects focusing on advanced materials, AI-driven resource management, and digital twins in construction.
- Establish national demonstration sites (Living Labs) for testing and sharing best practices.
- Foster national public-private partnerships (PPPs) for circular construction initiatives and facilitate participation in EU programs (Horizon Europe, Digital Europe).

National KPIs & Targets:

KPI 4.2.1 (National): Number of collaborative research and development projects focused on digital technology for circular construction by 2030.

Target: At least 5 of projects by 2030.

KPI 4.2.2 (National): Number of national public-private partnerships established for the digitalization of circular construction initiatives by 2030.

Target: At least 3 of partnerships by 2030.

Comments: These targets are installed based on indicators for 2026-2030 identified in [The Science and Innovation Programme 2026-2030](#) provided by The Ministry of education, science and innovation.

As an example of good practice, the project named “New environmentally friendly thermal insulation materials based on ash and waste plastic” is now executed by private Montenegrin entrepreneur “Mont Way DOO Podgorica” in collaboration with the Faculty of Metallurgy and Technology of the University of Montenegro within the S3 Strategy 2019-2024 programme.

Pillar 5: Raising Awareness & Changing Mindsets

Objective 5.1: Implement awareness campaigns to promote the benefits of digitalization within circular construction.

National Actions:

- Design and execute targeted national communication campaigns for construction companies, policymakers, and the public.
- Utilize various channels (social media, national media, industry events, educational programs) to disseminate information.
- Highlight national success stories and economic/environmental benefits of circular and digital practices.

National KPIs & Targets:

KPI 5.1.1 (National): Reach of national awareness campaigns (number of people informed through various channels) by 2030.

Target: At least 20000 of people by 2030 (3% of country's population).

Objective 5.2: Encourage the adoption of digital technologies focusing on circular economy principles used in construction business models.

National Actions:

- Provide support programs (e.g., coaching, mentorship, toolkits) for construction companies to integrate digital solutions into their business models.
- Organize workshops and masterclasses on circular business model innovation enabled by digital tools.
- Showcase successful national examples of companies adopting digitalized circular business models.

National KPIs & Targets:

KPI 5.2.1 (National): Number of national construction companies adopting digital technologies in their circular business models by 2030.

Target: At least 5 of companies by 2030.

Comments: This target can be reached through the digitalization of the construction permit process (e-permit), e-monitoring of inspections on-site, e-integration of projects, land registry, and tax administration, digitalization of CDW waste tracking

5. National Context and Challenges

SWOT Analysis

Based on four comprehensive studies carried out in 2024–2025 withing Circular DigiBuild Project and the latest in-depth analysis of the Construction industry³ provided for the development of the National S3 Strategy for the 2026-2031 period the following specific strengths, weaknesses, opportunities, and threats relevant to Montenegrin construction industry were identified:

Strengths:

- **Strategic orientation towards the EU: Montenegro** has made significant progress on its EU accession path, which includes aligning legislation and standards with European norms across all sectors, including Construction.
- **Significance of the Construction sector in the economy:** Construction is among key sectors of Montenegro's economy. There is strong investment

³ [Montenegro S3 In-depth analysis of priority domains \(qualitative\) – June 2025](#)

interest for this sector, which plays a crucial role in the development of other sectors such as tourism and energy.

- **High intensity of infrastructure investment:** The announcement of a major investment wave in civil engineering works (traffic infrastructure) presents an opportunity for growth. This could serve as a foundation for the development of the construction materials industry, focusing on the principles of sustainability and the use of recycled materials (rubber, ash, slag), which can enhance the competitiveness of the Montenegro's Construction sector.
- **Natural resources:** Montenegro possesses certain raw materials, such as stone and wood, which present significant potential for the local production of construction materials and products.
- **Staff education:** The education system produces a sufficient number of high educated professionals to meet the needs of the Construction sector in Montenegro. The quality of this workforce is high.

Weaknesses:

- **Lack of vision:** Spatial planning often lacks a long-term vision, with projects driven by current circumstances, or even individual interests, rather than future needs and public benefit (e.g., construction within future transport corridors).
- **The lack of advanced technologies for efficient recycling and material recovery:** Montenegro currently lacks advanced recycling technologies and modern material recovery facilities, which limits the country's ability to efficiently process CDW. As a result, valuable raw materials and by-products remain underutilized, while reliance on landfilling continues to generate environmental pressures.
- **Reliance on imported construction materials and products:** Montenegro has an extremely low level of domestic production of construction materials and products, with minimal involvement of local companies in this sector. As a result, there is a heavy reliance on imports, leading to increased construction costs and higher final prices of buildings.
- **Reluctance to innovate:** There is significant inertia and reluctance to adopt innovations, particularly within the business sector and even in the helix of government when the state acts as an investor, who decides (non) to accept innovative solutions.
- **Economic instability:** Due to Montenegro's small market size, the Construction industry is highly sensitive to external and internal geopolitical

and economic crises. In recent years, this has resulted in a decline in foreign direct investments and a slowdown in project implementation.

- **Slow bureaucracy and inefficient administrative procedures:** The process of adopting new laws that define the Construction sector has been prolonged, which in turn delays the development of new spatial plans. The procedures for obtaining building permits, expropriation, etc., are also slow and inefficient.
- **Weak internationalization:** High costs and a lack of workforce limit Montenegrin construction companies from expanding into foreign markets.

Opportunities:

- **Integration of Digital Tools:** Implementation of BIM and Digital Twins technologies in their full capacity, using big data, artificial intelligence (AI), blockchain and Internet of Things (IoT) tools to enhance planning, efficiency, and circularity of the construction industry through digitization.
- **Increasing the efficiency of state administration** through the digitalization of the construction permit process (e-permit), e-monitoring of inspections on-site, e-integration of projects, land registry, and tax administration, etc.;
- **Digitalization and automation of various administrative activities**, such as site reporting, keeping construction log, etc.
- **Modular & Prefabricated Construction:** implement 3D printing, robotic assembly, and adaptive design tools to speed up construction and enable circular designs, producing prefab systems using local materials.
- **Digital tools for tracking material flows:** material passports and it's integration to BIM, digital instruments for lifecycle analysis (LCA) of materials.
- **Circular procurement practices:** determine quoters for reused and recycled materials in tender specifications, require material passports and digital tracking of construction materials and CDW, support brownfield investments and projects that demonstrate circular design principles.
- **Recycling of CDW and industrial by-products:** production of secondary materials from CDW, used rubber, plastic, glass, ash, slag, etc. which could replace consumption of natural raw materials and at the same time addressing waste management while conserving natural resources.
- **Creation of national construction and demolition waste (CDW) recycling center** establishing reuse hub for recycled materials and industrial byproducts in combination with digital tools for tracking material flows.
- **Establishment of the national reuse hub** for recycled materials and industrial byproducts.

- **Development of the green construction materials industry** based on local natural resources – an opportunity already recognized by foreign investors in Montenegro. Planned exploitation of stone and timber as part of the sustainable development of local resources.
- **Recycling of buildings and spaces** – giving new value to old structures. A significant number of buildings in Montenegro, representing cultural heritage and national or city identity, dating back several hundred years or from the 20th century, are currently out of use. Through appropriate “recycling,” i.e., reconstruction and repurposing, they can gain and generate new value.

Threats:

- **Slow adaptation of state institutions** to new technologies and materials, which delays the implementation of innovations.
- **Lack of a legislative framework** for the standardization and regulation of new materials and processes.
- **High initial costs for introducing digitalization** or new technologies, and especially for launching local production of construction materials and products. A new domestic manufacturer needs time to gain market trust with quality and price, both in Montenegro and the region, which raises concerns about the profitability and justification of such investments.
- **Limited availability of qualified workforce** for the application of advanced technologies. - Climate changes and seismic activity, which may increase risks for infrastructure.
- **Unplanned exploitation of natural resources**, such as wood and stone, which can threaten ecosystems.
- **Dependence on imported technologies, materials, and products**, instead of fostering local innovations – leading to full reliance on the global market.
- **Lack of consumer awareness and insufficient collaboration between stakeholders**

Addressing National Gaps:

Gaps and barriers on national level identified in the "Consolidated Findings from the Four Studies"	How this TAP specifically addresses these gaps and barriers
---	---

- Limited Adoption of Digital Tools: The adoption of digital tools remains limited, and most projects in the construction industry are still managed using traditional project management techniques	Pillar 2 is focused on: - establishment of national BIM roadmap, - support in technical assistance and consulting services for construction companies adopting digital technologies; - establishment of campaigns and workshops on the benefits of BIM and digital tools.
- Workforce Training Gaps: Lack of skilled personnel and higher upfront costs hinder wider adoption of prefabrication and modular construction.	Pillar 3 is focused on: - integration of “digitalization in construction” in university curricula (architecture, engineering) and vocational training programs. - development of national certification programs for professionals in circular and digital construction.
- Recycling and Reuse in Early Stages: Reuse remains minimal due to a lack of specialized facilities and infrastructure for processing construction and demolition waste.	Pillar 4 is focused on: - Establishment of the conditions for recycling of CDW, opportunities to secondary and recycled materials on the local market. - Map CDW flows, establishing circular supply chains, and digital tracking platforms to

	improve CDW management efficiency.
--	------------------------------------

6. Financial Strategy (National Level)

Funding Sources

Implementation of activities needed to achieve Objectives and KPIs identified in this TAP will be budgeted under different financing instruments: ministries, local municipalities and national and local institutions budgets, grants and co-financing instruments financed by national budget, donor programmes, EU programmes and private sector investments.

On **national level** it will be financed under:

- Ministry of Economy Development programmes;
- Ministry of Education, Science and Innovation programmes (Programme for science and innovation 2026-2030);
- Ministry of Ecology, Sustainable Development and Northern Region Development;
- Innovation Fond of Montenegro;
- Environmental Protection Fund (the Eco-Fund);
- Local projects (LLC Deponija from Podgorica is planning to create CDW recycling center).

On the topics of research and innovations (S3) Montenegro takes part at the following **international programmes**:

- Interreg IPA Adrion;
- Interreg VI-A IPA CBC Croatia – Bosnia and Herzegovina – Montenegro 2021-2027;
- ERASMUS-EDU-2022-CBHE-STRAND-2;
- European Commission, Western Balkan Fund;
- Interreg MED programme;
- Horizon Europe;
- COST;
- EUREKA;

- EIC;
- Single market program;
- COSME.

Private investments:

- Direct investment by construction companies in BIM adoption and staff training
- Targeted co-financing by motivated SMEs from construction and IT sectors

Budget Allocation

As this TAP is not an official government document, the indicative funding shares are provided solely as estimates of potential funding sources for the proposed activities, rather than as formal budget allocations.

TAP's Pillar	Share (%)
Pillar 1: Policy & Regulatory Frameworks	10%
Pillar 2: Digital Innovation & Technology	40%
Pillar 3: Skills & Capacity	15%
Pillar 4: Collaboration & Supply Chains	30%
Pillar 5: Awareness & Mindsets	5%

7. Implementation Plan (National Level)

Governance Structure

The implementation of the Montenegrin TAP would be under surveillance of the task force composed of relative national representatives who were participating in the Circular DigiBuild Project and new national representatives joining the Trans-Danubian Cluster for Circular Digitalized Construction. Zero Waste Montenegro as the member of the Trans-Danubian Cluster for Circular Digitalized Construction –

“DANUBE CiDiCon CLUSTER” will oversee the Montenegrin TAP’s implementation and provide support in coordination of the monitoring activities at the national level, including progress tracking and reporting.

Timeline

Pillar	Objective	KPI	2026	2027	2028	2029	2030
Pillar 1: Enabling Policy & Regulatory Frameworks	Objective 1.1: Harmonize circular construction standards and regulations related to digitalization.	KPI 1.1.2 (National): Reduction in regulatory barriers for secondary material use in construction by 2028.					
	Objective 1.2: Develop and implement financial incentives for circular construction practices.	Number of SMEs utilizing national financial incentives for circular construction by 2030.					
Pillar 2: Fostering Digital Innovation & Technology Adoption	Objective 2.1: Promote the adoption of Building Information Modeling (BIM) and other digital technologies.	KPI 2.1.2 (National): Number of professionals trained in BIM and other digital construction tools by 2030.					
		KPI 2.1.3 (National): Number of best practices (pilot projects, other initiatives) demonstrating					

		innovative digital applications in circular construction launched by 2030.						
	Objective 2.2: Support the development and deployment of digital platforms for material tracking and waste management.	Number of national digital platforms implemented for circular construction and their interoperability by 2030.						
Pillar 3: Building Skills & Capacity	Objective 3.1: Develop education and training programs for digital skills within circular construction.	KPI 3.1.1 (National): Number of education and training programs in digital technologies for circular construction by 2030.						
		KPI 3.1.2 (National): Number of national universities and vocational schools incorporating digital technologies for circular construction into their curricula by 2030.						

	Objective 3.2: Promote knowledge transfer and best practice sharing among stakeholders.	KPI 3.2.1 (National): Number of national knowledge-sharing events (workshops, conferences) organized annually.					
		KPI 3.2.2 (National): Increase in the number of national cluster members or companies participating in cross-border circular construction projects by 2030.					
Pillar 4: Strengthening Collaboration & Supply Chains	Objective 4.1: Facilitate the development of digital regional supply chains for recycled and secondary construction materials.	KPI 4.1.1 (National): Increase in the volume of recycled and secondary materials used in national construction projects by 2030.					
		KPI 4.1.2 (National): Number of national companies involved in regional/national circular supply chains by 2030					
	Objective 4.2: Promote collaboration between research institutions,	KPI 4.2.1 (National): Number of collaborative research and development projects focused on					

	industry, and governments.	digital technology for circular construction by 2030.					
		KPI 4.2.2 (National): Number of national public-private partnerships established for the digitalization of circular construction initiatives by 2030.					
Pillar 5: Raising Awareness & Changing Mindsets	Objective 5.1: Implement awareness campaigns to promote the benefits of digitalization within circular construction.	KPI 5.1.1 (National): Reach of national awareness campaigns (number of people informed through various channels) by 2030.					
	Objective 5.2: Encourage the adoption of digital technologies focusing on circular economy principles used in construction business models.	KPI 5.2.1 (National): Number of national construction companies adopting digital technologies in their circular business models by 2030.					

Monitoring and Evaluation:

A national framework for tracking progress will be provided by relevant public body on annual base. Progress will be reviewed through regular Danube CiDiCon meetings, discussed with partners from the Danube CiDiCon cluster.

Risk Management:

Identify potential national-level risks to the implementation of the TAP (e.g., funding delays, lack of political will, low industry uptake, skill shortages).

Propose specific mitigation measures for each identified risk.

Potential risks for the Montenegrin TAP implementation include:

- Political instability and limited political support,
- Delays in funding and economic instability,
- Reluctance to innovate, and
- Lack of skilled professionals in circular and digital construction.

Mitigation measures:

- Diversification of funding opportunities
- Alignment with existing national and EU initiatives,
- Continuous stakeholder engagement within quadra helix groups
- Awareness-raising and knowledge-sharing activities to increase Interest for innovation
- Government support for capacity-building programmers to professionals skills development in circular and digital construction practices.

8. Stakeholder Engagement (National Level)

Collaboration Mechanisms:

Communication and collaboration will be strengthened through national stakeholder exchanges within the Danube CiDiCon cluster and participation in working groups connected to the governance structures of the Danube Region.

The B2B platform created under the Circular DigiBuild project will serve as a central space to share progress and results, gather feedback, such for new partners and

coordinate activities with regional partners. In addition, collaboration will be supported by the use of online communication tools, ensuring continuous dialogue and effective knowledge exchange.

Involvement of Key Groups:

Governments / Public Authorities: Engagement will take place through targeted consultations and knowledge-sharing activities coordinated by profile Ministries, involving relevant ministries and public bodies to support policy alignment and the integration of circular construction priorities into existing strategies and initiatives.

Industry Associations & SMEs: Industry stakeholders will be engaged through workshops, pilot activities, and knowledge exchange within the S3 Strategy implementation, encouraging innovation, testing of circular solutions, and practical implementation.

Research & Education Institutions: Collaboration with universities and research centres will support scientific input, development of methodologies and tools, and capacity-building activities related to circular and digital construction.

Financial Institutions & Investors: Dialogue with financial actors will focus on exploring opportunities for financing circular construction initiatives and supporting the scaling of circular-based business models.

Civil Society & NGOs: Public awareness and transparency will be supported through dissemination activities, stakeholder engagement, and cooperation with civil society organizations working on circular economy and sustainability.

Note: Key Stakeholders are identified in Annex A.

Communication Plan:

A national communication strategy will ensure transparency, visibility, and continuous dissemination of TAP activities and results within the Montenegro:

- Regional online platform for information, good practice exchange and participation opportunities (DigiBuild B2B Platform: <https://www.circulardigibuild.eu/bg/>)
- Participation in the Danube CiDiCon cluster's communication activities and events.

- Periodical newsletters from Danube CiDiCon Cluster distributed to all RMSG members and stakeholders.
- Social media awareness campaigns targeting both industry professionals and the general public.

9. Sustainability and Scalability

Sustainability Mechanisms

The outcomes and initiatives developed under the TAP will be sustained through continued collaboration of national and local stakeholders from the Quadruple Helix, as well as cooperation with partners from the Danube Region.

Ensuring the long-term sustainability of TAP outcomes:

- *Regulatory reforms:* Adopted standards and amendments will be permanently embedded in the national legal framework.
- *Educational integration:* Circular and digital construction concepts will be incorporated into university educational programmes and Chamber of Engineers programmes, securing a steady pipeline of skilled professionals.
- *Strategic funding:* Implementation of the S3 Strategy 2026–2031 (key areas for funding: construction, green energy transition and energy efficiency, ICT), progressive integration of BIM (development of BIM roadmap through InDiCo Global project), harmonization of circular construction practitioners to public procurement and creation of CDW recycling center by LLC Deponija will provide a foundation for circular construction in Montenegro.
- *Cooperation:* strengthening cooperation between local companies and SMEs through initiatives provided by Association of Construction and Building Materials; cooperation with The DANUBE CiDiCon Cluster network on Regional level.

Scalability Strategies

Successful pilot initiatives, implemented through S3 Strategy programmes or BIM roadmap will be proposed for replication and adaption in municipalities and on national level. Relevant information will be scaled through B2B platform, CiDiCon

Cluster and other stakeholder networks, workshops, and knowledge exchange activities.

10. Annexes

Annex A: List of key national stakeholders involved.

Governments / Public Authorities:

- Ministry of Spatial Planning, Urbanism and State Property
- Ministry of Ecology, Sustainable Development and Northern Region Development
- Environmental Protection Agency
- Ministry of Energy and Mining
- Ministry of Economic Development
- Ministry of Education, Science and Innovation
- Ministry of European Affairs (Danube Region)
- Deponija LLC
- Institute for Standardization of Montenegro

Research & Education Institutions:

- University of Montenegro UCG:
 - Faculty of Architecture,
 - Faculty of Civil Engineering
 - Faculty of Metallurgy and Technology
- University of Donja Gorica UDG:
 - Faculty of Polytechnics
- Science and technology park Montenegro
- Tehnopolis - Innovation and Entrepreneurship Center

Financial Institutions & Investors:

- Innovation Fund of Montenegro
- Environmental Protection Fund of Montenegro (Eco-Fund)
- Central Bank of Montenegro (CBCG)
- World Bank
- European Investment Bank (EIB)
- European Bank for Reconstruction and Development (EBRD)
- United Nations Development Programme in Montenegro (UNDP)

Industry Associations & SMEs:

- The Montenegrin Circular Economy Hub (Circular Hub)
- Chamber of Engineers of Montenegro
- Association of Construction and Building Materials Industry
- Telemont
- Altscape
- Ecoenergy Consulting
- ION Solution
- TM Invest
- Mep team
- Vigoris
- Concord
- Penta MNE
- Sectron Montenegro
- ARHETIP doo
- Preming d.o.o
- Cikom
- Fleka
- Mont Way DOO Podgorica
- DOO Meditera
- "Institut za građevinarstvo" d.o.o
- Monteput
- Adria Invest
- Rašketić doo
- Bemax
- Zetogradnja
- Čelebić
- Strabag/Crnagoraput
- IGP Fidija
- ETG inženjering
- Paten studio
- Maljat Stone
- NikCom
- Mehanizacija i programat
- LD gradnja
- Jela komerc
- MN BUILD DOO

- CEMA
- A.tim Studio
- ZETA MONT
- A12 project d.o.o

Civil Society & NGOs:

- ICT Cortex
- ADP ZID
- NGO "Gradionica"
- NVO "DigitalDen"
- NGO "Expeditio"
- NGO "KANA"
- NVO European Democratic initiatives AD
- NVO "Grupa građana BU2"
- Center of environmental initiatives
- NVU "Dr. Martin Schneider-Jacoby"

Annex B: Detailed national project proposals linked to the objectives.

Name of project	National Partners	Connection to TAP's objectives
"Driving Digital and Sustainable Transformation in Montenegro through ICT and BIM Standards"	Institute for Standardization of Montenegro (ISME) in partnership with Association of Construction and Building Materials, Chamber of engineers, UCG Faculty of civil engineering	- Objectives 1.1 (Integrate European standards for BIM, AI, IoT into national construction and digital innovation practices) - Objectives 2.1, 2.2 (BIM integration, introduction of IoT monitoring for smart resource use and CDW management) - Objective 3.1 (strengthen the skills of engineers, architects, and policymakers through workshops, conferences, provide training for trainers) - Objective 4.2 (conduct a national BIM team); - Objective 5.1, 5.2 (rise BIM awareness)
"ReWaste – A New Era in Waste Management in	UNDP Montenegro, Deponija LLC Podgorica	Objectives 2.1. 2.2 (Integrate digital monitoring of waste collection, storage, and processing) Increase recycling rates,

Montenegro		transform waste into secondary raw materials)
"Circular Transition and Responsible Business Conduct"	UNDP Montenegro, Ministry of Economic Development, International Labour Organization (ILO)	Objectives 2.2 (application of industrial symbiosis for CDW reuse, map resource flows, Identify by-products. exploring opportunities for resource exchange, shared infrastructure)
Set of programmes: - Innovation Development Programme (2023–2027 Framework) - "Startup Revolution" - Collaborative Innovation Grants - Innovation Vouchers	Innovation Fund of Montenegro	- Objectives 1.1, 4.1 (provide SMEs with accessible support to test prototypes, adopt digital tools such as IoT, and collaborate with research institutions; enable construction companies to deliver circular solutions like recycled materials and CDW reuse, strengthening competitiveness and alignment with EU sustainability standards) - Objective 4.2 (Promote collaboration between construction companies and research institutions, government)

Annex C: Data sources and methodologies for national KPIs.

The national KPIs presented in this TAP were defined through an analysis of Montenegro's strategic goals and policy objectives, as outlined in national documents and reports (Annex D), together with relevant projects and activities highlighted in Annex B. This integrated approach ensures that the KPIs reflect both policy priorities and practical implementation measures.

Annex D: Relevant national policy documents or reports.

- Law on Construction of Structures
- Rulebook on the Management of Construction Waste
- Law on Waste
- National Waste Management Plan 2025–2029
- Law on Energy Efficiency
- National Energy and Climate Plan (NECP, 2025)
- Law on Public Procurement
- Roadmap Towards the Circular Economy in Montenegro (2022)

- National Strategy for Circular Transition to 2030 with Action Plan 2023–2024
- National Strategy for Sustainable Development up to 2030 (NSSD)
- “MONTENEGRO ON THE ROAD TO THE CIRCULAR ECONOMY” (Needs Assessment Report)
- Smart Specialization Strategy (S3) 2019-2024
- Evaluation of the Smart Specialization Strategy (S3) 2019-2024 (report)
- Mapping Montenegro’s potential in the context of Smart Specialization (report)
- Strategy for Scientific Research Activity of Montenegro 2024-2028
- Montenegro Research Infrastructures Roadmap 2024-2028
- Montenegro S3 quantitative report on mapping potential
- Montenegro S3 In-depth analysis of priority domains (qualitative)
- Draft of the Smart Specialisation Strategy (S3) 2026–2031
- Montenegro's Science and Innovation Programme 2026-2030

Romania

Territorial Action Plan (TAP) for Digital Innovation in Circular Construction

Authors:

PP10 West RDA

PP09 IRCEM

Partner organizations in the Circular DigiBuild project

Table of Contents

TERRITORIAL ACTION PLAN (TAP) FOR DIGITAL INNOVATION IN CIRCULAR CONSTRUCTION... 1

1. INTRODUCTION / EXECUTIVE SUMMARY.....	3
PURPOSE:.....	3
ALIGNMENT:.....	3
CURRENT STATUS:.....	3
2. VISION AND MISSION (TERRITORIAL ADAPTATION).....	6
VISION:.....	6
MISSION:.....	6
3. ALIGNMENT WITH EU STRATEGY FOR THE DANUBE REGION (EUSDR).....	6
4. STRATEGIC PILLARS, OBJECTIVES, AND KEY ACTIONS (NATIONAL KPIS).....	6
PILLAR 1: ENABLING POLICY & REGULATORY FRAMEWORKS.....	7
OBJECTIVE 1.1: HARMONIZE CIRCULAR CONSTRUCTION STANDARDS AND DIGITAL REGULATIONS.....	7
OBJECTIVE 1.2: DEVELOP AND IMPLEMENT FINANCIAL INCENTIVES FOR CIRCULAR CONSTRUCTION PRACTICES.....	8
PILLAR 2: FOSTERING DIGITAL INNOVATION & TECHNOLOGY ADOPTION.....	8
OBJECTIVE 2.1: PROMOTE THE ADOPTION OF BUILDING INFORMATION MODELING (BIM) AND OTHER DIGITAL TECHNOLOGIES.....	8
OBJECTIVE 2.2: SUPPORT THE DEVELOPMENT AND DEPLOYMENT OF DIGITAL PLATFORMS FOR MATERIAL TRACKING AND WASTE MANAGEMENT.....	10
PILLAR 3: BUILDING SKILLS & CAPACITY.....	10
OBJECTIVE 3.1: DEVELOP EDUCATION AND TRAINING PROGRAMS FOR DIGITAL SKILLS WITHIN CIRCULAR CONSTRUCTION.....	10
OBJECTIVE 3.2: PROMOTE KNOWLEDGE TRANSFER AND BEST PRACTICE SHARING AMONG STAKEHOLDERS.....	11
PILLAR 4: STRENGTHENING COLLABORATION & SUPPLY CHAINS.....	12
OBJECTIVE 4.1: FACILITATE THE DEVELOPMENT OF DIGITAL REGIONAL SUPPLY CHAINS FOR RECYCLED AND SECONDARY CONSTRUCTION MATERIALS.....	12
OBJECTIVE 4.2: PROMOTE COLLABORATION BETWEEN RESEARCH INSTITUTIONS, INDUSTRY, AND GOVERNMENTS.....	12
PILLAR 5: RAISING AWARENESS & CHANGING MINDSETS.....	13
OBJECTIVE 5.1: IMPLEMENT AWARENESS CAMPAIGNS TO PROMOTE THE BENEFITS OF DIGITALIZATION WITHIN CIRCULAR CONSTRUCTION.....	13
OBJECTIVE 5.2: ENCOURAGE THE ADOPTION OF DIGITAL TECHNOLOGIES FOCUSING ON CIRCULAR ECONOMY PRINCIPLES USED IN CONSTRUCTION BUSINESS MODELS.....	13
5. NATIONAL CONTEXT AND CHALLENGES.....	14
SWOT ANALYSIS:.....	14

6. FINANCIAL STRATEGY (NATIONAL LEVEL).....	15
FUNDING SOURCES:.....	15
BUDGET ALLOCATION.....	15
KEY NATIONAL PROJECTS & PRIORITIES.....	16
CAPACITY BUILDING (PILLAR 3 PRIORITY):.....	16
PILOT PROJECTS & DEMONSTRATION SITES (PILLAR 2 & 4 PRIORITY):.....	16
FINANCIAL INSTRUMENTS (PILLAR 1 PRIORITY):.....	17
GOVERNANCE & TRANSNATIONAL ALIGNMENT:.....	17
STRATEGIC FUNDING SOURCES.....	17
7. IMPLEMENTATION PLAN (NATIONAL LEVEL).....	17
GOVERNANCE STRUCTURE:.....	17
TIMELINE:.....	17
MONITORING AND EVALUATION:.....	19
RISK MANAGEMENT:.....	21
8. STAKEHOLDER ENGAGEMENT.....	23
COLLABORATION MECHANISMS:.....	23
INVOLVEMENT OF KEY GROUPS:.....	25
COMMUNICATION PLAN:.....	27
9. SUSTAINABILITY AND SCALABILITY.....	28
ANNEX A: LIST OF KEY NATIONAL STAKEHOLDERS INVOLVED.....	30
ANNEX B: RELEVANT NATIONAL POLICY DOCUMENTS OR REPORTS.....	32

1. Introduction / Executive Summary

Purpose: The purpose of this Territorial Action Plan (TAP) is to outline Romania's formal commitment, strategic framework, and localized actions designed to implement the transnational "2030 Danube Region Digital Innovation Strategy for Circular Construction." By establishing clear, tangible national targets, identifying responsible public and private entities, and coordinating targeted funding streams, this TAP aims to transition Romania's construction sector from a linear "take-make-dispose" model to a resource-efficient, digitally optimized circular paradigm.

Alignment: This TAP aligns with the overall vision, mission, and strategic pillars of the 2030 Danube Region Digital Innovation Strategy for Circular Construction. It Directly implements the strategy five pillars (policy, digital innovation, skills, collaboration, awareness) and EUSDR pillars¹(connecting region, protecting environment, building prosperity, strengthening region)

Current Status:

Romania is at an emerging stage — limited national BIM adoption, fragmented CDW (construction & demolition waste) tracking, growing recycling capacity but low market uptake of secondary materials, few national digital platforms, skill gaps in digital construction and circular design.

Romania has a BIM task force at the ministerial level (MDLPA) and an adopted BIM roadmap².

ClusterTEC³ as a representative coagulation of the construction sector, is running two projects to deliver professional BIM training. These projects have begun incorporating BIM occupations into the national occupational registry (COR), e.g., BIM Manager, BIM Coordinator, BIM Engineer.

Already performed studies show the approach must be top-down: engage clients (those who commission/fund/operate built assets) to establish a clear information management framework - from information requirements (across all project stages) to production and

¹ <https://danube-region.eu/>

² <https://www.mdlpa.ro/uploads/articole/attachments/656461ef87008830824446.pdf>

³ <https://clustertec.ro/>

verification before delivery. Initially, processes that use information should be assessed and stabilized. It is also crucial to define specific BIM uses that generate information requirements, 3D model uses, and information exchanges.

The Romanian BIM national roadmap implementation is delayed (budget, government changes, etc.) from the original 2022 - 2028 target period. Though, mandating BIM alone will not yield expected benefits. Effective BIM implementation requires clear client-defined information requirements, acceptance criteria for deliverables, and approval processes. A core BIM requirement is defining the purpose for which information is developed. Requirements should follow ISO 19650 levels of information needed across:

- geometry
- alphanumeric data
- documents.

BIM task force group in Romania

Key organizations and Institutional Members are mentioned below.

The task force includes delegates from the following ministries and national bodies:

- Ministry of Development, Public Works and Administration (MDLPA): Coordinates and leads the group.
- Ministry of Research, Innovation and Digitalization (MCID).
- Ministry of Education (MED).
- Ministry of Finance (MF).
- Ministry of Investment and European Projects (MIPE).
- National Agency for Public Procurement (ANAP).
- Romanian Association for Standardization (ASRO).
- State Office for Inventions and Trademarks (OSIM).

Expert and Industry Representatives

The group also integrates expertise from the professional and academic sectors to align the Roadmap for BIM Adoption with industry standards:

- BIMTECH Association⁴: Actively represented in the task force;

⁴ <https://bimtech.ro/>

- TEC Cluster⁵: facilitator for the adoption of advanced technologies — such as BIM, Digital Twin, artificial intelligence, digital project management and automated processes — and support standardization and interoperability in construction.
- Leviatan Group⁶: frequently involved in high-level digital maturity and BIM certification discussions related to national strategy.

