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CCC Trend Report V3

Deliverable D1.3

Overview of 53 cities awarded the Mission Label across submission windows 3 and 4

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Abbreviations and acronyms

Acronym	Description
AFOLU	Agriculture, forestry, and land use
BAU	Business as usual
CAP	Climate Action Plan
CCC	Climate City Contract
CIP	Climate Investment Plan
GHG	Greenhouse gases
IPPU	Industrial processes and product use
MEL	Monitoring, evaluation and learning
NBS	Nature-based solutions
NZC	NetZeroCities
RES	Renewable energy sources
SECAP	Sustainable Energy and Climate Action Plan
WP	Work Package

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Summary

This report provides a synthesis of Climate City Contracts from 53 European Mission cities awarded the Mission Label across submission Windows 3 and 4. It builds on the analytical logic developed through the earlier trend reports.

The Climate City Contract is both a planning document and a governance mechanism for city-wide climate-neutral transformation. The report considers not only whether cities set ambitious targets and propose mitigation actions, but also how they use the CCC process to organise responsibilities, mobilise stakeholders, connect action and investment planning, establish monitoring and learning systems, and build the enabling conditions required for implementation by 2030.

The Window 3 and Window 4 cohorts demonstrate that the CCC preparation process has become more mature over time, implementation-oriented and governance-focused. Across both cohorts, cities increasingly connect climate neutrality to broader urban transformation agendas, including regeneration, quality of life, health, circular economy, energy poverty, public participation, social inclusion, biodiversity, adaptation, digitalisation, investment mobilisation and multi-level governance. This highlights that the Mission framework is not only being interpreted as a technical emissions-reduction requirement, but increasingly as a mechanism for coordinating systemic change across urban systems and actor networks.

The Window 3 cohort provides strong evidence of governance mobilisation and peer-learning potential. Cities such as Aachen, Gävle, Milan, Bologna, Gothenburg, The Hague, Trikala and Umeå show how the CCC can be used to structure stakeholder commitments, citizen assemblies, climate accords, testbeds, transition maps, digital monitoring systems and internal coordination arrangements. Window 3 also includes useful examples of action portfolio design, circular economy approaches, smart-city integration, energy poverty measures and investment planning, although the cohort continues to show common needs around quantification, residual emissions, stakeholder roles and monitoring responsibilities.

The Window 4 cohort extends these trends across a larger and more diverse set of cities and shows how the CCC process is being adapted to an even wider range of institutional, territorial and socio-economic contexts. The Window 4 cities illustrate the importance of mission governance, finance, stakeholder mobilisation, social justice and implementation traceability. At the same time, the larger cohort makes visible the continuing challenge of translating broad ambition into quantified, sequenced, financed and monitored pathways for delivery.

Several areas of good practice emerge across both cohorts. Cities provide useful peer-learning examples in target clarity, consumption-based and Scope 3 ambition, baseline methodology, impact pathways, circular economy, renewable energy deployment, citizen engagement, climate justice, digitalisation, monitoring and investment planning. These examples are valuable not because they offer complete models to replicate, but because they show concrete ways in which cities are making the CCC operational in different local contexts.

Recurring challenges remain broadly consistent across the trend report series. These include ambiguities in target boundaries and terminology, incomplete treatment of gases or specific sectors, limited action-level quantification, residual emissions strategies that require further refinement, uneven sectoral detail, operationalisation of stakeholder commitments, incomplete monitoring indicators, co-benefit measurement, and integration between Climate Action Plans and Climate Investment Plans.

The central conclusion is that future CCC iterations should focus on implementation traceability and learning. Cities should move from credible strategic plans toward more traceable implementation systems that clarify which actors will deliver which actions, how each action contributes to closing the emissions gap, how investments will be mobilised and monitored, how co-benefits and distributional impacts will be assessed, and how monitoring results will trigger course correction over time.

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For the Mission as a whole, the report highlights the need to strengthen support for cities in areas where individual municipal capacity is often insufficient. These include emissions modelling, climate investment governance, multi-level policy alignment, stakeholder co-signatory accountability, monitoring and evaluation, digital data governance, residual emissions strategies, and peer-learning mechanisms that allow cities to learn from concrete governance practices rather than general principles alone.

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Keywords

Climate City Contract; EU Cities Mission; mission governance; climate neutrality; urban transformation; investment planning; monitoring and iteration; multi-level governance; stakeholder mobilisation.

Introduction

Mission-oriented urban climate policy has become a central framework for accelerating systemic transformation in European cities. The EU Mission for 100 Climate-Neutral and Smart Cities by 2030 translates this approach into a time-bound and place-based governance challenge: cities are asked to define credible pathways to climate neutrality, mobilise local ecosystems, align investment and implementation, and establish commitments through the Climate City Contract process.

The Climate City Contract is the core governance instrument of the Cities Mission. It combines a Climate Action Plan and a Climate Investment Plan, with a commitment document supported by local stakeholder commitments. As such, the CCC is not only a planning template. It is also a mechanism for organising collective action, clarifying transition pathways, aligning actors, surfacing implementation barriers, mobilising finance and creating learning loops around climate-neutral city transformation.

This report is the third CCC trend report analysing how Mission cities are using the Climate City Contract. The first trend report examined the first labelled cities and established the CCC as an emerging governance innovation across action planning, investment planning and stakeholder commitments. The second trend report analysed the Window 2 cohort of 23 labelled cities and developed a more systematic analytical structure for comparing the key components of the CCC. This report builds on these and applies the same analytical logic to two further cohorts: 20 Window 3 cities and 33 Window 4 cities.

The combined scope of this report covers 53 cities awarded the Mission Label across Windows 3 and 4. The Window 3 and Window 4 cohorts broadens the evidence base and allows the report to identify both continuity and change in how the CCC has been interpreted across successive submission windows.

The purpose of the report is to identify trends, strengths, shared challenges and peer-learning opportunities across these cohorts. The analysis focuses on the CCCs themselves and asks what they reveal about the evolving capacity of cities to define targets, quantify emissions, assess starting conditions, design action portfolios, organise governance, remove barriers, establish monitoring systems, integrate horizontal topics and mobilise investment for implementation.

The methodological approach is qualitative and comparative. The analysis draws on the CCCs, coded Window 3 and 4 evidence, and feedback reports. Where specific recommendations from review materials are discussed, they are treated as inputs for understanding how CCCs can be strengthened in future iterations.

The analysis also distinguishes between strategic maturity and implementation readiness. Many CCCs contain strong political commitment, coherent transition narratives and broad action portfolios. However, implementation readiness depends on further features: quantified action-level impacts, clear timelines, responsible actors, investment sources, risk mitigation, monitoring indicators, governance mandates and mechanisms for iterative course correction. The report therefore pays particular attention to whether the CCCs reflect readiness to move from ambition and planning toward delivery.

The combined Window 3 and Window 4 analysis make it possible to reflect on development across all four submission windows covered by the trend report series. Across the series, the CCC appears to be evolving from a novel planning and commitment mechanism into a more sophisticated mission governance framework. The core focus in now on how cities are making their ambition governable, investable, monitorable and socially legitimate.

The remainder of the report is organised in two main cohort sections followed by a synthesis section and overall conclusions. The Window 3 section synthesises the findings from the 20 labelled

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cities, while the Window 4 section analyses the larger cohort of 33 labelled cities. The synthesis section them draws together the main lessons across both cohorts and situates them within the wider development of the Climate City Contract process across Windows 1, 2, 3 and 4, before the conclusion section gives reflects and draws some overall findings and possible next steps.

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1 Section 1: Window 3 - 20 labelled cities

1.1 Window 3 cohort overview

For a detailed overview of each Window 4 city and key associated strengths and peer learning opportunities see **Appendix A.1**

The Window 3 cohort is diverse in geography, institutional form and transition context. It includes large metropolitan authorities, medium-sized cities, district-level administrations, port and coastal cities, university cities, industrial and circular economy-oriented cities, and cities with strong histories of citizen engagement or smart-city development.

This diversity is important because it shows that the CCC is not a single planning template applied uniformly across cities. Instead, it is being adapted to different governance capacities, emission profiles, political mandates and stakeholder ecosystems. The review material shows that cities use the CCC to consolidate earlier SECAPs and climate strategies, launch new governance structures, expand stakeholder participation, and connect mitigation to broader local priorities.

The cohort also reflects a maturing stage of the Mission. Compared with the first cohort, the Window 3 review material contains more explicit attention to investment planning, digital tools, citizen participation, co-benefits, residual emissions, hard-to-abate sectors and stakeholder commitments. Compared with Window 2, Window 3 provides more examples of cities using the CCC as a local governance platform for implementation, although common methodological and operational challenges remain.

1.2 Climate Action Plan

The Climate Action Plan is the central planning component of the CCC and provides the evidence base, strategic logic, action portfolio, governance arrangements and monitoring framework for achieving climate neutrality by 2030. In the Window 3 cohort, the CAPs demonstrate strong ambition and increasing attention to implementation governance, but they also show the need for further refinement in quantification, responsibilities, monitoring and sectoral balance.

1.2.1 Climate Neutrality Ambition (GHG Targets and Scope)

Overview: Climate Neutrality Ambition (GHG Targets and Scope)

- The Window 3 cohort highlights strong commitment to the 2030 Mission objectives, with many cities connecting climate neutrality to broader social, economic and territorial objectives.
- Several cities go beyond the minimum scope of the Mission by addressing consumption-based emissions, Scope 3 domains, circularity, or wider territorial boundaries.
- Common refinement needs concern target terminology, scope boundaries, treatment of F-gases, major transport infrastructures and residual emissions.

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1.2.1.1 General cohort information and comparison

The Window 3 cities show a mature and generally ambitious interpretation of the climate neutrality target. Across the cohort, climate neutrality is not only framed as a mitigation objective but also as a way to reorganise urban governance, mobilise stakeholders and align existing local strategies with the Mission timetable. The cohort includes capital and large metropolitan contexts, medium-sized cities, districts, port and coastal cities, industrial cities and university cities, producing substantial variety in how the 2030 objective is embedded in local institutional and territorial conditions.

Ambition is often expressed through a combination of direct emissions reductions, residual emissions treatment and complementary objectives. Some cities focus primarily on Scope 1 and Scope 2 reductions within administrative boundaries, while others incorporate selected Scope 3 or consumption-based domains, particularly construction, food, circular economy, procurement and hard-to-abate sectors. This diversity reflects local capacities and emission profiles, but it also requires clear definitions to ensure that targets remain comparable and monitorable.

A notable feature of this cohort is that climate neutrality is frequently linked to broader societal outcomes. Cities connect the target to energy poverty reduction, health, urban regeneration, economic development, quality of life, biodiversity, adaptation, citizen engagement and administrative innovation. This represents a continuation of the governance-oriented reading of the CCC identified in the earlier trend reports, but Window 3 provides stronger examples of cities using the target to mobilise local ecosystems and signal long-term institutional direction.

Window 3 cities generally demonstrate strong political commitment to the 2030 climate-neutrality objective, but they differ in how they express the target, define the baseline and describe the gases, sectors and boundaries included. Some plans are framed as CO_2 neutrality, while others explicitly refer to climate neutrality or GHG neutrality. This distinction is important because the Mission requirement covers greenhouse gases rather than only CO_2, and because sectors such as waste, agriculture, industrial processes, port activity, airports and consumption-based emissions can be treated differently across local inventories.

The main comparison across the cohort is therefore not whether cities are committed to climate neutrality, but how robustly they define what that commitment includes. The strongest examples make the target boundary transparent, identify all sectors and gases, explain the treatment of Scope 3 emissions where relevant, and connect additional ambition areas such as consumption, food systems, construction or circular economy to the core target. These plans provide stronger foundations for peer learning because they show how climate neutrality can be made precise without narrowing its transformative potential.

1.2.1.2 Key strengths and peer-learning examples

Consumption-based and Scope 3 ambition is a notable area of good practice in the Window 3 cohort. These cities provide useful examples for cities seeking to move beyond territorial emissions only. Gävle adds a consumption-based neutrality goal for 2035, Gothenburg addresses hard-to-abate and Scope 3 emissions, Milan explicitly highlights Scope 3 attention, The Hague includes behavioural and Scope 3 dimensions, and Aachen links circularity in building materials, agriculture and nutrition to wider emissions reduction.

Strength / good practice area	Cities	Learning opportunity

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Consumption-based and Scope 3 ambition	Gävle, Gothenburg, Milan, The Hague, Aachen	These cities provide useful examples for cities seeking to move beyond territorial emissions only. Gävle adds a consumption-based neutrality goal for 2035, Gothenburg addresses hard-to-abate and Scope 3 emissions, Milan explicitly highlights Scope 3 attention, The Hague includes behavioural and Scope 3 dimensions, and Aachen links circularity in building materials, agriculture and nutrition to wider emissions reduction.
Target clarity and scope definition	Kranj, Ljubljana, Trikala, Suceava, Eilat	These cities provide useful reference points on communicating target logic and scope. Kranj and Ljubljana present strong target and emissions framing, Trikala is noted for clarity on exclusions and inclusions, Suceava presents the emissions gap and target in a clear way, and Eilat provides useful BAU and target framing.
Ambition connected to territorial and social objectives	Bergamo, Prato, Turin, Umeå, Kranj	These cities show how the neutrality target can be embedded in broader transformation narratives. Bergamo considers an expanded territorial framing, Prato anchors ambition in circular economy and socio-cultural change, Turin connects neutrality with resilience and quality of urban life, Umeå uses a systemic transition framing, and Kranj links climate neutrality to quality of life and resilience.

Target clarity and scope definition is a notable area of good practice in the Window 3 cohort. These cities provide useful reference points on communicating target logic and scope. Kranj and Ljubljana present strong target and emissions framing, Trikala is noted for clarity on exclusions and inclusions, Suceava presents the emissions gap and target in a clear way, and Eilat provides useful BAU and target framing.

Ambition connected to territorial and social objectives is a notable area of good practice in the Window 3 cohort. These cities show how the neutrality target can be embedded in broader transformation narratives. Bergamo considers an expanded territorial framing, Prato anchors ambition in circular economy and socio-cultural change, Turin connects neutrality with resilience and quality of urban life, Umeå uses a systemic transition framing, and Kranj links climate neutrality to quality of life and resilience.

City	Strength and peer-learning relevance
Aachen	Useful example for wider stakeholder-backed ambition and Scope 3/circular economy actions, particularly in building materials, agriculture and nutrition.
Gävle	Strong example of going beyond the immediate Mission boundary through consumption-based climate neutrality by 2035 alongside the 2030 objective.
Gothenburg	Important example for hard-to-abate and Scope 3 emissions, including how a city can begin to govern emissions that lie beyond direct municipal control.
Aarhus	Although not part of the Window 3 cohort, the uploaded compiled review source illustrates how consumption-based construction and food emissions can be addressed through explicit targets and actions.

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Trikala	Relevant for clarity on target inclusions and exclusions and for integrated urban planning around a citizen-centred neutrality pathway.

1.2.1.3 Common challenges and recommendations

Target terminology and boundary ambiguity is a shared improvement area across the cohort. It is identified in relation to 20 cities or associated recommendations, indicating that it should be treated as a cross-cutting priority for future CCC iterations. Clarify whether the target refers to climate neutrality, CO_2 neutrality or net-zero GHG emissions; define administrative, functional and infrastructure boundaries.

Common challenge	Number of cities	Shared recommendation
Target terminology and boundary ambiguity	20	Clarify whether the target refers to climate neutrality, CO_2 neutrality or net-zero GHG emissions; define administrative, functional and infrastructure boundaries.
Treatment of gases and selected sectors	20	Confirm coverage of all relevant gases and justify any omissions or negligible sources, including F-gases where applicable.
Major infrastructure and transboundary emissions	14	Clarify how airports, ports, commuting, shipping, aviation or other cross-boundary systems are included or excluded.
Residual emissions and offsetting logic	19	Ensure residual emissions are treated only after mitigation potential is exhausted and are linked to transparent, high-quality removal strategies.
Scope 3 and consumption-based emissions are often supplementary rather than fully integrated	13	Clarify how additional Scope 3 or consumption measures relate to the core neutrality target, monitoring and commitments.

Treatment of gases and selected sectors is a shared improvement area across the cohort. It is identified in relation to 20 cities or associated recommendations, indicating that it should be treated as a cross-cutting priority for future CCC iterations. Confirm coverage of all relevant gases and justify any omissions or negligible sources, including F-gases where applicable.

Major infrastructure and transboundary emissions is a shared improvement area across the cohort. It is identified in relation to 14 cities or associated recommendations, indicating that it should be treated as a cross-cutting priority for future CCC iterations. Clarify how airports, ports, commuting, shipping, aviation or other cross-boundary systems are included or excluded.

Residual emissions and offsetting logic is a shared improvement area across the cohort. It is identified in relation to 19 cities or associated recommendations, indicating that it should be treated as a cross-cutting priority for future CCC iterations. Ensure residual emissions are treated only after mitigation potential is exhausted and are linked to transparent, high-quality removal strategies.

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Scope 3 and consumption-based emissions are often supplementary rather than fully integrated is a recurring area for refinement across the Window 3 material. This challenge or closely related recommendation appears in relation to 13 cities. Clarify how additional Scope 3 or consumption measures relate to the core neutrality target, monitoring and commitments.

1.2.2 Quantification of Emissions and Pathways

Overview: Quantification of Emissions and Pathways

- The cohort shows substantial progress in using emissions inventories, BAU scenarios, emissions gap tables and impact pathways to structure climate neutrality planning.
- The best examples provide transparent baseline methodology, sector-level gap analysis and explicit pathway logic.
- Future iterations should focus on reconciling datasets, improving action-level quantification and connecting quantitative assumptions to monitoring and finance.

1.2.2.1 General cohort information and comparison

Quantification is one of the central functions of the CCC process because it turns political ambition into a measurable trajectory. In Window 3, most cities provide baseline inventories and some form of emissions gap analysis, often supported by economic models, SECAP inventories, local monitoring tools or updated sectoral data. The level of sophistication varies, but the overall direction is toward more explicit accounting of baseline conditions, frozen-policy scenarios and the contribution of planned measures.

The cohort shows that cities are increasingly able to work with multiple forms of emissions data, including historical inventories, more recent recalculations, BAU projections and sectoral breakdowns. This is positive because the CCC must remain iterative: inventories are expected to improve over time as data sources, methodologies and monitoring systems mature. At the same time, the presence of multiple datasets creates a recurrent need for greater transparency about which inventory is used for target setting, which is used for gap analysis, and how methodological updates affect comparability.

The strongest plans use quantification not only as an accounting requirement but as a strategic management tool. They link emission sources to priority actions, identify the scale of the remaining gap, and begin to connect impact pathways to investment planning and monitoring. The next methodological frontier for many cities is action-level quantification: the ability to show how each action, actor contribution and investment contributes to closing the gap by 2030.

Emissions quantification is one of the most important areas for strengthening future CCC iterations because it underpins the credibility of targets, pathways, action portfolios and investment plans. Across the Window 3 cohort, cities generally provide baseline inventories and emissions gap tables, but the clarity and comparability of those tables vary. Some cities use economic models, some draw on SECAP inventories, some provide updated local inventories, and some include BAU scenarios that need clearer explanation.

The best examples show methodological transparency and use quantification as a management tool. These plans explain baseline choices, reconcile different datasets, describe expected reductions

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by sector and show how quantified pathways relate to planned actions. Where this is not yet fully developed, future iterations should focus on converting pathway-level ambition into action-level reduction estimates, so that the CCC can be used to track implementation performance over time.

1.2.2.2 Key strengths and peer-learning examples

Transparent baseline methodology is a notable area of good practice in the Window 3 cohort. These cities offer examples of comparatively clear baseline work. Bergamo is specifically recognised for describing the methodology used to define its CCC baseline and for explaining updates from the SECAP inventory. Eilat is noted for emission inventory and BAU work, while Kranj, Ljubljana and Prato provide strong emissions and pathway framing.

Strength / good practice area	Cities	Learning opportunity
Transparent baseline methodology	Bergamo, Eilat, Kranj, Ljubljana, Prato	These cities offer examples of comparatively clear baseline work. Bergamo is specifically recognised for describing the methodology used to define its CCC baseline and for explaining updates from the SECAP inventory. Eilat is noted for emission inventory and BAU work, while Kranj, Ljubljana and Prato provide strong emissions and pathway framing.
Clear emissions gap and impact pathway logic	Suceava, Aachen, Porto, The Hague, Miskolc	Suceava is a useful peer-learning example for clear presentation of the emissions gap. Aachen provides a comprehensive pathway structure, even where further quantification of individual measures is needed. Porto and The Hague offer strong impact pathway examples, while Miskolc is recognised for impact pathways and status quo analysis.
Integration of quantification with learning and future iteration	Umeå, Milan, Bergamo, Eilat	Umeå's Climate Transition Map, Milan's climate budgeting approach, Bergamo's commitment to fill data gaps as stakeholder information becomes available, and Eilat's attention to continuous CCC updating all show how quantification can support iterative governance rather than remain a static reporting exercise.

Clear emissions gap and impact pathway logic is a notable area of good practice in the Window 3 cohort. Suceava is a useful peer-learning example for clear presentation of the emissions gap. Aachen provides a comprehensive pathway structure, even where further quantification of individual measures is needed. Porto and The Hague offer strong impact pathway examples, while Miskolc is recognised for impact pathways and status quo analysis.

Integration of quantification with learning and future iteration is a notable area of good practice in the Window 3 cohort. Umeå's Climate Transition Map, Milan's climate budgeting approach, Bergamo's commitment to fill data gaps as stakeholder information becomes available, and Eilat's attention to continuous CCC updating all show how quantification can support iterative governance rather than remain a static reporting exercise.

City	Strength and peer-learning relevance

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Bergamo	Noted for describing the methodology behind its CCC baseline and explaining updates to the SECAP inventory.
Eilat	Recognised for BAU work and quantification that supports the city's pathway framing.
Suceava	Provides a useful example of clearly presenting the emissions gap and connecting it to implementation barriers and solutions.
Porto	Relevant for impact pathways and alignment of strategic goals with quantified implementation needs.
Miskolc	Recognised for robust status quo analysis and impact pathways connected to smart solutions.

1.2.2.3 Common challenges and recommendations

Inventory reconciliation and methodological transparency is a shared improvement area across the cohort. It is identified in relation to 20 cities or associated recommendations, indicating that it should be treated as a cross-cutting priority for future CCC iterations. Explain differences between SECAP, economic model, local inventory and BAU datasets; state clearly which dataset underpins the target.

Common challenge	Number of cities	Shared recommendation
Inventory reconciliation and methodological transparency	20	Explain differences between SECAP, economic model, local inventory and BAU datasets; state clearly which dataset underpins the target.
Action-level emissions reduction estimates	20	Quantify expected reductions for individual measures and show how their combined contribution closes the emissions gap.
Residual emissions values and treatment	19	Present residual emissions separately from reductions; avoid conflating carbon sinks, compensation and direct mitigation.
Sectoral disaggregation and data gaps	20	Improve granularity for buildings, transport modes, waste streams, AFOLU, IPPU and Scope 3 domains where relevant.

Action-level emissions reduction estimates is a shared improvement area across the cohort. It is identified in relation to 20 cities or associated recommendations, indicating that it should be treated as a cross-cutting priority for future CCC iterations. Quantify expected reductions for individual measures and show how their combined contribution closes the emissions gap.

Residual emissions values and treatment is a shared improvement area across the cohort. It is identified in relation to 19 cities or associated recommendations, indicating that it should be treated as a cross-cutting priority for future CCC iterations. Present residual emissions separately from reductions; avoid conflating carbon sinks, compensation and direct mitigation.

Sectoral disaggregation and data gaps are a shared improvement area across the cohort. It is identified in relation to 20 cities or associated recommendations, indicating that it should be treated as a cross-cutting priority for future CCC iterations. Improve granularity for buildings, transport modes, waste streams, AFOLU, IPPU and Scope 3 domains where relevant.

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1.2.3 Status Quo Assessment

Overview: Status Quo Assessment

- Status quo analysis is strongest when it combines emissions data with institutional, socio-economic, spatial and stakeholder context.
- Several cities use the CCC to consolidate existing strategies, inventories and local diagnostics into a more coherent transition baseline.
- Common gaps relate to uneven sectoral depth, limited stakeholder influence analysis and insufficient connection between baseline conditions and action prioritisation.

1.2.3.1 General cohort information and comparison

The status quo assessment gives the CCC its local specificity. Window 3 cities generally move beyond a narrow emissions inventory and include information on current policies, demographic conditions, urban form, infrastructure, stakeholder ecosystems, climate risks, economic structure and social vulnerability. This helps show why different cities select different action portfolios and governance models, even though they share the same 2030 Mission objective.

The cohort displays significant variation in the maturity of baseline analysis. Some cities provide rich descriptions of existing governance arrangements, sectoral infrastructure, building stock, mobility systems, renewable energy potential, citizen participation processes and stakeholder networks. Others present a more uneven picture, with strong coverage in some sectors but limited detail in waste, AFOLU, IPPU, cooling, consumption-based emissions or the implementation status of existing policies.

A good status quo assessment is not only descriptive. It should identify the starting conditions that shape feasible action, including institutional capacity, data quality, social acceptance, skills, regulatory constraints and finance. The best Window 3 examples begin to connect these conditions to the design of governance arrangements, pathway choices and investment planning, which is essential for the CCC to function as a practical implementation framework.

Status quo assessments in Window 3 show an increasingly broad understanding of the starting point for climate-neutral transformation. Cities include not only emissions data but also information on demographics, spatial structure, governance arrangements, building stock, transport systems, current policies, stakeholder ecosystems, economic activity, vulnerable groups and relevant local initiatives. This breadth is important because the CCC is intended to enable implementation, and implementation depends on institutional, social and territorial conditions as much as on emissions accounting.

The strongest status quo sections link baseline information to strategic choices. They explain why certain sectors are prioritised, what existing plans already deliver, where governance or investment gaps remain, and which actors need to be mobilised. Weaker status quo sections remain descriptive or uneven, with detailed energy and transport information but limited waste, AFOLU, IPPU, cooling, social or stakeholder analysis.

1.2.3.2 Key strengths and peer-learning examples

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Comprehensive status quo and diagnostic framing is a notable area of good practice in the Window 3 cohort. Miskolc is explicitly recognised for status quo analysis, Aachen provides detailed demographic, spatial, building and transport context, Umeå integrates existing strategies through its Climate Transition Map, and Turin connects science-based analysis with multi-level governance.

Strength / good practice area	Cities	Learning opportunity
Comprehensive status quo and diagnostic framing	Miskolc, Aachen, Umeå, Turin	Miskolc is explicitly recognised for status quo analysis, Aachen provides detailed demographic, spatial, building and transport context, Umeå integrates existing strategies through its Climate Transition Map, and Turin connects science-based analysis with multi-level governance.
Use of existing strategies and local institutional histories	Münster, Porto, Bologna, Milan	Münster builds from longstanding initiatives, Porto levels up complementary strategies and stakeholder processes, Bologna integrates institutional co-creation, and Milan connects climate planning to regeneration and decarbonisation centres.
Attention to local social and territorial conditions	Liepāja, Kranj, Prato, Bergamo	Liepāja includes marginalised communities in co-creation, Kranj connects neutrality with quality of life and resilience, Prato links climate action to its circular economy and industrial context, and Bergamo frames health and energy poverty as key co-benefits.

Use of existing strategies and local institutional histories is a notable area of good practice in the Window 3 cohort. Münster builds from longstanding initiatives, Porto levels up complementary strategies and stakeholder processes, Bologna integrates institutional co-creation, and Milan connects climate planning to regeneration and decarbonisation centres.

Attention to local social and territorial conditions is a notable area of good practice in the Window 3 cohort. Liepāja includes marginalised communities in co-creation, Kranj connects neutrality with quality of life and resilience, Prato links climate action to its circular economy and industrial context, and Bergamo frames health and energy poverty as key co-benefits.

City	Strength and peer-learning relevance
Miskolc	Strong example for robust status quo analysis linked to smart solutions and mitigation-adaptation thinking.
Aachen	Detailed demographic, spatial, building stock, transport and economic context.
Umeå	Climate Transition Map illustrates how existing strategies can be consolidated into a shared transition baseline.
Turin	Science-based status quo and multi-level governance framing.
Liepāja	Social and stakeholder context includes marginalised communities and just transition considerations.

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1.2.3.3 Common challenges and recommendations

Uneven baseline depth across sectors is a shared improvement area across the cohort. It is identified in relation to 18 cities or associated recommendations, indicating that it should be treated as a cross-cutting priority for future CCC iterations. Bring waste, wastewater, AFOLU, IPPU, cooling and transport sub-sectors to a level of detail comparable to energy and buildings.

Common challenge	Number of cities	Shared recommendation
Uneven baseline depth across sectors	18	Bring waste, wastewater, AFOLU, IPPU, cooling and transport sub-sectors to a level of detail comparable to energy and buildings.
Stakeholder mapping not always analytical	15	Move from listing stakeholders to assessing roles, influence, dependencies, responsibilities and implementation relevance.
Limited explanation of existing policy implementation	16	Document what current plans have already delivered, what remains under implementation, and where gaps remain.
Insufficient use of social and spatial diagnostics	14	Link vulnerability, inequality, territorial differences and infrastructure constraints more directly to action prioritisation.

Stakeholder mapping not always analytical is a shared improvement area across the cohort. It is identified in relation to 15 cities or associated recommendations, indicating that it should be treated as a cross-cutting priority for future CCC iterations. Move from listing stakeholders to assessing roles, influence, dependencies, responsibilities and implementation relevance.

Limited explanation of existing policy implementation is a shared improvement area across the cohort. It is identified in relation to 16 cities or associated recommendations, indicating that it should be treated as a cross-cutting priority for future CCC iterations. Document what current plans have already delivered, what remains under implementation, and where gaps remain.

Insufficient use of social and spatial diagnostics is a shared improvement area across the cohort. It is identified in relation to 14 cities or associated recommendations, indicating that it should be treated as a cross-cutting priority for future CCC iterations. Link vulnerability, inequality, territorial differences and infrastructure constraints more directly to action prioritisation.

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1.2.5 Strategy and Approach

Overview: Strategy and Approach

- Window 3 cities increasingly frame the CCC as a mission-oriented governance and transformation strategy, not only as a climate plan.
- Strong plans use narratives of regeneration, quality of life, circularity, social inclusion, health and innovation to build legitimacy for climate neutrality.
- The main improvement need is to translate broad narratives into prioritised implementation logics, responsibilities and adaptive decision-making processes.

1.2.5.1 General cohort information and comparison

The strategy and approach section demonstrates how cities interpret climate neutrality as a transformation challenge. In Window 3, many cities articulate clear transition narratives that connect emissions reduction to local identity, economic restructuring, social inclusion, health, innovation and quality of life. This is important because climate neutrality depends on changing urban systems and actor behaviour, not only delivering isolated technical measures.

The cohort shows a strong movement toward integrated strategies. Cities increasingly combine mitigation with adaptation, circular economy, urban regeneration, social innovation, citizen participation and multi-level governance. This reflects a deepening understanding of the CCC as a governance mechanism capable of convening actors and aligning policies across domains.

At the same time, strategic narratives sometimes remain broader than the operational detail needed for implementation. Future iterations should strengthen the line of sight between vision, strategic priorities, action portfolios, investment planning, monitoring and stakeholder commitments. This is particularly important where plans rely on external actors, behavioural change, technological innovation or regulatory shifts outside direct municipal control.

Window 3 cities increasingly use the CCC to articulate a broader transition narrative. Many plans connect climate neutrality to health, energy security, affordability, inclusion, economic development, circularity, digitalisation, biodiversity, resilience, urban regeneration or quality of life. This indicates a shift from climate action as a technical emissions agenda toward climate neutrality as a mission-oriented transformation framework.

The best strategies are those that combine a clear transition narrative with a practical implementation logic. They define strategic priorities, explain how these priorities address the emissions gap, and show how governance, finance, stakeholder commitments and monitoring will support delivery. The common improvement need is to translate narrative ambition into implementation pathways that can be managed, evaluated and adjusted.

1.2.5.2 Key strengths and peer-learning examples

Integrated mission narratives is a notable area of good practice in the Window 3 cohort. Bologna links climate, health, socio-economic benefits and administrative innovation. Ljubljana translates its commitment into eight systemic strategic priorities. Turin uses a science-based and multi-level governance framework, while Umeå frames transition through social, economic and ecological improvements.

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Strength / good practice area	Cities	Learning opportunity
Integrated mission narratives	Bologna, Ljubljana, Turin, Umeå	Bologna links climate, health, socio-economic benefits and administrative innovation. Ljubljana translates its commitment into eight systemic strategic priorities. Turin uses a science-based and multi-level governance framework, while Umeå frames transition through social, economic and ecological improvements.
Place-based transformation and regeneration logic	Milan, Prato, Porto, Bergamo	Milan's strategy around regeneration and decarbonisation centres, Prato's circular economy framing, Porto's anchoring in city history and needs, and Bergamo's health-oriented science-based plan provide good examples of place-based mission framing.
Inclusive and socially oriented strategies	Liepāja, The Hague, Kranj, Trikala	Liepāja foregrounds marginalised communities and just transition co-benefits, The Hague combines stakeholder engagement with behavioural change, Kranj links neutrality to quality of life and resilience, and Trikala presents a citizen-centric smart-city approach.

Place-based transformation and regeneration logic is a notable area of good practice in the Window 3 cohort. Milan's strategy around regeneration and decarbonisation centres, Prato's circular economy framing, Porto's anchoring in city history and needs, and Bergamo's health-oriented science-based plan provide good examples of place-based mission framing.

Inclusive and socially oriented strategies is a notable area of good practice in the Window 3 cohort. Liepāja foregrounds marginalised communities and just transition co-benefits, The Hague combines stakeholder engagement with behavioural change, Kranj links neutrality to quality of life and resilience, and Trikala presents a citizen-centric smart-city approach.

City	Strength and peer-learning relevance
Bologna	Strong example of linking climate, health, socio-economic benefits and administrative innovation.
Ljubljana	Translates its climate neutrality ambition into eight systemic strategic priorities.
Milan	Uses regeneration and decarbonisation centres to connect climate action with urban transformation.
Prato	Distinctive circular economy narrative rooted in the city's industrial history.
Kranj	Frames climate neutrality through quality of life, resilience and responsibility across territorial boundaries.

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1.2.5.4 Common challenges and recommendations

Strategic priorities not always linked to quantified pathways is a shared improvement area across the cohort. It is identified in relation to 16 cities or associated recommendations, indicating that it should be treated as a cross-cutting priority for future CCC iterations. Connect each strategic priority to emissions impact, enabling conditions, investment needs and monitoring indicators.

Common challenge	Number of cities	Shared recommendation
Strategic priorities not always linked to quantified pathways	16	Connect each strategic priority to emissions impact, enabling conditions, investment needs and monitoring indicators.
Broad co-benefit narratives require stronger operationalisation	15	Define how health, equity, skills, quality of life and economic co-benefits will be measured and used in decisions.
Integration across existing strategies can remain implicit	14	Map the relationship between SECAPs, mobility plans, circular economy strategies, climate budgets and CCC actions.
Social innovation and behavioural change need implementation detail	13	Clarify mechanisms, target groups, expected outputs and how behavioural measures contribute to emissions reduction.

Broad co-benefit narratives require stronger operationalisation is a shared improvement area across the cohort. It is identified in relation to 15 cities or associated recommendations, indicating that it should be treated as a cross-cutting priority for future CCC iterations. Define how health, equity, skills, quality of life and economic co-benefits will be measured and used in decisions.

Integration across existing strategies can remain implicit is a shared improvement area across the cohort. It is identified in relation to 14 cities or associated recommendations, indicating that it should be treated as a cross-cutting priority for future CCC iterations. Map the relationship between SECAPs, mobility plans, circular economy strategies, climate budgets and CCC actions.

Social innovation and behavioural change need implementation detail is a shared improvement area across the cohort. It is identified in relation to 13 cities or associated recommendations, indicating that it should be treated as a cross-cutting priority for future CCC iterations. Clarify mechanisms, target groups, expected outputs and how behavioural measures contribute to emissions reduction.

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1.2.7 Pathways and Action Portfolio

Overview: Pathways and Action Portfolio

- The action portfolios show broad coverage and increasing maturity in linking technical, governance, behavioural and social innovation measures.
- Best-practice examples combine sectoral measures with systemic levers, stakeholder commitments and cross-sectoral co-benefits.
- Common refinements concern action-level quantification, timelines, responsible actors, risk mitigation and balance across less mature sectors.

For a detailed analysis of sectoral observations within Window 3 action portfolios see **Appendix B.1**.

1.2.7.1 General cohort information and comparison

The action portfolio is where the CCC becomes a delivery framework. Window 3 portfolios generally cover the main emitting sectors and include a combination of infrastructure investments, regulatory and planning instruments, governance interventions, stakeholder partnerships, behaviour-oriented initiatives and innovation projects. This breadth is a strength because climate neutrality requires simultaneous change across energy, buildings, mobility, waste, land use, industry and consumption.

The cohort demonstrates increasing attention to systemic levers. Cities are not only listing mitigation projects; they are experimenting with climate budgets, citizen assemblies, local climate agreements, renewable energy communities, knowledge hubs, green procurement, circular economy platforms, digital tools, testbeds and transition teams. These mechanisms can help move the CCC beyond a static plan toward an enabling architecture for implementation.

The main quality difference between action portfolios lies in maturity. The strongest portfolios provide clear sequencing, responsible actors, emissions impacts, investment links, indicators and risk management. Less mature portfolios include many promising actions but do not yet show whether their aggregate contribution is sufficient to close the emissions gap. Future iterations should therefore prioritise quantitative consolidation and clearer implementation roadmaps, especially for high-impact measures.

The Window 3 action portfolios show a wide range of technical, governance, social innovation, infrastructure, nature-based and digital interventions. Energy, buildings and transport remain the most developed sectors, while AFOLU, IPPU, waste/wastewater, cooling and hard-to-abate emissions are more unevenly treated. This pattern is broadly consistent with the earlier trend reports, but Window 3 also contains stronger examples of circular economy, consumption-based emissions, climate accords, testbeds and citizen-oriented implementation models.

The strongest action portfolios provide a clear relationship between emissions sources, actions, responsibilities, timelines, costs and expected outcomes. They are also balanced: they combine technology and infrastructure with governance, participation, procurement, behavioural change and capacity-building measures. The central refinement need is to improve action maturity, especially through quantified impacts and delivery responsibilities.

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1.2.7.2 Key strengths and peer-learning examples

Comprehensive and balanced action portfolios is a notable area of good practice in the Window 3 cohort. Kranj is recognised for its pathways and action portfolio, Trikala for the variety and consistency of actions, Ljubljana for its action portfolio and eight systemic priorities, and Prato for linking impact pathways with individual actions.

Strength / good practice area	Cities	Learning opportunity
Comprehensive and balanced action portfolios	Kranj, Trikala, Ljubljana, Prato	Kranj is recognised for its pathways and action portfolio, Trikala for the variety and consistency of actions, Ljubljana for its action portfolio and eight systemic priorities, and Prato for linking impact pathways with individual actions.
Strong sectoral strategies in energy, RES, waste and stationary energy	Milan, Bergamo, Aachen, Gothenburg, Münster	Milan is recognised for strong waste, RES and stationary energy strategies. Bergamo shows clear RES and energy poverty-related action. Aachen is a reference for energy in buildings. Gothenburg provides strong examples on RES, heating and cooling, NBS and hard-to-abate emissions, while Münster is recognised for RES, heating and stationary energy.
Systemic and governance-oriented actions	Porto, The Hague, Umeå, Bologna	Porto offers strong impact pathway and stakeholder collaboration examples, The Hague links impact pathways to behavioural change and citizen science, Umeå uses the Climate Transition Map to connect strategies and action, and Bologna integrates formalised citizen participation with administrative innovation.

Strong sectoral strategies in energy, RES, waste and stationary energy is a notable area of good practice in the Window 3 cohort. Milan is recognised for strong waste, RES and stationary energy strategies. Bergamo shows clear RES and energy poverty-related action. Aachen is a reference for energy in buildings. Gothenburg provides strong examples on RES, heating and cooling, NBS and hard-to-abate emissions, while Münster is recognised for RES, heating and stationary energy.

City	Strength and peer-learning relevance
Aachen	Strong building energy, transport and circularity examples, with a well-structured portfolio mapped to prior plans.
Gothenburg	Important for hard-to-abate emissions, Scope 3 and testbed-based implementation.
Milan	Strong examples on circular economy, regeneration and decarbonisation centres.
Bergamo	Relevant for health co-benefits, energy poverty and renewable energy actions.

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Prato	Strong circular economy and industrial transition framing.

Systemic and governance-oriented actions is a notable area of good practice in the Window 3 cohort. Porto offers strong impact pathway and stakeholder collaboration examples, The Hague links impact pathways to behavioural change and citizen science, Umeå uses the Climate Transition Map to connect strategies and action, and Bologna integrates formalised citizen participation with administrative innovation.

1.2.7.3 Common challenges and recommendations

Action-level quantification remains incomplete is a shared improvement area across the cohort. It is identified in relation to 20 cities or associated recommendations, indicating that it should be treated as a cross-cutting priority for future CCC iterations. Quantify emissions reductions, costs, timelines and dependencies for all major actions, especially high-impact actions.

Common challenge	Number of cities	Shared recommendation
Action-level quantification remains incomplete	20	Quantify emissions reductions, costs, timelines and dependencies for all major actions, especially high-impact actions.
Maturity varies across sectors within the same plan	18	Bring weaker sectors such as waste, AFOLU, IPPU, cooling and freight to the same level of detail as buildings and energy.
Responsibilities and stakeholder roles need further delineation	17	Specify municipal leads, partner responsibilities, co-signatory actions and governance escalation routes.
High-impact measures require risk and contingency planning	15	Develop mitigation plans for actions dependent on large infrastructure, technology readiness, national legislation or private finance.
Timelines and milestones are incomplete	15	Add short-term and medium-term milestones that can guide implementation before 2030.

Maturity varies across sectors within the same plan is a shared improvement area across the cohort. It is identified in relation to 18 cities or associated recommendations, indicating that it should be treated as a cross-cutting priority for future CCC iterations. Bring weaker sectors such as waste, AFOLU, IPPU, cooling and freight to the same level of detail as buildings and energy.

Responsibilities and stakeholder roles need further delineation is a shared improvement area across the cohort. It is identified in relation to 17 cities or associated recommendations, indicating that it should be treated as a cross-cutting priority for future CCC iterations. Specify municipal leads, partner responsibilities, co-signatory actions and governance escalation routes.

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High-impact measures require risk and contingency planning is a shared improvement area across the cohort. It is identified in relation to 15 cities or associated recommendations, indicating that it should be treated as a cross-cutting priority for future CCC iterations. Develop mitigation plans for actions dependent on large infrastructure, technology readiness, national legislation or private finance.

Timelines and milestones being partial or incomplete is a recurring area for refinement across the Window 3 material. This challenge or closely related recommendation appears in relation to 15 cities. Add short-term and medium-term milestones that can guide implementation before 2030.

