

Research report

EU Urban Transformation and Project Management: Research Findings and Strategic Insights

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Introduction

Purpose

This report distils current evidence on how European cities are operationalising the twin green–digital transition and pinpoints the project-management levers that make urban transformation faster, fairer, and financeable.

It frames “EU urban transformation” as the policy-driven reshaping of cities toward climate neutrality, resilience, inclusion and digitalisation under EU multi-level governance.

Objectives

The analysis is guided by a clear objective-to synthesise what works in delivery-and by practical questions, including: how local strategies translate the Green Deal and Digital Decade; which indicators best track progress; what governance models accelerate implementation; how ERDF/CF, RRF and InvestEU are blended; which programme structures scale pilots; where open data/standards reduce lifecycle risk; and how equity and affordability are safeguarded.

Structure of the document

The document is organised to move from context to action:

1. Introduction & Context - defines EU urban transformation, sets objectives, outlines methodology, and explains why PM²-style governance is central to delivery.
2. Data Analysis & Findings - seven lenses: (i) demographics & urbanisation, (ii) infrastructure patterns & challenges, (iii) digital transformation in planning, (iv) sustainability metrics, (v) economic impacts & funding, (vi) governance & stakeholder engagement, and (vii) technology adoption in project management.
3. Case Studies - Barcelona, Rotterdam, Amsterdam, and Tallinn illustrate portfolio-based delivery, co-benefits and replication pathways.
4. Cross-case Synthesis & Strategic Insights - extracts transferable practices and translates them into PM-ready guidance for city leaders, national authorities, implementers and investors.
5. Conclusion & Future Research - summarises contributions, notes limitations, and sets a 2025–2030 research agenda.

Together, these sections provide a policy-anchored, indicator-informed, and project-management-oriented roadmap from strategy to bankable, monitorable urban portfolios.

Context

1) What “EU urban transformation” means today (policy lens)

In this report, **EU urban transformation** is the policy-driven reshaping of European cities toward climate neutrality, resilience, inclusion, and digitalisation-implemented through integrated, place-based strategies and EU multi-level governance.

Core policy pillars and programmes

- **European Green Deal** - overarching strategy to climate-neutrality by 2050:
European Commission overview (https://commission.europa.eu/strategy-and-policy/priorities-2019-2024/european-green-deal_en) and Communication COM(2019) 640 (<https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:52019DC0640>)
- **Europe’s Digital Decade (2030)** - targets for connectivity, digital public services, skills, and business digitalisation:
EC overview (https://commission.europa.eu/strategy-and-policy/priorities-2019-2024/europe-fit-digital-age/europes-digital-decade-digital-targets-2030_en) and DG CNECT portal (<https://digital-strategy.ec.europa.eu/en/policies/europes-digital-decade>)
- **Urban Agenda for the EU and New Leipzig Charter** - framework for integrated urban development and “just, green, productive” cities:
Urban Agenda page (https://ec.europa.eu/regional_policy/policy/themes/urban-development/agenda_en) and New Leipzig Charter PDF (<https://www.bmi.bund.de/SharedDocs/downloads/EN/eu-presidency/gemeinsame-erklarungen/new-leipzig-charta-2020.pdf>)
- **EU Missions – Climate-Neutral & Smart Cities** - mission approach with 100+ cities using Climate City Contracts:
Mission page (https://research-and-innovation.ec.europa.eu/funding/funding-opportunities/funding-programmes-and-open-calls/horizon-europe/eu-missions-horizon-europe/climate-neutral-and-smart-cities_en) and Publications Office overview (<https://op.europa.eu/en/publication-detail/-/publication/a796c50a-d644-11ee-b9d9-01aa75ed71a1/language-en>)
- **European Urban Initiative (EUI)** - funding for innovative actions and capacity building: EUI portal (<https://www.urban-initiative.eu/>)

Financing architecture

- **Cohesion Policy (ERDF & Cohesion Fund)** - Regulation (EU) 2021/1058 (<https://eur-lex.europa.eu/eli/reg/2021/1058/oj/eng>) and **Common Provisions Regulation 2021/1060** (<https://eur-lex.europa.eu/eli/reg/2021/1060/oj/eng>)
- **InvestEU** - programme portal (https://investeu.europa.eu/index_en) and EC funding page (https://commission.europa.eu/funding-tenders/find-funding/eu-funding-programmes/investeu_en)
- **Recovery and Resilience Facility (RRF)** - EC overview (<https://commission.europa.eu/business-economy-euro/economic-recovery/recovery->

[and-resilience-facility_en](https://eur-lex.europa.eu/eli/reg/2021/241/oj/eng)) and Regulation (EU) 2021/241 (<https://eur-lex.europa.eu/eli/reg/2021/241/oj/eng>)

2) Research objectives & guiding questions

Objective. Synthesize current evidence on how EU cities operationalise the twin green–digital transition and identify **project-management levers** to deliver faster, fairer, financeable urban transformation.

Guiding questions.

1. How do city strategies localise the Green Deal and Digital Decade (links above)?
2. Which indicators best track progress (emissions, retrofits, modal split, digital public service uptake) using official datasets (see Section 3)?
3. Which multi-level governance and stakeholder models correlate with faster delivery (Urban Agenda/New Leipzig Charter: https://ec.europa.eu/regional_policy/policy/themes/urban-development/agenda_en; <https://www.bmi.bund.de/SharedDocs/downloads/EN/eu-presidency/gemeinsame-erklaerungen/new-leipzig-charta-2020.pdf>)?
4. How are ERDF/CF, RRF and InvestEU blended to crowd-in private capital (<https://eur-lex.europa.eu/eli/reg/2021/1058/oj/eng>; <https://eur-lex.europa.eu/eli/reg/2021/241/oj/eng>; https://investeu.europa.eu/index_en)?
5. Which programme structures (Cities Mission/EUI: https://research-and-innovation.ec.europa.eu/.../climate-neutral-and-smart-cities_en; <https://www.urban-initiative.eu/>) scale pilots into bankable project pipelines?
6. Where do data platforms and open standards reduce lifecycle costs/risks (Digital Decade: <https://digital-strategy.ec.europa.eu/en/policies/europes-digital-decade>)?
7. How are equity, health, affordability and inclusion safeguarded during transition (New Leipzig Charter: <https://www.bmi.bund.de/SharedDocs/downloads/EN/eu-presidency/gemeinsame-erklaerungen/new-leipzig-charta-2020.pdf>)?

3) Methodology & data sources

Design. Mixed-methods approach: desk research, comparative policy analysis, and indicator synthesis anchored to authoritative EU datasets.

Primary policy/programme sources

- European Green Deal overview (https://commission.europa.eu/strategy-and-policy/priorities-2019-2024/european-green-deal_en) and COM(2019) 640 (<https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:52019DC0640>)
- Digital Decade overview (https://commission.europa.eu/strategy-and-policy/priorities-2019-2024/europe-fit-digital-age/europes-digital-decade-digital-targets-2030_en) and policy portal (<https://digital-strategy.ec.europa.eu/en/policies/europes-digital-decade>)
- Urban Agenda (https://ec.europa.eu/regional_policy/policy/themes/urban-development/agenda_en) & New Leipzig Charter (<https://www.bmi.bund.de/SharedDocs/downloads/EN/eu-presidency/gemeinsame-erklaerungen/new-leipzig-charta-2020.pdf>)

- Cities Mission (https://research-and-innovation.ec.europa.eu/funding/funding-opportunities/funding-programmes-and-open-calls/horizon-europe/eu-missions-horizon-europe/climate-neutral-and-smart-cities_en) and Publications Office (<https://op.europa.eu/en/publication-detail/-/publication/a796c50a-d644-11ee-b9d9-01aa75ed71a1/language-en>)
- EUI (<https://www.urban-initiative.eu/>)
- ERDF/CF Regulation 2021/1058 (<https://eur-lex.europa.eu/eli/reg/2021/1058/oj/eng>), CPR 2021/1060 (<https://eur-lex.europa.eu/eli/reg/2021/1060/oj/eng>)
- InvestEU (https://investeu.europa.eu/index_en) and EC funding page (https://commission.europa.eu/funding-tenders/find-funding/eu-funding-programmes/investeu_en)
- RRF overview (https://commission.europa.eu/business-economy-euro/economic-recovery/recovery-and-resilience-facility_en) and Regulation 2021/241 (<https://eur-lex.europa.eu/eli/reg/2021/241/oj/eng>)

Indicators & statistics

- **Eurostat City Statistics (Urban Audit)** - database (<https://ec.europa.eu/eurostat/web/cities/database>) and metadata (https://ec.europa.eu/eurostat/cache/metadata/en/urb_esms.htm)
- **EEA** - European city air quality viewer (<https://www.eea.europa.eu/en/topics/in-depth/air-pollution/european-city-air-quality-viewer>) and highlight note (<https://www.eea.europa.eu/highlights/new-european-city-air-quality>)
- **Copernicus Urban Atlas** - product (<https://land.copernicus.eu/en/products/urban-atlas>), 2018 download (<https://land.copernicus.eu/en/products/urban-atlas/urban-atlas-2018>), EEA data page (<https://www.eea.europa.eu/data-and-maps/data/copernicus-land-monitoring-service-urban-atlas>)
- **GHSL (JRC)** - portal (<https://human-settlement.emergency.copernicus.eu/>) and JRC catalogue (<https://data.jrc.ec.europa.eu/collection/ghsl>); **Degree of Urbanisation (GHS-DUC)** dataset (<https://data.europa.eu/89h/f5224214-6b66-43df-a9c6-cc974f17d803>)
- **OECD FUAs** - definition overview (<https://www.oecd.org/en/data/datasets/oecd-definition-of-cities-and-functional-urban-areas.html>) and EU-OECD FUA working paper (https://www.oecd.org/content/dam/oecd/en/publications/reports/2019/12/the-eu-oecd-definition-of-a-functional-urban-area_cef4a128/d58cb34d-en.pdf)
- **ESPON** - database portal (archive) (<https://archive.espon.eu/tools-maps/espon-database>)

Units of analysis & comparability

- Spatial units: **City**, **Functional Urban Area (FUA)** and district/neighbourhood (Urban Atlas). See Eurostat cities (<https://ec.europa.eu/eurostat/web/cities/database>), OECD FUA definition (<https://www.oecd.org/en/data/datasets/oecd-definition-of-cities-and-functional-urban-areas.html>), and Urban Atlas (<https://land.copernicus.eu/en/products/urban-atlas>).

- Time horizon: policies (2014–2025); land-use change (2006–2018+) using Urban Atlas (<https://land.copernicus.eu/en/products/urban-atlas/urban-atlas-2018>); EEA city indicators (rolling updates: <https://www.eea.europa.eu/en/topics/in-depth/air-pollution/european-city-air-quality-viewer>).
- Indicator selection aligned with Digital Decade fields (<https://digital-strategy.ec.europa.eu/en/policies/europes-digital-decade>).

Analytical steps

1. **Policy–indicator mapping** using sources above (e.g., Green Deal COM(2019) 640: <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:52019DC0640>; Digital Decade portal: <https://digital-strategy.ec.europa.eu/en/policies/europes-digital-decade>).
2. **Benchmarking peer cities** with Eurostat/OECD/GHSL baselines (<https://ec.europa.eu/eurostat/web/cities/database>; <https://www.oecd.org/en/data/datasets/oecd-definition-of-cities-and-functional-urban-areas.html>; <https://data.jrc.ec.europa.eu/collection/ghsl>) and Copernicus land-use trajectories (<https://land.copernicus.eu/en/products/urban-atlas>).
3. **Delivery model review** from Cities Mission/EUI documentation (https://research-and-innovation.ec.europa.eu/.../climate-neutral-and-smart-cities_en; <https://www.urban-initiative.eu/>).
4. **Finance lens** tracing ERDF/CF (<https://eur-lex.europa.eu/eli/reg/2021/1058/oj/eng>), InvestEU (https://investeu.europa.eu/index_en), RRF (<https://eur-lex.europa.eu/eli/reg/2021/241/oj/eng>).