The implementation of the National Roadmap for BIM Adoption in Romania is structured into four progressive stages, designed to move from initial preparation to mandatory nationwide use by late 2028. The roadmap is delayed; therefore, the below periods and years are already old.

Stage 1: Initial Preparation (Q3 – Q4 2022)

Stage 2: Framework Development (Q1 2023 – Q2 2024)

Stage 3: Pilot Implementation (Q3 2024 – Q3 2026)

Stage 4: Nationwide Expansion (Q4 2026 – Q4 2028)

Experts' opinions:

” At the beginning of 2026, Romania is in a transition phase, which we could characterize as partial implementation with standardization trends. According to the national roadmap for BIM implementation, we are theoretically in Stage III (Q3 2024 - Q3 2026), which aims to launch the introduction of BIM at the national level and implement pilot projects. However, the reality on the ground shows a major discrepancy between the private and public sectors. In the private sector, especially in large, commercial or industrial projects, we see, punctually, an increasing maturity. Here, beneficiaries understand the added value of BIM, from interdisciplinary coordination to cost control, increased productivity and performance in facility management. There are experienced teams, Common Data Environments (CDEs) are used, and they try to comply with international standards such as ISO 19650 at a minimum. In contrast, public projects are still, for the most part, in the superficial pilot phase. Although there are BIM requirements in some specifications, these are often formal, without an understanding of the processes behind them, not even by those who introduced the requirement in the specifications. Public administration does not yet have the necessary mechanisms to verify and use BIM deliverables, which means that implementation remains, most of the time, at a declarative level.”

Ilie Drăgan, Senior Trainer & Consultant, BIM Sprint

⁵ <https://clustertec.ro/>

⁶ <https://leviatangroup.com/ro/acasa/>

2. Vision and Mission (Territorial Adaptation)

Vision:

By 2030 Romania will be a leading Danube-region adopter of digital tools and circular construction practices, reducing embodied carbon and material waste while boosting green jobs and SME competitiveness.

Mission:

Enable policy, finance, skills and digital infrastructure to mainstream reuse, material passports and BIM across public and private construction projects, via partnerships between government, industry, research and DIHs.

3. Alignment with EU Strategy for the Danube Region (EUSDR)

Areas as highlighted in the transnational strategy:

Pillar: Connecting the Region (Improved Infrastructure, Digitalization)

National BIM roadmap for public procurement, interoperable digital platforms.

Pillar: Protecting the Environment (Resource Efficiency, Waste Reduction)

Increase use of secondary materials and CDW circularity.

Pillar: Building Prosperity (Innovation, SME Growth)

Participate in Danube networks, host national focal point for supply chain mapping.

Pillar: Strengthening the Region (Institutional Capacity, Collaboration)

Participate in Danube networks (e.g. CiDiCon cluster⁷), host national focal point for supply chain mapping.

4. Strategic Pillars, Objectives, and Key Actions (National KPIs)

This section details the country-specific implementation for each of the five strategic pillars defined in the Danube Region strategy.

⁷ <https://www.cidicon.org/>

Pillar 1: Enabling Policy & Regulatory Frameworks

Objective 1.1: Harmonize circular construction standards and digital regulations

This objective is aiming at harmonizing the standards & integrate digital compliance as foreseen in the Stage 2 of the National Roadmap for BIM Adoption in Romania, under the title of Framework Development.

National Actions:

- Review and identify barriers to circularity within the upcoming Code of Territorial Planning, Urbanism, and Construction (CATUC)⁸
- Address the technical blockage identified by the Circular Economy Coalition (CERC)⁹ by drafting national End-of-Waste (EoW) criteria for recycled aggregates under SR EN standards. Formulate localized Environmental Product Declaration (EPD) databases and Life Cycle Assessment (LCA) guidelines to support sustainable architectural planning.
- Prepare local manufacturers for the mandatory implementation of Digital Product Passports (DPPs) and circular design criteria under the updated Construction Products Regulation (CPR)¹⁰ and Ecodesign for Sustainable Products Regulation (ESPR)¹¹ by 2028.

KPIs & Targets:

KPI 1.1.1: Number of national circular construction standards related to digitalization adopted

- This KPI measures the formal integration of circularity and digitalization into national construction codes, specifically focusing on drafting End-of-Waste (EoW) criteria for recycled aggregates.
- Target: 5 Standards by 2028

⁸ <https://federatiaconstructorilor.ro/attachments/article/654/CATUC.pdf>

⁹ <https://economiecirculara.eu/>

¹⁰ https://single-market-economy.ec.europa.eu/sectors/construction/construction-products-regulation-cpr_en

¹¹ <https://eur-lex.europa.eu/eli/reg/2024/1781/oj/eng>

KPI 1.1.2: Qualitative assessment of reduced regulatory barriers through new certification schemes

- A qualitative assessment of the effectiveness of new certification schemes and acceptance criteria in reducing legal hurdles for using secondary materials.
- Target: High Improvement (Qualitative) by 2030

Objective 1.2: Develop and implement financial incentives for circular construction practices

National Actions:

- Integrate mandatory ESG, ESRS, and DNSH (Do No Significant Harm) criteria into public procurement from 2026
- Develop new, targeted national grant schemes, tax incentives, or loan programs for circular construction projects and digital adoption, especially for SMEs

KPIs & Targets:

KPI 1.2.1: Total monetary value of public and private investment in circular construction projects

- Tracks the cumulative monetary value of public and private funds directed toward projects that utilize digital circular economy methods.
- Target: €500 Million (Placeholder based on PNRR scale) by 2030

KPI 1.2.2: Number of SMEs utilizing national financial incentives for circular construction

- Counts the number of Small and Medium Enterprises successfully utilizing national grant schemes or tax incentives for digital circular transitions.
- Target: 100 SMEs by 2028

Pillar 2: Fostering Digital Innovation & Technology Adoption

Objective 2.1: Promote the adoption of Building Information Modeling (BIM) and other digital technologies

National Actions:

- Implement the **National Roadmap for BIM Adoption**¹², moving from BIM Level 2 pilot projects (2026–2028) to mandatory use in large public investments by 2030
- Support demonstration projects and pilot initiatives showcasing the practical application of BIM, AI, digital twins, and IoT in circular construction.
- Develop standard training programs for the 5 newly approved COR (Classification of Occupations in Romania¹³) BIM codes to formalize individual labor contracts and reduce tender appeals in public procurement : Building Information Modeling Consultant (COR 242123), Building Information Modeling Coordinator (COR 242124), Building Information Modeling Manager (COR 121312), Building Information Modeling Specialist (COR 242125), Building Information Modeling Technician (COR 311218)

KPIs & Targets:

KPI 2.1.1: Percentage of public construction projects utilizing BIM

- Measures the percentage of significant public and private construction projects that have successfully transitioned to BIM Level 2 or higher
- Target: 50% of large public investments by 2030

KPI 2.1.2: Number of professionals trained specifically in the 5 newly approved BIM COR codes (e.g., BIM Manager, BIM Coordinator)

- Tracks the number of individuals trained and certified under the 5 newly approved national BIM COR codes mentioned above (e.g., BIM Manager, BIM Coordinator).
- Target: 1,000 Professionals by 2028

KPI 2.1.3: Number of digital best practice pilots

- Measures the successful launch of pilot projects that demonstrate the use of Digital Twins, AI, or IoT in resource-efficient construction.
- Target: 10 Pilot Projects by 2028

Objective 2.2: Support the development and deployment of digital platforms for material tracking and waste management

National Actions:

¹² <https://www.mdlpa.ro/uploads/articole/attachments/656461ef87008830824446.pdf>

¹³ <https://old.mmuncii.gov.ro/j33/index.php/ro/2014-domenii/munca/c-o-r>

- Develop a National Digital Library and a digital platform for tracking secondary construction materials (like the French KROQI ¹⁴ model)
- Implement national data standards and material passports consistent with EU and Danube Region guidelines.
- Collaborate with waste management entities to integrate Construction and Demolition Waste (CDW) tracking

KPIs & Targets:

KPI 2.2.1: Number of interoperable digital platforms implemented for circular construction

- Counts the number of active national platforms that allow for the standardized exchange of material data.
- Target: 2 Platforms by 2028

KPI 2.2.2: Increase in the volume of construction materials tracked digitally

- Quantifies the volume (in m³ or tonnes) of construction materials whose lifecycle is monitored via Digital Product Passports.
- Target: 20% Increase in Volume by 2030

Pillar 3: Building Skills & Capacity

Objective 3.1: Develop education and training programs for digital skills within circular construction

National Actions:

- Incorporate circular design, BIM-integrated Life Cycle Assessment (LCA), and digital deconstruction into technical university curricula (e.g., UTCB, UTCN)
- Develop formal Occupational Standards (SO) corresponding to the five newly approved COR BIM codes (COR 242123, COR 242124, COR 121312, COR 242125, COR 311218), enabling national accreditation and supporting regional dual-education programs to train vocational BIM Technicians
- Deploy subsidized training initiatives (such as the iCON HUB projects led by Cluster TEC¹⁵) to offer free digital competency courses for construction SMEs.

KPIs & Targets:

¹⁴ <https://kroqi.fr/>

¹⁵ <https://clustertec.ro/article/formare-gratuita-si-competente-digitale-pentru-construcii-prin-proiectele-icon-hub>

KPI 3.1.1: Number of education and accredited training programs in digital circular construction

- Measures the availability of public education and accredited modules specifically focused on digital deconstruction and BIM-integrated Life Cycle Assessment (LCA).
- Target: 8 Programs by 2028

KPI 3.1.2: Number of national universities and vocational schools incorporating digital technologies for circular construction into their curricula

- Tracks the number of technical universities and vocational schools that have formally added digital circular construction to their core curricula.
- Target: 6 Institutions by 2028

Objective 3.2: Promote knowledge transfer and best practice sharing among stakeholders.

National Actions:

Organize regular national workshops, conferences, and seminars on circular and digital construction.

Establish a national online knowledge hub or repository for best practices, case studies, and research findings.

Facilitate national peer-to-peer learning networks and mentorship programs for companies.

Encourage participation of national stakeholders in transnational knowledge-sharing events.

KPI 3.2.1: Number of national knowledge-sharing events

- Counts the number of workshops, conferences, and seminars organized to facilitate peer-to-peer learning between industry and government.
- Target: 4 Events Annually through 2030

Pillar 4: Strengthening Collaboration & Supply Chains

Objective 4.1: Facilitate the development of digital regional supply chains for recycled and secondary construction materials

National Actions:

- Map national producers and recyclers of secondary materials to identify collaboration potential
- Engage Digital Innovation Hubs (DIHs) and sectoral clusters (like Cluster TEC) to support SMEs

KPIs & Targets:

KPI 4.1.1: Secondary Material Market Share

- Measures the increase in the actual volume of recycled materials successfully integrated into national infrastructure projects
- Target: 15% Increase by 2030

KPI 4.1.2: Number of companies participating in regional circular supply chains

- Tracks the number of companies actively participating in the "Danube Circular Construction Supply Network" or localized digital supply chains.
- Target: 50 Companies by 2028

Objective 4.2: Promote collaboration between research institutions, industry, and governments.

National Actions:

- Create a National Network for Digital and Circular Construction Innovation linking research centers (ex. Technical University of Cluj-Napoca - UTCN, Technical University of Civil Engineering Bucharest - UTCB) and ministries (Ministry of Development, Public Works and Administration - MDLPA, Ministry of Environment, Water, and Forests - MMAP)
- Launch R&D calls for AI-driven resource management and Digital Twins
- Foster national public-private partnerships (PPPs) for circular construction initiatives and facilitate participation in EU programs (Horizon Europe, Digital Europe).

KPIs & Targets:

KPI 4.2.1: Number of collaborative research and development projects focused on digital technology for circular construction

- Measures the number of research projects jointly funded by the government and industry focused on AI-driven resource management.

- Target: 5 Projects by 2028

Pillar 5: Raising Awareness & Changing Mindsets

Objective 5.1: Implement awareness campaigns to promote the benefits of digitalization within circular construction.

National Actions:

- Design and execute targeted communication campaigns (e.g., "Circular Build Romania") showing that implementing waste-prevention and selective demolition can save up to 8% in operating costs and reduce greenhouse gas emissions by 2-4% annually
- Showcase successful national pilot projects and "success stories" through social and industry media

KPIs & Targets:

KPI 5.1.1: Reach of awareness campaigns (number of people informed through various channels)

- Quantifies the number of industry professionals and citizens reached through the "Circular Build Romania" campaign.
- Target: 10,000 People by 2030

Objective 5.2: Encourage the adoption of digital technologies focusing on circular economy principles used in construction business models.

National Actions:

- Provide support programs (e.g., coaching, mentorship, toolkits) for construction companies to integrate digital solutions into their business models.
- Organize workshops and masterclasses on circular business model innovation enabled by digital tools.
- Showcase successful national examples of companies adopting digitalized circular business models.

KPI 5.2.1: Number of construction companies adopting digital-circular business models

- Counts the number of construction companies that have successfully integrated digitalized circular principles into their primary business models.
- Target: 40 Companies by 2030

5. National Context and Challenges

SWOT Analysis:

Strengths:

- Highly active regional clusters (Cluster TEC, Transilvania IT Cluster) driving digital skill standards.
- Formalized political commitment via the PAEC (H.G. 927/2023¹⁶)
- Co-funded European Digital Innovation Hubs (TEDIHT, eDIH-DIZ) providing robust "test before invest" platforms.

Weaknesses:

- Lack of localized Life Cycle Assessment (LCA) databases and EPD libraries.
- Fragmented, uncooperative construction supply chains and outdated paper-based administrative workflows.

Opportunities:

- Mandatory integration of ESG, ESRS, and DNSH criteria in public procurement.
- Modernization of permitting procedures and BIM integration through the CATUC.

Threats:

- Persistent volume of illegal CDW dumping, which undermines the economics of certified recycling.
- The shortage of skilled labor and resistance from labor unions to adopting BIM workflows.
- Price differences in the market, where lower-priced, virgin additives remain more attractive than processed secondary materials.

¹⁶ <https://dezvoltaredurabila.gov.ro/public/uploads/files/02-%20Hotarare%20PAEC.pdf>

6. Financial Strategy (National Level)

Funding Sources:

- National Budget: Allocation from relevant ministries (e.g., environment, infrastructure, economy, education).
- National Recovery and Resilience Plan (PNRR):
 - PNRR Component 3: Funding for waste collection stations and digital tracking
 - PNRR Component 5 (Renovation Wave): Modernizing green building standards and energy-efficiency renovations
- EU Structural Funds (ERDF, ESF): To be leveraged for regional circular projects (e.g. West Regional Programme 2021-2028).
- Horizon Europe / Digital Europe: Strategy for national entities to participate in and secure funding from these programs.
- Interreg Danube Region Programme: Mechanisms for national project proposals and participation.
- Private Investment: Strategies for attracting venture capital, corporate investment, and fostering Public-Private Partnerships (PPPs).

Budget Allocation

Indicative Budget Allocation by Pillar:

Pillar	Recommended Allocation	Priority Focus Areas	Primary Funding Sources
Pillar 1: Policy & Finance	25%	Development of targeted national grant schemes, tax incentives, and ESG-DNSH integration in procurement.	PNRR Component 5, National Budget.
Pillar 2: Digital Innovation	30%	Pilot projects for BIM Level 2/3, Digital Twins, and material tracking platforms.	PNRR Component 3, West Regional Programme Axis 1.
Pillar 3: Skills & Capacity	20%	Capacity building: Accredited curricula at technical universities (UTCB, UTCN) and SME training modules.	EU Structural Funds (ESF), National Budget.

Pillar 4: Supply Chains & R&D	15%	Pilot projects: Living Labs for secondary materials and R&D calls for AI-driven resource management.	Horizon Europe, Interreg, PRV Axis 1.
Pillar 5: Awareness	5%	"Circular Build Romania" campaign and showcasing national success stories.	Interreg, National Budget.
Governance & Coordination	5%	Governance: Multi-level steering committee and CiDiCon Cluster transnational coordination.	Interreg, National Budget.

Key National Projects & Priorities

To ensure successful implementation by 2030, the budget must be funneled into these prioritized categories:

Capacity Building (Pillar 3 Priority):

Funding should be allocated to institutionalizing training pathways, ensuring BIM and circular engineering modules become permanent features of degree structures rather than one-off grant projects.

Support for the European Digital Innovation Hubs (EDIHs) to provide "test before invest" services for SMEs.

Pilot Projects & Demonstration Sites (Pillar 2 & 4 Priority):

Investment in Living Labs to validate BIM-LCA methodologies and standardized demolition plans.

PNRR Component 3 funds are specifically earmarked for the physical infrastructure of these pilots, including container-based waste collection stations and mechanical shredders.

Financial Instruments (Pillar 1 Priority):

Establishment of a dedicated national fund or support program specifically for green and digital construction startups to bridge the gap where general EU funds may not apply.

Subsidies for raising the energy performance of residential buildings using digital circular methods (Renovation Wave).

Governance & Transnational Alignment:

Allocation for the National BIM Task Force to coordinate inter-institutional implementation and align Romanian standards with ISO 19650 and EU regulations.

Continuous funding for the CiDiCon Cluster to act as a transnational coordinator for generating and managing cross-border circular construction projects.

Strategic Funding Sources

- National Recovery and Resilience Plan (PNRR): Major source for waste management infrastructure (Component 3) and digital energy renovations (Component 5).
- West Regional Programme (2021–2027): Targeted funding for Axis 1 (RDI & digitalization) and Axis 2 (energy efficiency).
- Private Investment: Encouraging venture capital and Public-Private Partnerships (PPPs) is vital for scaling the digital material marketplaces and supply chain mapping

7. Implementation Plan (National Level)

Governance Structure:

Establish a national steering committee or task force composed of representatives from key national ministries, industry associations, research institutions, and civil society.

Define roles and responsibilities for implementing, coordinating, and monitoring the TAP.

Timeline:

The following roadmap for 2026–2030 outlines the phased transition to digital circular construction.

Phase 1: Pilot Implementation & Framework Finalization (2027)

- Key Milestones:

- Completion of Stage 3 of the National BIM Roadmap, focusing on selective testing.
 - Legislative identification of barriers to circularity within the upcoming Code of Territorial Planning, Urbanism, and Construction (CATUC).
- Deliverables:
 - Report on BIM Level 2 pilot projects in the public sector.
 - Map of national producers and recyclers to identify collaboration potential for secondary materials.
- Responsible Entities: Ministry of Development (MDLPA), BIM Task Force (BIM TF RO), and National Agency for Public Procurement (ANAP).

Phase 2: Regulatory Mandates & Digital Integration (2027)

- Key Milestones:
 - Mandatory Digital Product Passports (DPPs): Local manufacturers must be prepared for lifecycle tracking requirements under EU updated regulations.
 - Mandatory ESG/DNSH Integration: Circularity and "Do No Significant Harm" criteria become mandatory in public procurement evaluations.
- Deliverables:
 - Launch of the "Circular Build Romania" awareness campaign to target an 8% reduction in operating costs for industry.
 - Integration of circular design and BIM-LCA modules into technical university curricula at UTCB and UTCN.
- Responsible Entities: MDLPA, Ministry of Environment (MMA), Ministry of Education, and Romanian Association for Standardization (ASRO).

Phase 3: Nationwide Expansion & Standard Adoption (2028–2029)

- Key Milestones:
 - Mandatory BIM Mandate (Late 2028): BIM becomes the "new normality," mandatory for all significant public investment projects.
 - National adoption of End-of-Waste (EoW) criteria for recycled aggregates to resolve technical market blockages.
- Deliverables:
 - Operational National Digital Platform for tracking and exchanging secondary construction materials.
 - Implementation of Digital Permitting systems for buildings nationwide.

- Responsible Entities: MDLPA, ASRO, and Ministry of Research, Innovation and Digitalization (MCID).

Phase 4: Institutionalization & 2030 Impact (2029–2030)

- Key Milestones:
 - Permanent Procurement Laws: Criteria for aggregate quotas and mandatory pre-demolition inspections are fully institutionalized into national law.
 - Achievement of an 80% recycling and reuse rate for construction and demolition waste.
- Deliverables:
 - Open Digital Dashboards visualizing real-time regional waste flow and carbon emissions saved.
 - Self-sustaining Institutionalized Training Pathways where circular engineering is a standard feature of accredited degree structures.
- Responsible Entities: MDLPA, MMAP, Universities (UTCB/UTCN), and the CiDiCon Cluster.

Summary of Responsibility & Monitoring

- Governance: The MDLPA acts as the primary coordinator, supported by the BIM TF RO for digital implementation and ADR Vest for regional monitoring and alignment with the West Regional Programme 2021–2027.
- Monitoring: Progress is tracked quarterly against National KPIs (e.g., % of BIM utilization, volume of digitally tracked materials), with annual reports submitted to the Danube Region Cluster for transnational alignment.

Monitoring and Evaluation:

To track progress against the National Key Performance Indicators (KPIs) identified in the Romania Territorial Action Plan (TAP), a multi-level framework is established to ensure accountability, transparency, and data-driven decision-making.

This framework consists of the following four components:

1. Governance & Oversight

National Steering Committee: A central body composed of representatives from the Ministry of Development (MDLPA), Ministry of Environment (MMAP), and technical bodies like ASRO and ANAP will oversee TAP implementation.

Transnational Coordination: The Danube CiDiCon Cluster acts as the primary governance structure at the regional level, coordinating monitoring efforts across the Danube region and facilitating knowledge transfer between advanced and emerging countries.

2. Reporting Mechanisms & Frequency

The framework utilizes a structured reporting hierarchy to maintain momentum toward the 2030 targets:

Quarterly Progress Reports: Submitted by responsible entities to the National Steering Committee to track operational milestones and address immediate risks (e.g., funding delays or skill shortages).

Annual Sustainability Reports: Comprehensive reviews submitted to the Danube Region Cluster. These reports communicate progress on all five pillars to both industry stakeholders and EU-level partners.

Phased Milestones (T0–T4): Progress is measured starting from a baseline (T0), which is established after the initial evaluation of national values. Subsequent milestones (T1–T4) align with the 2025–2030 roadmap phases.

3. Monitoring Methodology & Tools

Baseline Evaluation (T0): Before tracking begins, an initial value for each KPI (e.g., current % of BIM utilization or current volume of recycled materials) must be determined to measure the "net improvement" over time.

Open Digital Dashboards: Romania will deploy centralized digital platforms to visualize real-time data, including:

Regional waste flow and volumes of secondary aggregates used in public works.

Estimated carbon emissions saved through circular practices.

Centralized Web Platform: A public-facing platform will display updated legislative timelines, certified recycler maps, and progress toward national goals to ensure transparency.

4. Impact Evaluation

To ensure the TAP remains effective, the framework includes formal evaluation points:

Internal Mid-term Evaluation: A 2027 review to assess the effectiveness of pilot projects and the integration of ESG/DNSH criteria in procurement.

External End-term Evaluation: A final 2030 impact assessment conducted by external experts to measure the total socio-economic and environmental results compared to traditional construction practices.

This framework ensures that progress is not just declarative but is backed by validated data and permanent institutional feedback loops.

Risk Management:

1. Financial Barriers and Funding Delays

- **Risks:** High upfront investment costs are a major hurdle, especially for SMEs that lack the internal capacity to adopt technologies like BIM and IoT. There is also a lack of dedicated financial instruments specifically targeting "clean construction".
- **Mitigation Measures:**
 - Leverage PNRR Component 3 for physical infrastructure (waste collection, shredders) and Component 5 for energy-efficient renovations using circular methods.
 - Establish a national fund or grant scheme specifically for green and digital construction startups to provide targeted support.
 - Utilize EU Structural Funds (ERDF, ESF) to scale regional projects and support SME development.

2. Skills Shortages and Workforce Resistance

- **Risks:** A significant gap exists in digital literacy and specialized skills for BIM, circular design, and Life Cycle Assessment (LCA). Furthermore, there is potential resistance from labor unions toward adopting new BIM workflows.
- **Mitigation Measures:**
 - Institutionalize training pathways by making BIM and circular engineering permanent features of accredited university degree structures (e.g., UTCB, UTCN).
 - Deploy subsidized training initiatives through European Digital Innovation Hubs (EDIHs), providing "test before invest" opportunities for industry professionals.
 - Launch the "Circular Build Romania" awareness campaign to demonstrate that waste prevention and digital tools can save up to 8% in operating costs, helping to change industry mindsets.

3. Regulatory Barriers and Bureaucratic Constraints

- Risks: Romania faces outdated or inconsistent construction regulations that create hurdles for innovative solutions. Fragmented tracking of construction and demolition waste (CDW) and a lack of standardized digital permitting also persist.
- Mitigation Measures:
 - Review the upcoming Code of Territorial Planning, Urbanism, and Construction (CATUC) to identify and remove specific legislative barriers to digitalization.
 - Draft national End-of-Waste (EoW) criteria for recycled aggregates to resolve technical blockages in the market.
 - Integrate mandatory ESG, ESRS, and DNSH (Do No Significant Harm) criteria into public procurement by 2026 to drive legal compliance.

4. Market Distortions and Illegal CDW Dumping

- Risks: The persistent volume of illegal CDW dumping undermines the economic viability of certified recycling. Additionally, the lower price of virgin materials often makes secondary materials less attractive to contractors.
- Mitigation Measures:
 - Implement Digital Product Passports (DPPs) and digital tracking systems to improve material traceability and enforce quality standards.
 - Institutionalize permanent procurement laws that include mandatory aggregate quotas for recycled materials, creating a stable domestic market.
 - Develop localized EPD databases to provide transparent data on the environmental performance of secondary materials.

5. Fragmented Collaboration and Weak Ecosystems

- Risks: Collaboration between research institutions and the private sector is often fragmented, limiting the commercialization of innovations. Industry projects are frequently managed with traditional, uncooperative techniques.
- Mitigation Measures:
 - Create a National Network for Digital and Circular Construction Innovation to link academic research centers with industry associations like Cluster TEC.
 - Utilize the CiDiCon Cluster to act as a transnational coordinator, facilitating knowledge transfer from frontrunner countries like Austria and Germany.

- Establish regional Living Labs as demonstration sites for testing and sharing best practices in real-world scenarios.

8. Stakeholder Engagement

Collaboration Mechanisms:

The implementation of the Romania Territorial Action Plan (TAP) utilizes a tiered engagement structure involving national working groups, Regional Multi-Stakeholder Groups (RMSG), and specialized online platforms to facilitate continuous feedback and transnational alignment.

1. Communication and Collaboration Mechanisms

- National Working Groups and Forums:
 - Romania will establish specialized national working groups involving relevant ministries (MDLPA, MMAP, MCID), industry experts, and research institutions to propose new legislation and standards, such as End-of-Waste criteria and BIM compliance.
 - These groups are tasked with translating transnational strategic goals into practical national outcomes, acting as a bridge between high-level policy and industry needs.
 - Regular national forums, workshops, and seminars will be organized to promote knowledge transfer and best practice sharing among stakeholders.
- Regional Multi-Stakeholder Groups (RMSG):
 - The RMSG serves as the primary feedback loop between project partners and national policy owners.
 - It is used to present and validate identified "Good Practices" (GPs) to ensure they are adapted to the Romanian context before being integrated into national policy recommendations.

- The RMSG already includes a broad range of actors, including public institutions, Civil Society Organizations (CSOs), academia, and the private sector, ensuring inclusive decision-making.
- Transnational Alignment (WGG & Clusters):
 - National efforts will be linked to the Danube Region's Working Groups (WGG) to ensure that Romanian standards remain interoperable with those of other partner countries.
 - The CiDiCon Cluster acts as the primary governance body for transnational coordination, facilitating cross-border circular construction projects and collaborative R&D.

2. *Digital Collaboration Platforms*

- National Online Platforms:
 - Centralized Web Platform: Romania will deploy a public-facing platform to display real-time progress reports, updated legislative timelines, and interactive maps of certified recyclers.
 - National Online Knowledge Hub: This repository will host best practices, case studies, and research findings to facilitate peer-to-peer learning and mentorship programs for SMEs.
 - Open Digital Dashboards: These dashboards will visualize regional waste flow data, the volume of secondary materials integrated into public works, and carbon emissions saved, ensuring transparency in implementation.
- Regional and Transnational Platforms:
 - Circular DigiBuild Networking Platform: Romania will participate in the multi-stakeholder platform created through the Circular DigiBuild project to facilitate regional problem-solving and knowledge sharing.

- Danube Circular Construction Supply Network: This digital marketplace will connect Romanian producers and recyclers with regional partners, utilizing harmonized data standards and Digital Product Passports to track and exchange secondary materials across borders.
- Cluster Hubs: The CiDiCon Cluster's online platform will serve as the central transnational hub for showcasing successful pilot projects and disseminating strategy results to a broader audience.

Involvement of Key Groups:

The engagement of authorities in Romania follows a multi-level governance structure designed to transition the construction sector toward a resource-efficient circular model through the following scheme:

Hierarchical Roles and Responsibilities

Level 1: Transnational Coordination & Oversight

- Danube CiDiCon Cluster: Acts as the primary governance structure for the transnational strategy, responsible for regional coordination, monitoring KPI progress across member countries, and facilitating knowledge transfer between advanced and emerging regions.

Level 2: National Policy, Finance & Regulatory Direction

- Ministry of Development, Public Works and Administration (MDLPA): The lead national authority responsible for directing policy, aligning national funds (e.g., PNRR), and coordinating the overall implementation of the TAP.
- Ministry of Environment, Waters and Forests (MMAF): Collaborates on environmental policy alignment and targeted funding for waste valorization and circularity.
- National Steering Committee / BIM Task Force (BIM TF RO): An inter-institutional body (including MCID, MEd, MF, MIPE, ANAP, ASRO, and OSIM) that coordinates digital standards, updates the BIM roadmap, and monitors national milestone progress.
- ANAP & ASRO: Responsible for integrating ESG/DNSH criteria into public procurement and adopting common circular construction and digital standards.

Level 3: Regional Management & Multi-Stakeholder Feedback

- Regional Development Agencies (e.g., ADR Vest): Act as intermediaries that manage and distribute Regional Operational Programs (such as the West Regional Programme 2021–2027) to fund local projects.
- Regional Multi-Stakeholder Groups (RMSG): Composed of local partners from academia, civil society, and the private sector to provide feedback, validate "Good Practices," and ensure policy recommendations are contextually relevant.

Level 4: Local Implementation, Execution & Innovation

- Local Municipal Authorities: Responsible for ground-level execution, including deploying waste collection stations (CAVs), mandating selective demolition, and implementing localized circular procurement.
- Professional associations (such as the Order of Architects of Romania - OAR, and civil engineering associations) align design standards.
- Sectoral Clusters & EDIHs (e.g., Cluster TEC, TEDIHT): Act as innovation intermediaries providing "test before invest" platforms, delivering professional BIM training, and supporting SMEs in adopting digital tools.
- Technical Universities (e.g., UTCB, UTCN): Tasked with designing academic curricula, conducting scientific Life Cycle Assessments (LCA), and validating material tests for recycled aggregates.
- Industry & SMEs: Participate in pilot projects, adopt Digital Product Passports, and transition to circular business models using BIM Level 2 maturity.
- Environmental NGOs: Monitor compliance with waste regulations and lead public awareness campaigns (e.g., "Circular Build Romania").

Communication Plan:

The communication plan for Romania's Territorial Action Plan (TAP) is designed to ensure transparency, visibility, and continuous dissemination of information regarding the strategy's progress toward its 2030 goals. It aims to bridge the gap between national policy and industry practice by utilizing digital tools and multi-level engagement.

1. *Key Communication Objectives*

- Raise Awareness: Actively promote the economic benefits of circular construction—such as operating cost savings of up to 8%—to encourage industry acceptance.
- Foster Transparency: Provide open access to real-time data regarding waste flows and the integration of secondary materials in public works.