1.2.8 Governance, Stakeholders and Participation

Overview: Governance, Stakeholders and Participation

- Window 3 provides strong evidence that the CCC is being used to reshape governance, convene urban ecosystems and formalise stakeholder commitments.
- The strongest examples combine internal municipal coordination with citizen participation, stakeholder platforms, climate agreements and multi-level partnerships.
- Future work should focus on operationalising roles, decision rights, accountability mechanisms and the continuing expansion of diverse stakeholders.

1.2.8.1 General cohort information and comparison

Governance is one of the clearest strengths of the Window 3 cohort. Many cities use the CCC to consolidate or create governance arrangements that extend beyond traditional municipal climate departments. These include transition teams, climate offices, climate agencies, city coalitions, climate councils, citizen assemblies, stakeholder agreements, business networks, academic partnerships and platforms for co-creation.

The cohort demonstrates a shift from consultation toward structured participation and co-ownership. Several cities integrate citizens, civil society, businesses, universities, utilities and municipal companies into the design or implementation of the CCC. This is particularly important because municipal administrations often have only partial control over the emissions that must be reduced by 2030. The CCC therefore becomes a mandate-building and coordination process for actors whose actions are necessary for delivery.

The governance challenge is now less about whether cities recognise the need for participation and more about how participation is institutionalised. Future iterations should define how governance bodies make decisions, how stakeholder commitments are updated, how citizen input affects policy, how conflicts are mediated, and how roles are resourced across departments and partners.

Governance is one of the strongest areas of the Window 3 cohort. Many cities use the CCC to establish or strengthen climate offices, transition teams, climate councils, citizen assemblies, stakeholder accords, climate agreements, testbeds, participatory platforms and multi-level coordination processes. This is a significant development because it shows the CCC functioning as a governance innovation rather than only a planning template.

The best examples provide a clear architecture for mobilisation: who leads, who coordinates, how departments work together, how stakeholders are brought in, how citizens participate, and how commitments are expected to support implementation. The remaining challenge is to make

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these arrangements sufficiently operational, including decision rights, mandates, reporting lines, staffing, meeting frequency, signatory responsibilities and mechanisms for updating commitments.

1.2.8.2 Key strengths and peer-learning examples

Large and structured stakeholder mobilisation is a notable area of good practice in the Window 3 cohort. Aachen has more than 130 supporting organisations and a tiered partner model. Gävle's Climate Agreement secures engagement from more than 50 stakeholders. Münster emphasises extensive and diverse stakeholder engagement, while Porto builds an impressive stakeholder dynamic around the CCC.

Strength / good practice area	Cities	Learning opportunity
Large and structured stakeholder mobilisation	Aachen, Gävle, Münster, Porto	Aachen has more than 130 supporting organisations and a tiered partner model. Gävle's Climate Agreement secures engagement from more than 50 stakeholders. Münster emphasises extensive and diverse stakeholder engagement, while Porto builds an impressive stakeholder dynamic around the CCC.
Citizen participation as governance innovation	Bologna, Milan, Suceava, Trikala, The Hague	Bologna's formal Citizen Assembly, Milan's permanent Citizens' Assembly on Climate and digital platforms, Suceava's participatory platform and youth climate forum, Trikala's citizen-centric governance, and The Hague's Climate Accord provide strong peer-learning examples.
Internal and multi-level governance arrangements	Gothenburg, Bergamo, Turin, Umeå, Aachen	Gothenburg's Climate Council, Testbed Gothenburg and Knowledge Hub address structural challenges. Bergamo is noted for multi-level governance, Turin for science-based multi-level governance, Umeå for integrating strategies through the Climate Transition Map, and Aachen for its tripartite EU-Mission Team and city-wide governance network.

Citizen participation as governance innovation is a notable area of good practice in the Window 3 cohort. Bologna's formal Citizen Assembly, Milan's permanent Citizens' Assembly on Climate and digital platforms, Suceava's participatory platform and youth climate forum, Trikala's citizen-centric governance, and The Hague's Climate Accord provide strong peer-learning examples.

Internal and multi-level governance arrangements is a notable area of good practice in the Window 3 cohort. Gothenburg's Climate Council, Testbed Gothenburg and Knowledge Hub address structural challenges. Bergamo is noted for multi-level governance, Turin for science-based multi-level governance, Umeå for integrating strategies through the Climate Transition Map, and Aachen for its tripartite EU-Mission Team and city-wide governance network.

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City	Strength and peer-learning relevance
Aachen	More than 130 supporting organisations and a structured partnership model with Premium, Framework and Basis partners.
Gävle	Climate Agreement with more than 50 stakeholders and ambition around consumption-based neutrality.
Milan	Permanent Citizens' Assembly and stakeholder network around climate transition.
Bologna	Formal citizen assembly and institutional co-creation around climate, health and administration.
The Hague	Climate Accord as a strong mechanism for engaging public and private stakeholders.
Umeå	Climate Transition Map and stakeholder engagement that connect governance, learning and implementation.

1.2.8.3 Common challenges and recommendations

Governance roles and decision processes require clearer specification is a shared improvement area across the cohort. It is identified in relation to 14 cities or associated recommendations, indicating that it should be treated as a cross-cutting priority for future CCC iterations. Define mandates, reporting lines, meeting cycles, decision rights and escalation processes for new governance bodies.

Co-signatory actions need further delineation is a shared improvement area across the cohort. It is identified in relation to 19 cities or associated recommendations, indicating that it should be treated as a cross-cutting priority for future CCC iterations. Specify what signatories will implement, how progress will be monitored, and how new stakeholders will be onboarded.

Common challenge	Number of cities	Shared recommendation
Governance roles and decision processes require clearer specification	14	Define mandates, reporting lines, meeting cycles, decision rights and escalation processes for new governance bodies.
Co-signatory actions need further delineation	19	Specify what signatories will implement, how progress will be monitored, and how new stakeholders will be onboarded.
Vertical governance is often acknowledged but not fully operationalised	15	Create practical mechanisms for sustained regional, national and EU-level coordination around enabling policies and finance.
Citizen engagement outputs are not always linked to decision-making	13	Explain how citizen assemblies, platforms, labs and consultations influence policies, action design and CCC iterations.

Vertical governance is often acknowledged but not fully operationalised is a shared improvement area across the cohort. It is identified in relation to 15 cities or associated

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recommendations, indicating that it should be treated as a cross-cutting priority for future CCC iterations. Create practical mechanisms for sustained regional, national and EU-level coordination around enabling policies and finance.

Citizen engagement outputs are not always linked to decision-making is a shared improvement area across the cohort. It is identified in relation to 13 cities or associated recommendations, indicating that it should be treated as a cross-cutting priority for future CCC iterations. Explain how citizen assemblies, platforms, labs and consultations influence policies, action design and CCC iterations.

1.2.9 Barriers and Enabling Environment

Overview: Barriers and Enabling Environment

- Barrier analysis is a key part of transforming the CCC from a plan into an implementation framework.
- The cohort identifies regulatory, financial, institutional, technical, behavioural and capacity-related barriers with varying degrees of specificity.
- The strongest examples connect barriers to mitigation measures, governance arrangements and enabling actions rather than treating them as generic risks.

1.2.9.1 General cohort information and comparison

Window 3 cities generally recognise that climate neutrality depends on overcoming enabling-condition barriers. These include limited municipal authority, funding gaps, regulatory constraints, procurement rules, data limitations, skills shortages, public acceptance, technology maturity, market conditions and dependency on private or national actors. This is consistent with earlier trend reports but more clearly connected in Window 3 to governance innovation and stakeholder mobilisation.

The most useful barrier analyses are site-specific and action-oriented. They explain which barriers affect which sectors or actions, which actors can influence them, and what measures will be taken to remove or reduce them. This turns barrier analysis into a management tool rather than a diagnostic appendix.

Several plans still need to move from identification to mitigation. Generic barrier lists are less useful than prioritised barrier pathways that specify ownership, severity, timing and contingency measures. Future CCC iterations should therefore integrate barrier removal into governance, monitoring, risk management and investment planning.

Barrier analysis in the Window 3 cohort is generally visible and often broad, covering finance, regulation, technology, capacity, social acceptance, skills, behaviour, data quality and infrastructure. Several cities explicitly identify dependencies outside direct municipal control, such as national legislation, grid regulation, transport policy, construction markets, private capital or utility decisions. This demonstrates a more realistic understanding of the implementation environment.

The strongest barrier analyses do not only list obstacles. They connect barriers to specific sectors, actions, actors and mitigation measures. They also identify enabling conditions such as governance reforms, finance mechanisms, stakeholder coalitions, data systems, procurement, political commitment and capacity-building. The main improvement need is to convert barrier identification into a practical risk-management and enabling-environment strategy.

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1.2.9.2 Key strengths and peer-learning examples

Detailed barrier diagnosis connected to solutions is a notable area of good practice in the Window 3 cohort. Suceava is recognised for well-identified implementation barriers and concurrent solutions. Bergamo is specifically recognised for comprehensive work on barriers. Porto is noted for overcoming implementation barriers, while Aachen identifies political, bureaucratic, human-resource, sociocultural and technological barriers and links them to network and vertical governance responses.

Use of stakeholder engagement to address barriers is a notable area of good practice in the Window 3 cohort. Gothenburg uses council, testbed and knowledge structures to address hard-to-abate and governance challenges. Milan's stakeholder network and citizen assemblies support co-creation. Gävle's Climate Agreement and Münster's engagement architecture create enabling conditions for broader implementation.

Strength / good practice area	Cities	Learning opportunity
Detailed barrier diagnosis connected to solutions	Suceava, Bergamo, Porto, Aachen	Suceava is recognised for well-identified implementation barriers and concurrent solutions. Bergamo is specifically recognised for comprehensive work on barriers. Porto is noted for overcoming implementation barriers, while Aachen identifies political, bureaucratic, human-resource, sociocultural and technological barriers and links them to network and vertical governance responses.
Use of stakeholder engagement to address barriers	Gothenburg, Milan, Gävle, Münster	Gothenburg uses council, testbed and knowledge structures to address hard-to-abate and governance challenges. Milan's stakeholder network and citizen assemblies support co-creation. Gävle's Climate Agreement and Münster's engagement architecture create enabling conditions for broader implementation.
Attention to social acceptance and just transition barriers	Bergamo, Liepāja, Kranj, The Hague, Trikala	These cities demonstrate how barriers can be understood socially as well as technically, including energy poverty, inclusion of marginalised communities, quality of life, behavioural change and citizen-centric governance.

Attention to social acceptance and just transition barriers is a notable area of good practice in the Window 3 cohort. These cities demonstrate how barriers can be understood socially as well as technically, including energy poverty, inclusion of marginalised communities, quality of life, behavioural change and citizen-centric governance.

City	Strength and peer-learning relevance
Suceava	Recognised for well-identified barriers and solutions.

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Aachen	Detailed finance and implementation barriers, including legislative, funding and skills constraints.
Gothenburg	Strong awareness of structural and hard-to-abate challenges.
Aarhus in related compiled material	Strong example of categorising financial, technological, institutional and social barriers and linking them to mitigation options.
Trikala	Relevant for identifying exclusions/inclusions and smart governance barriers in an integrated urban planning context.

1.2.9.3 Common challenges and recommendations

Barriers are not always linked to specific actions is a shared improvement area across the cohort. It is identified in relation to 16 cities or associated recommendations, indicating that it should be treated as a cross-cutting priority for future CCC iterations. Map each major barrier to affected actions, responsible actors, mitigation measures and monitoring points.

Common challenge	Number of cities	Shared recommendation
Barriers are not always linked to specific actions	16	Map each major barrier to affected actions, responsible actors, mitigation measures and monitoring points.
External dependencies require clearer strategies	15	Develop routes for addressing national regulation, grid constraints, permitting, funding and procurement barriers.
Skills and institutional capacity gaps need stronger plans	14	Include capacity-building actions, staffing plans and cross-departmental competence development.
Social acceptance and behavioural barriers need more operational detail	13	Specify engagement, compensation, incentive and deliberation mechanisms for contested measures.

External dependencies require clearer strategies is a shared improvement area across the cohort. It is identified in relation to 15 cities or associated recommendations, indicating that it should be treated as a cross-cutting priority for future CCC iterations. Develop routes for addressing national regulation, grid constraints, permitting, funding and procurement barriers.

Skills and institutional capacity gaps need stronger plans is a shared improvement area across the cohort. It is identified in relation to 14 cities or associated recommendations, indicating that it should be treated as a cross-cutting priority for future CCC iterations. Include capacity-building actions, staffing plans and cross-departmental competence development.

Social acceptance and behavioural barriers need more operational detail is a shared improvement area across the cohort. It is identified in relation to 13 cities or associated

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recommendations, indicating that it should be treated as a cross-cutting priority for future CCC iterations. Specify engagement, compensation, incentive and deliberation mechanisms for contested measures.

1.2.10 Monitoring, Evaluation, Digitalisation and Iteration

Overview: Monitoring, Evaluation, Digitalisation and Iteration

- Monitoring and iteration are increasingly treated as governance functions rather than only reporting tasks.
- Several Window 3 cities use climate budgets, digital tools, smart-city platforms or transition maps to organise data and learning.
- Common needs include clearer indicators, responsibilities, review cycles, co-benefit monitoring and integration between CAP and CIP monitoring.

1.2.10.1 General cohort information and comparison

Monitoring, evaluation and iteration are crucial for the CCC because the 2030 pathway is uncertain and requires adaptive management. Window 3 cities increasingly describe monitoring systems, indicators, climate budgets, digital tools and future CCC update cycles. This indicates that the CCC is being understood as an iterative governance process rather than a one-off label document.

Digitalisation appears as both a technical tool and a governance enabler. Cities use or propose smart-city platforms, digital monitoring tools, climate budgeting systems, open data portals, digital citizen participation tools and transition maps. These approaches can improve transparency, data quality and coordination if they are connected to clear governance responsibilities and interoperable data systems.

The main challenge is to ensure that monitoring systems are actionable. Indicators should track emissions, action delivery, investment, co-benefits, social impacts and enabling conditions. They should also trigger learning and corrective action. Future iterations should therefore clarify who gathers data, who interprets it, who decides on course correction and how monitoring feeds into CCC updates.

Monitoring and iteration are essential for turning the CCC into an adaptive governance tool. Window 3 cities generally recognise the need to update, monitor and revise their CCCs, and several include digital tools, climate budgets, indicators, dashboards or regular review processes. This represents a positive development from earlier cohorts, where monitoring was often more limited or generic.

The best monitoring systems combine emissions tracking, action implementation monitoring, financial monitoring and co-benefit indicators. They also clarify frequency, responsibilities, data sources and how evidence will be used for corrective action. The key improvement need is to move from indicator lists to active learning systems that inform decisions, budget adjustments, stakeholder commitments and successive CCC iterations.

1.2.10.2 Key strengths and peer-learning examples

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Digital tools and smart solutions for monitoring and participation is a notable area of good practice in the Window 3 cohort. Aachen includes smart solutions for tracking emissions and public involvement. Trikala stands out for smart solutions and citizen-centric governance. Bergamo is recognised for smart digitalisation, Miskolc for smart-city and digitalisation strengths, and Porto for digitalisation and open data.

Strength / good practice area	Cities	Learning opportunity
Digital tools and smart solutions for monitoring and participation	Aachen, Trikala, Bergamo, Miskolc, Porto	Aachen includes smart solutions for tracking emissions and public involvement. Trikala stands out for smart solutions and citizen-centric governance. Bergamo is recognised for smart digitalisation, Miskolc for smart-city and digitalisation strengths, and Porto for digitalisation and open data.
Climate budgeting, transition maps and iterative governance	Milan, Umeå, Eilat, Prato	Milan's climate budgeting, Umeå's Climate Transition Map, Eilat's continuous CCC update approach and Prato's monitoring strengths provide useful examples of monitoring as a strategic governance process.
Monitoring linked to sectoral and co-benefit planning	Aachen, The Hague, Gothenburg, Suceava	These cities provide useful reference points for linking monitoring to sectors, citizen science, digitalisation or implementation strategies, although each also points to areas requiring further refinement.

Climate budgeting, transition maps and iterative governance is a notable area of good practice in the Window 3 cohort. Milan's climate budgeting, Umeå's Climate Transition Map, Eilat's continuous CCC update approach and Prato's monitoring strengths provide useful examples of monitoring as a strategic governance process.

Monitoring linked to sectoral and co-benefit planning is a notable area of good practice in the Window 3 cohort. These cities provide useful reference points for linking monitoring to sectors, citizen science, digitalisation or implementation strategies, although each also points to areas requiring further refinement.

City	Strength and peer-learning relevance
Aachen	Well-conceived monitoring system with planned digital tools and links to action and investment indicators.
Milan	Strong climate budgeting and citizen assembly links that can support reflexive governance.
Bergamo	Attention to monitoring methodology, missing data and renewable energy indicators.
Umeå	Transition mapping provides a basis for learning-oriented iteration.
Gävle	Climate Agreement creates potential for monitoring stakeholder contributions over time.

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1.2.10.3 Common challenges and recommendations

Monitoring responsibilities and sense-making roles unclear is a shared improvement area across the cohort. It is identified in relation to 14 cities or associated recommendations, indicating that it should be treated as a cross-cutting priority for future CCC iterations. Assign responsibility for data collection, aggregation, interpretation and corrective action.

Common challenge	Number of cities	Shared recommendation
Indicators incomplete for sectors and co-benefits	17	Add KPIs for waste, AFOLU, IPPU, air quality, social impacts, skills, participation and investment delivery.
Iteration cycles need stronger links to decision-making	15	Specify how monitoring results will trigger revised actions, budgets, stakeholder commitments and CCC updates.
Investment monitoring is weakly integrated	15	Track finance mobilisation, spending, cost-effectiveness and emission reductions together.
Monitoring responsibilities and sense-making roles unclear	14	Assign responsibility for data collection, aggregation, interpretation and corrective action.
Iteration processes need stronger governance links	14	Explain how CCC updates will affect action portfolios, budgets, signatory commitments and political decisions.
Digital strategies not always comprehensive	12	Define interoperability, data governance, cybersecurity, transparency, infrastructure and social acceptance requirements.

Indicators incomplete for sectors and co-benefits is a shared improvement area across the cohort. It is identified in relation to 17 cities or associated recommendations, indicating that it should be treated as a cross-cutting priority for future CCC iterations. Add KPIs for waste, AFOLU, IPPU, air quality, social impacts, skills, participation and investment delivery.

Digital strategies not always comprehensive is a shared improvement area across the cohort. It is identified in relation to 12 cities or associated recommendations, indicating that it should be treated as a cross-cutting priority for future CCC iterations. Define interoperability, data governance, cybersecurity, transparency, infrastructure and social acceptance requirements.

Iteration cycles need stronger links to decision-making is a shared improvement area across the cohort. It is identified in relation to 15 cities or associated recommendations, indicating that it should be treated as a cross-cutting priority for future CCC iterations. Specify how monitoring results will trigger revised actions, budgets, stakeholder commitments and CCC updates.

Investment monitoring is weakly integrated is a recurring area for refinement across the Window 3 material. This challenge or closely related recommendation appears in relation to 15 cities. Track finance mobilisation, spending, cost-effectiveness and emission reductions together.

Iteration processes need stronger governance links is a recurring area for refinement across the Window 3 material. This challenge or closely related recommendation appears in relation to 14 cities.

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Explain how CCC updates will affect action portfolios, budgets, signatory commitments and political decisions.

1.2.11 Horizontal Topics and Cross-Cutting Considerations

Overview: Horizontal Topics and Cross-Cutting Considerations

- Horizontal topics are increasingly visible across Window 3, especially social inclusion, circular economy, air quality, health, digitalisation, adaptation and citizen engagement.
- The strongest plans integrate horizontal topics into action portfolios, governance and monitoring rather than treating them as separate themes.
- Further work is needed to measure co-benefits, manage trade-offs and connect social justice to concrete implementation choices.

1.2.11.1 General cohort information and comparison

Horizontal topics are central to the governance value of the CCC. They show whether cities are using climate neutrality to improve quality of life, health, social inclusion, innovation, resilience and urban sustainability more broadly. Window 3 provides many examples of cities linking mitigation to circular economy, energy poverty, citizen science, smart-city tools, adaptation, biodiversity and behavioural change.

The cohort is particularly strong in recognising co-benefits and cross-cutting principles. Many plans refer to health, air quality, social cohesion, skills, education, energy citizenship, citizen engagement and vulnerable groups. Cities also increasingly connect climate action to circularity and consumption, especially in buildings, food, procurement and waste.

However, cross-cutting themes are not always embedded in implementation systems. Future iterations should move from narrative recognition to measurable integration: identifying target groups, distributional impacts, co-benefit indicators, governance responsibilities, risk mitigation measures and investment implications.

Horizontal topics are more visible in Window 3 than in earlier cohorts. Cities increasingly refer to air quality, health, energy poverty, vulnerable groups, skills, citizen engagement, circular economy, digitalisation, biodiversity, adaptation and consumption-based emissions. This is an important sign of maturation because it shows the CCC being used to connect climate neutrality with broader urban transformation and justice objectives.

The strongest examples integrate horizontal topics into strategy and implementation rather than treating them as add-ons. They show how co-benefits can increase legitimacy, support public engagement, attract investment and reduce implementation risks. The main refinement need is to monitor these topics systematically and to connect them to governance and decision-making.

1.2.11.2 Key strengths and peer-learning examples

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Circular economy and consumption-oriented action is a notable area of good practice in the Window 3 cohort. Prato anchors the transition in circular economy and local industrial history. Milan and Aachen provide strong circularity and waste/building material examples. Gothenburg addresses new economic models and circularity, while Suceava highlights recyclable materials and local production of construction elements.

Strength / good practice area	Cities	Learning opportunity
Circular economy and consumption-oriented action	Prato, Milan, Aachen, Gothenburg, Suceava	Prato anchors the transition in circular economy and local industrial history. Milan and Aachen provide strong circularity and waste/building material examples. Gothenburg addresses new economic models and circularity, while Suceava highlights recyclable materials and local production of construction elements.
Social inclusion, energy poverty and vulnerable groups	Bergamo, Liepāja, Kranj, Trikala, The Hague	Bergamo's work on energy poverty and vulnerable communities, Liepāja's inclusion of marginalised communities, Kranj's quality-of-life framing, Trikala's social inclusiveness and The Hague's climate justice focus offer useful good-practice signposts.
Air quality, health, adaptation and nature-based links	Milan, Gothenburg, Ljubljana, Eilat, Umeå	Milan explicitly links climate neutrality and air quality. Gothenburg is recognised for NBS and hard-to-abate emissions. Ljubljana integrates adaptation and mitigation synergies. Eilat links clean energy and nature-based co-benefits, while Umeå frames climate action through wider ecological and social improvement.

Social inclusion, energy poverty and vulnerable groups is a notable area of good practice in the Window 3 cohort. Bergamo's work on energy poverty and vulnerable communities, Liepāja's inclusion of marginalised communities, Kranj's quality-of-life framing, Trikala's social inclusiveness and The Hague's climate justice focus offer useful good-practice signposts.

Air quality, health, adaptation and nature-based links is a notable area of good practice in the Window 3 cohort. Milan explicitly links climate neutrality and air quality. Gothenburg is recognised for NBS and hard-to-abate emissions. Ljubljana integrates adaptation and mitigation synergies. Eilat links clean energy and nature-based co-benefits, while Umeå frames climate action through wider ecological and social improvement.

City	Strength and peer-learning relevance
Bergamo	Strong example for health co-benefits, energy poverty and science-based framing.
Milan	Strong air quality, circular economy and citizen engagement examples.
Liepāja	Co-creation with marginalised communities and just transition framing.
Miskolc	Smart solutions linking mitigation and adaptation.

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Prato	Circular economy and digitalisation connected to industrial transition.
Aachen	Digital monitoring and citizen-facing smart-city tools.

1.2.11.3 Common challenges and recommendations

Co-benefits often recognised but not quantified is a shared improvement area across the cohort. It is identified in relation to 16 cities or associated recommendations, indicating that it should be treated as a cross-cutting priority for future CCC iterations. Define co-benefit indicators and link them to monitoring, investment and decision-making.

Common challenge	Number of cities	Shared recommendation
Co-benefits often recognised but not quantified	16	Define co-benefit indicators and link them to monitoring, investment and decision-making.
Circular economy and Scope 3 actions need more quantified pathways	15	Specify material flows, consumption baselines, stakeholder roles and expected emissions impacts.
Digitalisation strategies are uneven	15	Clarify digital infrastructure, interoperability, data governance, cybersecurity and social acceptance.
Distributional impacts need deeper analysis	14	Assess who benefits, who pays, who may be negatively affected and how mitigation measures will be designed.
Air quality and health links require stronger monitoring	12	Integrate air quality and health indicators into climate action governance and monitoring systems.

Distributional impacts need deeper analysis is a shared improvement area across the cohort. It is identified in relation to 14 cities or associated recommendations, indicating that it should be treated as a cross-cutting priority for future CCC iterations. Assess who benefits, who pays, who may be negatively affected and how mitigation measures will be designed.

Circular economy and Scope 3 actions need more quantified pathways is a shared improvement area across the cohort. It is identified in relation to 15 cities or associated recommendations, indicating that it should be treated as a cross-cutting priority for future CCC iterations. Specify material flows, consumption baselines, stakeholder roles and expected emissions impacts.

Digitalisation strategies are uneven is a recurring area for refinement across the Window 3 material. This challenge or closely related recommendation appears in relation to 15 cities. Clarify digital infrastructure, interoperability, data governance, cybersecurity and social acceptance.

Air quality and health links require stronger monitoring is a shared improvement area across the cohort. It is identified in relation to 12 cities or associated recommendations, indicating that it should be treated as a cross-cutting priority for future CCC iterations. Integrate air quality and health indicators into climate action governance and monitoring systems.

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1.3 Investment Planning and Finance

Overview: Investment Planning and Finance

- Window 3 investment plans show increasing sophistication in costing, finance mobilisation and risk analysis, but levels of maturity differ across cities.
- Best-practice examples include detailed financial strategies, secured funding for costed actions, risk management frameworks and capacity-building for investment planning.
- Common refinements include clearer cost bases, private finance mobilisation, capital source breakdowns, investment-effectiveness analysis and stronger CAP-CIP integration.

1.3.1 General cohort information and comparison

Investment planning remains one of the most demanding aspects of the CCC process. Window 3 cities generally demonstrate growing awareness that climate neutrality requires coordinated public, private and civic capital. Several plans estimate substantial investment needs, allocate costs across sectors, identify funding gaps, assess risks and begin to connect action portfolios with capital planning.

The cohort shows different levels of maturity in financial planning. Some cities provide detailed investment requirements, current planned investments, risk frameworks and funding sources. Others are still developing cost estimates, stakeholder-specific finance strategies or private investment mobilisation mechanisms. This variation is expected because climate investment planning is relatively new for many municipalities and depends heavily on local financial capacities, data availability and external stakeholders.

The strongest investment plans are those that connect finance to implementation management. They show how actions will be funded, where private investment is expected, what risks affect delivery, how capital-intensive projects relate to emissions reductions, and how monitoring will support course correction. Future iterations should continue to strengthen the integration of CAP and CIP, particularly through cost-effectiveness analysis and clearer public-private financing strategies.

Investment planning is more developed in parts of the Window 3 cohort than in earlier iterations, but it remains a major area for future development. Several cities provide substantial investment estimates, risk frameworks, sectoral allocations and funding strategies. However, common gaps remain in the consistency of cost estimates, public-private finance logic, cost-effectiveness, year-by-year planning, secured versus unsecured finance and links between investments and expected emissions reductions.

The strongest investment plans treat finance as part of implementation governance. They identify capital needs, funding sources, risks, barriers, private-sector roles and potential financial instruments. The next step is to more systematically align investment plans with action portfolios, monitoring frameworks and stakeholder commitments.

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1.3.2 Key strengths and peer-learning examples

Comprehensive financial strategy and risk management is a notable finance-related strength in the Window 3 cohort. Aachen stands out for a comprehensive financial strategy, a substantial estimated investment, a proactive risk management framework and extensive stakeholder engagement across public, private and civil society actors.

Strength / good practice area	Cities	Learning opportunity
Comprehensive financial strategy and risk management	Aachen	Aachen stands out for a comprehensive financial strategy on a large-scale investment, a proactive risk management framework and extensive stakeholder engagement across public, private and civil society actors.
Secured funding and public-private burden sharing	Bergamo	Bergamo provides a strong example of methodical investment planning. The review notes that funding for costed actions representing 57% of the total is already secured, and that the financial burden of net-zero goals is allocated between private sector, municipality and other public sources.
Capacity building and partnership models	Miskolc, Trikala, Porto, The Hague	Miskolc is recognised for capacity building for capital and investment planning. Trikala highlights innovative partnership models that leverage NGOs, private companies and financiers. Porto and The Hague offer useful examples of stakeholder involvement and financing-related collaboration.

Secured funding and public-private burden sharing is a notable finance-related strength in the Window 3 cohort. Bergamo provides a strong example of methodical investment planning. The review notes that funding for costed actions representing 57% of the total is already secured, and that the financial burden of net-zero goals is allocated between private sector, municipality and other public sources.

Capacity building and partnership models is a notable finance-related strength in the Window 3 cohort. Miskolc is recognised for capacity building for capital and investment planning. Trikala highlights innovative partnership models that leverage NGOs, private companies and financiers. Porto and The Hague offer useful examples of stakeholder involvement and financing-related collaboration.

City	Strength and peer-learning relevance
Aachen	Strongest example for comprehensive financial strategy, risk management, sectoral allocations and private capital mobilisation, with an estimated EUR 7.2bn investment need.
Bergamo	Recognised for costed actions and finance detail, with funding secured for costed actions.
Milan	Relevant for climate budgeting and investment-oriented governance.
Porto	Useful for linking strategic goals, stakeholder engagement and finance needs.

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Gothenburg	Relevant for investment needs associated with hard-to-abate emissions and testbed innovation.

1.3.3 Common challenges and recommendations

Incomplete cost coverage and inconsistent cost basis remains an important improvement area for climate investment planning. It is identified in relation to 20 cities or associated recommendations, and should be addressed through future CAP-CIP alignment and investment plan iteration. Provide a single current best estimate, explain methodology and cover the full emissions reduction pathway.

Common challenge	Number of cities	Shared recommendation
Incomplete cost coverage and inconsistent cost basis	20	Provide a single current best estimate, explain methodology and cover the full emissions reduction pathway.
Private investment mobilisation requires further detail	18	Identify public/private ratios, investor roles, bankable projects, financial instruments and barriers to private capital.
Risk assessment should be more operational	16	Define trigger events, severity criteria, mitigation responsibilities and contingency measures.
CAP-CIP integration can be strengthened	20	Link investments to actions, timelines, expected emissions reductions, co-benefits and cost-effectiveness.
Investment monitoring needs clearer indicators	15	Track secured finance, funding gaps, annual expenditure, leverage and implementation progress.

Private investment mobilisation requires further detail remains an important improvement area for climate investment planning. It is identified in relation to 18 cities or associated recommendations, and should be addressed through future CAP-CIP alignment and investment plan iteration. Identify public/private ratios, investor roles, bankable projects, financial instruments and barriers to private capital.

Risk assessment should be more operational remains an important improvement area for climate investment planning. It is identified in relation to 16 cities or associated recommendations, and should be addressed through future CAP-CIP alignment and investment plan iteration. Define trigger events, severity criteria, mitigation responsibilities and contingency measures.

CAP-CIP integration can be strengthened remains an important improvement area for climate investment planning. It is identified in relation to 20 cities or associated recommendations, and should

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be addressed through future CAP-CIP alignment and investment plan iteration. Link investments to actions, timelines, expected emissions reductions, co-benefits and cost-effectiveness.

Investment monitoring needs clearer indicators is a recurring area for refinement across the Window 3 material. This challenge or closely related recommendation appears in relation to 15 cities. Track secured finance, funding gaps, annual expenditure, leverage and implementation progress.

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2 Section 2: Window 4 - 33 labelled cities

2.1 Window 4 cohort overview and implications for mission governance

For a detailed overview of each Window 4 city and key associated strengths and peer learning opportunities see **Appendix A.2**

The Window 4 cohort broadens the evidence base for understanding how Climate City Contracts are being used as governance mechanisms. The cohort comprises 33 cities and metropolitan authorities with very different territorial scales, governance powers, baseline conditions and emission profiles, ranging from large metropolitan systems such as Istanbul and Copenhagen to smaller or mid-sized municipalities such as Velenje, Tauragė, Gabrovo and Liberec.

The cohort confirms that the CCC framework has become a common planning architecture across highly diverse urban contexts. Cities frame their CCC around the 2030 climate neutrality objective or an emissions reduction target of approximately 80 percent or more, while also adapting the Mission template to local contexts such as metropolitan governance, district-level demonstration areas, port and airport emissions, industrial transition, district heating systems, and social justice priorities.

The most mature Window 4 submissions tend to combine long-standing climate policy experience with a clear transition governance architecture. This is particularly visible in cities such as Helsinki, Oslo, Copenhagen, Bristol, Lund, Nantes Métropole and Aarhus, where the CCC materials emphasise prior climate planning, structured coordination arrangements, and the mobilisation of external partners as part of implementation.

Several Window 4 cities demonstrate strong ambition in connecting the CCC to complimentary transformation agendas. Examples include Athens' framing of the CCC as a Green Social Contract, Velenje's emphasis on just transition in the context of coal phase-out, Aarhus' climate-economic approach and consumption-based emissions targets, and Glasgow's emphasis on climate justice and wider social outcomes.

The cohort also contains some recurring challenges that are consistent with earlier windows. These include ambiguity in emissions boundaries, insufficient quantification of individual actions, uneven treatment of residual emissions, gaps in IPPU and AFOLU, limited monitoring indicators for socio-economic transformation, and incomplete alignment between investment planning and quantified emission reductions.

The Window 4 cohort is therefore not simply a larger sample; it provides a more differentiated view of how CCCs operate across governance contexts. The larger Number of cities makes it possible to distinguish between general cohort trends and specific areas of excellence that can be used as peer-learning references for cities preparing their next CCC iterations.

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2.2 Climate Action Plan

2.2.1 Climate Neutrality Ambition (GHG Targets and Scope)

Overview: climate neutrality ambition across the Window 4 cohort

- Window 4 CCCs reaffirm the Mission ambition of reaching climate neutrality or deep emissions reduction by 2030.
- Cities vary in how they define baselines, target boundaries, gases and treatment of residual emissions.
- The most comprehensive CCCs make their ambition tangible by clarifying sectors, scopes, gases, geographical boundaries and the role of municipal influence versus wider regional or national dependencies.
- Specific city examples are used below to highlight good practice, while challenges are presented as shared issues across the cohort rather than weaknesses of individual cities.

2.2.1.1 General cohort information and comparison

Window 4 cities reaffirm the core Mission ambition of reaching climate neutrality by 2030. The main differences across the cohort concern target boundaries, treatment of non-CO_2 gases, inclusion of F-gases, handling of transboundary infrastructure, and whether residual emissions and natural sinks are clearly separated from gross emissions reductions.

The most mature approaches make the ambition credible by pairing the headline target with defined sectors, scopes, gases, territorial boundaries and a clear explanation of residual emissions. Several Window 4 cities provide useful examples of how ambition can be framed beyond a minimum compliance target.

The Window 4 cohort generally confirms that the Climate City Contract has become a common vehicle for translating local climate ambition into a 2030 neutrality framework. Most city CCCs indicate explicit alignment with the Mission ambition and show that cities are no longer treating climate neutrality only as an environmental target. Instead, the target is frequently connected to social cohesion, economic development, innovation, local partnerships and institutional reform. This reflects a broader evolution in the CCC process: ambition is increasingly framed as a governance and mobilisation challenge rather than simply a quantified emissions-reduction endpoint.

There is nevertheless significant diversity in how cities define the target and its boundary. Some cities set targets against a fixed historic baseline, while others use a Business-as-Usual scenario to calculate the emissions reduction required by 2030. Several cities also include additional ambition layers, such as climate-positive or consumption-based objectives, municipal operational targets, or commitments to reduce emissions beyond the administrative boundary. This diversity can be valuable because it allows cities to tailor the CCC to local conditions, but it also requires careful explanation to ensure that the target remains transparent, comparable and credible.

Good practice is visible where cities explicitly connect ambition with scope, methodology and implementation consequences. Aarhus is a strong example because it combines a high reduction target with attention to consumption-based emissions in construction, urban development and food. Copenhagen is important as a city that frames climate neutrality within a broader global green role model and climate-positive ambition. Athens provides a useful example of extending responsibility beyond a

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narrow municipal boundary through the Athens Energy Alliance and the inclusion of a share of transboundary traffic. Dublin, Vilnius, Sofia, Helsingborg, Oslo and Rzeszów also show useful practices in clarifying climate ambition and embedding it into wider transformation narratives.

The most common challenge is not a lack of ambition, but insufficient clarity about what the target includes and how different baselines, scopes and residual emissions are treated. This applies particularly to emissions from ports, airports, transboundary transport, F-gases, IPPU, AFOLU, ETS facilities, imported emissions and the treatment of natural sinks. Where these elements are ambiguous, it becomes difficult to assess whether the planned action portfolio fully corresponds to the stated target. Future CCC iterations should therefore give greater priority to target definitions that are precise enough to support monitoring, finance, stakeholder accountability and public communication.

2.2.1.2 Strengths and peer-learning examples

Dublin provides a useful reference point for ambition within the Window 4 cohort. The feedback highlights that this practice is relevant for other Mission cities because it demonstrates how the CCC can be used to translate a strategic commitment into a more concrete governance, sectoral or implementation approach: It is positively noted that in the commitment the Dublin City Council indicates the ambition to include its neighbouring local authorities the next iteration of the CCC, as such going beyond the geographical boundary anticipated at the time of the call for Expression of Interest.

City	Strength	Peer-learning relevance
Dublin	Ambition	It is positively noted that in the commitment the Dublin City Council indicates the ambition to include its neighbouring local authorities the next iteration of the CCC, as such going beyond the geographical boundary anticipated at the time of the call for Expression of Interest.
Sofia	Ambition	The feedback identifies Sofia as a useful peer-learning reference for ambition. The example should be consulted because it illustrates practical approaches that other Mission cities can adapt when refining their own Climate City Contracts, implementation arrangements and future CCC iterations.
Helsingborg	Ambition	Helsingborg's CCC demonstrates high ambition and commitment backed by political consensus and a strong track record of environmental action and sustained collaboration and investments towards achieving climate neutrality.
Oslo	Ambition	The feedback identifies Oslo as a useful peer-learning reference for ambition. The example should be consulted because it illustrates practical approaches that other Mission cities can adapt when refining their own Climate City Contracts, implementation arrangements and future CCC iterations.
Rzeszów	Ambition	The city's ambition surpasses the Mission's minimum requirements by including Scope 3 emission s in stationary energy and transport. In the stationary energy sector, the scope 3 emissions contribute to a substantial amount to the total emissions (near 6%) and arise as a result of losses in energy or heat transmission. In the transport sector, the

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		share of scope 3 emissions is much lower (0.05%) and it is due to electricity losses in the network.
Greater Dunkirk	Exclusions	The feedback identifies Greater Dunkirk as a useful peer-learning reference for exclusions. The example should be consulted because it illustrates practical approaches that other Mission cities can adapt when refining their own Climate City Contracts, implementation arrangements and future CCC iterations.
Riga	Target	The city has developed a portfolio of actions that is properly sized to achieve the 2030 emissions reductions target, and is adequately balanced between soft and hard measures tackling the most relevant emissions sources.

Sofia provides a useful reference point for ambition within the Window 4 cohort. The feedback highlights that this practice is relevant for other Mission cities because it demonstrates how the CCC can be used to translate a strategic commitment into a more concrete governance, sectoral or implementation approach: Sofia's Municipality is taking proactive steps to reduce energy consumption and associated emissions at Sofia Airport, which is excluded from the scope of the SECAP and CO_2 emissions inventory. This demonstrates the city's commitment to reducing emissions from all sources, regardless of the size or contribution to the overall emissions target. The city's actions, including the lease/purchase of new vehicles, upgrade.

Helsingborg provides a useful reference point for ambition within the Window 4 cohort. The feedback highlights that this practice is relevant for other Mission cities because it demonstrates how the CCC can be used to translate a strategic commitment into a more concrete governance, sectoral or implementation approach: Helsingborg's CCC demonstrates high ambition and commitment backed by political consensus and a strong track record of environmental action and sustained collaboration and investments towards achieving climate neutrality.

Oslo provides a useful reference point for ambition within the Window 4 cohort. The feedback highlights that this practice is relevant for other Mission cities because it demonstrates how the CCC can be used to translate a strategic commitment into a more concrete governance, sectoral or implementation approach: The city is notable for its ambitious goal to become the first zero -emission capital by 2030 by targeting hard -to-abate emissions such as those from incineration plants, waterborne navigation, heavy vehicles, private cars, and construction sites. Oslo's commitment extends to significantly lowering indirect and Scope 3 emissions, with specific targets (like a 30% reduction in GHG emissions from building materials an.

Rzeszów provides a useful reference point for ambition within the Window 4 cohort. The feedback highlights that this practice is relevant for other Mission cities because it demonstrates how the CCC can be used to translate a strategic commitment into a more concrete governance, sectoral or implementation approach: The city's ambition surpasses the Mission's minimum requirements by including Scope 3 emission s in stationary energy and transport. In the stationary energy sector, the scope 3 emissions contribute to a substantial amount to the total emissions (near 6%) and arise as a result of losses in energy or heat transmission. In the transport sector, the share of scope 3 emissions is much lower (0.05%).

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Strength area	Cities	Why these cases are useful for peer learning
Broad scope and target coverage	Athens, Riga, Dublin, Vilnius, Sofia	These cities offer examples of target formulations that attempt to include all relevant sectors, gases and scopes, while also making clearer links between climate neutrality and sectoral implementation.
Ambition beyond minimum Mission requirements	Aarhus, Athens, Oslo, Lund, Helsinki	These cities show how CCCs can incorporate consumption-based emissions, regional energy collaboration, residual-emissions reasoning or additional transition goals beyond the minimum scope.
Clear strategic narrative around ambition	Rzeszów, Kraków, Helsinki, Dublin	These cases illustrate how ambition can be embedded in a wider urban transition narrative rather than presented only as an emissions-reduction percentage.

The strongest examples in this section are useful because they show how a specific CCC component can be made more actionable, credible or transferable. The named cities should be read as signposts for peer learning, not as the only cities performing well in this area.

City	Strength / practice area	Why this is useful for peer learning
Aarhus	Consumption-based emissions	its proactive approach to addressing consumption-based emissions, with a particular emphasis on the construction and urban development, and food sectors. An assessment based on national data is performed, clear targets are presented, and concrete actions are implemented to drive meaningful change, which are additional.
Copenhagen	Global green role model	Copenhagen aims at being climate-positive and a global green role model for other cities. Copenhagen participates in the Cities Mission '100 Climate-Neutral and Smart Cities in 2030' to reach the targets of the European Green Deal, to foster a green and climate neutral Europe, to contribute significantly to the Mission.
Greater Dunkirk	Exclusions	Although the industrial-port zone of Greater Dunkirk is explicitly excluded from its commitment and action plan, it is positive that emissions and the status quo in this zone are clearly presented, along with the major initiative undertaken by a consortium of stakeholders to achieve the carbon neutrality target set for.
Riga	Target	The city has developed a portfolio of actions that is properly sized to achieve the 2030 emissions reductions target, and is adequately balanced between soft and hard measures tackling the most relevant emissions sources.
Athens	Target	Athens is commended for including all sectors, scopes, and gases in its target and for extending climate actions beyond its borders through the Athens Energy Alliance, as well as for including half of its transboundary traffic in the target, showcasing a commitment to regional sustainability.