Limitations & assumptions

- **Data lags & heterogeneity** (e.g., Urban Atlas 2018: <https://land.copernicus.eu/en/products/urban-atlas/urban-atlas-2018>; uneven city reporting in Eurostat: https://ec.europa.eu/eurostat/cache/metadata/en/urb_esms.htm).
- **Attribution vs. contribution** in multi-level policy environments.
- **Policy evolution** (e.g., Digital Decade indicators: <https://digital-strategy.ec.europa.eu/en/policies/europes-digital-decade>; Cities Mission financing tools: https://research-and-innovation.ec.europa.eu/.../climate-neutral-and-smart-cities_en).

4) Why project management is central to urban transformation

Urban transformation is delivered through projects and programmes. The European Commission's PM² methodology is widely used/adapted across EU-funded initiatives because it offers clear governance roles, decision gates, and benefits management aligned to audit and financing needs. Building on this, PM² provides a practical lifecycle—Initiating, Planning, Executing, and Closing—with phase-exit “go/no-go” gates that connect strategic intent to delivery reality. Roles such as Project Owner, Steering Committee, Business

Manager, Solution Provider Manager, and Project Manager ensure accountability, while the Project Support Office (PSO/PMO) safeguards standards, documentation, and audit trails. Core artefacts—the Business Case, Project Charter, Project Handbook, Work Plan, Risk/Issue/Change Logs, and a Benefits Realisation Plan—create traceability from EU policy objectives (e.g., Green Deal, Digital Decade, Cities Mission) to measurable city-level outcomes.

At programme level, PM²-Programme extends this governance with a Programme Charter, Roadmap, and Benefits Register that orchestrate multiple pilots (mobility, energy, housing) into a coherent portfolio, sequencing investments and managing interdependencies. Digital components can be delivered with PM²-Agile overlays (sprint cadences, product backlogs) while hard-infrastructure work proceeds through stage-gated delivery—both governed by a common risk, quality, and change-control framework. For municipalities, this means: (1) adopting PM² roles and decision gates across all pilots; (2) maintaining a public Benefits/KPI register linked to open dashboards; (3) enforcing interoperability and data-governance requirements in procurement; (4) integrating Climate City Contracts and municipal budgeting with the PM² schedule and benefits plan; and (5) institutionalising successful pilots into services with defined ownership, OPEX/CAPEX, and continuous improvement cycles. This disciplined yet adaptable approach turns EU funding into sustained urban value.

- PM² official portal (https://pm2.europa.eu/index_en)
- PM² guides & artefacts (https://pm2.europa.eu/resources_en)
- PM² Publications Office page (<https://op.europa.eu/en/publication-detail/-/publication/b8458be2-821d-11eb-9ac9-01aa75ed71a1/language-en>)

Delivery chain logic

- **Strategy** → **Portfolio**. City climate/innovation strategies become **portfolios** (e.g., deep renovation, zero-emission mobility, data platforms) within Cohesion Policy priorities (<https://eur-lex.europa.eu/eli/reg/2021/1058/oj/eng>).
- **Programme** → **Projects**. Programmes decompose into replicable **projects** with standard scopes, procurement and monitoring-supported by EUI for innovation and capacity (<https://www.urban-initiative.eu/>).
- **Finance & risk**. **InvestEU** de-risks private finance (https://investeu.europa.eu/index_en); **RRF** couples reforms with investments (<https://eur-lex.europa.eu/eli/reg/2021/241/oj/eng>).
- **Assurance & benefits**. PM² benefits management links outcomes (CO₂, air/noise exposure, digital uptake) to Eurostat/EEA/GHSL indicators (<https://ec.europa.eu/eurostat/web/cities/database>; <https://www.eea.europa.eu/en/topics/in-depth/air-pollution/european-city-air-quality-viewer>; <https://data.jrc.ec.europa.eu/collection/ghsl>).

Takeaway. In EU cities, policy ambition becomes reality only when there is a governed pipeline of well-prepared, financeable, and monitorable projects—exactly what PM² structures and what the Cities Mission/EUI incentivise (https://pm2.europa.eu/index_en);



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https://research-and-innovation.ec.europa.eu/.../climate-neutral-and-smart-cities_en;
<https://www.urban-initiative.eu/>).

Data Analysis & Findings

1) Demographic & urbanisation trends across EU regions

Quant signals (2021–2025).

Population by Degree of Urbanisation (DEGURBA). Cities: 39.2%, towns & suburbs: 36.3%, rural: 24.6% (≈100% with rounding). These shares summarise how EU residents are distributed across settlement types and underscore Europe's polycentric pattern—large urban centres, a broad belt of intermediate settlements, and a quarter of the population in thinly populated areas.

What the classes mean (methodological short note).

- Cities (densely populated areas): local units where the majority of residents live in urban centres—contiguous 1 km² grid cells that meet high-density and minimum-population thresholds.
- Towns & suburbs (intermediate density areas): local units dominated by urban clusters—medium-density, mid-size settlements.
- Rural (thinly populated areas): local units where the majority of residents live outside those clusters/centres.

DEGURBA is built “bottom-up” from the 1 km² population grid, then assigned to local administrative units, making results comparable across Member States and not dependent on national legal definitions of a “city.”

See Eurostat overview and the DEGURBA method page for precise thresholds and the latest methodological notes. Source & method: Eurostat overview (https://ec.europa.eu/eurostat/statistics-explained/index.php/Urban-rural_Europe_-_introduction) and DEGURBA method page (<https://ec.europa.eu/eurostat/web/degree-of-urbanisation/information-data>).

Ageing: Ageing. The EU's median age is 44.7 years (as of 1 Jan 2024), up +2.2 years since 2014. Country range: Ireland 39.4 (youngest) to Italy 48.7 (oldest). “Median age” means half the population is older and half younger; it's a concise proxy for ageing pressure on services, labour markets, and public finances.

- Longer-run trend: the EU median age has risen +5.4 years since 2004 (39.3 → 44.7). Several southern and eastern Member States now sit near the top of the distribution (Italy 48.7; Bulgaria & Portugal 47.1; Greece 46.9), while a handful of smaller, higher-migration countries remain younger (Ireland 39.4; Luxembourg 39.7; Malta 39.8; Cyprus 40.6).
- Planning implications:
 - Workforce & productivity: shrinking working-age cohorts heighten skills shortages; prioritise upskilling, automation, and retention in municipal utilities and care sectors.

- Health & care demand: plan for integrated primary care, long-term care, and age-friendly housing retrofits (accessibility, lifts, thermal comfort).
 - Mobility & public space: design for walkability, benches, lighting, barrier-free access; ensure reliable, frequent public transport and demand-responsive services.
 - Digital inclusion: couple e-government/telehealth roll-outs with training and assisted channels to avoid exclusion.
 - Territorial nuance: capitals and university regions may skew younger due to migration; peripheral/rural areas often age faster—tailor service footprints accordingly.
- Monitoring notes: track median age alongside share 65+ and 80+ to capture service intensity; the EU share of 65+ reached 21.6% and 80+ 6.1% in 2024. Use consistent cut-off dates (1 January) when comparing across years.
 - Context indicator: the old-age dependency ratio (65+ to 15–64) has been climbing for a decade (about one-third in 2022, continuing upward), underscoring budgetary pressure trends. Sources: Eurostat article (https://ec.europa.eu/eurostat/statistics-explained/index.php/Population_structure_and_ageing) and news note (<https://ec.europa.eu/eurostat/web/products-eurostat-news/w/ddn-20250221-2>).

Urban air quality: Air quality in European cities (EEA viewer, updated 4 Jul 2025). The latest update confirms continued long-term improvements and shows Nordic capitals among the cleanest: Stockholm, Reykjavík and Helsinki top the capitals comparison. The 2025 release also adds an explicit capitals-only view. Method (what's new in 2025). Cities are now ranked by combined long-term mortality risk from PM_{2.5}, NO₂ and O₃ over the last two calendar years, using 1×1 km maps to compute population-weighted concentrations. Results are grouped into deciles (1 = cleanest risk decile). Coverage expands to 761 Urban Audit cities (previously ~372 when PM_{2.5}-only). Trend context for PM_{2.5}. Air quality has improved over decades, and most monitoring stations now meet the current EU PM_{2.5} annual limit; however, many urban populations remain above WHO guideline levels—a key reason the viewer tracks multi-pollutant risk. Use both the viewer and EEA status reports when quoting trends. Sources: viewer (<https://www.eea.europa.eu/en/topics/in-depth/air-pollution/european-city-air-quality-viewer>) and EEA news (<https://www.eea.europa.eu/en/newsroom/news/nordic-capitals-rank-as-cleanest-in-updated-european-city-air-quality-viewer>).

Comparative insights.

- Ageing pressures are strongest in Southern—and parts of Eastern—Europe, with Italy among the oldest profiles (median age 48.7; old-age dependency ratio ~38%), while North-Western Member States remain comparatively younger—Ireland stands out (median age 39.4; dependency ratio ~24%). At the EU level, the median age reached 44.7 on 1 Jan 2024 (up +2.2 years since 2014), and the old-age dependency ratio rose to 33.9% in 2024 (from 33.4% in 2023). These patterns reflect lower fertility and out-migration in parts of the South/East versus net in-migration and higher fertility in some North-Western countries. Territorial differences matter too: predominantly rural regions show higher dependency (≈40.5%) than urban regions (≈33.3%), implying greater service pressure outside large cities. For planning, pair national-level ageing strategies with place-based measures (rural care access, workforce retention, age-friendly

housing) and track median age, 65+, 80+ alongside dependency ratios to target resources where ageing is most acute.

(Eurostat: https://ec.europa.eu/eurostat/statistics-explained/index.php/Population_structure_and_ageing).

- Countries with a higher concentration of people living in cities (DEGURBA, LAU level) include Malta, Cyprus, Spain, the Netherlands and Greece—each with more than half of their population in the “cities” class. By contrast, rural shares are comparatively higher in Ireland (≈45%) and also above 40% in Slovenia, Lithuania, Romania and Slovakia. These differences reflect settlement morphology (island states and highly urbanised corridors vs. dispersed small-town/rural patterns) and should guide portfolio balance across cities / towns & suburbs / rural when designing interventions and KPIs. (Eurostat urban rural page: https://ec.europa.eu/eurostat/statistics-explained/index.php/Urban-rural_Europe_-_introduction).

Case snapshots.

City-level demographics and mobility behaviour (Urban Europe 2024, Eurostat). Use the Demographic developments in cities chapter for city-by-city population change, age structure, and the split between natural change and net migration. Pair it with the Quality of life in cities chapter, which includes mobility-related perception indicators (e.g., satisfaction with public transport), plus safety, green space and noise—useful behavioural proxies when hard modal data are missing. Data were extracted in July 2024 (next update planned Sept 2026) and can be linked to the underlying City statistics (urb) and Transport datasets listed on the page. For delineations, rely on Eurostat’s shared city/FUA method (city + commuting zone, 15% commuting threshold) to make consistent comparisons between core cities and their functional areas. (https://ec.europa.eu/eurostat/statistics-explained/index.php/Urban-rural_Europe_-_demographic_developments_in_cities).

Trend takeaway.

EU cities are simultaneously attracting a larger share of residents and getting older, which tightens capacity across housing, care, and accessible mobility. In practice, this means:

- Housing: prioritise age-friendly retrofits (step-free access, lifts, thermal comfort), mixed-tenure and intergenerational models, and proximity to primary care and daily services; plan new stock around barrier-free standards from the outset.
- Care systems: scale community-based and home-care services, integrate telehealth with local clinics, and address workforce shortages via upskilling and task-shifting in municipal providers.
- Mobility & public realm: guarantee low-floor, high-frequency transit; expand demand-responsive services in low-density areas; improve sidewalks, crossings, benches, lighting, and step-free interchanges; support safer micromobility with protected networks.

Benchmarking & KPIs (use DEGURBA for comparability). Keep DEGURBA as the common unit for cross-country comparisons, and complement with Functional Urban Areas (FUA) for core–commuter zone analysis. Track:

- Demographics: median age; 65+ and 80+ shares by DEGURBA class.
- Housing accessibility: % dwellings with step-free access/lifts; annual retrofit rate.
- Care capacity: home-care coverage and long-term care places per 1,000 residents aged 75+.
- Mobility access: share of 65+ within a 10-minute walk of transit running \geq every 15 minutes; paratransit/DRT coverage; pedestrian injury rate for 65+.
- Affordability & inclusion: rent-to-income ratios for single-elderly households; heat-risk and green-space access in older neighbourhoods.