- Highlight Success: Showcase national success stories and "best practice" pilot projects (e.g., BIM Level 2 implementations) to inspire confidence among SMEs and stakeholders.
- Drive Mindset Change: Cultivate a culture that embraces digital tools and circular economy principles through targeted outreach.

2. *Primary Communication Channels*

Romania will deploy a variety of digital and traditional channels to reach diverse stakeholder groups:

- Centralized Web Platform: This site will serve as the formal home for the TAP, displaying updated legislative timelines, progress reports, and interactive maps of certified recyclers.
- Open Digital Dashboards: These dashboards will visualize real-time regional waste flow data, the volume of secondary aggregates used, and estimated carbon emissions saved.
- Industry Media & Expert Columns: Publication of monthly policy analyses and expert columns in leading construction journals to maintain professional visibility.
- Cluster Hub: The Danube CiDiCon Cluster platform will act as a transnational central hub for sharing best practices and project outcomes across the Danube Region.
- Social & National Media: Use of social media impressions, media mentions, and newsletters to disseminate updates on KPIs and funding opportunities.

3. *Strategic Communication Actions*

- "Circular Build Romania" Campaign: A flagship initiative designed to educate the public and industry on the advantages of selective demolition and digitalization.
- Knowledge-Sharing Events: Annual workshops, seminars, and conferences to facilitate peer-to-peer learning and mentorship programs for companies.
- Stakeholder Forums: Regular forums for communication between governments, industry associations, and research institutions to ensure feedback is integrated into policy.

4. *Monitoring Effectiveness (National KPIs)*

To ensure the communication plan remains effective, progress is measured against specific metrics:

- KPI 5.1.1 (National Reach): Tracks the number of people informed through various channels, measured by website visitors, event attendees, and social media impressions.
- KPI 5.1.2 (Public Support): Assesses whether awareness translates into actual public support for policies, measured through surveys or levels of engagement in policy discussions.

5. Responsibilities

- MDLPA: Coordinates high-level policy communication and alignment with national recovery funds (PNRR).
- Sectoral Clusters (e.g., Cluster TEC): Drive innovation and practical implementation at the SME level through training and pilot project results.
- Environmental NGOs: Monitor compliance and lead campaigns for sustainable residential practices to ensure citizen perspectives are represented.

9. Sustainability and Scalability

To ensure the long-term success and expansion of the Territorial Action Plan (TAP) for Romania, the following sustainability and scalability strategies have been established, aligning with national policy goals for 2030.

1. Sustainability Mechanisms

Romania will move beyond initial grant-based funding by institutionalizing circular and digital practices into the national legal and educational frameworks:

- Permanent Procurement Requirements: Criteria for circular procurement, mandatory pre-demolition inspections, and aggregate quotas will be incorporated directly into national public procurement laws. This institutionalization is designed to create a permanent, self-sustaining domestic market for recycled construction products.
- Institutionalized Training Pathways: To ensure a continuous supply of skilled professionals without the need for ongoing grant support, BIM and circular engineering modules will be integrated as permanent features of accredited university degree structures (e.g., at UTCB and UTCN).
- Market-Driven Adoption: By demonstrating that waste prevention and selective demolition can save up to 8% in operating costs, the plan encourages construction companies to adopt circular business models as a standard competitive advantage.

2. Scalability Strategies

Successful pilot projects will serve as blueprints for nationwide expansion and transnational knowledge sharing:

- **Standardized Demolition Plans:** Operational workflows, circular contract templates, and BIM-LCA methodologies validated during early pilot projects will be transformed into open-source plans. These resources will enable local governments across Romania to establish their own municipal material recovery facilities.
- **Regional Hubs and EDIHs:** The use of European Digital Innovation Hubs (such as TEDIHT and eDIH-DIZ) provides "test before invest" platforms that allow SMEs from various regions to pilot digital twin models and circular transitions before full-scale implementation.
- **Transnational Alignment:** Lessons learned from national initiatives will be shared with the Danube CiDiCon Cluster, facilitating the scaling of successful Romanian models to other partner countries in the Danube Region.
- **Expansion of Digital Platforms:** National digital platforms for material tracking (e.g., the National Digital Library) are designed to be interoperable, allowing them to scale from local tracking to regional and eventually cross-border secondary material marketplaces.

Annex A: List of key national stakeholders involved.

Based on the Territorial Action Plan (TAP) and the National Roadmap for BIM Adoption, the key national stakeholders involved in Romania's digital circular construction transition are organized into the following categories:

1. Governmental Bodies (Ministries)

- **Ministry of Development, Public Works and Administration (MDLPA):** Acts as the lead national coordinator for policy direction, funding alignment, and the National BIM Task Force.
- **Ministry of Research, Innovation and Digitalization (MCID):** Involved in coordinating digital standards and innovation policy.

- Ministry of Environment, Waters and Forests (MMAF): Collaborates on environmental policy alignment, waste management regulations, and targeted funding for circularity.
- Ministry of Investment and European Projects (MIPE): Manages the integration of European funds, such as PNRR, into national projects.
- Ministry of Education (MEd): Focuses on curriculum development and vocational training for new digital occupations.
- Ministry of Finance (MF): Involved in the development of financial incentives and grant schemes.
- Ministry of Justice (MJ): Addresses legal issues regarding data protection and intellectual property in digital construction.

2. National Agencies and Technical Bodies

- National Agency for Public Procurement (ANAP): Responsible for integrating ESG, ESRS, and DNSH (Do No Significant Harm) criteria into public procurement evaluations.
- Romanian Association for Standardization (ASRO): Tasked with adopting common circular construction and digital standards, such as ISO 19650.
- State Office for Inventions and Trademarks (OSIM): Supports intellectual property rights related to new technologies.
- Regional Development Agencies (e.g., ADR Vest): Act as intermediaries to distribute regional operational programs and coordinate local implementation.
- National BIM Task Force (BIM TF RO): An inter-institutional body that coordinates digital standards and monitors progress on the BIM roadmap.

3. Industry, Clusters, and Professional Associations

- Cluster TEC (Technology Enabled Construction): Facilitates the adoption of advanced technologies (BIM, Digital Twins, AI) and provides professional training for SMEs.
- BIMTECH Association: Provides industry expertise to align the national roadmap with international standards.
- Order of Architects of Romania (OAR) and Civil Engineering Associations: Play a key role in aligning design standards with circular principles.
- Circular Economy Coalition (CERC): Identifies technical blockages and supports the drafting of End-of-Waste criteria.
- Transilvania IT Cluster: Collaborates on driving digital skill standards.

- Industry Representatives: Large companies like Leviatan Group and various Construction SMEs participate in pilot projects and transition to circular models.

4. Research, Academia, and Innovation Hubs

- Technical Universities: Specifically, the Technical University of Cluj-Napoca (UTCN) and the Technical University of Civil Engineering Bucharest (UTCB), which design academic curricula, conduct Life Cycle Assessments (LCA), and validate material tests.
- European Digital Innovation Hubs (EDIHs): Hubs such as TEDIHT and eDIH-DIZ provide "test before invest" platforms for SMEs to pilot digital twin models.
- IRCCEM (Institute for Research in Circular Economy and Environment): Involved as a partner in the development of the Territorial Action Plan.

5. Local Authorities and Civil Society

- Local Municipal Authorities: Responsible for ground-level execution, including mandating selective demolition and deploying waste collection infrastructure.
- Environmental NGOs: Monitor compliance with waste management regulations and lead public awareness campaigns like "Circular Build Romania".

Annex B: Relevant national policy documents or reports.

- National Strategy for Research, Innovation and Smart Specialization 2021–2027 (NS RISS): This document provides the overarching framework for supporting innovation, digitalization, and sustainable economic transformation in Romania. It emphasizes Industry 4.0 and the green transition while complementing regional strategies.
- National Recovery and Resilience Plan (PNRR): This is a critical strategic document that connects national reform goals with EU funding. Key components include:
 - Component 3 (Waste Management): Finances physical infrastructure such as container-based waste collection stations, mechanical shredders, and digital tracking systems.

- Component 5 (Renovation Wave / Valul Renovării): Focuses on modernizing green building standards and financing energy-efficiency renovations using digital circular economy methods.
- Romanian Strategy for the Circular Economy (NSCE): This strategy acts as a national roadmap to accelerate Romania's transition from a linear to a circular economic model.
- Action Plan promoting the Circular Economy: Approved as part of the NSCE, this plan details a national vision for transitioning nine key economic sectors, including construction, to circular practices.
- National Roadmap for BIM Adoption (Foaia de parcurs privind implementarea metodologiei BIM): This roadmap outlines the phased implementation of Building Information Modeling for public sector investment projects, as required by PNRR milestones.
- Code of Territorial Planning, Urbanism, and Construction (CATUC): This upcoming legislative framework aims to modernize permitting procedures and integrate BIM. The TAP includes actions to review this draft code to identify and remove barriers to circularity and digitization.
- Digital Decade vision 2030: A national policy document that aligns Romania's digital transformation goals with the broader European vision for 2030.
- RIS3 West (Regional Innovation Strategy for Smart Specialization for the West Region): While regional in scope, it is a primary document for the West Region of Romania that bridges national and regional objectives, specifically identifying "Energy Efficiency and Sustainable Construction" as a priority domain.

Territorial Action Plan (TAP) for Digital Innovation in Circular Construction

V02 – Republic of Serbia | PP12 – Science and Technology Park Novi Sad (STP NS)

1. Introduction / Executive Summary

Purpose: This Territorial Action Plan (TAP) sets out the commitment of the Republic of Serbia to implementing the 2030 Danube Region Digital Innovation Strategy for Circular Construction^[1] within the Circular DigiBuild project (Interreg Danube Region Programme). It defines the national actions, targets, and institutional responsibilities through which Serbia will advance its engagement with circular and digital construction practices over the period 2026–2030, moving from its current early-stage position^[3] toward a more coordinated and capable national ecosystem. The TAP has been prepared by PP12 – Science and Technology Park Novi Sad (STP NS), in consultation with the RMSG – including FTN Novi Sad as an academic member – and with relevant national ministries, agencies, professional bodies, and industry stakeholders.^[2]

Alignment: This TAP is aligned with the vision, mission, and five strategic pillars of the transnational strategy^[1]: Enabling Policy & Regulatory Frameworks; Fostering Digital Innovation & Technology Adoption; Building Skills & Capacity; Strengthening Collaboration & Supply Chains; and Raising Awareness & Changing Mindsets. At the EU level, the TAP supports the EU Strategy for the Danube Region (EUSDR), the European Green Deal, the EU Circular Economy Action Plan, and the Green Agenda for the Western Balkans.^[11] The TAP is a working implementation instrument of PP12 and its national partners; it does not constitute, and does not presume, formal adoption by the Government of the Republic of Serbia.

Current Status: Serbia is classified as an early-stage country^[3] in the Circular DigiBuild policy review, alongside Bosnia and Herzegovina, Moldova, and Montenegro. The construction sector contributes approximately 5.4–6.0% of national GDP.^[6] Integration of circular economy (CE) principles and advanced digital technologies remains uneven.

A landmark regulatory development is the amendment to the Law on Planning and Construction requiring mandatory BIM for all facilities in Serbia from 1 January 2028,^{[7][8]} which places Serbia among a small group of non-EU countries with a legislated

BIM mandate. This mandate is central to the policy logic of this TAP: BIM is treated as the primary mechanism by which structured building and material data can be generated, and subsequently linked to material passports, construction and demolition waste (CDW) traceability, circular public procurement, and a stronger domestic secondary materials market.

CDW management is a critical gap: Serbia has not reported reuse data for construction materials to the EEA for 2021.^[20] Formal CDW recycling infrastructure remains embryonic, and the National Waste Management Programme 2022–2031^[10] sets a 40% CDW recovery target, against a current near-zero baseline for formal high-quality recycling. The overall municipal solid waste recycling rate was 15.5% in 2023.^[19] A comparative study found that 80% of Serbian demolition and recycling companies earn under 10% of revenue from waste management, compared to around 33% in EU counterparts.^[12]

BIM adoption remains concentrated among larger, internationally oriented firms. The BIM Serbia Association, a buildingSMART International Developing Chapter since September 2023,^[9] is building a professional community, but SME penetration is very limited. In the Circular DigiBuild D.2.2.2 study,^[4] Serbia contributed 12 Possible Applicable Solutions (RS-1 to RS-12), covering BIM/openBIM, digital twins, drone monitoring, GIS, 3D printing, laser scanning, augmented reality, concrete sensors, and autonomous construction equipment – demonstrating active research engagement.

The Associated Strategic Partner (ASP) in the Circular DigiBuild project is the Vojvodina Provincial Secretariat for Regional Development,^[2] not a national ministry, and Serbia's project budget of EUR 100,000 is the minimum among all 18 partners^[2] – both facts reinforcing the early-stage classification and the need for this TAP to bridge to national ministerial coordination. Coalition 27's 2024 shadow report^[13] confirms that Serbia has stagnated on Chapter 27 implementation, with environmental investment at approximately 1% of GDP.^[22]

2. Vision and Mission (Territorial Adaptation)

Vision (National): By 2030, the Republic of Serbia will have established a functioning national ecosystem for digital and circular construction, in which construction projects systematically apply digital tools to improve resource efficiency, material traceability, and environmental performance, and in which regulatory frameworks, professional competences, and market structures are progressively aligned with EU practices and the best practices of the Danube Region.^[1] The 2028 BIM legislative mandate^[8] serves as the primary policy anchor, providing a demand-side signal that

will drive the generation of structured building and material data. Building on this BIM-generated data, Serbia will progressively develop the infrastructure for material passports, digital CDW tracking, and secondary material exchange, so that digitalisation directly enables – rather than runs in parallel to – circular construction practice.

Mission (National): To facilitate collaboration, knowledge sharing, and the adoption of innovative digital and circular solutions among national stakeholders in order to transform Serbia's construction sector towards a circular economy, in alignment with the transnational strategy^[1] and the Danube CiDiCon cluster. The mission is pursued through four complementary lines of action: (1) establishing regulatory and institutional foundations that link the 2028 BIM mandate to circularity requirements in technical regulation and public procurement; (2) supporting the adoption of digital technologies that produce re-usable building and material data – including BIM, digital CDW tracking platforms, and material passports – so that this data becomes the operational basis for circular practice; (3) building the professional skills base and knowledge infrastructure for effective implementation; and (4) fostering collaborative networks between government, research institutions, industry, professional chambers, and civil society. Serbia's mission is not to match the most advanced Danube Region countries by 2030, but to make demonstrable, traceable, and institutionally anchored progress that creates irreversible momentum for deeper transformation beyond 2030.

3. Alignment with EU Strategy for the Danube Region (EUSDR)

The actions outlined in this TAP contribute to the EUSDR Priority Areas highlighted in the transnational strategy, reinforcing Serbia's role as an active partner within this framework.^[1]

Pillar: Connecting the Region (Improved Infrastructure, Digitalisation): Serbia's BIM 2028 mandate^[8] and its commitment to digital CDW tracking platforms and interoperable data systems contribute to deeper digital connectivity across the Danube Region. The 12 digital technology solutions contributed by Serbia to D.2.2.2^[4] – from BIM/openBIM to digital twins and laser scanning – provide the technical basis for connecting Serbia to regional supply networks and standardised data-exchange systems.

Pillar: Protecting the Environment (Resource Efficiency, Waste Reduction): Against a background of negligible formal CDW recycling^[20] and a national 40% CDW recovery target by 2031,^[10] the TAP's emphasis on CDW regulatory reform, sorting and reuse infrastructure, and digital material tracking tools directly supports the EUSDR environmental pillar. These actions align with the EU Waste Framework Directive

(CDW priority waste stream provisions) and EUSDR Priority Area 5 (Environmental Risks).

Pillar: Building Prosperity (Innovation, SME Growth): Financial incentives for SMEs, BIM implementation support channelled through the Serbia Innovation Fund,^[17] and targeted investment in R&D through universities and Science and Technology Parks will foster new technologies and business models. Demonstration projects and Living Labs will help construction SMEs adopt digital and circular solutions, contributing to green job creation and supply-chain resilience.

Pillar: Strengthening the Region (Institutional Capacity, Collaboration): The national governance model established under this TAP – connecting an inter-ministerial coordination structure to the Danube CiDiCon cluster through PP12 – contributes to institutional capacity building and improved multi-level governance. Coalition 27's monitoring role^[13] and NALED's advocacy function^[15] provide civil-society accountability, while improved inter-ministerial coordination reduces policy fragmentation and supports Serbia's EU Chapter 27 implementation.^[23]

4. Strategic Pillars, Objectives, and Key Actions (National KPIs)

This section details Serbia's country-specific implementation for each of the five strategic pillars defined in the transnational strategy. For each objective, the TAP specifies concrete national actions, responsible bodies, indicative timelines, and measurable KPIs with realistic national targets for an early-stage country.

Pillar 1: Enabling Policy & Regulatory Frameworks

Serbia's regulatory environment provides a basic foundation but lacks sector-specific provisions that systematically require circularity, digital data use, or secondary material integration. While the 2028 BIM mandate^[8] is now embedded in law, implementing by-laws are still being shaped, and public procurement regulations do not yet incorporate circularity or CDW data criteria. Coalition 27 confirms^[13] that Serbia has stagnated on Chapter 27 implementation, with environmental investment at approximately 1% of GDP.^[22]

Objective 1.1: Harmonize circular construction standards and regulations related to digitalisation.

National Actions:

1. Review relevant national instruments – construction and technical documentation rules, public procurement criteria, waste management and CDW obligations, standards transposition procedures, and digital data

- exchange and reporting protocols – and publish a regulatory gap analysis identifying priority areas for amendment by end of 2026. The 2028 BIM mandate^[6] provides the baseline; the analysis extends to CDW, secondary materials, and digital documentation requirements.
2. Establish a national inter-ministerial working group on circular and digital construction regulation, chaired by the Ministry of Construction, Transport and Infrastructure, with representation from the Ministry of Environmental Protection, Ministry of Science, Ministry of Economy, Ministry of Finance (Office for Public Procurement), Chamber of Engineers of Serbia, Institut IMS, and academic institutions including FTN Novi Sad and the Faculty of Civil Engineering, University of Belgrade. The working group convenes at minimum twice per year.
 3. Review and propose amendments to relevant secondary legislation (by-laws, rulebooks, technical documentation provisions) to align them with the 2028 BIM mandate and progressively integrate circular economy data requirements, producing at least two concrete amendment proposals or implementation guidance documents by 2028.
 4. Develop model tender clauses and implementation guidance for integrating digital tools (BIM deliverables, material passports, CDW tracking outputs) into public procurement specifications, so that contracting authorities can adopt them on a voluntary basis from 2027 and – where appropriate – on a mandatory basis following the BIM deadline. A model clause toolkit shall be published jointly with the Office for Public Procurement and NALED by end of 2027.
 5. Develop a dedicated local self-government procurement module within the model tender clause toolkit, providing practical guidance for cities and municipalities on integrating BIM deliverables, CDW documentation requirements, and minimum recycled-content criteria into tenders for schools, kindergartens, public buildings, local roads, utility infrastructure, and demolition and renovation contracts. Local self-government units are the contracting authority for the majority of small- and medium-scale public construction work in Serbia; without a dedicated local module, circular and digital criteria will remain confined to a small number of national-level tenders. The module shall be co-developed with the Standing Conference of Towns and Municipalities (SKGO) and piloted in at least 2 municipalities by end of 2028.
 6. Pilot the use of these model clauses on at least 3 major public construction tenders (individual contract value above EUR 5 million) by 2029, combining BIM deliverables, a documented CDW management plan, and minimum recycled-content criteria where technically feasible.

7. Support and formalise the mandate of the Institute for Standardization of Serbia (ISS) U442 commission – 'Informaciono modeliranje objekta – BIM' – to prioritise the transposition of ISO 19650 series, EN 17412, and related CEN/TC 442 BIM standards into Serbian SRPS standards ahead of the 2028 mandatory implementation deadline.^[8]
8. Engage the Serbia Green Building Council (SGBS) in the regulatory working group as a core civil-society and industry body with expertise in green construction standards, lifecycle approaches, and sustainable building certification.
9. Participate actively in transnational initiatives for standard harmonisation within Circular DigiBuild^[9] and the Danube CiDiCon cluster.

Responsible Bodies: Ministry of Construction, Transport and Infrastructure (lead); Ministry of Environmental Protection; Ministry of Science, Technological Development and Innovation; Ministry of Finance – Office for Public Procurement; Chamber of Engineers of Serbia; ISS (U442 commission); Institut IMS; FTN Novi Sad; Faculty of Civil Engineering Belgrade; Serbia Green Building Council; NALED.

Timeline: Regulatory gap analysis: 2026; working group operational: 2026–2030; model tender clause toolkit: 2027; pilot procurement tenders: 2028–2029; by-law amendments / implementation guidance: 2027–2028.

National KPIs & Targets:

KPI 1.1.1 (National): Number of circular and digital construction standards or normative documents (BIM SRPS transpositions, by-law amendments, implementation guidance documents) adopted or substantively updated.^{[8][10]}

Target: 4 standards or normative documents revised, newly adopted, or published as formal implementation guidance by 2030, of which at least 2 relate to SRPS BIM standards transposition.

KPI 1.1.2 (National): Share of major public construction tenders (individual contract value above EUR 5 million) that incorporate at least one explicit circularity criterion or BIM deliverables requirement.^{[8][10]}

Target: Baseline established in 2026 via the regulatory gap analysis; at least 15% of qualifying tenders by 2029; at least 30% by 2030.

KPI 1.1.3 (National): Number of institutions (ministries, agencies, contracting authorities) that have formally adopted the model tender clauses or implementation guidance developed under this objective.

Target: At least 5 institutions by 2029; at least 10 by 2030.

Objective 1.2: Develop and implement financial incentives for circular construction practices.

National Actions:

1. Analyse existing national and EU-sourced financial instruments for their applicability to circular and digital construction, with specific attention to IPA III Windows 3 and 4^[18] and Serbia Innovation Fund programmes;^[17] publish recommendations by end of 2027.
2. Advocate with the Serbia Innovation Fund^[17] for a dedicated funding call on circular and digital construction via Matching Grants or Collaborative Grant Scheme mechanisms; operationalise this call by 2028.
3. Integrate circularity and digitalisation criteria (BIM deliverables, documented CDW management plan, minimum recycled-content criteria where technically feasible) into public procurement for construction projects, piloting in at least 3 major tenders by 2029.
4. Establish a dedicated support programme for green and digital construction startups within the STP Novi Sad innovation ecosystem, and explore with the Development Fund of the Republic of Serbia and EBRD/EIB a revolving loan guarantee mechanism co-financed under IPA III to de-risk CDW infrastructure investment.
5. Engage EBRD and EIB country offices to promote green construction lending criteria that include circularity performance and BIM documentation requirements.

Responsible Bodies: Ministry of Finance; Ministry of Economy; Serbia Innovation Fund; Ministry of Construction; Development Fund of the Republic of Serbia; EBRD / EIB country offices; professional chambers.

Timeline: Financial instrument mapping: 2026–2027; first dedicated funding call: 2028; pilot green procurement criteria: 2028–2029; loan facility feasibility: 2028–2029.

National KPIs & Targets:

KPI 1.2.1 (National): Dedicated national or EU-sourced funding instruments (grant calls, loan windows, guarantee schemes) operational for circular and digital construction.^{[17][18]}

Target: At least 1 dedicated national or EU-sourced funding instrument operational by 2028; at least 2 by 2030.

KPI 1.2.2 (National): Number of SMEs receiving support from these instruments.^[17]

Target: At least 50 SMEs by 2030.

Pillar 2: Fostering Digital Innovation & Technology Adoption

Serbia has taken a decisive legislative step with the mandatory BIM requirement from 1 January 2028,^{[7][8]} which creates an unprecedented market demand signal. The BIM Serbia Association's buildingSMART chapter status^[9] and Serbia's 12 digital technology solutions contributed to D.2.2.2^[4] demonstrate a growing research and professional base. The 2028 mandate's effectiveness depends critically on parallel investment in skills (Pillar 3), technical assistance for SMEs, and – decisively – on connecting BIM outputs to circular-economy data structures (material passports, CDW tracking), so that the mandate does not stop at digital modelling but extends into material traceability and circular procurement.

Objective 2.1: Promote the adoption of Building Information Modeling (BIM) and other digital technologies.

National Actions:

1. Launch a national BIM implementation support programme focused on SME compliance with the 2028 mandatory requirement,^[8] including guidance materials, software licensing support, and a BIM helpdesk service hosted by STP Novi Sad and the Chamber of Engineers with BIM Serbia and FTN Novi Sad as technical partners.
2. Support at least 5 publicly procured BIM pilot projects launched by end of 2028, with results of at least 3 of them published by end of 2029, with open documentation and knowledge-sharing events.^[4]
3. Develop national BIM documentation standards and delivery requirements aligned with EU BIM standards and with CDW circular economy data requirements, ensuring BIM deliverables systematically generate material inventory and component data useful for future reuse and traceability; publish a first set of model delivery requirements by end of 2027.
4. Provide technical assistance and consulting services for companies adopting BIM and the digital technologies contained in Serbia's D.2.2.2 catalogue,^[4] including digital twins, drones, laser scanning, and augmented reality.
5. Support participation of Serbian construction technology startups in Horizon Europe^[14] and Digital Europe calls focused on digital construction, smart buildings, and material tracking.

Responsible Bodies: Ministry of Construction, Transport and Infrastructure (mandate lead); Chamber of Engineers; BIM Serbia Association; FTN Novi Sad (academic partner); Faculty of Civil Engineering Belgrade; PP12 – STP Novi Sad (Secretariat and DIH); STP Belgrade; Serbia Innovation Fund.

Timeline: BIM support programme design: 2026; 5 pilot projects launched: by end of 2028; results of 3 pilots published: by end of 2029; national BIM delivery standards: 2027; BIM mandate effective: 1 January 2028; post-mandate compliance monitoring: 2028–2030.

National KPIs & Targets:

KPI 2.1.1 (National): Share of national public construction procurement procedures above EUR 5 million that include BIM as a documented delivery requirement.^[8]

Target: At least 15% by 2028 (pre-mandate pilots and voluntary early adoption); at least 40% by 2030.

KPI 2.1.2 (National): Number of professionals completing accredited BIM, digital construction, or circular construction CPD and formal programmes.

Target: At least 500 professionals by end of 2028; at least 1,500 by 2030. (IKS has approximately 30,000 licensed members; a ~5% reach by 2030 is a conservative but credible target for an early-stage country.)

KPI 2.1.3 (National): Number of publicly procured BIM pilot projects with open documentation and published results demonstrating innovative digital applications in circular construction.^[4]

Target: 5 pilot projects launched by end of 2028; results of at least 3 published by end of 2029; at least 5 pilots with published results by 2030.

Objective 2.2: Support the development and deployment of digital platforms for material tracking and waste management.

Digital platforms enabling CDW traceability and material tracking are a prerequisite for circular construction. The policy logic of this objective is to use BIM-generated building and material data as the input layer for material passports and CDW tracking tools, so that digitalisation translates directly into improved circular practice. Serbia has not reported reuse data for construction materials to the EEA for 2021,^[20] formal

CDW recycling infrastructure is embryonic,^[10] and 80% of Serbian demolition and recycling companies earn under 10% of revenue from waste management activities.

^[12]

National Actions:

1. Commission a scoping study on digital CDW tracking and secondary material exchange platforms applicable in Serbia, drawing on Danube Region partner experiences and EU Digital Product Passport policy developments.
2. Develop and pilot a digital CDW tracking prototype on at least 2 demolition or renovation projects by end of 2028, integrating with the SEPA national waste register^[21] and with BIM-based material inventories where available.
3. Implement national data standards and material passports consistent with EU and Danube Region guidelines, compatible with the EU Digital Product Passport framework, and interoperable with BIM data generated under Objective 2.1.
4. Collaborate with SEPA^[21] and national waste management companies to integrate digital solutions for CDW tracking into the national waste register; formalise a data exchange protocol between the CDW tracking pilot(s) and the SEPA register by end of 2029.
5. Engage national Digital Innovation Hubs (STP Novi Sad / Belgrade) and construction clusters to support SMEs – recycling companies, demolition contractors, material traders – in adopting digital tracking systems.
6. Establish at least 1 experimental digital material reuse hub connected to a demolition site by 2028, demonstrating how material passports and secondary material listings can facilitate reuse.
10. Introduce pre-demolition and pre-renovation material audits as a mandatory deliverable for all public-sector demolition or major renovation contracts above EUR 2 million from 2028 onwards, building on the CDW management plan requirement already under development. Each audit shall document the material composition of the structure, identify components and materials suitable for reuse, high-quality recycling, or controlled disposal, and feed structured data directly into the SEPA CDW tracking protocol established under action 4 of this objective. A standard audit template shall be published jointly with SEPA and the Ministry of Construction by end of 2027.
11. Launch a pilot 'Municipal As-Is BIM and Material Inventory Programme' in at least 2 pilot municipalities (drawn from Belgrade, Novi Sad, Niš, and Kragujevac). Using scan-to-BIM, GIS, drone surveys, laser scanning, and available technical documentation, the programme will produce as-is BIM models and structured material inventories for a selected set of public buildings (schools, administrative buildings, public infrastructure assets). The objective is to establish, for the first time, documented knowledge of which

materials are embedded in the existing public building stock, in what approximate quantities and condition, and how they can be reused, recycled, or safely managed at end-of-life. The largest future CDW stream will originate not from new construction but from reconstruction, renovation, and demolition of the existing stock; without systematic as-is documentation, this potential is invisible to circular supply chains. Programme outputs shall directly feed the secondary materials exchange platform under Objective 4.1 and provide the first national data points for material stock accounting. Programme to be operational by end of 2028; results published by end of 2029.

Responsible Bodies: Ministry of Environmental Protection (CDW data lead); SEPA; Ministry of Construction; PP12 – STP Novi Sad (pilot host); FTN Novi Sad (academic / technical partner); Faculty of Civil Engineering Belgrade; Serbia Innovation Fund.

Timeline: Scoping study: 2026; CDW tracking pilots: 2027–2028; reuse hub prototype: 2028; national data exchange protocol with SEPA: 2029.

National KPIs & Targets:

KPI 2.2.1 (National): Number of national digital platforms implemented for circular construction (CDW tracking, material passports, secondary material exchange) assessed for interoperability against data exchange standards compliance, integration capability, and stakeholder uptake.^{[4][10]}

Target: 1 CDW tracking pilot platform operational by end of 2028; 2 platforms with demonstrated interoperability by 2030.

KPI 2.2.2 (National): Volume of CDW formally reported through national digital systems (tonnes) and share of this volume accompanied by traceability records suitable for secondary material use.^{[21][20]}

Target: Establish digital baseline by end of 2026; document a measurable increase in formally reported CDW volumes against baseline by 2030, and establish a first national figure for traceability-enabled CDW volumes.

KPI 2.2.3 (National): Formal data exchange protocol between CDW tracking pilots and the SEPA national waste register.^[21]

Target: Protocol prepared and signed between the TAP Secretariat, SEPA, and participating pilot operators by end of 2029.

Pillar 3: Building Skills & Capacity

The shortage of BIM-competent professionals is a critical risk given the mandatory 2028 deadline.^{[7][8]} Circular design, CDW digital management, and lifecycle assessment expertise are scarcer still. Serbia's D.2.2.2 contributions^[4] show research-level engagement, but market-facing professional training is structurally absent from most engineering programmes and CPD pathways.

Objective 3.1: Develop education and training programmes for digital skills within circular construction.