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Dublin	Ambition	It is positively noted that in the commitment the Dublin City Council indicates the ambition to include its neighbouring local authorities the next iteration of the CCC, as such going beyond the geographical boundary anticipated at the time of the call for Expression of Interest.
Vilnius	Ambition	The city is notable for the inclusion of ETS facilities in the 2030 climate neutrality target, going beyond the Mission's requirements.
Sofia	Ambition	Sofia's Municipality is taking proactive steps to reduce energy consumption and associated emissions at Sofia Airport, which is excluded from the scope of the SECAP and CO_2 emissions inventory. This demonstrates the city's commitment to reducing emissions from all sources, regardless of the size or contribution to the.

2.2.1.3 Common challenges and recommendations

The shared challenges in this section are not evidence that the theme is less important; rather, they indicate where future CCC iterations can deepen the level of detail and improve the plan's usefulness for implementation, monitoring and peer learning.

Common challenge	Pattern across Window 4 cities	Recommendation for future CCC iterations
Target boundary ambiguity	Common across the cohort, especially where cities have ports, airports, functional urban areas or district-level target boundaries.	Clarify administrative and functional boundaries, explain exclusions, and specify how emissions linked to shared infrastructure are treated.
Unclear gas coverage	A recurring issue where F-gases or non-CO_2 gases are not explicitly confirmed.	Confirm all GHGs included in the target and inventories, or justify non-occurrence with evidence.
Gross versus net target ambiguity	Present where natural sinks or residual emissions are used in target calculations.	Present gross emissions reductions separately from compensation and residual emissions.
BAU versus baseline confusion	Present where targets are compared to 2030 BAU scenarios while baseline years are also used.	State clearly whether the percentage reduction is relative to a historical baseline, a BAU scenario, or both.

Overall, this section suggests that Window 4 cities are moving towards more comprehensive CCCs, but the next iteration should focus on implementation readiness. The most useful improvements would be to strengthen the connection between the stated ambition, the action portfolio, stakeholder responsibilities, investment planning, and the monitoring framework.

The Window 4 cohort generally confirms that the Climate City Contract has become a common vehicle for translating local climate ambition into a 2030 neutrality framework. Most city CCCs indicate explicit alignment with the Mission ambition and show that cities are no longer treating climate neutrality only as an environmental target. Instead, the target is frequently connected to social cohesion, economic development, innovation, local partnerships and institutional reform. This reflects a broader

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evolution in the CCC process: ambition is increasingly framed as a governance and mobilisation challenge rather than simply a quantified emissions-reduction endpoint.

There is nevertheless significant diversity in how cities define the target and its boundary. Some cities set targets against a fixed historic baseline, while others use a Business-as-Usual scenario to calculate the emissions reduction required by 2030. Several cities also include additional ambition layers, such as climate-positive or consumption-based objectives, municipal operational targets, or commitments to reduce emissions beyond the administrative boundary. This diversity can be valuable because it allows cities to tailor the CCC to local conditions, but it also requires careful explanation to ensure that the target remains transparent, comparable and credible.

Good practice is visible where cities explicitly connect ambition with scope, methodology and implementation consequences. Aarhus is a strong example because it combines a high reduction target with attention to consumption-based emissions in construction, urban development and food. Copenhagen is important as a city that frames climate neutrality within a broader global green role model and climate-positive ambition. Athens provides a useful example of extending responsibility beyond a narrow municipal boundary through the Athens Energy Alliance and the inclusion of a share of transboundary traffic. Dublin, Vilnius, Sofia, Helsingborg, Oslo and Rzeszów also show useful practices in clarifying climate ambition and embedding it into wider transformation narratives.

The most common challenge is not a lack of ambition, but insufficient clarity about what the target includes and how different baselines, scopes and residual emissions are treated. This applies particularly to emissions from ports, airports, transboundary transport, F-gases, IPPU, AFOLU, ETS facilities, imported emissions and the treatment of natural sinks. Where these elements are ambiguous, it becomes difficult to assess whether the planned action portfolio fully corresponds to the stated target. Future CCC iterations should therefore give greater priority to target definitions that are precise enough to support monitoring, finance, stakeholder accountability and public communication.

Window 4 cities show a high level of formal commitment to the Mission target, but the analytical quality of the ambition statements varies depending on how clearly the target boundary, baseline and residual emissions strategy are defined. Across the cohort, the strongest CCCs do more than state a 2030 target: they explain whether the target covers all gases and sectors, how the target relates to baseline inventories and BAU scenarios, and how difficult-to-control emissions are treated.

The most mature ambition statements combine broad coverage with a transparent account of where municipal influence is direct, indirect or dependent on other governance levels. Athens is a strong example because the CCC review material notes that the city includes all sectors, scopes and gases in its target and also extends climate action beyond its administrative boundary through the Athens Energy Alliance. Aarhus is notable for going beyond the Mission minimum through consumption-based targets for construction, urban development and food, while Dublin, Vilnius, Sofia, Helsingborg, Oslo and Rzeszów are identified as cities with clear ambition-related strengths in the Window 4 review material.

The main challenge is not a lack of ambition, but the need to make the target more auditable and implementation-ready. Recommendations related to ambition and scope appear for 35 cities in the Window 4 review material. These recommendations most often concern the treatment of F-gases, the use of CO_2 neutrality rather than climate neutrality language, the status of IPPU and AFOLU emissions, airport and port emissions, and the relation between the target and the emissions inventory. This suggests that future CCC iterations should focus on turning headline ambition into a transparent accounting boundary.

A practical implication is that the next iteration of Window 4 CCCs should include a short target-boundary statement in each plan. This statement should list sectors, gases, scopes, geographical boundaries, known exclusions, high-emitting infrastructure and the rationale for any source that is not included. It should also clarify whether the target is calculated against a historical baseline, a BAU scenario, or both. This would make ambition comparable across cities and easier to monitor over time.

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- Clearly define whether the 2030 target refers to climate neutrality, carbon neutrality or CO_2 neutrality, and ensure that the terminology is used consistently across the commitment, action plan and investment plan.
- State explicitly which sectors, scopes, gases and geographical boundaries are included, and justify any exclusions or assumptions of negligible emissions.
- Explain how residual emissions, negative emissions and natural sinks are treated, including safeguards to ensure that sinks are used only for unavoidable emissions.
- Where cities go beyond the minimum Mission scope through consumption-based or transboundary emissions, describe the accounting approach and implications for implementation responsibilities.

The most mature ambition statements combine broad coverage with a transparent account of where municipal influence is direct, indirect or dependent on other governance levels. Athens is a strong example because the review feedback notes that the city includes all sectors, scopes and gases in its target and also extends climate action beyond its administrative boundary through the Athens Energy Alliance. Aarhus is notable for going beyond the Mission minimum through consumption-based targets for construction, urban development and food, while Dublin, Vilnius, Sofia, Helsingborg, Oslo and Rzeszów are identified as cities with clear ambition-related strengths in the Window 4 review material.

2.2.2 Quantification of Emissions & Pathways

Overview: emissions quantification and pathway credibility

- Window 4 CCCs generally provide emissions inventories and emissions-gap assessments, but the robustness of quantification varies according to the transparency of baseline inventories, BAU scenarios, action-level reductions and residual emissions strategies.
- The strongest cases connect inventories, pathways and action portfolios, making it possible to assess how planned actions are expected to close the emissions gap.
- Residual emissions are increasingly recognised as a strategic issue, but many CCCs still require clearer distinctions between reduction, removal, compensation and carbon-credit use.

2.2.2.1 General cohort information and comparison

Quantification remains one of the most important differentiators between strong and less mature CCCs in Window 4. Most cities provide inventories and emissions gap tables, but the robustness of these materials varies according to the clarity of methods, population data, baseline years, scenario assumptions and alignment between emissions gaps and individual actions.

The strongest plans use multiple inventories, explain methodology, link sectoral emissions to action pathways and provide a credible analysis of residual emissions. Weaker plans provide sufficient headline figures but leave uncertainty about data discrepancies, model assumptions, or whether quantified actions are enough to close the emissions gap.

Residual emissions are increasingly treated as a distinct strategic issue, rather than merely an arithmetic remainder. However, many residual emissions strategies remain preliminary and require clearer timelines, certified approaches to compensation, and stronger distinction between mitigation, removal and offsetting.

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Good practice in Window 4 is visible where cities treat emissions quantification as an adaptive planning and accountability tool, not only a reporting requirement.

The Window 4 CCCs show that cities have improved the amount of emissions data included in CCC submissions, but also that the robustness and clarity of baseline inventories remains one of the most persistent technical challenges. Many cities provide several inventories, scenario calculations, annexed datasets and sectoral breakdowns. This represents a stronger analytical basis than earlier, less mature planning documents, but it also creates risks when the relationship between the different datasets is not explained clearly.

A recurring pattern is that cities use different emissions inventories for different purposes: one inventory may be used for the status quo, another for the BAU scenario, and another for target setting or comparison with earlier plans. In some cases, the CCCs recommend reconciling discrepancies between inventory years, clarifying the modelling assumptions used in BAU projections, or explaining why per capita emissions appear low compared with national values. These are not minor technical issues: they influence the size of the emissions gap, the credibility of the action portfolio and the financing requirements associated with implementation.

Good practice is visible where cities provide historical inventories, explain methodological changes and connect emissions data to future planning. Aarhus is highlighted for detailed annexed inventories covering several recent years, while Athens is commended for a rich historical dataset and a clear comparison between previous plans, the NECP, the BAU scenario and the proposed CCC. Dijon Métropole provides an important example of carbon footprint assessment that goes beyond conventional territorial accounting by incorporating life-cycle and imported emissions. Dresden, Leipzig, Łódź, Warsaw and Vilnius also provide useful examples of status quo and baseline analysis that support a fuller understanding of transition conditions.

The challenge for the next iteration is to move from data availability to data interpretability. A CCC can include a large quantity of data and still leave the reader uncertain about which baseline drives the target, how frozen policy is defined, what assumptions underpin the BAU projection and whether existing measures have been double-counted. Cities should therefore present a short methodological narrative alongside tables and annexes, explaining the purpose of each inventory, the modelling assumptions used, and how the baseline connects to the emissions gap and impact pathways.

2.2.2.2 Strengths and peer-learning examples

Helsinki provides a useful reference point for residual emissions within the Window 4 cohort. The feedback highlights that this practice is relevant for other Mission cities because it demonstrates how the CCC can be used to translate a strategic commitment into a more concrete governance, sectoral or implementation approach: The city is commended for having identified key barriers to compensating for residual emissions and for working on three technical reports to guide future strategies to deal with residual emissions. Helsinki demonstrates foresight by considering regulatory challenges, such as double counting, and by involving political review to inform its residual strategy. Additionally, the city envisions conducting cost -impact an.

City	Strength area	Peer-learning relevance
Helsinki	Residual emissions	The feedback identifies Helsinki as a useful peer-learning reference for residual emissions. The example should be consulted because it illustrates practical approaches that other Mission cities can adapt when refining their own Climate City Contracts, implementation arrangements and future CCC iterations.

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Kraków	Status quo vs future	The feedback identifies Kraków as a useful peer-learning reference for status quo vs future. The example should be consulted because it illustrates practical approaches that other Mission cities can adapt when refining their own Climate City Contracts, implementation arrangements and future CCC iterations.
Oslo	Residual emissions	Oslo is notable for its thorough analysis and clear justification of residual emissions across various sectors. The city is also recognised for its cr edible strategy to compensate these emissions through technological solutions, notably the carbon capture facility at Klemetsrud, which is key to the city's goal of becoming "carbon negative" by 2030. This is complemented by efforts to protect natural carb on sinks through urban development that avoids rural encroachment and promotes densification rather than sprawl.
Greater Dunkirk	Residual emissions strategy	The feedback identifies Greater Dunkirk as a useful peer-learning reference for residual emissions strategy. The example should be consulted because it illustrates practical approaches that other Mission cities can adapt when refining their own Climate City Contracts, implementation arrangements and future CCC iterations.
Riga	Status quo vs future	The plan builds on past and ongoing efforts carried out by the municipality to combat climate change and marks a significant shift f rom the current state, outlining a transformative pathway to improve the built environment, energy and mobility sectors, among other sectors, with a focus on enhancing energy efficiency, increasing renewable energy use, and modernizing transport infrastructure.

Kraków provides a useful reference point for status quo vs future within the Window 4 cohort. The feedback highlights that this practice is relevant for other Mission cities because it demonstrates how the CCC can be used to translate a strategic commitment into a more concrete governance, sectoral or implementation approach: The city is notable for having provided a comprehensive list of existing and relevant policies, strategies, and regulations at multiple levels of governance, clearly indicating the contribution of existing policies, strategies and regulations to the emissions reduction target. The vision for the future sees the implementation of the CCC as the guiding climate strategy complementing other existing programmes.

Oslo provides a useful reference point for residual emissions within the Window 4 cohort. The feedback highlights that this practice is relevant for other Mission cities because it demonstrates how the CCC can be used to translate a strategic commitment into a more concrete governance, sectoral or implementation approach: Oslo is notable for its thorough analysis and clear justification of residual emissions across various sectors. The city is also recognised for its credible strategy to compensate these emissions through technological solutions, notably the carbon capture facility at Klemetsrud, which is key to the city's goal of becoming "carbon negative" by 2030. This is complemented by efforts to protect natural carbon sinks.

Greater Dunkirk provides a useful reference point for residual emissions strategy within the Window 4 cohort. The feedback highlights that this practice is relevant for other Mission cities because it demonstrates how the CCC can be used to translate a strategic commitment into a more concrete governance, sectoral or implementation approach: The intention to set up a monitoring system to regularly assess the stability and effectiveness of natural carbon sinks, such as reforested areas and restored wetlands is very positively no ted, as these systems will enable early detection of potential reversals, such as carbon release due to land-use changes or environmental events like wildfires. Moreover, the creation of buffer reserves within carbon sequestration.

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Riga provides a useful reference point for status quo vs future within the Window 4 cohort. The feedback highlights that this practice is relevant for other Mission cities because it demonstrates how the CCC can be used to translate a strategic commitment into a more concrete governance, sectoral or implementation approach: The plan builds on past and ongoing efforts carried out by the municipality to combat climate change and marks a significant shift from the current state, outlining a transformative pathway to improve the built environment, energy and mobility sectors, among other sectors, with a focus on enhancing energy efficiency, increasing renewable energy use, and modernizing transport infrastructure.

Several cities provide strong examples of baseline and status quo analysis. Aarhus includes detailed annexed inventories covering several years and is recognised for its account of baseline emissions. Athens provides a rich dataset covering historical emissions, building stock, transport patterns, demographic information and GIS-based urban data. Riga, Paris, Vilnius, Cork, Sofia, Kraków and Tauragė are also useful signposts for stronger baseline or status-quo analysis. These cases demonstrate that cities are increasingly treating the CCC as an evidence base for transition planning rather than only as a strategic statement.

The strongest examples in this section are useful because they show how a specific CCC component can be made more actionable, credible or transferable. The named cities should be read as signposts for peer learning, not as the only cities performing well in this area.

City	Strength / practice area	Why this is useful for peer learning
Aarhus	Baseline emissions	its detailed account of baseline emissions through annexed inventories where an in-depth analysis of activity data and emission values of the years 2018, 2020, 2021 and 2022. A brief textual explanation of the underpinning methodology and the reported methodology change would be a welcomed addition.
Dijon Métropole	Evaluation of Carbon Footprint	Dijon Metropole demonstrates a robust commitment to environmental stewardship by adopting an advanced approach to carbon footprint assessment, surpassing the requirements of the Mission. In 2022, the Metropole conducted a comprehensive evaluation of its carbon emissions that extends beyond conventional direct emission.
Riga	Status quo vs future	The plan builds on past and ongoing efforts carried out by the municipality to combat climate change and marks a significant shift from the current state, outlining a transformative pathway to improve the built environment, energy and mobility sectors, among other sectors, with a focus on enhancing energy efficiency, i.
Athens	Status quo vs future	The CCC includes a thorough analysis of historical GHG emissions reduction and the potential for future progress vis-à-vis potential barriers, as well as for providing a rich dataset that offers a comprehensive multi-dimensional view of the urban landscape. Critical barriers and opportunities are adequately incorporate.
Kraków	Status quo vs future	The city is notable for having provided a comprehensive list of existing and relevant policies, strategies, and regulations at multiple levels of governance, clearly indicating the contribution of existing policies, strategies and regulations to the emissions reduction target.

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2.2.2.3 Common challenges and recommendations

The shared challenges in this section are not evidence that the theme is less important; rather, they indicate where future CCC iterations can deepen the level of detail and improve the plan's usefulness for implementation, monitoring and peer learning.

Common challenge	Pattern across Window 4 cities	Recommendation for future CCC iterations
Data discrepancies between inventories	30 cities received recommendations related to baseline, emissions gap or residual emissions clarity.	Reconcile inventory values, document methodologies and provide population values for relevant years.
Individual action impacts not quantified	A recurring issue across many cities, even where impact pathways are well developed.	Quantify expected GHG reduction, energy savings, renewable generation and sequestration at action level.
Residual emissions strategies preliminary	Common where residual emissions rely on external offsets, natural sinks or future technical removals.	Develop timelines, certification approaches, permanence safeguards and clear accounting rules.
Unclear BAU assumptions	Frequently noted where the NZC economic model or local projections are used without enough explanation.	Report assumptions, model inputs, demographic trends and included policy measures.

Overall, this section suggests that Window 4 cities are moving towards more comprehensive CCCs, but the next iteration should focus on implementation readiness. The most useful improvements would be to strengthen the connection between the stated ambition, the action portfolio, stakeholder responsibilities, investment planning, and the monitoring framework.

The Window 4 CCCs show that cities have improved the amount of emissions data included in CCC submissions, but also that the robustness and clarity of baseline inventories remain one of the most persistent technical challenges. Many cities provide several inventories, scenario calculations, annexed datasets and sectoral breakdowns. This represents a stronger analytical basis than earlier, less mature planning documents, but it also creates risks when the relationship between the different datasets is not explained clearly.

A recurring pattern is that cities use different emissions inventories for different purposes: one inventory may be used for the status quo, another for the BAU scenario, and another for target setting or comparison with earlier plans. In some cases, the CCC materials recommend reconciling discrepancies between inventory years, clarifying the modelling assumptions used in BAU projections, or explaining why per capita emissions appear low compared with national values. These are not minor technical issues: they influence the size of the emissions gap, the credibility of the action portfolio and the financing requirements associated with implementation.

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Good practice is visible where cities provide historical inventories, explain methodological changes and connect emissions data to future planning. Aarhus is highlighted for detailed annexed inventories covering several recent years, while Athens is commended for a rich historical dataset and a clear comparison between previous plans, the NECP, the BAU scenario and the proposed CCC. Dijon Métropole provides an important example of carbon footprint assessment that goes beyond conventional territorial accounting by incorporating life-cycle and imported emissions. Dresden, Leipzig, Łódź, Warsaw and Vilnius also provide useful examples of status quo and baseline analysis that support a fuller understanding of transition conditions.

The challenge for the next iteration is to move from data availability to data interpretability. A CCC can include a large quantity of data and still leave the reader uncertain about which baseline drives the target, how frozen policy is defined, what assumptions underpin the BAU projection and whether existing measures have been double-counted. Cities should therefore present a short methodological narrative alongside tables and annexes, explaining the purpose of each inventory, the modelling assumptions used, and how the baseline connects to the emissions gap and impact pathways.

The Window 4 feedback indicates that most cities have established the basic infrastructure for emissions accounting, but the robustness of emissions-gap estimation remains a central area for further work. A recurring pattern is that cities provide multiple emissions inventories, use different inventory methods, or refer to several baseline values without fully explaining how they are reconciled. This weakens transparency, even when the underlying analytical work appears substantial.

At the same time, recommendations related to baseline inventories, BAU scenarios and emissions gaps appear for 34 cities. The most common issues are data discrepancies across tables, missing population values, insufficient explanation of BAU assumptions, uncertainty over whether previous plans have already been included in frozen-policy scenarios, incomplete treatment of AFOLU and IPPU, and unclear treatment of natural sinks. These are not minor technical issues: they directly affect the credibility of the emissions gap and therefore the plausibility of the action portfolio.

The main recommendation is that each city should produce a consolidated emissions-accounting note as part of the next CCC iteration. This note should identify the inventory year, emissions methodology, gases and sectors included, population values, BAU assumptions, the treatment of local renewable energy, the role of national projections and the relationship between prior climate plans and new CCC actions. A standardised note of this kind would also support cross-city comparison and make future Mission review cycles more efficient.

Common baseline or emissions-gap issue	Number of cities	Recommended refinement
Need to clarify inventory methodology, reconcile baseline values or explain discrepancies.	33	Provide a consolidated inventory note and ensure that values in tables, figures and narrative sections match.
Need to clarify BAU or frozen-policy scenario assumptions	33	Specify whether BAU includes national policies, existing local plans, population change, grid decarbonisation and technological turnover.
Need to clarify the emissions gap and relation between impact pathways and quantified actions.	32	Show the full chain from baseline to BAU, target, emissions gap, quantified actions and residual emissions.

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Need to include or justify marginal sectors and gases such as AFOLU, IPPU and F-gases.	24	Quantify small sources where possible, or explicitly justify why they are negligible and how they will be monitored in future iterations.

Residual emissions are one of the areas where Window 4 cities show growing analytical awareness but uneven implementation credibility. Many plans recognise that some emissions may remain difficult to eliminate by 2030, especially in transport, waste, IPPU, agriculture or infrastructure systems that depend on national frameworks. However, the evidence base for residual emissions and the credibility of compensation strategies vary considerably across the cohort.

The stronger cases distinguish between emissions reductions, carbon removals, natural sinks and compensation. Helsinki and Oslo are useful signposts because the review material identifies residual-emissions strengths, while Aarhus is particularly important for peer learning because the city discusses both natural and technological sinks, including CCS, even though the review also recommends further clarification. These examples show that residual-emissions strategies are becoming more explicit, but also that they need careful accounting to avoid treating reductions, removals and offsets interchangeably.

Recommendations related to residual emissions appear for 31 cities, making this one of the most widely shared areas for future work. The most common issue is that strategies often lack a clear timeline, quantified sequestration potential, certification route, explanation of unavoidable emissions, or distinction between local removals and external credits. Some cities also need to guard against under-commitment by ensuring that natural sinks compensate only residual emissions after feasible reductions have been exhausted.

- Provide one consolidated explanation of the baseline, BAU scenario, target year, population assumptions and inventory methodology used for the CCC.
- Clarify any differences between inventories, annexed datasets, economic-model outputs and previous climate plans.
- Include sectoral and sub-sectoral breakdowns wherever possible, particularly for transport, stationary energy, waste, AFOLU and IPPU.
- Use the emissions baseline as a bridge into the action portfolio by showing how each major source of emissions is addressed through quantified pathways and actions.

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Residual-emissions learning area	Cities	Learning opportunity
Use of natural and technological sinks	Aarhus, Helsinki, Oslo	These cities show how residual-emissions strategies can be made explicit, but also why reductions, removals and compensation must be clearly separated.
Need for quantified and certified compensation	Athens, Aarhus, Oslo	These cases illustrate the importance of quantifying sequestration potential, addressing double counting and using credible carbon-removal certification routes.
Link to land-use and biodiversity planning	Aarhus, Lund, Reykjavík, Vilnius	These cities show how residual-emissions thinking can be linked to AFOLU, NBS, biodiversity and territorial planning rather than treated as a separate offsetting exercise.

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2.2.3 Status Quo Assessment

Overview: baseline diagnosis and city context

- The Window 4 cohort shows stronger diagnostic capacity than earlier phases, especially where CCCs provide rich data on emissions, buildings, transport, energy, stakeholders, social context and existing climate policy.
- The strongest status quo assessments connect baseline conditions directly to future action priorities, helping readers understand why specific pathways and interventions have been selected.
- Common gaps remain in the treatment of smaller or harder-to-quantify sectors, including AFOLU, IPPU, waste, air quality and socio-economic vulnerabilities.

2.2.3.1 General cohort information and comparison

The Window 4 CCCs show considerable variation in the quality of status quo analysis. Many cities provide rich descriptions of population, building stock, transport systems, governance structures and existing policy frameworks, while others provide uneven sectoral detail or do not sufficiently describe waste, IPPU, AFOLU or social conditions.

A strong status quo analysis is important because it anchors the action portfolio in the city's actual starting point. Where cities describe existing policies, emissions trends, stakeholder structures and implementation barriers in detail, the CCC becomes a more credible implementation document and not only a strategic vision.

The strongest examples are those that connect baseline conditions to future pathways, identifying not only what the city emits, but also which institutions, infrastructures, behavioural patterns

and market conditions shape the feasibility of implementation. Several cities stand out for offering rich baseline diagnosis and strong links between current conditions and future action.

Window 4 cities increasingly use the CCC to create a comprehensive diagnostic picture of the city, but the depth of status quo analysis is uneven across sectors. The strongest plans combine emissions data with demographic, spatial, institutional and socio-economic analysis. This allows the CCC to function as a governance intelligence tool: it identifies not only what emissions need to be reduced, but also which actors, infrastructures, capabilities and regulatory conditions shape the feasibility of action.

Athens offers one of the most comprehensive examples because the review feedback highlights its rich dataset on buildings, transport, waste, demographic composition, access to green space and GIS-based mapping. Dresden is also identified for a thorough analysis of demographics, governance, energy efficiency, transport, urban planning and the economy. Leipzig, Łódź, Warsaw and Vilnius provide additional examples of status quo strengths. These cities can be used as reference cases for others seeking to build a more multi-dimensional diagnostic foundation for CCC iteration.

The main shared challenge is that some status quo sections remain stronger for high-emitting sectors than for enabling domains. Buildings, energy and transport are generally better documented than digitalisation, air quality, social impacts, waste sub-systems, IPPU and AFOLU. In several cases, stakeholder mapping lists relevant actors but does not analyse their roles, influence, interests or implementation responsibilities. This limits the ability to translate the status quo analysis into a targeted governance and implementation strategy.

Future iterations should therefore connect status quo analysis more directly to action design. For each sector, cities should identify the emissions baseline, relevant infrastructure systems, existing policies, responsible actors, affected groups, barriers, data gaps and monitoring needs. This would make the status quo section more useful for implementation and would support adaptive management in subsequent CCC cycles.

2.2.3.2 Strengths and peer-learning examples

Wrocław provides a useful reference point for status quo analysis within the Window 4 cohort. The feedback highlights that this practice is relevant for other Mission cities because it demonstrates how the CCC can be used to translate a strategic commitment into a more concrete governance, sectoral or implementation approach: The CCC includes a thorough analysis of GHG emissions and their sources and an analysis of historical trends in the levels of emissions over the years. It also provides a thorough description of the current characteristics of the city that offers a comprehensive multi-dimensional view of the urban landscape. Critical barriers are clearly described and opportunities to overcome them identified.

City	Strength area	Peer-learning relevance
Wrocław	Status quo analysis	The CCC includes a thorough analysis of GHG emissions and their sources and an analysis of historical trends in the levels of emissions over the years. It also provides a thorough description of the current characteristics of the city that offers a comprehensive multi-dimensional view of the urban landscape. Critical barriers are clearly described and opportunities to overcome them identified.

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Warsaw	Status quo	The feedback identifies Warsaw as a useful peer-learning reference for status quo. The example should be consulted because it illustrates practical approaches that other Mission cities can adapt when refining their own Climate City Contracts, implementation arrangements and future CCC iterations.
Oslo	Status quo	The CCC offers a very clear and transparent description of emissions sources vis- à-vis emissions trends over the years and policies, events, laws that promoted the variation.
Dresden	Status quo analysis	The feedback identifies Dresden as a useful peer-learning reference for status quo analysis. The example should be consulted because it illustrates practical approaches that other Mission cities can adapt when refining their own Climate City Contracts, implementation arrangements and future CCC iterations.
Leipzig	Status quo	The feedback identifies Leipzig as a useful peer-learning reference for status quo. The example should be consulted because it illustrates practical approaches that other Mission cities can adapt when refining their own Climate City Contracts, implementation arrangements and future CCC iterations.
Łódź	Status quo	The feedback identifies Łódź as a useful peer-learning reference for status quo. The example should be consulted because it illustrates practical approaches that other Mission cities can adapt when refining their own Climate City Contracts, implementation arrangements and future CCC iterations.

Warsaw provides a useful reference point for status quo within the Window 4 cohort. The feedback highlights that this practice is relevant for other Mission cities because it demonstrates how the CCC can be used to translate a strategic commitment into a more concrete governance, sectoral or implementation approach: The city is notable for the comprehensive excursus on local, regional, national, and international policies and strategies relevant to reaching climate neutrality, particularly in areas like heat, electricity, urban development, and climate adaptation. Additionally, the city is recognised for its proactive approach in planning an external evaluation to ensure the CCC's coherence with other municipal documents.

Oslo provides a useful reference point for status quo within the Window 4 cohort. The feedback highlights that this practice is relevant for other Mission cities because it demonstrates how the CCC can be used to translate a strategic commitment into a more concrete governance, sectoral or implementation approach: The CCC offers a very clear and transparent description of emissions sources vis- à-vis emissions trends over the years and policies, events, laws that promoted the variation.

Dresden provides a useful reference point for status quo analysis within the Window 4 cohort. The feedback highlights that this practice is relevant for other Mission cities because it demonstrates how the CCC can be used to translate a strategic commitment into a more concrete governance, sectoral or implementation approach: The thorough analysis of Dresden's current situation is noteworthy, covering all levels from local to international and across various sectors. This in -depth examination, organized around key themes, provides a broad understanding of the city's features, obstacles, and progress. Specifically, it delves into aspects such as demographics, governance, energy efficiency, urban planning, transport, and the economy.

Leipzig provides a useful reference point for status quo within the Window 4 cohort. The feedback highlights that this practice is relevant for other Mission cities because it demonstrates how the CCC can be used to translate a strategic commitment into a more concrete governance, sectoral or

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implementation approach: The plan offers a detailed overview of current climate action at international, federal, state, and local levels. It presents overarching strategies and specifically addresses sector-specific approaches at the state and local levels. Emphasis is placed on programmes initiated by the city of Leipzig, which are directly derived from federal or state provisions and give rise to the CCC.

2.2.3.3 Common challenges and recommendations

The shared challenges in this section are not evidence that the theme is less important; rather, they indicate where future CCC iterations can deepen the level of detail and improve the plan's usefulness for implementation, monitoring and peer learning.

Common challenge	Pattern across Window 4 cities	Recommendation for future CCC iterations
Uneven sectoral baseline detail	12 cities received recommendations concerning status quo completeness or sectoral baseline depth.	Provide comparable status quo information across all relevant sectors, including waste, IPPU and AFOLU.
Limited stakeholder influence mapping	Often stakeholders are listed without explaining their role, influence, capacity or implementation responsibility.	Use stakeholder mapping to distinguish influence, interest, responsibility and expected contribution.
Weak connection between existing plans and CCC actions	Some plans list existing strategies but do not clarify which elements are incorporated into the CCC.	Explain how previous plans are integrated and how double counting is avoided.
Limited spatial or distributional analysis	Some submissions do not sufficiently map priority neighbourhoods, vulnerable groups or territorial disparities.	Use spatial data, demographic indicators and vulnerability analysis to prioritise implementation.

Overall, this section suggests that Window 4 cities are moving towards more comprehensive CCCs, but the next iteration should focus on implementation readiness. The most useful improvements would be to strengthen the connection between the stated ambition, the action portfolio, stakeholder responsibilities, investment planning, and the monitoring framework.

Window 4 cities increasingly use the CCC to create a comprehensive diagnostic picture of the city, but the depth of status quo analysis is uneven across sectors. The strongest plans combine emissions data with demographic, spatial, institutional and socio-economic analysis. This allows the CCC to function as a governance intelligence tool: it identifies not only what emissions need to be reduced, but also which actors, infrastructures, capabilities and regulatory conditions shape the feasibility of action.

Athens offers one of the most comprehensive examples because the CCC review material highlights its rich dataset on buildings, transport, waste, demographic composition, access to green space and GIS-

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based mapping. Dresden is also identified for a thorough analysis of demographics, governance, energy efficiency, transport, urban planning and the economy. Leipzig, Łódź, Warsaw and Vilnius provide additional examples of status quo strengths. These cities can be used as reference cases for others seeking to build a more multi-dimensional diagnostic foundation for CCC iteration.

The main shared challenge is that some status quo sections remain stronger for high-emitting sectors than for enabling domains. Buildings, energy and transport are generally better documented than digitalisation, air quality, social impacts, waste sub-systems, IPPU and AFOLU. In several cases, stakeholder mapping lists relevant actors but does not analyse their roles, influence, interests or implementation responsibilities. This limits the ability to translate the status quo analysis into a targeted governance and implementation strategy.

Future iterations should therefore connect status quo analysis more directly to action design. For each sector, cities should identify the emissions baseline, relevant infrastructure systems, existing policies, responsible actors, affected groups, barriers, data gaps and monitoring needs. This would make the status quo section more useful for implementation and would support adaptive management in subsequent CCC cycles.

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2.2.4 Strategy and Approach

Overview: strategic framing, integration and justice

- Window 4 CCCs increasingly frame climate neutrality as a broader urban transformation agenda rather than a narrow emissions-reduction exercise.
- Many CCCs connect climate action to social justice, public health, economic development, energy security, green infrastructure and institutional change.
- The strongest strategies combine a clear narrative with practical governance, participation and investment mechanisms that can support implementation.

2.2.4.1 General cohort information and comparison

Window 4 CCCs show a progressively stronger strategic framing of climate neutrality as a mission-oriented governance challenge. Across the cohort, the strongest plans move beyond stating a 2030 target and instead describe how climate neutrality is connected to quality of life, energy security, social cohesion, circular economy, resilience, investment planning and institutional capacity. This is important because the CCC is intended to function not only as a planning document, but also as a mandate-setting and coordination framework for city-wide transition.

The main shared challenge is to translate strategic narratives into implementation routines. Many CCCs articulate strong visions, but future iterations should make clearer how strategic priorities are translated into decision-making mandates, departmental responsibilities, budget allocations, procurement rules, stakeholder commitments and monitoring indicators. This would strengthen the credibility of the strategic approach and reduce the risk that integrated narratives remain separate from operational delivery.

Window 4 cities increasingly present climate neutrality as a whole-of-government and whole-of-society governance challenge. Several CCCs highlight new or strengthened internal coordination

units, climate offices, investment councils, mission teams, interdepartmental groups and participatory forums. This is an important evolution because it shows the CCC being used not only to document actions, but also to reshape how municipalities organise responsibility for climate-neutrality delivery.

The governance arrangements vary significantly across the cohort. Some cities build on long-standing climate offices or resilience departments, while others are creating new directorates, steering committees or cross-administration teams. Larger capitals and metropolitan authorities often face complex jurisdictional barriers around transport, energy systems, planning and public investment. Smaller cities often show strong local ownership but may have more limited staff capacity, technical capacity or finance capacity. Across these different contexts, the most credible plans are those that explicitly diagnose institutional barriers and then describe how the proposed governance model will address them.

Athens provides a useful example of governance reform because the CCC links the Office of Urban Resilience and Sustainability, the proposed Directorate for Climate Policy and Civil Protection, the Climate Neutrality Investment Council and the Athens Climate Forum. Helsinki, Dublin, Vilnius and Budapest are also highlighted for governance arrangements that combine internal coordination with broader stakeholder engagement. Copenhagen and Greater Dunkirk provide examples of how climate action can be embedded in a wider strategic and governance narrative. Dijon Métropole is important because of its detailed governance design, while Lund and Glasgow illustrate the value of dedicated governance structures and collaborative approaches.

The key shared challenge is that governance structures are often described more clearly as intentions than as operating systems. In several cities, the CCCs recommend more detail on decision-making lines, meeting frequency, reporting duties, staffing, capacity building, interdepartmental responsibilities and coordination with regional and national authorities. This is especially important where high-impact actions depend on actors beyond municipal control. Future iterations should therefore move toward governance roadmaps that show how the CCC will be managed, resourced, monitored and adapted during implementation.

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2.2.4.2 Strengths and peer-learning examples

Several cities provide strong examples of integrated strategic framing. Athens frames its CCC as a Green Social Contract and connects climate neutrality to neighbourhood improvement, energy poverty alleviation and social cohesion. Aarhus frames climate neutrality as a long-term strategic commitment dating back to earlier climate visioning, and links it to climate budgeting, biodiversity, adaptation and citizen engagement. Bristol, Dublin, Helsinki, Oslo and Copenhagen illustrate how CCCs can build on established climate policy trajectories while using the Mission framework to increase coherence across implementation systems.

The strongest examples in this section are useful because they show how a specific CCC component can be made more actionable, credible or transferable. The named cities should be read as signposts for peer learning, not as the only cities performing well in this area.

City	Strength / practice area	Why this is useful for peer learning
Copenhagen	Governance	The plan has a clear multi-level governance structure, with the Technical and Environmental Administration and the Climate Secretariat responsible for implementing and coordinating the

		climate action plan through multi-annual roadmaps and regular meetings.
Dijon Métropole	Multi-level governance	The planning process underpinning the CCC is based on several levels of governance involving various stakeholders and key players in climate transition, from local to regional and European. The collaborative governance framework is notable with the participation of all players facilitated through workshops.
Greater Dunkirk	Governance	The city is notable for its effort to create a robust governance framework around climate neutrality, with the transition team established having a key role in this. The transition team is a dynamic group of stakeholders, primarily from the Greater Dunkirk administration, which focuses on developing strategies and projects.
Glasgow	Overall Strategy	the city shows an interesting approach, based on the adoption of an innovative modelling tool for the assessment of the impacts of the decarbonisation strategies. The high level of detail in terms of calculation and hypotheses reported in the attached Net Zero Routemap (NZR) can be considered as an overall strength.
Leipzig	Multi-level governance	Leipzig strengthens its climate action through the stonGERcities network, fostering cooperation among the eight German Mission Cities. With a steering committee involving federal ministries, research institutes, and local authorities, the city benefits from policy alignment, shared solutions, and institutional support.
Nantes Métropole	Governance	The city is notable for its effort to create a robust and iterative governance framework around climate neutrality, and for its' commitment to transparent stakeholder engagement, systemic thinking, and territorial collaboration. Firstly, the “ONE HEALTH” principle is integrated into Nantes Metropole's organizational structure.
Athens	Governance	The city demonstrates a proactive approach in establishing an integrated governance structure for climate policy, exemplified by the Office of Urban Resilience and Sustainability and the future Directorate for Climate Policy and Civil Protection.
Helsinki	Holism	Helsinki is notable for its holistic approach to climate-related issues, integrating a comprehensive set of environmental protection targets for 2040 that address climate change mitigation and adaptation, air and water protection, biodiversity, noise and soil management, circular economy, responsible procurement.

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2.2.4.3 Common challenges and recommendations

Emerging common challenges across the cohort:

- Describe the governance structure as an operating model, not only an organigram, including decision-making, accountability, reporting, escalation and corrective-action processes.
- Clarify how climate-neutrality functions are embedded in municipal departments and how cross-departmental coordination will be sustained beyond project-based arrangements.
- Strengthen vertical governance strategies for sectors where cities depend on regional, national or EU-level competences.
- Link governance structures to monitoring and investment planning so that implementation decisions can be adjusted as evidence emerges.

2.2.5 Pathways and Action Portfolio

Overview: action portfolio maturity and implementation traceability

• Window 4 action portfolios are often broad and strategically coherent, but their implementation maturity varies significantly.

• The strongest portfolios connect impact pathways to specific measures, responsibilities, timelines, costs, indicators and expected emissions reductions.

• A recurring challenge is that pathway-level coherence is often stronger than action-level evidence, making it difficult to verify whether actions will fully close the emissions gap.

For a detailed analysis of sectoral observations within Window 4 action portfolios see **Appendix B.2.**

2.2.5.1 General cohort information and comparison

The action portfolio is the main place where the ambition of the CCC is translated into implementable measures. Window 4 cities generally present broad portfolios across energy, buildings, transport, waste, land use, governance and social innovation, but the maturity of individual actions varies considerably.

The strongest portfolios are those that connect impact pathways to specific actions, provide timelines, responsibilities, costs, expected emissions reductions and links to investment planning. Less mature portfolios describe actions at a high level or rely on future technical assessments to quantify their effect.

The CCC materials repeatedly show that pathway-level coherence is often stronger than action-level maturity. This means that cities may have a credible overall transformation logic, but still need to develop the operational detail required to assess feasibility, sequence implementation and monitor progress.

A small set of Window 4 cities provide especially useful examples of action portfolio maturity and balance.

The Window 4 cohort shows clear progress in the use of impact pathways as an organising device for climate-neutrality planning. Many city CCCs note that pathways are increasingly

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comprehensive and able to connect emissions reduction, governance, finance, behaviour change, stakeholder mobilisation and co-benefits. This suggests that the CCC framework is helping cities move beyond single-sector action lists toward a more systemic interpretation of urban transformation.

However, the action portfolio remains the point where strategic credibility is most often tested. Across many cities, impact pathways indicate that the emissions gap can be closed at aggregate level, but individual actions are not yet sufficiently quantified in terms of GHG reductions, energy savings, renewable generation, cost, timeline, responsible actor or implementation dependencies. This creates a recurring gap between the strategic logic of the CCC and the operational evidence needed to show that actions can deliver the required reduction by 2030.

Good practice is visible where cities translate strategic pathways into specific, sequenced and accountable actions. Dijon Métropole is highlighted for detailed impact pathway fact sheets that connect timelines, budgets, expected impacts and change levers. Riga is noted for maturity and the articulation of pathways, while Tauragė is also identified as offering a mature contribution. Paris and Rzeszów provide useful action portfolio examples, and Leipzig offers a particularly rich set of strategies across food, transport, renewable energy, heating, green infrastructure, social housing and private sector engagement. These cities provide useful signposts for moving from a general strategy to a more operational portfolio.

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2.2.5.2 Strengths and peer-learning examples

Rzeszów provides a useful reference point for action portfolio within the Window 4 cohort. The feedback highlights that this practice is relevant for other Mission cities because it demonstrates how the CCC can be used to translate a strategic commitment into a more concrete governance, sectoral or implementation approach: The extensive list of individual actions included in Rzeszów's action portfolio is noteworthy. Rzeszów has taken a multifaceted approach towards the transition towards climate neutrality. Initiatives include green energy procurement, renewable energy projects, and developing geothermal and combined heat and power plants. The city is decarbonizing heating through eco -friendly options and modernizing power grids.