Balance portfolios across cities / towns & suburbs / rural so gains are not confined to capitals. Use PM² decision gates to require: (i) DEGURBA-disaggregated baselines, (ii) a Benefits Register with ageing-sensitive KPIs, (iii) proof of CAPEX→OPEX sustainability for care and transport services, and (iv) interoperability of data for dashboards and audit. When comparing over time, note grid/boundary updates that can shift classifications; always state the reference year and DEGURBA version used. (Eurostat method page above).

2) Infrastructure development patterns & challenges

Quant signals.

- TEN-T revision (Reg. (EU) 2024/1679). Confirms phased completion deadlines—Core by 2030, Extended Core by 2040, Comprehensive by 2050—and reframes governance around European Transport Corridors (merging the former core network corridors with rail freight corridors). The revision also extends four corridors to Ukraine and Moldova to strengthen connectivity with key neighbours.
 - Operational requirements to plan for: by 2040 passenger rail on the core/extended-core must allow ≥ 160 km/h; ERTMS is to be deployed across the entire TEN-T (phase-out of national systems); freight capacity is boosted via 740 m trains and expanded trans-shipment terminals; major airports (>12 m pax/year) must be connected by long-distance rail; urban nodes must have Sustainable Urban Mobility Plans; and alternative-fuels infrastructure is coordinated with AFIR.
 - Delivery implications for city/regional programmes: align project gates and benefits registers to the 2030/2040/2050 milestones; prioritise cross-border rail and node interchanges for the 2040 intermediate deadline; ensure ERTMS readiness and 740 m freight handling in rail schemes; and embed SUMP-linked, zero/low-emission mobility investments at TEN-T urban nodes. (Council press, 13 Jun 2024: <https://www.consilium.europa.eu/en/press/press-releases/2024/06/13/trans-european-transport-network-ten-t-council-gives-final-green-light-to-new-regulation-ensuring-better-and-sustainable-connectivity-in-europe/>; EC overview: <https://transport.ec.europa.eu/transport->

[themes/infrastructure-and-investment/trans-european-transport-network-ten-t_en](#)).

Comparative insights.

Cross-border sections are explicitly prioritised in the revised TEN-T: the Commission will adopt implementing acts for key cross-border and national sections to keep the 2030/2040/2050 milestones on track. Operational standards tighten too (e.g., ERTMS as the single signalling system; ≥ 160 km/h passenger speeds on core/extended-core by 2040; 740 m freight trains), making many borders the gating items for corridor performance.

- Urban nodes obligations: all major cities on TEN-T must have SUMP, and hubs must strengthen long-distance rail links (e.g., airports >12 m pax/year connected by rail)—so station interchanges and last-mile links at nodes become delivery bottlenecks as well.
- Central/Eastern corridors often face larger upgrade scopes: flagship schemes like Rail Baltica remain under construction and not yet in operation by 2026, signalling heavier greenfield/retrofit workloads (speed, electrification, ERTMS) along eastern axes than on many mature western links.
- Permitting is a systemic risk—especially for cross-border works. The Commission notes that complex procedures have delayed TEN-T implementation, particularly on cross-border projects, and points to the Streamlining Directive to accelerate permits. Programme plans should build in permitting-critical milestones and one-stop-shop coordination.
- Freight at borders: new operational targets (e.g., ≤ 15 min average dwell time for freight at border crossings) underscore why border sections dominate the critical path in schedules and benefits (Source: [Mobility and Transport](#)).

Challenge patterns.

Permitting & capacity bottlenecks are now a headline delivery risk across transport and energy. In wind alone, typical approval times of 7–9 years (sometimes >10) inflate costs by 10–35%, while grid-connection queues stall otherwise “shovel-ready” projects.

- EU fixes in law:
 - TEN-T Streamlining Directive (EU) 2021/1187 introduces clearer, coordinated procedures (single contact point/“one-stop” approaches) and a maximum four-year limit for the entire permit-granting process on major TEN-T projects—aimed squarely at cross-border bottlenecks.
- RED III (Directive (EU) 2023/2413) sets binding time limits for renewables: ≤ 12 months in designated renewables acceleration areas (≤ 24 months outside; longer for offshore), with ≤ 6 –12 months for repowering and small installations—plus screening and EIA streamlining provisions.

- Digitalisation & one-stop shops: Member States are rolling out digital one-stop portals for RES, e-submission, status tracking, and data reuse; the Commission highlights potential use of AI to speed case handling.
- Operating reality: Industry and analysts still flag bureaucracy and grid capacity as binding constraints—permitting reforms must be paired with grid planning and resourcing of competent authorities. (WEF permitting note for energy infrastruktúra: <https://www.weforum.org/stories/2024/09/wind-energy-permitting-processes-europe/>).

Trend takeaway.

- Sequencing shift to Core & Extended Core urban nodes. Expect early tranches to focus on TEN-T urban nodes along the Core (2030) and Extended Core (2040), where capacity unlocks ripple across whole corridors. Prioritise nodes using a data-driven triage: corridor criticality (cross-border role), passenger volumes and airport–rail connectivity obligations, freight interchange and 740 m train handling, ERTMS readiness, and AFIR-linked charging/refuelling gaps. Pair this with digital permitting (one-stop contact points, e-submission, status tracking) under the TEN-T Streamlining Directive and national SUMP programmes now required to support urban nodes, so permits move in parallel with design and procurement. Embed this logic in PM² gate reviews: require DEGURBA/FUA-disaggregated baselines, a permit plan with critical path milestones, and evidence of SUMP alignment before “go” decisions.

3) Digital transformation in urban planning

Quant/standards signals.

- **Digital Decade** for smart communities & services. The EU’s Digital Decade frames measurable 2030 targets (digital public services, connectivity, skills, digital business). The Commission’s Smart Cities & Communities strand translates this to city-scale tooling and governance (communities of practice, guidance, funding hooks). For urban projects, treat these as top-level compliance anchors for service design and monitoring. EC policy page (<https://digital-strategy.ec.europa.eu/en/policies/smart-cities-and-communities>).
- **European Data Space for Smart Communities (DS4SSCC)** aims to enable **cross-sector city data sharing**. DS4SSCC is building a cross-sector, federated data space for local/regional authorities and their providers—so mobility, energy, environment, and planning data can be shared/reused securely across cities and vendors. Use its artefacts (reference architecture, pilot calls) to plan interoperability and procurement requirements in your projects. (<https://www.ds4sscc.eu/Living-in.EU> partnership page: <https://living-in.eu/partnerships/data-spaces-smart-and-sustainable-cities-and-communities>).

- **Minimal Interoperability Mechanisms (MIMs)** provide a practical baseline for city platforms. MIMs define a vendor-neutral, “good-enough” interoperability baseline for city platforms; MIMs Plus (latest iterations) clarifies fundamental vs. application-based MIMs to help scale and replicate solutions. In bids and technical specs, require MIMs/MIMs Plus conformance for APIs, data models, identity/consent, and transactions to avoid lock-in and enable cross-city reuse. (OASC MIMs: <https://oascities.org/minimal-interoperability-mechanisms/>; explainer: <https://data.europa.eu/en/news-events/news/minimal-interoperability-mechanisms-advancing-europes-digital-future>; MIMs Plus v6 doc: https://living-in.eu/sites/default/files/files/approved-mims-plus_li.eu_v6.0.docx_1.pdf).
- **INSPIRE** legacy and open data. The Commission’s 2022 evaluation confirms INSPIRE’s role in creating an EU-wide spatial data infrastructure (common discovery, metadata and services), which your teams can leverage as authoritative basemaps/registries. The 2024 Geospatial Trends report spotlights geospatial digital twins and tighter links between national geoportals and open-data portals—useful when designing planning dashboards and simulation pipelines.

Commission evaluation doc (<https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX%3A52022SC0195>) and 2024 geospatial trends (<https://data.europa.eu/sites/default/files/report/Geospatial%20trends%20report%202024.pdf>).

Comparative insights.

- Tallinn leads for municipal e-services (UN 2024). In the UN E-Government Survey 2024’s Local Online Service Index (LOSI), Tallinn ranks #1 (tied with Madrid) with a LOSI score of 0.9271—about 93% of assessed features—up from 3rd in 2022. The 2024 LOSI evaluates six criteria: institutional framework, content provision, services provision, participation & engagement, e-government literacy, and technology. Use these pillars as a delivery checklist and KPIs (e.g., % life-events fully online, WCAG conformance, transactional completion time, API openness, participatory features). (UN 2024 survey; city note: <https://www.tallinn.ee/en/news/tallinns-e-services-ranked-best-world-un> and UN city data page: <https://publicadministration.un.org/egovkb/en-us/Data/City/id/27-Tallinn/dataYear/2024>).
- Urban digital twins adoption is accelerating (Eurocities, 30 Jul 2025). Cities are moving from pilots to portfolio tools, using twins for climate resilience, mobility management, and urban planning. Key lessons: start with a clear use-case, set up governance/steering committees and data ownership from the outset, build capacity across teams, ensure interoperable/open standards and modular architectures, address privacy, cybersecurity, and GDPR/AI Act compliance, and measure value against original goals. Examples include Rotterdam (flood/climate modelling), Dublin (mobility operations), Rennes Métropole (planning + public engagement), Milan (air quality/green space), and SmartLamppost deployments in Portuguese cities as shared infrastructure. The Eurocities Digital Forum Lab has produced member-only Guidelines for developing digital twins and opened a 2025–26 call for pitches. Use these insights to anchor requirements and KPIs in your projects. (Eurocities 2025)

insights: <https://eurocities.eu/latest/helping-cities-make-better-decisions-with-digital-twins/>).

Case snapshots.

Data spaces + MIMs to federate mobility, energy, and built-environment data across municipalities. Use a federated architecture so data stay with the owner (city, utility, operator) but are discoverable and reusable via shared rules and interfaces. In practice:

- Architecture: local “connectors” expose data products (e.g., GTFS-RT, traffic loops, EV chargers, SCADA aggregates, EPC/renovation layers, building footprints) to a shared catalogue; access is granted through policies and logs rather than bulk copying.

MIMs in action:

- MIM1 – Context Information Management (NGSI-LD/OGC APIs): real-time state of assets (buses, sensors, chargers, building systems).
- MIM2 – Common data models/semantics: SAREF & extensions (energy/IoT), DATEX II (roads), GTFS/GBFS (mobility), CityGML/CityJSON (built space), INSPIRE/OGC for geodata.
- MIM3 – Ecosystem transactions: service discovery, logging, billing/settlement for B2G/G2G exchanges.
- MIMs Plus: identity & consent (eIDAS/OIDC), data licences, provenance, service-level & monitoring hooks.
- Governance & legal: standard data-sharing agreements, purpose-bound policies, DPIA/GDPR controls (esp. for ANPR/mobility traces), and a joint stewardship board (city, operator, DSO/TSO, housing/land registry).
- Typical cross-city use cases: regional multimodal travel-time dashboards; LEZ/clean-air compliance using ANPR + air-quality context; energy flexibility (public buildings + DSO signals); heat-risk mapping (buildings + greenspace + micro-climate); renovation targeting (EPC + deprivation + permits).
- Procurement hooks: require MIMs conformance, open API specs, DCAT-AP metadata, and exportability of both data & logs; mandate testable interface samples in bids.
- Implementation steps: (1) inventory priority datasets; (2) map to shared models; (3) deploy connectors & identity/consent; (4) publish to a common catalogue; (5) pilot one cross-municipal service; (6) harden SLAs/monitoring.
- KPIs for the PM² Benefits Register: % priority datasets MIMs-conformant; catalogue coverage & freshness (avg update latency); # cross-department/cross-city reuses;

API success/error rates; time to onboard a new data product; avoided integration cost vs. one-off builds; decision lead-time reduction for target use cases.