National Actions:

1. Integrate circular economy principles and BIM/digital construction modules into university curricula (architecture, civil engineering, construction management) and vocational training programmes at a minimum of 3 higher-education institutions by end of 2027 and 6 by 2030, with a direct focus on BIM 2028 compliance.^[9]
2. Develop national certification or competence-verification schemes for professionals in circular and digital construction delivered through the Chamber of Engineers of Serbia (CPD), with a first cohort graduating by end of 2027.
3. Establish partnerships between educational institutions and industry for internships and practical training in BIM, CDW management, and digital material tracking, with at least 3 formal agreements in place by 2028.
4. Launch national online learning resources for continuous professional development in circular and digital construction in Serbian language, hosted by STP Novi Sad in cooperation with FTN Novi Sad as academic content provider, accessible free of charge.
5. Establish a national Train-the-Trainers programme to build the capacity of university lecturers and industry trainers, enabling scaling of training provision beyond a small group of early adopters.
6. Develop a national competency framework for digital and circular construction professionals, setting out knowledge, skills, and behaviours at different career levels.

Responsible Bodies: FTN Novi Sad and Faculty of Civil Engineering Belgrade (curriculum lead); Chamber of Engineers of Serbia (CPD); Ministry of Education; Ministry of Science; PP12 – STP Novi Sad (online resources).

Timeline: University modules and first CPD cohort: 2027; online resources: 2027; Train-the-Trainers network: 2028–2029; national competency framework: 2028.

National KPIs & Targets:

KPI 3.1.1 (National): Number of education and training programmes in digital technologies for circular construction (university modules, vocational courses, accredited CPD programmes, online learning tracks) operational.

Target: At least 3 programmes (university + CPD) by 2027; at least 8 programmes across all categories by 2030.

KPI 3.1.2 (National): Number of universities and vocational schools incorporating BIM and digital technologies for circular construction into their curricula.

Target: At least 3 institutions by 2027; at least 6 institutions by 2030.

KPI 3.1.3 (National): Number of public-sector procurement officers and technical staff (contracting authorities, ministries, inspectorates) who have completed training on BIM, circular procurement criteria, and CDW obligations.

Target: At least 100 public-sector staff trained by 2029; at least 250 by 2030.

Objective 3.2: Promote knowledge transfer and best practice sharing among stakeholders.

National Actions:

1. Organise an annual National Forum on Digital and Circular Construction – co-organised by the Chamber of Engineers, PP12 – STP Novi Sad, and FTN Novi Sad as academic partner – launching in 2027, to showcase pilot results and facilitate networking.
2. Establish a national online knowledge hub or repository for best practices, case studies, research findings, and regulatory guidance, accessible free of charge; publish at least 5 Serbian pilot case studies by end of 2028.
3. Facilitate the secondment or exchange of at least 10 Serbian construction professionals or researchers to Danube Region partner institutions through the Circular DigiBuild network^[1] between 2026 and 2030.
4. Encourage participation of national stakeholders in transnational knowledge-sharing events within the Danube CiDiCon cluster and Circular DigiBuild consortium.

Responsible Bodies: PP12 – STP Novi Sad (knowledge platform and forum lead); FTN Novi Sad (academic partner); Chamber of Engineers (industry dissemination); universities and research institutions.

Timeline: First national forum: 2027; online repository: 2027; first 5 case studies published: 2028; professional exchanges: ongoing 2026–2030.

National KPIs & Targets:

KPI 3.2.1 (National): Structured knowledge-sharing outputs – national forum editions, published Serbian pilot case studies, and regional workshops – organised or released each year.

Target: At least 1 national forum per year from 2027; at least 4 regional workshops cumulatively by 2030; at least 5 published Serbian case studies by end of 2028.

KPI 3.2.2 (National): Number of Serbian entities (companies, public authorities, research institutions) actively engaged in cross-border circular construction activities through the Danube CiDiCon cluster.^[1]

Target: At least 10 Serbian entities actively engaged by 2030.

Pillar 4: Strengthening Collaboration & Supply Chains

Serbia's construction sector is characterised by negligible formal CDW recycling infrastructure,^[20] fragmented supply chains, and an underdeveloped secondary material market. Industry data show that 80% of Serbian demolition and recycling companies earn under 10% of revenue from waste management activities, compared to around 33% of EU counterparts.^[12] Building collaborative infrastructure through which materials, data, and knowledge flow efficiently between designers, contractors, demolition firms, recyclers, and public clients is a structural prerequisite for circular construction transformation.

Objective 4.1: Facilitate the development of digital regional supply chains for recycled and secondary construction materials.

National Actions:

1. Establish a national focal point for the Danube Circular Construction Supply Network,^[1] hosted at PP12 – STP Novi Sad with participation of FTN Novi Sad and industry partners.
2. Map national CDW sorting, processing, and reuse facilities to identify geographic gaps in secondary material supply chain infrastructure; publish findings by 2027 using SEPA data^[21] and the National Waste Management Programme^[10] as baseline inputs.
3. Develop a national secondary materials exchange or matchmaking platform – or integrate into a regional platform developed within the Danube CiDiCon cluster^[1] – to connect demolition project owners with secondary material buyers, verified by material passport data.

4. Implement national data standards and material passports for traceability and reuse, aligned with EU Digital Product Passport frameworks and with BIM outputs under Objective 2.1.
5. Engage national Digital Innovation Hubs (STP Novi Sad / Belgrade) to support CDW-sector SMEs – recycling companies, demolition contractors, material traders – in adopting digital supply chain tools.
6. Promote the inclusion of recycled and secondary material content requirements, with material passport documentation, in at least 3 major public infrastructure projects by 2030, aligning with the National Waste Management Programme 40% CDW recovery target.^[10]
7. Prepare – in cooperation with Institut IMS, ISS, and the Chamber of Engineers – practical quality assurance and liability guidance for secondary materials, so that designers and contracting authorities can incorporate recycled content with reduced perceived risk.

Responsible Bodies: Ministry of Environmental Protection (CDW data lead); Ministry of Construction (procurement); SEPA; Serbia Innovation Fund; PP12 – STP Novi Sad / STP Belgrade; FTN Novi Sad (research partner); Institut IMS; ISS; construction industry associations.

Timeline: CDW infrastructure mapping: 2027; secondary material platform pilot: 2028; national data standards: 2028–2029; secondary material requirements in procurement: 2030.

National KPIs & Targets:

KPI 4.1.1 (National): Volume and share of documented use of secondary construction materials in Serbian public construction projects within the TAP's target scope (pilot tenders plus voluntary early adopters), tracked and verified by digital technologies.^[10]

Target: Baseline established in 2026 via CDW infrastructure mapping; at least 5 percentage points increase in documented secondary material use in the target scope by 2030.

KPI 4.1.2 (National): Number of national companies (construction, recycling, demolition, design) involved in regional/national circular supply chains through digital platforms or formal network participation.

Target: At least 50 companies by 2030.

Objective 4.2: Promote collaboration between research institutions, industry, and governments.

National Actions:

1. Establish a National Platform for Digital and Circular Construction Innovation as the TAP's multi-stakeholder advisory body (see Section 7), co-chaired by the Ministry of Construction and an academic representative, with civil society input from Coalition 27 and NALED, meeting at minimum twice per year.
2. Launch at least 2 national R&D funding calls through the Serbia Innovation Fund^[17] specifically targeting circular and digital construction, with mandatory industry-academia consortium requirements, by 2028.
12. Establish a permanently open, demand-driven 'Serbia Circular Construction Innovation Partnership Scheme' (SCIPS), structured as a standing instrument within the Serbia Innovation Fund distinct from periodic competitive R&D calls. Under SCIPS, a company, local self-government unit, or public contracting authority submits a structured problem statement, commits to co-financing the research activity and to providing pilot location access, relevant data, and application context; a matched academic or research institution partner develops, tests, and validates the solution; and public funds cover the research and development costs. The applicant's co-financing obligation ensures industry commitment; the requirement that all funded outputs be applied in practice -- not limited to academic publication -- ensures relevance. The scheme addresses the structural weakness of time-limited project-based R&D: it creates a permanent channel through which real construction-sector problems drive applied research, and through which research results re-enter the market rapidly. Design and launch of the scheme by end of 2027; first partnerships activated by 2028.
3. Establish at least 1 national Living Lab for circular and digital construction – a joint university-industry demonstration environment hosted by PP12 – STP Novi Sad with FTN Novi Sad as academic co-host – by end of 2029.
4. Foster national public-private partnerships (PPPs) for circular construction initiatives and facilitate participation in EU programmes (Horizon Europe,^[14] Digital Europe, Interreg Danube follow-up calls), targeting at least 2 successful project participations by 2030.

Responsible Bodies: Ministry of Construction (Platform co-chair); Ministry of Science (R&D funding lead); Serbia Innovation Fund; PP12 – STP Novi Sad; FTN Novi Sad; industry associations; Coalition 27 (advisory/monitoring); NALED.

Timeline: National Platform established: 2026–2027; first R&D calls: 2027–2028; Living Lab operational: 2029; EU project participations: ongoing from 2027.

National KPIs & Targets:

KPI 4.2.1 (National): Number of collaborative R&D projects focused on digital technology for circular construction, linking Serbian academia, industry, and government.^{[4][17]}

Target: At least 10 projects by 2030 (national and EU-funded combined).

KPI 4.2.2 (National): Number of national PPPs or formal cooperation agreements established for digitalisation of circular construction initiatives, including Living Labs and demonstration site agreements.^[1]

Target: At least 3 PPPs or formal cooperation agreements by 2030.

Pillar 5: Raising Awareness & Changing Mindsets

The 2028 BIM mandate^[8] will itself drive a degree of awareness, but targeted communication is needed to ensure the mandate is understood as an opportunity and to embed circular economy thinking alongside BIM adoption. Coalition 27's warning that Serbia 'stands still' on environmental performance^[13] underscores that regulatory change alone is insufficient without cultural and behavioural change.

Objective 5.1: Implement awareness campaigns to promote the benefits of digitalisation within circular construction.

National Actions:

1. Design and execute targeted national communication campaigns ('Build Smart, Build Circular Serbia') for construction SMEs, local government building officers, investors, and the general public, using digital channels, industry media, and in-person formats at fairs and Chamber of Engineers events.
2. Utilise various channels – social media, national media, industry events, and educational programmes – to disseminate information on BIM 2028 compliance pathways,^[8] CDW management obligations, secondary material sourcing, and circular procurement options.
3. Highlight national success stories and the economic and environmental benefits of circular and digital practices, including Serbian pilot project results from Pillars 2 and 4.
4. Organise at least 4 regional awareness workshops in Belgrade, Novi Sad, Niš, and Kragujevac by 2028, involving local governments, contractors, and investors.

5. Leverage Coalition 27's established communication and civil society networks^[13] to amplify public awareness of CDW environmental obligations and circular construction opportunities.
6. Partner with the Serbia Green Building Council (SGBS) to leverage its professional network of architects, engineers, and developers for awareness dissemination, and to co-organise events that integrate BIM compliance awareness with broader green construction and sustainability agendas.

Responsible Bodies: Chamber of Engineers (industry communication lead); Ministry of Construction (endorsement); PP12 – STP Novi Sad (content development and digital dissemination); FTN Novi Sad (academic content); Coalition 27; NALED; Serbia Green Building Council.

Timeline: Campaign design and launch: 2026–2027; regional workshops: annually from 2027; sustained media presence: 2027–2030.

National KPIs & Targets:

KPI 5.1.1 (National): Number of construction SMEs and public-sector contracting authorities that have participated in structured BIM/circular awareness activities and that confirm, through a short follow-up survey, an intention to incorporate BIM or circularity criteria in their next procurement or project cycle.

Target: At least 200 SMEs and 30 contracting authorities reporting such intention by end of 2028; at least 500 SMEs and 80 contracting authorities by 2030.

KPI 5.1.2 (National): Documented change in awareness and attitudes in the sector, measured by an annual industry survey on BIM adoption awareness and circular construction attitudes.

Target: Baseline survey in 2026; at least 20% improvement in the composite awareness/attitude score by 2030 compared to baseline.

Objective 5.2: Encourage the adoption of digital technologies focusing on circular economy principles used in construction business models.

National Actions:

1. Provide support programmes (coaching, mentorship, toolkits) for construction companies to integrate digital solutions into their business models, including BIM 2028 compliance guidance^[6] and circular procurement frameworks.
2. Organise workshops and masterclasses on circular business model innovation enabled by digital tools, leveraging Serbia's D.2.2.2 solution catalogue^[4] (BIM,

- digital twins, drones, 3D printing, laser scanning) as practical case studies; develop and publish at least 5 Serbian company case studies with quantified outcomes by 2029.
3. Showcase successful national examples of companies adopting digitalised circular business models; establish an annual Circular Construction Innovation Award Serbia from 2028.
 4. Integrate circular business model innovation into the business support services of STP Novi Sad and STP Belgrade, making it a standard element of construction technology startup incubation.

Responsible Bodies: PP12 – STP Novi Sad / STP Belgrade (startup and business model lead); construction industry associations; FTN Novi Sad (case study development); Chamber of Engineers.

Timeline: Business model toolkit: 2027; first Innovation Award: 2028; 5 case studies published: 2029; mentoring programme at scale: 2028–2030.

National KPIs & Targets:

KPI 5.2.1 (National): Number of Serbian construction companies that have formally adopted digital technologies within a documented circular business model (BIM-enabled design with material data, CDW digital management, secondary material sourcing with traceability).^[17]

Target: At least 30 companies by 2029; at least 60 companies by 2030. (Against an estimated base of more than 10,000 construction SMEs in Serbia, this is a conservative but credible early-stage target.)

KPI 5.2.2 (National): Documented national investment in digitalised circular construction methods (capital expenditure on BIM software and licences, CDW digital tools, material tracking platforms), captured through the annual industry survey and Innovation Fund data.^[17]

Target: Establish investment baseline in 2026; at least 20% increase in documented digital circular construction investment by 2030 compared to baseline.

5. National Context and Challenges

SWOT Analysis: The following analysis is grounded in the Circular DigiBuild project studies,^{[1][3][4][5]} EEA Serbia country profile 2025,^{[19][20]} EC Serbia Progress Report 2025,^[23] SEPA waste management report,^[21] and Coalition 27 shadow report.^[13]

Strengths: (1) EU candidate country status driving regulatory alignment motivation. (2) Confirmed mandatory BIM from 2028 – one of the strongest non-EU BIM policy commitments,^[8] embedded in law. (3) BIM Serbia Association as buildingSMART International Developing Chapter.^[9] (4) 12 verified digital technology solutions contributed to Circular DigiBuild D.2.2.2^[4] (BIM/openBIM, digital twins, drones, laser scanning, autonomous equipment, etc.). (5) Active participation as PP12 in Circular DigiBuild.^[2] (6) Institut IMS as sole Serbian ENBRI member with construction materials expertise.^[16] (7) National Waste Management Programme 2022–2031 with 40% CDW recovery target.^[10] (8) Horizon Europe association since January 2021.^[14] (9) Green Agenda for the Western Balkans (Sofia Declaration 2020) as policy anchor.^[11]

Weaknesses: (1) CDW formal recycling rate effectively near zero; no reuse data reported to EEA for 2021.^[20] (2) 80% of Serbian demolition/recycling companies earn under 10% of revenue from waste management.^[12] (3) Municipal solid waste recycling rate only 15.5% in 2023.^[19] (4) No circularity or CDW criteria in public procurement. (5) Fragmented governance: no standing inter-ministerial coordination mechanism for circular/digital construction. (6) ASP for Circular DigiBuild is a provincial body (Vojvodina secretariat), not a national ministry.^[2] (7) Environmental investment at approximately 1% of GDP.^[22] (8) Severe shortage of BIM-trained professionals ahead of 2028 mandate.^[8] (9) Limited liability and quality-assurance frameworks for secondary materials.

Opportunities: (1) IPA III with 61% green allocation,^[18] Horizon Europe association,^[14] and Serbia Innovation Fund^[17] providing co-financing channels. (2) BIM 2028 mandate as strongest possible demand-side driver. (3) Significant CDW volumes from urban regeneration, Expo 2027 Belgrade, and infrastructure investment creating secondary material market potential. (4) Danube CiDiCon cluster and Circular DigiBuild for structured transnational knowledge transfer.^[1] (5) Reform and Growth Facility for the Western Balkans as additional EU incentive mechanism.

Threats: (1) Slow EU accession: Chapter 10 (Digital Economy) not yet opened;^[23] Chapter 27 implementation lagging. (2) Coalition 27 warns Serbia 'stands still' on environmental progress.^[13] (3) Private sector may resist CDW compliance if enforcement remains weak. (4) Brain drain of engineering graduates. (5) Under-reporting of CDW data masking the true scale of the problem.^[21] (6) Fragmentation between national, provincial, and local levels of authority.

Addressing National Gaps: This TAP specifically addresses the gaps and barriers identified in the Circular DigiBuild consolidated findings.^{[1][5]}

Regulatory and enforcement gaps (weak CDW enforcement, no circularity in procurement) are addressed through Objective 1.1 (gap analysis, working group, by-

law amendments, model tender clauses, procurement criteria) and Objective 1.2 (financial instrument design and green procurement). Digital technology and BIM adoption gaps (limited SME penetration despite the 2028 mandate,^[8] no digital CDW systems) are addressed through Objective 2.1 (BIM support programme, pilot projects with material inventory outputs) and Objective 2.2 (CDW digital platforms linked to BIM and SEPA). CDW infrastructure gaps (near-zero formal recycling,^[20] no secondary material market) are addressed through Objectives 4.1 and 2.2. Skills and capacity gaps are addressed through Pillar 3, including a specific indicator on public-sector staff training. Institutional fragmentation and the absence of national ministerial coordination – compounded by the provincial-level ASP structure^[2] – are addressed through the three-level governance model described in Section 7. The limited environmental investment share^[22] is addressed through the financial strategy in Section 6, targeting IPA III, Horizon Europe, the Serbia Innovation Fund, and EBRD/EIB co-financing.

6. Financial Strategy (National Level)

Funding Sources:

National Budget (Competent Ministries): Allocations from the relevant line ministries – Construction, Transport and Infrastructure; Environmental Protection; Science, Technological Development and Innovation; Economy; Education – will support core governance functions, the regulatory working group, gap analysis work, and development of implementation guidance, model tender clauses, and public-sector training. Given that Serbia invests approximately 1% of GDP in environmental protection,^[22] advocating for increased budget allocations for circular and digital construction reform is an explicit objective under Objective 1.2.

EU Pre-Accession Funds (IPA III): Serbia is an explicit IPA III beneficiary^[18] with 61% of its envelope allocated to green initiatives. Window 3 (Green Agenda and Sustainable Connectivity) is the primary channel for CDW infrastructure, environmental compliance, and digital-economy components of this TAP – in particular Objectives 2.2, 4.1, and parts of 1.2. Window 4 (Competitiveness and Inclusive Growth) is the primary channel for SME innovation and skills development – in particular Objectives 1.2, 3.1, and 5.2.

Serbia Innovation Fund: The Innovation Fund^[17] operates more than 15 programmes including Mini Grants (up to EUR 80,000), Innovation Vouchers, Matching Grants (up to EUR 500,000), and the Collaborative Grant Scheme. Advocacy for dedicated circular construction calls within the Fund's work programme is an explicit action under Objective 1.2.

Horizon Europe / Digital Europe: As a fully associated Horizon Europe country since January 2021,^[14] Serbian institutions compete on equal terms with EU Member States. Cluster 5 (Climate, Energy, Mobility) and Cluster 4 (Digital, Industry, Space) are most relevant to Objectives 2.1, 2.2, and 4.2. The TAP targets at least 2 Horizon / Digital Europe project participations by 2030.

Interreg Danube Region Programme: The Circular DigiBuild project itself is Interreg-funded.^[1] Post-2027 Interreg Danube Programme calls will provide further opportunities; the networks built through the current programme position PP12 and its national partners as strong candidates for follow-up calls, notably in support of Objectives 3.2, 4.1, and 4.2.

Development Finance and PPP-type Instruments: EBRD and EIB green construction lending facilities will be engaged to co-finance CDW infrastructure, green building retrofits, and large-scale digital infrastructure. A revolving loan guarantee mechanism co-financed under IPA III is explored jointly with the Development Fund of the Republic of Serbia (Objective 1.2). PPP structures are envisaged for demonstration projects and Living Labs (Objective 4.2).

Private Investment: Direct investment by construction companies in BIM adoption – driven by the 2028 mandate – is expected to be the largest single source of private expenditure connected to this TAP. Corporate investment and venture capital engagement with Innovation Fund-supported startups provide complementary private financing for Objectives 2.2 and 5.2.

Budget Allocation: Total TAP-related investment over 2026–2030 is indicatively estimated at EUR 8–15 million in mobilised public and private resources combined, depending on IPA III absorption pace, Innovation Fund call design, and private-sector co-financing leverage. This is an early-stage estimate and not a committed national allocation. Indicative distribution across the pillars and governance functions: Pillar 1 (Policy & Regulation) approximately 15%; Pillar 2 (Digital Innovation) approximately 25% – highest allocation, reflecting BIM 2028 mandate implementation and CDW platform development; Pillar 3 (Skills) approximately 20%; Pillar 4 (Collaboration) approximately 20%; Pillar 5 (Awareness) approximately 10%; governance and M&E approximately 10%.

7. Implementation Plan (National Level)

Governance Structure:

Implementation is supported by a three-level national governance structure, distinguishing strategic oversight, operational coordination, and stakeholder / advisory participation.

(1) Strategic oversight – National Inter-Ministerial Working Group on Circular and Digital Construction. Chaired by the Ministry of Construction, Transport and Infrastructure as the lead ministry on the BIM 2028 mandate, with participation of the Ministry of Environmental Protection, Ministry of Science, Technological Development and Innovation, Ministry of Economy, Ministry of Education, Ministry of Finance (Office for Public Procurement), and the Office for European Integration. The Working Group sets strategic direction, endorses major policy proposals, and convenes at minimum twice per year. It addresses the governance gap identified in the Circular DigiBuild Application Form,^[2] where Serbia's ASP is a provincial body rather than a national ministry.

(2) Operational coordination – TAP Secretariat. Hosted at PP12 – Science and Technology Park Novi Sad (STP NS),^[2] the Secretariat is responsible for day-to-day implementation, KPI tracking, annual reporting, stakeholder coordination, and liaison with the Danube CiDiCon cluster. The Secretariat draws on academic support from FTN Novi Sad as a key RMSG member – notably for pilot projects, training content, and Living Lab activities – without FTN assuming PP12 status.

(3) Stakeholder / advisory participation – National Platform for Digital and Circular Construction Innovation. A multi-stakeholder advisory body including industry associations, professional chambers, higher-education institutions (FTN Novi Sad, Faculty of Civil Engineering Belgrade, and others), Institut IMS, ISS (U442 commission), Coalition 27^[13] as environmental monitoring voice, NALED^[15] as economic governance voice, Serbia Green Building Council, and financial institutions. The Platform provides technical input, stakeholder consultation, and validation of pilot results, and operationalises the Circular DigiBuild RMSG at national level.

Within the National Platform, a **Local Implementation Network (LIN)** will be established comprising pilot local self-government units -- initially the cities of Belgrade, Novi Sad, Niš, and Kragujevac, with gradual expansion to other municipalities -- as a structured sub-group dedicated to translating TAP measures into local practice. Local self-government units are the systemic drivers of circular construction at the point of delivery: they exercise authority over urban planning, building permit issuance, local public procurement (schools, kindergartens, community buildings, local roads, utility infrastructure), management of the public

building stock, reconstruction and demolition programmes, and local CDW monitoring and reporting. The LIN will serve as the primary channel for embedding the model tender clause toolkit (including the local procurement module), the Municipal As-Is BIM Programme, and CDW reporting protocols into local administrative practice. It will also provide structured feedback from local level to the National Inter-Ministerial Working Group on implementation barriers, resource gaps, and regulatory obstacles encountered on the ground.

Roles summary: National Inter-Ministerial Working Group – strategic oversight and cross-ministerial alignment; TAP Secretariat (hosted at PP12) – operational implementation, KPI tracking, annual reporting, external-facing communication; National Platform – technical input, stakeholder consultation, validation of pilot results. FTN Novi Sad participates as a core academic member of the National Platform and as a research / training partner of the Secretariat, not as a co-holder of PP12 status.

Timeline:

Phase 1 – Short-term (2026–2027): governance setup (Inter-Ministerial Working Group and TAP Secretariat operational); T0 baseline data collection; regulatory gap analysis published (end of 2026); BIM support programme launched; first CDW tracking pilot commissioned; first CPD training cohort; initial model tender clauses drafted; national awareness programme launched; knowledge hub established.

Phase 2 – Mid-term (2028–2029): BIM mandate takes effect (1 January 2028) and compliance monitoring begins; at least 5 publicly procured BIM pilot projects launched by end of 2028 with open documentation; results of at least 3 pilots published by end of 2029; CDW tracking pilot platform operational with a formal SEPA data-exchange protocol signed by end of 2029; model tender clauses adopted by at least 5 institutions; first Innovation Fund dedicated call operational; National Platform fully operational; at least 2 R&D funding calls launched; at least 500 professionals trained by end of 2028 (KPI 2.1.2 trajectory); mid-term KPI evaluation (2029).

Phase 3 – Long-term (2030): at least 40% of qualifying public procurement procedures above EUR 5 million with BIM deliverables; at least 5 BIM pilot projects with published results; at least 2 interoperable digital platforms for CDW / material tracking operational; at least 1,500 professionals trained cumulatively; at least 250 public-sector procurement officers and technical staff trained; at least 60 companies with documented digital circular business models; Living Lab operational; final evaluation and impact report (Q1 2031).

Monitoring and Evaluation:

A national framework for tracking progress against the National KPIs will be established by the TAP Secretariat, aligned with the transnational strategy's T0–T4 monitoring logic.^[1] Baseline data (T0) will be collected by end of 2026 from SEPA waste reports,^[21] SORS national accounts,^[6] Chamber of Engineers records, Ministry of Construction procurement data, and an inaugural industry survey. Annual Progress Reports will be issued by March of each year (first report March 2028 covering 2026–2027), shared with the Inter-Ministerial Working Group and the Danube CiDiCon cluster. Internal mid-term evaluation in 2029; external end-term evaluation with final impact report by March 2031.

Risk Management:

Key national-level risks and realistic mitigation measures:

- (1) Political and institutional instability.** Mitigation: embed the TAP in multi-stakeholder frameworks; anchor BIM^[8] and CDW obligations in legislation and by-laws; insulate the TAP Secretariat function from short-term political shifts through its institutional hosting at PP12.
- (2) Insufficient funding and IPA III absorption delays.** Mitigation: diversify across IPA III,^[18] Serbia Innovation Fund,^[17] Horizon Europe,^[14] Interreg follow-up calls, and private-sector co-financing; maintain contingency scope per pillar.
- (3) Industry non-compliance with the 2028 BIM mandate, particularly among SMEs.** Mitigation: prioritise SME-targeted technical assistance, scale CPD programmes urgently, channel Innovation Fund^[17] support to BIM software and training costs, and deploy the BIM helpdesk network early.
- (4) Weak CDW enforcement.** Mitigation: introduce performance-based procurement criteria; strengthen inspectorate capacity through targeted training (KPI 3.1.3); link financial incentives to documented waste management plans.
- (5) CDW data under-reporting.** Mitigation: establish minimum data reporting protocols from 2026 with SEPA;^[21] develop proxy indicators; require structured CDW reporting as part of public procurement deliverables in pilot tenders.
- (6) Interoperability problems and vendor lock-in in BIM and CDW digital platforms.** Mitigation: require openBIM-compatible formats (IFC / BCF) and open data standards in all publicly financed platforms and pilots; leverage BIM Serbia's buildingSMART Developing Chapter status^[9] and the ISS U442 commission to anchor open standards in national practice.
- (7) Weak liability and quality-assurance frameworks for secondary materials.** Mitigation: prepare quality assurance and liability guidance with Institut IMS^[16] and

ISS; embed documentation requirements (material passports, testing records) in pilot public tenders to build contracting-authority confidence.

(8) Weak market demand for recycled and secondary materials. Mitigation: create demand through public procurement criteria (KPI 1.1.2), demonstration projects (KPIs 2.1.3 and 4.1.1), and targeted awareness campaigns towards public investors.

(9) Fragmentation between national, provincial, and local actors. Mitigation: ensure Vojvodina provincial institutions are formally linked through the National Platform and the Inter-Ministerial Working Group;^[2] include at least one representative of local self-government in the Platform; use regional workshops to build shared practice.

(10) Administrative coordination failure between ministries. Mitigation: formalise the Inter-Ministerial Working Group's mandate through an administrative act; ensure quarterly operational liaison meetings; align reporting cycles with existing ministry planning calendars.

8. Stakeholder Engagement (National Level)

Collaboration Mechanisms:

National forums, working groups, and the Regional Multi-Stakeholder Group (RMSG) structure within the Circular DigiBuild project^[1] will be used for communication, collaboration, and feedback. The National Platform for Digital and Circular Construction Innovation (Section 7) serves as the primary national multi-stakeholder forum and operationalises the RMSG at national level, with FTN Novi Sad participating as a core academic member. National online collaboration channels (the TAP section of the PP12 / STP Novi Sad website with a public KPI dashboard and knowledge repository) and participation in regional and transnational Danube CiDiCon platforms will ensure continuous information flow between all levels.

Involvement of Key Groups:

Ministries: The Ministry of Construction, Transport and Infrastructure is the lead ministry for the BIM mandate, regulatory reform, and public procurement; the Ministry of Environmental Protection is responsible for CDW regulation and oversees SEPA; the Ministry of Science, Technological Development and Innovation is responsible for R&D funding and Horizon Europe coordination; the Ministry of Economy supports SME engagement and green-economy policy; the Ministry of Education supports curriculum reform; the Ministry of Finance (Office for Public Procurement) is central to procurement-criteria reform.

Public Authorities and Agencies: SEPA is the key agency for CDW data, the waste register, and the data-exchange protocol under Objective 2.2. The Environmental Inspectorate supports enforcement. The Institute for Standardization of Serbia (ISS), through the U442 commission, is the central standardisation actor for BIM SRPS transposition. At the local level, at least 4 municipalities (Belgrade, Novi Sad, Niš, Kragujevac) will serve as pilot procurement actors and regional workshop hosts.

Beyond their role as pilot procurement actors, local self-government units will be invited to participate in the Local Implementation Network (LIN) within the National Platform (see Section 7). Their engagement as systemic actors -- responsible for urban planning, permitting, local public procurement, public building stock management, reconstruction and demolition, and local CDW monitoring -- is essential for scaling TAP measures beyond national flagship projects. The Standing Conference of Towns and Municipalities (SKGO) will be engaged as the institutional interlocutor for the LIN and as co-developer of the local procurement module within the model tender clause toolkit.

Professional Chambers: The Chamber of Engineers of Serbia leads CPD, professional standards, and BIM mandate compliance support. The Serbian Chamber of Construction Industry engages SMEs and contractors.

Academia: FTN Novi Sad and the Faculty of Civil Engineering, University of Belgrade are primary academic partners. Institut IMS,^[16] Serbia's sole ENBRI member, contributes to CDW quality standards and secondary-material testing. Other universities (Niš, Kragujevac, Subotica) will be engaged in curriculum reform and regional outreach.

Innovation Ecosystem Actors: PP12 – STP Novi Sad^[2] acts as TAP Secretariat host and as the primary Digital Innovation Hub anchor; STP Belgrade supports startup and SME digital tool uptake; BIM Serbia Association^[9] operates as the buildingSMART Developing Chapter.

Industry Associations & SMEs: The Serbian Chamber of Construction Industry, BIM Serbia Association, Association of Architects of Serbia, and industry clusters are core partners. SMEs – over 90% of construction firms – will be engaged through practical, low-threshold formats: BIM compliance toolkits, mentoring programmes, and regional workshops. The 2028 BIM mandate^[8] creates a natural engagement hook for SMEs that previously lacked incentive to engage with digital construction.

Civil Society: Coalition 27^[13] will participate in policy consultations, governance oversight through the National Platform, and awareness-campaign amplification. NALED,^[15] with more than 350 member organisations, will support SME outreach, regulatory-reform advocacy, and digital procurement development. The Serbia Green

Building Council (SGBS) will engage on green construction standards integration, circular economy criteria in building regulations, and joint awareness activities.