City	Strength area	Peer-learning relevance
Rzeszów	Action Portfolio	The feedback identifies Rzeszów as a useful peer-learning reference for action portfolio. The example should be consulted because it illustrates practical approaches that other Mission cities can adapt when refining their own Climate City Contracts, implementation arrangements and future CCC iterations.
Tauragė	Maturity	comprehensive quantification at the level of most individual actions both concerning their extent and impact on GHG emissions, energy savings and the level of detail of action descriptions, incl. short term and medium- term targets, timeframes and suitable indicators to track the implementation of actions.
Łódź	Action portfolio	: The description of pathways and action portfolio is comprehensive and outline a varied set of actions and tools, addressing major emission generating activities and it is properly sized to achieve the 2030 emissions reduction target;

Riga	Maturity	The municipality's action portfolio demonstrates a good level of maturity, with a comprehensive and detailed description of pathways, fields of action, and expected impacts that are well-aligned with the city's challenges and potentials. The actions are articulated in both qualitative and quantitative terms, with clear estimates of emission reductions, energy savings, and costs.

Tauragė provides a useful reference point for maturity within the Window 4 cohort. The feedback highlights that this practice is relevant for other Mission cities because it demonstrates how the CCC can be used to translate a strategic commitment into a more concrete governance, sectoral or implementation approach: comprehensive quantification at the level of most individual actions both concerning their extent and impact on GHG emissions, energy savings and the level of detail of action descriptions, incl. short term and medium- term targets, timeframes and suitable indicators to track the implementation of actions.

Łódź provides a useful reference point for action portfolio within the Window 4 cohort. The feedback highlights that this practice is relevant for other Mission cities because it demonstrates how the CCC can be used to translate a strategic commitment into a more concrete governance, sectoral or implementation approach. The description of pathways and action portfolio is comprehensive and outline a varied set of actions and tools, addressing major emission generating activities and it is properly sized to achieve the 2030 emissions reduction target.

City	Strength / practice area	Why this is useful for peer learning
Dijon Métropole	Design of Impact Pathways	The detailed description at the level of the impact pathways is noteworthy. Each impact pathway is detailed in its own fact sheet, with clear emphasis on integration with other change levers and cross-cutting aspects. Additionally, defined timelines and budgets, as well as specified expected impacts, provide clarity an.
Glasgow	In-depth analysis of pathways	The plan provides a detailed assessment of the impacts of decarbonisation strategies, along with a comparison of two potential evolutionary scenarios— one grounded in current policies and the other cantered on more ambitious sustainability actions as the core of the climate neutrality strategy.
Łódź	Action portfolio	The description of pathways and action portfolio is comprehensive and outline a varied set of actions and tools, addressing major emission generating activities and it is properly sized to achieve the 2030 emissions reduction target;
Paris	Action Portfolio	Paris has a comprehensive action portfolio including 392 specific actions, each supported by measurable indicators to track progress and identified co-benefits.
Riga	Maturity	The municipality's action portfolio demonstrates a good level of maturity, with a comprehensive and detailed description of pathways, fields of action, and expected impacts that are well-aligned with the city's challenges and potentials. The actions are articulated in both qualitative and quantitative terms, with clear.

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Rzeszów	Action Portfolio	The extensive list of individual actions included in Rzeszów's action portfolio is noteworthy. Rzeszów has taken a multifaceted approach towards the transition towards climate neutrality. Initiatives include green energy procurement, renewable energy projects, and developing geothermal and combined heat and power plant.
Tauragė	Maturity	comprehensive quantification at the level of most individual actions both concerning their extent and impact on GHG emissions, energy savings and the level of detail of action descriptions, incl. short term and medium-term targets, timeframes and suitable indicators to track the implementation of actions.

Riga provides a useful reference point for maturity within the Window 4 cohort. The feedback highlights that this practice is relevant for other Mission cities because it demonstrates how the CCC can be used to translate a strategic commitment into a more concrete governance, sectoral or implementation approach: The municipality's action portfolio demonstrates a good level of maturity, with a comprehensive and detailed description of pathways, fields of action, and expected impacts that are well-aligned with the city's challenges and potentials. The actions are articulated in both qualitative and quantitative terms, with clear estimates of emission reductions, energy savings, and costs.

The strongest examples in this section are useful because they show how a specific CCC component can be made more actionable, credible or transferable. The named cities should be

Sector	General maturity in Window 4	Good practice references	Priority for next iterations
Buildings and stationary energy	Relatively mature in many plans, often supported by previous climate or energy strategies.	Bordeaux Métropole, Budapest, Cork, Helsinki, Istanbul, Nantes Métropole, Riga, Tauragė.	Further develop private building delivery models, cooling, renovation finance and skills.
Transport	Comprehensive in some cities but strongly affected by jurisdictional dependencies.	Budapest, Helsinki, Istanbul, Lund, Nantes Métropole, Oslo, Riga, Sofia.	Strengthen freight, ports/airports, contingency plans and modal shift indicators.
Renewable energy	Strong in cities with mature energy planning or utility partnerships.	Bordeaux Métropole, Bristol, Budapest, Helsinki, Istanbul, Lund, Nantes Métropole, Riga.	Quantify local potential, storage, grid flexibility and electricity for mobility.
Waste and circular economy	Uneven; strong examples exist but many plans need deeper wastewater and emissions detail.	Budapest, Istanbul, Nantes Métropole, Warsaw	Disaggregate data and quantify waste prevention, reuse and circularity impacts.
AFOLU and NBS	Emerging; strongest where land use is linked	Lund, Nantes Métropole, Riga, Warsaw	Separate emissions, sinks and residual compensation; define targets and indicators.

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	to adaptation and biodiversity.		
Industry and IPPU	Generally least developed, except where industrial actors or ETS installations are explicitly considered.	Tauragė	Clarify relevance, quantify emissions and engage industrial stakeholders.

2.2.5.3 Common challenges and recommendations

The shared challenges in this section are not evidence that the theme is less important; rather, they indicate where future CCC iterations can deepen the level of detail and improve the plan's usefulness for implementation, monitoring and peer learning.

Common challenge	Pattern across Window 4 cities	Recommendation for future CCC iterations
Action-level quantification incomplete	26 cities received recommendations related to action portfolio maturity, reach or balance.	Quantify impact, cost, responsibility, timeline and dependency for each key action.
High dependence on a small number of high-impact actions	Present where district heating, grid decarbonisation, CCS or single infrastructure investments carry large shares of reductions.	Develop risk mitigation plans and alternative pathways for critical high-impact measures.
Pathways and actions not always aligned	Some emissions gap tables, impact pathways and individual action descriptions do not fully match.	Reconcile emissions gap tables with action-level accounting and investment plans.
Sectoral gaps remain	Transport, waste, IPPU, AFOLU or cooling are sometimes underdeveloped.	Use future CCC iterations to fill sector-specific gaps and improve action balance.

Overall, this section suggests that Window 4 cities are moving towards more comprehensive CCCs, but the next iteration should focus on implementation readiness. The most useful improvements would be to strengthen the connection between the stated ambition, the action portfolio, stakeholder responsibilities, investment planning, and the monitoring framework.

The Window 4 cohort shows clear progress in the use of impact pathways as an organising device for climate-neutrality planning. Many city CCCs note that pathways are increasingly comprehensive and able to connect emissions reduction, governance, finance, behaviour change, stakeholder mobilisation and co-benefits. This suggests that the CCC framework is helping cities move beyond single-sector action lists toward a more systemic interpretation of urban transformation.

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However, the action portfolio remains the point where strategic credibility is most often tested. Across many cities, impact pathways indicate that the emissions gap can be closed at aggregate level, but individual actions are not yet sufficiently quantified in terms of GHG reductions, energy savings, renewable generation, cost, timeline, responsible actor or implementation dependencies. This creates a recurring gap between the strategic logic of the CCC and the operational evidence needed to show that actions can deliver the required reduction by 2030.

Good practice is visible where cities translate strategic pathways into specific, sequenced and accountable actions. Dijon Métropole is highlighted for detailed impact pathway fact sheets that connect timelines, budgets, expected impacts and change levers. Riga is noted for maturity and the articulation of pathways, while Tauragė is also identified as offering a mature contribution. Paris and Rzeszów provide useful action portfolio examples, and Leipzig offers a particularly rich set of strategies across food, transport, renewable energy, heating, green infrastructure, social housing and private sector engagement. These cities provide useful signposts for moving from a general strategy to a more operational portfolio.

The shared recommendation is that future CCC iterations should strengthen the action-level evidence base without losing the systemic framing. Cities do not need to reduce the CCC to a narrow engineering plan, but they do need to show how governance innovation, social innovation, infrastructure development and financing will combine to deliver measurable emissions reductions. This requires action-level quantification where possible, transparent assumptions where quantification is not yet possible, and a clear plan for refining actions during implementation.

Window 4 action portfolios generally show broad sectoral coverage and increasingly sophisticated impact pathways, but many remain less mature at the level of individual measures. The typical pattern is that cities can describe the strategic fields of action and the system-level transformation they seek, while the individual actions still need stronger quantification, responsibility assignment, cost estimation and milestone definition.

There are several positive examples. Łódź, Paris and Rzeszów are identified for action portfolio strengths. Athens is commended for a clear narrative that connects strategic priorities, sectoral goals, capacity building and monitoring, even though the review also recommends greater action-level quantification. Helsinki, Kraków, Sofia, Bristol, Copenhagen and Budapest provide further examples of cities where the review material points to stronger strategic or sectoral portfolio development. These cases demonstrate that the portfolio logic is improving across the Mission, particularly where actions are linked to existing plans and governance structures.

Recommendations related to maturity and action portfolio reach appear for 32 cities. The recurring challenge is that action descriptions do not always allow reviewers or cities to determine whether the portfolio can close the emissions gap. Many actions lack expected emissions reductions, energy savings, renewable energy production, sequestration effects, costs, timelines, responsible actors or implementation dependencies. This is especially important where the plan relies on a small number of high-impact measures, such as CCS, district heating decarbonisation, metro expansion, grid transformation or large-scale renewable energy deployment.

The main recommendation is to create an action traceability table for each city. Such a table should show, for every action, the relevant sector, emissions source, responsible actor, implementation period, investment need, expected emissions reduction, co-benefits, barrier mitigation measures and monitoring indicators. This would make the action portfolio a practical management tool rather than only a descriptive list of measures.

Traceability field	Why it matters for CCC iteration	Typical Window 4 refinement needed

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Emissions reduction or sequestration potential	Shows whether actions can plausibly close the emissions gap.	Quantify individual actions, not only impact pathways or sector-level totals.
Responsible and involved actors	Clarifies who must deliver each action.	Link municipal departments, utilities, signatories and external partners to specific measures.
Timeline and milestones	Supports implementation tracking and adaptive management.	Add short- and medium-term milestones for 2025, 2027 or 2028 where relevant.
Costs and finance source	Connects CAP and CIP.	Align action costs with investment-plan estimates, budget lines and funding instruments.
Indicators and review process	Connects action delivery to monitoring and learning.	Define KPIs, data sources, frequency and responsibility for corrective action.

- Quantify the mitigation potential of individual actions wherever feasible, and identify where future technical assessment is required.
- Include implementation timelines, milestones, responsible actors, involved stakeholders and dependencies for major actions.
- Connect each action to the relevant emissions source and impact pathway so that the overall emissions gap can be traced from target to delivery.
- Identify critical high-impact actions, such as CCS, district heating conversion, metro expansion or large-scale retrofitting, and include risk mitigation plans for delays or under-delivery.

The sectoral evidence shows that Window 4 CCCs are strongest where cities combine technical decarbonisation with enabling governance arrangements. In buildings, this means linking renovation targets to advice, financing and skills; in transport, it means pairing modal shift targets with jurisdictional coordination; in renewable energy, it means combining installation targets with grid, storage and social acceptance measures; and in waste, AFOLU and IPPU it means filling sectors that are often treated as marginal but may become important in future iterations.

A general pattern is that energy and buildings are more mature than waste, IPPU and AFOLU. This mirrors earlier windows, but Window 4 contains more examples of cities beginning to use these less developed sectors as spaces for systemic innovation, including circular construction, blue carbon research, land-use planning, urban greening, multifunctional renewable energy sites and industrial partnerships.

The strongest portfolios avoid treating sectors as isolated silos. They link renewable energy to mobility electrification, buildings to energy poverty and health, waste to circular economy and district heating, land use to biodiversity and social acceptance, and monitoring to investment planning. This integrated logic is one of the most important markers of CCC maturity.

2.2.6 Governance

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Overview: governance and institutional integration

- Governance is one of the strongest dimensions of Window 4, with many CCCs using the Mission framework to clarify institutional roles, create climate units, strengthen horizontal coordination and expand multi-level engagement.
- The strongest governance examples combine political commitment, administrative capacity, stakeholder platforms, learning routines and explicit recognition of jurisdictional dependencies.
- Common recommendations concern formalising new bodies, clarifying mandates, resourcing transition teams, strengthening vertical governance and embedding climate neutrality into core municipal routines.

2.2.6.1 General cohort information and comparison

Governance is one of the strongest and most interesting dimensions of the Window 4 cohort. Many cities have moved beyond climate action as a technical planning exercise and use the CCC to reorganise internal coordination, define multi-level interfaces, and establish new stakeholder-facing structures.

The cohort shows a wider range of governance models than earlier windows, including climate units, mission offices, climate secretariats, investment councils, interdepartmental groups, metropolitan alliances, and stakeholder coalitions. This demonstrates the CCC's role as an enabling governance mechanism rather than a stand-alone plan.

However, a recurring challenge is that governance innovations are often described at a strategic level but require further operationalisation. Cities need clearer information on mandates, reporting lines, decision-making authority, staffing, meeting frequency, escalation procedures and how these arrangements will be sustained beyond the first CCC iteration.

Window 4 includes many strong governance examples that can inform peer learning on mission governance and implementation capacity.

Governance is one of the strongest areas of Window 4 compared with earlier windows, particularly where cities use the CCC to formalise cross-departmental coordination, stakeholder coalitions and mission-oriented implementation structures. Many plans recognise that climate neutrality cannot be delivered through a single department and therefore introduce climate offices, interdepartmental teams, steering groups, climate forums or dedicated investment councils.

Several cities provide strong governance signposts. Athens demonstrates a proactive approach through the Office of Urban Resilience and Sustainability, the planned Directorate for Climate Policy and Civil Protection, the Athens Climate Forum and the Climate Neutrality Investment Council. Aarhus is notable for its self-reflective diagnosis of the magistrate structure and its use of cross-magistrate working groups, the Climate Secretariat and the Centre for Innovation Aarhus. Copenhagen, Dublin, Glasgow, Greater Dunkirk, Helsinki, Vilnius, Budapest, Dijon Métropole and Nantes Métropole are also useful examples of governance or multi-level integration strengths.

The next step for Window 4 cities is to move from governance architecture to governance operating model. This means specifying who convenes each body, how often it meets, what decisions it can make, how it escalates barriers, how it coordinates with finance and monitoring functions, and how implementation responsibility is distributed across municipal departments, municipal companies, regional authorities and external partners.

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Governance maturity element	Emerging Window 4 practice	Further refinement needed
Central climate coordination unit	Climate offices, resilience departments, climate secretariats and mission teams are increasingly common.	Clarify mandates, staffing, decision rights, escalation routes and links to political leadership.
Horizontal municipal integration	Several cities use cross-departmental teams or thematic working groups to connect energy, mobility, buildings and land use.	Translate coordination into formal implementation routines, shared KPIs and resource allocation mechanisms.
Vertical and multi-level coordination	Cities often recognise dependence on national grids, public transport systems, regulations and funding streams.	Create structured cooperation pathways with regional and national authorities, including named processes for resolving regulatory barriers.
External ecosystem governance	Climate forums, alliances, living labs and stakeholder coalitions are widespread strengths.	Specify how external partners move from consultation and commitment to accountable co-delivery of actions.

2.2.6.2 Strengths and peer-learning examples

City	Strength area	Peer-learning relevance
Helsinki	Holism	The feedback identifies Helsinki as a useful peer-learning reference for holism. The example should be consulted because it illustrates practical approaches that other Mission cities can adapt when refining their own Climate City Contracts, implementation arrangements and future CCC iterations.
Padova	Participatory governance	Padova demonstrates a strong governance framework for climate transition, emphasizing clarity in roles and responsibilities. The use of Climate Agreements to define specific implementation commitments showcases an advanced participatory approach. Additionally, the activation of a Living Lab fosters collaboration and inclusiveness within a well-structured cooperative environment, enhancing stakeholder engagement and collective action towards climate neutrality.
Dublin	Governance	Dublin's approach to integrating all organizational silos both within the city council and with other important stakeholders is an asset. The integration of other associated plans and strategies helps create synergies and a platform for successful implementation. Further, the plan features an impressive stakeholder mapping, includes all relevant stakeholders for plan implementation.
Istanbul	Holism	The feedback identifies Istanbul as a useful peer-learning reference for holism. The example should be consulted because it illustrates

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		practical approaches that other Mission cities can adapt when refining their own Climate City Contracts, implementation arrangements and future CCC iterations.
Budapest	Governance	The feedback identifies Budapest as a useful peer-learning reference for governance. The example should be consulted because it illustrates practical approaches that other Mission cities can adapt when refining their own Climate City Contracts, implementation arrangements and future CCC iterations.
Cork	Participatory governance	The feedback identifies Cork as a useful peer-learning reference for participatory governance. The example should be consulted because it illustrates practical approaches that other Mission cities can adapt when refining their own Climate City Contracts, implementation arrangements and future CCC iterations.
Helsingborg	Governance	The plan develops an articulated array of governance interventions, each designed to mobilize a specific group of stakeholders to achieve the climate -neutrality objective, ensuring that all stakeholders can contribute meaningfully to Helsingborg's climate goals. Interventions range from Agreements to Political declarations, to Funds, to participatory spaces and campaigns, including both local stakeholders and other levels of government.

Helsinki provides a useful reference point for holism within the Window 4 cohort. The feedback highlights that this practice is relevant for other Mission cities because it demonstrates how the CCC can be used to translate a strategic commitment into a more concrete governance, sectoral or implementation approach: Helsinki is notable for its holistic approach to climate -related issues, integrating a comprehensive set of environmental protection targets for 2040 that address climate change mitigation and adaptation, air and water protection, biodiversity, noise and soil management, circular economy, responsible procurement, and environmental awareness, all aligned with its sustainable development objectives.

Padova provides a useful reference point for participatory governance within the Window 4 cohort. The feedback highlights that this practice is relevant for other Mission cities because it demonstrates how the CCC can be used to translate a strategic commitment into a more concrete governance, sectoral or implementation approach: Padova demonstrates a strong governance framework for climate transition, emphasizing clarity in roles and responsibilities. The use of Climate Agreements to define specific implementation commitments showcases an advanced participatory approach. Additionally, the activation of a Living Lab fosters collaboration and inclusiveness within a well-structured cooperative environment, enhancing stakeholder engagement.

Dublin provides a useful reference point for governance within the Window 4 cohort. The feedback highlights that this practice is relevant for other Mission cities because it demonstrates how the CCC can be used to translate a strategic commitment into a more concrete governance, sectoral or implementation approach: Dublin's approach to integrating all organizational silos both within the city council and with other important stakeholders is an asset. The integration of other associated plans and strategies helps create synergies and a platform for successful implementation. Further, the plan features an impressive stakeholder mapping, includes all relevant stakeholders for implementation.

Istanbul provides a useful reference point for holism within the Window 4 cohort. The feedback highlights that this practice is relevant for other Mission cities because it demonstrates how the CCC can be used to translate a strategic commitment into a more concrete governance, sectoral or implementation approach: The city is notable for its innovative approach in creating synergy between climate change

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adaptation and mitigation efforts. Istanbul demonstrates a comprehensive strategy that addresses both resilience and emissions reduction by investing in infrastructure to mitigate emissions as well as the impacts of floods, h eat waves, and other extreme weather events. The development of the Drinking Water and Wastewater Maste.

Budapest provides a useful reference point for governance within the Window 4 cohort. The feedback highlights that this practice is relevant for other Mission cities because it demonstrates how the CCC can be used to translate a strategic commitment into a more concrete governance, sectoral or implementation approach: The city is notable for the multiple efforts to create a robust governance framework around climate neutrality, including the Department of Landscape Architecture and the Department for Climate and Environmental Affairs, which play key roles in organising environmental initiatives. The collaborative "Mission Group" structure effectively involves various stakeholders, including the municipality, private and public se.

2.2.6.3 Common challenges and recommendations

The shared challenges in this section are not evidence that the theme is less important; rather, they indicate where future CCC iterations can deepen the level of detail and improve the plan's usefulness for implementation, monitoring and peer learning.

Common challenge	Pattern across Window 4 cities	Recommendation for future CCC iterations
Governance roles insufficiently operationalised	7 cities received explicit governance recommendations, but the underlying issue is visible more widely.	Define roles, reporting lines, decision rights, coordination routines and escalation mechanisms.
Multi-level dependencies not matched by formal mechanisms	Common in transport, energy regulation, housing renovation and grid development.	Create formal cooperation pathways with regional, national and utility actors.
Capacity and skills gaps	Frequently noted where new governance bodies are proposed without clear staffing or capacity-building plans.	Link governance reform to HR planning, staff training and long-term administrative mandates.
Horizontal coordination remains uneven	Many cities identify siloed administration as a barrier.	Institutionalise cross-departmental working groups and shared climate KPIs.

Overall, this section suggests that Window 4 cities are moving towards more comprehensive CCCs, but the next iteration should focus on implementation readiness. The most useful improvements would be to strengthen the connection between the stated ambition, the action portfolio, stakeholder responsibilities, investment planning, and the monitoring framework.

Window 4 cities increasingly present climate neutrality as a whole-of-government and whole-of-society governance challenge. Several CCC materials highlight new or strengthened internal coordination units, climate offices, investment councils, mission teams, interdepartmental groups and participatory forums.

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This is an important evolution because it shows the CCC being used not only to document actions, but also to reshape how municipalities organise responsibility for climate-neutrality delivery.

The governance arrangements vary significantly across the cohort. Some cities build on long-standing climate offices or resilience departments, while others are creating new directorates, steering committees or cross-administration teams. Larger capitals and metropolitan authorities often face complex jurisdictional barriers around transport, energy systems, planning and public investment. Smaller cities often show strong local ownership but may have more limited staff capacity, technical capacity or finance capacity. Across these different contexts, the most credible plans are those that explicitly diagnose institutional barriers and then describe how the proposed governance model will address them.

Athens provides a useful example of governance reform because the CCC links the Office of Urban Resilience and Sustainability, the proposed Directorate for Climate Policy and Civil Protection, the Climate Neutrality Investment Council and the Athens Climate Forum. Helsinki, Dublin, Vilnius and Budapest are also highlighted for governance arrangements that combine internal coordination with broader stakeholder engagement. Copenhagen and Greater Dunkirk provide examples of how climate action can be embedded in a wider strategic and governance narrative. Dijon Métropole is important because of its detailed governance design, while Lund and Glasgow illustrate the value of dedicated governance structures and collaborative approaches.

The key shared challenge is that governance structures are often described more clearly as intentions than as operating systems. In several cities, the CCC materials recommend more detail on decision-making lines, meeting frequency, reporting duties, staffing, capacity building, interdepartmental responsibilities and coordination with regional and national authorities. This is especially important where high-impact actions depend on actors beyond municipal control. Future iterations should therefore move toward governance roadmaps that show how the CCC will be managed, resourced, monitored and adapted during implementation.

Governance is one of the strongest areas of Window 4 compared with earlier windows, particularly where cities use the CCC to formalise cross-departmental coordination, stakeholder coalitions and mission-oriented implementation structures. Many plans recognise that climate neutrality cannot be delivered through a single department and therefore introduce climate offices, interdepartmental teams, steering groups, climate forums or dedicated investment councils.

Several cities provide strong governance signposts. Athens demonstrates a proactive approach through the Office of Urban Resilience and Sustainability, the planned Directorate for Climate Policy and Civil Protection, the Athens Climate Forum and the Climate Neutrality Investment Council. Aarhus is notable for its self-reflective diagnosis of the magistrate structure and its use of cross-magistrate working groups, the Climate Secretariat and the Centre for Innovation Aarhus. Copenhagen, Dublin, Glasgow, Greater Dunkirk, Helsinki, Vilnius, Budapest, Dijon Métropole and Nantes Métropole are also useful examples of governance or multi-level integration strengths.

The shared governance challenge is that many new bodies are described at a strategic level but not yet fully institutionalised. Recommendations related to governance and integration appear for 15 cities. The most common issues concern unclear mandates, limited detail on reporting lines, insufficient timelines for establishing new directorates or offices, weak vertical coordination with national and regional authorities, and insufficient staffing or skills strategies. These findings suggest that governance innovation is present, but often still in an early operational phase.

The next step for Window 4 cities is to move from governance architecture to governance operating model. This means specifying who convenes each body, how often it meets, what decisions it can make, how it escalates barriers, how it coordinates with finance and monitoring functions, and how implementation responsibility is distributed across municipal departments, municipal companies, regional authorities and external partners.

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Governance maturity element	Emerging Window 4 practice	Further refinement needed
Central climate coordination unit	Climate offices, resilience departments, climate secretariats and mission teams are increasingly common.	Clarify mandates, staffing, decision rights, escalation routes and links to political leadership.
Horizontal municipal integration	Several cities use cross-departmental teams or thematic working groups to connect energy, mobility, buildings and land use.	Translate coordination into formal implementation routines, shared KPIs and resource allocation mechanisms.
Vertical and multi-level coordination	Cities often recognise dependence on national grids, public transport systems, regulations and funding streams.	Create structured cooperation pathways with regional and national authorities, including named processes for resolving regulatory barriers.
External ecosystem governance	Climate forums, alliances, living labs and stakeholder coalitions are widespread strengths.	Specify how external partners move from consultation and commitment to accountable co-delivery of actions.

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2.2.7 Barriers and Challenges

Overview: barriers, risks and enabling conditions

- Window 4 CCCs generally identify a wide range of barriers, including finance, regulation, institutional capacity, skills, technology readiness, public acceptance, data availability and multi-level dependencies.
- The most mature CCCs connect barriers to specific mitigation measures, responsible actors, enabling conditions and iterative monitoring.
- A recurring challenge is that barrier identification is often stronger than barrier removal planning, especially for issues outside direct municipal control.

2.2.7.1 General cohort information and comparison

The Window 4 CCCs demonstrate that cities are increasingly aware of the barriers that shape implementation. Across the cohort, barriers are not only technical but also institutional, regulatory, financial, behavioural and organisational. This reflects a growing recognition that climate neutrality depends on enabling environments, not only on the identification of sectoral measures.

2.2.7.2 Strengths and peer-learning examples

Several cities provide strong examples of barrier analysis. In particular:

- Aarhus identifies barriers linked to land availability, social acceptance, technological maturity, financing and institutional coordination.
- Athens embeds critical barriers in impact pathways, particularly around multi-level governance, financial cooperation and capacity building.

These examples show how barrier analysis can be used to clarify the conditions required for implementation.

2.2.7.3 Common challenges and recommendations

The shared recommendation is that future CCC iterations should move from barrier identification to barrier removal planning. This means specifying which actor is responsible for addressing a barrier, which governance level is involved, what mitigation measures are proposed, what timeline is expected, and how progress will be monitored. Where barriers sit outside municipal control, CCCs should define an advocacy, partnership or multi-level coordination strategy rather than simply noting the dependency.

2.2.8 Monitoring, Evaluation, and Iteration

Overview: monitoring, evaluation and iteration

- Monitoring and iteration are becoming more developed in Window 4, but the level of sectoral specificity remains uneven.
- The strongest CCCs connect indicators to pathways, action portfolios, investment plans, co-benefits and future CCC iteration cycles.
- Common recommendations concern clearer responsibilities, methods, indicator baselines, target values, socio-economic indicators and links between monitoring and corrective action.

2.2.8.1 General cohort information and comparison

Monitoring, evaluation and iteration are becoming more developed in Window 4, but they remain uneven across sectors and across types of impact. Many cities describe GHG monitoring systems and annual review cycles, while fewer provide strong indicators for co-benefits, social transformation, air quality, investment implementation or action-level progress.

The strongest systems connect indicators to impact pathways, action portfolios, investment planning and future CCC iterations. They also identify digital platforms, dashboards, observatories or data governance arrangements that can support transparent reporting and adaptive management.

The recurring challenge is that monitoring frameworks often remain too general. Cities need indicators that are specific enough to guide corrective action and broad enough to capture systemic change, including governance, learning, social justice, green jobs, energy poverty, health and adaptation co-benefits.

Window 4 includes several promising approaches to MEL and digital monitoring.

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Monitoring, evaluation and iteration are central to whether the CCC can function as a living governance instrument. Window 4 cities increasingly include monitoring systems, indicator sets, digital platforms, observatories, review cycles and future iteration plans. This is a strong sign that the CCC process is shifting from plan preparation toward implementation governance. However, the quality of monitoring frameworks varies considerably.

The more advanced monitoring approaches connect emissions tracking, action implementation, finance, co-benefits and governance responsibilities. This matters because climate neutrality by 2030 requires course correction: cities need to know not only whether emissions are declining, but also whether actions are being implemented, whether enabling conditions are changing, whether investments are materialising and whether social impacts are being managed. Monitoring therefore needs to support adaptive management rather than simply annual reporting.

Athens is commended for its use of the Kausal Platform and data-driven tools, including observatories and stakeholder data integration. Paris, Riga, Stavanger, Dublin, Warsaw, Istanbul and Lund are also identified as useful monitoring examples. Wrocław and Trondheim provide monitoring-system signposts, while Aachen offers a well-defined monitoring system that links climate neutrality progress and action implementation, although further clarity on responsibilities is recommended.

The recurring challenge is that many monitoring systems are not yet sufficiently complete across all CCC dimensions. Several plans need more sector-specific indicators, clearer calculation methods, responsibilities for data collection and sense-making, interim targets, social and economic indicators, investment monitoring and corrective-action procedures. Future iterations should therefore make monitoring more directly usable for management decisions, city council accountability, stakeholder commitments and Mission-level learning.

2.2.8.2 Strengths and peer-learning examples

Dublin provides a useful reference point for monitoring within the Window 4 cohort. The feedback highlights that this practice is relevant for other Mission cities because it demonstrates how the CCC can be used to translate a strategic commitment into a more concrete governance, sectoral or implementation approach: The extensive and diverse range of indicators being monitored by the city is noteworthy and can benefit the city both in terms of monitoring progress towards the overall objective (by tracking GHG emissions by sector) and in communicating the action plan's benefit to its citizens (by tracking other co-benefits). The 'Terrain AI' initiative and Urban Sense Real Time CO 2 Monitoring further supplements this.

Wrocław provides a useful reference point for monitoring system within the Window 4 cohort. The feedback highlights that this practice is relevant for other Mission cities because it demonstrates how the CCC can be used to translate a strategic commitment into a more concrete governance, sectoral or implementation approach: The city's approach to defining its indicators is noteworthy for its clarity and thoroughness, providing a transparent framework for each Key Performance Indicator (KPI). For every indicator, the city meticulously specifies the data source, unit of measurement, and sets both a baseline and target value, thereby facilitating precise monitoring and evaluation of progress towards achieving climate neutrality.

Warsaw provides a useful reference point for monitoring within the Window 4 cohort. The feedback highlights that this practice is relevant for other Mission cities because it demonstrates how the CCC can be used to translate a strategic commitment into a more concrete governance, sectoral or implementation approach: The evaluation and reporting process are clearly outlined. Additionally, the city is commended for the intention to improve the physical infrastructure to collect data, such as by introducing telemetric systems for heating and smart solutions for rainwater management, as well as its

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efforts to integrate data collection through the City Information Bank and spatial databases, fostering a unified approach to climate pr.

Trondheim provides a useful reference point for monitoring system within the Window 4 cohort. The feedback highlights that this practice is relevant for other Mission cities because it demonstrates how the CCC can be used to translate a strategic commitment into a more concrete governance, sectoral or implementation approach: A significant strength of the city's plan is its well-conceived and comprehensive set of monitoring indicators, which covers the overall impact of the plan, outputs and outcomes, and individual actions. The city has established a robust framework for tracking progress towards its climate and sustainability goals, including a wide range of indicators such as GHG emission reduction, co-benefits, transportation, waste m.

Istanbul provides a useful reference point for monitoring within the Window 4 cohort. The feedback highlights that this practice is relevant for other Mission cities because it demonstrates how the CCC can be used to translate a strategic commitment into a more concrete governance, sectoral or implementation approach: The city is commended for its commitment to transparency and accountability by regularly publishing Climate Monitoring Reports that assess progress towards climate neutrality and are publicly available. Istanbul has taken the initiative to designate Climate Responsibles within various Istanbul Metropolitan Municipality (IMM) units to drive climate goals and facilitate regular monitoring, demonstrating a proactive ap.

The strongest examples in this section are useful because they show how a specific CCC component can be made more actionable, credible or transferable. The named cities should be read as signposts for peer learning, not as the only cities performing well in this area.

City	Strength / practice area	Why this is useful for peer learning
Paris	Monitoring	Paris has set up a complete monitoring system which jointly with emission inventories and Carbon Budget, inform the monitoring and course correction of the carbon neutrality emission pathway.
Riga	Monitoring	The municipality has presented a well-conceived monitoring system with a comprehensive set of indicators, utilizing a clear and structured approach that covers all actions and sub-actions. The indicators are harmonized across planning documents and multidimensional, providing a solid foundation for tracking emissions.
Stavanger	Monitoring	The feedback identifies Stavanger as a useful peer-learning reference for monitoring. The example should be consulted because it illustrates practical approaches that other Mission cities can adapt when refining their own Climate City Contracts, implementation arrangements and future CCC iterations.
Athens	Monitoring	The city is notable for its clear and dynamic method envisioned for progress monitoring, utilising the Kausal Platform for visualisation and key indicator tracking, with EU project support for stakeholder data integration. It is also commended for investing in data- driven tools and establishing observatories.
Dublin	Monitoring	The extensive and diverse range of indicators being monitored by the city is noteworthy and can benefit the city both in terms of monitoring progress towards the overall objective (by tracking

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		GHG emissions by sector) and in communicating the action plan's benefit to its citizens (by tracking other co-benefits).
Wrocław	Monitoring system	The city's approach to defining its indicators is noteworthy for its clarity and thoroughness, providing a transparent framework for each Key Performance Indicator (KPI). For every indicator, the city meticulously specifies the data source, unit of measurement, and sets both a baseline and target value.
Warsaw	Monitoring	The evaluation and reporting process are clearly outlined. Additionally, the city is commended for the intention to improve the physical infrastructure to collect data, such as by introducing telemetric systems for heating and smart solutions for rainwater management, as well as its efforts to integrate data collection.
Trondheim	Monitoring system	A significant strength of the city's plan is its well-conceived and comprehensive set of monitoring indicators, which covers the overall impact of the plan, outputs and outcomes, and individual actions. The city has established a robust framework for tracking progress towards its climate and sustainability goals.

2.2.8.3 Common challenges and recommendations

The shared challenges in this section are not evidence that the theme is less important; rather, they indicate where future CCC iterations can deepen the level of detail and improve the plan's usefulness for implementation, monitoring and peer learning.

Common challenge	Pattern across Window 4 cities	Recommendation for future CCC iterations
Indicators too generic or incomplete	21 cities received monitoring recommendations.	Add sector-specific, action-level and co-benefit indicators with baselines and targets.
Social and economic impacts not monitored	Common across the cohort.	Include energy poverty, green jobs, distributional effects, health and affordability indicators.
Responsibility for data and corrective action unclear	Several plans define indicators but not accountability arrangements.	Assign data collection, sense-making and corrective action roles.
Investment monitoring weakly integrated	Often CAP and CIP monitoring are not fully aligned.	Connect financial indicators to emissions reductions and implementation milestones.

Overall, this section suggests that Window 4 cities are moving towards more comprehensive CCCs, but the next iteration should focus on implementation readiness. The most useful improvements would be to strengthen the connection between the stated ambition, the action portfolio, stakeholder responsibilities, investment planning, and the monitoring framework.

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Monitoring, evaluation and iteration are central to whether the CCC can function as a living governance instrument. Window 4 cities increasingly include monitoring systems, indicator sets, digital platforms, observatories, review cycles and future iteration plans. This is a strong sign that the CCC process is shifting from plan preparation toward implementation governance. However, the quality of monitoring frameworks varies considerably.

The more advanced monitoring approaches connect emissions tracking, action implementation, finance, co-benefits and governance responsibilities. This matters because climate neutrality by 2030 requires course correction: cities need to know not only whether emissions are declining, but also whether actions are being implemented, whether enabling conditions are changing, whether investments are materialising and whether social impacts are being managed. Monitoring therefore needs to support adaptive management rather than simply annual reporting.

Athens is commended for its use of the Kausal Platform and data-driven tools, including observatories and stakeholder data integration. Paris, Riga, Stavanger, Dublin, Warsaw, Istanbul and Lund are also identified as useful monitoring examples. Wrocław and Trondheim provide monitoring-system signposts, while Aachen offers a well-defined monitoring system that links climate neutrality progress and action implementation, although further clarity on responsibilities is recommended.

The recurring challenge is that many monitoring systems are not yet sufficiently complete across all CCC dimensions. Several plans need more sector-specific indicators, clearer calculation methods, responsibilities for data collection and sense-making, interim targets, social and economic indicators, investment monitoring and corrective-action procedures. Future iterations should therefore make monitoring more directly usable for management decisions, city council accountability, stakeholder commitments and Mission-level learning.

Monitoring and iteration are stronger in Window 4 than in earlier cohorts, but there is still a gap between overall monitoring frameworks and action-level learning systems. Many cities describe annual reporting, indicator dashboards, digital platforms or review cycles. However, fewer plans fully explain who collects the data, how indicators are calculated, how corrective action will be triggered, or how monitoring will inform the next CCC iteration.

Athens is a useful signpost through its use of the Kausal Platform, data visualisation and observatories. Paris, Riga, Stavanger, Dublin, Warsaw, Istanbul, Lund, Oslo, Wrocław, Trondheim and Gabrovo also provide monitoring-related examples. These cases show that cities are increasingly investing in data-driven oversight, but also that indicator frameworks need to cover co-benefits, socio-economic outcomes and investment implementation, not only emissions.

Recommendations related to monitoring and iteration appear for 29 cities. Common gaps include missing indicators for AFOLU, waste, air quality, social impacts or investment outcomes; insufficient methodological detail; lack of data frequency; limited responsibility assignment; weak links between action plan and investment plan indicators; and unclear corrective-action processes. Some cities also need to align their monitoring systems with existing frameworks such as the Green City Accord or national reporting systems.

Future CCC iterations should treat monitoring as a governance process rather than a reporting requirement. Each city should identify emissions indicators, process indicators, implementation milestones, investment indicators and co-benefit indicators. It should also specify responsibility for data gathering, aggregation, interpretation and corrective action. This would support the reflexive and adaptive governance ambitions of the CCC process.

- Define indicators for emissions, action implementation, finance, governance, stakeholder commitments, co-benefits and social impacts.
- Assign responsibilities for data collection, quality assurance, aggregation, sense-making and corrective action.

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- Include interim milestones and review cycles that support adaptive management before 2030.
- Align monitoring in the action plan and investment plan, including tracking of capital expenditure, operating costs, finance mobilisation and cost-effectiveness.

2.2.9 Horizontal Topics and Cross-Cutting Considerations

Overview: horizontal topics and co-benefits

- Horizontal topics are increasingly visible in Window 4, particularly social justice, energy poverty, air quality, digitalisation, climate adaptation, biodiversity, citizen engagement and co-benefits.
- The strongest CCCs embed these topics into action design, governance and monitoring rather than treating them as separate narratives.
- Common recommendations concern operationalising digital strategies, monitoring co-benefits, assessing social impacts, addressing air-quality risks, and linking adaptation and mitigation more concretely.

2.2.9.1 General cohort information and comparison

Horizontal topics are increasingly visible in Window 4, particularly social justice, citizen participation, digitalisation, air quality, climate adaptation, biodiversity and health co-benefits. This suggests that CCCs are becoming more integrated governance documents rather than purely technical decarbonisation plans.

The strongest examples embed social justice into the design of climate actions, rather than treating it as an accompanying principle. They also link climate mitigation to energy poverty alleviation, youth engagement, green jobs, public health, urban greening, air quality and resilience.

However, the degree of operationalisation remains uneven. Digital strategies are often mentioned without sufficient interoperability, cyber security, data governance or social acceptance detail. Air quality co-benefits are frequently recognised but not quantified. Social impacts are acknowledged but not always monitored through indicators or linked to mitigation measures.

Window 4 provides many useful examples of horizontal integration and co-benefit framing.

Social justice is one of the areas where Window 4 cities show a clear evolution in how climate neutrality is framed. Many plans go beyond general references to public acceptance and instead connect climate action to energy poverty, vulnerable households, social cohesion, neighbourhood improvement, health, jobs, affordability and inclusive participation. This suggests that the CCC is increasingly understood as a social contract as well as a technical decarbonisation pathway.

The strongest social-justice approaches are those that identify who may benefit, who may be burdened and how policy design can redistribute benefits. This includes revenue-sharing from renewable energy, targeted retrofit support, energy poverty offices, youth engagement, vulnerable group outreach, affordability safeguards, skills development and attention to social impacts from mobility or housing measures. However, social analysis is still uneven, and several plans do not yet assess negative distributional impacts in sufficient detail.

Athens is an important signpost because it frames the CCC as a Green Social Contract and establishes the Office of Energy Poverty Alleviation. Bordeaux Métropole, Greater Dunkirk, Glasgow, Nantes Métropole, Paris, Dublin and Warsaw are identified for social aspects, while Velenje

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and Athens are highlighted for climate justice. Dresden is noted for a focus on equity, and Leipzig provides a social housing strategy within a broader portfolio of transition actions.

The next stage is to integrate social justice into implementation rather than treating it as a parallel theme. Future CCC iterations should include indicators for social outcomes, assess the affordability and distributional impacts of major measures, and identify mitigation strategies where climate actions could impose costs on vulnerable groups. This is particularly important for building renovation, mobility pricing, energy costs, renewable infrastructure, land-use change and new climate-related requirements for private actors.

2.2.9.2 Strengths and peer-learning examples

Velenje provides a useful reference point for climate justice within the Window 4 cohort. The feedback highlights that this practice is relevant for other Mission cities because it demonstrates how the CCC can be used to translate a strategic commitment into a more concrete governance, sectoral or implementation approach: The plan is positively recognized for its focus on climate justice as key principle in the context of the upcoming closure of the coal mine. This plan is particularly notable because it addresses the impact of transition not only on specific groups but on the entire community. To mitigate the social impacts of this transition, the municipality has implemented a remarkable strategy centred on attracting and developing.

City	Strength area	Peer-learning relevance
Velenje	Climate justice	The feedback identifies Velenje as a useful peer-learning reference for climate justice. The example should be consulted because it illustrates practical approaches that other Mission cities can adapt when refining their own Climate City Contracts, implementation arrangements and future CCC iterations.
Dublin	Innovation	The research being undertaken into the potential impact of seagrass and the opportunities for blue carbon sequestration is innovative and could provide useful information-sharing opportunities.
Warsaw	Social aspects	The feedback identifies Warsaw as a useful peer-learning reference for social aspects. The example should be consulted because it illustrates practical approaches that other Mission cities can adapt when refining their own Climate City Contracts, implementation arrangements and future CCC iterations.
Istanbul	Innovation	The feedback identifies Istanbul as a useful peer-learning reference for innovation. The example should be consulted because it illustrates practical approaches that other Mission cities can adapt when refining their own Climate City Contracts, implementation arrangements and future CCC iterations.
Sofia	Smart city and digitalisation	Sofia's Municipality demonstrates a strong commitment to data-driven decision -making by highlighting the need for a more robust and centralised data management approach, strengthening local capacities in data collection and analysis, and developing digital tools and more integrated monitoring platforms. In the long -term, this approach will e nable the city to make informed decisions and improve its ability to track progress towards climate neutrality.