- Risk controls: vendor lock-in → insist on standards & exit plans; privacy → minimise/aggregate, apply purpose limitation; quality → publish validation rules & data quality scores; sustainability → budget OPEX for stewardship, not just CAPEX.

(DS4SSCC: <https://www.ds4sscc.eu/>; OASC news: <https://oascities.org/news/>).

Trend takeaway.

Cities that standardise interfaces (MIMs), leverage INSPIRE/Open Data rules, and participate in data spaces reduce vendor lock-in and lower lifecycle costs for planning tools and digital twins. By adopting Minimal Interoperability Mechanisms, municipalities ensure that digital services, sensors, and platforms can “speak the same language” through common APIs, semantic models, and transaction protocols. This prevents dependency on proprietary connectors, making it easier to change suppliers or scale up solutions without costly re-integration. When combined with the INSPIRE Directive and broader EU open data regulations, cities gain legally backed rights to re-use and publish core geospatial datasets—parcels, networks, land use, environmental layers—in machine-readable and standardised formats. This creates a foundation of authoritative, city-owned datasets that remain usable even if technology vendors change. Participation in European data spaces (e.g., DS4SSCC for Smart Communities) further strengthens this model by enabling secure, federated data exchange across city departments and borders, using policy-based access controls rather than one-off integrations. In this way, cities can plug planning software, simulation engines, or digital twins directly into shared catalogues of data products, lowering both the CAPEX (initial integration) and OPEX (maintenance, upgrades) costs.

Over the lifecycle of urban digital transformation projects, this approach reduces duplication, accelerates time-to-market for new services, and enables portfolio-scale synergies—for instance, a mobility digital twin can reuse the same datasets as an energy planning tool or climate-risk model. For governance, this also creates transparency: procurement contracts can require MIMs/INSPIRE compliance, exit strategies with data portability, and catalogue-based discovery, ensuring long-term sovereignty of municipal data. Ultimately, these standards-based strategies shift cities from being dependent on vendor ecosystems to being curators of interoperable, future-proof digital infrastructures.

4) Sustainability metrics & green transition progress

Quant signals (EU level).

- Renewables in final energy. The EU reached a 24.5% share of renewables in gross final energy consumption in 2023, up from 23.0% in 2022, with progress driven mainly by wind and solar capacity additions and a rebound in hydropower after drought years. Yet, the EU remains below the 2030 target of 42.5% (with a 45% ambition level), highlighting the scale-up needed under the Fit for 55 package and the revised Renewable Energy Directive (RED III). Sectoral gaps remain—while electricity is greening rapidly, heating/cooling and transport lag. For urban planning, this underscores the role of district heating retrofits, rooftop PV, and EV infrastructure in

local energy strategies. (Eurostat explainer: https://ec.europa.eu/eurostat/statistics-explained/index.php/Renewable_energy_statistics; EEA indicator page: <https://www.eea.europa.eu/en/analysis/indicators/share-of-energy-consumption-from>; Eurostat news: <https://ec.europa.eu/eurostat/web/products-eurostat-news/w/ddn-20241219-3>).

- GHG emissions. Preliminary estimates for 2023 show EU greenhouse gas emissions 37% below 1990 levels, moving beyond the 2020 climate target but still requiring accelerated annual reductions (~5%/year) to hit the 55% cut by 2030. The decline reflects coal-to-renewables switching, energy efficiency, and structural economic changes, but also temporary demand reductions from high energy prices. For cities, this translates into heightened responsibility: local building retrofits, mobility decarbonisation, and waste sector mitigation are critical to closing the gap, especially as urban areas are both high emitters and hubs for innovation. (<https://www.eea.europa.eu/en/newsroom/news/eea-trends-and-projections>).
- Municipal waste. In 2023, the EU generated 511 kg of municipal waste per capita, slightly up from 505 kg in 2022, with 48% recycled—a record high but still short of the 55% target by 2025 under the Waste Framework Directive. Landfilling has fallen to ~23% EU-wide, though some Member States still landfill >60%. Cities are at the frontline of achieving higher recycling rates through separate collection systems, circular economy hubs, and repair/reuse schemes, with digital tools (smart bins, traceability apps) increasingly used to drive behavioural change and monitor compliance. (Eurostat explainer: https://ec.europa.eu/eurostat/statistics-explained/index.php/Municipal_waste_statistics; PDF snapshot 28/08/2025: <https://ec.europa.eu/eurostat/statistics-explained/SEPDF/cache/10360.pdf>; Eurostat news: <https://ec.europa.eu/eurostat/web/products-eurostat-news/w/ddn-20250213-1>).
- Urban air quality. EEA's European City Air Quality Viewer shows gradual improvement in PM_{2.5} concentrations over the past decade, with many Nordic capitals and smaller cities ranking among the cleanest. However, Southern and Eastern European cities still register concentrations above WHO guidelines, particularly for PM_{2.5} and NO₂, often linked to traffic density, heating fuels, and topography. Progress is uneven: while EU air quality directives are largely complied with, local exceedances remain a health burden, with ~250,000 premature deaths annually still attributable to fine particulate matter. Cities need to pair LEZs, modal shift investments, and building heating upgrades with monitoring linked to EU datasets (EEA, Copernicus). (<https://www.eea.europa.eu/en/topics/in-depth/air-pollution/european-city-air-quality-viewer>).

Comparative insights (city/region).

- Air quality disparities across Europe. Nordic capitals—such as Stockholm, Helsinki, and Reykjavík—frequently top the rankings for cleanest urban air, reflecting their reliance on renewables, district heating, strong emission standards, and favourable climatic/dispersion conditions. By contrast, many central-eastern and southern cities continue to show higher long-term exposure to PM_{2.5}, with concentrations exceeding

both EU limit values and WHO guideline levels. Examples include industrial-transport hubs in Poland, Bulgaria, Italy's Po Valley, and parts of Greece, where dense traffic, coal/biomass heating, and geographical/topographic constraints combine to trap pollutants.

- Health and policy implications. While EU-wide PM_{2.5} levels have improved steadily over the past decade, uneven progress means that urban populations in the most affected areas face elevated health risks—including respiratory and cardiovascular diseases. This contributes to the estimated 250,000 premature deaths annually from PM_{2.5} across the EU. Local governments in higher-exposure regions must prioritise low-emission zones (LEZs), modal shift investments, residential heating upgrades, and industrial emission controls, while Nordic cases show how consistent policy frameworks + renewable integration can sustain low exposure levels.
- Monitoring & benchmarking. The EEA's European City Air Quality Viewer allows population-weighted, city-by-city comparisons, making it a useful PM² benefits-tracking tool. Embedding these data into urban project dashboards supports evidence-based prioritisation: e.g., sequencing investments first in cities where PM_{2.5} exposure remains above critical thresholds, while documenting co-benefits (health, equity, climate) for compliance and funding audits.

Case snapshots.

- Barcelona Superblocks reclaim street space by creating low-traffic cells where through-traffic is diverted to perimeter roads. Inside each superblock, streets are calmed for walking, cycling, play, trees and seating, with service access maintained at low speeds. Delivery uses tactical urbanism first (paint, planters, light furniture) followed by hardscape upgrades, often tied to school streets and local commerce. How to use: plan superblocks at the district scale; set traffic-diversion plans before works; hard-wire unloading windows, emergency access, and universal design. Track KPIs: modal split, vehicle-km inside the cell, noise (dB), NO₂/PM_{2.5} at curbs, shade coverage, and time-to-cross for seniors/children.

(city pages: <https://ajuntament.barcelona.cat/superilles/en> and programme explainer: <https://ajuntament.barcelona.cat/usosdeltemps/en/actuacio/barcelona-superblock-programme>).

- Paris “15-minute city” embeds proximity into the planning toolkit: mixed-use zoning, local services in every arrondissement, bikeable networks, school streets, micro-parks and ground-floor activation. The city's monitoring focuses on access times to daily needs (schools, care, groceries, green space), protected cycling continuity, and reclaiming schoolyards/play streets. How to use: map each neighbourhood's 15-minute basket (education, health, groceries, green, culture), identify gaps, and sequence fixes via quick-build street changes and service relocation incentives. KPIs: % residents with ≤15-minute access to each service, km of continuous protected lanes, school-street coverage, retail vacancy on active frontages, and resident satisfaction. (City report 2024: <https://cdn.paris.fr/paris/2024/02/22/rdd2023-en-web->

[5mo-eAot.pdf](#)).

- Amsterdam Circular Strategy 2020–2025 (toward –50% virgin materials by 2030, fully circular by 2050) applies doughnut economics to the urban economy, prioritising construction/renovation, consumer goods, and food/biowaste. Instruments include circular procurement, material passports/BIM integration, urban mining from demolitions, and repair/reuse hubs. How to use: require material inventories and design-for-disassembly in permits; set tender points for reused/recycled content; create a city marketplace for secondary materials; and pilot circularity metrics on municipal assets first. KPIs: % recycled/reused content in public works, tonnes of materials recovered, embodied-carbon saved (kgCO₂e/m²), % tenders with circular criteria, and diversion from landfill/incineration.

(city PDF: https://assets.amsterdam.nl/publish/pages/1043702/amsterdam-circular-2020-2025-public_version.pdf; policy page: <https://www.amsterdam.nl/en/policy/sustainability/circular-economy/>).

Trend takeaway.

At the macro scale, the EU shows signs of absolute decoupling: higher shares of renewables (24.5% in 2023) and lower GHG emissions (–37% vs. 1990, prelim 2023) even as GDP grew. This confirms the trajectory of Fit for 55 and the Green Deal frameworks. But when shifting from EU-level aggregates to lived realities in cities, progress becomes uneven and sector-specific.

EU recycling rates are improving (48% in 2023), yet waste generation per capita (511 kg/year) remains stubbornly high, with large national disparities. Air pollution is declining overall, but PM_{2.5} exposure still exceeds WHO guidelines in many Southern and Eastern cities, showing that urban form, transport choices, and heating fuels matter more than EU averages.

City-level interventions drive the real co-benefits. Measures such as:

- Street reallocation schemes (e.g., Barcelona’s Superblocks, Paris school streets) cut traffic emissions, noise, and accidents while freeing public space.
- Circular procurement rules (e.g., Amsterdam Circular Strategy) reduce virgin material use, boost recycling industries, and lower embodied carbon in buildings.
- Urban climate services (green roofs, pocket parks, permeable surfaces) deliver dual benefits for air quality and resilience to heat/floods.

These interventions generate multipliers: improved public health (fewer respiratory illnesses, more active mobility), stronger local economies (repair/reuse hubs, construction jobs), and increased social cohesion (accessible public space, citizen participation in design). They also directly feed into EU monitoring frameworks—PM² Benefits Registers can be populated with indicators like kg CO₂e avoided, % modal shift, % recycled content, m² public space gained—turning city-scale pilots into traceable contributions to EU-level targets.

5) Economic impacts & funding mechanisms

Quant/finance signals.