Financial Institutions and Investors: The Serbia Innovation Fund^[17] and the Development Fund of the Republic of Serbia will be engaged on dedicated instrument design. EBRD and EIB country offices will be engaged on green construction lending facilities with circularity and digital performance criteria.

Communication Plan:

A national communication strategy will be developed by the TAP Secretariat in 2026 to ensure transparency, visibility, and continuous dissemination of results. It includes: a dedicated TAP section on the PP12 / STP Novi Sad website with a public KPI dashboard; annual progress reports; press releases timed to major milestones; a coordinated social media presence on professional channels; direct communications to Chamber of Engineers members and university staff through cooperating partners; participation in major construction sector fairs; and contributions to Danube CiDiCon cluster communication outputs.

9. Sustainability and Scalability

Sustainability Mechanisms: The outcomes and projects initiated under this TAP are designed to be sustained beyond the initial funding cycle through: institutionalisation of the National Platform as a permanent multi-stakeholder forum beyond the Circular DigiBuild project period; progressive integration of BIM and circularity requirements into national legislation,^[8] by-laws, and public procurement standards; embedding digital and circular construction training in university curricula and Chamber of Engineers CPD requirements; development of durable knowledge assets (case study library, competency framework, toolkit resources, model tender clauses); and cultivation of a domestic community of BIM and circular construction practitioners. The Inter-Ministerial Working Group is intended to evolve from a project-driven body into a permanent coordination structure anchored in the Ministry of Construction's regular governance arrangements.

Scalability Strategies: Successful national pilots will be replicated along the BIM-to-circularity logic of this TAP. The 2028 BIM mandate^[8] scales BIM from voluntary pilots (2026–2027) to mandatory compliance (2028) to advanced BIM–CDW data integration (2029–2030). Digital CDW tracking scales from single-site proof-of-concept (2027–2028) through a formal SEPA data-exchange protocol (2029) to national CDW register integration (post-2030). Skills training scales from CPD cohorts (2027) through a Train-the-Trainers network (2028–2029) to mainstream integration across engineering programmes (post-2030). Circular supply chains scale

from bilateral PPP pilots (2028–2029) to a national secondary material exchange platform (2030), with potential regional integration with Danube partner platforms (post-2030), sharing lessons with other Danube Region countries through the Danube CiDiCon cluster.^[1]

10. Annexes (Optional)

Note: The following annexes provide supplementary information supporting the main TAP body. They cover key stakeholders, project proposals, KPI data sources, and policy references. All claims in the main document are cross-referenced to the numbered sources in Annex D.

Annex A: List of key national stakeholders involved.

- **Ministry of Construction, Transport and Infrastructure:** Public Authority – Lead ministry; BIM mandate owner; regulatory reform; public procurement (Pillars 1, 2, 4)
- **Ministry of Environmental Protection:** Public Authority – CDW regulation; SEPA oversight; waste registry (Pillars 1, 2, 4)
- **Ministry of Science, Technological Development and Innovation:** Public Authority – R&D funding; Horizon Europe coordination (Pillars 3, 4)
- **Ministry of Economy:** Public Authority – SME support; green economy policy (Pillar 1)
- **Ministry of Education:** Public Authority – Curriculum reform (Pillar 3)
- **Ministry of Finance – Office for Public Procurement:** Public Authority – Procurement-criteria reform; model tender clauses (Pillar 1)
- **SEPA – Serbian Environmental Protection Agency:** Environmental Agency – CDW waste registry; data collection; monitoring baseline (Pillars 2, 4, 7)
- **Serbia Innovation Fund:** National Innovation Agency – Mini Grants, Matching Grants, Collaborative Grants; 15+ programmes (Pillars 1, 2, 4)
- **Development Fund of the Republic of Serbia:** Finance Institution – Loan instruments; investment co-financing (Pillar 1)
- **Chamber of Engineers of Serbia (IKS):** Professional Chamber – CPD; professional standards; BIM mandate compliance (Pillars 3, 5)
- **Serbian Chamber of Construction Industry:** Industry Association – SME and contractor engagement; supply chain (Pillars 4, 5)

- **BIM Serbia Association (buildingSMART Developing Chapter):** Professional / Industry – BIM standards; community building; 2028 mandate transition support (Pillar 2)
- **Association of Architects of Serbia:** Industry Association – Circular design awareness; CPD (Pillars 3, 5)
- **PP12 – Science and Technology Park Novi Sad (STP NS):** Innovation Ecosystem (PP12) – Sole Circular DigiBuild partner for Serbia; TAP Secretariat host; DIH anchor; startup support; digital platform incubation (All Pillars)
- **Science and Technology Park Belgrade:** Innovation Ecosystem – Startup and SME digital tool support (Pillars 2, 4)
- **Faculty of Technical Sciences (FTN), University of Novi Sad:** Higher Education / RMSG member – Academic partner and core member of the Regional Multi-Stakeholder Group (RMSG) and of the National Platform; research, training content, pilot projects, and Living Lab co-hosting. Not a PP12 partner. (All Pillars)
- **Faculty of Civil Engineering, University of Belgrade:** Higher Education – Research; curriculum; pilot projects (Pillars 2, 3, 4)
- **Institut IMS a.d. (Institute for Testing of Materials):** Research Institute / ENBRI – Materials testing; CDW quality certification; standards (Pillars 1, 2, 4)
- **Institute for Standardization of Serbia (ISS) – U442 Commission:** Standards Body – BIM SRPS transposition (ISO 19650, EN 17412, CEN/TC 442) (Pillar 1)
- **NALED (National Alliance for Local Economic Development):** Civil Society – SME advocacy; good governance; digital procurement reform (Pillars 1, 5)
- **Coalition 27:** Civil Society / Environmental Monitor – Chapter 27 monitoring; CDW and waste advocacy; awareness (Pillars 1, 5)
- **Serbia Green Building Council (SGBS):** Civil Society / Industry – Green construction standards; lifecycle approaches; circular economy integration (Pillars 1, 5)
- **Pokrajinski sekretariat za regionalni razvoj (Vojvodina):** ASP – Associated Strategic Partner in Circular DigiBuild; regional implementation coordination
- **EBRD and EIB Country Offices, Serbia:** Financial Institutions – Green construction lending; infrastructure project co-financing (Pillar 1)
- **Danube CiDiCon Cluster (transnational):** Transnational Cluster – Regional coordination; knowledge transfer; Circular DigiBuild (All Pillars)

Annex B: Detailed national project proposals linked to the objectives.

- **SerbBIM Pilot Programme:** BIM implementation on 5 publicly procured buildings with open documentation and compliance testing ahead of the 2028 mandate. Lead: PP12 – STP Novi Sad as TAP Secretariat, in cooperation with the Ministry of Construction, BIM Serbia, and FTN Novi Sad as academic partner. Duration: 2026–2029. Funding: IPA III Window 4 + Serbia Innovation Fund. Linked to: Objectives 2.1, 1.1.
- **CDW Track Serbia:** Pilot digital CDW tracking system on 2 demolition sites, integrating with SEPA's national waste registry, producing a validated data exchange protocol. Lead: PP12 – STP Novi Sad, in cooperation with the Ministry of Environmental Protection, SEPA, and FTN Novi Sad as research partner. Duration: 2027–2029. Funding: IPA III Window 3 + Serbia Innovation Fund R&D call. Linked to: Objectives 2.2, 4.1.
- **CircularBuild Academy Serbia:** Curriculum development, CPD programme, and public-sector training track for 2028 BIM mandate compliance and circular construction. Lead: Chamber of Engineers of Serbia, in cooperation with FTN Novi Sad, the Faculty of Civil Engineering Belgrade, and at least one additional university. Duration: 2026–2028. Funding: Ministry of Science; Horizon Europe MSCA potential. Linked to: Objectives 3.1, 3.2.
- **Serbia Living Lab for Circular Construction:** Joint university–industry demonstration and testing environment for BIM–CDW integration, hosted by PP12 – STP Novi Sad with FTN Novi Sad as academic co-host. Duration: 2027–2030. Funding: IPA III Window 3 + private industry co-financing. Linked to: Objective 4.2.
- **Serbia Secondary Materials Digital Exchange:** National secondary-material marketplace connected to Danube Region partner platforms, verified by material passport data. Lead: PP12 – STP Novi Sad, in cooperation with the Ministry of Environmental Protection, Institut IMS, and industry partners. Duration: 2028–2030. Funding: Interreg Danube follow-up + private sector. Linked to: Objective 4.1.

Annex C: Data sources and methodologies for national KPIs.

- **SEPA, Annual Report on Waste Management 2011–2023 (2024):** CDW generation, treatment, recycling data; baseline for KPIs 2.2.2, 4.1.1

- **SEPA CDW waste register:** CDW digital tracking and data-exchange protocol KPIs (2.2.1, 2.2.2, 2.2.3)
- **Ministry of Construction, Transport and Infrastructure – public procurement data (cross-referenced with the Public Procurement Portal):** BIM and circularity criteria in tenders: KPIs 1.1.1, 1.1.2, 1.1.3, 1.2.1, 2.1.1
- **Chamber of Engineers of Serbia – CPD records:** Professional training KPIs 2.1.2, 3.1.1, 3.1.2, 3.1.3
- **Serbia Innovation Fund – grant disbursement records:** SME support and investment KPIs 1.2.1, 1.2.2, 4.2.1, 5.2.1, 5.2.2
- **Participating universities (FTN Novi Sad, Faculty of Civil Engineering Belgrade, and others) – enrolment records:** University training KPI 3.1.2
- **TAP Secretariat annual industry survey (baseline 2026):** BIM adoption rates; circular practice awareness; CDW management practices; supports KPIs 5.1.1, 5.1.2, 5.2.1, 5.2.2
- **EEA Serbia country profile and Eurostat CDW datasets:** EU benchmarking of Serbian CDW performance
- **Programme-level structured reporting on knowledge-sharing outputs:** National forum attendance, regional workshops, published case studies; supports KPI 3.2.1

Annex D: Relevant national policy documents or reports.

All numbered references [N] in this document correspond to the following sources:

- [1] Circular DigiBuild, "2030 Danube Region Digital Innovation Strategy for Circular Construction," V06, February 2026. Project document.
- [2] Circular DigiBuild, "Application Form DRP0200309," V3.0, 29 March 2024. PP12 = STP Novi Sad.
- [3] Circular DigiBuild, "Policy Review (D.2.4.2) – Consolidated Report," 2025. Serbia: 'early-stage' category.
- [4] Circular DigiBuild, "Common Report (D.2.2.2): Possible Applicable Solutions," 2025. Serbia contributed 12 PASs (RS-1 to RS-12).
- [5] Circular DigiBuild, "Cross-Sectoral Opportunities (D.2.3.2)," 2024–2025.
- [6] SORS/RZS, "Gross Domestic Product, 2022," 2023: construction (NACE F) = 5.4–6.0% of GDP. <https://publikacije.stat.gov.rs/G2023/HtmLE/G20231274.html>
- [7] Ministry of Construction, Transport and Infrastructure, Statement by Minister Aleksandra Sofronijević on mandatory BIM from 1 January 2028, 2 June 2025. <https://www.srbija.gov.rs/vest/en/250486/>

[8] National Assembly of Serbia, Amendments to the Law on Planning and Construction (Zakon o izmenama i dopunama ZPI, Sl. glasnik RS, br. 62/2023), BIM mandatory from 1 January 2028.

[9] BIM Serbia Association, buildingSMART International Developing Chapter since September 2023.
<https://bim-serbia.com>

[10] Government of Serbia, "Waste Management Programme 2022–2031" (Official Gazette RS No. 12/22). 40% CDW recovery target. <https://www.ekologija.gov.rs>

[11] EC and Western Balkans Leaders, "Sofia Declaration on the Green Agenda for the Western Balkans," 10 November 2020.

[12] Cvetković et al., "Advancing the Circular Economy through CDW Management – Comparative Insights from Serbia and the EU," Preprints, November 2025. DOI: 10.20944/PREPRINTS202511.0361.V1.

[13] Coalition 27, Shadow Report 2024: "Years Go by, We Stand Still."
<https://ekosistem.mis.org.rs/en/shadow-report-of-coalition-27-2024/>

[14] European Commission, Horizon Europe Serbia Association, January 2021. <https://research-and-innovation.ec.europa.eu>

[15] NALED, 350+ member organisations. <https://naled.rs/en/upoznajte-naled>

[16] Institut IMS a.d., established 1929, sole Serbian ENBRI member. <https://institutims.rs>

[17] Serbia Innovation Fund: Mini Grants, Matching Grants (up to EUR 500,000), 15+ programmes.
<https://www.inovacionifond.rs/en/>

[18] EC, IPA III 2021–2027 Serbia: 61% green allocation. <https://enlargement.ec.europa.eu>

[19] EEA, "Europe's Environment 2025 – Serbia": MSW recycling 15.5% in 2023.
<https://www.eea.europa.eu/en/europe-environment-2025/countries/serbia>

[20] EEA, "Waste Prevention Country Profile – Serbia," February 2025: no reuse data reported for construction materials for 2021.

[21] SEPA, "Report on Waste Management in the Republic of Serbia 2011–2023," December 2024.
<https://sepa.gov.rs>

[22] Coalition 27, Shadow Report 2024, op. cit.: environmental investment ~1% of GDP from 2021.

[23] EC, "Serbia 2025 Report." Chapter 27 opened December 2021; Chapter 10 not yet opened.
https://enlargement.ec.europa.eu/serbia-report-2025_en

Territorial Action Plan (TAP) **for Digital Innovation in Circular Construction**

SLOVAKIA

Circular DigiBuild Project
Interreg Danube Region Programme

Author: Ing. Tomáš Pavlík, MSc
Project Partner: SBA – Slovak Business Agency (PP06)
May 2026

Table of Contents

List of Abbreviations	4
1. Introduction / Executive Summary	7
2. Vision and Mission (Territorial Adaptation)	8
3. Alignment with EU Strategy for the Danube Region (EUSDR)	8
4. Strategic Pillars, Objectives, and Key Actions (National KPIs)	9
SBA Actions	9
Pillar 1: Enabling Policy & Regulatory Frameworks	10
Pillar 2: Fostering Digital Innovation & Technology Adoption	11
Pillar 3: Building Skills & Capacity	12
Pillar 4: Raising Awareness & Changing Mindsets	13
5. National Context and Challenges	14
5.1 The Full Lifecycle of Circular Construction in Slovakia	14
Phase 1: Design	15
Phase 2: Construction	16
Phase 3: Operation	17
Phase 4: Renovation & Retrofit	18
Phase 5: Demolition	19
Phase 6: Building Materials	21
5.2 The Four Pillars of Slovakia's Circular Construction Transition	23
Pillar 3. Building skills & capacity	23
Pillar 4. Raising Awareness	25
6. Financial Strategy (National Level)	26
6.1 Funding Sources	26
6.2 Budget Allocation	28
7. Implementation Plan, Stakeholder Engagement and Sustainability (National Level)	29
7.1 Institutional Reality and Governance	29
7.2 Timeline and Monitoring	29
7.3 Risk Management	30
7.4 Stakeholder Engagement	30
7.5 Sustainability and Scalability	30
8. Annexes	32

Annex A: List of Key National Stakeholders	33
Annex B: Utilized National Policy Documents or Reports	38

List of Abbreviations

Abb.	English	Slovak
AI	Artificial Intelligence	Umelá inteligencia
APVV	Slovak Research and Development Agency	Agentúra na podporu výskumu a vývoja
BIM	Building Information Modelling	Informačné modelovanie stavieb
BIMaS	BIM Association of Slovakia	BIM Asociácia Slovenska
CDW	Construction and Demolition Waste	Stavebný a demolačný odpad
CIRCO	Circular Design Methodology	Metodológia cirkulárneho dizajnu
CPD	Continuing Professional Development	Kontinuálny profesijný rozvoj
CPR	Construction Products Regulation	Nariadenie o stavebných výrobkoch
DPP	Digital Product Passport	Digitálny pas výrobku
EDIH	European Digital Innovation Hub	Európske centrum digitálnej inovácie
EED	Energy Efficiency Directive	Smernica o energetickej efektívnosti
EIB	European Investment Bank	Európska investičná banka
EOTA	European Organisation for Technical Assessment	Európska organizácia pre technické posúdenie
EPC	Energy Performance Contracting	Zmluva o energetickom výkone
EPBD	Energy Performance of Buildings Directive	Smernica o energetickej hospodárnosti budov
ERDF	European Regional Development Fund	Európsky fond regionálneho rozvoja
ESF+	European Social Fund Plus	Európsky sociálny fond Plus
EU	European Union	Európska únia
EUSDR	EU Strategy for the Danube Region	Stratégia EÚ pre dunajský región
FM	Facility Management	Správa budov / facility manažment
GDP	Gross Domestic Product	Hrubý domáci produkt
GES	Guaranteed Energy Savings	Garantované úspory energie
GPP	Green Public Procurement	Zelené verejné obstarávanie
INCIEN	Institute for Circular Economy	Inštitút cirkulárnej ekonomiky
IVU	Individual Learning Accounts	Individuálne vzdelávacie účty
IoT	Internet of Things	Internet vecí
KPI	Key Performance Indicator	Kľúčový ukazovateľ výkonnosti
LCA	Life Cycle Assessment	Posudzovanie životného cyklu
LCC	Life Cycle Cost(ing)	Náklady životného cyklu
MD SR	Ministry of Transport of the Slovak Republic	Ministerstvo dopravy SR
MH SR	Ministry of Economy of the Slovak Republic	Ministerstvo hospodárstva SR
MIRRI SR	Ministry of Investment, Regional Development and Informatics of the Slovak Republic	Ministerstvo investícií, regionálneho rozvoja a informatizácie SR

Abb.	English	Slovak
	Republic	
MŠVVa M SR	Ministry of Education, Research, Development and Youth of the Slovak Republic	Ministerstvo školstva, výskumu, vývoja a mládeže SR
ME SR	Ministry of Environment of the Slovak Republic	Ministerstvo životného prostredia SR
NARA SK	National Recycling Agency Slovakia	Národná recyklačná agentúra Slovensko
NBRP	National Building Renovation Plan	Národný plán obnovy budov
OECD	Organisation for Economic Co-operation and Development	Organizácia pre hospodársku spoluprácu a rozvoj
RMSG	Regional Multi-Stakeholder Group	Regionálna skupina viacerých zainteresovaných strán
RRF	Recovery and Resilience Facility	Mechanizmus na podporu obnovy a odolnosti
SAV	Slovak Academy of Sciences	Slovenská akadémia vied
SAŽP	Slovak Environment Agency	Slovenská agentúra životného prostredia
SBA	Slovak Business Agency	Slovak Business Agency
SEA	Strategic Environmental Assessment	Strategické environmentálne posúdenie
SIEA	Slovak Innovation and Energy Agency	Slovenská inovačná a energetická agentúra
SIH	Slovak Investment Holding	Slovenský investičný holding
SKA	Slovak Chamber of Architects	Slovenská komora architektov
SKGBC	Slovak Green Building Council	Slovenská rada pre zelené budovy
SKSI	Slovak Chamber of Civil Engineers	Slovenská komora stavebných inžinierov
SME	Small and Medium-sized Enterprise	Malý a stredný podnik
SOH SR 2035	Waste Management Strategy of the Slovak Republic to 2035	Stratégia odpadového hospodárstva SR do roku 2035
SR	Slovak Republic	Slovenská republika
STU	Slovak University of Technology in Bratislava	Slovenská technická univerzita v Bratislave
SÚTN	Slovak Institute for Technical Standardisation	Slovenský ústav technickej normalizácie
SWOT	Strengths, Weaknesses, Opportunities, Threats	Silné stránky, slabé stránky, príležitosti, hrozby
TAB	Technical Assessment Body	Orgán technického posúdenia
TAP	Territorial Action Plan	Územný akčný plán

Abb. English

TCO	Total Cost of Ownership
TSÚS	Building Testing and Research Institute
TUKE	Technical University of Košice
UNIZA	University of Žilina
UUPV	Office for Territorial Planning and Construction of the Slovak Republic
ÚVO	Office for Public Procurement
VET	Vocational Education and Training
WGG	Working Group on Governance
ZSPS	Slovak Construction Industry Union

Slovak

Celkové náklady vlastníctva
Technický a skúšobný ústav stavebný
Technická univerzita v Košiciach
Univerzita v Žiline
Úrad pre územné plánovanie a výstavbu SR
Úrad pre verejné obstarávanie
Odborné vzdelávanie a príprava
Pracovná skupina pre riadenie
Zväz stavebného priemyslu Slovenska

1. Introduction / Executive Summary

The Slovak Republic reaffirms its commitment to advancing circular economy principles in the construction sector, in line with national strategic frameworks such as the Waste Management Strategy of the Slovak Republic to 2035 (SOH SR 2035) and related policy instruments. This commitment reflects both national priorities and alignment with broader European objectives on resource efficiency and circular construction, including the 2030 Danube Region Digital Innovation Strategy for Circular Construction. This Territorial Action Plan outlines specific national actions, targets, and responsibilities to achieve the transnational strategy's vision within the Slovak Republic.

Construction is a structurally significant sector across Europe and in Slovakia alike. At the EU level, the sector contributes approximately 5–6% of GDP and accounts for around 7.5% of total employment but generates more than one-third of overall waste and is the single largest waste-generating sector. Slovakia broadly mirrors these proportions. According to estimates from the Ministry of Environment of the Slovak Republic, the country generates approximately 4.7 million tonnes of construction waste annually¹, including backfilling material.

This TAP is addressed to policymakers, public procurers, industry leaders, and civil society actors who shape the Slovak construction sector. Its purpose is twofold: to provide an honest assessment of where Slovakia stands, and to define concrete actions that can accelerate the transition toward circular and digital construction within a realistic institutional and financial context.

The benefits of this transition are tangible and distributed across all stakeholder groups. For the **state and public administration**, circular construction reduces long-term infrastructure costs through lifecycle-based procurement, improves resource security by reducing dependence on virgin raw materials, and supports compliance with an accelerating body of EU regulatory obligations. For **businesses and entrepreneurs**, it opens new market opportunities in renovation services, secondary materials processing, digital building management, and energy performance contracting — with Slovak companies well positioned to develop competitive capacity that extends beyond the domestic market. For **citizens**, it means better-quality, healthier, and more energy-efficient buildings, lower operational costs over time, and reduced environmental burden from construction waste in their communities. At the broadest level, the circular construction transition directly addresses one of the most significant sources of environmental pressure in the Slovak economy: a sector that consumes large volumes of primary raw materials, generates nearly one third of all waste, and is responsible for a substantial share of energy consumption and carbon emissions — and that has the technical and economic means to do significantly better.

Slovakia enters this TAP as an *emerging country* within the 2030 Danube Region Digital Innovation Strategy — positioned neither as a leader nor at the starting line. The sector is highly fragmented, dominated by SMEs with limited capacity for digital or circular innovation. Digitalization and circularity continue to develop in separate silos, and cross-ministerial coordination between ME SR, the Office for Territorial Planning and Construction, and other policy actors remain insufficient. These structural realities shape the ambition and scope of the actions defined in this plan.

¹ Information provided by the Ministry of Environment of the Slovak Republic

2. Vision and Mission (Territorial Adaptation)

Vision: To position Slovakia as an active bridge between advanced and early-stage Danube Region countries by 2030 — absorbing and locally adapting proven best practices from frontrunners, while embedding digital and circular construction solutions into national policy, education, and industry. Learning fast, adapting smart.

Mission: To facilitate collaboration, knowledge sharing, and the adoption of proven digital and circular solutions among Slovak stakeholders — connecting national industry, academia, and public authorities with Danube Region networks to accelerate Slovakia's construction sector transformation toward a circular economy.

3. Alignment with EU Strategy for the Danube Region (EUSDR)

The Slovak Territorial Action Plan is developed within the framework of the EU Strategy for the Danube Region (EUSDR), adopted in 2011 and revised in 2020, which provides the overarching macro-regional cooperation framework for 14 countries. Slovakia, as one of nine EU Member States in the strategy, is committed to embedding EUSDR priorities into its national actions.

The actions outlined in this TAP directly contribute to all four EUSDR pillars:

Connecting the Region - through adoption of digital tools (BIM, digital platforms, material passports) that improve interoperability and cross-border data exchange in the construction sector.

Protecting the Environment - through circular construction practices that reduce construction and demolition waste, improve resource efficiency, and lower CO₂ emissions.

Building Prosperity - through support for SME innovation, digital skills development, and creation of new circular economy business models in the construction sector.

Strengthening the Region - through active participation in transnational knowledge networks, the Circular DigiBuild cluster, and harmonization of standards with Danube Region partners.

4. Strategic Pillars, Objectives, and Key Actions (National KPIs)

Slovakia approaches implementation as an emerging country - neither at the starting line nor among the frontrunners. The strategy is not one of invention but of disciplined adoption and local adaptation of proven practices from Danube Region frontrunners. The actions defined across the following four pillars address the full lifecycle of circular construction - from design and BIM standardisation through construction procurement, building operations, demolition, and secondary materials - complemented by targeted investment in skills, certification, and awareness. The details behind each action, including current status, challenges, and evidence base, are set out in Chapter 5.

The key actions listed across the four pillars below are divided into two distinct categories. The first category comprises actions to which SBA, as national coordinator of this TAP, explicitly commits as part of its facilitative and knowledge-dissemination role within the Circular DigiBuild project and beyond. The second category comprises actions that emerge from the national analysis in Chapter 5 and are formulated as recommendations addressed to the relevant public authorities, ministries, and sectoral stakeholders identified throughout this document. This distinction reflects the institutional reality described in Chapter 7: SBA does not hold statutory authority or a dedicated implementation budget, and it would be misleading to present regulatory, procurement, or legislative actions as SBA commitments. Both categories are essential to achieving the TAP's objectives - SBA's role is to advocate, facilitate, and support the actions it does not directly lead.

SBA Actions

ID	Proposed Action	KPI	Target 2030
A	Submission of New Project Proposals → Actively participate in and submit new EU-funded project proposals related to these thematic areas in order to ensure continuity, further development of expertise, and long-term sustainability of project outcomes.	Continuous participation in EU-funded project initiatives related to the thematic areas.	2 new EU project proposals submitted as a project partner or an associated partner
B	Project Capitalization, Dissemination and Sharing of Project Results → Ensure the continued dissemination of project results and outputs after project completion. Relevant deliverables, methodologies, lessons learned, and best practices will be shared through meetings, workshops, and collaboration activities within other projects and with relevant stakeholders in the field.	Regular dissemination of project results ensured through stakeholder and other thematic-related projects activities.	10 dissemination activities organized 50 stakeholders reached
C	Sustaining and Expanding the Stakeholder Network → Maintain and further develop the existing stakeholder group by connecting stakeholders with new and ongoing projects in the relevant thematic areas. Where direct	An active and sustainable stakeholder network maintained beyond the project duration.	15 stakeholders connected to follow-up initiatives

ID	Proposed Action	KPI	Target 2030
	continuation is not possible, stakeholders will be linked with other relevant initiatives and invited to participate in events, workshops, and networking activities related to these topics.		
D	Internal Capacity Building and Knowledge Transfer → Strengthen internal capacities through the dissemination of relevant project outputs to the <i>National contact point of Slovak Business Agency for the circular economy</i> , enabling further distribution of knowledge and good practices to relevant organizations and sectoral stakeholders. Internal knowledge-sharing activities will help ensure the long-term use and sustainability of project results.	Continued knowledge-sharing and dissemination supported through existing stakeholder networks (e.g. Circular DigiBuild stakeholders group and Platform Circular Slovakia) and SBA activities implemented within national projects, state programs or other cooperations.	5 knowledge-sharing activities implemented through existing stakeholder networks and SBA activities
E	Sharing of Relevant Good Practices → Relevant good practices and useful examples identified during and after the project will be shared through the project platform in order to support the continuous exchange of knowledge and the collection of good practice examples in Slovakia.	Continuous exchange and collection of relevant good practice examples supported through the project platform.	10 good practice examples shared on the platform 15 contributions uploaded to the platform
F	Active participation in shaping the priorities of the new programming period → SBA's representatives are members of the COSME Committee and the EUSDR Priority Area 8 Competitiveness of enterprises - Working Group on Circular Economy and Bioeconomy. SBA will communicate the relevance of this topic and its incorporation among future priorities to the responsible authorities.	Sharing TAP within the working group of EUSDR and the COSME Committee and actively promoting the circular and digital construction to be explicitly recognised as a funding priority in the new programming period of Interreg Danube Region.	2 EU programmes reached out to consider the topic within the priorities in the new programming period

Pillar 1: Enabling Policy & Regulatory Frameworks

ID	Proposed Action	KPI	Target 2030
1.1	Develop a national BIM strategy defining adoption targets, standards, and an implementation roadmap	National BIM strategy adopted (Y/N)	Strategy adopted by 2027
1.2	Accelerate building permitting processes through digitalisation, building on the Digital Image of the Country programme	% of permit applications processed digitally	50% by 2030

ID	Proposed Action	KPI	Target 2030
1.3	Mandatory BIM documentation for all new publicly procured and renovated buildings throughout full lifecycle	% of new public buildings with BIM requirement in procurement	100% above threshold by 2030
2.1	Extend and enforce GPP requirements across all state-commissioned construction projects, with phased extension to municipal procurement	% of state construction contracts with GPP criteria applied	70% by 2030
2.2	Enforce the target that at least 70% of the total public procurement value is implemented through GPP by 2030	% of total public procurement value through GPP	70% by 2030
2.3	Enforce the target that 70% of the total number of public procurement contracts are implemented through GPP by 2030	% of total contracts through GPP	70% by 2030
2.4	Shift procurement evaluation from lowest price to TCO, incorporating LCA and LCC methodologies	% of public construction contracts using TCO/LCC as an evaluation criterion	30% of qualifying contracts by 2030
4.1	Comply with EPBD EU/2024/1275 - transposition and submission of National Building Renovation Plan	EPBD transposed (Y/N); NBRP submitted (Y/N)	Both completed by the end of 2026
5.1	Establish a comprehensive system for CDW data collection and public disclosure of waste information	Disaggregated CDW reporting methodology adopted (Y/N)	Adopted by 2028
5.2	Adopt and implement mandatory pre-demolition audits and selective demolition requirements for building removals	% of demolitions above the statutory threshold with completed audit	80% compliance by 2030
6.1	Finalize and adopt the update to Decree No. 344/2022 to clarify the transition from demolition waste to recycle	Updated decree adopted (Y/N)	Adopted by 2027

Pillar 2: Fostering Digital Innovation & Technology Adoption

ID	Proposed Action	KPI	Target 2030
2.5	Promote LCA/LCC methodologies as best practices via pilot projects on public buildings	Number of completed and published LCA/LCC pilot projects	5 pilot projects by 2030
3.1	Establish mandatory BIM handover quality standards for publicly procured buildings	% of newly commissioned public buildings with a verified as-built BIM model at handover	50% of qualifying buildings by 2030
3.2	Prepare a roadmap for passportization of existing public buildings	Roadmap adopted (Y/N); number of public buildings passportized	Roadmap by 2027; 500 buildings by 2030
3.3	Integrate LCC requirements into green	% of public building	50% of qualifying

ID	Proposed Action	KPI	Target 2030
	public procurement criteria for building operations	procurement documents including LCC operational cost requirements	procurements by 2030
3.4	Promote digital twin adoption through targeted support for public building operators	Number of public buildings with an operational digital twin deployed	10 pilot deployments by 2030
5.3	Develop and promote regional digital construction material exchange platforms (material banks)	Platform operational (Y/N); projects registered; volume listed (tonnes)	Piloted by 2028; 50 projects annually by 2030
6.2	Integrate secondary material requirements into green public procurement criteria	% of public construction contracts specifying minimum recycled content requirements	20% of qualifying contracts by 2030
6.3	Prepare for Digital Product Passport compliance with special attention to SMEs	Number of Slovak SME manufacturers with DPP-compliant certified secondary material products	20 SME manufacturers by 2030
6.4	Promote secondary materials use in the design phase via BIM libraries and material databases	Number of certified secondary materials listed in BIM libraries/databases used by Slovak architects	50 certified products listed by 2030
6.5	Establish a state-supported certification assistance scheme for SMEs processing secondary construction materials	Number of SMEs supported through certification assistance scheme; number of certified secondary material products brought to market	30 SMEs supported by 2030; 15 certified secondary material products on the market by 2030
8.4	Develop a dedicated online knowledge hub aggregating best practices, case studies, legislative updates, and practical tools	Platform live (Y/N); unique visitors annually	Live by 2027; 10,000 visitors annually

Pillar 3: Building Skills & Capacity

ID	Proposed Action	KPI	Target 2030
7.1	Integrate BIM literacy into secondary vocational school curricula as a baseline competency requirement	Number of vocational schools with BIM in the standard curriculum	20 schools by 2030
7.2	Establish a national certification framework for BIM and circular construction professionals	Framework adopted (Y/N); number of certified professionals	Framework by 2028; 500 certified professionals by 2030
7.3	Register circular and digital construction courses within the IVU system (vzdelavamsa.sk)	Courses in the IVU catalogue; number of participants	10 courses by 2027; 1,000 participants by 2030
8.2	Document and disseminate Slovak reference cases as the backbone of awareness activities	Number of published Slovak circular/digital construction case studies	30 case studies by 2030

ID	Proposed Action	KPI	Target 2030
8.3	Establish an annual national event on circular and digital construction	Events held annually; number of participants per event	Annually from 2027; 500+ participants per event

Pillar 4: Raising Awareness & Changing Mindsets

ID	Proposed Action	KPI	Target 2030
8.1	Launch a coordinated national awareness campaign for circular and digital construction	Estimated reach (number of people); construction companies reached	50,000 people; 2,000 companies by 2030
8.2	Document and disseminate Slovak reference cases as the backbone of the campaign	Number of published case studies publicly available	30 case studies by 2030
8.3	Establish an annual national event on circular and digital construction	Events held annually; participants per event	Annually from 2027; 500+ participants
8.4	Develop a dedicated online knowledge hub aggregating best practices, case studies, legislative updates, funding instruments, and practical tools	Platform live (Y/N); unique visitors annually	Live by 2027; 10,000 visitors annually

5. National Context and Challenges

Slovakia's construction sector is entering a period of accelerating regulatory and technological change - one that will either widen the gap with more advanced Danube Region countries or close it, depending on the policy decisions made in the next five years. The sector contributes approximately 5-6% of GDP, employs 7.5% of the national workforce, and generates nearly one third of all waste - yet it operates without a national BIM strategy, without a green procurement framework that meaningfully reaches construction, and without reliable data on its true circular performance. The following SWOT analysis provides a structured snapshot of Slovakia's starting position across the four dimensions most relevant to this TAP.