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Helsingborg	Innovation	With a strong focus on mission-oriented innovation, the city strives to strengthen its innovation capacity and its innovation partnerships in the context of the city's climate-neutrality work, and has taken important steps in this direction including with the creation of a new Department of Innovation and Transformation or the establishment of the Transition Arena, a collaborative platform encouraging dialogue, innovation, and co -creation among government, industry, academia, and civil society.
Kraków	Social Aspects	The plan provides a comprehensive overview of the potential social impacts of the energy transition, particularly addressing key issues such as transport exclusion, energy poverty, social housing, and the transition to green jobs. The plan also emphasizes education, skills development, and job creation as key co-benefits of the green transition. Krakow places value on the creation of local energy communities and energy awareness.

Dublin provides a useful reference point for innovation within the Window 4 cohort. The feedback highlights that this practice is relevant for other Mission cities because it demonstrates how the CCC can be used to translate a strategic commitment into a more concrete governance, sectoral or implementation approach: The research being undertaken into the potential impact of seagrass and the opportunities for blue carbon sequestration is innovative and could provide useful information-sharing opportunities.

Warsaw provides a useful reference point for social aspects within the Window 4 cohort. The feedback highlights that this practice is relevant for other Mission cities because it demonstrates how the CCC can be used to translate a strategic commitment into a more concrete governance, sectoral or implementation approach: The city is notable for its commitment to an equitable energy transition, particularly through participatory approaches that engage diverse stakeholders, exemplified by the Warsaw Climate Panel. The plan's attention to addressing energy poverty is a strength, involving thorough analysis, public policy design, and the development of financial support programmes. Initiatives like the Sun4All project and plans.

Istanbul provides a useful reference point for innovation within the Window 4 cohort. The feedback highlights that this practice is relevant for other Mission cities because it demonstrates how the CCC can be used to translate a strategic commitment into a more concrete governance, sectoral or implementation approach: Istanbul clearly demonstrates commitment to innovation in climate action. It has achieved significant milestones, such as manufacturing its own tram and introducing electric/hybrid-powered sea taxis. The Action Plan showcases innovation in developing business and finance models for combined seismic and energy renovations, in supporting pilot projects focused on sea transport, in promoting a New Generation Express Met.

Sofia provides a useful reference point for smart city and digitalisation within the Window 4 cohort. The feedback highlights that this practice is relevant for other Mission cities because it demonstrates how the CCC can be used to translate a strategic commitment into a more concrete governance, sectoral or implementation approach: Sofia's Municipality demonstrates a strong commitment to data- driven decision -making by highlighting the need for a more robust and centralised data management approach, strengthening local capacities in data collection and analysis, and developing digital tools and more integrated monitoring platforms. In the long-term, this approach will enable the city to make informed decisions and improve its ability to trac.

The strongest examples in this section are useful because they show how a specific CCC component can be made more actionable, credible or transferable. The named cities should be read as signposts for peer learning, not as the only cities performing well in this area.

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City	Strength / practice area	Why this is useful for peer learning
Athens	Climate justice	The city is notable for its commitment to social justice and inclusiveness within its Climate City Contract (CCC), which is also envisioned as a Green Social Contract aiming to foster social cohesion, neighbourhood improvement, and equitable economic revitalisation.
Bordeaux Métropole	Social aspects	The plan is well-designed and socially engaging, demonstrating a strong commitment to inclusive climate action. Besides placing a strong emphasis on citizens engagement as described above, Bordeaux also promotes education, for example for the 2021-2022 school year more than 4,000 students participated in environmental.
Copenhagen	Innovation	The city is notable for the inclusion of innovative solutions in the proposed action portfolio, such as the introduction of carbon capture and storage activities, low temperature district heating, intelligent energy management systems, electrification of non-road machinery, and the development of a green energy system.
Dresden	Focus on equity	A notable strength of the plan is its strong emphasis on intergenerational equity, demonstrated through the active involvement of young people in city councils and the close collaboration between schools and environmental education programmes.
Dublin	Innovation	The research being undertaken into the potential impact of seagrass and the opportunities for blue carbon sequestration is innovative and could provide useful information-sharing opportunities.
Glasgow	Social aspects	The Action Plan emphasizes social inclusion and community empowerment in Glasgow's transition to net-zero carbon, demonstrating a strong commitment to community involvement. It effectively promotes energy communities and community-based Renewable Energy Sources (RES) projects through the city's Community Renewables Ene.
Greater Dunkirk	Social aspects	Particular attention is given to the transition of the job market toward green jobs, educating and training citizens (including young people and municipal employees) and creating job opportunities. For instance, the C-DeCIDé project is implementing comprehensive training programmes for 12,500 students and continuing ed.
Istanbul	Innovation	Istanbul clearly demonstrates commitment to innovation in climate action. It has achieved significant milestones, such as manufacturing its own tram and introducing electric/hybrid-powered sea taxis. The Action Plan showcases innovation in developing business and finance models for combined seismic and energy renovation.

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Leipzig	Social housing – strategy	Leipzig integrates social justice into its climate strategy by promoting energy-efficient refurbishment and renewable energy deployment in municipal and cooperative housing. The municipal housing company LWB is implementing a large-scale investment plan to retrofit its housing stock while maintaining social rent levels.
Leipzig	Digitalisation and collaboration	Leipzig demonstrates a strong commitment to digitalisation and cross-sector collaboration through real-time data collection systems, sensor concepts, and the development of a comprehensive Urban Data Platform. The city is also building a digital twin to support climate-sensitive urban planning and energy transition, li.
Nantes Métropole	Social aspects	The plan is well-designed in terms of its potential social impacts and demonstrates strong social innovation, particularly in its ability to foster social connections. Strong emphasis is given in education, especially of children, for example through the educational package to schools and the school-eco-mobility action.
Nantes Métropole	Air quality	Air quality aspects are well covered throughout the document, especially the status quo in relation to air quality, whilst there are also links to air quality benefits in the pathways and action portfolio.
Paris	Social aspects	The Climate Action Plan presents a comprehensive framework for socially inclusive and sustainable urban transformation. District heating and energy communities play a crucial role in ensuring affordable energy access for all, while significant emphasis has been put on energy sobriety, circular economy and active mobility.
Paris	Air Quality	The CCC includes specific air quality objectives and targets together with energy and climate mitigation and adaptation.
Riga	Digitalisation	The municipality has a proven track record of successfully implementing digital solutions, as evident from the effective energy management system already in use, demonstrating its capability and commitment to leveraging technology for improvement. It is actively working towards extending digitalisation, with various pl.
Velenje	Smart city and digitalisation	Attention to smart city aspects, including the development of a comprehensive digital platform of the city integrating key climate neutrality related systems.

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2.2.9.3 Common challenges and recommendations

The shared challenges in this section are not evidence that the theme is less important; rather, they indicate where future CCC iterations can deepen the level of detail and improve the plan's usefulness for implementation, monitoring and peer learning.

Common challenge	Pattern across Window 4 cities	Recommendation for future CCC iterations
Digitalisation lacks implementation detail	23 cities received recommendations related to horizontal topics, including digitalisation, social aspects and air quality.	Define digital infrastructure, interoperability, data governance, cyber security and social acceptance measures.
Air quality co-benefits not quantified	Common even where transport and heating actions should improve air quality.	Assess air quality impacts and define monitoring indicators linked to new standards.
Social justice not fully operationalised	Often framed as principle but not translated into indicators or mitigation measures.	Assess distributional impacts, vulnerable groups and compensation mechanisms.
Co-benefits not connected to decision-making	Co-benefits are often listed without prioritisation logic.	Use co-benefits to inform action prioritisation, investment cases and stakeholder engagement.

Overall, this section suggests that Window 4 cities are moving towards more comprehensive CCCs, but the next iteration should focus on implementation readiness. The most useful improvements would be to strengthen the connection between the stated ambition, the action portfolio, stakeholder responsibilities, investment planning, and the monitoring framework.

Social justice is one of the areas where Window 4 cities show a clear evolution in how climate neutrality is framed. Many plans go beyond general references to public acceptance and instead connect climate action to energy poverty, vulnerable households, social cohesion, neighbourhood improvement, health, jobs, affordability and inclusive participation. This suggests that the CCC is increasingly understood as a social contract as well as a technical decarbonisation pathway.

The strongest social-justice approaches are those that identify who may benefit, who may be burdened and how policy design can redistribute benefits. This includes revenue-sharing from renewable energy, targeted retrofit support, energy poverty offices, youth engagement, vulnerable group outreach, affordability safeguards, skills development and attention to social impacts from mobility or housing measures. However, social analysis is still uneven, and several plans do not yet assess negative distributional impacts in sufficient detail.

Athens is an important signpost because it frames the CCC as a Green Social Contract and establishes the Office of Energy Poverty Alleviation. Bordeaux Métropole, Greater Dunkirk, Glasgow, Nantes Métropole, Paris, Dublin and Warsaw are identified for social aspects, while Velenje and Athens are highlighted for climate justice. Dresden is noted for a focus on equity, and Leipzig provides a social housing strategy within a broader portfolio of transition actions.

The next stage is to integrate social justice into implementation rather than treating it as a parallel theme. Future CCC iterations should include indicators for social outcomes, assess the affordability and distributional impacts of major measures, and identify mitigation strategies where climate actions could impose costs on vulnerable groups. This is particularly important for building renovation, mobility pricing, energy costs, renewable infrastructure, land-use change and new climate-related requirements for private actors.

Horizontal topics in Window 4 reveal both growing ambition and uneven integration. Digitalisation, smart city tools, air quality, health, innovation, social co-benefits and adaptation are

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frequently mentioned, but they are not always fully embedded in action design, monitoring or governance. The most developed plans use these themes to strengthen implementation capacity, data governance and co-benefit tracking rather than presenting them as add-ons.

Digitalisation is particularly important because many cities intend to use digital tools for emissions monitoring, building data, traffic management, citizen engagement, solar mapping, digital twins or investment tracking. However, the CCC materials often recommend more detail on interoperability, data infrastructure, cybersecurity, social acceptance, digital upskilling and implementation timelines. Without this detail, digital tools risk remaining project-level innovations rather than system-wide governance capabilities.

Dublin, Sofia and Velenje are notable for smart city and digitalisation-related strengths, while Athens uses data-driven platforms and observatories to support climate monitoring. Athens uses data-driven platforms and observatories, while Dublin, Velenje, Sofia, Riga and Lund provide further digitalisation signposts. Copenhagen and Helsingborg are identified for innovation, and Leipzig is highlighted for digitalisation and collaboration. Air quality is a recurrent recommendation across a significant part of the cohort, with Athens and Aarhus showing how mobility, biomass, building measures and monitoring can be connected to air-quality co-benefits and risks.

The shared challenge is to move from mentioning horizontal topics to integrating them in the CCC operating model. Cities should clarify which digital tools are needed for which implementation functions, how data will be governed, how air quality and health co-benefits will be monitored, and how smart city interventions will contribute to emissions reduction, participation or service delivery. Future iterations should also ensure that digitalisation does not create new forms of exclusion or data vulnerability.

Social justice is one of the clearest areas of development in Window 4, with many cities framing climate neutrality as a social transition rather than only a technical emissions-reduction exercise. The strongest plans link climate action to energy poverty, access to mobility, housing affordability, public health, neighbourhood improvement, youth engagement and inclusive participation.

Athens is one of the strongest examples because its CCC is framed as a Green Social Contract and includes an Office of Energy Poverty Alleviation, revenue redistribution mechanisms and youth participation structures. Bordeaux Métropole, Greater Dunkirk, Glasgow, Nantes Métropole, Paris, Dublin, Warsaw, Dresden, Budapest, Cork, Istanbul and Gabrovo also provide social aspects or equity-related signposts. Dresden is particularly relevant for the connection between heat planning, housing affordability and energy poverty through the Share of Wallet tool.

Recommendations related to social justice and co-benefits appear for 21 cities. Common gaps include limited assessment of distributional impacts, insufficient monitoring of social outcomes, weak analysis of vulnerable groups beyond consultation, limited strategies for compensating negative impacts, and lack of indicators for energy poverty alleviation, green jobs, affordability or access. Some plans contain strong social principles but need to translate them into measurable safeguards and benefits.

Future iterations should include a social impact and co-benefit framework. This should identify affected groups, potential risks, expected benefits, mitigation measures, redistributive mechanisms, indicators and responsible actors. Where climate actions may increase costs for households, tenants or small businesses, the plan should explain how fairness will be protected. Where actions generate benefits, such as improved air quality or reduced energy bills, these should be monitored and communicated.

Digitalisation and air quality are cross-cutting themes that are often recognised in Window 4 but not yet consistently integrated into implementation systems. Many cities mention digital tools, platforms, sensors, maps or data systems, while fewer provide a coherent digital transformation strategy. Similarly, air quality co-benefits are often expected from transport and energy actions, but monitoring and governance arrangements are not always specified.

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Dublin, Sofia, Velenje, Copenhagen, Leipzig, Lund, Nantes Métropole, Padova, Paris, Reykjavík, Gabrovo and Dresden provide relevant digitalisation or air quality signposts within the Window 4 material. Athens is especially important for air quality because the review recommends a more thorough analysis of air quality synergies, co-benefits and risks, while also acknowledging expected benefits from mobility and residential measures. Aarhus is relevant because its review highlights the need to integrate air quality into governance and monitoring while also identifying potential benefits from district heating decarbonisation and mobility changes.

Recommendations related to digitalisation and air quality appear for 26 cities. Digitalisation gaps include insufficient detail on implementation, infrastructure requirements, interoperability, cybersecurity, social acceptance and digital skills. Air quality gaps include limited baseline analysis, weak indicator sets, insufficient consideration of biomass risks and underdeveloped links to governance systems. These findings suggest that cities should move from isolated tools to integrated data governance and co-benefit monitoring.

Future CCC iterations should define the role of digital systems in climate governance. This includes identifying which platforms support emissions monitoring, building renovation, mobility management, renewable energy planning, citizen engagement or investment tracking. Cities should also include air quality indicators where climate actions affect combustion, traffic, biomass or urban greening, and should use these indicators to track health co-benefits and avoid unintended harms.

- Assess social and distributional impacts of major actions, including potential negative effects as well as benefits.
- Integrate energy poverty, affordability, vulnerable groups, skills and green jobs into the monitoring framework.
- Link social justice to concrete measures, finance mechanisms and governance responsibilities.
- Use co-benefits as an implementation and legitimacy tool, but define how they will be measured and acted upon.

Digitalisation is particularly important because many cities intend to use digital tools for emissions monitoring, building data, traffic management, citizen engagement, solar mapping, digital twins or investment tracking. However, the CCCs often recommend more detail on interoperability, data infrastructure, cybersecurity, social acceptance, digital upskilling and implementation timelines. Without this detail, digital tools risk remaining project-level innovations rather than system-wide governance capabilities.

- Develop a digitalisation and data-governance narrative that connects tools, infrastructure, interoperability, cybersecurity and responsibilities.
- Integrate air quality and health co-benefits into action design, especially in transport, heating, biomass, nature-based solutions and district energy measures.
- Use digital tools to support monitoring, citizen engagement and implementation management, not only communication.
- Assess social acceptance, accessibility and digital skills needs associated with smart city interventions.

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2.2.10 Stakeholder Commitments and Citizen Engagement

Overview: stakeholder mobilisation and citizen engagement

• Stakeholder mobilisation is a prominent feature of Window 4, with many CCCs using the contract process to widen participation and structure commitments from public bodies, companies, universities, civil society and citizens.

• The strongest approaches combine stakeholder mapping, participatory forums, youth engagement, climate assemblies, partner tiers and specific commitments linked to implementation.

• Common recommendations concern connecting engagement to decision-making, clarifying signatory actions, expanding diversity of stakeholders and maintaining participation during implementation and CCC iteration.

2.2.10.1 General cohort information and comparison

Stakeholder mobilisation and citizen engagement are prominent features of the Window 4 cohort. Many cities use the CCC to bring together businesses, utilities, universities, NGOs, citizens and other public institutions, and several plans include structured commitment models or stakeholder forums.

The cohort shows a clear movement from consultation towards more organised co-production and implementation partnerships. This is visible in stakeholder coalitions, climate forums, youth assemblies, one-stop-shops, climate agreements, and structured signatory models that distinguish levels of commitment.

At the same time, many plans still need to clarify how stakeholder and citizen inputs shape decision-making, action prioritisation, investment choices and future iterations. The challenge is therefore not only to engage stakeholders, but to embed engagement in governance and implementation processes.

The strongest Window 4 examples provide practical models for mobilising different parts of the urban ecosystem.

The Window 4 cohort shows that stakeholder mobilisation has become one of the strongest and most visible dimensions of CCC practice. Many city CCCs describe broad engagement processes involving public bodies, universities, utilities, private companies, NGOs, neighbourhood actors, youth initiatives, citizens forums and civil society organisations. This confirms that the CCC is being used as a mobilisation instrument, not only as a municipal planning document.

The depth of stakeholder engagement differs across cities. Some plans provide a detailed stakeholder map, identify actor roles and link stakeholders to specific sectors or actions. Others show strong consultation activity but provide less clarity on how stakeholder input shaped the action portfolio or how signatories will be accountable during implementation. This distinction is important: engagement during CCC preparation is valuable, but implementation requires a move from consultation to distributed responsibility, co-delivery and regular renewal of commitments.

Athens is a particularly strong signpost because its Climate Forum, specialised workshops and stakeholder mapping connect public bodies, universities, private companies, NGOs and civil society organisations to the CCC process. Bordeaux Métropole is highlighted for stakeholder engagement and citizen empowerment, including the role of ZIRI and citizen consultation structures. Athens demonstrates a comprehensive stakeholder process through the Climate Forum, workshops and

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mapping across influence, interest and emissions sectors. Aarhus is strong on Climate Alliance Aarhus, Community Councils, Co-Citizenship and youth-oriented engagement. Glasgow, Łódź, Paris, Bristol, Dublin, Wrocław, Istanbul and Rzeszów also offer useful citizen engagement examples.

The next step for the cohort is to clarify the governance value of participation. Several CCCs recommend describing how citizen outputs influence decisions, how vulnerable groups are engaged in ways that shape policy, how signatory commitments are translated into quantified or concrete actions, and how additional stakeholders will be brought in over time. The strongest future CCCs will be those that treat participation as an ongoing mechanism for implementation, learning and legitimacy rather than as a discrete consultation exercise.

2.2.10.2 Strengths and peer-learning examples

Bristol provides a useful reference point for citizen engagement within the Window 4 cohort. The feedback highlights that this practice is relevant for other Mission cities because it demonstrates how the CCC can be used to translate a strategic commitment into a more concrete governance, sectoral or implementation approach: The city's specific focus on citizen engagement within its portfolio of planned activities is remarkable, as well as its clear intention to strengthen and broaden citizen engagement elements in the future. A further strength of the plan is in referring to citizen engagement as a key component within some broader actions as well, such as those tackling mobility issues, highlighting the need to co-design solutions.

Velenje provides a useful reference point for citizens within the Window 4 cohort. The feedback highlights that this practice is relevant for other Mission cities because it demonstrates how the CCC can be used to translate a strategic commitment into a more concrete governance, sectoral or implementation approach: Setting up the Climate and Energy Office conceived as one-stop-shop for citizens, offering access to different knowledge and advice across the different relevant aspects (energy consumption, sustainable mobility, waste, greening) in one common place, and its specific attention to marginalized groups, such as low-income families or the elderly, positively contributes to ensuring broader communication and engagement.

City	Strength area	Peer-learning relevance
Bristol	Citizen engagement	The feedback identifies Bristol as a useful peer-learning reference for citizen engagement. The example should be consulted because it illustrates practical approaches that other Mission cities can adapt when refining their own Climate City Contracts, implementation arrangements and future CCC iterations.
Velenje	Citizens	Setting up the Climate and Energy Office conceived as one-stop-shop for citizens, offering access to different knowledge and advice across the different relevant aspects (energy consumption, sustainable mobility, waste, greening) in one common place, and its specific attention to marginalized groups, such as low-income families or the elderly, positively contributes to ensuring broader communication and engagement in the transition process.
Dublin	Citizen engagement	The feedback identifies Dublin as a useful peer-learning reference for citizen engagement. The example should be consulted because it illustrates practical approaches that other Mission cities can

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		adapt when refining their own Climate City Contracts, implementation arrangements and future CCC iterations.
Wrocław	Citizen engagement	The feedback identifies Wrocław as a useful peer-learning reference for citizen engagement. The example should be consulted because it illustrates practical approaches that other Mission cities can adapt when refining their own Climate City Contracts, implementation arrangements and future CCC iterations.
Istanbul	Citizen engagement	The plan is commended for linking citizen engagement activities to governance improvements and climate neutrality goals, utilising institutional formats like Citizen Assembly and City Councils. Additionally, the city is recognised for its approach to combining online and in-person engagement through digital platforms like the Istanbul Senin app and the participatory budget management initiative, Bütçem Senin.
Liberec	Citizen engagement	The feedback identifies Liberec as a useful peer-learning reference for citizen engagement. The example should be consulted because it illustrates practical approaches that other Mission cities can adapt when refining their own Climate City Contracts, implementation arrangements and future CCC iterations.
Rzeszów	Stakeholder involvement	The city extensively engaged stakeholders during the preparation of the climate city contract. Mechanisms included public consultations, forums, public-private partnerships, and intersectoral cooperation platforms. The strategic goals and individual actions of the CCC were therefore developed through various consultations with a wide range of stakeholders.

Dublin provides a useful reference point for citizen engagement within the Window 4 cohort. The feedback highlights that this practice is relevant for other Mission cities because it demonstrates how the CCC can be used to translate a strategic commitment into a more concrete governance, sectoral or implementation approach: Key provisions of the action plan have been informed by contributions from citizens. It is remarkable that the plan explains the various rounds of citizen consultations having supported its drafting. The city's commitment to the creation of community spaces (such as community hubs, discovery and biodiversity centres, maker spaces), as well as to strengthening collaborations with the Dublin Public Participation Networ.

Wrocław provides a useful reference point for citizen engagement within the Window 4 cohort. The feedback highlights that this practice is relevant for other Mission cities because it demonstrates how the CCC can be used to translate a strategic commitment into a more concrete governance, sectoral or implementation approach: Wrocław has created a comprehensive strategy to tackle the social implications of transitioning to a more sustainable energy system, with a strong emphasis on equity and inclusivity. A key feature of this approach is the empowerment of local communities, which is particularly vital in Poland where there are significant cultural and behavioral obstacles to overcome.

Istanbul provides a useful reference point for citizen engagement within the Window 4 cohort. The feedback highlights that this practice is relevant for other Mission cities because it demonstrates how the CCC can be used to translate a strategic commitment into a more concrete governance, sectoral or implementation approach: The plan is commended for linking citizen engagement activities to governance improvements and climate neutrality goals, utilising institutional formats like Citizen Assembly and City Councils. Additionally, the city is recognised for its approach to combining online and

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in-person engagement through digital platforms like the Istanbul Senin app and the participatory budget management initiative, Bütçem Senin.

The strongest examples in this section are useful because they show how a specific CCC component can be made more actionable, credible or transferable. The named cities should be read as signposts for peer learning, not as the only cities performing well in this area.

City	Strength / practice area	Why this is useful for peer learning
Aarhus	Stakeholder and citizen engagement	the city has several governance approaches, e.g. the Climate Alliance Aarhus, in place to foster civic and stakeholder engagement to connect citizens, businesses, and organisations to emission domains, ensuring inclusive and effective climate action. Other examples are the Community Councils and integrating citizen eng.
Bordeaux Métropole	Stakeholder engagement	The plan has identified key stakeholders, including private and public companies, associations, networks and institutions. It includes stakeholders it has existing partnerships and collaboration with, and it has also identified further stakeholders it needs to reach and engage with. The city is notable for its efforts.
Copenhagen	Stakeholder Involvement	The plan builds upon a well-established system to involve stakeholders. The Action Plan clearly recognises the importance of involving stakeholders, including citizens, associations, and the private sector, in the implementation of the climate action plan. This inclusive approach helps to ensure that the actions are su.
Dresden	Strong Citizen engagement	One of the city's key strengths lies in its robust expertise in sustainable urban development. This commitment is further demonstrated by initiatives like Mobil-O-Mat, which empowers residents to actively engage in shaping future mobility plans. Additionally, the city's transition to climate neutrality is strongly supp.
Greater Dunkirk	Stakeholder engagement and participation	The plan demonstrates best practices in engaging a wide range of relevant stakeholders, such as local and regional authorities, universities and industry, and promoting intermunicipal collaboration, for example by organising mayors and deputy mayors' conferences, setting up a forum of Directors of Technical services, a.
Glasgow	Citizen engagement	The city's dedication to establishing a Community Engagement Framework is commendable, as it aims to enhance Glasgow City Council's role in promoting meaningful citizen involvement in climate change decision-making. This initiative is crucial for encouraging local action to tackle the climate and ecological emergency.
Łódź	Stakeholder involvement	: the Action Plan includes a detailed table summarising the systems & stakeholder mapping and their level of influence and interest in the plan as well as a description of major

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		events and engagement activities by stakeholders' category;
Nantes Métropole	Stakeholder engagement and participation	The plan demonstrates best practices in engaging a wide range of relevant stakeholders, such as associations, businesses, and local authorities. Initially, three monthly meetings were organised, named the Turning point workshops, to bring together various different stakeholders, including academia, innovation players.

2.2.10.3 Common challenges and recommendations

The shared challenges in this section are not evidence that the theme is less important; rather, they indicate where future CCC iterations can deepen the level of detail and improve the plan's usefulness for implementation, monitoring and peer learning.

Common challenge	Pattern across Window 4 cities	Recommendation for future CCC iterations
Citizen engagement not clearly linked to governance	7 cities received explicit engagement recommendations, while many others could strengthen this connection.	Explain how citizen outputs are used in decisions, monitoring, prioritisation and CCC iteration.
Stakeholder roles insufficiently specified	Common where many signatories are listed but their actions are not fully delineated.	Define the specific actions, resources and responsibilities of co-signatories.
Engagement remains consultative	Some plans rely mainly on information events or consultation.	Develop deeper co-design, living labs and implementation partnerships where appropriate.
Diversity and inclusion could be strengthened	Some plans identify vulnerable groups but do not fully describe engagement methods.	Target hard-to-reach groups through trusted intermediaries and tailored participation formats.

Window 4 cities are moving towards more comprehensive CCCs, but the next iteration should focus on implementation readiness. The most useful improvements would be to strengthen the connection between the stated ambition, the action portfolio, stakeholder responsibilities, investment planning, and the monitoring framework.

The Window 4 cohort shows that stakeholder mobilisation has become one of the strongest and most visible dimensions of CCC practice. Many city CCCs describe broad engagement processes involving public bodies, universities, utilities, private companies, NGOs, neighbourhood actors, youth initiatives, citizens forums and civil society organisations. This confirms that the CCC is being used as a mobilisation instrument, not only as a municipal planning document.

The depth of stakeholder engagement differs across cities. Some plans provide a detailed stakeholder map, identify actor roles and link stakeholders to specific sectors or actions. Others show strong consultation activity but provide less clarity on how stakeholder input shaped the action portfolio

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or how signatories will be accountable during implementation. This distinction is important: engagement during CCC preparation is valuable, but implementation requires a move from consultation to distributed responsibility, co-delivery and regular renewal of commitments.

Athens is a particularly strong signpost because its Climate Forum, specialised workshops and stakeholder mapping connect public bodies, universities, private companies, NGOs and civil society organisations to the CCC process. Bordeaux Métropole is highlighted for stakeholder engagement and citizen empowerment, including the role of ZIRI and citizen consultation structures. Athens demonstrates a comprehensive stakeholder process through the Climate Forum, workshops and mapping across influence, interest and emissions sectors. Aarhus is strong on Climate Alliance Aarhus, Community Councils, Co-Citizenship and youth-oriented engagement. Glasgow, Łódź, Paris, Bristol, Dublin, Wrocław, Istanbul and Rzeszów also offer useful citizen engagement examples.

The next step for the cohort is to clarify the governance value of participation. Several CCC materials recommend describing how citizen outputs influence decisions, how vulnerable groups are engaged in ways that shape policy, how signatory commitments are translated into quantified or concrete actions, and how additional stakeholders will be brought in over time. The strongest future CCCs will be those that treat participation as an ongoing mechanism for implementation, learning and legitimacy rather than as a discrete consultation exercise.

Stakeholder mobilisation is one of the most visible strengths in Window 4, with many cities using the CCC to widen participation beyond municipal government. The review material identifies stakeholder and citizen engagement strengths for a large share of the cohort, including both broad participatory forums and more targeted structures for specific social groups, youth, businesses, knowledge institutions and local communities.

Athens is a strong signpost because the city combines Climate Forum meetings, specialised workshops, stakeholder mapping across sectors and the Athens Climate Youth Assembly. Aarhus provides useful learning through Climate Alliance Aarhus, Community Councils, the Co-Citizenship unit and a dedicated Climate Plan for Children and Young People. Copenhagen, Łódź, Glasgow, Bristol, Dublin, Wrocław, Istanbul, Rzeszów, Greater Dunkirk, Nantes Métropole, Budapest and Dijon Métropole also provide examples of stakeholder mobilisation and citizen engagement strengths.

The main challenge is to connect participation more directly to decision-making and implementation. Recommendations related to stakeholder mobilisation and citizen engagement appear for 15 cities. Common issues include limited explanation of how citizen inputs influence action design, weak identification of barriers to participation, insufficient engagement of difficult-to-reach groups, and underdeveloped links between signatories and specific implementation responsibilities. In some cases, the CCC demonstrates strong consultation but does not yet show how participation becomes a durable governance resource.

Future iterations should therefore strengthen the chain from engagement to co-delivery. Cities should identify which actions require active citizen participation, what outputs are expected from engagement processes, how these outputs will influence policy or investment decisions, and how signatories will report progress on commitments. This would help transform stakeholder mobilisation from a legitimacy-building process into an implementation mechanism.

- Clarify what is expected from stakeholders and citizens, and how their contributions will influence action design, implementation, monitoring and iteration.
- Link co-signatory commitments to specific actions, timelines, responsibilities and, where possible, expected emissions or co-benefit contributions.
- Develop targeted strategies for groups that are less likely to participate through standard consultation formats, including vulnerable households, youth, tenants and migrant communities.

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- Renew and expand commitments during implementation so that the CCC remains a living governance tool rather than a one-off label submission.

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2.3 Investment Planning and Finance

Overview: investment planning and finance

- Window 4 investment plans show increasing sophistication, with several CCCs presenting major investment needs, sectoral allocations, funding sources, risk frameworks and emerging climate budgeting approaches.
- The strongest plans treat finance as part of climate governance by linking investment needs to emissions reductions, public-private collaboration, risk management and stakeholder mobilisation.
- Common recommendations concern cost consistency, capital-source breakdowns, private finance mobilisation, climate-budget traceability, investment monitoring and cost-effectiveness of emissions reductions.

2.3.1 General cohort information and comparison

Investment planning is one of the areas where Window 4 cities are beginning to move from strategic planning towards implementation. Many CCC materials describe large capital requirements and a growing awareness that municipal budgets alone cannot deliver climate neutrality by 2030.

The investment figures cited in the CCC materials illustrate the scale and diversity of the challenge. An indicative range of between approximately €18.6 billion and €379 million highlights the scale of investment needs and the diversity across the window of cities. Even so, these figures are not directly comparable because they reflect different territorial scopes, sectoral boundaries and costing methodologies, but they demonstrate the scale of the implementation challenge.

Several Window 4 cities also demonstrate the importance of linking investment planning to sectoral delivery. Aarhus identifies capital-intensive investments in mobility and transport, energy systems, the food system, solar parks, district heating decarbonisation, electricity grid development, CCS facilities and light rail expansion. Copenhagen, Nantes Métropole, Dijon Métropole and Bristol similarly show that the investment plan is increasingly becoming a bridge between climate strategy and implementation finance.

Common weaknesses remain in the alignment between finance and emissions reduction. Many investment plans would benefit from clearer annual budget breakdowns, more consistent cost assumptions, stronger differentiation between secured and unsecured funding, greater attention to private capital mobilisation, and explicit links between investment amounts, expected emissions reductions and cost-effectiveness.

For future CCC iterations, the key improvement is to make the investment plan function as an implementation control system. This means that cities should be able to show which investments deliver which actions, when they will be financed, who pays, what emissions reductions are expected, and what corrective action will be taken if funding does not materialise.

Investment planning in Window 4 shows a marked shift toward more explicit capital planning, but the depth of financial detail remains uneven. Several city CCCs describe substantial investment requirements, sectoral allocations, municipal budgets, EU and national funding sources, private capital expectations, risk frameworks and finance councils. This suggests that cities are increasingly recognising that the CCC must connect climate ambition to investment mobilisation, not only to public expenditure planning.

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The more advanced investment plans identify investment needs by sector, distinguish municipal and private responsibilities, discuss funding gaps, and explore innovative financial instruments. Athens is a strong example, with a balanced investment plan, strategic partnerships, financial institutions engaged in the CCC process and interest in green bonds, green loans and inclusive financial tools. Athens is highlighted for financial awareness, optimism and proactiveness, including the Climate Neutrality Investment Council, strategic partnerships and interest in green bonds, green loans and inclusive financial tools. Aarhus provides a useful example of a climate-economic approach and large capital-intensive projects in mobility, energy systems, food systems, solar parks, district heating, electricity grids, CCS and light rail.

Investment planning theme	Window 4 pattern	Possible next steps
Scale of required investment	Many cities identify multi-billion-euro requirements, especially in buildings, energy and transport.	Provide consistent cost definitions and clarify whether figures include capital expenditure, operational expenditure, private investment and municipal budgets.
Funding sources	Plans commonly refer to municipal, EU, national and private sources, but secured funding is often less clear.	Distinguish secured, planned and prospective funding sources and specify the role of private finance.
Financial instruments	Some cities explore green bonds, PPPs, climate funds or investment councils.	Assess feasibility of instruments, legal constraints, repayment mechanisms and accessibility for vulnerable groups.
Investment monitoring	Financial monitoring is often less developed than emissions monitoring.	Track spending, implementation progress, emissions reduction and cost-effectiveness over time.
Risk and barrier assessment	Investment barriers are often described qualitatively.	Use risk matrices, trigger events, barrier severity and mitigation plans to guide decision-making.

The common challenge is that investment plans often need better alignment with the action portfolio and emissions outcomes. Cities may provide headline investment figures without sufficiently linking them to expected reductions, cost-effectiveness, annual capital needs, funding sources, operating costs, private investment assumptions or climate-budget tracking. Where private capital is expected to play a major role, plans should explain the mechanisms through which it will be mobilised and the risks that could affect delivery.

Future iterations should therefore strengthen climate budgeting as a governance practice. This means linking budgets to emissions reductions, tracking historical and planned climate expenditure, integrating municipal utilities and public companies where relevant, identifying the public-private investment ratio, and monitoring finance mobilisation alongside implementation progress. Investment planning should become part of adaptive management: if finance is delayed or under-secured, cities need mechanisms to reprioritise actions and maintain progress toward 2030.

Investment planning in Window 4 shows clear progress towards more sophisticated climate finance strategies, although the level of detail remains uneven. Several cities provide total investment needs, sectoral allocations, risk frameworks, finance sources, climate budgeting approaches

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or mechanisms to engage private capital. This indicates that the CIP is increasingly becoming a central component of CCC implementation rather than a separate financial annex.

Aarhus provides an important example through its climate-economic approach, climate budgeting and large-scale investment plan, including major allocations for mobility, energy systems, food systems, solar parks, district heating, grid development, CCS and light rail. Athens is notable for its Climate Neutrality Investment Council, balanced investment plan and interest in innovative instruments such as green bonds and climate resilience fees. Helsinki, Oslo, Riga, Reykjavík, Padova, Velenje, Stavanger and Helsingborg provide additional investment planning signposts.

2.3.2 Strengths and peer-learning examples

The strongest investment plans are those that treat finance as part of the governance architecture of the CCC. Athens, for example, is notable for financial awareness and proactiveness, including a Climate Neutrality Investment Council and attention to green bonds, climate resilience fees and inclusive access to financial tools. Aachen, although part of the Window 3 comparison material rather than the Window 4 supplement, provides a useful reference point for the importance of risk management and capital planning; Window 4 cities show a similar move towards investment-oriented CCCs.

The strongest examples in this section are useful because they show how a specific CCC component can be made more actionable, credible or transferable. The named cities should be read as signposts for peer learning, not as the only cities performing well in this area.

City	Strength / practice area	Why this is useful for peer learning
Aarhus	Climate-economic approach	the adoption of a climate-economic approach in the 2024 budget settlement is positively noted, enabling cost-effective realisation of climate targets and maximising emission reductions.
Athens	Financial awareness, optimism and proactiveness	The city is notable for its attention to securing investments for the CCC, with a strong interest already evident in the development phase. The creation of the Climate Neutrality Investment Council, involving the Municipality, financial institutions, and city bodies, reflects a strategic approach to diversify funding s.

2.3.3 Common challenges and recommendations

Common issues include insufficient historic climate budget data, unclear public-private investment split, lack of annualised cost breakdowns, limited explanation of financing instruments, weak linkage between investment and emissions reduction, inconsistent cost estimates, insufficient risk trigger definitions and limited monitoring of investment implementation. These issues are critical because they determine whether the action portfolio can move from planning to delivery.

- Link investment needs to specific actions, expected emissions reductions, operating costs and cost-effectiveness wherever possible.

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- Provide annual or phased financing requirements by sector, funding source and responsible actor.
- Clarify assumptions about private investment, public-private partnerships, grants, loans, green bonds and other financial instruments.
- Integrate investment monitoring with climate budgeting and action-plan monitoring so that financial gaps can trigger corrective action.

Investment planning in Window 4 shows clear progress towards more sophisticated climate finance strategies, although the level of detail remains uneven. Several cities provide total investment needs, sectoral allocations, risk frameworks, finance sources, climate budgeting approaches or mechanisms to engage private capital. This indicates that the CIP is increasingly becoming a central component of CCC implementation rather than a separate financial annex.

Aarhus provides an important example through its climate-economic approach, climate budgeting and large-scale investment plan, including major allocations for mobility, energy systems, food systems, solar parks, district heating, grid development, CCS and light rail. Athens is notable for its Climate Neutrality Investment Council, balanced investment plan and interest in innovative instruments such as green bonds and climate resilience fees. Helsinki, Oslo, Riga, Reykjavík, Padova, Velenje, Stavanger and Helsingborg provide additional investment planning signposts.

Future CIPs should connect every major investment to expected emissions reduction, implementation timeline, financing source, responsible actor, risk profile and co-benefits. They should also distinguish between municipal budget, municipal utilities, national or EU funds, private investment, concessional finance and innovative instruments. Where cities expect private sector investment, the plan should explain how private capital will be mobilised and what enabling conditions or risk-sharing mechanisms are required.

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3 Section 3: Synthesis

3.1 Window 3 Synthesis and implications for mission governance

3.1.1 Window 3 overview

The Window 3 CCCs provide a rich set of city-specific examples that can support practical peer learning across the Mission. The following overview consolidates the city profile material from the earlier analytical section and presents it as a summative discussion rather than as a separate annex. The examples are intended to help readers identify where to look for transferable practices, while recognising that each city operates within a specific governance, territorial and socio-economic context.

The following table consolidates the principal peer-learning signposts from the Window 3 cohort. It identifies where readers may look for useful examples when designing peer-learning exchanges or developing future CCC iterations.

Table 1 - Window 3 overview

City	Good practice signposts
Aachen	Longstanding engagement; more than 130 supporting organisations; strong building refurbishment, circularity and digital monitoring; IP estimates EUR 7.2bn need.
Bergamo	Clear commitment, science-based plan, health co-benefits, energy poverty measures, strong digital solutions; funding secured for costed actions.
Bologna	Exemplary commitment, institutional co-creation and a formal Citizen Assembly; four objectives linking climate, health, socio-economic benefits and administrative innovation.
Bucharest	Ambitious district-scale vision linking climate neutrality, resilience and social cohesion; strong local dynamic with businesses and civic actors.
Eilat	Comprehensive approach with municipal transition teams; clean energy, electric mobility and nature-based solution co-benefits; clear BAU work.
Gothenburg	Addresses hard-to-abate and Scope 3 emissions; uses Climate Council, Testbed Gothenburg and knowledge infrastructure to work on structural challenges.
Gävle	Goes beyond 2030 climate neutrality with consumption-based neutrality in 2035; Climate Agreement involves over 50 stakeholders.
Kranj	Frames climate neutrality through quality of life and resilience; strong attention to citizens, regional cooperation and transboundary responsibility.

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Liepāja	Clear municipal leadership, key local stakeholders, marginalised communities in co-creation, and strong just transition co-benefit framing.
Ljubljana	Exemplary multi-dimensional approach translated into eight systemic strategic priorities with quality of life, investment and economic growth co-benefits.
Milan	Innovative strategy around regeneration and decarbonisation centres; permanent Citizens' Assembly and stakeholder network; strong circular economy, RES and air quality links.
Miskolc	Clear commitment, smart solutions combining mitigation and adaptation, academia partnership, robust status quo analysis and smart-city/digital strengths.
Münster	Solid CCC rooted in longstanding initiatives; comprehensive socio-cultural change framework and extensive diverse stakeholder engagement.
Porto	Strong commitment anchored in city needs; good stakeholder involvement, climate governance, citizen participation and complementary strategy alignment.
Prato	Dynamic circular economy approach linked to the city's industrial history, socio-cultural shifts, multilevel governance and digitalisation.
Suceava	Clear vision for a vibrant resilient city; well-identified implementation barriers and solutions; participatory platform and youth engagement.
The Hague	Clear commitment; Climate Accord creates a strong tool for engaging diverse public and private stakeholders; Scope 3 and behavioural change strengths.
Trikala	Innovative smart solutions and citizen-centric governance; clear exclusions/inclusions and holistic integrated urban planning.
Turin	Science-based and multi-level governance framework; co-benefits linked to resilience, economic benefits and quality of life; strong academia engagement.
Umeå	Systemic approach with social, economic and ecological improvements; Climate Transition Map links existing strategies and stakeholder engagement.

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The Window 3 analysis suggests that future Mission support should focus on implementation readiness rather than only plan completion. Cities have increasingly strong visions, governance frameworks and action portfolios, but many still need support to translate these into quantified, financed and monitored implementation pathways.

Peer learning should be organised around concrete governance mechanisms and implementation challenges. The most transferable lessons are likely to concern how cities structure climate agreements, citizen assemblies, climate budgets, transition maps, digital monitoring systems, circular economy platforms, investment partnerships and multi-level coordination processes.