- ERDF – Sustainable Urban Development (SUD). Under Article 11 of Regulation (EU) 2021/1058, at least 8% of each Member State's ERDF allocation must support Sustainable Urban Development (SUD). This earmark ensures that ERDF is not only used for broad regional growth but also directly channels funds into integrated urban strategies, covering projects such as green mobility, brownfield regeneration, digital platforms for city services, and climate adaptation. Member States must designate urban authorities to manage these resources, enhancing local ownership. For city planners, this means ERDF can be a baseline funding source for long-term, multi-sector urban transformation portfolios. (consolidated OJ PDF: <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX%3A02021R1058-20241224>; OJ landing: <https://eur-lex.europa.eu/eli/reg/2021/1058/oj/eng>).
- RRF – Recovery and Resilience Facility. Each national RRF plan must allocate ≥37% to climate/green transition and ≥20% to digital, effectively hardwiring sustainability and digitalisation into post-COVID investments. For cities, this translates into large-scale renovation waves, clean energy deployment, EV infrastructure, and e-government services as priority lines. Because funding is tied to milestone delivery, municipalities benefit from PM²-style gatekeeping to ensure compliance and disbursement. RRF has become a catalyst for accelerating urban retrofits and smart infrastructure roll-outs. (EC overview: https://commission.europa.eu/business-economy-euro/economic-recovery/recovery-and-resilience-facility_en).
- InvestEU – EU guarantee leverage. With a €26.2 billion EU budget guarantee, InvestEU is designed to mobilise up to €372 billion of additional investment across four policy windows: sustainable infrastructure; research, innovation and digitalisation; SMEs; and social investment and skills. For cities, InvestEU offers risk-sharing structures and blended finance tools that de-risk larger or more innovative projects such as district-scale renewable systems, affordable housing retrofits, or urban digital twins. Its advisory services help municipalities prepare bankable projects and align with investor criteria. (EC page: https://commission.europa.eu/funding-tenders/find-funding/eu-funding-programmes/investeu_en; EUR-Lex summary: <https://eur-lex.europa.eu/EN/legal-content/summary/investeu-programme-2021-2027.html>).
- Cities Mission finance enablers. The EU Mission on Climate-Neutral and Smart Cities provides participating cities with an EU Mission Label, which unlocks European Investment Bank (EIB) advisory services, access to a €2 billion dedicated lending envelope, and entry into the Climate City Capital Hub—a platform connecting cities with private investors and financial intermediaries. This label serves as a quality mark, signalling that a city's climate action plan meets EU standards, thereby reducing perceived investment risks. For project managers, the Mission Label is both a political endorsement and a financial gateway, enabling cities to combine EU grants, loans, and private finance into cohesive investment packages. (EC news, 7 May 2025: https://research-and-innovation.ec.europa.eu/news/all-research-and-innovation-news/european-commission-awards-eu-mission-label-39-new-cities-2025-05-07_en).

Comparative insights. Member-State implementation of Article 11 varies—Germany as an example (2021–2027). In federal systems like Germany, the national 8% SUD earmark (Art. 11, ERDF 2021/1058) is met at national level, but cannot be imposed uniformly on each Land’s programme. As a result, Länder choose different delivery models (e.g., ITI-type territorial strategies, dedicated urban calls, or mainstreaming SUD actions inside priorities), set their own thematic focuses (mobility/air quality, brownfields & housing-related regeneration, digital/green public services), and designate urban authorities with varying degrees of management autonomy (intermediate body vs. beneficiary role). Monitoring frameworks and co-financing rates also differ, leading to above-minimum urban allocations in some Länder and closer-to-minimum shares in others. This pattern—decentralised selection, diverse instruments, and heterogeneous KPIs—illustrates why Article-11 outcomes vary by Member State and governance set-up. For cross-country benchmarking, use the EUI registry of “Article 11 cities” plus national OPs to track who manages SUD, with what tools, and at what scale. (example analysis DE, 2025: https://www.deutscher-verband.org/fileadmin/user_upload/documents/Studien/UrbanDimension_GER_2025.pdf).

Trend takeaway.

Blending grants (ERDF/RRF) with debt/guarantees (InvestEU/EIB) is shifting from one-off projects to programmatic, de-risked city pipelines. The cities that unlock capital fastest tend to have:

- Standard project templates (business case, risk/benefit model, MRV plan), repeatable procurement lots, and a live investment register sequenced to 2030/2040 milestones.
- Climate City Contracts (CCCs), EU Mission Label alignment, and PM² gatekeeping (go/no-go criteria, benefits register, CAPEX→OPEX plan) that investors recognise.
- Portfolio-level KPIs (GHG, energy savings, air quality, affordability), audited baselines, and digital data rooms so due diligence scales across similar projects.
- Use InvestEU/EIB guarantees, ELENA-style technical assistance, and performance contracts (ESCO/heat-as-a-service) to shift delivery and performance risk off municipal balance sheets.
- Aggregate small interventions (e.g., school retrofits, EV charging, heat-pump swaps) into thematic tranches with uniform contracts, M&V, and repayment flows.
- MIMs/INSPIRE-based data and open APIs embedded in specs to avoid vendor lock-in and protect lifecycle value.

What to put in your PM² benefits & finance workstreams:

- Readiness KPIs: % of projects with investment-grade business cases; avg. time from concept to FID; share using standard contracts.
- Impact KPIs: € leveraged per € of grant; portfolio IRR/payback band; verified tCO₂e/year reduced; €/tCO₂e; % low-income households benefitting.

- Resilience KPIs: % of assets under performance guarantees; OPEX coverage ratio; # of successful vendor swaps without re-integration.
- Bottom line: Grants open the door, but bankable, standardised, and well-governed pipelines—anchored by CCCs and the Mission Label—are what pull in scalable private and development finance at pace.

6) Governance models & stakeholder engagement

Quant/structure signals.

- Climate City Contracts (CCC). The CCC is the core governance instrument of the EU Mission for 100 Climate-Neutral and Smart Cities by 2030. It bundles Commitments (climate neutrality targets, governance model), Actions (sectoral pathways: energy, mobility, housing, digital, nature-based solutions), and Investments (funding envelopes, financing partners). Unlike traditional strategies, CCCs are co-created with citizens, businesses, academia, and civil society, making them both a policy contract with the EU and a social contract with local stakeholders. They serve as the gateway to Mission Label recognition, which in turn unlocks EIB advisory, lending envelopes, and access to the Climate City Capital Hub. (Mission page: https://research-and-innovation.ec.europa.eu/funding/funding-opportunities/funding-programmes-and-open-calls/horizon-europe/eu-missions-horizon-europe/climate-neutral-and-smart-cities_en; NZC explainer: <https://netzerocities.eu/climate-city-contract/>). [Research and innovation+1](#)

Comparative insights & cases.

- Barcelona. Its CCC aligns decarbonisation with a climate justice programme, explicitly prioritising vulnerable neighbourhoods for retrofits, green mobility corridors, and public-space reclamation. Investments are framed not only in terms of tonnes of CO₂ reduced, but also in equity indicators (heat-stress reduction, access to affordable mobility, improved air quality in deprived areas). The CCC is paired with participatory budgeting, citizen assemblies, and climate justice labs, ensuring legitimacy and distributive fairness. (NZC CCC file:

https://netzerocities.app/_content/files/knowledge/4178/barcelona_nzc_ccc_ok.pdf;
trend report 2025 with equity focus: <https://netzerocities.eu/wp-content/uploads/2025/09/SGA-NZC-Deliverable-D1.2.-Trend-report-2.pdf>).

- Citizen engagement practices. NetZeroCities (NZC) has catalogued a wide range of methods—deliberative assemblies, living labs, co-design workshops, participatory digital platforms—that cities deploy to keep CCCs iterative and socially anchored. This resource library allows peer cities to adapt tested approaches for trust-building, behavioural change, and legitimacy of trade-offs (e.g., reallocating road space, prioritising low-income households for renovation subsidies). (<https://netzerocities.app/QR-Citizen%26Urban>).

Trend takeaway.

- Cities that treat CCCs as “living documents”—continuously updated through monitoring dashboards, citizen feedback loops, and adaptive action plans—move faster from planning to investment portfolios. The integration of explicit equity instruments (neighbourhood-level pilots, targeted subsidies, co-creation labs) enhances both financing attractiveness and political durability. For investors and EU institutions, such CCCs signal not only climate ambition but also social licence to operate, reducing implementation risk and accelerating blended finance flows.

7) Technology adoption in urban project management

Quant/standards signals.

- PM² (EC project methodology). The European Commission’s official project management method, PM², provides a structured lifecycle (Initiating, Planning, Executing, Closing), roles & responsibilities, decision gates, and artefacts (Business Case, Project Handbook, Benefits Register). It is openly published and widely used across EU-funded programmes, aligning with audit, financing, and benefits-tracking requirements. For municipalities, adopting PM² gives credibility in Horizon, ERDF, and Mission-driven projects, and ensures comparability across Member States. (Publications Office page: <https://op.europa.eu/en/publication-detail/-/publication/0e3b4e84-b6cc-11e6-9e3c-01aa75ed71a1>; resources hub: https://pm2.europa.eu/resources_en).
- BIM (Building Information Modelling). The EU BIM Task Group handbook promotes public-sector BIM adoption, framing BIM as a common digital language for the built environment. BIM supports life-cycle cost (LCC) analysis, interoperability (IFC/ISO standards), and better integration with digital twins and permitting systems. It is increasingly a precondition in EU procurement for construction and renovation, ensuring transparency, collaboration, and traceability. (https://www.eubim.eu/wp-content/uploads/2017/07/EUBIM_Handbook_Web_Optimized-1.pdf; Interoperable Europe overview: <https://interoperable-europe.ec.europa.eu/collection/rolling-plan-ict-standardisation/construction-building-information-modelling>).
- E-procurement & Life-Cycle Costing (LCC). The EU procurement framework (Directive 2014/24/EU, EP factsheet) requires public buyers to use digital tendering platforms, enabling transparent procedures, data reuse, and LCC-based award criteria that shift focus from lowest upfront cost to whole-life value. This helps cities embed circularity, energy performance, and resilience in their capital programmes. (EP factsheet: <https://www.europarl.europa.eu/factsheets/en/sheet/34/public-procurement-contracts>).
- Digital permitting. Projects like ACCORD are accelerating digital permitting across Europe, linking planning approvals, BIM models, geospatial data, and e-procurement platforms in one workflow. Pilots in demo countries show how one-stop digital permit shops reduce lead times, improve compliance, and integrate environmental checks (EIA, energy codes) into automated validation. This trend is critical for speeding up renovation waves, renewable deployment, and TEN-T infrastructure upgrades. (ACCORD project country pathways: <https://accordproject.eu/transformation->

[pathways-towards-digital-permitting-processes-in-demo-countries/](https://zenodo.org/records/15324508/files/ACCORD_%20transition%20and%20the%20recommendations_%20May%202025%20Webinar.pdf); webinar paper:
[https://zenodo.org/records/15324508/files/ACCORD %20transition%20and%20the%20recommendations %20May%202025%20Webinar.pdf](https://zenodo.org/records/15324508/files/ACCORD_%20transition%20and%20the%20recommendations_%20May%202025%20Webinar.pdf)).

Comparative insights.

- BIM uptake is uneven. Northern and Western Member States (Nordics, UK, Netherlands, Germany) adopted BIM earlier, embedding it in procurement rules and training. Southern and Eastern MS are catching up, often using RRF-backed reforms to build digital public services and roll out One-Stop Shops (OSS) for building renovations. These OSS act as citizen-facing hubs for energy efficiency upgrades, while BIM and digital permitting are embedded in the backend. This creates a leapfrogging opportunity for regions that previously lagged, provided interoperability standards are enforced. (EPRS RRF digital brief: [https://www.europarl.europa.eu/RegData/etudes/BRIE/2024/762367/EPRS BRI%282024%29762367_EN.pdf](https://www.europarl.europa.eu/RegData/etudes/BRIE/2024/762367/EPRS_BRI%282024%29762367_EN.pdf); OSS calls overview: <https://www.euro-access.eu/en/calls/1866/One-Stop-Shops-Integrated-services-for-clean-energy-transition-in-buildings>).

Trend takeaway.

The emerging urban project delivery tech-stack = PM² (governance) + BIM (design/construction) + e-procurement + LCC (procurement/finance) + digital permitting (approvals) + city data spaces (operation/integration). Where adopted together, cities see:

- Shorter project cycles (permits drop from years to months; design iterations accelerate through BIM/digital twins).
- Clearer benefits tracing (PM² + data spaces + LCC allow direct link from EU policy KPIs to municipal dashboards).
- Lower delivery risk (interoperability reduces vendor lock-in; digital records improve audit readiness; early error detection reduces overruns).

Actionable, PM-ready insights

1. Prioritise urban nodes on the TEN-T core and extended core—these are subject to hard EU deadlines (2030/2040) and attract blended finance if projects are sequenced correctly. Couple transport upgrades with district-scale co-benefits (air quality, noise reduction, retrofit synergies) to maximise ERDF/RRF eligibility.

- Funding alignment: ensure at least 8% ERDF (Art. 11) flows into integrated urban packages, and position local projects to hit RRF milestones for disbursement (≥37% climate, ≥20% digital).