Diagram 1.: SWOT Analysis - Circular & Digital Construction in Slovakia

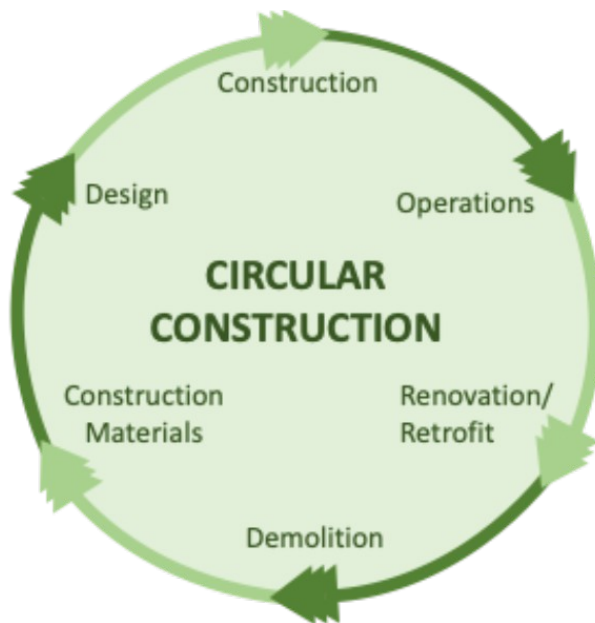
Source: Author's own processing

The actions defined across the lifecycle phases and four strategic pillars in this chapter directly target the weaknesses and threats identified above, while building on existing strengths and the policy windows that the current moment presents. The analysis below provides the evidence base and rationale behind each intervention - organised first by the six phases of the circular construction lifecycle, then by the two cross-cutting pillars of Skills & Capacity and Raising Awareness.

5.1 The Full Lifecycle of Circular Construction in Slovakia

Circular construction is not a single intervention - it is a system that spans the entire lifecycle of a construction, from initial design through construction, operation, renovation, and ultimately demolition. The diagram below illustrates this cycle encompassing six interconnected phases: **Design, Construction, Operation, Renovation/Retrofit, Demolition, and Construction Materials.**

Diagram 2.: Circular Construction



Source: Author's own processing

This TAP was developed with full awareness of all six phases. The analysis below identifies the current status and key challenges in each phase, and where the evidence and stakeholder input support actionable intervention, proposes concrete measures to accelerate digital innovation and circularity.

Phase 1: Design

The design phase represents Slovakia's strongest entry point into circular construction. Architectural and engineering firms, particularly in Bratislava, have an increasing awareness of BIM tools. According to the BIM Association of Slovakia (BIMaS), the overall BIM implementation rate reached 28.5% in 2025, with the rate for building construction even higher at 36.5%. The sector's own growth projections are optimistic: BIMaS estimates BIM could be used on up to 70% of projects within the next five years².

However, a structural anomaly undermines this progress. BIM adoption in Slovakia is driven almost exclusively by the private sector - in 2025, 56.3% of practitioners reported adopting BIM based on employer initiative, with only 3.1% citing a requirement from a public authority³. This stands in direct contrast to the experience of advanced countries within the Circular DigiBuild initiative, where state policy and regulation were the primary drivers of sector-wide adoption. The

² BIM Association of Slovakia (BIMaS). (2025). Aktuálny stav BIM na Slovensku (BIM Current Status in SR). Presented by Doc. Ing. Tomáš Funtík, PhD., Slovak Technical University, Bratislava.

³ BIM Association of Slovakia (BIMaS). (2025). Aktuálny stav BIM na Slovensku (BIM Current Status in SR). Presented by Doc. Ing. Tomáš Funtík, PhD., Slovak Technical University, Bratislava.

absence of a national BIM strategy and any public procurement mandate means that growth remains organic, uneven, and fragile.

A further structural barrier is the building permitting process. Despite the increasing volume of BIM documentation produced during design, permitting procedures continue to be based exclusively on 2D documentation, rendering BIM data irrelevant for regulatory purposes and eliminating incentives for its systematic use. In March 2026, the Government of the Slovak Republic approved the programme intent *Digital Image of the Country (Digitálny obraz krajiny)*, submitted by the Office for Territorial Planning and Construction, which aims to digitalize permitting processes. This is a significant step, though implementation timelines remain to be confirmed.

Proposed actions:

- Develop a national BIM strategy defining adoption targets, standards, and an implementation roadmap
- Accelerate building permitting processes through digitalisation, building on the *Digital Image of the Country* programme
- Introduce a mandatory requirement for all new publicly procured and publicly renovated buildings - at the state and municipal level - to maintain BIM documentation throughout the full lifecycle of the structure

Phase 2: Construction

Slovakia's construction sector is highly fragmented, with small and medium-sized enterprises (SMEs) accounting for the majority of market participants⁴. For these companies, the transition toward circular and digital construction practices presents a disproportionate burden - the investment required in tools, training, and process change is difficult to absorb without the scale that larger firms enjoy.

A critical structural factor shapes the entire sector: the state and public administration together commission approximately half of all construction output in Slovakia⁵ - highways, railways, schools, and public buildings. This concentration of public demand makes the state the single most powerful lever for sector-wide transformation. If the state does not require circular and digital practices, and is not willing to pay for them, market-wide adoption will not follow.

The current public procurement framework works against this ambition. Contracts are awarded predominantly on the basis of the lowest price. This systematically eliminates investment in innovation, education, and higher-quality materials, including recycled and secondary construction materials that carry a cost premium. While Slovakia has set an ambitious national target - the Strategy of Environmental Policy of the Slovak Republic until 2030 aims for green public procurement to represent at least 70% of the total value of public procurement - the 2023 baseline

⁴ Based on the interview with ZSPS

⁵ Based on the interview with ZSPS

stands at 17.04% by value and 19.57% by number of contracts, confirming a significant implementation gap⁶.

The solution lies in transitioning public procurement toward a Total Cost of Ownership (TCO) approach, incorporating Life Cycle Cost (LCC) and Life Cycle Assessment (LCA) methodologies. Under this framework, procurement decisions would account not only for construction cost, but for operational costs, energy performance, material durability, recyclability, and end-of-life value - reframing the economics of circular construction across the full building lifetime.

Proposed actions:

- Extend and enforce green public procurement requirements across all state-commissioned construction projects, with phased extension to municipal procurement
 - Enforce the original target of Slovakia that at least 70% of the total value of public procurement is implemented through green public procurement by 2030
 - Enforce the original target of Slovakia that 70% of the total number of public procurement contracts are implemented through green public procurement by 2030
- Shift the procurement evaluation framework from lowest price to Total Cost of Ownership (TCO), incorporating LCA and LCC methodologies as standard assessment criteria
- Promote LCA/LCC methodologies as the best practices via pilot projects

Phase 3: Operation

Evidence from standardised LCC methodologies consistently show that the operational phase accounts for the majority of total building costs over a structure's lifetime - estimates place this figure at 80% or more, significantly exceeding initial construction and fit-out costs. This makes the operational phase not only the longest, but economically the most consequential stage of any building's life. Equally, decisions made at the design stage - modelled in BIM - have a decisive and largely irreversible impact on operational costs, energy performance, and the building's long-term circular potential: what materials were chosen, how systems were designed, and how easily components can be accessed, maintained, or replaced.

Facility management (FM) software platforms form the operational backbone of modern building management. Their core functions span energy efficiency monitoring, planned and reactive maintenance, asset lifecycle tracking, space utilisation, occupant comfort and indoor environment quality, health and safety compliance, and operational cost control. When properly implemented, FM systems transform building operations from reactive to predictive - reducing costs, extending asset lifetimes, and providing the data foundation for LCC and LCA analysis.

The critical challenge in Slovakia is that this foundation is systematically absent. Industry stakeholders, including operators of leading FM platforms active on the Slovak market, report that the transition from construction to operations is the point at which BIM data most consistently fails. Delivered BIM models routinely do not reflect as-built reality - discrepancies in geometry,

⁶ Waste Management Strategy of the Slovak Republic to 2035, p. 36, available at https://www.minzp.sk/files/sekcia-enviromentalneho-hodnotenia-riadenia/odpady-a-obaly/registre-a-zoznamy/strategia_odpadoveho_hospodarstva_sr_do_2035.pdf

systems, and material specifications are common. To date, it is difficult to identify a Slovak building that has been handed over with a BIM model of sufficient quality for direct operational use without significant correction. The consequence is that building operators are forced to conduct their own asset surveys - a process known as passportization - which typically takes months to years, is labour-intensive, and represents a significant avoidable cost that ultimately burdens building owners, tenants, and in the case of public buildings, taxpayers.

Where the full data chain is intact - quality BIM at handover, integrated FM system, and IoT sensor infrastructure - the results are demonstrably positive. Digital twins, which connect a live BIM model to real-time building data, have proven effective for modelling future investment scenarios, optimising maintenance cycles, and enabling continuous LCC monitoring. These are not experimental tools: they are in active use by leading developers and operators in more advanced markets but also in Slovakia, and the underlying technology is accessible. The barrier in Slovakia is not technological readiness - it is the absence of data quality standards at handover that would make these tools viable at scale.

Proposed actions:

- Establish mandatory BIM handover quality standards for publicly procured buildings
- Prepare a roadmap for passportization of existing public buildings
 - This is a precondition for cost cutting and deployment of LCC/LCA methodologies, digital twin projects and reconstruction/retrofit planning based on data
- Integrate LCC requirements into green public procurement criteria for building operations
- Promote digital twin adoption through targeted support for public building operators

Phase 4: Renovation & Retrofit

Slovakia faces a significant and growing obligation under the revised EU Energy Performance of Buildings Directive (EPBD, EU/2024/1275, entered into force May 2024, to be transposed by May 2026). Key requirements include:

- Renovation of the **16% worst-performing non-residential buildings by 2030** and 26% by 2033
- **3% annual renovation** of central government buildings by floor area
- All new public buildings to meet **zero-emission standards by 2028**
- Each Member State to submit a **National Building Renovation Plan**

Translated into Slovak reality, Slovakia has not yet transposed the Directive nor submitted a National Building Renovation Plan. Targets are extremely challenging and significantly exceed current capacity and pace. **This TAP identifies this as a critical national issue. However, given its complexity and cross-ministerial scope, a full treatment of the renovation and retrofit challenge exceeds the boundaries of this document** and should be addressed by relevant Ministries, especially the Ministry of Transport and the Ministry of Economy.

However, it is important to mention that the EPBD obligations represent not only a compliance challenge but a significant economic opportunity for Slovakia. The scale of building renovation

required over the coming years creates direct demand for energy services, digital building management, and circular material flows - precisely the areas this TAP addresses. Energy Performance Contracting (EPC) and guaranteed energy savings schemes (known as GES - *garantované energetické služby*) offer a model where renovation is financed through future energy savings, reducing upfront barriers for building owners and creating long-term revenue streams for Slovak service providers. Slovak companies that develop competitive capacity in these areas - in renovation technologies, FM platforms, BIM-integrated LCC tools, or circular material supply chains - are positioned to expand into neighbouring markets across the Danube region and beyond.

The financing architecture also offers an underexplored opportunity. EIB Group financing in Slovakia reached €649 million⁷ in 2025, with energy upgrades among the top priorities. A deliberate shift toward revolving financial instruments - channelling a portion of EU structural funds through loan and guarantee vehicles rather than non-repayable grants - would allow the same public capital to support a significantly larger volume of renovation activity over time. Slovak Investment Holding (SIH) already operates such mechanisms in other investment areas and could provide the institutional framework for scaling this approach in the building sector. Failing to act on this window carries a symmetric risk: markets that Slovakia does not capture domestically will be entered by more prepared competitors from more advanced EU countries, displacing local firms from their own renovation supply chain.

There is an additional structural problem: renovation and energy retrofit cannot currently be easily combined in a single project under Slovak regulatory and procurement frameworks, despite being logically and economically complementary. Removing this barrier would materially accelerate Slovakia's renovation pipeline.

Proposed actions:

- Comply with the EU regulation
- Out-of-scope of this study

Phase 5: Demolition

Construction and demolition waste generation in Slovakia has remained stable over the past five years at approximately 4.7 million tonnes annually. According to the Ministry of Environment of the Slovak Republic, the CDW recovery rate calculated using the European Commission methodology stands at 89%⁸ - a figure that places Slovakia nominally above the EU's 70% target established under the Waste Framework Directive. Slovakia has met this target continuously since 2020.

From a circularity perspective, the current 70% recovery target measured by weight across all CDW streams is a necessary but insufficient metric. A more meaningful framework would

⁷ European Investment Bank (EIB). Press Release, March 2026 <https://www.eib.org/en/press/all/2026-118-slovakia-financing-from-eib-group-jumps-60-to-eur649-million-in-2025-with-focus-on-energy-upgrades-and-urban-development>

⁸ Information provided by the Ministry of Environment of the Slovak Republic

disaggregate targets by individual waste streams - distinguishing, for example, between concrete, masonry, metals, wood, and hazardous materials - and set stream-specific reuse and recycling targets that reflect the actual circular potential of each material. This would shift the policy focus from aggregate tonnage compliance (easy-to-achieve) toward genuine material quality and circularity outcomes.

On top of this, Slovakia itself acknowledges significant weaknesses in waste data collection and reporting. The reported recovery rate includes backfilling - the use of demolition material to fill excavations or level terrain - which, as discussed in the methodological context of this TAP, does not constitute genuine circularity. The share of the reported 89% attributable to backfilling versus actual material recycling and reuse is not currently disaggregated in publicly available Slovak statistics. This means the true circularity performance of the demolition phase is unknown, and so is the gap between reported compliance and genuine circular material flows.

A significant legislative step is currently in preparation. The draft amendment to the Waste Act introduces a mandatory pre-demolition audit for all building removals. The audit requires the originator of waste to conduct a systematic inventory of all materials and components prior to demolition, determine which materials are suitable for reuse or recycling, identify the presence of hazardous substances and define a waste management plan that maximises the application of the waste hierarchy and minimises landfill disposal. This is a substantive and necessary intervention. Currently, it is ineffective as the existing implementing Decree No. 344/2022 lacks a defined audit methodology and enforcement mechanisms - the planned amendments to both the Waste Act and the implementing decree aim to address this.

Beyond compliance, there is a significant untapped opportunity in developing regional digital platforms for construction material exchange. Recoverable materials are routinely lost to lower-value applications not because demand is absent, but because supply is undiscoverable - and this problem is fundamentally regional, they are highly relevant to one within the same region. Slovakia's administrative regions provide a natural framework for piloting such an approach, where pre-demolition audit data feeds directly into a regional materials catalogue, making secondary materials visible and accessible to local contractors, processors, and developers before demolition commences.

Proposed actions:

- Establish a comprehensive system for waste data collection and public disclosure of waste information
- Adopt and implement the mandatory pre-demolition audits and selective demolition requirements
- Develop and promote regional digital construction material exchange platforms (material banks)

Phase 6: Building Materials

The building materials phase is the point at which the entire value of the demolition and recovery process is either realised or lost. Recovered demolition waste only delivers genuine circular value

if secondary and recycled materials are actively promoted, quality-certified, and integrated into new construction. This phase is therefore the logical continuation of Phase 5 - what is recovered from demolition must find its way back into the material supply chain as a verified, market-ready product.

The overarching regulatory objective is clear: maximise the utilisation of CDW as secondary raw material and minimise landfill disposal. Slovak legislation addresses both sides of this equation. On the utilisation side, Act No. 79/2015 Coll. as amended by Act No. 230/2022 Coll. obliges originators of waste from buildings with a built-up area exceeding 300 m² to ensure recovery, recycling, or reuse of at least 70% by weight of construction and demolition waste. The practical conditions under which recovered demolition materials can be reclassified from waste to recycate - and the requirements for placing them on the market - are defined in Decree No. 344/2022 Z.z. on construction and demolition waste. The Ministry of Environment is currently preparing an update to this decree, with the intention of revising the criteria for classifying removed construction materials as by-products and establishing clearer conditions for their market use. This update is significant: the rules governing the transition from waste to secondary material are the legal foundation on which any secondary materials market depends.

However, cost remains a critical barrier: recycled materials must meet the testing, load-bearing, and conformity requirements - a process that is disproportionately expensive for the SMEs that dominate Slovakia's construction sector. Public investment in shared testing infrastructure and subsidised conformity pathways would materially lower the market entry barrier for secondary construction materials - enabling Slovak SMEs to compete on quality rather than absorb certification costs that currently make circularity commercially unviable.

On the landfill minimisation side, Slovakia has progressively increased landfill fees for industrial and construction waste, making disposal the most expensive waste management option and creating a financial incentive to seek recovery alternatives. This pricing pressure is an important but insufficient driver - it pushes material away from landfill without necessarily directing it toward high-value reuse.

A further and significant regulatory shift is approaching at the EU level. The revised Construction Products Regulation (EU) 2024/3110, in force since January 2025, introduces mandatory Digital Product Passports (DPP) for construction products - including products made from used and recycled materials - providing structured data on composition, recycled content, environmental performance, and end-of-life guidance. DPPs become mandatory for manufacturers from approximately January 2028, with full compliance required by 2032. The Ministry of Transport is the key national institution responsible for product certification under this framework. DPPs are directly relevant to secondary materials: they will require manufacturers of recycled construction products to document and disclose the material composition and environmental performance of their outputs in a standardised, machine-readable format - creating the transparency that buyers, architects, and procurement authorities need to confidently specify secondary materials.

Despite this evolving framework, the Slovak market for secondary construction materials remains underdeveloped. The circular potential of demolition waste can only be realised if secondary and recycled materials are actively promoted, quality-certified, and integrated into new design. This requires development of innovative construction products from demolition-sourced materials, a certification and quality assurance framework for secondary materials, financial or procurement

incentives favouring their use, and mechanisms to bring these new material options to the attention of architects and designers at the earliest design stage - where material choices are made and where substitution is still cost-effective.

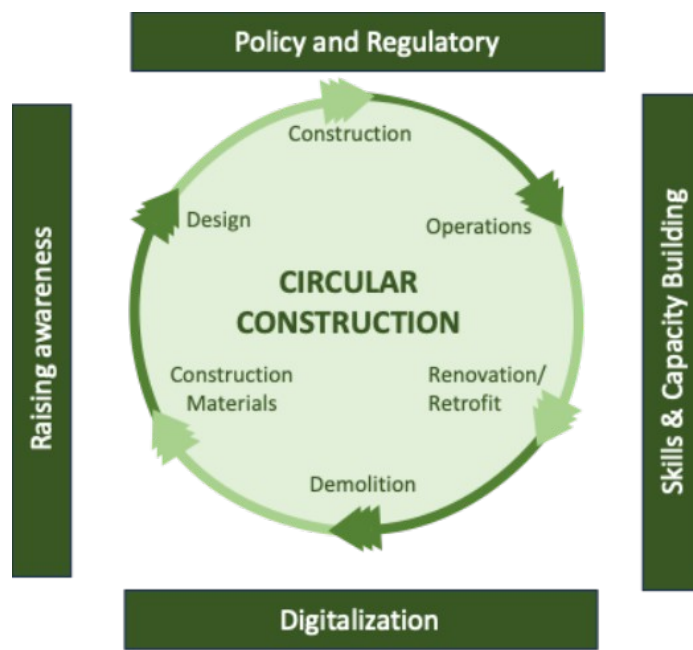
Proposed actions:

- Finalize and adopt the update to Decree no. 344/2022 to clarify the transition from demolition waste to recycle
- Integrate secondary material requirements into green public procurement criteria
- Prepare for Digital Product Passport compliance with special attention to SMEs - to make certification affordable for them
- Promote secondary materials use in the design phase
- Establish a state-supported certification assistance scheme for SMEs processing secondary construction materials

5.2 The Four Pillars of Slovakia's Circular Construction Transition

The lifecycle phases analysed in the preceding section do not operate in isolation - they are enabled, accelerated, or constrained by four cross-cutting pillars that form the structural backbone of this TAP, as suggested by the central project template.

Diagram 3.: Circular Construction and the Pillars



Source: Author's own processing

As illustrated in the diagram, the six construction lifecycle phases sit at the centre of a framework shaped by Policy & Regulatory conditions, Digitalization, Skills & Capacity Building, and Raising Awareness. These pillars are not sequential - they operate simultaneously and reinforce each other: the best BIM mandate is ineffective without trained professionals to implement it; the most comprehensive awareness campaign delivers little without the regulatory framework to back it up. For Pillars 1 (Policy & Regulatory) and 2 (Digitalization), the detailed action tables and KPIs are set out in the preceding lifecycle analysis, where each phase-specific intervention has already been mapped to its policy and digital enablers. This section focuses on Pillars 3 and 4 - Building Skills & Capacity and Raising Awareness - which cut across all six lifecycle phases and require dedicated treatment as standalone strategic priorities.

Pillar 3. Building skills & capacity

The construction sector employs approximately 7.5% of Slovakia's workforce. According to the Sectoral Council's *Strategy for Human Resource Development to 2050* (2025)⁹, the shortage of

⁹ Stratégia rozvoja ľudských zdrojov v nových demografických, technologických a environmentálnych podmienkach dostupná na <https://www.ruzsr.sk/media/9f282694-209f-4e72-82de-116ca7f2dc07.pdf>

qualified labour is one of the most pressing challenges, compounded by unfavourable demographic trends, an ageing workforce averaging 47 years, low wage attractiveness, and accelerating technological change that existing educational pipelines are not equipped to address.

Higher Education

Slovakia has four universities with construction-relevant faculties: STU Bratislava (the largest, with nearly 2,000 students), the University of Žilina, the Technical University of Košice, and the Technical University in Zvolen, which specialises in timber construction. While these institutions provide solid technical foundations, circular construction, LCA, CDW management, and digital-circular integration are absent as standalone programmes at all four - relevant content appears only as fragmented elective modules.

Secondary and Vocational Education

BIM is currently implemented in only a handful of Slovak vocational schools, despite the industry expecting it to become a baseline competency at every level of the workforce. The ability to open and read a BIM model is fast becoming a basic professional skill, and the gap between this expectation and school curricula is widening.

On the circular construction side. INCIEN - the Institute for Circular Economy - is developing a five-module training methodology for secondary vocational schools under the Sus-Con VET project. The modules cover legislation, education, materials, and waste management, and are designed to be equally applicable at higher vocational and university level. Completion is expected in 2027.

Industry reports some impact on state curricula but translating sectoral signals into updated school programmes typically takes years.

A broader recommendation emerging from stakeholder consultations is to strengthen the link between vocational schools and local employers - moving beyond occasional internships toward structured arrangements where students work on real projects at real worksites as an integrated part of their curriculum.

Lifelong Learning

Slovakia's newly launched Individual Learning Accounts (IVU, April 2026¹⁰) allow every citizen from age 16 to select a course from certified providers and receive a state subsidy - with €10.4 million¹¹ budgeted over three years. The reform also introduces micro-credentials and recognition of competencies acquired through practice, directly relevant for construction workers. Circular and digital construction courses are not yet present in the IVU catalogue - a gap and an immediate opportunity.

In Slovakia no national BIM or circular construction certification programme exists. This is one of the common tools for support in neighbouring more advanced countries.

¹⁰ <https://vzdelavamsa.iedu.sk/>, <https://epale.ec.europa.eu/en/content/slovakia-starts-individual-learning-accounts-april-1st>

¹¹ <https://www.minedu.sk/ministerstvo-skolstva-spusta-individualne-vzdelavacie-ucty-pre-dospelych/>

Proposed actions:

- Integrate BIM literacy into secondary vocational school curricula as a baseline competency requirement
- Establish a national certification framework for BIM and circular construction professionals
- Register circular and digital construction courses within the IVU system
- Develop a national repository of Slovak circular construction case studies
- Launch co-financed upskilling support for SMEs through EU structural fund instruments, targeting circular and digital construction skills for SME owners, site managers and technicians, linked to the national certification framework

Pillar 4. Raising Awareness

Slovakia has no coordinated national awareness campaign specifically targeting circular or digital construction. Relevant activities exist but are fragmented across multiple organisations, each covering a different audience segment without systemic coordination or sustained public funding. The result is that awareness of circular and digital construction practices remains confined largely to early adopters and innovation-oriented firms - while the majority of the sector, dominated by SMEs, remains largely unreached.

The landscape of active organisations is as follows. **INCIEN** is the most active player in circular economy awareness, delivering training for businesses and public institutions, educational programmes for schools, and collaborative projects with international partners. **Circular Slovakia** is a national cluster bringing together more than 50 members from the public, private, and non-governmental sectors. The cluster is the organizer of Circular Summits in Slovakia, aimed at helping businesses and the public understand the circular economy as a sustainable and competitive model.

BIMaS is the primary awareness platform for digital construction, reaching practitioners through the National BIM Conference, BIM Summit and BIM4FREE events - but operating entirely on membership fees and sponsorship without state support. **Slovak Business Agency (SBA)** runs several projects relevant to circular economy adoption by SMEs, including awareness workshops, business vouchers for advice and diagnostics in the circular economy and business advisory services through a national contact point for the circular economy. **SAŽP** manages environmental awareness activities and the GPP monitoring portal, but without construction-specific campaign content. **ME SR** communicates on waste management and circular economy at the policy level, again without a targeted construction sector campaign.

The common thread across all these actors is capacity constraint: each operates within its own mandate and funding envelope, reaching its own audience, without a shared communication platform or joint campaign infrastructure. Slovak reference cases - real projects demonstrating circular and digital construction in practice - are poorly documented and not systematically disseminated, which limits the persuasiveness of any awareness effort directed at sceptical SME audiences.

Proposed Actions

- Launch a coordinated national awareness campaign for circular and digital construction
- Document and disseminate Slovak reference cases as the backbone of the campaign
- Establish an annual national event on circular and digital construction
- Develop a dedicated online knowledge hub aggregating best practices, case studies, legislative updates, available funding instruments, and practical tools

6. Financial Strategy (National Level)

6.1 Funding Sources

Slovakia's financial strategy for circular and digital construction is shaped by a fundamental structural constraint: the national budget carries a significant infrastructure debt with limited capacity for new sectoral investment. Approximately 80%¹² of public investment is financed through EU sources - predominantly EU Structural and Cohesion Funds and the Recovery and Resilience Facility. This dependency defines both the near-term opportunity and the medium-term risk: EU funds provide the scale that national budgets cannot match, but their fragmentation across thematic calls and managing authorities creates the coordination inefficiencies identified throughout this TAP, and their availability is not permanent.

Looking ahead, the role of the national budget will inevitably grow. Discussions on the post-2027 programming period - covering 2028-2034 - suggest that the overall envelope available to Slovakia may be smaller, and that a portion of funding will be redirected toward so-called dual-use technologies. This redirection is worth monitoring closely: energy infrastructure has been designated as critical infrastructure and may qualify for several dedicated calls under dual-use funding mechanisms, creating a financing opportunity that Slovak stakeholders in circular construction - particularly in building renovation and energy efficiency - could proactively explore.

In the near term, the following funding sources remain the primary financing vehicles:

EU Structural and Cohesion Funds (ERDF, ESF+, Cohesion Fund) are the backbone of Slovak public investment in construction, environment, and skills. Within the 2021-2027 programming period, the Programme Slovakia allocates funds across themes directly relevant to this TAP - including building renovation, environmental infrastructure, digitalisation, and workforce development. Circular and digital construction requirements should be systematically embedded as eligibility conditions across relevant calls to avoid the fragmentation identified in Phase 2 and Phase 4 of this TAP.

Critically, the next programming period (2028-2034) is currently being shaped. Budgets, thematic priorities, and eligibility conditions are under active negotiation - and this window will close. **Slovakia must engage proactively in the design of the new programmes to ensure that circular and digital construction is explicitly recognised as a funding priority**, that integrated

¹² This is generally accepted consensus quoted by policy makers, researchers or media. See i.e. public quotes by Supreme Audit Office of the Slovak Republic (NKU) or Head of the Representation of the European Commission in the Slovak Republic

renovation calls are enabled rather than fragmented by theme, and that SME support instruments are included from the outset. Influence at this stage costs significantly less than trying to retrofit priorities into a programme already agreed.

Recovery and Resilience Facility (RRF) had dedicated allocation €620 mil within the Component 2 which makes it the single largest dedicated financing instrument for building renovation in Slovakia's recent history. It is nearing the end of its operational life and cannot be relied upon as a sustained financing vehicle beyond the current programming cycle.

Horizon Europe and Digital Europe provide competitive research and innovation funding directly accessible to Slovak universities, research institutions, and companies. Experience however shows that the programme is extremely competitive.

Interreg Danube Region Programme is the direct funding vehicle for Circular DigiBuild and its successor activities. Slovakia should maintain active participation and position national stakeholders as consortium partners and, where possible, lead partners in future calls.

European Investment Bank (EIB) and revolving instruments - EIB Group financing in Slovakia reached €649¹³ million in 2025, with energy upgrades among the stated priorities. A deliberate shift toward revolving financial instruments - channelling a portion of ERDF allocations through loan and guarantee vehicles administered via Slovak Investment Holding (SIH) rather than non-repayable grants - would allow the same public capital to support a significantly larger volume of renovation and circular construction activity over time. This shift is particularly relevant as grant-based RRF funding winds down.