The next CCC iterations should place particular emphasis on closing the gap between strategic ambition and operational delivery. This includes clarifying target boundaries, reconciling emissions inventories, quantifying action impacts, specifying stakeholder responsibilities, linking CAP and CIP data, and using monitoring information to trigger adaptive management decisions.

3.2 Window 4 Synthesis

This section consolidates the cross-window and cross-cutting interpretation that was previously distributed across separate expanded analysis sections. It brings together the comparison between Window 3 and Window 4, implications for Mission support, peer-learning signposts and overall synthesis. The intention is to keep the main evidence integrated in the topic sections above, while reserving the discussion for higher-level interpretation of what the Window 4 analysis suggests for CCC iteration and Mission support.

3.2.1 Window 4 Overview

The following table is intended to support practical use of the Window 4 synthesis. It highlights reference cases of good practice, to help support peer learning.

Table 2 - Window 4 overview

City	Good practice signposts
Aarhus	Consumption-based emissions, AFOLU, renewable energy planning, climate-economic budgeting and stakeholder engagement.
Athens	Climate justice, Green Social Contract framing, stakeholder mapping, financial awareness, transport portfolio, NBS and monitoring tools.
Bordeaux Métropole	Stakeholder engagement, social aspects, stationary energy, RES and citizens engagement.
Bristol	Citizen engagement, community co-design, nature-based solutions, just energy transition and renewable energy partnerships.
Budapest	Governance, stationary energy, transport, waste, RES and stakeholder mobilisation.
Copenhagen	Governance, innovation, stakeholder engagement and high climate-positive ambition.
Cork	Participatory governance, heating and cooling, stationary energy and broad stakeholder collaboration.
Dijon Métropole	Multi-level governance and co-creative, cross-sectoral climate and biodiversity planning.
Dresden	Status quo analysis and political commitment.
Dublin	Citizen consultation, innovation around blue carbon, monitoring indicators and broader stakeholder engagement.
Gabrovo	Adaptation linkage and smaller-city climate transition framing.
Glasgow	Climate justice, governance structure, citizen engagement and social aspects.
Greater Dunkirk	Governance, social aspects and industrial transition context.
Helsingborg	High ambition, political consensus, environmental track record and governance innovation.
Helsinki	Mature governance, stakeholder mobilisation, residual emissions work, stationary energy, transport innovation and broad climate planning.

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Istanbul	Comprehensive transport, renewable energy, stationary energy, waste/wastewater, digital and governance innovation.
Košice	Climate governance, stakeholder commitments and investment planning.
Kraków	Status quo versus future analysis and governance awareness.
Leipzig	Status quo analysis and multi-level governance.
Liberec	Citizen engagement, multi-level governance and stakeholder mobilisation.
Łódź	Action portfolio, stakeholder involvement and citizen engagement.
Lund	Agriculture and land-use prioritisation, governance structure, monitoring, transport, RES and digitalisation.
Nantes Métropole	Governance, stakeholder engagement, citizens engagement, AFOLU, stationary energy, RES, waste and social aspects.
Oslo	High ambition, residual emissions analysis, monitoring, transport and stakeholder mobilisation.
Padova	Participatory governance, Climate Agreements and clear roles for climate transition.
Reykjavík	Scope 1-3 target framing and stakeholder signatories.
Riga	Monitoring, digitalisation, status quo versus future, AFOLU and RES.
Rzeszów	Stakeholder involvement, citizen engagement, social aspects and extensive action portfolio.
Sofia	Ambition around airport-related emissions, smart city and digitalisation, transport and RES.
Stavanger	Monitoring, digitalisation, social aspects and extended geographic ambition.
Tauragė	Action maturity, transport, heating and cooling, IPPU/ETS inclusion and stakeholder engagement.
Trondheim	Monitoring system, renewable energy and comprehensive sectoral coverage.
Velenje	Just transition in a coal-region context, green jobs, citizen one-stop-shop, smart city platform and transition governance.
Warsaw	Status quo analysis, monitoring infrastructure, RES, heating, waste-to-energy and urban greenery.
Wrocław	Status quo analysis, monitoring indicators and a substantial investment framing.

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The Window 4 analysis confirms that the Climate City Contract is increasingly functioning as a governance framework for city-wide climate neutrality, rather than only as a planning template. The strongest Window 4 examples use the CCC to connect target-setting, emissions accounting, institutional coordination, stakeholder mobilisation, sectoral implementation, finance and monitoring.

The cohort also confirms that future CCC iterations should focus on implementation readiness. The central task is to make each plan more operational by specifying how actions will be delivered, how investments will be mobilised, how stakeholders will contribute, how barriers will be removed, and how progress will be monitored and corrected over time.

The priority recommendations for the Window 4 cohort are therefore cross-cutting. Cities should refine emissions accounting and target boundaries, quantify individual actions, develop credible residual emissions strategies, operationalise governance arrangements, specify stakeholder responsibilities, strengthen sectoral gaps, link investment planning to emissions reductions, and build monitoring systems that support adaptive management and learning.

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Table 3 - Priority recommendations emerging from Window 4 city cohort

Priority recommendation	Why it matters	Examples of relevant Window 4 learning references
Clarify target boundaries and emissions accounting.	Ambiguity in gases, scopes, BAU scenarios, ports, airports, industrial assets and natural sinks can reduce credibility.	Athens, Aarhus, Oslo, Riga and Copenhagen show different approaches to boundary and residual emissions questions.
Quantify individual actions and link them to emissions gaps.	Without action-level quantification, it is difficult to judge whether the portfolio can deliver the target.	Tauragė and Riga provide useful references for action maturity and quantification.
Treat governance as an implementation system.	New bodies and forums need mandates, capacity, decision rights and reporting routines.	Helsinki, Copenhagen, Nantes Métropole, Aarhus and Athens provide strong governance examples.
Make stakeholder commitments operational.	Signatories must be linked to specific actions, resources, responsibilities and monitoring.	Oslo, Athens, Bristol and Copenhagen provide relevant models for structured mobilisation.
Strengthen sectoral gaps in IPPU, AFOLU, waste and cooling.	These areas remain less mature but will matter for future iterations and residual emissions.	Lund, Nantes Métropole, Aarhus, Warsaw, Istanbul and Glasgow provide useful learning points.
Integrate investment planning with implementation monitoring.	Investment plans need to show who pays, when, and what emissions reductions are achieved.	Aarhus, Copenhagen, Dijon Métropole, Bristol, Wrocław and Athens illustrate the scale and governance importance of finance.
Expand monitoring beyond emissions.	Climate neutrality transitions also require learning on social justice, health, jobs, air quality, energy poverty and governance capacity.	Dublin, Wrocław, Warsaw, Lund, Oslo, Riga and Stavanger provide useful monitoring examples.
Expand adaptive MEL	Use monitoring to trigger review, correction and resource reallocation, not only to report annual emissions.	Supports continuous learning and timely course correction before 2030.

Treat social justice as implementation design	Assess affordability, distributional impacts, vulnerable groups, skills and energy poverty in relation to major actions.	Reduces transition risks and strengthens legitimacy.

3.3 Cross window synthesis

3.3.1 Development from window 1 to window 3

Overview: cross-window development

• Window 1 established the CCC as a governance innovation and a structured planning process across action, investment and commitments.

• Window 2 demonstrated more systematic coding and synthesis of targets, pathways, governance, monitoring, horizontal topics and investment planning.

• Window 3 shows stronger governance mobilisation, more explicit peer-learning examples and deeper attention to implementation conditions, while many methodological challenges persist.

The development from Window 1 to Window 3 shows a gradual maturation of the Climate City Contract process. The first trend report focused on the novelty of the CCC as a governance tool and analysed the first cohort across CAP, CIP, commitments and governance processes. It highlighted the value of the CCC in accelerating ambition and organising climate action, while also identifying early challenges around quantification, sector coverage, investment planning and stakeholder commitments.

The Window 2 trend report introduced a more systematic and comparable analytical structure. It organised the analysis around climate neutrality ambition, emissions quantification, status quo assessment, strategy, action portfolios, governance, barriers, monitoring, horizontal topics and investment planning. This structure is retained in the present report because it closely reflects the review logic of the CCC and allows observations to be compared across cohorts.

The Window 3 shows that many of the same core challenges persist, but the context has shifted from plan formulation toward implementation readiness. Cities are now more explicit about governance bodies, stakeholder ecosystems, citizen engagement, investment needs, digital tools and iteration. This indicates that the CCC is increasingly understood as an implementation governance framework rather than only a document submitted for assessment.

A key similarity across Windows 2 and 3 is the continued need to strengthen action-level quantification. Cities increasingly provide emissions inventories, gap tables and impact pathways, yet the expected contribution of individual actions remains unevenly quantified. This is one of the most important methodological priorities for future CCC iterations because it affects credibility, monitoring, finance and accountability.

A notable change in Window 3 is the stronger visibility of governance and stakeholder mobilisation as best-practice areas. The cohort contains several distinctive examples: Aachen's multi-tiered stakeholder model, Gävle's Climate Agreement, Milan and Bologna's citizen assemblies, Gothenburg's testbed and knowledge infrastructure, The Hague's Climate Accord, Umeå's Climate Transition Map and Trikala's smart citizen-centric governance. These examples demonstrate how the CCC can become a convening instrument for city-wide transition governance.

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Another development is the stronger integration of horizontal topics. Window 3 cities more often connect climate neutrality to circular economy, consumption-based emissions, energy poverty, vulnerable groups, health, air quality, nature-based solutions, adaptation, digitalisation and citizen science. This does not mean that these topics are fully operationalised, but it shows that the CCC is increasingly being used to connect emissions reduction with broader urban transformation goals.

Investment planning has also become more prominent and sophisticated, although still uneven. Window 1 identified investment planning as new and challenging for many cities, and Window 2 showed persistent gaps in finance strategies and investment monitoring. Window 3 includes stronger examples of costed plans, risk frameworks and secured funding, especially in Aachen and Bergamo, but the overall cohort still needs clearer public-private financing strategies, cost-effectiveness evidence and stronger integration between action portfolios and investment plans.

Overall, the cross-window trend is toward increasing maturity but also increasing complexity. As cities move from setting targets to implementing systemic transition pathways, the CCC must support adaptive governance, coordination across actors, monitoring of enabling conditions, and iterative updating of actions and investments. Future trend reports should therefore place greater emphasis on implementation progress, learning loops, actor commitments and evidence of institutional change.

Cross-window theme	Window 1 pattern	Window 2 pattern	Window 3 pattern	Observable trend
Targets and scope	Strong acceleration of ambition; early scope and sector questions.	High ambition with persistent boundary and scope ambiguities.	More examples of Scope 3, consumption and territorial extensions, but clarity still needed.	Define target boundaries, gases and residual emissions consistently.
Quantification	Quantification identified as a core challenge.	Gap tables and scenarios more systematically assessed.	Improving inventories and pathways, but action-level quantification remains central challenge.	Prioritise quantified action contributions and methodology transparency.
Governance and participation	Governance structures and national platforms highlighted.	Stakeholder engagement and governance bodies compared across cities.	Strong best practices in climate agreements, citizen assemblies, transition teams and platforms.	Operationalise roles, mandates, decisions and co-signatory actions.
Horizontal topics	Justice, participation and co-benefits visible but uneven.	Cross-cutting themes more systematically included.	Circularity, energy poverty, air quality, digitalisation and citizen science more prominent.	Move from recognition to measurable co-benefits and distributional monitoring.
Investment planning	New and capacity-intensive process.	Common gaps in finance and investment	More mature examples of costed plans and risk management, but	Link finance to actions, emissions impact, risks and

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		monitoring identified.	uneven CAP-CIP integration.	private capital strategies.

3.3.2 Comparison between Window 3 and Window 4

The comparison between Window 3 and Window 4 suggests continuity in the core strengths and recurring gaps of Mission city CCCs, but also a gradual evolution in how cities use the CCC as a governance instrument. Window 4 cities generally show more explicit attention to finance, stakeholder mobilisation, co-benefits and governance integration, while many of the same technical challenges remain around quantification, residual emissions, action maturity and monitoring.

Compared with Window 3, Window 4 appears more heterogeneous because the cohort is larger and includes a wider range of metropolitan, industrial, capital-city, port, district-level and smaller-city contexts. This makes the Window 4 evidence base especially useful for identifying different pathways through which CCCs are being adapted to local governance conditions.

The similarity between the two windows is most visible in the persistence of planning-to-implementation gaps. Both cohorts contain strong strategic narratives and broad action portfolios, but many cities still need more action-level quantification, clearer responsibilities, stronger investment links, more robust residual emissions strategies and more operational monitoring systems.

The main evolution is that more Window 4 cities explicitly frame the CCC as a city-wide governance and investment process. Cities such as Athens, Aarhus, Helsinki, Copenhagen, Nantes Métropole, Glasgow and Bristol show that the CCC is increasingly being used to reorganise municipal coordination, mobilise stakeholders, connect climate action to social outcomes, and define finance needs for implementation.

Another trend is the increased visibility of horizontal and systemic topics. Window 3 already showed increasing attention to climate justice, stakeholder participation and multi-level governance, but Window 4 appears to deepen this trend through more examples of energy poverty offices, youth assemblies, climate forums, community one-stop-shops, digital monitoring platforms, urban greening strategies and financial governance bodies.

However, the evolution is uneven. Some Window 4 submissions are highly mature in governance and stakeholder mobilisation but less mature in action-level quantification. Others have strong technical action portfolios but weaker social or monitoring frameworks. This reinforces the importance of CCC iteration as a continuous learning process rather than a one-off label application exercise.

Dimension	Window 3 pattern	Window 4 pattern	Interpretation
Ambition and scope	High ambition and broad sectoral coverage, with recurring scope ambiguities.	Similarly high ambition, with more complex boundary questions in metropolitan, port, airport and district contexts.	The core Mission ambition is stable, but boundary-setting becomes more important as the sample diversifies.
Quantification	Emissions gap and action quantification	The same issue persists; more cities provide rich	Methodological maturity is improving

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	often required further refinement.	inventories but action-level quantification remains uneven.	but remains a central CCC iteration priority.
Governance	Strong examples of dedicated units, interdepartmental coordination and stakeholder processes.	More varied governance architectures, including climate directorates, forums, alliances, investment councils and mission offices.	Window 4 strengthens the view of CCCs as governance innovation tools.
Stakeholder mobilisation	Important but uneven; strengths often linked to specific local platforms.	More visible use of signatories, stakeholder forums, youth assemblies and partnership models.	The commitment component is becoming more operational, but signatory actions need stronger specification.
Action portfolios	Broad portfolios but incomplete timelines, responsibilities and action-level impact estimates.	The same gap persists, even where pathways are sophisticated.	Implementation readiness depends on moving from pathway logic to action-level detail.
Sectors	Energy, buildings and transport more developed; IPPU, AFOLU and waste less mature.	Similar pattern, but more examples of circular economy, NBS, blue carbon, renewable energy communities and industrial engagement.	Sectoral breadth is increasing, but depth remains uneven.
Monitoring and iteration	Monitoring frameworks often required stronger indicators and review processes.	More digital tools and platforms are visible, but indicators for social and economic transformation remain weak.	MEL is becoming more prominent but still needs stronger reflexive governance design.
Investment planning	Investment planning improved compared with earlier windows but often lacked action-level links.	More multi-billion-euro investment plans and financial instruments are visible.	Finance is becoming central to CCC credibility, but cost-effectiveness and secured funding need clearer treatment.

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Overall, Window 4 does not represent a simple linear improvement over Window 3. Instead, it shows a broader distribution of maturity: some cities are highly advanced in particular areas, while others need substantial refinement. This is valuable for the Mission because it creates a richer set of peer-learning examples and a clearer understanding of which aspects of the CCC process remain structurally difficult across cities.

The most important cross-window lesson is that CCC quality depends on integration across components. A strong emissions target is not enough without quantified actions; a broad action portfolio is not enough without finance and responsibilities; a strong governance model is not enough without monitoring and accountability; and extensive stakeholder engagement is not enough unless it is linked to implementation decisions and future CCC iteration.

The comparison between Window 3 and Window 4 suggests both continuity and maturation in the CCC process. The same core challenges remain visible across both windows: target-boundary clarity, emissions quantification, action-level maturity, monitoring, finance, and the integration of sectors such as IPPU, waste and AFOLU. This continuity indicates that these issues are not isolated shortcomings of individual cities, but structural challenges in translating climate-neutrality ambition into operational and governable plans.

At the same time, Window 4 shows a broader set of good-practice examples and a stronger tendency to connect climate neutrality to implementation governance. Compared with Window 3, there is more visible attention to climate budgeting, investment councils, financial instruments, digital monitoring platforms, energy poverty, consumption-based emissions, youth engagement, and co-benefit narratives. This does not mean that Window 4 plans are uniformly stronger; rather, the larger cohort provides a richer field of examples and shows how cities are increasingly using the CCC to organise institutions, partnerships and financing around the 2030 objective.

The main area of progress from Window 3 to Window 4 is the governance interpretation of the CCC. Window 3 already showed strong examples of mission governance and stakeholder mobilisation, but Window 4 more frequently makes explicit the need for new directorates, offices, teams, forums, investment councils and monitoring platforms. This suggests that the CCC process is gradually moving from plan formulation toward transition management. However, the same transition also raises the standard of evidence required: where cities claim that new governance structures will support implementation, future iterations need to describe how they will operate in practice.

The most persistent gap across both windows is the relationship between impact pathways and action-level quantification. Window 4 cities often provide more developed strategic pathways, but many still need to quantify individual actions and demonstrate how the sum of actions closes the emissions gap. This mirrors Window 3 and reinforces the need for common support around action maturity, sectoral modelling, investment-costing and implementation monitoring. The Mission support offer should therefore focus not only on improving plan text, but also on building the analytical and organisational capacities that cities need to turn CCCs into delivery frameworks.

The comparison also shows a growing role for peer learning. Window 3 provided examples of strong governance, monitoring, stakeholder collaboration and sectoral action. Window 4 expands this repertoire with additional cases in consumption-based emissions, finance, energy poverty, digitalisation, climate-economic approaches and advanced stakeholder mobilisation. The most useful contribution of a cross-window trend report is therefore to signpost cities toward concrete peer examples rather than only summarising general findings. In this sense, the CCC process is becoming an accumulating knowledge base for city-level climate-neutrality governance.

The progression from Window 3 to Window 4 suggests that the Climate City Contract is becoming a more demanding governance instrument. In earlier cohorts, the central analytical question was often whether cities could formulate a credible climate-neutrality strategy and assemble the main components of the CCC. In Window 4, the CCCs increasingly reflect whether cities can demonstrate the operational conditions for implementation: quantified action portfolios, workable governance structures, investment strategies, monitoring systems, stakeholder commitments and adaptive iteration processes. This shift raises the standard of analysis because the CCC is no longer only a plan for achieving the Mission Label, but a framework for governing delivery under time pressure.

The Window 4 material also shows that the CCC is increasingly functioning as a boundary object between different forms of knowledge and authority. Cities bring together technical emissions

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inventories, political commitments, municipal budget processes, sector strategies, stakeholder partnerships, citizen participation and external funding mechanisms. The strongest plans do not simply place these elements next to each other. They show how they interact. For example, a renewable energy strategy may be connected to social justice through revenue redistribution, to monitoring through a solar map or digital platform, to finance through investment councils or capital planning, and to stakeholder engagement through energy communities or local partnerships.

The comparison with Window 3 reinforces that many recurring recommendations are not signs of failure but signs of the increasing complexity of climate-neutrality governance. Quantifying individual actions, aligning investment plans with emissions impacts, developing residual emissions strategies and defining monitoring indicators are demanding tasks. They require analytical capacity, data systems, sector expertise and institutional coordination. The fact that these issues recur across windows indicates that future Mission support should focus more strongly on implementation capacities rather than only on plan quality.

At the same time, Window 4 provides a richer repertoire of practical examples for peer learning. Aarhus offers examples on consumption-based emissions, AFOLU, renewable energy integration, climate-economic approaches and stakeholder engagement. Athens provides examples on climate justice, energy poverty, governance innovation, transport, RES, monitoring and financial mobilisation. Aachen offers strong material on partnership levels, buildings, finance and risk management. Bordeaux Métropole contributes examples of stakeholder mobilisation and citizen participation. Dijon Métropole is useful for carbon footprinting, impact pathway design, circularity and food systems. Copenhagen, Helsinki, Dublin, Riga, Nantes Métropole, Warsaw, Vilnius and others add further examples that can be organised into thematic peer-learning clusters.

The key implication is that cross-window analysis should increasingly be used to curate a learning infrastructure for Mission cities. Rather than only reporting aggregate trends, future reports can identify which cities are useful to study for specific CCC challenges. For instance, a city struggling with residual emissions could examine Aarhus, Athens, Helsinki or Oslo; a city refining its stakeholder model could examine Aachen, Bordeaux Métropole, Athens or Aarhus; a city developing NBS could examine Athens, Aarhus, Glasgow, Warsaw or Vilnius; and a city improving investment planning could examine Aachen, Athens or Aarhus. This type of signposting helps make the trend report actionable for cities and City Advisors.

CCC component	Window 3 pattern	Window 4 pattern	Implication for future iterations
Ambition and target scope	Window 3 already showed broad alignment with 2030 climate neutrality, but some ambiguity remained around gases, sectors, scopes and major infrastructure.	Window 4 confirms high ambition and adds more examples of extended responsibility, including consumption-based emissions, transboundary mobility and climate-positive framing.	Future iterations should treat target-boundary clarity as a prerequisite for credible monitoring and finance, not as a purely technical annex.
Baseline and emissions gap	Window 3 highlighted the importance of baseline consistency and the challenge of linking sectoral data to pathways.	Window 4 provides richer datasets in many cases, but also more complex methodological issues because cities often use several inventories, BAU	Cities need concise methodological narratives that explain which inventory drives the target and how the emissions gap is calculated.

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		scenarios and previous plans.	
Action portfolio maturity	Window 3 showed that many cities had credible strategic portfolios but insufficient action-level quantification.	Window 4 shows more developed impact pathways, but the same challenge persists where aggregate reductions are not traceable to quantified individual actions.	Mission support should focus on methods for action quantification, uncertainty handling and sequencing of implementation milestones.
Governance	Window 3 established governance as a central CCC theme, especially around coordination, multi-level integration and stakeholder processes.	Window 4 more often includes new offices, directorates, climate forums, investment councils and cross-administration teams.	The next analytical standard should assess whether these structures are operationalised, resourced and connected to decision-making.
Stakeholder commitments	Window 3 demonstrated the importance of local ecosystem mobilisation and commitment processes.	Window 4 provides a broader range of stakeholder models, including differentiated partnership levels and stronger youth and citizen structures.	Future CCCs should specify how stakeholder commitments translate into actions, delivery accountability and iteration.
Finance and investment	Window 3 identified investment planning as a developing capability, often less mature than action planning.	Window 4 gives more attention to finance, climate budgeting, private capital, risk frameworks and investment councils, though links to emissions impact are still uneven.	Investment planning should be integrated with climate budgeting, action portfolios and monitoring systems.
Monitoring and MEL	Window 3 highlighted underdeveloped monitoring frameworks and the need for indicators, responsibilities and review cycles.	Window 4 includes stronger platforms and monitoring concepts, but gaps remain in social indicators, finance tracking, sector specificity and corrective action.	Monitoring should shift from reporting progress to enabling adaptive management and course correction.
Horizontal topics	Window 3 showed increasing attention to justice, digitalisation, air quality and adaptation, but	Window 4 contains stronger examples of energy poverty, social justice, digital tools, co-benefits and NBS,	Horizontal topics should be embedded in governance, action design, indicators and investment decisions.

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	inconsistent integration.	while still needing operational detail.	

The Window 4 analysis suggests continuity with Window 3 in the main types of challenges, but also a gradual evolution in the maturity and breadth of CCCs. Both windows show strong ambition, broad sectoral coverage, governance innovation and extensive stakeholder engagement. Both also show recurring gaps in action-level quantification, residual-emissions strategies, monitoring indicators and finance traceability. The difference is not that Window 4 has resolved these challenges, but that more cities appear to recognise them explicitly and to embed them in planned future iterations.

Compared with Window 3, Window 4 appears to show a stronger emphasis on climate finance, social justice and governance as implementation infrastructure. The review material for Window 4 more frequently highlights climate budgeting, investment councils, risk frameworks, social contracts, youth assemblies, energy poverty offices and participatory structures. This suggests that the CCC process is evolving from a plan-assessment framework towards a more integrated governance and delivery framework.

At the same time, Window 4 confirms that several challenges are structurally persistent across cohorts. Quantification of individual actions remains difficult, particularly when measures depend on behavioural change, private actors, national policies or infrastructure outside municipal control. Residual emissions remain analytically challenging because cities must distinguish unavoidable emissions from unquantified reductions and must define credible compensation routes. Sectoral gaps also persist for IPPU, AFOLU, waste, air quality and digitalisation, especially where these domains are less central to existing municipal climate planning.

The comparison also suggests that peer learning should increasingly be organised around implementation problems rather than only thematic topics. For example, cities could learn from Aarhus, Athens and Helsinki on connecting governance, finance and monitoring; from Athens, Dresden and Glasgow on social justice and citizen engagement; from Aarhus, Lund and Vilnius on land-use and NBS integration; from Nantes Métropole, Riga, Istanbul and Oslo on transport and mobility; and from Aarhus, Athens, Bristol, Helsinki, Riga and Trondheim on renewable energy systems. This would help translate the accumulated learning from Windows 1-4 into practical support for CCC iteration.

Cross-window issue	Window 3 pattern	Window 4 evolution	Implication for future CCC iteration
Ambition and scope	Strong 2030 ambition, but recurring ambiguities around scope, gases and boundaries.	Similar ambition remains, with more examples of broader scope, regional collaboration and consumption-based elements.	Use standard target-boundary statements across future CCC iterations.
Action quantification	Common need to quantify individual actions and link them to emissions gaps.	The same gap persists, but more cities acknowledge action-portfolio immaturity and plan future refinement.	Create action traceability tables linking measures, emissions, costs, actors and indicators.
Governance	Governance structures are increasingly visible but often still emerging.	More mature examples of climate offices, forums, investment councils and	Move from governance architecture to operating models with

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		stakeholder coalitions appear.	mandates, staffing and decision routines.
Finance	Investment planning remains uneven and often separate from CAP implementation.	More sophisticated CIPs appear, with climate budgeting, risk management and private-finance mobilisation.	Integrate CAP and CIP through investment-to-impact tracking.
Social justice and co-benefits	Social equity is present but unevenly translated into indicators or safeguards.	Stronger use of social contracts, energy poverty offices, youth processes and redistributive logic.	Develop measurable co-benefit and distributional impact frameworks.
Monitoring and iteration	Monitoring frameworks often lack indicators, responsibilities and corrective-action logic.	More digital platforms and dashboards appear, but action-level MEL remains incomplete.	Define responsibilities, data flows, review cycles and adaptive management triggers.

The comparison between Window 3 and Window 4 suggests both continuity and maturation in the CCC process. The same core challenges remain visible across both windows: target-boundary clarity, emissions quantification, action-level maturity, monitoring, finance, and the integration of sectors such as IPPU, waste and AFOLU. This continuity indicates that these issues are not isolated shortcomings of individual cities, but structural challenges in translating climate-neutrality ambition into operational and governable plans.

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The main area of progress from Window 3 to Window 4 is the governance interpretation of the CCC. Window 3 already showed strong examples of mission governance and stakeholder mobilisation, but Window 4 more frequently makes explicit the need for new directorates, offices, teams, forums, investment councils and monitoring platforms. This suggests that the CCC process is gradually moving from plan formulation toward transition management. However, the same transition also raises the standard of evidence required: where cities claim that new governance structures will support implementation, future iterations need to describe how they will operate in practice.

The most persistent gap across both windows is the relationship between impact pathways and action-level quantification. Window 4 cities often provide more developed strategic pathways, but many still need to quantify individual actions and demonstrate how the sum of actions closes the emissions gap. This mirrors Window 3 and reinforces the need for common support around action maturity, sectoral modelling, investment-costing and implementation monitoring. The Mission support offer should therefore focus not only on improving plan text, but also on building the analytical and organisational capacities that cities need to turn CCCs into delivery frameworks.

The comparison also shows a growing role for peer learning. Window 3 provided examples of strong governance, monitoring, stakeholder collaboration and sectoral action. Window 4 expands this

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repertoire with additional cases in consumption-based emissions, finance, energy poverty, digitalisation, climate-economic approaches and advanced stakeholder mobilisation. The most useful contribution of a cross-window trend report is therefore to signpost cities toward concrete peer examples rather than only summarising general findings. In this sense, the CCC process is becoming an accumulating knowledge base for city-level climate-neutrality governance.

Common challenges and recommendations occurring across windows include:

- Use Window 3 and Window 4 together as a peer-learning library, with city examples linked to specific CCC components and implementation challenges.
- Develop targeted support modules for action-level quantification, climate budgeting, monitoring indicators, residual emissions strategies and sectoral hard-to-address emissions.
- Encourage cities in later iterations to report not only plans but also changes in governance practice, stakeholder commitments and implementation evidence.
- Maintain a constructive distinction between named good-practice examples and anonymised shared challenges, preserving the learning-oriented tone of the trend report.

The comparison between Window 3 and Window 4 suggests continuity in the core strengths and recurring gaps of Mission city CCCs, but also a gradual evolution in how cities use the CCC as a governance instrument. Window 4 cities generally show more explicit attention to finance, stakeholder mobilisation, co-benefits and governance integration, while many of the same technical challenges remain around quantification, residual emissions, action maturity and monitoring.

Compared with Window 3, Window 4 appears more heterogeneous because the cohort is larger and includes a wider range of metropolitan, industrial, capital-city, port, district-level and smaller-city contexts. This makes the Window 4 evidence base especially useful for identifying different pathways through which CCCs are being adapted to local governance conditions.

The similarity between the two windows is most visible in the persistence of planning-to-implementation gaps. Both cohorts contain strong strategic narratives and broad action portfolios, but many cities still need more action-level quantification, clearer responsibilities, stronger investment links, more robust residual emissions strategies and more operational monitoring systems.

The main evolution is that more Window 4 cities explicitly frame the CCC as a city-wide governance and investment process. Cities such as Athens, Aarhus, Helsinki, Copenhagen, Nantes Métropole, Glasgow and Bristol show that the CCC is increasingly being used to reorganise municipal coordination, mobilise stakeholders, connect climate action to social outcomes, and define finance needs for implementation.

Another evolution is the growing visibility of horizontal and systemic topics. Window 3 already showed increasing attention to climate justice, stakeholder participation and multi-level governance, but Window 4 appears to deepen this trend through more examples of energy poverty offices, youth assemblies, climate forums, community one-stop-shops, digital monitoring platforms, urban greening strategies and financial governance bodies.

However, the evolution is uneven. Some Window 4 submissions are highly mature in governance and stakeholder mobilisation but less mature in action-level quantification. Others have strong technical action portfolios but weaker social or monitoring frameworks. This reinforces the importance of CCC iteration as a continuous learning process rather than a one-off label application exercise.

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Table 4 - Thematic patterns across windows 3 and 4

Dimension	Window 3 pattern	Window 4 pattern	Interpretation
Ambition and scope	High ambition and broad sectoral coverage, with recurring scope ambiguities.	Similarly high ambition, with more complex boundary questions in metropolitan, port, airport and district contexts.	The core Mission ambition is stable, but boundary-setting becomes more important as the sample diversifies.
Quantification	Emissions gap and action quantification often required further refinement.	The same issue persists; more cities provide rich inventories but action-level quantification remains uneven.	Methodological maturity is improving but remains a central CCC iteration priority.
Governance	Strong examples of dedicated units, interdepartmental coordination and stakeholder processes.	More varied governance architectures, including climate directorates, forums, alliances, investment councils and mission offices.	Window 4 strengthens the view of CCCs as governance innovation tools.
Stakeholder mobilisation	Important but uneven; strengths often linked to specific local platforms.	More visible use of signatories, stakeholder forums, youth assemblies and partnership models.	The commitment component is becoming more operational, but signatory actions need stronger specification.
Action portfolios	Broad portfolios but incomplete timelines, responsibilities and action-level impact estimates.	The same gap persists, even where pathways are sophisticated.	Implementation readiness depends on moving from pathway logic to action-level detail.
Sectors	Energy, buildings and transport more developed; IPPU, AFOLU and waste less mature.	Similar pattern, but more examples of circular economy, NBS, blue carbon, renewable energy communities and industrial engagement.	Sectoral breadth is increasing, but depth remains uneven.
Monitoring and iteration	Monitoring frameworks often required stronger indicators and review processes.	More digital tools and platforms are visible, but indicators for social and economic transformation remain weak.	MEL is becoming more prominent but still needs stronger reflexive governance design.
Investment planning	Investment planning improved compared with earlier windows but often lacked action-level links.	More multi-billion-euro investment plans and financial instruments are visible.	Finance is becoming central to CCC credibility, but cost-effectiveness and secured funding need clearer treatment.

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Overall, Window 4 does not represent a simple linear improvement over Window 3. Instead, it shows a broader distribution of maturity: some cities are highly advanced in particular areas, while others need substantial refinement. This is valuable for the Mission because it creates a richer set of peer-learning examples and a clearer understanding of which aspects of the CCC process remain structurally difficult across cities.

The most important cross-window lesson is that CCC quality depends on integration across components. A strong emissions target is not enough without quantified actions; a broad action portfolio is not enough without finance and responsibilities; a strong governance model is not enough without monitoring and accountability; and extensive stakeholder engagement is not enough unless it is linked to implementation decisions and future CCC iteration.

The Window 4 analysis suggests continuity with Window 3 in the main types of challenges, but also a gradual evolution in the maturity and breadth of CCCs. Both windows show strong ambition, broad sectoral coverage, governance innovation and extensive stakeholder engagement. Both also show recurring gaps in action-level quantification, residual-emissions strategies, monitoring indicators and finance traceability. The difference is not that Window 4 has resolved these challenges, but that more cities appear to recognise them explicitly and to embed them in planned future iterations.

Compared with Window 3, Window 4 appears to show a stronger emphasis on climate finance, social justice and governance as implementation infrastructure. The review material for Window 4 more frequently highlights climate budgeting, investment councils, risk frameworks, social contracts, youth assemblies, energy poverty offices and participatory structures. This suggests that the CCC process is evolving from a plan-assessment framework towards a more integrated governance and delivery framework.

At the same time, Window 4 confirms that several challenges are structurally persistent across cohorts. Quantification of individual actions remains difficult, particularly when measures depend on behavioural change, private actors, national policies or infrastructure outside municipal control. Residual emissions remain analytically challenging because cities must distinguish unavoidable emissions from unquantified reductions and must define credible compensation routes. Sectoral gaps also persist for IPPU, AFOLU, waste, air quality and digitalisation, especially where these domains are less central to existing municipal climate planning.

The comparison also suggests that peer learning should increasingly be organised around implementation problems rather than only thematic topics. For example, cities could learn from Aarhus, Athens and Helsinki on connecting governance, finance and monitoring; from Athens, Dresden and Glasgow on social justice and citizen engagement; from Aarhus, Lund and Vilnius on land-use and NBS integration; from Nantes Métropole, Riga, Istanbul and Oslo on transport and mobility; and from Aarhus, Athens, Bristol, Helsinki, Riga and Trondheim on renewable energy systems. This would help translate the accumulated learning from Windows 1-4 into practical support for CCC iteration.

Table 5 – Cross-window challenges across cohort 3 and 4

Cross-window issue	Window 3 pattern	Window 4 evolution	Implication
Ambition and scope	Strong 2030 ambition, but recurring ambiguities around scope, gases and boundaries.	Similar ambition remains, with more examples of broader scope, regional collaboration and consumption-based elements.	Use standard target-boundary statements across future CCC iterations.

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Action quantification	Common need to quantify individual actions and link them to emissions gaps.	The same gap persists, but more cities acknowledge action-portfolio immaturity and plan future refinement.	Create action traceability tables linking measures, emissions, costs, actors and indicators.
Governance	Governance structures are increasingly visible but often still emerging.	More mature examples of climate offices, forums, investment councils and stakeholder coalitions appear.	Move from governance architecture to operating models with mandates, staffing and decision routines.
Finance	Investment planning remains uneven and often separate from CAP implementation.	More sophisticated CIPs appear, with climate budgeting, risk management and private-finance mobilisation.	Integrate CAP and CIP through investment-to-impact tracking.
Social justice and co-benefits	Social equity is present but unevenly translated into indicators or safeguards.	Stronger use of social contracts, energy poverty offices, youth processes and redistributive logic.	Develop measurable co-benefit and distributional impact frameworks.
Monitoring and iteration	Monitoring frameworks often lack indicators, responsibilities and corrective-action logic.	More digital platforms and dashboards appear, but action-level MEL remains incomplete.	Define responsibilities, data flows, review cycles and adaptive management triggers.

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3.4 Further synthesis and recommendations

Since window 4 represents the largest and most recent cohort of cities, additional analysis of emerging themes and clustering helps identify further trends and learning opportunities.

3.4.1 Emerging themes from Window 4 analysis

Theme 1: From strategic ambition to implementation traceability

The principal maturity challenge in Window 4 is traceability between the target, the emissions gap, the impact pathways, the action portfolio and the investment plan. A plan may be ambitious and conceptually integrated, but it is difficult to assess implementation credibility when the mitigation potential of individual actions is not quantified or when responsibilities, timelines and financing are unclear. This challenge is especially visible for high-impact measures such as CCS, large-scale renovation, district heating, metro expansion, public transport electrification, renewable energy infrastructure and afforestation.

Traceability is not only a technical matter. It is also a governance issue because city councils, citizens, investors, utilities and signatories need to understand how specific actions contribute to the 2030 target. The most credible next iteration of a CCC would allow a reader to follow each major emissions source through the baseline, the emissions gap, the planned intervention, the responsible actors, the financing pathway, the monitoring indicator and the corrective action process. This is the direction in which Window 4 feedback is implicitly pushing the cohort.

Theme 2: From participation to co-delivery

Cities frequently show strong stakeholder engagement, and the engagement process is shifting from participation to co-delivery. The CCC often display broad engagement, climate forums, signatories, citizen assemblies and stakeholder mapping. However, cities need to operationalise on how these actors will implement actions, how commitments are specified, how citizen inputs shape decisions and how new actors will be brought into future iterations. This indicates that consultation is no longer sufficient as a marker of maturity.

Co-delivery requires different forms of accountability. Cities need to identify which stakeholders can reduce which emissions, what they have committed to do, what support they require and how progress will be monitored. Aachen is useful because its partnership categories differentiate forms of commitment. Athens and Aarhus are useful because they connect engagement to governance structures and social objectives. Bordeaux Métropole and Nantes Métropole show the importance of structured citizen and stakeholder engagement. These examples can help develop a more operational understanding of multi-actor collaboration in future CCCs.

Theme 3: From finance estimates to climate investment governance

Investment plans demonstrate that cities are increasingly estimating large-scale finance needs and identifying funding sources. However, a mature investment plan requires more than a capital estimate. It needs to show how climate expenditure relates to emissions reductions, how public and private finance will be mobilised, how risks are managed, how operating costs are considered, and how investment monitoring will inform implementation decisions. The CCC materials repeatedly ask for more detail on annual budgets, cost-effectiveness, private investment assumptions and financial mechanisms.

This creates an opportunity to treat climate budgeting as a governance innovation. If cities can link annual budgets to climate actions and emissions outcomes, the CCC becomes embedded in municipal financial management. Aarhus is an important example because the climate-economic approach connects budget settlement and cost-effective target realisation. Aachen and Athens demonstrate more developed investment governance through detailed investment requirements, risk frameworks, investment councils and discussions of innovative finance. These examples suggest that future trend reports should analyse finance not as a separate annex, but as a core part of climate-neutrality governance.

Theme 4: From co-benefit statements to measurable social and environmental outcomes

Many plans include strong co-benefit narratives around air quality, health, biodiversity, social cohesion, energy poverty, employment and quality of life. This is positive because it helps explain why climate neutrality matters beyond emissions. However, the next step is to connect these benefits to indicators and decision-making. Without measurable outcomes, co-benefits risk remaining rhetorical and may not influence prioritisation, investment or corrective action.

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Energy poverty, air quality and NBS provide clear examples. Athens demonstrates how energy poverty can be institutionalised through a dedicated office and linked to green energy transition measures. Aarhus and Athens show how biodiversity, adaptation and NBS can be integrated with mitigation. Aachen and Athens illustrate that air quality risks and benefits need more explicit monitoring, particularly around transport, heating and biomass. The broader lesson is that co-benefits should become part of the evidence base used to prioritise and adapt the action portfolio.

Theme 5: From city-level plans to multi-level implementation systems

Many high-impact actions depend on actors beyond the municipality. Public transport, power grids, district energy, airports, ports, land-use regulation, national energy policy, building standards and funding instruments are often controlled or heavily shaped by regional, national or private actors. The strongest CCCs recognise this dependency and begin to describe multi-level governance strategies, but many still need a clearer account of how collaboration will be sustained and how barriers will be escalated.

The implication for future CCC iterations is that cities should not only list external dependencies but also describe the governance mechanisms used to address them. This could include formal agreements, joint investment planning, regional climate forums, national policy dialogues, utility partnerships, regulatory advocacy and city-to-city coalitions. Window 4 shows progress in this direction, but the CCCs suggest that multi-level integration remains a key area where cities need practical support and peer learning.

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3.4.2 Cluster-based overview of Window 4 cities

A typology-based reading helps explain why similar recommendations recur across very different Window 4 cities. The cohort contains capital cities, metropolitan authorities, port and coastal cities, industrial or post-industrial centres, university and innovation cities, and smaller municipalities with strong local governance but more limited administrative scale. These differences matter because they shape which emissions sources dominate, which actors control key infrastructures, which financial instruments are available, and how easily the municipality can coordinate implementation.

The CCC framework creates a shared structure across these different contexts, but it does not eliminate contextual variation. A metropolitan authority may be better placed to coordinate regional mobility or spatial planning, while a small municipality may have stronger proximity to citizens and local stakeholders. A capital city may have more institutional capacity and visibility, but also more fragmented authority across national, metropolitan and municipal bodies. A port or airport city may face difficult boundary questions, while a city with limited industrial activity may need to justify exclusions and focus more on buildings, transport, waste and consumption-based emissions. The value of the trend report is therefore not to flatten these differences, but to show how they affect the maturity of CCCs.