- Portfolio packaging: bundle smaller investments (e.g., heat-pump retrofits, EV chargers, school energy upgrades) into bankable tranches with common specs.
 - KPIs: % portfolio spend in TEN-T nodes; air/noise exposure reductions (dB/μg/m³); retrofit rate per 1,000 dwellings; € leveraged per € of grant.
 - Risk controls: map permitting/land-acquisition critical path; confirm CAPEX→OPEX sustainability for long-term services. (TEN-T: https://transport.ec.europa.eu/.../trans-european-transport-network-ten-t_en; ERDF: <https://eur-lex.europa.eu/eli/reg/2021/1058/oj/eng>; RRF: https://commission.europa.eu/.../recovery-and-resilience-facility_en).
2. Adopt a tech + governance stack from the outset: PM² methodology for roles and decision gates, MIMs/INSPIRE-compliant data models for interoperability, and mandatory BIM for all publicly funded works above a defined threshold (e.g., €2–5m).
- Why it matters: this reduces change orders, accelerates permitting via digital validation, and ensures data portability across contractors/vendors.
 - Procurement hooks: require MIMs/INSPIRE conformance in tenders; insist on IFC/ISO BIM models; demand exit plans with full data export rights.
 - KPIs: % tenders with MIMs clauses; % major works delivered in BIM; permit lead-time reduction (months→weeks); integration cost as % of project cost trending downward.
 - Risk controls: validate vendor “standards claims” via test payloads; maintain version control of schemas; budget for data stewardship. (PM²: https://pm2.europa.eu/resources_en; MIMs: <https://oascities.org/minimal-interoperability-mechanisms/>; INSPIRE: <https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX%3A52022SC0195>; BIM: https://www.eubim.eu/wp-content/uploads/2017/07/EUBIM_Handbook_Web_Optimized-1.pdf).
3. Position the CCC as a single pipeline & investment plan that integrates energy, mobility, housing, and nature-based actions into one governance and finance framework.
- Mission Label pathway: achieving the label signals credibility, unlocking EIB advisory, €2bn lending envelopes, and Climate City Capital Hub access.
 - Portfolio mechanics: CCCs act as a Programme Charter + Benefits Register, allowing all projects to feed into one benefits-tracking dashboard.
 - Equity instruments: include neighbourhood-level pilots, participatory budgeting, and climate justice labs to strengthen social licence.
 - KPIs: € of Mission-related investment unlocked; % CCC actions in execution; % citizen co-created projects; equity indicators (e.g., heat-stress reduction in vulnerable districts).
 - Risk controls: refresh CCCs annually (“living contract”); embed monitoring dashboards; ensure CAPEX and OPEX flows are integrated. (<https://netzerocities.eu/climate-city-contract/>; https://research-and-innovation.ec.europa.eu/news/all-research-and-innovation-news/european-commission-awards-eu-mission-label-39-new-cities-2025-05-07_en).
4. Infrastructure alone won’t deliver—permitting one-stop shops, digital public services, and RRF/Digital Decade reforms must be in place to unlock cycles.

- Permitting reforms: roll out digital one-stop portals with e-submission, automated validation (BIM + geodata checks), and clear statutory time limits.
- Digital public services: ensure RRF-funded systems support integrated urban mobility cards, e-planning portals, and energy-renovation OSS for citizens.
- KPIs: average permitting lead-time (months); % permits issued via digital portal; citizen satisfaction scores with digital urban services; # projects passing through one-stop shops.
- Risk controls: audit digital portals for interoperability and GDPR compliance; monitor staffing capacity in permitting authorities; test fallback procedures for legacy cases. (RRF digital services brief:

https://www.europarl.europa.eu/RegData/etudes/BRIE/2024/762367/EPRS_BRI%282024%29762367_EN.pdf; Smart cities policy: <https://digital-strategy.ec.europa.eu/en/policies/smart-cities-and-communities>).

Case Studies - Successful EU Urban Transformation Projects

Case 1 - Barcelona: Superblocks (Superilles) as a Citywide Public-Realm & Mobility Programme

What it is. Barcelona's **Superblocks** reorganise street networks to restrict through-traffic within 3×3 block cells, reclaiming space for people, trees, and local commerce. Official programme pages outline the concept, objectives and roll-out model: City of Barcelona Superblocks (<https://ajuntament.barcelona.cat/superilles/en>) and programme explainer (<https://ajuntament.barcelona.cat/usosdeltemps/en/actuacio/barcelona-superblock-programme>). Independent summaries: C40 case study (<https://www.c40.org/case-studies/barcelona-superblocks/>) and BCNUEJ note (<https://www.bcnuej.org/outreach/barcelona-superblocks/>). [bcnuej.org+3ajuntament.barcelona.cat+3ajuntament.barcelona.cat+3](https://www.bcnuej.org+3ajuntament.barcelona.cat+3ajuntament.barcelona.cat+3)

Project management approach.

- **Portfolio governance.** City-level portfolio with district-level programmes, sequenced corridors and hubs; iterative delivery through tactical works evolving into capital schemes (above city pages). **Decision gates** (political approval → design codes → construction packages) echo PM² phase gating. ajuntament.barcelona.cat+1
- **Scope & benefits.** Clear **benefits framework** around safety, air/noise, climate adaptation (more canopy/ permeable surfaces), local economy, and equity; benefits tracked at corridor/district level (C40 brief: <https://www.c40.org/case-studies/barcelona-superblocks/>). [C40 Cities](#)
- **Stakeholder engagement.** Block-level co-design with residents, traders and schools, supported by standard street typologies (city pages). ajuntament.barcelona.cat

Lessons & good practices.

- Treat **street transformation as a portfolio**, not a set of isolated pilots.
- Use **standardised design kits** to control cost and speed replication.
- Start with **tactical, reversible interventions** to de-risk politics and procurement, then “lock-in” with capital works and maintenance contracts (city and C40 pages). ajuntament.barcelona.cat+1

Scalability & replication.

- The superblock logic scales from a single junction to a **citywide network**; other cities can adopt the **cell-based** model using their own block structure and traffic hierarchy; numerous EU cities are adapting elements (C40). Provide open **design codes + monitoring KPIs** to export.

Case 2 - Rotterdam: Water Squares & Climate-Adapted Public Space (Rotterdam Climate Adaptation Strategy)

What it is. Rotterdam integrates flood resilience into everyday public spaces-**water squares** that temporarily store cloudburst runoff while serving as attractive plazas in dry weather.

Official/curated descriptions: National Climate Adaptation Portal (EN)

(<https://klimaatadaptatienederland.nl/en/%40297382/rotterdam-water-squares-rainwater-makes-playing/>) and Rotterdam Weatherwise **Programme Framework 2030** (ENG PDF)

(https://rotterdamsweerwoord.nl/content/uploads/2023/06/RWW_Programmakader-2030_ENG.pdf).

Background: C40 adaptation overview (<https://www.c40.org/case-studies/c40-good-practice-guides-rotterdam-climate-change-adaptation-strategy/>) and Urbanisten project page (<https://www.urbanisten.nl/work/rotterdam-adaptation-strategy>).

Research analysis: IDOS paper on placemaking and resilience (https://www.idos-research.de/uploads/media/DP_1.2021.pdf). [IDOS+4Kennisportaal](#)

[Klimaatadaptatie+4Rotterdams Weerwoord+4](#)

Project management approach.

- **Area-based programmes.** The city sequences interventions by catchment and vulnerability, aligning **multi-year CAPEX** with public-space renewals (Programme Framework 2030).
- **Multi-benefit business case.** Projects combine **stormwater storage**, urban cooling, play/amenity and place-making; this enables **co-funding** from transport, green and health budgets.
- **Design–operate loop.** Strong role for local design offices and municipal operators to iterate from prototype squares (e.g., Benthemplein) into a typology library (Urbanisten; IDOS paper).

Lessons & good practices.

- Frame climate adaptation as **desirable public space** to build public support.
- Use **hydrological catchments** as the programme unit; co-design across engineering + landscape + community.
- Maintain a **library of standard details** (inlets, basins, materials) to cut delivery time/cost (Programme Framework 2030; Urbanisten). [Rotterdams Weerwoord+1](#)

Scalability & replication.

- Highly replicable to European cities facing cloudbursts/combined sewers: start with **pilot squares**, build a **city typology catalogue**, and integrate into **development control** so new districts contribute to storage. (National portal; Programme Framework 2030).

Case 3 - Amsterdam: From Strategy to Pipeline in the Circular Economy (Procurement-Led Delivery)

What it is. Amsterdam's **Circular Strategy 2020–2025** commits to **50% fewer virgin materials by 2030** and a **100% circular city by 2050**, with interim procurement targets (e.g., circular criteria in built-environment tenders). Official documents: Strategy PDF (city) (<https://assets.amsterdam.nl/publish/pages/1043702/amsterdam-circular-2020-2025-public-version.pdf>); policy page (<https://www.amsterdam.nl/en/policy/sustainability/circular-economy/>). Additional reference: Carbon Neutral Cities Alliance copy of the strategy (<https://carbonneutralcities.org/wp-content/uploads/2020/06/Amsterdam-Circular-2020-2025-Strategy-HighRes.pdf>) and TU Delft Circular Design Atlas summary (<https://www.tudelft.nl/en/architecture-and-the-built-environment/circular-design-atlas/amsterdam-circular>). [I](#)

Project management approach.

- **Portfolio = value chains.** The city structures delivery by **material flows** (construction, consumer goods, food & organics), each with pilots → scaling projects → regulatory levers (strategy PDF).
- **Procurement as a gate.** **Circular procurement** makes projects “investment-grade” by hard-coding criteria (reused content, modularity, LCA/LCC). This places **benefits tracking** in contracts and enables market development (policy page/strategy).
- **Metrics.** Material Flow Analysis (MFA) + KPIs allow **portfolio benefits** to roll up to city targets; learning cycles via pilots inform new tender templates (strategy).

Lessons & good practices.

- Start with a **citywide strategy**, but drive change through **procurement playbooks** and **framework agreements**.
- Tie **pilots to value chains** to avoid fragmentation.
- Require **LCA/LCC** and **design-for-disassembly** to ensure lifecycle benefits (strategy/policy pages).

Scalability & replication.

- Any EU city can replicate by: adopting **circular criteria** in capital works, creating **material-flow roadmaps**, and aggregating demand via regional purchasing groups; use **ERDF Article 11** urban funds and **RRF** digital procurement reforms to

mainstream (strategy/policy pages).

Case 4 - Tallinn: Citywide Digital Public Services & “Once-Only” Administration

What it is. Tallinn shares the top global ranking for digital public services in the **UN 2024 E-Government Survey**; the city and Estonia's national stack (eID, **X-Road**, “once-only” principle) enable end-to-end online services for residents and businesses. Sources: Tallinn city news (<https://www.tallinn.ee/en/news/tallinns-e-services-ranked-best-world-un>), UN Local Online Service Index (LOSI) city page (<https://publicadministration.un.org/egovkb/en-us/Data/City/id/27-Tallinn/dataYear/2024>), and e-Estonia overview of the 2024 UN survey results (<https://e-estonia.com/estonia-is-at-the-top-of-the-un-e-government-ranking/>). [T](#)

Project management approach.

- **City portfolio of e-services** managed against **Digital Decade** fields (skills, services, infrastructure), with **service design** cycles and continuous deployment.
- **Platform governance.** Strong **interoperability** via X-Road and **digital identity** reduces integration risk and OPEX; **KPIs** benchmarked through UN LOSI and national dashboards (city/UN/e-Estonia pages). [Tallinn+2Public Administration+2](#)

Lessons & good practices.

- Anchor digital projects in **common enablers** (eID, interoperability, data exchange), not bespoke systems.
- Use **public scorecards** (UN LOSI) to focus teams and budgets.
- Pair **policy reforms** (once-only, e-signatures) with the tech stack to unlock end-to-end services.

Scalability & replication.

- Replicable through **national–city agreements** on identity and data exchange, city **design standards** for services, and **change management** for departments; use **RRF** funding and **InvestEU Public Sector Loan Facility** to finance the stack and migration (tie to EU instruments mentioned earlier; Tallinn/UN pages for benchmarking).