Private investment and Public-Private Partnerships - Energy Performance Contracting (EPC) and guaranteed energy savings schemes (GES) offer a model where renovation is financed through future energy savings, reducing upfront public expenditure and creating long-term revenue streams for Slovak service providers. Targeted de-risking instruments - guarantees and first-loss tranches administered through SIH - could accelerate private market entry, particularly for SMEs developing capacity in renovation services, FM platforms, and circular material supply chains.

6.2 Budget Allocation

It is important to be transparent about the institutional reality: the Slovak Business Agency (SBA) serves as the national coordinator and knowledge dissemination hub for this TAP. SBA does not hold a dedicated implementation budget and is financed through project-based mechanisms. Its primary contribution to TAP implementation is therefore coordinative and facilitative - connecting stakeholders, disseminating knowledge, contributing to the project platform, and advocating for the integration of circular and digital construction priorities into the financing instruments administered by other bodies.

¹³ European Investment Bank (EIB). Press Release, March 2026 <https://www.eib.org/en/press/all/2026-118-slovakia-financing-from-eib-group-jumps-60-to-eur649-million-in-2025-with-focus-on-energy-upgrades-and-urban-development>

7. Implementation Plan, Stakeholder Engagement and Sustainability (National Level)

7.1 Institutional Reality and Governance

Slovakia's implementation model is shaped by a clear institutional reality: SBA, as the national coordinator of this TAP, operates as a knowledge and facilitation hub without a dedicated implementation budget or statutory authority over the sector. This is not a weakness to be hidden but a starting condition to be designed around. The TAP's implementation, therefore, depends on SBA's ability to connect, convene, and advocate - mobilising the authority and resources of other institutions rather than substituting for them.

Effective implementation of this TAP requires the active engagement of all four helices of the innovation ecosystem: public authorities providing regulatory frameworks and funding, industry and SMEs implementing and investing, research and education institutions generating knowledge and building capacity, and civil society ensuring public legitimacy and demand-side pressure. This quadruple helix logic underpins the stakeholder engagement model described below - no single actor can drive Slovakia's circular construction transition alone, and SBA's coordinative role is precisely to activate and connect these four groups around shared objectives.

The TAP's coordination model is built around Slovakia's active participation in the International Circular Construction Platform,¹⁴ one of the key outputs of the Circular DigiBuild project. SBA, as national TAP coordinator, will proactively engage Slovak stakeholders - key ministries, industry associations, research institutions, and civil society organisations - in this international platform, ensuring that Slovak perspectives are represented and that relevant knowledge, methodologies, and best practices from across the Danube Region flow back into the national context. At the national level, SBA will disseminate platform outputs, facilitate stakeholder connections, and advocate for the integration of circular and digital construction priorities into relevant policy and funding processes - without the overhead of a formal national governance body.

7.2 Timeline and Monitoring

Implementation of this TAP operates on two distinct tracks. The first comprises SBA's own continuous commitments, which run across the full 2025–2030 horizon without fixed phase boundaries. Progress against the KPIs defined for each commitment will be tracked on an ongoing basis, with an annual summary review conducted to assess overall advancement and inform any necessary adjustments.

The remaining proposed actions set out in Chapter 4 — those formulated as recommendations addressed to public authorities, ministries, and sectoral stakeholders — are accompanied by indicative implementation timelines in the respective pillar tables. These timelines reflect the analytical findings of this TAP and serve as a reference framework for the responsible actors. SBA does not assume a monitoring obligation in respect of these actions and cannot commit to their delivery; however, SBA reserves the right to include selected recommended actions in its monitoring scope where this is deemed relevant and feasible.

¹⁴ As of now the proposed name is B2B Platform for Circular and Digital Construction

7.3 Risk Management

The principal risks to TAP implementation and their mitigations are as follows. Fragmented political ownership across multiple ministries is the highest-probability risk - mitigated by embedding TAP priorities into formal inter-ministerial processes (the new programming period negotiations, EPBD transposition working groups, and the SOH SR 2035 review cycle) rather than relying on voluntary coordination alone. Low industry uptake, particularly among SMEs, is addressed through the awareness, skills, and financial instruments defined in Chapters 4-6. Funding discontinuity after the conclusion of Circular DigiBuild is expected to be partially mitigated by the project consortium's plan to contribute to the international platform through project-based financing and progressively embedding key actions in regulatory and procurement mechanisms that are intended to reduce reliance on project funding. Political will and regulatory capacity remain external risks that this TAP cannot fully control but can partially address by building a visible, evidence-based constituency for action.

7.4 Stakeholder Engagement

The project platform serves as a collaborative space that connects and engages diverse stakeholder groups, but different stakeholder groups require tailored approaches. **Public authorities** - national ministries and municipalities - will be engaged through formal policy processes: programming period negotiations, legislative consultations, and procurement framework reviews. **Industry associations and SMEs** will be reached through BIMaS, ZSPS, and Circular Slovakia's existing networks, with SBA providing direct SME advisory support through its existing business development infrastructure.

Research and education institutions will be engaged through the curriculum development processes identified in Chapter 5, Horizon Europe consortia, and the case study documentation programme. **Financial institutions** - EIB, SIH, and commercial banks active in building renovation financing - will be engaged in the design of revolving instruments and EPC frameworks. **Civil society and the general public** will be reached through the national awareness campaign and knowledge hub defined in Chapter 4.

7.5 Sustainability and Scalability

The long-term sustainability of this TAP rests on three mechanisms.

First, regulatory embedding: actions that are translated into legislative requirements - BIM handover standards, pre-demolition audits, GPP criteria, DPP compliance - become self-sustaining once enacted and do not depend on project funding.

Second, market development: as secondary material markets, EPC services, and digital building management platforms mature, commercial incentives replace public subsidy as the primary driver of adoption.

Third, institutional continuity: the project platform, envisioned as a digital portal combining information sharing, best practice dissemination, and stakeholder networking, represents the core institutional legacy of this TAP. The project consortium's plan to sustain this platform beyond the project completion provides the organisational anchor for long-term coordination.

8. Annexes

Annex A: List of Key National Stakeholders Involved.

Annex B: Utilized National Policy Documents or Reports.

Annex A: List of Key National Stakeholders

TAP Coordinator

Slovak Business Agency (SBA) National coordinator of this Territorial Action Plan within the Circular DigiBuild project. SBA serves as the primary knowledge dissemination and stakeholder coordination hub without a dedicated implementation budget - its contribution is coordinative and facilitative. Following the conclusion of the Circular DigiBuild project, SBA plans to contribute to the project's knowledge and stakeholder platform for circular and digital construction, envisioned as a digital portal combining information sharing, best practice dissemination, and stakeholder networking.

Public Authorities and Regulatory Bodies

Ministry of Environment of the Slovak Republic (Ministerstvo životného prostredia SR — ME SR) Responsible for circular economy policy, waste management legislation, and implementation of parts of the Recovery and Resilience Plan (Component 2 - Building Renovation, REPowerEU chapter). Primary authority for CDW recovery policy, demolition waste regulation, the Waste Management Strategy of the Slovak Republic to 2035 (SOH SR 2035), and the update of Decree No. 344/2022 on construction and demolition waste. Also responsible for monitoring and reporting on green public procurement indicators. Key institution across Pillars 1, 2, and 4.

Office for Territorial Planning and Construction of the Slovak Republic (Úrad pre územné plánovanie a výstavbu SR - UUPV) Established in 2022 as the central state authority for building legislation, construction permits, and digitalisation of construction processes. The new Building Act (No. 25/2025 Z.z.) mandates digitalisation of territorial plans for all regional cities by 2026 and the entire country by 2032. UUPV submitted the Digital Image of the Country (Digitálny obraz krajiny) programme intent - approved by the Government of the Slovak Republic in March 2026 - which aims to digitalise building permitting processes with a planned timeline to end of 2026. Key institution for BIM mandate development, permitting reform, and BIM handover quality standards under Pillars 1 and 2.

Ministry of Transport of the Slovak Republic (Ministerstvo dopravy SR) Primary national authority responsible for the transposition of EPBD (EU/2024/1275) into Slovak law via amendment of Act No. 555/2005 Z.z. on energy performance of buildings, and for submission of the National Building Renovation Plan (NBRP) - deadline end of 2026. Key partner for renovation framework and energy efficiency policy actions under Pillar 1. Under CPR 2024/3110, the Ministry of Transport also serves as the designated national competent authority responsible for market surveillance of construction products and oversight of the Digital Product Passport framework in Slovakia.

Ministry of Economy of the Slovak Republic (Ministerstvo hospodárstva SR) Supervisory ministry of the Slovak Business Agency. Co-responsible for the transposition of the Energy Efficiency Directive (EED) alongside the Ministry of Transport. Relevant for SME support instruments and green economy initiatives.

Ministry of Investment, Regional Development and Informatisation of the Slovak Republic (MIRRI SR) Responsible for Slovakia's digital transformation strategy, coordination of EU structural funds, and preparation of Slovakia's Partnership Agreement for the 2028–2034 programming period. Lead authority for digital infrastructure and key institution for knowledge hub development and revolving financial instrument design under Pillars 2 and 4.

Ministry of Education, Research, Development and Youth of the Slovak Republic (Ministerstvo školstva, výskumu, vývoja a mládeže SR - MŠVVaM SR) Responsible for the national education system including vocational schools and the newly launched Individual Learning Accounts (IVU) system - operative from April 2026 via vzdelavamsa.sk. Key institution for curriculum reform, national certification framework, and upskilling programme under Pillar 3.

Office for Public Procurement (Úrad pre verejné obstarávanie - ÚVO) National authority responsible for public procurement legislation and monitoring. Key partner for implementing green public procurement requirements, TCO/LCC evaluation criteria, and recycled content mandates under Pillar 1.

Slovak Innovation and Energy Agency (Slovenská inovačná a energetická agentúra — SIEA) Intermediary body for the Slovakia Programme 2021–2027, administering calls for energy efficiency in public buildings and enterprises. Coordinator of EDIH EXPANDI 4.0 (co-financed by the Digital Europe Programme and RRF). Key institution for financial instruments and SME digitalisation support under Pillars 1 and 2.

Slovak Environment Agency (Slovenská agentúra životného prostredia - SAŽP) Technical body under ME SR responsible for monitoring circular economy indicators, administering the green public procurement monitoring portal (gpp.sazp.sk), organising capacity building workshops, and producing analytical publications on circular economy in Slovakia. Key institution for data collection, baseline measurement, and monitoring framework implementation across all pillars.

European Investment Bank (EIB) - Slovak Operations The EIB Group is Slovakia's largest multilateral financing partner, with total financing reaching €649 million in 2025 - a 60% increase year-on-year - with energy upgrades and urban development among the stated priorities. The EIB provides both direct lending to public entities and guarantees supporting SME financing through intermediary banks. In the context of this TAP, the EIB is a key partner for structuring revolving financial instruments for building renovation and circular construction, in coordination with Slovak Investment Holding (SIH). EIB financing is particularly relevant for scaling Energy Performance Contracting (EPC) schemes and for de-risking private investment in circular construction services.

Statistical Office of the Slovak Republic (Štatistický úrad SR - ŠÚ SR) National statistical authority responsible for publishing construction sector statistics, waste generation data, and employment figures. Key institution for improving CDW data disaggregation and monitoring framework under Pillar 1.

Technical and Certification Bodies

TSÚS - Technický a skúšobný ústav stavebný, n.o. Slovakia's notified body (No. 1301) for construction product certification under the EU Construction Products Regulation (CPR). Also designated as a Technical Assessment Body (TAB) and a member of EOTA. Supports the Ministry of Transport for implementing the new CPR 2024/3110 requirements, including Digital Product Passports (DPP) and for developing accessible certification pathways for SME processors of secondary construction materials.

SÚTN - Slovenský ústav technickej normalizácie National standardization body responsible for transposing EU harmonized standards into Slovak national standards. Key institution for standard harmonization actions under Pillar 1.

Industry Associations

BIM Association of Slovakia (BIMaS) Professional association active since 2013, representing BIM professionals across architecture, engineering, and construction. Organises the annual National BIM Conference, BIM Summit, and BIM4FREE educational events. Conducts the annual national BIM implementation survey - the primary source of BIM adoption data in Slovakia. Developed a national BIM implementation strategy in collaboration with SKSI and SKA. Participant in the EU BIM Task Group and buildingSMART International. Key institution for BIM adoption, training, certification framework development, and awareness activities under Pillars 2, 3, and 4.

Slovak Construction Industry Union (Zväz stavebného priemyslu Slovenska - ZSPS) Primary industry association representing construction companies. Chairs the Sectoral Council for Construction, Geodesy and Cartography, which published the Strategy for Human Resource Development to 2050. Active in discussions on digitalisation, decarbonisation, and workforce development. Provided direct stakeholder input to this TAP on GPP, BIM adoption barriers, and SME capacity constraints. Key institution for industry engagement under Pillars 1, 3, and 4.

Slovak Chamber of Civil Engineers (Slovenská komora stavebných inžinierov - SKSI) Professional chamber representing authorised civil engineers. Responsible for mandatory continuing professional development (CPD) for licensed professionals. Key institution for integrating circular and digital construction content into CPD requirements and for developing the national certification framework under Pillar 3.

Slovak Chamber of Architects (Slovenská komora architektov - SKA) Professional chamber representing authorised architects. Key institution for integrating circular design principles, secondary material specifications, and BIM-based lifecycle thinking into architectural practice, and for CPD reform under Pillar 3.

Civil Society and Circular Economy Organizations

INCIEN - Inštitút cirkulárnej ekonomiky - Leading Slovak civil society organisation focused on circular economy education, research, and advocacy. Delivers circular economy training for businesses and public institutions in collaboration with SBA. Developing the Sus-Con VET five-module training methodology for secondary vocational schools (completion 2027) in partnership

with organisations from Latvia, Spain, Cyprus, and Bulgaria. Provided direct stakeholder input to this TAP on capacity building gaps and awareness challenges. Key institution for education, training, and awareness activities under Pillars 3 and 4.

Circular Slovakia is a public-private platform and cluster supporting Slovakia's transition to a circular economy. It brings together more than 50 members from the public, private, and non-governmental sectors. As an umbrella organization, it builds a network of active stakeholders and creates space for dialogue, networking, and the exchange of knowledge and experience at both national and international levels. Through education and awareness-raising activities, it also helps strengthen capacities in the field of circular economy and provides practical tools for its implementation. The platform is the organizer of Circular Summit in Slovakia, aimed at helping businesses and the public understand the circular economy as a sustainable and competitive model. Key institution for stakeholder networking, business model innovation, and knowledge dissemination under Pillar 4.

Slovak Green Building Council (SKGBC) Founded in 2010, SKGBC is the primary ambassador for sustainable construction in Slovakia, bringing together companies from across the construction ecosystem to advance ecological, economical, and social aspects of sustainable building. With 90 members, the council organises the annual Green Building Summit and Green Building Academy, participates in the legislative process, and connects Slovak practitioners to international best practice through the World Green Building Council network. Key institution for awareness and sustainable design integration under Pillars 3 and 4.

Research and Education Institutions

Slovak University of Technology in Bratislava - Faculty of Civil Engineering (STU SvF) Largest construction education and research institution in Slovakia, with nearly 2,000 students across eight accredited programmes. The Faculty of Civil Engineering participates in the EU BIM Task Group. Primary academic partner for BIM research, LCA/LCC pilot projects, curriculum development, and Horizon Europe consortium participation. Key institution under Pillars 2 and 3.

Slovak University of Technology in Bratislava - Faculty of Architecture and Design (STU FAD) The Faculty of Architecture and Design at STU Bratislava is an active contributor to digital construction research and education, with BIM integrated into its curriculum and research activities. The faculty operates the XR Lab - a specialised research and teaching centre focused on extended reality (XR) technologies

Technical University of Košice (Technická univerzita v Košiciach - TUKE) Second major technical university with relevant civil engineering and construction faculties. Key institution for regional capacity building and curriculum development under Pillar 3.

University of Žilina - Faculty of Civil Engineering (UNIZA) Third major civil engineering faculty in Slovakia. Key institution for curriculum development and regional engagement under Pillar 3.

Technical University in Zvolen (Technická univerzita vo Zvolene) Trains construction professionals with a particular emphasis on timber as a structural material — directly relevant to

circular material flows and bio-based construction innovation. Key institution for timber construction and circular materials research under Pillars 2 and 3.

Slovak Academy of Sciences (Slovenská akadémia vied - SAV) Relevant for R&D collaboration in advanced materials and circular construction innovation.

Slovak Research and Development Agency (Agentúra na podporu výskumu a vývoja - APVV) National R&D funding agency. Key instrument for co-financing collaborative research projects on digital tools for circular construction

Others

Cyrkl Slovak digital platform for secondary materials exchange, already operational in the Slovak market. Identified as a potential foundation or institution for a national demolition materials marketplace under Pillar 4.

bAvenir develops a digital platform supporting the upcycling process in the construction and manufacturing industries, with a focus on timber and concrete material streams as part of the **CIRCULess project** (Horizon Europe).

NARA SK — National Recycling Agency Slovakia - A non-profit expert organisation dedicated to improving circular economy processes and addressing environmental issues in Slovakia. NARA SK is actively engaged in national and international projects focused on the transition to a circular economy, conducts life cycle assessments (LCA) and life cycle costing (LCC) of buildings and products, builds research and innovation partnerships, and provides expert consultancy on green infrastructure.

Annex B: Utilized National Policy Documents or Reports

National Legislation

Waste Management

Document	Key Provisions	Status
Act No. 79/2015 Coll. on Waste, as amended by Act No. 230/2022 Coll.	Primary waste management act. Amendment introduced mandatory selective demolition, on-site waste sorting, reporting obligations, and a 70% recycling target by weight for construction waste from buildings above 300 m ²	In force
Decree ME SR No. 344/2022 Coll. on construction and demolition waste	Specifies procedures, documentation requirements, and conditions for by-products classification of removed construction materials	In force; update under preparation
Decree No. 382/2018 Coll. on waste landfilling	Defines inert waste categories relevant to CDW management	In force
Decree ME SR No. 371/2015 Coll. implementing provisions of the Waste Act	Implementing regulations for the Waste Act	In force

Construction and Planning

Document	Key Provisions	Status
Act No. 200/2022 Coll. on Territorial Planning	Legal framework for digital territorial planning, in effect from 1 April 2024	In force
Act No. 25/2025 Coll. — New Building Act	Replaces Act No. 50/1976 Coll. Introduces mandatory digitalisation of construction processes, a new permit system, and Portál výstavby platform. Mandates digitalisation of territorial plans for regional cities by 2026 and the entire country by 2032	In force from 1 April 2025
Act No. 555/2005 Coll. on Energy Performance of Buildings	Primary legislative instrument for EPBD transposition; amendment in preparation	Amendment pending; deadline May 2026

National Strategic Documents

Document	Responsible Body	Status
Envirostratégia 2030 — Strategy of Environmental Policy of the Slovak Republic until 2030	Ministry of Environment SR	In force; identifies Slovakia's main environmental challenges
Stratégia odpadového hospodárstva SR do roku 2035 (SOH SR 2035) — Waste Management Strategy to 2035	Ministry of Environment SR	SEA process initiated April 2025; consolidates Waste Management Plan, Waste Prevention Programme, and Food Waste Prevention Programme; CDW explicitly addressed as priority material flow
Circular Economy Roadmap for Slovakia — <i>Closing the Loop in Slovakia</i> (OECD, 2020)	ME SR + OECD + European Commission	Published; construction sector explicitly addressed with over 30 concrete policy recommendations
Waste Prevention Programme	Ministry of Environment SR	In force from 2019
Waste Management Programme 2021–2025	Ministry of Environment SR	Current framework document
Recovery and Resilience Plan — Component 2: Building Renovation (€620 million) + REPowerEU Building Renovation (€403 million)	Government of SR / ME SR	Active; includes Reform 3 on construction waste management and a platform for energy performance data of public buildings; operational deadline 2026
Digitálny obraz krajiny (Digital Image of the Country)	Office for Territorial Planning and Construction SR (UUPV)	Approved by the Government of SR in March 2026; aims to digitalise building permitting, automate construction approvals, and improve the quality of territorial plans; expected implementation by the end of 2026
Slovakia's Digital Transformation Strategy 2030	MIRRI SR	In force; covers AI, IoT, and blockchain relevant to construction digitalisation
Slovakia RIS3 2021+	MIRRI SR	In force; circular economy and digital technologies included as priority areas
Guide to Construction and Demolition Waste Management (<i>Príručka nakladania so stavebným odpadom a odpadom z demolácií</i>)	Ministry of Environment SR	Published; practical guidance for waste producers, contractors, and authorities on selective demolition, waste sorting, documentation, and recovery pathways
Human Resources Development Strategy (<i>Stratégia rozvoja ľudských zdrojov v nových demografických, technologických a environmentálnych</i>)	Sectoral Council for Construction, Geodesy and Cartography	Published 2025; identifies BIM, digitalisation, automation, and green transformation as priority competency areas. Available at: ruzsr.sk

Document	Responsible Body	Status
<i>podmienkach do roku 2050)</i>		
Green Public Procurement Action Plan (<i>Akčný plán zeleného verejného obstarávania</i>)	Ministry of Environment SR	In force; national GPP target of 70% by value and by number of contracts; 2023 baseline: 17.04% by value, 19.57% by number of contracts

EU Legislation with Direct Impact on Slovakia

Document	Key Provisions	Status
Directive 2008/98/EC on Waste (as amended by 2018/851/EU)	Establishes the waste hierarchy and key definitions applicable to CDW management	In force
Construction Products Regulation (EU) 2024/3110 (CPR)	Introduces mandatory Digital Product Passports, Environmental Product Declarations, and sustainability requirements for construction products, including recycled and secondary materials. Replaces Regulation 305/2011. DPP mandatory from approximately January 2028; full compliance by 2032	In force from January 2025
Energy Performance of Buildings Directive (EU/2024/1275, EPBD)	Sets mandatory renovation targets, zero-emission building standards; requires each Member State to submit a National Building Renovation Plan (NBRP). Slovak transposition deadline: May 2026; NBRP submission deadline: December 2026	In force May 2024; transposition pending in Slovakia

EU Strategic Documents

Document	Key Provisions	Status
European Green Deal (2019)	Overarching EU policy framework within which all circular construction and digitalisation initiatives are positioned	In force
EU Circular Economy Action Plan (2020)	Identifies construction as one of eight priority sectors. Expected to be replaced by the Circular Economy Act in 2026, which is anticipated to introduce binding requirements on secondary raw material use and resource recovery targets	In force; successor legislation in preparation
EU Construction and Demolition Waste Management Protocol (updated 2024)	Technical framework for CDW management, including guidelines for pre-demolition and pre-renovation audits; directly referenced in the national gap analysis in Chapter 5	Published 2024
EU Strategy for a	Expected to provide a comprehensive	In preparation

Document	Key Provisions	Status
Sustainable Built Environment	framework integrating CDW, energy efficiency, digitalisation, and circular economy policy into a coherent built environment strategy	
2030 Danube Region Digital Innovation Strategy for Circular Construction	Transnational strategy of the Circular DigiBuild project upon which this Territorial Action Plan is based	Adopted; this TAP is the national implementation instrument for Slovakia

Territorial Action Plan (TAP) for Digital Innovation in Circular Construction

Table of Contents

Territorial Action Plan (TAP) for Digital Innovation in Circular Construction.....	1
1. Introduction / Executive Summary.....	2
Purpose.....	2
Alignment.....	3
Current Status.....	3
2. Vision and Mission (Territorial Adaptation).....	3
Vision (National).....	3
Mission (National).....	4
3. Alignment with EU Strategy for the Danube Region (EUSDR).....	4
4. Strategic Pillars, Objectives, and Key Actions (National KPIs).....	5
Pillar 1: Enabling Policy & Regulatory Frameworks.....	5
Objective 1.1: Harmonize circular construction standards and regulations related to digitalization.....	5
Objective 1.2: Develop and implement financial incentives for circular construction practices	6
Pillar 2: Fostering Digital Innovation & Technology Adoption.....	6
Objective 2.1: Promote the adoption of Building Information Modeling (BIM) and other digital technologies.....	7
Objective 2.2: Support the development and deployment of digital platforms for material tracking and waste management.....	7
Pillar 3: Building Skills & Capacity.....	8
Objective 3.1: Develop education and training programs for digital skills within circular construction.....	8
Objective 3.2: Promote knowledge transfer and best practice sharing among stakeholders.....	9
Pillar 4: Strengthening Collaboration & Supply Chains.....	9
Objective 4.1: Facilitate the development of digital regional supply chains for recycled and secondary construction materials.....	9
Objective 4.2: Promote collaboration between research institutions, industry, and governments.....	10
Pillar 5: Raising Awareness & Changing Mindsets.....	11

Objective 5.1: Implement awareness campaigns to promote the benefits of digitalization within circular construction.....	11
Objective 5.2: Encourage the adoption of digital technologies focusing on circular economy principles used in construction business models.....	11
5. National Context and Challenges.....	12
SWOT Analysis.....	12
Addressing National Gaps.....	12
6. Financial Strategy (National Level).....	14
Funding Sources.....	14
Budget Allocation.....	15
7. Implementation Plan (National Level).....	15
Governance Structure.....	15
Timeline.....	16
Monitoring and Evaluation.....	17
Risk Management.....	17
8. Stakeholder Engagement (National Level).....	18
Collaboration Mechanisms.....	18
Involvement of Key Groups.....	19
Communication Plan.....	19
9. Sustainability and Scalability.....	20
Sustainability Mechanisms.....	20
Scalability Strategies.....	20
10. Annexes (Optional).....	21
Annex A: Data sources and methodologies for national KPIs.....	21
Annex B: Relevant national policy documents or reports.....	21

1. Introduction / Executive Summary

Purpose: This TAP serves as the national roadmap to implement the "2030 Danube Region Digital Innovation Strategy for Circular Construction" in Slovenia. It aims to accelerate the twin green and digital transition in the Slovenian construction sector by fostering circularity through digital tools.

The Slovenian construction sector stands at a critical historical juncture, necessitating a comprehensive shift toward a circular and digital paradigm. As the cornerstone of the national economy, construction investments represented 10.1% of Slovenia's Gross Domestic Product (GDP) in 2022, a significant rise from previous years, reflecting a robust yet resource-intensive industry. This Territorial Action Plan (TAP) serves as the formalized national implementation vehicle for the "2030 Danube Region Digital

Innovation Strategy for Circular Construction," adapted specifically to the socio-economic and regulatory landscape of the Republic of Slovenia. The urgency of this plan is underscored by the convergence of the European Green Deal objectives, the finalization of Slovenia's National Recovery and Resilience Plan (NRRP) milestones by August 2026, and the immediate need for resilient infrastructure following the catastrophic floods of 2023.

Alignment: Alignment with the transnational strategy is ensured through the maintenance of five core strategic pillars: Enabling Policy, Digital Innovation, Skills Development, Collaboration in Supply Chains, and Awareness Raising. This TAP integrates the latest updates from 2024 and 2025, including the implementation of the "eGraditev" electronic system (Slovenia's national digital platform within the Spatial Information System (PIS) that enables the electronic submission, processing, and tracking of building permits and other administrative procedures) and mandatory BIM requirements for public procurement contracts exceeding €2 million starting in 2025. By synchronizing national funding from the National Recovery and Resilience Plan (NRRP), the European Cohesion Policy 2021–2027, and the Just Transition Fund, Slovenia aims to institutionalize a built environment that minimizes waste, maximizes wood-chain utilization, and leverages data-driven governance to ensure long-term environmental resilience.

Current Status: Slovenia's current status in the circular and digital construction landscape is characterized as "advanced" within the Danube Region peer group. This classification is supported by high baseline adoption levels in energy-efficient construction methods and Building Information Modeling (BIM) among large-scale infrastructure projects. However, more detailed analysis indicates a persistent "digital divide" among small and medium-sized enterprises (SMEs) and a critical shortage of domestic skilled labor. Furthermore, while material costs surged by 21.8% in recent cycles, the material circularity rate in 2020 remained at 12.3%, highlighting the necessity for the targeted 15.5% target by 2027 outlined in this plan.

2. Vision and Mission (Territorial Adaptation)

Vision (National): The national vision for Slovenia is to emerge as the leading regional hub for circular and digital construction excellence within the Danube Region by 2030, fostering a regenerative built environment that serves as a global model for the "Industry 5.0" transition. This vision is predicated on the belief that technology must serve humanity and nature, utilizing artificial intelligence (AI), the Internet of Things (IoT), and digital twins to close material loops and preserve the intrinsic value of natural resources. Slovenia envisions a future in which buildings are viewed as "material banks," the domestic wood chain's capacity to store carbon is completely fulfilled, and digital transparency guarantees that no construction waste is dumped in landfills without first undergoing secondary recovery evaluation.

Mission (National): Slovenia's mission is to facilitate the seamless integration of circular economy principles and digital innovation across the entire construction value chain. This will be achieved through the empowerment of Strategic Development and Innovation Partnerships (SRIPs), specifically the SRIP for Circular Economy and the SRIP for Smart Buildings and Wood Chain (PSiDL), to act as catalysts for quadruple-helix collaboration. The mission focuses on:

- Developing and enforcing digital regulatory frameworks, such as the "eGraditev" system, to eliminate administrative bottlenecks.
- Providing tailored financial instruments and tax incentives to enable SMEs to transition from linear to circular business models.
- Bridging the digital skills gap through education and continuous professional training for the construction workforce.
- Positioning Slovenia as a co-creator of global trends in sustainable wood-based construction and high-value-added smart building solutions.

3. Alignment with EU Strategy for the Danube Region (EUSDR)

This TAP aims to harmonize Slovenian national efforts with the broader strategic objectives of the EUSDR, ensuring that localized construction reforms contribute to the transnational stability and ecological integrity of the Danube region. The focus on digital innovation serves as a horizontal enabler across the following EUSDR pillars:

Pillar: Connecting the Region (Improved Infrastructure, Digitalization)

The emphasis on Slovenia's "Gigabit infrastructure development plan 2030" and the mandatory rollout of 5G connectivity for smart construction sites will ensure that Slovenia remains digitally integrated across the Danube logistics network. The implementation of the "eGraditev" system directly supports the EUSDR goal of improving institutional transparency and cross-border administrative interoperability.

Pillar: Protecting the Environment (Resource Efficiency, Waste Reduction)

The primary objective of increasing material circularity to 15.5% aligns with the EUSDR's environmental protection priorities. By mandating the use of digital material passports and supporting urban mining technologies, Slovenia can address the EUSDR target of reducing construction and demolition waste (CDW) streams, which currently account for around 70% of all waste generated in Slovenia.

Pillar: Building Prosperity (Innovation, SME Growth)

Slovenian Sustainable Smart Specialization Strategy's (S5) focus on "Factories of the Future" and "Smart Buildings" promotes a high-productivity economy that creates added value for all citizens. This TAP specifically targets the growth of circular startups and the digital transformation of construction SMEs, supporting the EUSDR priority of enhancing regional competitiveness through smart specialization.

Pillar: Strengthening the Region (Institutional Capacity, Collaboration)

Participation in transnational initiatives like the "ReBuilt" project (Interreg Central Europe) and the "Circular DigiBuild" project (Interreg Danube Region), strengthens Slovenia's institutional capacity to manage the twin transition. The plan also aims at improving governance and multi-level cooperation through Strategic Development and Innovation Partnerships (SRIPs) and regional clusters (such as the Danube CiDiCon Cluster, established within the framework of the Circular DigiBuild project).

4. Strategic Pillars, Objectives, and Key Actions (National KPIs)

This section details the country-specific implementation for each of the five strategic pillars defined in the Danube Region strategy. For each objective, specify concrete national actions, responsible bodies, timelines, and measurable KPIs with national targets.