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Table 6 - Clustering of window 4 cities and implications

City type / contextual feature	Window 4 cities	Implication
Capital and large metropolitan cities	Athens, Copenhagen, Dublin, Helsinki, Oslo, Paris, Reykjavík, Riga, Sofia, Warsaw.	Often have stronger visibility, larger technical teams and more complex governance interfaces with national and metropolitan bodies. Their CCCs commonly raise issues around public transport, energy systems, housing, social justice, data systems and multi-level coordination.
Metropolitan authorities and functional urban areas	Bordeaux Métropole, Dijon Métropole, Greater Dunkirk, Nantes Métropole.	Often have an opportunity to connect climate neutrality with territorial planning, stakeholder networks and cross-municipal coordination. They can be strong on integrated spatial approaches but still need clear allocation of responsibilities across municipalities and sectors.
Port, coastal and infrastructure-linked cities	Aarhus, Copenhagen, Dublin, Glasgow, Helsinki, Istanbul, Oslo, Reykjavík, Stavanger, Trondheim.	Often face boundary questions concerning ports, shipping, airports, ferries, energy infrastructure and maritime economies. Their CCCs benefit from explicit treatment of transboundary emissions and

		partnerships with infrastructure operators.
Industrial and post-industrial transition cities	Dresden, Greater Dunkirk, Kraków, Łódź, Leipzig, Velenje, Wrocław.	Often need to connect climate neutrality to economic restructuring, industrial energy demand, district heating, circular economy, skills and just transition. IPPU and industrial stakeholder engagement become especially important.
University and innovation-oriented cities	Aarhus, Athens, Bristol, Cork, Dresden, Dublin, Lund, Trondheim.	Often show strong potential for experimentation, digitalisation, citizen labs, research partnerships and innovation projects. The challenge is to connect pilots and innovation ecosystems to quantified city-wide emissions reductions.
Smaller and mid-sized municipalities	Gabrovo, Košice, Liberec, Padova, Rzeszów, Tauragė, Velenje, Vilnius.	Often show local ownership and agility, but may need additional support for finance, modelling, sector-specific quantification and administrative capacity. Peer learning can be particularly valuable where cities face similar capacity constraints.

Capital and large metropolitan cities tend to make the governance challenge most visible. They often have extensive administrative capacity but fragmented authority over the systems that matter most for climate neutrality. Athens, Paris, Dublin, Helsinki, Copenhagen, Oslo, Warsaw and Riga must engage with transport operators, utility companies, national energy policy, regional planning and large stakeholder ecosystems. Their plans therefore often reveal the importance of formal multi-level governance and the need for city strategies that can work across institutional boundaries. These cities can offer peer-learning examples on governance innovation, but they also show that high capacity does not remove the need for clearer implementation accountability.

Metropolitan authorities and functional urban areas provide a different kind of learning because they can address climate neutrality at a territorial scale. Bordeaux Métropole, Dijon Métropole, Greater Dunkirk and Nantes Métropole show how metropolitan institutions can integrate stakeholder engagement, spatial strategy, circular economy, transport and territorial coordination. This is important because many emissions and enabling conditions do not stop at municipal borders. The main challenge for metropolitan CCCs is to show how the metropolitan strategy translates into action by individual municipalities, utilities, private actors and citizens.

Port and coastal cities make target-boundary issues particularly important. Aarhus, Copenhagen, Dublin, Glasgow, Helsinki, Istanbul, Oslo, Reykjavík, Stavanger and Trondheim illustrate how ports, shipping, ferries, offshore or maritime activities, airports and energy infrastructure can complicate emissions accounting and implementation responsibility. The strongest plans do not simply exclude these sources; they either include them, explain their treatment, or propose collaboration with relevant operators. This is a key area for future Mission guidance because infrastructure-linked emissions often sit at the edge of municipal authority but remain highly relevant to the urban emissions footprint.

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Industrial and post-industrial cities highlight the need to connect climate neutrality with economic transition. Dresden, Greater Dunkirk, Kraków, Łódź, Leipzig, Velenje and Wrocław demonstrate that CCCs in industrial contexts must pay attention to manufacturing, district heating, skills, industrial energy demand, circular economy and just transition. Even where IPPU emissions are not large in the inventory, industrial activities can shape energy demand, employment, stakeholder structures and investment needs. Future iterations should therefore treat industry not only as an emissions sector, but as part of the wider economic governance of urban transformation.

Table 7 - Support needs and cluster relevance

Support need	City cluster relevance
Target and boundary guidance	Especially relevant for port, coastal, capital and infrastructure-linked cities where ports, airports, ETS facilities or transboundary transport are significant.
Action quantification support	Relevant across all city types, but especially for cities that have strong narratives and impact pathways but limited quantified action-level evidence.
Governance operating models	Especially useful for capitals, metropolitan authorities and cities with fragmented responsibilities across departments or levels of government.
Climate-budgeting methods	Relevant for larger cities with substantial investment portfolios, but also for smaller cities needing clear public investment prioritisation.
Stakeholder co-delivery models	Relevant across all cities, but especially for cities with many signatories or broad civic engagement processes.
Digital and monitoring infrastructure	Relevant for cities developing smart tools, observatories, digital twins or data-driven monitoring systems.
Residual emissions and NBS guidance	Relevant for cities relying on natural sinks, afforestation, biochar, CCS or external credits.
Just transition assessment	Especially relevant for cities with energy poverty, housing affordability, industrial transition or transport affordability concerns.

University and innovation-oriented cities show how research capacity and experimentation can support CCC implementation. Aarhus, Athens, Bristol, Cork, Dresden, Dublin, Lund and Trondheim are examples where universities, research institutions, digital tools, living labs, pilot projects or innovation offices can strengthen the transition. However, the CCC materials also suggest a common risk: innovation activities may be well described without being clearly connected to city-wide delivery. The next stage is to show how pilots scale, how data is integrated, how innovation supports quantification and how research partnerships contribute to implementation rather than remaining parallel activities.

Smaller and mid-sized municipalities contribute an important perspective because they sometimes demonstrate stronger proximity to citizens and clearer local ownership. Cities such as Gabrovo, Košice, Liberec, Padova, Rzeszów, Tauragė, Velenje and Vilnius may have fewer resources than larger capitals, but they can often build more direct stakeholder relationships and more visible local transition narratives. Their common needs concern technical modelling, finance capacity, climate budgeting, sector-specific analysis and monitoring systems. This indicates that peer learning

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should not only flow from larger to smaller cities; smaller municipalities can also provide examples of participation, agility and local ownership that are valuable to the wider Mission.

The typology analysis reinforces the importance of differentiated Mission support. A single improvement template will not serve all Mission cities equally well. Cities with major transport dependencies may need multi-level governance and mobility indicators; cities with strong renewable ambitions may need grid, storage and social acceptance support; cities with limited staff capacity may need practical templates and technical assistance; and cities with strong innovation ecosystems may need support translating pilots into scaled impact. Future trend reports can therefore combine common recommendations with differentiated pathways for city types.

Window 4 demonstrates that the CCC process is now generating a sufficiently rich evidence base to support differentiated learning across city types. The next stage of analysis should therefore combine three levels: general trends across the cohort, city-specific good-practice signposts, and typology-sensitive recommendations. This would make future reports more directly useful for cities preparing CCC iterations because it would allow them to identify not only what needs improvement, but also which comparable cities may offer relevant examples.

The final implication is that the Window 4 cohort should be understood as a transition from CCC preparation toward CCC implementation under diverse institutional conditions. The common structure of the CCC materials makes comparison possible, but the substance of implementation will depend on local governance systems, city scale, territorial boundaries, economic structures and stakeholder ecosystems. A mature trend-report approach should therefore use the common CCC categories to identify shared trends, while using city examples and typologies to show how those trends play out in practice.

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Conclusion

The analysis across Windows 3 and 4 indicate that the Climate City Contract is becoming a central governance mechanism for the EU Cities Mission. Across 53 cities, the CCC is being used to consolidate previous climate strategies, structure 2030 targets, organise action portfolios, mobilise stakeholders, plan investments and create monitoring and iteration processes. The report therefore reinforces the central finding of the trend report series: the value of the CCC lies not only in the production of a plan, but in its capacity to organise a city-wide transition process.

The development across the four windows shows increasing maturity in how cities understand and use the CCC. Window 1 established the CCC as a novel governance and commitment instrument. Window 2 introduced more systematic comparative evidence on targets, pathways, governance, monitoring, horizontal topics and investment planning. Window 3 showed stronger examples of stakeholder mobilisation, climate agreements, citizen assemblies, transition teams, testbeds, smart tools and place-based mission narratives. Window 4 extends these patterns across a larger cohort and makes visible the growing importance of implementation traceability, investment governance, multi-level dependencies and measurable co-benefits.

A consistent strength across the later windows is the broadening of climate neutrality beyond a narrow emissions-reduction agenda. Many cities now connect the 2030 target to health, air quality, regeneration, circular economy, energy poverty, digitalisation, social inclusion, biodiversity, adaptation and quality of life. This strengthens the legitimacy of climate action because it frames climate neutrality as a wider urban development mission rather than as a stand-alone environmental objective.

The strongest CCCs also demonstrate that governance innovation is becoming a defining feature of Mission implementation. Cities such as Aachen, Gävle, Milan, Bologna, Gothenburg, The Hague, Trikala and Umeå illustrate different ways of creating governance capacity through stakeholder agreements, climate accords, citizen assemblies, climate councils, knowledge hubs, transition maps, digital tools and participatory platforms. These examples show that implementation depends on the ability to coordinate actors beyond the municipality, especially where emissions are controlled by households, companies, utilities, transport providers, regional authorities or national policy frameworks.

The comparative analysis also shows that investment planning is becoming more prominent but remains uneven. Some cities provide detailed investment needs, planned funding, risk frameworks, secured finance or public-private burden-sharing models. However, many CCCs still need stronger links between actions, costs, financing sources, emissions impacts, co-benefits and monitoring. Future CCC iterations should therefore treat investment planning as a core part of implementation governance, not as a separate financial annex.

Several challenges are observed across all currently labelled Mission cities:

- **The main recurring challenge across all trend reports is the gap between strategic ambition and operational traceability.** Cities increasingly define ambitious targets and broad portfolios, but many still need to quantify action-level emissions reductions, specify responsibilities, set milestones, clarify dependencies, define monitoring indicators and show how the combined portfolio will close the emissions gap by 2030. This is particularly important for high-impact measures, residual emissions strategies, Scope 3 domains, hard-to-abate sectors and actions dependent on actors beyond municipal control.
- **A second recurring challenge is methodological consistency.** Cities often work with multiple inventories, BAU scenarios, SECAP datasets, local models and sectoral assumptions. This is understandable in an iterative process, but future CCC versions should explain clearly which dataset underpins the target, which dataset will be used for monitoring, how

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methodological updates affect comparability, and how residual emissions, carbon sinks, offsetting and direct mitigation are separated.

- **A third challenge concerns governance operationalisation.** Many CCCs now describe ambitious governance structures, but future iterations should make these arrangements more actionable. This includes specifying mandates, reporting lines, decision rights, staffing, meeting cycles, escalation procedures, co-signatory responsibilities, citizen feedback loops and mechanisms for onboarding new stakeholders. The shift from participation to co-delivery is one of the central governance tasks for the next phase of the Mission.
- **The final challenge is the measurement of co-benefits and distributional impacts.** Cities increasingly refer to health, social justice, air quality, energy poverty, employment, skills, biodiversity and quality of life. However, these benefits are not always translated into indicators, targets, monitoring responsibilities or investment criteria. Future CCC iterations should make co-benefits more measurable and decision-relevant, while also assessing who benefits, who pays, who may be negatively affected and what compensatory or enabling measures are required.

The report also highlights the importance of peer learning. The most useful learning across the Mission is likely to come from practical examples of how cities make climate neutrality governable: how they structure climate budgets, design climate agreements, use citizen assemblies, link digital platforms to monitoring, organise investment councils, mobilise utilities, engage businesses, address vulnerable groups, and manage dependencies with regional and national actors. These examples should be curated and exchanged systematically across the Mission platform.

For future Mission support, the findings point to several priority areas. Cities would benefit from targeted support on emissions modelling, action-level quantification, residual emissions strategies, climate investment planning, CAP-CIP integration, co-signatory accountability, monitoring and evaluation, digital data governance, co-benefit indicators, and multi-level policy alignment. Support should be designed not only around technical templates but around practical implementation challenges that cities face when moving from approved CCCs to delivery.

Overall, the combined Window 3 and Window 4 evidence shows that the CCC process is moving in the right direction, but that the next stage must focus on implementation, learning and accountability. The first four windows have established a strong basis for climate-neutral city planning. The task now is to use CCC iteration to deepen delivery capacity, test assumptions, update actions, mobilise finance, strengthen stakeholder commitments and ensure that the Mission remains adaptive, inclusive and credible as cities move toward the 2030 target.

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Appendix A - Detailed overview of cities and key strengths

A.1 Window 3 detailed city overview

Table 8 - Window 3 detailed city overview

Window 3 City	City profile
Aachen	Aachen's CCC reflects longstanding municipal engagement, continuous political support and strong civil-society mobilisation for climate neutrality. The city combines clear and ambitious strategies with a highly developed stakeholder engagement model, including more than 130 supporting organisations. The plan is especially strong on socially equitable transformation, citizen involvement and attention to marginalised groups. Aachen also provides good practice in energy-efficient refurbishment, municipal leadership in the building stock, circular economy and Scope 3-related actions, including building materials, agriculture and nutrition. Its investment plan is comprehensive, setting out cost scenarios, capital planning, risks and barriers.
Bergamo	Bergamo's CCC presents a clear and transparent commitment that is closely aligned with the city's Expression of Interest and communicated to citizens. The city emphasises inclusivity, co-creation and collaboration with academia, while also seeking to involve the wider urban ecosystem. Health is framed as a key co-benefit, and the action plan is science-based, with ambition extending beyond minimum Mission requirements. Bergamo is particularly strong on inventory methodology, integration of mitigation and adaptation, digital solutions, energy poverty and support for vulnerable communities. Its investment planning is methodical, with funding already secured for a significant share of costed actions and a clear allocation of responsibility across public and private sources.
Bologna	Bologna's CCC demonstrates a high level of ambition, strong engagement capacity and clear alignment with Mission principles. The city integrates institutional co-creation processes, including a formal Citizen Assembly, and frames climate neutrality through four strategic objectives covering climate, health, socio-economic benefits and administrative innovation. Its action plan provides a comprehensive pathway to climate neutrality and shows a strong understanding of the city's climate challenges and opportunities. Bologna is also notable for its inclusive stakeholder co-design methodology and data-driven Digital Twin initiative. The investment plan is clear and well documented, linking emissions reduction strategy, key investment needs and implementation priorities.
Bucharest	Bucharest 2nd District's CCC sets out an ambitious district-scale vision that links climate neutrality with resilience, social cohesion and improved urban quality of life. The district context is important because the administration must work within a wider metropolitan and national governance system while mobilising local businesses, civic actors and public institutions. The plan shows a strong local dynamic and uses the CCC to strengthen stakeholder engagement around implementation. Its profile is especially relevant for other district or sub-municipal authorities seeking to define their contribution to a wider city transition. Further development of responsibilities,

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	investment pathways and multi-level coordination can help strengthen the district's delivery role.
Eilat	Eilat's CCC presents a comprehensive approach to climate neutrality, supported by municipal transition teams and a clear focus on clean energy, electric mobility and nature-based solution co-benefits. The city is notable for its emissions inventory and Business-as-Usual work, which provide a useful basis for pathway framing. Eilat's action plan links mitigation with adaptation and reflects the specific opportunities and constraints of a coastal and tourism-oriented city. The plan gives attention to clean energy production, decarbonised mobility and local environmental co-benefits. Its approach is useful for cities seeking to combine climate neutrality with resilience, ecosystem protection and strategic municipal coordination.
Gothenburg	Gothenburg's CCC is notable for addressing hard-to-abate emissions and Scope 3 challenges through governance innovation. The city uses structures such as the Climate Council, Testbed Gothenburg and Knowledge Arena to work on complex systemic issues that extend beyond direct municipal control. Gothenburg's action plan shows leadership in circular economy, smart-city approaches and digital strategies, while also presenting strong sectoral strategies in heating and cooling, renewable energy and nature-based solutions. The investment plan provides a comprehensive account of planned actions, cost scenarios and capital planning, and draws on experience from earlier climate finance initiatives, including lessons from the city's Green Bond framework.
Gävle	Gävle's CCC confirms the city's commitment to climate neutrality by 2030 and goes further by setting an ambition for climate-neutral consumption-based emissions by 2035. The city's Climate Agreement and collaborative governance structure build on existing climate action and secure engagement from more than 50 stakeholders. The action plan is systemic, covering social, economic, infrastructural and organisational changes. It is particularly strong on consumption-based measures in food, construction and wider consumption, as well as innovative initiatives such as Mobility as a Service and an Energy-Optimized Port Cluster.
Kranj	Kranj's CCC presents a strong and integrated commitment to climate neutrality, quality of life and resilience. The city places citizens at the centre of the transition and embeds co-creation, multi-level governance, innovation, regional cooperation and stakeholder alliances across the strategy. Kranj's action plan is exceptionally clear and comprehensive, with strong coverage across sectors and proactive attention to Scope 3 emissions. The methodology behind the emissions inventory, including the AFOLU sector, is a notable strength. The plan includes detailed impact pathways and a clear analysis of residual emissions.
Liepāja	Liepāja's CCC provides a clear commitment aligned with the city's Expression of Interest and underpinned by municipal leadership and management support. The city demonstrates strong engagement from key local stakeholders and includes marginalised communities in the co-creation process. The transition co-benefits are well described, with a strong emphasis on just transition principles and social indicators. Liepāja has already achieved a substantial emissions reduction over the past 15 years, providing a strong starting point for the 2030 pathway.
Ljubljana	Ljubljana's CCC presents an exemplary multi-dimensional and multi-level governance approach translated into eight systemic strategic priorities. The city integrates co-benefits around quality of life, investment and economic growth, and uses the CCC process to strengthen co-creation and build strategic alliances with more than 70 stakeholders. Ljubljana's action plan is rich, clear, measurable and balanced, with a

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	well-developed action portfolio and strong consistency in target and emissions inventory. The plan demonstrates a compelling strategy across sectors, outstanding attention to social aspects, and strong integration of mitigation and adaptation.
Milan	Milan's CCC sets out an innovative strategy based on centres for regeneration and decarbonisation, linking climate neutrality to urban transformation. The city integrates co-creation, transparency and inclusion through a permanent Citizens' Assembly on Climate, digital platforms and a stakeholder network. Milan identifies co-benefits around urban resilience and social inclusion and presents strong sectoral strategies for waste, renewable energy and stationary energy. Its emissions accounting is especially clear, including attention to AFOLU and Scope 3 emissions. The investment plan aligns well with strategic objectives and connects the action plan to financial planning, supporting a coherent framework for implementation across key sectors.
Miskolc	Miskolc's CCC is clear and well structured, showing strong alignment with Mission principles and objectives. The city advances innovative smart climate solutions that connect mitigation and adaptation while emphasising benefits for the urban environment, health and social wellbeing. Partnerships with academia and major private actors support this orientation toward ambition and innovation. The action plan is well developed, with a detailed status quo analysis, clear impact pathways, full sector and scope coverage, and a comprehensive renewable energy strategy that considers the supply chain. Digital solutions, including citizen engagement tools, are also prominent. The investment plan sets out finance, barriers, risks and capacity-building needs.
Münster	Münster's CCC is anchored in a longstanding municipal commitment to climate action and builds on earlier initiatives and recognised climate policy experience. The city emphasises the need for a comprehensive approach that enables broader socio-cultural change and involves numerous and diverse stakeholders. Its action plan reflects strong ambition, climate justice principles and integrated governance, with particularly notable strategies in renewable energy, heating and building renovation. Münster also places importance on activating citizens for inclusive and participatory climate action.
Porto	Porto's CCC is strongly anchored in the city's history, needs and existing climate governance. The city uses the CCC process to strengthen complementary strategies and stakeholder engagement, especially through the Porto Climate Pact. The plan involves a wide range of actors and places emphasis on citizen participation, climate governance and implementation partnerships. Porto's action portfolio is comprehensive and well detailed, covering circular economy, renewable energy production and consumption, sustainable water management and Scope 3 commitments. The city also presents a strong approach to overcoming implementation barriers. Its investment plan is coherent, with cost scenarios aligned to climate actions and informed by stakeholder consultation and previous investment experience.
Prato	Prato's CCC reflects a dynamic and innovative approach to climate neutrality, strongly rooted in the city's circular economy identity and industrial history. The city links the transition to socio-cultural change, multilevel governance and engagement across public and private actors, including industry, health and culture. Prato's action plan stands out for clarity, an ambitious target that includes Scope 3 emissions, a clear emissions accounting methodology, and detailed quantitative pathways connected to individual actions. The city also presents strong sectoral strategies in transport, renewable energy and agriculture, supported by a comprehensive digital strategy. The investment plan connects finance with partnerships and innovation.

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Suceava	Suceava's CCC is clear and comprehensive, linking climate action to a wider vision for a climate-neutral, vibrant and resilient city. The plan identifies implementation barriers and corresponding solutions in a clear way and uses the CCC process to build local conditions for climate neutrality. Co-creation and transparency are strongly integrated, including participatory and youth engagement elements. The action plan presents a clear emissions reduction target and emissions gap strategy. Suceava is particularly notable for its focus on circular economy, recyclable materials and local production of construction materials, as well as innovative stationary energy measures such as Home Energy Management Systems.
The Hague	The Hague's CCC provides a clear commitment aligned with Mission ambition and principles, while building on and raising the ambition of previous strategies. Co-creation is strongly embedded through The Hague's Climate Accord, which engages a diverse public and private stakeholder ecosystem. The action plan includes proactive measures on Scope 3 emissions, climate justice and stakeholder-based climate deals. It is also strong on energy flexibility, grid stability and transport decarbonisation. The investment plan defines key fields of action, capital and operational costs, and potential funding sources. It also demonstrates awareness of the need to involve private finance, financial instruments and a broad range of stakeholders in delivery.
Trikala	Trikala's CCC is clear, detailed and strongly aligned with the Mission's smart and citizen-centred principles. The city stands out for innovative digital solutions, citizen-centric governance and a bottom-up approach to behavioural change. The action plan is well written, with clarity on target inclusions and exclusions and a diverse mix of actions with both direct and indirect impacts. Trikala also presents complementary measures to strengthen the enabling environment for implementation. The plan highlights the importance of engaging citizens and stakeholders, who are expected to contribute significantly to investment delivery.
Turin	Turin's CCC sets out a strong and clear commitment to 2030 climate neutrality, supported by co-benefits around resilience, economic development and improved urban quality of life. The city's science-based and multi-level governance framework is a notable strength, enabling engagement with academia, public utility companies, private finance and the local airport. Turin's action plan is clear on target inclusions and exclusions and provides a detailed description of inventory methodology. The city also demonstrates strong use of digital solutions and data collection.
Umeå	Umeå's CCC reflects strong ambition and a systemic transition approach aimed at social, economic and ecological improvement. The city uses a Climate Transition Map to connect existing strategies, create synergies with relevant programmes and strengthen stakeholder engagement. Umeå's action plan goes beyond local territorial emissions by including a consumption-based emissions target and paying attention to hard-to-abate emissions from industry, port activities and waste incineration. The plan is also notable for stakeholder participation, transparency and the treatment of residual emissions as part of the climate-neutrality pathway.

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A.2 Window 4 detailed city overview

Table 9 - Window 4 detailed city overview

Window 4 City	City profile
Aarhus	Aarhus' Climate City Contract shows strong ambition with a –88% emissions reduction target compared to 1990. It covers all GHGs across key sectors, including Scope 3 emissions for construction and food. The Aarhus Goals embed co-benefits and citizen engagement throughout. Thirteen signatories, including major institutions and companies, have committed with specific actions, reflecting robust partnership and governance. Aarhus' action plan excels for its comprehensive assessments of consumption-based emissions, setting clear targets, and implementing sector-specific actions in renewable energy and Agriculture, Forestry and Other Land Use (AFOLU). The city leads by example with detailed baseline emissions data and fosters synergies with biodiversity and climate adaptation. A climate-economic approach ensures inclusive and effective climate action. With its climate neutrality vision dating back.
Athens	Athens commits to reducing GHG emissions by 80% across the entire municipality, addressing the most relevant sources and sectors, while strengthening social cohesion. Athens' CCC is built on a robust stakeholder consultation process, including dedicated Climate Forum meetings, and is supported by 48 signatories. Athens is commended for its comprehensive action plan, addressing social justice, integrated governance, and stakeholder engagement. The city demonstrates a commitment to a fair and inclusive green transition for all citizens. Athens emphasizes diverse, inclusive funding strategies, innovative tools, and strategic partnerships, ensuring optimism, proactivity, and fairness in achieving climate neutrality. Athens' 2030 investment plan presents a balanced planned investment of EUR 2.303 billion across essential sectors such as public and non-motorised transport, energy-efficient buildings, and.
Bordeaux Métropole	Bordeaux Métropole's Climate City Contract places strong emphasis on stakeholder engagement: fourteen diverse actors, including key public and private institutions, have signed individual commitments, with more expected to join. In the action plan, strong stakeholder engagement is ensured through the Zone for the Integration of Intelligent Networks which supports synergies between companies based on the principle of industrial ecology. The Sustainable Development Council, together with the upcoming Climate Citizens' Committee and the 2023 Great Citizen Dialogue, further enhance citizens participation. The plan also prioritises social equity, especially through urban renewal in disadvantaged neighbourhoods, ensuring an inclusive energy transition. The planned investment costs seem affordable compared to the public budget. Bordeaux Métropole provides a detailed overview of measures across all sectors.
Bristol	Former European Green Capital, Bristol, aims for climate neutrality by 2030, targeting an ambitious 87% GHG reduction across all scopes and most sectors. It highlights co-benefits such as green job creation, fuel poverty alleviation, improved health, and enhanced air quality. Anchored in the One City Climate Strategy, it emphasises fairness and collaboration as guiding principles. Bristol's plan excels in its detailed methodological approach, comprehensive action portfolio, and commitment to a just

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	energy transition. The city also demonstrates leadership in nature-based solutions, synergies with climate resilience, and remarkable citizen engagement, with a strong focus on community involvement and co-designing solutions with residents to address environmental and climate challenges in a collaborative manner. Bristol's comprehensive investment plan outlines an ambitious target of.
Budapest	Budapest's CCC commitment aims for climate neutrality by 2030, reducing emissions by 80% and offsetting 20%, covering the entire administrative territory of the city. Co-benefits include improved health, reduced pollution, and economic gains. A collaborative governance structure and broad stakeholder support strengthen the implementation of Budapest's climate strategy. Budapest's action plan excels in socio-economic sustainability, utilising the Degrowth Doughnut model to address social impacts, housing, and community resilience while promoting green job creation. The comprehensive stationary energy strategy prioritises building renovations, district heating, solar energy, and community-focused initiatives. Decarbonizing heating, innovative transport electrification, cycling programmes, and stakeholder engagement demonstrate Budapest's commitment to equitable, sustainable, and innovative climate neutrality solutions. Budapest's investment plan is a well-defined framework for capital planning and.
Copenhagen	Copenhagen's Climate City Contract commits to climate neutrality by 2030 and aims to be climate- positive by 2035, covering all gases and scopes citywide. With an emissions reduction of almost 70% since 2010, the city is on track. Co-benefits like cleaner air, health, green jobs, and social inclusion are integrated throughout the plan. Strong governance is backed by public consultation, with key municipal stakeholders signed on. Copenhagen's plan stands out for its role as a global green model, which is key to supporting other cities in the transition, strong innovation through carbon capture and smart energy management systems, and robust multi-level governance. The plan ensures broad stakeholder involvement through a well-structured, inclusive, and collaborative approach across key areas of action.
Cork	Cork's CCC commitment targets an 80% GHG emissions reduction by 2030, supported by clear strategic priorities and extensive stakeholder collaboration, including diverse Cork City Climate Neutral Leadership Group members and central government backing. It integrates adaptation goals based on climate risk assessments and emphasises co-benefits like health, resilience, and climate justice. The incorporation of iterative processes adds strength. Cork's action plan demonstrates strengths in participatory governance, transparency, and data quality. It acknowledges limitations and commits to improvement, recognising the risks of inaction while also highlighting synergies with adaptation and conservation. The plan is adaptive, using experiential learning principles to continuously assess and adjust its approach, ensuring resilience to setbacks and scenario changes, and promoting a proactive and responsive climate strategy.
Dijon Métropole	Dijon Métropole's CCC is based on the Climate and Biodiversity Plan, which adopts a co-creative, cross- sectoral approach inspired by the RESPONSE project, engaging 18 diverse partners. Covering the entire territory, it integrates climate and biodiversity priorities—mitigation, adaptation, and cooperation— and outlines a detailed governance and implementation framework. Dijon Métropole's action plan is distinguished by its meticulous design of impact pathways, with each pathway detailed in comprehensive fact sheets. The plan features a collaborative governance framework that engages stakeholders at multiple levels, ensuring inclusive planning in the CCC process. Dijon Métropole demonstrates leadership in carbon footprint evaluation by assessing both direct and indirect Scope 3 emissions. The city

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	prioritises circular economy practices, by focusing on construction operations that promote material.
Dresden	Dresden commits to an 80% reduction in the city's energy-related GHG emissions from 1990 by 2030, and shows strong political commitment, and a science-based roadmap aiming for net-zero by 2040. Interim targets, a dedicated management system, and alignment with the Mission underscore this ambition. The plan features a comprehensive adaptation strategy, a detailed understanding of co- benefits and enjoys broad support from a diverse group of stakeholders. Dresden's action plan features a detailed status quo analysis covering all levels, from local to international, across various sectors. It highlights strong citizen engagement through initiatives involving residents and places a notable focus on intergenerational equity. The city's innovative approach to district heating is commendable, alongside outstanding stakeholder engagement and the involvement of.
Dublin	Dublin is committed to striving to reduce GHG emissions by 80% by 2030. The plan is underpinned by the support of five key signatories, while an extended network of stakeholders, comprising municipal companies, state agencies, private companies, and academia, enriches the collaborative effort. Governance is led by a well-structured steering group that also focuses on providing funding and support for local communities, integrating principles of accountability, transparency, co-creation, and innovation. Dublin's action plan is notable for its innovative monitoring approach, using advanced digital systems and its ambition to expand its CCC to neighbouring local authorities in the next iteration. The governance structure effectively integrates organisational silos. Research into the potential of seagrass and blue carbon sequestration highlights Dublin's commitment and.
Gabrovo	Gabrovo aims to reduce emissions by 80,5% by 2030 compared to a 2008 baseline. The plan emphasises the link with adaptation and makes green infrastructure and nature-based solutions strategic priorities. The city has clearly identified co-benefits for each commitment target, while capacity building through workshops, training programs, and knowledge-sharing initiatives underpin the plan alongside an emphasis on transparency and accountability. Winner of the European Green Leaf award in 2021, Gabrovo's action plan stands out for its strong participatory model and commitment to social innovation. The plan also demonstrates proactive crisis management measures, enhancing resilience to extreme weather events and improving the city's capacity to respond to future challenges. With a clear focus on smart administration and digital transformation, Gabrovo is.
Glasgow	Glasgow's Climate City Contract targets net-zero CO_2 by 2030, covering the whole city with plans to expand beyond CO_2 in the future. It aligns with existing plans like the Glasgow Climate Adaptation Plan and the Net Zero Routemap. Strong local partnerships include city and university leadership, with wide stakeholder support via the Sustainable Glasgow Charter. Social co-benefits and multi-level governance are acknowledged. Glasgow's action plan is notable for its innovative approach, employing a cutting-edge modelling tool to assess the impacts of its decarbonisation strategies. The emphasis on governance, including soft measures and increasing public awareness and involvement, underscores a commitment to tackling energy poverty and fostering a healthy environment. The plan offers a comprehensive overview of current policies affecting climate.
Greater Dunkirk	Greater Dunkirk's Climate City Contract targets net-zero emissions by 2030 for the Greater Dunkirk area, excluding the industrial zone, which is on a 2050 neutrality trajectory due to its national significance. Strong emphasis is placed on social justice, equity, and quality of life. Stakeholder engagement is ongoing, underpinned by broad

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	political consensus and innovative participatory processes. Greater Dunkirk's action plan shows strong ambition with clear emissions data from its industrial-port zone. It features robust governance, active stakeholder networks, and innovative citizen engagement initiatives. Social inclusion is prioritised through creative, participatory programmes like the Eco- Winning initiative, Village of the Future, and the Changing Life Together consultation platform. Greater Dunkirk's investment plan targets emission reduction through a €250 million investment over.
Helsingborg	Helsingborg's CCC commitment targets climate neutrality by 2030 for the entire geographical area without exceptions. It integrates mitigation and adaptation goals within a Council-adopted framework and Quality of Life Programme. Extensive stakeholder consultation and citizen engagement are emphasised, with strong support from over 100 businesses and associations. Helsingborg's action plan demonstrates high ambition, innovation, and commitment to tackling high emitting sources. The city excels in a residual emissions strategy, and a varied and tailored array of governance interventions. Its approach to learning, and its strong action portfolio on transport and Agriculture, Forestry and Other Land Use (AFOLU) sector decarbonisation also show strength. Helsingborg's comprehensive plan makes it a frontrunner in climate action, serving as a model for other cities to.
Helsinki	Helsinki aims for an emissions reduction of at least 80% by 2030 compared to 1990 levels, with a goal of becoming carbon zero by 2040. This effort is backed by extensive stakeholder engagement, including the city-owned energy company, the metropolitan area transport company, the port, and the Sustainability Network, which includes over 100 companies. The strategy also identifies social justice and the role of green areas as carbon sinks and relaxation spaces as co-benefits. Helsinki's action plan is notable for its proactive strategy in addressing Scope 3 and residual emissions, showcasing its commitment to comprehensive climate action. The city excels in developing educational formats, panels, and neighbourhood associations, empowering citizens to actively engage in sustainability efforts. Helsinki's approach to stakeholder.
Istanbul	Istanbul commits to an 80% reduction in GHG emissions by 2030, demonstrating a strong ambition across its extensive administrative territory. The strategy is comprehensive, leveraging synergies between mitigation and adaptation efforts. Istanbul's plan showcases wide support from diverse actors, including the Istanbul citizens' assembly. Istanbul's action plan is characterised by a multi-goal and holistic approach to addressing the multifaceted challenges of climate change. It features a comprehensive action portfolio that underscores a commitment to innovative climate action. A notable strength is the strong emphasis on inclusivity, citizen involvement, and co-creation, with a commitment to equity and social inclusion. The plan also commits to transparency, regular monitoring, and accountability, with regular climate reports and a collaborative platform to track progress towards.
Košice	Košice's Climate City Contract shows strong climate governance, with fourteen stakeholders committing to action and detailed cooperation plans. With reference to a business-as-usual scenario, the city aims to reduce CO_2 emissions by 611,000 tonnes until 2030. Co-benefits include better air quality, energy savings, and job creation. The city leads efforts, supported by municipally owned companies, universities and civic groups, besides existing partnerships. Košice's action plan is notable for its collaboration with major polluters and industries. The plan emphasises robust stakeholder engagement, fostering effective and collaborative actions across sectors. Governance structures are being designed to enhance transparency and encourage community participation. The plan aligns with EU-funded projects within

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	the scheme of the Just Transition Fund to support decarbonisation. Additionally, it demonstrates.
Kraków	Kraków's CCC commitment targets an 80% GHG reduction by 2030, covering the entire municipality. It emphasizes systemic climate transformation, co-benefits like job creation, affordable energy, and health, and robust stakeholder collaboration, including with the Ministry of Climate and Environment, and the World Bank. Transparency, scientific cooperation, and citizen engagement through assemblies and co-partnerships are key strengths of Kraków's approach. Kraków's action plan excels in its comprehensive description of policies and strategies, clear target definition, and ambitious action portfolio. The city documents challenges and barriers, including social impacts, and emphasises education, skills development, and job creation. Its strategy to decarbonize the stationary energy sector demonstrates a strong commitment to transforming the building sector and achieving a sustainable energy transition. The investment.
Leipzig	Leipzig's optimistic Climate City Contract scenario targets an 80% GHG reduction by 2030 compared to a 2019 baseline, with climate neutrality by 2040. It covers key sectors and includes adaptation through existing initiatives and future digitalisation strategies, like digital twins. The plan embeds strong stakeholder engagement, underpinned by forty-two signatories, and co-benefits like air quality, jobs, and investment attractiveness. Leipzig demonstrates a strong commitment to digitalisation through the development of an Urban Data Platform, enhancing data-driven decision-making. The city exemplifies effective multi-level governance and cooperation within the stronGERcities network. An integrated food strategy ties local production to social justice, promoting equitable food systems. Additionally, Leipzig's forward-looking mobility strategy introduces multimodal services and low-car districts, paving the way for a sustainable.
Liberec	Liberec's CCC commitment aims for an 82% GHG reduction by 2030, with the remaining 18% offset, covering the entire city. It integrates adaptation and mitigation, supported by a Council-approved adaptation strategy and broad stakeholder engagement. Co-benefits include improved public spaces, reduced pollution, job creation, and inclusion of vulnerable groups. Liberec promotes cross-sector collaboration, citizen participation, and regional leadership through an impressive process cycle. Liberec's action plan excels in its clarity and detail, emphasising multi-level governance, citizen engagement, and stakeholder involvement. The city's holistic approach to nature-based solutions and commitment to inclusive urban planning are notable strengths. Liberec's efforts to engage vulnerable groups and address energy poverty are commendable, making it a model for sustainable and resilient urban development, with a.
Lund	Lund's CCC commitment targets an 80% GHG reduction by 2030, across its administrative area, with forestry as the only exclusion. Supported by a Council decision, it incorporates co-benefits such as cleaner air and greener spaces. Lund boasts a strong track record and well-established climate action policy, founded on stakeholder consultation and expert advice from the Climate Policy Council of Independent Researchers. Lund aims to become climate positive by 2045, targeting reductions in both transboundary and consumption-based emissions. Its action plan balances soft and hard measures, prioritising agriculture and land use strategically. Citizen engagement is noteworthy, with initiatives like participatory budgeting and inclusive energy communities. The Lund Innovation Ecosystem Project Tracking (LIEPT) model is promising. The plan incorporates a well-crafted set.

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Łódź	Łódź's Climate City Contract targets an 80% GHG emissions reduction from 2018, covering most sectors. Adaptation is addressed, and co-benefits—like cleaner air, better health, and green urban spaces—are well detailed. Strong multi-level stakeholder engagement with thirty-two signatories ensures broad support. Cross-sectoral collaboration stands out as a key strength. Łódź's comprehensive action plan includes a varied set of actions that are well-designed to meet the 2030 emissions reduction target. The plan features detailed systems and stakeholder mapping, alongside a structured description of tailored engagement activities. Citizen engagement is particularly noteworthy, employing a combination of participatory mechanisms such as the citizens' budget, citizens' panels, vox populi voting, and interactive meetings or walks with city officials. Łódź's investment plan responds reasonably to a.
Nantes Métropole	Nantes Métropole' Climate City Contract stands out for its innovative stakeholder engagement and governance. With an 80% emissions reduction target by 2030, it covers most sectors and scopes. The commitment emphasises co-benefits like health and quality of life under the "One Health" approach. Strong multi-sector collaboration and citizen involvement mark it as a governance best practice. The action plan is notable for its robust governance framework that incorporates the above- mentioned "One Health" principle, supported by technical and steering committees. The city showcases strong stakeholder engagement with the formation of a climate council, while citizen involvement is also central with innovative initiatives like Climate Challenges and Great Debates actively engaging residents. The plan presents a comprehensive approach to renewable energy.
Oslo	Oslo's CCC commitment targets a 95% GHG reduction by 2030, with additional goals to become carbon-negative and achieve zero-emission transport and construction. Backed by 139 signatories and a council decision, Oslo demonstrates ambitious planning and alignment with the Mission principles, showcasing strong coherence and innovation. Oslo's action plan excels in its credibility, ambition, and effective strategic framework. Notable strengths include clear decision-making, bold actions on hard-to-abate emissions, a comprehensive Climate Budget, and strong policy instruments such as public procurement. Oslo is commended for its evaluation of distributional impacts in policy proposals, ensuring that climate measures do not exacerbate social inequality. Oslo's thorough analysis and clear justification of residual emissions are praiseworthy. Oslo, which was European Green Capital in 2019 and.
Padova	Padova aims for an 80% emission reduction target compared to 2021 levels. The CCC outlines three priority areas with detailed actions and quantifications through 2026. With 36 signatories, including banks, professional associations, and academic institutions, the commitment reflects extensive and diverse stakeholder support, with detailed quantifications and timelines. Co-benefits focus on innovative financing and providing effective support for vulnerable citizens. Padova's action plan is notable for its focus on energy poverty reduction and mitigating urban heat islands, exceeding mission requirements. The focus on digitalisation embraces smart metering and energy management systems to enhance efficiency and citizen engagement. A comprehensive barrier analysis addresses implementation challenges, while innovative financing methods, such as One-Stop Shops and crowdfunding, actively engage private stakeholders in climate.
Paris	Paris' Climate City Contract covers scope 1, 2 and 3 emissions. Adaptation is a core component, with measures enhancing resilience to climate hazards and protecting residents. Stakeholder and citizen engagement is strongly addressed, notably through the Citizens' Assembly and the Paris Action Pact. Co-benefits include health,

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	resilience, equity, and innovation. Paris' action plan stands out for its comprehensive greenhouse gas inventory covering scopes 1, 2 and 3, and a robust portfolio of 392 measurable actions. It promotes inclusive, sustainable urban transformation, focusing on energy sobriety, circular economy, active mobility, and education. The plan also integrates air quality objectives alongside climate mitigation and adaptation efforts. Paris has developed a comprehensive investment plan requiring nearly EUR 9.0 billion to achieve climate neutrality.
Reykjavík	Reykjavík's CCC is clear and well-structured, targeting an 80% emissions reduction from 2019, covering Scopes 1–3, with only agricultural activities excluded from the Agriculture, Forestry, and Other Land Use (AFOLU) sector. Adaptation measures include biodiversity policy and nature-based solutions. Stakeholder engagement is strong, with 18 signatories across sectors and two ministries' signatures reinforcing strong political commitment Reykjavík's action plan effectively targets Scope 3 emissions, with a particular focus on the construction sector and fostering behavioural changes in transport and waste management. The plan is transparent and clear, highlighting co-benefits and synergies with adaptation and biodiversity. It actively promotes citizen engagement through digital channels. Reykjavík's commitment to renewable energy and overall proactive approach further underscore its dedication to sustainable urban development.
Riga	Riga's Climate City Contract targets an 80% emissions reduction from 1990 levels, covering key sectors citywide, including Emission Trade Schemes facilities. The process featured exceptional co-creation, with over 130 stakeholders engaged. Co-benefits like air quality are integrated throughout and adaptation is a key priority. Strong governance, transparency, and 24 diverse signatories reflect deep, cross-sectoral commitment. Riga's action plan is well-aligned with its 2030 emissions target, featuring a mature, well-detailed portfolio of measures. It includes a strong barrier analysis, clear solutions, and a comprehensive strategy covering renewables, transport, and the built environment. A notable emphasis on digitalisation enhances data collection, sharing, and solution development. The investment plan aligns Riga's budgeting with emission reduction goals, integrating climate action into projects like public.
Rzeszów	Rzeszów's CCC commitment targets an 80% GHG reduction compared to 2022, covering most emissions citywide. It integrates mitigation and adaptation goals, strong citizen engagement, co- creation, transparency, and partnerships across sectors supported by a Smart City Team. The commitment is backed by a solid list of signatories, including the Ministry of Climate and Environment, universities, and the private sector. Rzeszów's action plan stands out for its comprehensive and diversified action portfolio, ambitious emissions strategy – which includes Scope 3 emissions in stationary energy and transport sectors -, and holistic approach to climate action. Key strengths include extensive stakeholder engagement and eco-friendly behaviour training. The investment plan indicates Rzeszów is well on track towards climate neutrality with well identified targets and.
Sofia	Sofia commits to an 81% reduction in emissions compared to the 2030 Business-as-Usual scenario. The inclusion of district heating, one of the major sources of heat energy in the city, indicates a comprehensive approach, alongside references to adaptation strategies. The CCC is supported by a diverse group of signatories, including the Ministry of Water and Environment. Sofia's action plan showcases a strong ambition and a forward-thinking approach to decreasing energy consumption effectively, complemented by a comprehensive approach to renewable energy. An emphasis on social aspects is demonstrated by inclusive transport solutions that prioritise mobility as a fundamental right and efforts to address energy poverty. Sofia

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	is committed to data-driven decision- making through a robust and centralised data management approach, strengthened.
Stavanger	Stavanger commits to an 80% reduction in emissions by 2030, compared to 2015, and full fossil-free status by 2040, with an extended geographical coverage compared to the Expression of Interest phase. The CCC incorporates a comprehensive and very detailed understanding of co-benefits. It demonstrates a collaborative approach with an extensive stakeholder involvement. Stavanger's action plan addresses hard-to-abate emissions and explores synergies between mitigation and other domains, particularly in adaptation, ecology, and biodiversity. It also incorporates social innovation approaches, considering vulnerability across different age groups. The action plan includes a comprehensive approach to integrating electrification and decarbonisation in relation to waterborne transport. The monitoring system is comprehensive, and Stavanger shows notable progress in digitalisation. The investment plan estimates a total investment.
Tauragė	Tauragė's CCC commitment targets an 85% GHG reduction by 2030, with almost no exclusions, covering the entire district municipality and ETS installations. Strategic priorities are clearly framed, emphasizing transparency, accountability, and co-creation. Supported by 18 signatories from national and local governments, companies, and associations, it demonstrates a broad commitment to the climate vision. Tauragė's action plan is comprehensive, transparent, and coherent, effectively addressing previous GHG data gaps and engaging stakeholders by sector. The city benefits from strong citizen involvement, with more than 70% of residents believing they can contribute to climate action. Actions are well- quantified, with clear targets and indicators. Tauragė exceeds expectations by considering end-use consumption of GHG-emitting products. Although a first time-ever exercise, Tauragė has prepared an.
Trondheim	Trondheim aims to reduce emissions by 80% by 2030, compared to 2009 levels, with comprehensive coverage across all emission sectors. The city benefits from solid and extensive stakeholder engagement, encompassing universities, transport and energy providers, the port, business communities, and local initiatives, and is supported by national and county-level coordination. Climate adaptation is addressed and co-benefits such as public health and green competitiveness are also identified. Trondheim's action plan is distinguished by its promotion of the circular economy, emphasizing increased reuse of waste and recycling of buildings and materials. The city harnesses digital tools and AI for effective action implementation. The plan adopts a comprehensive approach to energy planning and showcases strong support for young people and small businesses, aiding.
Velenje	Velenje aims to reduce GHG emissions by 80% compared to the 2018 baseline, with a robust sectoral coverage for the entire city boundary. The city identifies the energy system, built environment, and transport sector as key strategic priorities. A dedicated section on key principles and collaborative methods ensures a solid foundation for effective and inclusive climate action, which is also supported by a wide and diverse range of stakeholders, including relevant ministries. Velenje's action plan stands out for its strong emphasis on climate justice as a key guiding principle with a remarkable strategy on attracting and developing green jobs. An inclusive participatory approach with an emphasis on youth engagement, and a fit for purpose governance system underpins the action plan.
Vilnius	As 2025 European Green Capital, Vilnius aims for an 80% reduction in GHG emissions from 2021 levels, with a good coverage of key sectors and a detailed breakdown to prioritize interventions. The initiative is supported by a diverse range of

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	signatories, including municipal utility companies, public and private businesses, and academia. Coordination by a dedicated public entity demonstrates a strong collaborative effort. The action plan stands out with its ambitious target, which includes Emissions Trade Scheme (ETS) facilities, and offers a highly detailed description of emissions data. It provides comprehensive coverage of industry, addressing both stationary energy and Industrial Processes and Product Use (IPPU) sectors. Attention to nature-based solutions (NBS) further enriches the plan's scope. Overall, the plan is rich.
Warsaw	Warsaw aims for an 80% reduction in emissions for the Praga-Południe and Ursynów districts by 2030, in line with their Expression of Interest. The city integrates both mitigation and adaptation strategies, with a focus on enhancing energy security and independence. A strong co-creation process is ensured through the involvement of various stakeholders and the establishment of the Partnership for Climate platform. Warsaw demonstrates a proactive approach in addressing key barriers to climate action, with a strong commitment to equitable and participatory processes, particularly in tackling energy poverty. The plan features a comprehensive and well-balanced heating decarbonisation strategy, alongside a diversified renewable energy sources strategy. The city boldly commits to preserving and enhancing nature- based solutions and has also developed robust.
Wrocław	Wrocław aims to reduce GHG emissions by 80% by 2030, compared to 2022 levels, with significant emphasis on buildings, transport and energy and heat production. The commitment incorporates adaptation strategies, as well as a wide range of co-benefits. The innovative "Wrocław Transition Team" fosters co-creation between city officials, businesses, and citizens, ensuring a collaborative approach, as reflected in the strong stakeholder support from diverse signatories. Wrocław 's action plan excels in promoting citizen engagement and social change through community-driven initiatives. It adopts an innovative approach to sustainable energy by leveraging community participation for energy solutions. The plan includes a thorough status quo analysis of current emissions and is supported by a strong governance structure that fosters collaboration for climate.