Cross-case Synthesis - What PM leaders can copy tomorrow

1. **Run city transformation as governed portfolios.** Each case treats transformation as a **portfolio** (streets, adaptation sites, value chains, e-services) with **standard artefacts**: a playbook, KPIs, funding plan, benefits log. (Barcelona/Rotterdam/Amsterdam/Tallinn sources above.)
2. **Start with scalable typologies.** Superblock junctions, water squares, circular procurement templates, and e-service modules are **typologies** that replicate quickly once proven.
Hard-code benefits into contracts. Use **procurement** (Amsterdam) and **design standards** (Barcelona/Rotterdam) to embed outcomes (air quality, storage capacity, material reuse) into delivery.
3. **Blend finance by framing co-benefits.** Adaptation as public-space upgrades (Rotterdam) and circularity as cost-saving LCC (Amsterdam) attract **multi-line budgets** and EU instruments.
4. **Use external scorecards for focus.** UN LOSI (Tallinn) or Mission **Climate City Contracts** can concentrate leadership attention and unlock capital. (Tallinn/UN; see Mission section earlier.)

Interpretation & Strategic Insights

Cross-cutting themes & how they connect

1. **Twin transition as the common North Star.** The **European Green Deal** sets the climate-neutrality frame (https://commission.europa.eu/strategy-and-policy/priorities-2019-2024/european-green-deal_en), while **Europe's Digital Decade (2030)** supplies the digital targets that make delivery faster and cheaper (https://commission.europa.eu/strategy-and-policy/priorities-2019-2024/europe-fit-digital-age/europes-digital-decade-digital-targets-2030_en). In cities, these converge through the **EU Cities Mission** model (https://research-and-innovation.ec.europa.eu/funding/funding-programmes-and-open-calls/horizon-europe/eu-missions-horizon-europe/climate-neutral-and-smart-cities_en): a mission label, a single pipeline (the Climate City Contract), and dedicated finance/advisory.
2. **Integrated, place-based development with social aims upfront.** The **New Leipzig Charter** reframes city policy around *just, green, productive* places (PDF: <https://www.bmi.bund.de/SharedDocs/downloads/EN/eu-presidency/gemeinsame-erklarungen/new-leipzig-charta-2020.pdf>), with the **Urban Agenda for the EU/EUI** turning that into practice and capacity (<https://www.urban-initiative.eu/>). This puts equity, inclusion and neighbourhood scale at the core of project portfolios, not as add-ons.
3. **Infrastructure backbones amplify city outcomes.** Urban decarbonisation and resilience hinge on **TEN-T** connections (urban nodes, rail hubs) under the revised 2024 regulation and corridor maps (press release: <https://www.consilium.europa.eu/en/press/press-releases/2024/06/13/trans-european-transport-network-ten-t-council-gives-final-green-light-to-new-regulation-ensuring-better-and-sustainable-connectivity-in-europe/>; overview: https://transport.ec.europa.eu/transport-themes/infrastructure-and-investment/trans-european-transport-network-ten-t_en).
4. **Interoperable data is a force multiplier.** City platforms that adopt **Minimal Interoperability Mechanisms (MIMs)** (<https://oascities.org/minimal-interoperability-mechanisms/>), participate in the **European Data Space for Smart Communities (DS4SSCC)** (<https://www.ds4sscc.eu/>), and align with the **Interoperable Europe Act** (<https://interoperable-europe.ec.europa.eu/interoperable-europe/interoperable-europe-act>) cut vendor lock-in, speed permitting/monitoring, and lower lifecycle costs across programmes.
5. **Demography and health co-benefits shape priorities.** Ageing and labour shortages (Eurostat, 2024 median age 44.7: https://ec.europa.eu/eurostat/statistics-explained/index.php/Population_structure_and_ageing) intersect with air-quality and heat risks (EEA's city air viewer: <https://www.eea.europa.eu/en/topics/in-depth/air-pollution/european-city-air-quality-viewer>) to push investments toward public transport, healthy streets, cooling/blue-green infrastructure and digitalised care services.

Gap analysis - where current approaches fall short

A) Delivery capacity & permitting bottlenecks.

- Cities frequently have strategies but lack a delivery **operating system** (permits, procurement, data, benefits tracking) to move portfolios at pace. The **RRF** accelerated reforms but monitoring and performance linkage remain uneven (overview: https://commission.europa.eu/business-economy-euro/economic-recovery/recovery-and-resilience-facility_en; critic by EU auditors reported 2025: <https://www.reuters.com/business/finance/eu-recovery-fund-not-fully-transparent-or-accountable-auditors-say-2025-05-06/>). **Implication:** institutionalise a standard project methodology (PM²), digital permitting, and milestone-to-benefit tracking across the portfolio.

B) Financing fragmentation & pipeline readiness.

- **ERDF Article 11** earmarks urban funding but many cities under-leverage it to create bankable, investment-grade pipelines (consolidated OJ text: <https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:02021R1058-20241224>; explainer for “Article 11 cities”: <https://www.urban-initiative.eu/article-11-cities>). Few systematically blend **InvestEU** guarantees (https://commission.europa.eu/funding-tenders/find-funding/eu-funding-programmes/investeu_en) with national/EIB lending. **Implication:** build a pipeline office tied to CCCs and use InvestEU/EIB to de-risk revenue or demand risk.

C) Interoperability & data governance still patchy.

- Many municipal platforms remain bespoke. The **Interoperable Europe Act** (entered into force 11 April 2024) provides a legal backbone (<https://interoperable-europe.ec.europa.eu/interoperable-europe/interoperable-europe-act>), but adoption requires practical civic tech standards like **MIMs** (<https://oascities.org/minimal-interoperability-mechanisms/>) and participation in **DS4SSCC** pilots (<https://www.ds4sscc.eu/about/the-project>). **Implication:** include MIMs and data-space compliance in all ICT procurements.

D) Cross-border alignment on infrastructure.

- Urban transformation policies often ignore wider network effects; the revised **TEN-T** regulation sets hard timetables (Core/Extended Core/Comprehensive), but city projects don't always sequence with corridor upgrades (press PDF: <https://www.consilium.europa.eu/en/press/press-releases/2024/06/13/trans-european-transport-network-ten-t-council-gives-final-green-light-to-new-regulation-ensuring-better-and-sustainable-connectivity-in-europe/pdf/>). **Implication:** align city portfolios with corridor milestones and urban-node functions.

Emerging opportunities & challenges to track

1) Mission-labelled urban pipelines attracting capital.

The Cities Mission's **Mission Label** plus the **Climate City Capital Hub** are structuring capital flows into city portfolios; reporting indicates a large multi-year investment push and

growing EIB alignment (e.g., <https://netzerocities.eu/mission-cities/>; Reuters on EU-backed plan and capital hub: <https://www.reuters.com/sustainability/sustainable-finance-reporting/eu-backs-650-billion-euro-plan-help-cities-reach-net-zero-by-2030-2024-06-25/>).

Watch-outs: pipeline quality and measurable benefits remain decisive for crowding in private finance.

2) Interoperable Europe + data spaces as delivery accelerators.

With the **Interoperable Europe Act** now in force, city–region–state services can be designed “once-only” and reused; **DS4SSCC** pilots show how cross-sector data sharing supports mobility, energy and planning use-cases (<https://interoperable-europe.ec.europa.eu/interoperable-europe/interoperable-europe-act>; <https://www.ds4sscc.eu/>). **Challenge:** ensure adoption of **MIMs** to avoid proprietary lock-in (<https://oascities.org/minimal-interoperability-mechanisms/>).

3) Industrial decarbonisation & procurement reforms feeding city markets.

The Commission’s “clean industrial deal” proposals foresee larger guarantees and permitting streamlining for clean tech and grids-relevant for city energy and fleet procurement (news coverage: <https://www.reuters.com/sustainability/sustainable-finance-reporting/european-commission-proposes-mobilising-100-bln-euros-eu-made-clean-tech-2025-02-26/>). **Challenge:** ensure municipal demand signals (framework contracts, offtake) convert new supply into local outcomes.

4) Demographic headwinds.

Ageing and low births will keep reshaping housing, care, and labour markets; Eurostat confirms rising median age and widening regional differences (https://ec.europa.eu/eurostat/statistics-explained/index.php/Population_structure_and_ageing; interactive 2025 demography: <https://ec.europa.eu/eurostat/web/interactive-publications/demography-2025>). Migration cushions totals but not the age pyramid everywhere (<https://www.reuters.com/world/europe/migration-boosts-eu-population-again-2023-2024-07-11/>). **City implication:** prioritise universal design, proximity services, and workforce automation/digital upskilling.

Strategic implications - what different stakeholders should do next

For city leaders & portfolio/PMO teams

- **Run transformation as governed portfolios** using **PM²** across the project lifecycle, with a Benefits Realisation Plan tied to Eurostat/EEA indicators (PM² portal: https://pm2.europa.eu/index_en).
- **Use the Climate City Contract** as the single pipeline and financing plan; aim for the **Mission Label** to unlock EIB advisory and capital-hub matchmaking (Mission page: https://research-and-innovation.ec.europa.eu/funding/funding-programmes-and-open-calls/horizon-europe/eu-missions-horizon-europe/climate-neutral-and-smart-cities_en; NZC cities list: <https://netzerocities.eu/mission-cities/>).
- **Standardise the digital layer:** require **MIMs** in tenders, join **DS4SSCC** pilots, align with the **Interoperable Europe Act** so services interconnect nationally and cross-border (MIMs: <https://oascities.org/minimal-interoperability-mechanisms/>; DS4SSCC:

<https://www.ds4sscc.eu/>; Act: <https://interoperable-europe.ec.europa.eu/interoperable-europe/interoperable-europe-act>).

- **Sequence with TEN-T:** focus early projects in **urban nodes** and around stations/ports where EU corridor upgrades magnify impact (TEN-T overview: https://transport.ec.europa.eu/transport-themes/infrastructure-and-investment/trans-european-transport-network-ten-t_en).

For national governments & managing authorities

- **Fully operationalise ERDF Article 11** with transparent city selections, multi-year envelopes, and technical assistance for pipeline preparation (text: <https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:02021R1058-20241224>)
- **Leverage the RRF** to lock in enabling reforms (digital permitting, one-stop shops, e-invoicing) that remove critical path delays (RRF overview: https://commission.europa.eu/business-economy-euro/economic-recovery/recovery-and-resilience-facility_en).
- **Back data interoperability:** transpose the **Interoperable Europe Act** swiftly, co-fund national connectors to **DS4SSCC** so local services plug into country platforms (Act: <https://interoperable-europe.ec.europa.eu/interoperable-europe/interoperable-europe-act>; DS4SSCC: <https://www.ds4sscc.eu/>).
- **Align with TEN-T timetables** and fund last-mile urban projects tied to corridor upgrades (press: <https://www.consilium.europa.eu/en/press/press-releases/2024/06/13/trans-european-transport-network-ten-t-council-gives-final-green-light-to-new-regulation-ensuring-better-and-sustainable-connectivity-in-europe/>).

For investors, lenders & utilities/operators

- **Use CCCs & Mission Label** as diligence anchors: they consolidate governance, actions and investments into bankable portfolios (Mission: https://research-and-innovation.ec.europa.eu/funding/funding-programmes-and-open-calls/horizon-europe/eu-missions-horizon-europe/climate-neutral-and-smart-cities_en).
- **Blend InvestEU with EIB instruments** to de-risk demand or construction and crowd-in private capital (InvestEU overview: https://commission.europa.eu/funding-tenders/find-funding/eu-funding-programmes/investeu_en).
- **Adopt open data/MIMs in network upgrades** to enable city platforms to orchestrate energy, mobility and water demand (MIMs: <https://oascities.org/minimal-interoperability-mechanisms/>).

For civil society, SMEs & universities

- **Co-create and watchdog:** use open dashboards and the **EEA city air viewer** to monitor outcomes, and bring SMEs into **DS4SSCC** pilots to build interoperable services (viewer: <https://www.eea.europa.eu/en/topics/in-depth/air-pollution/european-city-air-quality-viewer>; DS4SSCC: <https://www.ds4sscc.eu/>).

- **Skills & inclusion:** align upskilling with **Digital Decade** targets to expand the local supplier base (https://commission.europa.eu/strategy-and-policy/priorities-2019-2024/europe-fit-digital-age/europes-digital-decade-digital-targets-2030_en).