Pillar 1: Enabling Policy & Regulatory Frameworks

Objective 1.1: Harmonize circular construction standards and regulations related to digitalization

National Actions:

The cornerstone of Slovenia's regulatory transformation is the 2025 amendment to the Building Act (GZ-1B), which represents a decisive step toward full digitalization of the permitting and oversight process. This objective focuses on integrating circularity requirements into the "eGraditev" platform, ensuring that data transparency becomes a legal prerequisite for construction activity.

National action 1: Full Implementation of eGraditev.

Over the course of 2026, the eGraditev system will become mandatory for all building permit applications in Slovenia, incorporating digital oversight for construction sites. This system will act as a central repository for all project documentation, significantly reducing the time taken for administrative compliance and ensuring that environmental opinions are integrated from the design phase.

National action 2: Regulatory Recognition of Secondary Materials.

Under the GZ-1B amendment, Slovenia will formally recognize the "non-waste" status of materials and products that have already been in use, provided they meet structural safety standards. Slovenia will also continue to promote the development of guidelines for secondary raw materials and the modernization of public procurement to support the industry's digital evolution.

National action 3: Transnational Standard Alignment.

Slovenia will continue to participate in transnational networks and initiatives, including aligning domestic standards with the broader EU regulatory frameworks, such as EU Construction Products Regulation (CPR) and the forthcoming 2026 Circular Economy Act.

National KPIs & Targets:

KPI 1.1.1 (National): Number of national circular construction standards updated to include digital tracking requirements.

Target: 3 updated standards by the end of 2028.

KPI 1.1.2 (National): Reduction in legal uncertainty for secondary material use measured by the number of revised certifications.

Target: 1 certification scheme established or updated by 2029.

Objective 1.2: Develop and implement financial incentives for circular construction practices

Financial barriers remain a significant deterrent for adoption of circular construction practices, particularly due to the high initial costs of advanced recycling technologies and digital tools. Slovenia will utilize NRRP and Cohesion funds to de-risk these investments for the private sector.

National Actions:

National action 1: Green Budgetary Planning and Procurement.

Starting from January 1, 2024, Slovenia has established a methodology for identifying and assessing budget elements that affect environmental policies. This will be expanded to include Green Public Procurement guidelines that mandate a minimum 10% recycled content in all public buildings.

National action 2: Circular Transition Grants for SMEs.

In 2026 the Ministry of the Economy, Tourism and Sport has allocated EUR 28 million from the Recovery and Resilience Facility to fund Slovenian business projects centered on eco-friendly production and sustainable construction. By incentivizing green production processes and resource efficiency, this investment aims to significantly increase domestic wood processing, directly supporting the national vision for an innovative and sustainable low-carbon industrial shift.

National action 3: Tax Relief for "Industry 5.0" companies.

In 2025, Slovenia's Industry 5.0 Institute proposed tax reliefs for Industry 5.0 companies, including up to 40% for investments in human-centric AI or Industry 5.0 technologies and 30% for projects establishing circular systems, such as industrial symbiosis and secondary material use.

National KPIs & Targets:

KPI 1.2.1 (National): New public building contracts verifying compliance with the minimum 10% recycled content mandate.

Target: 100% public building contracts by 2030.

KPI 1.2.2 (National): Increase in the number of companies claiming tax reliefs for circular systems and human-centric AI.

Target: 20% increase by 2030.

Pillar 2: Fostering Digital Innovation & Technology Adoption

Objective 2.1: Promote the adoption of Building Information Modeling (BIM) and other digital technologies

National Actions:

National action 1: Mandatory BIM for Public Procurement

Effective January 1, 2025, BIM adoption is mandatory for all public contracts with a value exceeding €2 million. By 2028, this requirement will extend to all public construction projects regardless of value.

National action 2: Pilot Digital Twin Projects

Through the flagship "Gradbeništvo 4.0" initiative and the "Betonarna Nagonje 2.0" project, Slovenia is deploying Digital Twin technology, including "Construction Site 4.0" and "Building as a Platform". These pilots utilize blockchain for secure data storage and IoT for real-time monitoring of material flows to enhance the seismic resilience and predictive maintenance of public infrastructure.

National action 3: AI in Construction Planning

Under the National Strategy for Artificial Intelligence until 2030, Slovenia will establish an "AI Competence Center" that will provide open-source predictive analytics tools for optimizing material use on construction sites.

National KPIs & Targets:

KPI 2.1.1 (National): Percentage of national construction projects utilizing BIM

Target: 100% of public construction projects regardless of value by 2028.

KPI 2.1.2 (National): Number of certified BIM managers in the Slovenian labor market.

Target: 250 certified BIM managers by 2029.

KPI 2.1.3 (National): Number of best practices (pilot projects, other initiatives) demonstrating innovative digital applications in circular construction

Target: 10 new pilot projects/initiatives by 2029.

Objective 2.2: Support the development and deployment of digital platforms for material tracking and waste management

National Actions:

National action 1: National Secondary Construction Material Exchange

Development or upgrade of a digital marketplace for the exchange of salvaged timber, recycled steel, and mineral aggregates, following the successful example of the CinderOss one-stop-shop for SRM-based construction products.

National action 2: Mandatory B2B e-Invoicing (ZIERDED)

Implementation of mandatory electronic invoicing and document exchange for all business entities by January 1 2028, with construction-specific transition support to ensure supply chain transparency.

National action 3: IoT-Based CDW Monitoring

Deployment of smart sensors and RFID tags on high-impact materials (steel, structural timber) in all public renovation projects to track their quality and origin throughout their lifecycle.

National KPIs & Targets:

KPI 2.2.1 (National): Number of operational digital platforms for circular construction and material tracking

Target: 1 platform implemented or updated by 2028.

KPI 2.2.2 (National): Increase in the volume of construction materials tracked digitally

Target: 20% increase by 2030.

Pillar 3: Building Skills & Capacity

Objective 3.1: Develop education and training programs for digital skills within circular construction

National Actions:

National action 1: Curricula Integration

Strengthening role of universities to implement updated educational modules for circular construction and digitalization in the construction sector, with the aim to modernize and empower future workforce to drive the twin transition in line with national and EU regulation.

National action 2: Industry 5.0 Competence Center

Establishment of a national Industry 5.0 competence center to train construction professionals in human-robot collaboration, AI-assisted design, and 3D printing with bio-composites.

National action 3: Increasing digital skills in the workforce

Slovenia has implemented several programs and initiatives to address the need for a more digitally skilled workforce. To identify, forecast and meet labour market needs, Slovenia is putting into place a Platform for Competence Prediction. Slovenia's goal is to increase the number of ICT experts from the current 4.5% to 10% by 2030, which includes digital skills for construction.

National KPIs & Targets:

KPI 3.1.1 (National): Number of education and training programs in digital technologies for circular construction

Target: 5 programs (at public and private universities and vocational schools) by 2030

KPI 3.1.2 (National): Number of national universities and vocational schools incorporating digital technologies for circular construction into their curricula by

Target: At least 2 universities or vocational schools by 2030

Objective 3.2: Promote knowledge transfer and best practice sharing among stakeholders

National Actions:

National action 1: Annual Circular Construction Forum

Organization of a national event featuring results from different national and EU funded projects, in order to showcase and demonstrate benefits of circular construction practices and stimulate stakeholder collaboration in the field.

National action 2: Online Knowledge Repository

Integrating available data and materials related to circular construction into an open-access repository to promote knowledge sharing and collect best practices with the aim to strengthen collaboration and support stakeholders exploring opportunities in circular construction.

National action 3: Study visits

Circular construction experts attending forums, conferences and other knowledge and best practice sharing events, aimed at increased peer-learning and project-based learning opportunities in the sector, utilizing the Danube CiDiCon Cluster membership to seek opportunities and improve transnational collaboration in the Danube region.

National KPIs & Targets:

KPI 3.2.1 (National): Number of national knowledge-sharing events (workshops, conferences) organized annually.

Target: 1 major event organized annually starting from 2027.

KPI 3.2.2 (National): increase in Slovenian companies participating in cross-border initiatives such as the Danube CiDiCon Cluster and EU funded projects

Target: 20% increase by 2030.

Pillar 4: Strengthening Collaboration & Supply Chains

Objective 4.1: Facilitate the development of digital regional supply chains for recycled and secondary construction materials

National Actions:

National action 1: Standardized Material Passports for Wood

Implementation of a national framework for wood-chain traceability, ensuring that domestic timber used in public "Nearly Zero Energy Buildings" is certified throughout its lifecycle. Action to be achieved through multi-stakeholder collaboration, across the quadruple helix.

National action 2: Digital tools for supply chain management

Engage national Digital Innovation Hubs (DIHs) and construction clusters to support SMEs in adopting digital tools for supply chain management and strengthen transnational collaboration in the Danube Region.

National KPIs & Targets:

KPI 4.1.1 (National): Increase in the volume of recycled and secondary materials used in national construction projects.

Target: Increase from 10% to 15% by 2029.

KPI 4.1.2 (National): Number of national companies involved in regional/national circular supply chains.

Target: 20 companies by 2030.

Objective 4.2: Promote collaboration between research institutions, industry, and governments

National Actions:

National action 1: Funding opportunities for innovative circular construction projects

Collecting information on funding opportunities (national, cross-border and EU) for innovative projects dealing with circularity in construction and with advanced digital technologies for construction. Information shared through a single “one-stop-shop” approach, for reducing fragmentation in accessing relevant information by involved stakeholders.

National action 2: Strengthening the role of PPPs

Slovenia is addressing the topics of circularity and digitalization in construction through already existing PPPs, namely strategic development and innovation partnerships - SRIP Circular Economy and SRIP Smart Building and Home with Wood Chain, dedicated to topics of circular economy, smart buildings and wood value chains

National action 3: Funding for early career researchers

The Slovenian Research and Innovation Agency launched over €5 million call for proposals on June 6, 2025, to co-finance independent research conducted by newly recruited researchers at public organizations. To be eligible, projects must align with the priority areas of Slovenia’s Sustainable Smart Specialization Strategy (S5)—such as Smart Buildings, Wood Chains, and the Circular Economy—to foster deeper collaboration between research and industry.

National KPIs & Targets:

KPI 4.2.1 (National): Number of collaborative research and development projects focused on digital technology for circular construction.

Target: 20 projects by 2030.

KPI 4.2.2 (National): Number of national public-private partnerships established for the digitalization of circular construction initiatives.

Target: 1 public-private partnership by 2030.

Pillar 5: Raising Awareness & Changing Mindsets

Objective 5.1: Implement awareness campaigns to promote the benefits of digitalization within circular construction

National Actions:

National action 1: Stakeholder engagement

Engaging stakeholders through online and in-person meetings, conferences, workshops and other events related to the topic of circular construction, to foster collaboration and provide information regarding funding opportunities and broader trends in the field.

National action 2: Circular Digibuild Platform promotion

Fostering transnational collaboration through promotion of the Circular Digibuild Platform, open for all types of stakeholders operating in the topics of circularity and digitalization of the construction sector. The platform can be utilized for different

purposes, from event promotions to the development of joint projects among stakeholders from the Danube Region.

National KPIs & Targets:

KPI 5.1.1 (National): Reach of national awareness campaigns (number of people informed through various channels).

Target: 10 000 people reached by 2029.

KPI 5.1.2 (National): Increase in public support for digitalization in circular construction policies (measured by surveys or engagement).

Target: 8% increase in awareness by 2029.

Objective 5.2: Encourage the adoption of digital technologies focusing on circular economy principles used in construction business models

National Actions:

National action 1: Circular Business Model Coaching

Providing construction companies with expert advisory support through activities fostered by digital innovation hubs, such as B2GreenHub, in order to accelerate the transition from linear to circular business models, especially targeting SMEs and Startups.

National action 2: Slovenian Startup Strategy Support

Workshops and webinars dedicated to the promotion and awareness raising regarding the Slovenian Startup Strategy, adopted in March 2026, aimed at transforming the economy into a high-tech innovation hub by fostering startups, strengthening venture capital, and simplifying regulations.

National KPIs & Targets:

KPI 5.2.1 (National): Number of national construction companies adopting digital technologies in their circular business models.

Target: 40 companies by 2030.

KPI 5.2.2 (National): Increase in national investment share in digitalized circular construction methods.

Target: 10% increase in CapEx for circular tech by 2030.

5. National Context and Challenges

SWOT Analysis

Strengths	Weaknesses
------------------	-------------------

● Advanced Strategic Framework: CE is a strategic priority, reflected through S5 Strategy and Roadmap towards the CE. ● Specialized R&D Infrastructure: strong research activities and expertise in wood science, recycling, secondary materials and digitalization. ● High Digital Base: High baseline adoption of BIM and energy-efficient building systems in large companies. ● Wood Chain Potential: Slovenia is a "top 4" most forested EU nation with abundant domestic raw materials.	● Labor shortages: shortage of domestic skilled engineers. ● Low residential investment: Construction investment in housing is only 2.7% of GDP (EU avg. 5.9%). ● Administrative bottlenecks: high number of procedures, limited administrative capacity. ● Fragmented SMEs: Small and medium companies lack the capital to invest in Industry 4.0/5.0 equipment.
Opportunities	Threats
● Mandatory BIM 2025: Regulatory push forces digital competency across the entire value chain. ● Public rental housing reform: €100M annual funding until 2035 for sustainable non-profit housing. ● EU post-flood support: Utilization of RRF and Cohesion funds for circular "Build Back Better" infrastructure ● Macroregional potential: utilizing potential (including funding) as a country that fully participates in 3 MRS (EUSDR; EUSALP; EUSAIR).	● Economic stagnation: GDP growth slowed to 0.1% in H1 2025; falling investment levels. ● US/Global Trade Tariffs: Risks to Slovenia's export-oriented construction services sector. ● Demographic hurdles: An aging population further tightening the labor supply long-term. ● Regulatory overload: Compliance burden of simultaneous EU (BIM, LCA) and national (eGraditev) mandates.

Addressing National Gaps:

□ Awareness and engagement

A primary barrier is the prevailing focus on initial investment costs rather than long-term lifecycle value. There is currently low awareness among both public and private investors regarding the economic benefits of circularity, such as reduced waste disposal fees and material savings. This lack of understanding leads to low engagement levels across the value chain, as stakeholders often perceive circular practices as an additional financial burden rather than a competitive advantage.

*Addressed in Pillar 5 of the TAP

□ Skills and labor shortages

The sector faces a dual challenge regarding its workforce. Nationally, there is a significant shortage of labor, with a high reliance on a foreign workforce that often lacks specialized training in local standards. Simultaneously, there is a critical lack of a domestic, specialized workforce capable of implementing advanced digital tools or managing complex circular construction processes. Without systemic upskilling, the industry remains restricted to traditional, resource-intensive methods.

*Addressed in Pillar 3 of the TAP

□ Fragmented stakeholder collaboration

Collaboration remains siloed, with significant friction in the transfer of innovation from research environments to practical, on-site application. Linkages between technology providers, designers, and contractors are often weak, preventing the "industrialization" of sustainable solutions. This fragmentation limits the scaling of best practices and ensures that innovation remains confined to isolated pilot environments rather than becoming the industry standard.

*Addressed in Pillar 4 and Pillar 1 of the TAP

□ The SME digital divide

While large-scale construction firms and infrastructure providers have begun to adopt sophisticated digital modeling and management tools, a significant "digital divide" persists among small and medium-sized enterprises (SMEs) and startups. These smaller players often lack the capital, technical capacity, and administrative resources required to adopt high-cost technologies. This gap creates a bifurcated market where circularity is only accessible to the largest entities, leaving the majority of the sector behind.

*Addressed in Pillar 2 of the TAP

□ Data and material tracking

The market for secondary and recycled materials is constrained by a lack of qualitative, reliable data. Without standardized digital tracking systems or material passports, there is a lack of transparency regarding the quality, origin, and structural integrity of salvaged materials. This data gap prevents the establishment of high-confidence secondary material markets and hinders the ability of regulators to enforce existing waste management protocols effectively.

*Addressed in Pillar 2 of the TAP

6. Financial Strategy (National Level)

Funding Sources:

European Cohesion Policy 2021–2027:

The Programme for the Implementation of the European Cohesion Policy 2021–2027 is one of the fundamental documents enabling Slovenia's access to EUR 3.2 billion of European funds for certain policy objectives and technical assistance. Although it concerns the 2021–2027 programming period, the programme will be implemented by the end of 2029.

During this period, Slovenia will have at its disposal (excluding technical assistance):

- EUR 793 million for green and low-carbon transition, investments in solar and wind energy extraction, improving energy efficiency of buildings, flood safety, wastewater collection and treatment;
- EUR 727 million for development, research and innovation, investments in research infrastructure and research capacities, and digitalisation;
- EUR 741 million for social inclusion, employment, education and training;
- EUR 511 million for sustainable and smart mobility, investments in modernisation of public passenger transport, especially railway infrastructure;
- EUR 85 million for territorial approaches such as urban and local development;
- EUR 249 million for the Savinja-Šalek region for phasing out coal and restructuring of the Zasavje region.

National Recovery and Resilience Plan (NRRP/NOO):

Following the approval of the fifth amendment to Slovenia's Recovery and Resilience Plan, a total of €2.08 billion is available from the EU's Recovery and Resilience Facility, consisting of €1.61 billion in grants and a reduced total of €468.84 million in loans. To date, Slovenia has already received €1.77 billion (85% of the total allocation), with the remaining funds accessible until the end of 2026. The updated plan maintains its strong green and digital focus, earmarking 44% of the funds for climate objectives and 24% for digital transformations across 84 planned measures.

National Environmental and Housing Funds:

- Climate Change Fund (Podnebni sklad): The Slovenian Government has adopted the Climate Fund spending program for the 2025–2028 period, which forecasts a total of €830 million in payouts funded by emissions trading auctions. The largest share of the budget, €375 million, is earmarked for sustainable mobility (including public transport modernization and zero-emission vehicles), followed by €121 million for industrial decarbonization and the circular economy, and €111 million for energy renovations of buildings and tackling energy poverty. The remaining funds are allocated to renewable energy sources (€95 million), climate change adaptation measures (€49 million), education and awareness (€26 million), and international climate financing (€12 million).
- National Housing Fund (Stanovanjski sklad): Under recent reforms, the state provides €100 million annually until 2035 for the construction and renovation of sustainable non-profit rental housing.

- Environmental Public Fund (Eko sklad): Provides favorable loans and grants for energy-efficient construction and circular resource management in the private sector.

Budget Allocation

TAP pillar	Primary Funding Mechanisms	% of Total Allocation	Priority Areas for Investment
Pillar 1: Enabling Policy & Regulatory Frameworks	National Environmental Funds / EKP Technical Assistance	10	Maintenance and upgrading of unified digital permitting systems; development of national technical norms for secondary material certification and circular public procurement standards.
Pillar 2: Fostering Digital Innovation & Technology Adoption	European Regional Development Fund (ESRR) / National Digitalization Funds	30	Large-scale deployment of Building Information Modeling (BIM) across all project scales; establishment of national Digital Twin infrastructures for critical infrastructure resilience and life-cycle management.
Pillar 3: Building Skills & Capacity	European Social Fund Plus (ESS+) / National Employment & Education Grants	20	Systematic transformation of vocational and higher education curricula; establishment of strategic competence centers for Industry 5.0 and advanced circular construction methodologies.
Pillar 4: Strengthening Collaboration & Supply Chains	Just Transition Fund (SPP) / ESRR / Bio-economy Subsidies	30	Development of regional circular processing hubs; cross-sectoral wood-chain optimization; implementation of digital material passporting systems for national traceability.
Pillar 5: Raising Awareness & Changing Mindsets	National Promotional Budgets / ESRR / Technical Coaching Vouchers	10	Strategic communication initiatives targeting systemic behavioral change; intensive coaching for SMEs to adopt circular and service-based business models.

7. Implementation Plan (National Level)

Governance Structure:

The successful deployment of this Action Plan relies on a well-coordinated, cross-sectoral management framework that can effectively bridge the gap between high-level policy objectives and practical field implementation. Given the nature of the focus area, the governance model detailed below is presented as a suggested framework and an aspirational benchmark, rather than an absolute operational prerequisite. It establishes a structural blueprint designed to maximize synergy, monitor progress, and ensure long-term sustainability. However, this structure remains adaptable; its components

may be scaled, phased in over time, or integrated into existing national mechanisms to match available administrative capacities and practical operational realities.

National Strategic Oversight

The plan is overseen by a high-level coordination group of decision-makers from the key policy areas of economic development, digital transformation, and environmental protection. This group is responsible for ensuring inter-ministerial alignment, removing regulatory bottlenecks, and confirming the final allocation of resources for the plan's priority areas.

Technical Coordination Unit

A dedicated management unit within the lead national authority for regional development acts as the technical secretariat. This unit serves as the primary point of contact for the action plan, manages the monitoring and evaluation framework, and handles communication with the broader Danube Region cluster.

Sectoral Implementation Partnerships

The day-to-day implementation is driven by established national partnerships (acting as industry clusters) that specialize in circularity and smart buildings. These partnerships serve as the bridge between public policy and the private sector, organizing workshops, facilitating R&D collaborations, and supporting SMEs in adopting new digital tools.

National Consultative Body

A permanent advisory council, representing the interests of research institutions, business associations, and civil society, provides regular feedback on the plan's implementation. This body ensures that the transition remains human-centric and that the technical goals of the plan align with the broader socio-economic needs of the country.

Timeline:

The following timeline serves as an indicative, phased roadmap for the 2026–2030 period. Designed as a flexible suggestion, it allows the adopting organization to adapt and refine specific milestones according to evolving public resources, national legislative timelines, and organizational capacities.

Phase 1: Establishing Foundations and Policy Alignment (2026–2027): During this initial period, the primary focus is on establishing the legal, administrative, and technological foundations necessary to support a circular and digital construction transition. This involves supporting the ongoing national rollout and optimization of electronic permitting and documentation exchange platforms (such as the "eGraditev" system) to reduce administrative barriers, while successfully transitioning from short-term recovery funding cycles (such as circular business grants and wood-processing investments under the RRF). Work would also focus on aligning national building and environmental guidelines with emerging European circular frameworks—specifically addressing the "non-waste" status of secondary materials—and supporting early-stage

research into advanced digital tools like artificial intelligence and predictive data analytics for site planning and management.

Phase 2: Sector Scaling and Core Digital Integration (2028–2029): This intermediate period focuses on progressively scaling these foundational tools and integrating digital processes across the broader construction sector. Activities would involve encouraging the step-by-step digitalization of inspection, reporting, and material data flows within national spatial and administrative networks. The adopting organization might focus on the phased expansion of Building Information Modeling (BIM) requirements across public procurement and public works, helping firms of different sizes build digital capacity and standardize data formats. Efforts during this phase would also support the expansion of regional circular hubs, wood-processing networks, and supply chain transparency initiatives funded under European cohesion programs.

Phase 3: Consolidation and Long-Term Evaluation (2030): In the final period, efforts shift toward consolidating achievements and conducting a comprehensive evaluation of the plan's long-term impacts against broader national objectives. This phase would involve reviewing overall progress toward national goals, such as the 15.5% material circularity target, and assessing the influence of sustainable and digital standards on affordable public housing and regional economic development. It would also encompass a final review of the rollout of high-capacity digital connectivity and renewable energy integration on sites and buildings, providing the necessary insights to guide future national development policies.

Monitoring and Evaluation:

The implementation of the TAP is supported by a robust monitoring and evaluation (M&E) plan, ensuring that every funded activity contributes to a measurable national result.

Progress against National KPIs will be tracked using a combination of the e-MA2 information system (for Cohesion Policy investments) and operational data from the eGraditev platform as it becomes mandatory by 2028. This framework will monitor a range of indicators, including material recovery volumes, BIM adoption rates in public tenders, and the impact of circular and green public procurement under the ZeJN guidelines.

Regular Reporting Mechanisms

Quarterly Progress Reports: Prepared by the Technical Coordination Unit for the National Strategic Oversight group to identify immediate implementation bottlenecks and ensure financial absorption.

Annual Sustainability Reports: Formal annual summaries submitted to the Danube CiDiCon Cluster to facilitate transnational benchmarking and knowledge exchange across the 13 partner countries.

Evaluation Cycles

Mid-term Internal Evaluation (2028): A strategic review to assess the effectiveness of the initial 2026-2028 phase, allowing for the reallocation of resources and the refinement of policy instruments before the final 2030 push.

End-term External Evaluation (2030): An independent assessment of the TAP's total effectiveness, measuring its long-term impact on sector productivity.

Risk Management:

The following framework identifies potential risks to the implementation of the Territorial Action Plan (TAP) in Slovenia, assessing their likelihood and proposing targeted mitigation measures.

- **Funding (medium):** A potential gap in investment continuity following the conclusion of the National Recovery and Resilience Plan (NRRP).
Mitigation: Ensure seamless transition to the 2021–2027 Cohesion Policy funds and the Climate Change Fund; promote Public-Private Partnerships (PPPs) to de-risk long-term projects.
- **Policy (medium):** Changes in government priorities following the 2026 election cycle, potentially stalling regulatory reforms.
Mitigation: Legally anchor key circularity and digital requirements in primary legislation (e.g., the Building Act GZ-1B and Circular Economy Act) to ensure continuity.
- **Technology adoption (high):** Small and medium-sized enterprises failing to adopt BIM or digital twins due to high initial costs and complexity.
Mitigation: Develop a "tiered adoption" framework that allows smaller firms to integrate digital tools at a pace matched to their capital capacity. This should include access to pre-configured digital templates and standardized data protocols to lower technical entry barriers, complemented by targeted financial de-risking instruments for first-time technology investments.
- **Skills development (high):** Persistent lack of a domestic workforce trained in Industry 5.0 and circular design methodologies.
Mitigation: Implement a systemic modernization of vocational and higher education curricula to ensure the next generation of professionals is "digital-first." For the existing workforce, establish accessible micro-credentialing and certification pathways that focus on green competencies, while creating integration programs to upskill the high percentage of foreign labor to national circular standards.
- **Market resistance (medium):** Continued industry focus on initial construction costs rather than long-term lifecycle value and material recovery.
Mitigation: Leverage the public sector's purchasing power to create a guaranteed "lead market" for secondary materials through high-standard green procurement mandates. Shift the industry narrative from "initial cost" to "lifecycle value" by providing data-driven technical advisory services that demonstrate the long-term ROI and operational savings of circular and digital building methods.

8. Stakeholder Engagement (National Level)

Collaboration Mechanisms:

- RMSG – Regional multi-stakeholder group established under the scope of Circular Digibuild project will serve as a model for future collaboration across priority areas. These groups, as outlined during the project, are composed of various actors from the quadruple helix, bringing together representatives from public authorities, research and academia, industry and civil society including NGOs.
- Strategic Development and Innovation Partnerships (SRIPs) - sectoral implementation is driven by the established SRIPs, namely:
 - SRIP Circular Economy: facilitates the creation of new value chains with closed material flows and supports the transition from linear to circular business models.
 - SRIP Smart Buildings and Wood Chain: integrating the domestic wood value chain into smart, sustainable living environments and promoting "Nearly Zero Energy Buildings".
 - SRIP GoDigital: strengthens research, development and innovation cooperation in the field of information and communication technologies (ICT) between small, medium and large enterprises, knowledge institutions and other actors of the RRI ecosystem as well as policy makers in the context of sustainable smart specialization.

Involvement of Key Groups:

Governments/Public Authorities: National and local authorities are engaged to harmonize regulatory frameworks (such as the GZ-1B amendment) and enforce Green Public Procurement (ZeJN) guidelines to create demand for circular solutions.

Industry Associations & SMEs: Represented through SRIPs, the Chamber of Construction (CCIS) and Slovenian Association for Building Information modeling (SiBIM), these actors drive the practical implementation of Building Information Modeling (BIM) and pilot digital twins on construction sites.

Research & Education Institutions: Led by the Slovenian National Building and Civil Engineering Institute (ZAG) and the InnoRenew CoE, as these institutions provide scientific validation for secondary materials and assist in the modernization of educational curricula. They will collaborate closely with universities and vocational schools to implement updated curricula and work together on strengthening the transition of solutions from research to practice.

Financial Institutions & Investors: Entities such as the SID Bank and the Slovenian Environmental Public Fund (Eco Fund) are involved in designing dedicated financial instruments to de-risk investments in Industry 5.0 technologies.

Civil Society & NGOs: Groups focused on circular culture ensure transparency and incorporate citizen perspectives into urban mining and renovation projects.

Communication Plan:

To ensure the visibility and transparency of the TAP implementation through 2030, a national communication strategy will be implemented. The plan focuses on standard

dissemination channels to keep stakeholders informed and to foster the adoption of circular and digital practices across the Slovenian construction value chain.

The primary tool for continuous engagement will be periodic electronic newsletters distributed through the established networks of the SRIP Circular Economy and SRIP Smart Buildings and Wood Chain (PSiDL). These briefings will provide concise updates on legislative changes (such as Building Act amendments), upcoming funding calls, and summaries of results from national and Interreg pilot projects.

Knowledge transfer will be anchored in targeted events, such as technical workshops, focused on practical tools and digital technologies for the construction sector or national and international conferences to showcase best practices and successful projects focused on circularity and digitalization in construction.

The plan will also utilize professional social media platforms (primarily LinkedIn) to disseminate the results, share short video testimonials from pioneering SMEs, and announce training and other collaboration opportunities. Standardized information regarding TAP progress and National KPI achievements will be published in a dedicated, easy-to-access section of the government portal (gov.si), as well as shared with the Danube CiDiCon Cluster and the Circular Digibuild platform.

Following best practices from European research programs, the TAP will produce "Public Summary Reports" at the end of each implementation phase. These documents will translate technical findings into actionable insights for construction companies and public procurers, ensuring that the results of national R&D projects are accessible to the wider market.

9. Sustainability and Scalability

Sustainability Mechanisms:

The outcomes of this TAP are designed to persist through three primary sustainability drivers:

1. Legislative institutionalization: the core pillars of the plan are legally anchored in the Building Act (GZ-1B) and the Spatial Planning Act, which mandate the full digitalization of permitting processes via the eGraditev system and the use of Building Information Modeling (BIM) for public procurement. By enshrining these requirements in primary law, the digital transformation becomes a permanent regulatory standard rather than a temporary project goal.
2. Continuous national financing: investment continuity is ensured by the Climate Change Fund (Podnebni sklad), which has allocated €830 million for the 2025–2028 period to support decarbonization and infrastructure resilience. Additionally, the reform of public rental housing provides €100 million annually until 2035 for sustainable construction, ensuring a long-term, state-backed market for circular construction services.
3. Self-sustaining industry networks and PPPs: The Strategic Development and Innovation Partnerships (SRIPs) for the Circular Economy and Smart Buildings (PSiDL) act as self-sustaining clusters. These networks have moved beyond initial setup to become established intermediaries that

facilitate ongoing private sector R&D and provide technical advisory services to members.

Scalability Strategies:

To maximize the national and regional impact of the initiatives between 2026 and 2030, a comprehensive scaling framework will be implemented. The strategy will focus on the systematic replication of successful innovation models across all Slovenian regions. By establishing a network of RMSGs, the expertise developed in pioneering urban areas will be adapted and transferred to industrial and rural zones, ensuring a uniform national transition to Industry 5.0 principles. Proven methodologies from deep renovation and material recovery initiatives will be codified into "standardized blueprints." These broad frameworks will provide local authorities and regional developers with ready-to-use guidelines for sustainable infrastructure, reducing the administrative and technical barriers to entry for smaller municipalities. Successful outcomes from initial pilot phases will be scaled vertically to reach a broader share of the national construction market. This involves transitioning from niche applications to sector-wide mandates, supported by enhanced data protocols that enable consistent performance across different company sizes and project scales. Slovenia will also utilize the Danube CiDiCon Cluster to share its scalable results with other partner countries. This process focuses on contributing best practice logic to the regional repository and hosting peer-learning visits to demonstrate how digital and circular principles can be successfully integrated into national policy frameworks. Scaling efforts will remain aligned with the broader evolution of the Circular Economy Act and European industrial policies, ensuring that Slovenian innovations are interoperable with the emerging EU-wide market for secondary raw materials.