Bottom line for strategy

- Treat city transformation as a **mission-driven, interoperable portfolio** that sits at the crossing of **Green Deal** goals (https://commission.europa.eu/strategy-and-policy/priorities-2019-2024/european-green-deal_en), **Digital Decade** targets (https://commission.europa.eu/strategy-and-policy/priorities-2019-2024/europe-fit-digital-age/europes-digital-decade-digital-targets-2030_en), **TEN-T** enablers (https://transport.ec.europa.eu/transport-themes/infrastructure-and-investment/trans-european-transport-network-ten-t_en) and **Interoperable Europe** rules (<https://interoperable-europe.ec.europa.eu/interoperable-europe/interoperable-europe-act>).
- Close the **capacity, finance and interoperability gaps** by institutionalising **PM²**, building **Mission-labelled** pipelines, and mandating **MIMs/DS4SSCC** participation across digital procurements.

A) Policy makers at EU & national levels

1. **Lock in interoperability as default.**
Adopt and operationalise the **Interoperable Europe Act** (<https://interoperable-europe.ec.europa.eu/interoperable-europe/interoperable-europe-act>) across ministries, require **Minimal Interoperability Mechanisms (MIMs)** in all city-facing ICT tenders (<https://oascities.org/minimal-interoperability-mechanisms/>), and co-fund participation in the **Data Space for Smart Communities (DS4SSCC)** (<https://www.ds4sscc.eu/>).
Why: reduces vendor lock-in, accelerates permitting/monitoring, lowers lifecycle cost.
2. **Make urban portfolios finance-ready.**
Operationalise **ERDF Article 11** sustainable urban development with transparent city selection, multi-year envelopes and technical assistance (consolidated OJ: <https://eur-lex.europa.eu/eli/reg/2021/1058/oj/eng>; guidance hub: <https://www.urban-initiative.eu/article-11-cities>). Use **RRF** to hard-wire enabling reforms (digital permitting, one-stop shops) (https://commission.europa.eu/business-economy-euro/economic-recovery/recovery-and-resilience-facility_en) and deploy **InvestEU** guarantees/advisory to crowd-in capital (https://commission.europa.eu/funding-tenders/find-funding/eu-funding-programmes/investeu_en; advisory: https://investeu.europa.eu/what-investeu/advisory-support_en).
3. **Tie city projects to corridor effects.**
Align national funding windows with the revised **TEN-T** milestones for urban nodes (overview: https://transport.ec.europa.eu/transport-themes/infrastructure-and-investment/trans-european-transport-network-ten-t_en).
4. **Standardise monitoring.**
Mandate a minimal indicator core using **Eurostat Cities** (<https://ec.europa.eu/eurostat/web/cities/database>) and **EEA city air viewer** (<https://www.eea.europa.eu/en/topics/in-depth/air-pollution/european-city-air-quality->

[viewer](#)), plus land-use context from **Copernicus Urban Atlas** (<https://land.copernicus.eu/en/products/urban-atlas>).

5. **Procurement as policy.**

Scale **Green Public Procurement** and lifecycle costing templates (https://environment.ec.europa.eu/topics/sustainable-development/green-public-procurement_en) and align with **EU Taxonomy** disclosures where material (https://finance.ec.europa.eu/sustainable-finance/tools-and-standards/eu-taxonomy-sustainable-activities_en).

B) City administrators & urban planners

1. **Run transformation as a single governed pipeline.**

Adopt/refresh a **Climate City Contract (CCC)** (<https://netzerocities.eu/climate-city-contract/>) as the city's portfolio & investment plan; seek the **Mission Label** for access to EIB/advisory and capital matchmaking (mission page: https://research-and-innovation.ec.europa.eu/funding/funding-programmes-and-open-calls/horizon-europe/eu-missions-horizon-europe/climate-neutral-and-smart-cities_en).

2. **Institutionalise delivery with PM².**

Stand up a city PMO and use **PM²** artefacts (Business Case, Benefits Realisation Plan, Risk Log) across programmes (https://pm2.europa.eu/resources_en).

3. **Digitise the backbone.**

Require **MIMs** in every data/platform tender (<https://oascities.org/minimal-interoperability-mechanisms/>), join **DS4SSCC** pilots (<https://www.ds4sscc.eu/>), and align spatial data to **INSPIRE/Interoperable Europe** (<https://interoperable-europe.ec.europa.eu/interoperable-europe/interoperable-europe-act>).

4. **Pick scalable typologies first.**

Prioritise interventions with strong replication-e.g., **street reallocation** (Barcelona Superblocks: <https://ajuntament.barcelona.cat/superilles/en>), **blue-green adaptation** (Rotterdam water squares: https://rotterdamsweerwoord.nl/content/uploads/2023/06/RWW_Programmakader-2030_ENG.pdf), **circular procurement** (Amsterdam: https://assets.amsterdam.nl/publish/pages/1043702/amsterdam-circular-2020-2025-public_version.pdf).

5. **Sequence with infrastructure.**

Focus early capital around **TEN-T urban nodes** and station areas to amplify corridor investment (https://transport.ec.europa.eu/transport-themes/infrastructure-and-investment/trans-european-transport-network-ten-t_en).

C) Project managers & implementation teams

1. **Benefits first.**

Create a **Benefits Realisation Plan** with baselines/targets mapped to Eurostat/EEA indicators (<https://ec.europa.eu/eurostat/web/cities/database>; <https://www.eea.europa.eu/en/topics/in-depth/air-pollution/european-city-air-quality-viewer>). Use PM² gate reviews to keep scope–benefits alignment (https://pm2.europa.eu/resources_en).

2. Build a delivery tech-stack.

Mandate **BIM** for public works and integrate with GIS/digital twins (EU BIM Task Group handbook: https://www.eubim.eu/wp-content/uploads/2017/07/EUBIM_Handbook_Web_Optimized-1.pdf). Track permitting cycle time and digitise workflows (ACCORD insights: <https://accordproject.eu/transformation-pathways-towards-digital-permitting-processes-in-demo-countries/>).

3. Procure outcomes, not widgets.

Use **GPP** criteria and **LCA/LCC** in tenders (https://environment.ec.europa.eu/topics/sustainable-development/green-public-procurement_en). Require **open APIs** and **MIMs** compliance (<https://oascities.org/minimal-interoperability-mechanisms/>).

4. Standardise & scale.

Publish **playbooks** (design kits, standard details, KPI templates) so districts can repeat proven solutions (e.g., superbloc typologies: <https://ajuntament.barcelona.cat/superilles/en>).

D) Private sector partners & investors

1. Use the CCC as the anchor.

Underwrite portfolios aligned with a **Mission-labelled CCC** (<https://netzerocities.eu/mission-cities/>); leverage **InvestEU** guarantees/EIB facilities for risk-sharing (https://commission.europa.eu/funding-tenders/find-funding/eu-funding-programmes/investeu_en).

2. Commit to open & interoperable delivery.

Bid with **MIMs-compliant** platforms and publish API/documentation (<https://oascities.org/minimal-interoperability-mechanisms/>); demonstrate **EU Taxonomy** alignment where relevant (https://finance.ec.europa.eu/sustainable-finance/tools-and-standards/eu-taxonomy-sustainable-activities_en).

3. Offer performance-based models.

ESCO/energy-savings and availability-based contracts for fleets/buildings; share KPIs on city dashboards (Eurostat/EEA frameworks as reference above).

Conclusion & Future Research (≈2 pages, with full text links)

Summary of contribution to knowledge

This report integrates **EU policy architecture** (Green Deal, Digital Decade, Urban Agenda/EUI, Cities Mission) (https://commission.europa.eu/strategy-and-policy/priorities-2019-2024/european-green-deal_en; https://commission.europa.eu/strategy-and-policy/priorities-2019-2024/europe-fit-digital-age/europes-digital-decade-digital-targets-2030_en; <https://www.urban-initiative.eu/>; https://research-and-innovation.ec.europa.eu/funding/funding-programmes-and-open-calls/horizon-europe/eu-missions-horizon-europe/climate-neutral-and-smart-cities_en) with **comparable datasets**

(Eurostat/EEA/Copernicus) (<https://ec.europa.eu/eurostat/web/cities/database>; <https://www.eea.europa.eu/en/topics/in-depth/air-pollution/european-city-air-quality-viewer>; <https://land.copernicus.eu/en/products/urban-atlas>) and a **project-management lens (PM²)** (https://pm2.europa.eu/resources_en). It translates strategy into **portfolio-level actions**, highlights **interoperability/data spaces** (<https://interoperable-europe.ec.europa.eu/interoperable-europe/interoperable-europe-act>; <https://www.ds4sscc.eu/>; <https://oascities.org/minimal-interoperability-mechanisms/>), and shows how **finance instruments** (ERDF Article 11, RRF, InvestEU) can be blended for delivery (<https://eur-lex.europa.eu/eli/reg/2021/1058/oj/eng>; https://commission.europa.eu/business-economy-euro/economic-recovery/recovery-and-resilience-facility_en; https://commission.europa.eu/funding-tenders/find-funding/eu-funding-programmes/investeu_en).

Research limitations

- **Data lag & heterogeneity:** City indicators (e.g., **Urban Atlas 2018**) lag construction cycles and differ by Member State reporting (<https://land.copernicus.eu/en/products/urban-atlas>; https://ec.europa.eu/eurostat/cache/metadata/en/urb_esms.htm).
- **Attribution vs contribution:** Outcomes reflect multi-level policies; causal claims are limited without experimental designs.
- **Coverage of local practices:** Some **Climate City Contracts** and delivery playbooks remain internal; qualitative insights rely on public case documentation.

Future research priorities

1. **Longitudinal portfolio evaluation:** Pre/post analyses for air quality, modal split, retrofit rates and equity at **neighbourhood scale**, combining **EEA/Eurostat** with city open data (<https://www.eea.europa.eu/en/topics/in-depth/air-pollution/european-city-air-quality-viewer>; <https://ec.europa.eu/eurostat/web/cities/database>).
2. **Interoperability ROI:** Measure **MIMs/DS4SSCC** impacts on total cost of ownership, delivery speed and vendor diversity (<https://oascities.org/minimal-interoperability-mechanisms/>; <https://www.ds4sscc.eu/>).
3. **Digital permitting effectiveness:** Track cycle-time and approval-quality changes from **one-stop shops** and model-based checks (ACCORD insights: <https://accordproject.eu/transformation-pathways-towards-digital-permitting-processes-in-demo-countries/>).
4. **Finance–outcome linkage:** Compare **InvestEU/EIB** structures that best correlate with measurable urban outcomes (https://commission.europa.eu/funding-tenders/find-funding/eu-funding-programmes/investeu_en).

5. **Circular procurement at scale:** Test LCA/LCC-based tenders and secondary-materials markets across regions (GPP: https://environment.ec.europa.eu/topics/sustainable-development/green-public-procurement_en).
6. **Corridor-city synchronisation:** Model benefits of sequencing city portfolios with **TEN-T** milestones (https://transport.ec.europa.eu/transport-themes/infrastructure-and-investment/trans-european-transport-network-ten-t_en).

Final strategic outlook (2025–2030)

Europe's window to meet **2030 climate-neutral city** targets and **TEN-T core** timelines will favour cities that:

- **Consolidate a Mission-labelled CCC** and run it as a PM²-governed portfolio (<https://netzerocities.eu/climate-city-contract/>; https://pm2.europa.eu/resources_en),
- **Mandate interoperability** (Interoperable Europe Act, **MIMs**, **DS4SSCC**) for every digital and data procurement (<https://interoperable-europe.ec.europa.eu/interoperable-europe/interoperable-europe-act>; <https://oascities.org/minimal-interoperability-mechanisms/>; <https://www.ds4sscc.eu/>), and
- **Blend ERDF/RRF with InvestEU/EIB** to turn plans into multi-year investment pipelines (<https://eur-lex.europa.eu/eli/reg/2021/1058/oj/eng>; https://commission.europa.eu/business-economy-euro/economic-recovery/recovery-and-resilience-facility_en; https://commission.europa.eu/funding-tenders/find-funding/eu-funding-programmes/investeu_en).

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