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Appendix B - Detailed sectoral observations within action portfolios

B.1 Window 3 sectoral insights

Stationary energy and buildings, heating and cooling

Stationary energy and buildings are among the most developed areas of many Window 3 action portfolios. This reflects the long history of municipal climate work in energy efficiency, renewable heat, municipal estate management and building renovation. The sector is also where many cities have the clearest relationship between emissions sources, policy instruments and investment needs.

The best examples show strong municipal leadership but also recognise that much of the building stock is outside direct municipal control. This means that incentives, advice, finance, partnerships with housing providers, regulatory alignment and energy communities are essential for implementation.

City	Relevant strength or practice
Aachen	Strongest reference example for energy in buildings, refurbishment and comprehensive stationary energy planning.
Milan	Strong stationary energy strategy and integration of energy retrofit measures with social and environmental objectives.
Porto	Recognised for stationary energy strengths in its action portfolio.
Bergamo	Links energy measures with energy poverty and support for vulnerable communities.
Münster	Recognised for stationary energy and heating strengths in a broader transition framework.

Private building stock remains difficult to influence should be addressed as part of the next iteration of the action portfolio. It is identified in relation to 15 cities or associated recommendations in the review material. Combine regulation, incentives, advisory services, finance and stakeholder partnerships.

Measures need clearer quantification should be addressed as part of the next iteration of the action portfolio. It is identified in relation to 18 cities or associated recommendations in the review material. Quantify energy savings, emissions reductions, renovation rates and building typologies.

Common challenge	Number of cities	Shared recommendation

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Private building stock remains difficult to influence	15	Combine regulation, incentives, advisory services, finance and stakeholder partnerships.
Measures need clearer quantification	18	Quantify energy savings, emissions reductions, renovation rates and building typologies.
Energy efficiency and renewable generation should be integrated	14	Link renovation, electrification, PV, heat pumps, district heating and demand management.
Monitoring for energy performance needs refinement	13	Track building-level indicators, renovation depth, heating conversion and realised savings.

Energy efficiency and renewable generation should be integrated should be addressed as part of the next iteration of the action portfolio. It is identified in relation to 14 cities or associated recommendations in the review material. Link renovation, electrification, PV, heat pumps, district heating and demand management.

Monitoring for energy performance needs refinement should be addressed as part of the next iteration of the action portfolio. It is identified in relation to 13 cities or associated recommendations in the review material. Track building-level indicators, renovation depth, heating conversion and realised savings.

City	Relevant strength or practice
Aachen	Leading example for energy-efficient refurbishment, municipal building stock leadership and expansion of green district heating.
Gothenburg	Noted for heating and cooling strengths and wider work on hard-to-abate emissions.
Münster	Provides useful examples on heating, stationary energy and RES as part of a socio-cultural transition framework.
Milan	Tests innovative district heating decarbonisation, including heat recovery, renewables and sewage-system heat pumps.
Suceava	Noted for innovative actions in stationary energy which can support learning on building and heat-related measures.

Heating and cooling remains a central implementation domain because it connects buildings, district energy systems, household costs, renewable energy deployment and infrastructure investment. Across the cohort, cities with developed district heating or municipal heat planning capacities are generally able to present more mature pathways, while cities with fragmented building ownership or high dependence on fossil heating face more complex implementation challenges.

The strongest examples combine heat-demand reduction, renovation, district heating decarbonisation, geothermal or waste heat recovery, heat pumps, renewable integration and

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municipal leadership. The most common weakness is that cooling is much less developed than heating, even where climate adaptation and heat risks are recognised.

Common challenge	Number of cities	Shared recommendation
Cooling strategies are often absent or weakly specified	9	Assess current and future cooling demand, especially in relation to heat risk, vulnerable groups and adaptation.
Building-level renovation pathways need more detail	12	Specify building types, floor area, renovation depth, expected savings and finance mechanisms.
District heating measures require clearer delivery logic	10	Clarify ownership, investment needs, fuel switching, connection rates and emissions impact.
Heat decarbonisation should be linked to social impacts	13	Assess affordability, energy poverty, rental housing and household distributional effects.

Cooling strategies are often absent or weakly specified should be addressed as part of the next iteration of the action portfolio. It is identified in relation to 9 cities or associated recommendations in the review material. Assess current and future cooling demand, especially in relation to heat risk, vulnerable groups and adaptation.

Building-level renovation pathways need more detail should be addressed as part of the next iteration of the action portfolio. It is identified in relation to 12 cities or associated recommendations in the review material. Specify building types, floor area, renovation depth, expected savings and finance mechanisms.

District heating measures require clearer delivery logic should be addressed as part of the next iteration of the action portfolio. It is identified in relation to 10 cities or associated recommendations in the review material. Clarify ownership, investment needs, fuel switching, connection rates and emissions impact.

Heat decarbonisation should be linked to social impacts should be addressed as part of the next iteration of the action portfolio. It is identified in relation to 13 cities or associated recommendations in the review material. Assess affordability, energy poverty, rental housing and household distributional effects.

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Renewable energy sources

Renewable energy sources are a prominent strength in the Window 3 cohort. Cities increasingly use renewables not only as technical supply measures but also as vehicles for social innovation, energy communities, local value creation, citizen engagement and energy poverty reduction.

A recurrent challenge is that renewable energy strategies depend on land availability, grid capacity, permitting, public acceptance, storage and coordination with private owners or utilities. The strongest plans recognise these enabling conditions and begin to create governance arrangements to address them.

City	**Relevant strength or practice**
Bergamo	Promotes renewable energy communities and explicitly links RES with energy poverty and vulnerable citizens.
Milan	Includes the Affori Niguarda Solidarity Renewable Energy Community, with revenues distributed to vulnerable groups.
Eilat	Recognised for renewable energy sources and clean-energy co-benefits.
Kranj	Recognised for RES strengths as part of its pathways and action portfolio.
Miskolc	Recognised for RES strategy and smart climate solutions.
Prato	Recognised for RES actions within a circular-economy-oriented transition.
Trikala	Integrates energy strategy with smart and citizen-centric governance.
Gothenburg	Recognised for measures related to RES and hard-to-abate emissions.

Renewable storage is often underdeveloped should be addressed as part of the next iteration of the action portfolio. It is identified in relation to 10 cities or associated recommendations in the review material. Assess the role of batteries, flexibility, demand response and storage in high-RES systems.

Location and land-use implications need more detail should be addressed as part of the next iteration of the action portfolio. It is identified in relation to 12 cities or associated recommendations in the review material. Map sites, constraints, public acceptance issues and multi-functional land-use opportunities.

Common challenge	Number of cities	**Shared recommendation**
Renewable storage is often underdeveloped	10	Assess the role of batteries, flexibility, demand response and storage in high-RES systems.
Location and land-use implications need more detail	12	Map sites, constraints, public acceptance issues and multi-functional land-use opportunities.
RES for mobility and electrification needs clarification	11	Explain how clean electricity for transport and charging infrastructure will be supplied.
Energy community models require delivery details	9	Specify governance, ownership, revenue distribution, vulnerable-group access and monitoring.

RES for mobility and electrification needs clarification should be addressed as part of the next iteration of the action portfolio. It is identified in relation to 11 cities or associated recommendations in the review material. Explain how clean electricity for transport and charging infrastructure will be supplied.

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Energy community models require delivery details should be addressed as part of the next iteration of the action portfolio. It is identified in relation to 9 cities or associated recommendations in the review material. Specify governance, ownership, revenue distribution, vulnerable-group access and monitoring.

Transport and mobility

Transport remains one of the most challenging sectors because it combines infrastructure, behaviour, land use, national policy, vehicle markets, freight, commuting and public acceptance. Window 3 cities generally recognise the importance of modal shift, electrification, public transport and active mobility, but the level of operational detail varies significantly.

The strongest transport strategies are those that align emissions data with measures across passenger mobility, public transport, freight, cycling, walking, parking, traffic management, electrification and behavioural change. Where transport actions are placed in separate mobility plans, future CCC iterations should ensure that these plans are fully integrated with the emissions gap and monitoring system.

City	**Relevant strength or practice**
Aachen	Provides a comprehensive transport portfolio with clear KPIs and attention to barriers beyond municipal control.
Kranj	Recognised for transport strengths as part of its wider action portfolio.
Ljubljana	Recognised for transport actions within an exemplary multi-dimensional strategy.
Prato	Recognised for transport and impact pathway strengths.
The Hague	Links transport with behavioural change, stakeholder engagement and climate justice.
Milan	Provides a comprehensive transport strategy and governance links through AMAT and wider municipal directorates.

Modal shift measures need stronger quantification should be addressed as part of the next iteration of the action portfolio. It is identified in relation to 15 cities or associated recommendations in the review material. Quantify expected impacts of public transport, active mobility, parking and demand management.

Freight and logistics are often less developed should be addressed as part of the next iteration of the action portfolio. It is identified in relation to 12 cities or associated recommendations in the review material. Include freight stakeholders, urban logistics, low-emission zones and last-mile delivery measures.

Dependence on national policy requires explicit strategies should be addressed as part of the next iteration of the action portfolio. It is identified in relation to 14 cities or associated recommendations in the review material. Clarify assumptions about taxes, vehicle standards, rail investments and other external levers.

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Common challenge	Number of cities	Shared recommendation
Modal shift measures need stronger quantification	15	Quantify expected impacts of public transport, active mobility, parking and demand management.
Freight and logistics are often less developed	12	Include freight stakeholders, urban logistics, low-emission zones and last-mile delivery measures.
Dependence on national policy requires explicit strategies	14	Clarify assumptions about taxes, vehicle standards, rail investments and other external levers.
Transport monitoring needs mode-specific indicators	13	Track mode share, vehicle fleet composition, public transport use, cycling/walking and charging infrastructure.

Transport monitoring needs mode-specific indicators should be addressed as part of the next iteration of the action portfolio. It is identified in relation to 13 cities or associated recommendations in the review material. Track mode share, vehicle fleet composition, public transport use, cycling/walking and charging infrastructure.

Waste, wastewater and circular economy

Waste and circular economy are increasingly important in Window 3 because they connect direct emissions, Scope 3 emissions, construction materials, procurement, food systems and behavioural change. Several cities treat circularity as a core strategic lever rather than a marginal waste-management issue.

City	Relevant strength or practice
Prato	Strong reference case for circular economy rooted in local industrial history and socio-cultural change.
Milan	Recognised for waste/wastewater and circular economy strengths, urban metabolism and resource valorisation.
Aachen	Targets circular economy in building materials, recycling grey energy and sustainable agriculture and nutrition.
Suceava	Promotes recyclable materials for local production of construction elements.
Kranj	Recognised for waste and circularity strengths.
Ljubljana	Recognised for waste strengths within a systemic strategy.

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The strongest examples are those that move beyond waste diversion to consider urban metabolism, resource valorisation, construction materials, recyclable local production, food systems and circular procurement. The common weakness is uneven quantification of waste streams and circular economy impacts.

Common challenge	Number of cities	Shared recommendation
Waste baseline data are often insufficiently disaggregated	17	Disaggregate by waste stream, treatment, disposal route, origin and composition.
Circular economy impacts need clearer emissions logic	15	Connect material reuse, procurement, construction and food actions to Scope 3 and territorial emissions impacts.
Wastewater and sludge actions are often underdeveloped	12	Assess wastewater treatment, sludge reuse, resource efficiency and waste-to-x opportunities.
Circular economy governance needs stakeholder clarity	14	Identify municipal, utility, industry, construction, food and citizen roles.

Waste baseline data are often insufficiently disaggregated should be addressed as part of the next iteration of the action portfolio. It is identified in relation to 17 cities or associated recommendations in the review material. Disaggregate by waste stream, treatment, disposal route, origin and composition.

Circular economy impacts need clearer emissions logic should be addressed as part of the next iteration of the action portfolio. It is identified in relation to 15 cities or associated recommendations in the review material. Connect material reuse, procurement, construction and food actions to Scope 3 and territorial emissions impacts.

Wastewater and sludge actions are often underdeveloped should be addressed as part of the next iteration of the action portfolio. It is identified in relation to 12 cities or associated recommendations in the review material. Assess wastewater treatment, sludge reuse, resource efficiency and waste-to-x opportunities.

Circular economy governance needs stakeholder clarity should be addressed as part of the next iteration of the action portfolio. It is identified in relation to 14 cities or associated recommendations in the review material. Identify municipal, utility, industry, construction, food and citizen roles.

AFOLU, nature-based solutions and territorial systems

AFOLU and nature-based solutions remain unevenly developed across the cohort, partly because their relevance varies according to territorial boundaries, land availability and local

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emission profiles. However, these areas are important for residual emissions, biodiversity, adaptation, water management, recreation and peri-urban relations.

The strongest plans use AFOLU and NBS to connect climate neutrality with ecological and territorial transformation. Future iterations should ensure that natural sinks are not used to reduce the ambition of direct mitigation and that sequestration is clearly distinguished from emissions reductions.

City	**Relevant strength or practice**
Gothenburg	Recognised for nature-based solutions and hard-to-abate emissions.
Kranj	Recognised for AFOLU and NBS strengths and transboundary responsibility.
Ljubljana	Recognised for AFOLU and NBS as well as mitigation-adaptation synergies.
Miskolc	Recognised for nature-based solutions and smart mitigation-adaptation approaches.
Prato	Recognised for agriculture and land-use strengths.
Umeå	Frames ecological improvement as part of the wider transition logic.

AFOLU action impacts are often not quantified should be addressed as part of the next iteration of the action portfolio. It is identified in relation to 15 cities or associated recommendations in the review material. Estimate emissions reduction, sequestration, hectares affected and co-benefits for each action.

Natural sinks and residual emissions require careful accounting should be addressed as part of the next iteration of the action portfolio. It is identified in relation to 16 cities or associated recommendations in the review material. Separate gross emissions reductions, sequestration and compensation in all tables.

Common challenge	Number of cities	**Shared recommendation**
AFOLU action impacts are often not quantified	15	Estimate emissions reduction, sequestration, hectares affected and co-benefits for each action.
Natural sinks and residual emissions require careful accounting	16	Separate gross emissions reductions, sequestration and compensation in all tables.
Stakeholder roles in land-use actions need detail	13	Identify landowners, farmers, regional authorities, utilities and community actors.
NBS co-benefits should be monitored	14	Track biodiversity, heat mitigation, water, recreation, health and resilience benefits.

Stakeholder roles in land-use actions need detail should be addressed as part of the next iteration of the action portfolio. It is identified in relation to 13 cities or associated recommendations in the review material. Identify landowners, farmers, regional authorities, utilities and community actors.

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NBS co-benefits should be monitored should be addressed as part of the next iteration of the action portfolio. It is identified in relation to 14 cities or associated recommendations in the review material. Track biodiversity, heat mitigation, water, recreation, health and resilience benefits.

Industry, IPPU and hard-to-abate emissions

Industry and IPPU are often less mature than energy, buildings and transport, but they are increasingly visible in cities with industrial histories, port functions, circular economy strategies or hard-to-abate activities. This topic is especially important for understanding the limits of municipal authority and the need for private-sector commitments.

The best examples address industry through circular economy, construction materials, innovation partnerships, testbeds, procurement or hard-to-abate emissions governance. Common gaps relate to the limited status quo analysis of non-energy industrial emissions and unclear pathways for IPPU.

City	Relevant strength or practice
Gothenburg	Strong example of addressing hard-to-abate and Scope 3 emissions through governance innovation and stakeholder engagement.
Aachen	Provides examples on circular building materials and industrial energy consumption, while also highlighting the need for IPPU analysis.
Milan	Explores circular economy practices and carbon capture-related approaches.
Prato	Links climate neutrality to circular economy and industrial identity.
Bergamo	Includes construction, waste and IPPU-related reflections connected to circularity and renewable energy.

IPPU status quo analysis is often limited should be addressed as part of the next iteration of the action portfolio. It is identified in relation to 14 cities or associated recommendations in the review material. Describe industrial processes, product use emissions and relevant industrial stakeholders.

Industrial actions need clearer pathways should be addressed as part of the next iteration of the action portfolio. It is identified in relation to 13 cities or associated recommendations in the review material. Define what municipalities can influence through procurement, permitting, partnerships and innovation.

Common challenge	Number of cities	Shared recommendation
IPPU status quo analysis is often limited	14	Describe industrial processes, product use emissions and relevant industrial stakeholders.
Industrial actions need clearer pathways	13	Define what municipalities can influence through procurement, permitting, partnerships and innovation.

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Hard-to-abate dependencies need risk management	12	Identify technology readiness, market dependence and national policy dependencies.
Private-sector commitments need quantification	15	Delineate company-specific actions, expected reductions, investment needs and reporting arrangements.

Hard-to-abate dependencies need risk management should be addressed as part of the next iteration of the action portfolio. It is identified in relation to 12 cities or associated recommendations in the review material. Identify technology readiness, market dependence and national policy dependencies.

Private-sector commitments need quantification should be addressed as part of the next iteration of the action portfolio. It is identified in relation to 15 cities or associated recommendations in the review material. Delineate company-specific actions, expected reductions, investment needs and reporting arrangements.

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B.2 Window 4 sectoral insights

Stationary Energy, Buildings, Heating and Cooling

Stationary energy, buildings, heating and cooling remain central to Window 4 climate neutrality strategies. In many cities, building renovation, heating decarbonisation, district heating, heat pumps, energy efficiency, rooftop photovoltaics and municipal building leadership form the backbone of the action portfolio.

The strongest plans distinguish between municipal buildings, residential buildings, non-residential buildings and wider building stock, and combine technical measures with enabling instruments such as subsidies, advice, building standards, one-stop-shops and social support for energy-vulnerable households.

A recurring challenge is that cooling remains less developed than heating. This is important because climate adaptation, heat vulnerability and increasing cooling demand create potential future energy and equity implications, especially in southern and dense urban contexts.

Window 4 contains several strong models for building-sector decarbonisation and heating transition.

Buildings, heating and stationary energy remain central to the Window 4 transition portfolios. Across the cohort, city CCCs commonly describe actions on building renovation, energy efficiency, district heating, electrification, local renewable energy, energy poverty support and municipal estate decarbonisation. The level of detail is often stronger in this sector than in waste, AFOLU or IPPU, partly because cities frequently have existing building strategies, energy plans or renovation programmes that can be integrated into the CCC.

The strongest plans show a clear relationship between the building stock diagnosis and the proposed measures. This includes data on building age, insulation status, heating technologies, ownership patterns, municipal buildings, energy demand, district heating potential and vulnerable households. Where this relationship is clear, the CCC can justify why particular measures are prioritised, how renovation rates will be increased, and how the transition can avoid worsening affordability or energy poverty.

Athens is highlighted as a strong example because of its comprehensive analysis of the building stock, proactive approach to energy retrofitting and explicit connection between building decarbonisation and energy poverty alleviation. Athens is notable for its comprehensive portrayal of stationary energy and the building stock, including historical buildings and the connection to energy poverty. Helsinki, Istanbul, Vilnius, Budapest and Cork are identified as useful signposts for stationary energy and buildings. Warsaw, Vilnius and Budapest also provide examples related to heating, while Dresden is noted for an innovative district heating approach.

The recurring challenges concern the operational detail needed to reach 2030 targets. Some plans do not yet provide sufficient information on building types, floor area, renovation depth, expected energy savings, district heating expansion, cooling demand or the role of storage and demand response. Cooling is often treated weakly or not addressed, even where heat risks and adaptation needs are relevant. Future iterations should therefore strengthen the link between building-stock analysis, intervention design, financing, social safeguards and monitoring indicators.

Strengths and peer-learning examples:

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Helsinki provides a useful reference point for stationary energy within the Window 4 cohort. The feedback highlights that this practice is relevant for other Mission cities because it demonstrates how the CCC can be used to translate a strategic commitment into a more concrete governance, sectoral or implementation approach: The CCC describes a comprehensive strategy and action portfolio to decarbonise the stationary energy sector, with a strong focus on heating decarbonisation, energy efficiency, and reducing emissions through high -performance targets for new buildings. The strategy to decarbonise the heating sector is ambitious, targeting the largest emission sources through diverse and technologically inclusive measures.

City	Strength area	Peer-learning relevance
Helsinki	Stationary energy	The feedback identifies Helsinki as a useful peer-learning reference for stationary energy. The example should be consulted because it illustrates practical approaches that other Mission cities can adapt when refining their own Climate City Contracts, implementation arrangements and future CCC iterations.
Velenje	Stationary Energy	The feedback identifies Velenje as a useful peer-learning reference for stationary energy. The example should be consulted because it illustrates practical approaches that other Mission cities can adapt when refining their own Climate City Contracts, implementation arrangements and future CCC iterations.
Warsaw	Heating	The feedback identifies Warsaw as a useful peer-learning reference for heating. The example should be consulted because it illustrates practical approaches that other Mission cities can adapt when refining their own Climate City Contracts, implementation arrangements and future CCC iterations.
Istanbul	Stationary energy	The city is notable for its innovative approaches in the stationary energy sector, such as the pilot project on the coupling of anti -seismic and energy ren ovation in buildings (with due attention to citizens' involvement and funding/financing mechanisms), and its participation in Horizon Europe projects like Procure and Neuthralpath, which promote the development of Positive Energy Zones and Clean Energy Districts, providing solutions for historical buildings.
Budapest	Stationary energy	The feedback identifies Budapest as a useful peer-learning reference for stationary energy. The example should be consulted because it illustrates practical approaches that other Mission cities can adapt when refining their own Climate City Contracts, implementation arrangements and future CCC iterations.
Cork	Heating & Cooling	Cork City's action plan features a comprehensive strategy to decarbonise the heating and cooling sector, which effectively integrates a range of measures, including building-level interventions such as heat pump installations, district heating systems, and building renovations, to achieve a robust and multi-faceted approach to reducing emissions.
Tauragė	Heating & Cooling	The city's strategy to decarbonise the heating and cooling sector is comprehensive, with a strong focus on reducing fossil fuel use, generating clean electricity, promoting energy efficiency in residential

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		and non-residential buildings and improving energy efficiency in manufacturing and construction.

Velenje provides a useful reference point for stationary energy within the Window 4 cohort. The feedback highlights that this practice is relevant for other Mission cities because it demonstrates how the CCC can be used to translate a strategic commitment into a more concrete governance, sectoral or implementation approach: The efforts on exploitation of synergies between environmental and social aspects, with reference to the just transition initiatives and related financial and social measures, are well targeted towards overcoming challenges in private building renovation. The planned action targeting multi-dwelling building is noticeable for its ability to exploit the community-scale governance level that such building typology entail.

Warsaw provides a useful reference point for heating within the Window 4 cohort. The feedback highlights that this practice is relevant for other Mission cities because it demonstrates how the CCC can be used to translate a strategic commitment into a more concrete governance, sectoral or implementation approach: The CCC offers a comprehensive and well -balanced list of options to decarbonise the heating sector, targeting a mix of soft and hard measures, and considering all main technology options (e.g. heat pumps, waste heat, low -temperature district heating, heating network extension, deep renovation of buildings and smart districts, along with measures to modernise and expand remote management).

Istanbul provides a useful reference point for stationary energy within the Window 4 cohort. The feedback highlights that this practice is relevant for other Mission cities because it demonstrates how the CCC can be used to translate a strategic commitment into a more concrete governance, sectoral or implementation approach: The city is notable for its innovative approaches in the stationary energy sector, such as the pilot project on the coupling of anti -seismic and energy ren ovation in buildings (with due attention to citizens' involvement and funding/financing mechanisms), and its participation in Horizon Europe projects like Procure and Neuthralpath, which promote the development of Positive Energy Zones and Clean Energy Districts.

Budapest provides a useful reference point for stationary energy within the Window 4 cohort. The feedback highlights that this practice is relevant for other Mission cities because it demonstrates how the CCC can be used to translate a strategic commitment into a more concrete governance, sectoral or implementation approach: The city is notable for its comprehensive strategy and action portfolio to decarbonise the stationary energy sector, with an emphasis on building renovations, expanding district heating, and increasing solar energy use. The city effectively integrates a wide range of stakeholders and through the Budapest Climate Agency, a key strategic strength, it will manage funding schemes and implement large-scale projects.

The strongest examples in this section are useful because they show how a specific CCC component can be made more actionable, credible or transferable. The named cities should be read as signposts for peer learning, not as the only cities performing well in this area.

City	Strength / practice area	Why this is useful for peer learning
Bordeaux Métropole	Stationary energy	The strategy and action portfolio to decarbonise the stationary energy sector is well described, with a strong focus on heating decarbonisation. Planned actions indicate a clear increase in ambition compared to the status quo and include interesting elements from a technological point of view.

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Dresden	Innovate approach to district heating	Dresden's district heating development stands out as a remarkable strength, showcasing both technical and social innovation. The plan incorporates mechanisms such as the "Share of Wallet" tool, an innovative spatial mapping system that identifies areas where households allocate a significant portion of their income to.
Nantes Métropole	Stationary energy	The strategy and action portfolio to decarbonise the stationary energy sector are quite comprehensive, i.e. tackling all the sources of emissions in stationary energy present in the city, with particular emphasis on the retrofitting of buildings, on the decarbonisation and extension of the district heating system.
Athens	Stationary energy	The city is notable for its comprehensive portrayal of the stationary energy sector and the current building stock. It is commended for its proactive approach to energy retrofitting across various building types (including historical buildings) supported by national subsidy programs, the clear and ambitious targets set.
Helsinki	Stationary energy	The CCC describes a comprehensive strategy and action portfolio to decarbonise the stationary energy sector, with a strong focus on heating decarbonisation, energy efficiency, and reducing emissions through high-performance targets for new buildings.
Velenje	Stationary Energy	The efforts on exploitation of synergies between environmental and social aspects, with reference to the just transition initiatives and related financial and social measures, are well targeted towards overcoming challenges in private building renovation. The planned action targeting multi-dwelling building is noticeable.
Warsaw	Heating	The CCC offers a comprehensive and well-balanced list of options to decarbonise the heating sector, targeting a mix of soft and hard measures, and considering all main technology options (e.g. heat pumps, waste heat, low-temperature district heating, heating network extension, deep renovation of buildings and smart districts.

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Common challenges and recommendations:

The shared challenges in this section are not evidence that the theme is less important; rather, they indicate where future CCC iterations can deepen the level of detail and improve the plan's usefulness for implementation, monitoring and peer learning.

Common challenge	Pattern across Window 4 cities	Recommendation for future CCC iterations

Cooling insufficiently addressed	11 cities received recommendations related to stationary energy, heating, cooling or buildings.	Assess cooling demand, passive cooling, district cooling and climate adaptation links.
Building stock analysis incomplete	Some plans do not provide enough detail on typology, tenure, renovation potential or ownership.	Provide disaggregated building stock data and tailor measures to building categories.
Renovation measures not fully operationalised	Often the desired renovation rate is clear but delivery instruments are less detailed.	Define incentives, capacity needs, financing tools, skills strategies and responsible actors.
Insufficient attention to non-municipal buildings	Cities often have stronger plans for municipal assets than private building stock.	Use advisory services, financial instruments and stakeholder partnerships for private buildings.

Overall, this section suggests that Window 4 cities are moving towards more comprehensive CCCs, but the next iteration should focus on implementation readiness. The most useful improvements would be to strengthen the connection between the stated ambition, the action portfolio, stakeholder responsibilities, investment planning, and the monitoring framework.

Buildings, heating and stationary energy remain central to the Window 4 transition portfolios. Across the cohort, city CCCs commonly describe actions on building renovation, energy efficiency, district heating, electrification, local renewable energy, energy poverty support and municipal estate decarbonisation. The level of detail is often stronger in this sector than in waste, AFOLU or IPPU, partly because cities frequently have existing building strategies, energy plans or renovation programmes that can be integrated into the CCC.

The strongest plans show a clear relationship between the building stock diagnosis and the proposed measures. This includes data on building age, insulation status, heating technologies, ownership patterns, municipal buildings, energy demand, district heating potential and vulnerable households. Where this relationship is clear, the CCC can justify why particular measures are prioritised, how renovation rates will be increased, and how the transition can avoid worsening affordability or energy poverty.

Athens is highlighted as a strong example because of its comprehensive analysis of the building stock, proactive approach to energy retrofitting and explicit connection between building decarbonisation and energy poverty alleviation. Athens is notable for its comprehensive portrayal of stationary energy and the building stock, including historical buildings and the connection to energy poverty. Helsinki, Istanbul, Vilnius, Budapest and Cork are identified as useful signposts for stationary energy and buildings. Warsaw, Vilnius and Budapest also provide examples related to heating, while Dresden is noted for an innovative district heating approach.

The recurring challenges concern the operational detail needed to reach 2030 targets. Some plans do not yet provide sufficient information on building types, floor area, renovation depth, expected energy savings, district heating expansion, cooling demand or the role of storage and demand response. Cooling is often treated weakly or not addressed, even where heat risks and adaptation needs are relevant. Future iterations should therefore strengthen the link between building-stock analysis, intervention design, financing, social safeguards and monitoring indicators.

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Buildings and stationary energy remain among the most developed sectors in Window 4, reflecting their importance in urban emissions profiles and the availability of established policy instruments. Many cities provide comparatively detailed accounts of building stock, heating systems, renovation needs, district heating, energy efficiency and renewable energy integration. This makes the sector one of the strongest areas for peer learning.

Athens is highlighted for its portrayal of the stationary energy sector and building stock, including its focus on energy retrofitting across building types and the Energy Poverty Alleviation Office. Bordeaux Métropole, Nantes Métropole, Helsinki, Velenje, Istanbul, Vilnius, Budapest, Warsaw and Copenhagen are also identified as signposts for stationary energy or heating strengths. Dresden is a useful case for district heating and social innovation, particularly through the Share of Wallet tool and energy coaches, while Warsaw, Vilnius and Budapest provide further examples of heating-related strengths.

Despite these strengths, recommendations related to stationary energy, buildings, heating or cooling appear for 19 cities. Common gaps include insufficient detail on renovation depth, limited quantification of energy savings, underdeveloped cooling strategies, weak description of building sub-sectors, uncertainty over how private building owners will be mobilised, and incomplete links between energy poverty, renovation finance and implementation capacity. Several cities also need to clarify the role of district heating, heat pumps, geothermal energy, building electrification, demand response and nearly-zero or positive-energy buildings.

Future iterations should deepen the link between building-stock diagnostics and action design. Cities should disaggregate building types, ownership patterns, heating technologies, renovation needs and vulnerable household groups, then connect these data to targeted measures, financing instruments and monitoring indicators. This is especially important where social justice depends on making building renovation accessible to low-income households or tenants.

- Disaggregate stationary energy and building data by building type, tenure, age, energy carrier and renovation need.
- Quantify expected energy savings, emissions reductions and investment needs for major retrofit, heating and district energy measures.
- Address cooling demand and passive cooling where relevant, especially in cities facing heat stress.
- Connect energy-efficiency programmes with social equity measures, including energy poverty, tenant protection and targeted support for vulnerable households.

Transport and Mobility

Transport is one of the most important and challenging sectors in the Window 4 cohort. Many cities identify transport as a large share of emissions and propose portfolios combining public transport, active mobility, electrification, freight measures, modal shift, parking policy, traffic reduction and digital mobility tools.

The strongest transport strategies are those that align measures with the avoid-shift-improve logic and include clear indicators, stakeholders and implementation responsibilities. These strategies also recognise that cities often lack full authority over public transport, major infrastructure, ports, airports and national road policies.

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Challenges persist around freight and logistics, aviation and port emissions, transboundary commuting, **and the need for contingency planning** where climate targets depend on large infrastructure projects or national-level policy changes.

Several Window 4 cities offer useful transport examples for peer learning.

Transport is one of the most consequential sectors in the Window 4 cohort because it often accounts for a large share of remaining emissions and is frequently affected by jurisdictional complexity. City plans typically include measures related to modal shift, public transport, walking and cycling, vehicle electrification, traffic management, freight, parking policy, low-emission mobility and urban planning. However, many cities have only partial control over public transport systems, ports, airports, regional roads or national vehicle policy, making governance and partnership particularly important.

The strongest transport sections combine a clear diagnosis of current mobility patterns with a credible set of interventions across avoid-shift-improve or optimise-shift-improve logics. These plans do not rely only on vehicle electrification but also address demand reduction, active mobility, public transport attractiveness, freight logistics, parking management and behavioural change. They also identify where regional or national authorities need to be involved and where city-level actions can still create enabling conditions.

Athens is a strong example of a comprehensive transport portfolio focused on reducing motorised traffic, promoting active mobility and public transport, and creating a mobility observatory. Riga is repeatedly identified as a transport signpost, and Nantes Métropole, Helsinki, Istanbul, Vilnius and Sofia also provide useful examples. Leipzig is notable for its transport strategy, while Aarhus provides an important example of the challenges and opportunities associated with integrating a complementary Green Mobility Plan into the CCC.

The shared challenge is that transport measures often remain less quantified than their expected importance would require. Some plans do not provide sufficient estimates of emissions reduction by action, timelines for public transport expansion, contingency plans for delayed infrastructure, or specific indicators for modal shift. Freight, port and airport-related emissions are also inconsistently addressed. Future iterations should therefore give greater attention to transport governance, operational milestones and monitoring indicators that track behavioural as well as technological change.

Strengths and peer-learning examples

Helsinki provides a useful reference point for transport within the Window 4 cohort. The feedback highlights that this practice is relevant for other Mission cities because it demonstrates how the CCC can be used to translate a strategic commitment into a more concrete governance, sectoral or implementation approach: The city's actions in the transport sector exhibit a strong innovation component, a commitment to mitigating the carbon footprint of major transport investments, and a strong ambition on electrification. Further, the city's efforts to engage citizens and stakeholders in the transition process are also commendable, particularly through the establishment of a dedicated citizen panel. Finally, the city's collaboration.

City	Peer-learning relevance
Helsinki	The city's actions in the transport sector exhibit a strong innovation component, a commitment to mitigating the carbon footprint of major transport investments, and a strong ambition on electrification. Further, the city's efforts to engage citizens and stakeholders in the transition process are also commendable, particularly through the establishment of a dedicated citizen panel. Finally, the city's collaboration with regional partners to address cross-boundary transport emissions is a notable strength.

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Istanbul	The city is notable for its comprehensive strategy to decarbonise the transport sector, emphasising infrastructure measures, public transport development, and the use of alternative fuels and electrification. Istanbul is also recognised for its innovative initiatives in the sector and the massive investments in new high -capacity electric vehicles, new metro lines, and new railways.
Sofia	The feedback identifies Sofia as a useful peer-learning reference for transport. The example should be consulted because it illustrates practical approaches that other Mission cities can adapt when refining their own Climate City Contracts, implementation arrangements and future CCC iterations.
Budapest	The feedback identifies Budapest as a useful peer-learning reference for transport. The example should be consulted because it illustrates practical approaches that other Mission cities can adapt when refining their own Climate City Contracts, implementation arrangements and future CCC iterations.
Lund	its planned actions, which showcase a strong emphasis on innovation, featuring cutting-edge initiatives such as the incorporation of mobility hubs and the pioneering decarbonisation of the city's work machinery, demonstrating a commitment to creative and forward-thinking solution.
Oslo	The feedback identifies Oslo as a useful peer-learning reference for transport. The example should be consulted because it illustrates practical approaches that other Mission cities can adapt when refining their own Climate City Contracts, implementation arrangements and future CCC iterations.
Tauragė	Tauragė's transport decarbonisation efforts are supported by a dedicated transport-related group, establishing strong political leadership and coordination and involves a forward -thinking approach to building capacity and expertise in climate change and sustainability in transport.

Istanbul provides a useful reference point for transport within the Window 4 cohort. The feedback highlights that this practice is relevant for other Mission cities because it demonstrates how the CCC can be used to translate a strategic commitment into a more concrete governance, sectoral or implementation approach: The city is notable for its comprehensive strategy to decarbonise the transport sector, emphasising infrastructure measures, public transport development, and the use of alternative fuels and electrification. Istanbul is also recognised for its innovative initiatives in the sector and the massive investments in new high -capacity electric vehicles, new metro lines, and new railways.

Sofia provides a useful reference point for transport within the Window 4 cohort. The feedback highlights that this practice is relevant for other Mission cities because it demonstrates how the CCC can be used to translate a strategic commitment into a more concrete governance, sectoral or implementation approach: The city has taken a proactive approach to addressing emissions within its own boundary, with a strong focus on reducing energy use at the Sofia Airport and improving the sustainability of airport operations. This initiative demonstrates the city's commitment to reducing emissions from aviation -related activities and showcases its ability to work effectively with stakeholders to achiev e climate goals.

Budapest provides a useful reference point for transport within the Window 4 cohort. The feedback highlights that this practice is relevant for other Mission cities because it demonstrates how the CCC can be used to translate a strategic commitment into a more concrete governance, sectoral or implementation approach: The city is commended for actively involving citizens in traffic calming projects through pilot initiatives and gathering feedback for permanent solutions, as well as for its thorough planning as concerns logistics optimisation (designated loading areas, a booking system, a sustainable city logistics policy that includes data -driven interventions and regulatory changes).

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Lund provides a useful reference point for transport within the Window 4 cohort. The feedback highlights that this practice is relevant for other Mission cities because it demonstrates how the CCC can be used to translate a strategic commitment into a more concrete governance, sectoral or implementation approach: its planned actions, which showcase a strong emphasis on innovation, featuring cutting-edge initiatives such as the incorporation of mobility hubs and the pioneering decarbonisation of the city's work machinery, demonstrating a commitment to creative and forward-thinking solution.

The strongest examples in this section are useful because they show how a specific CCC component can be made more actionable, credible or transferable. The named cities should be read as signposts for peer learning, not as the only cities performing well in this area.

City	Why this is useful for peer learning
Leipzig	Leipzig presents a systemic and forward-looking approach to urban mobility, combining multimodal services (e.g., LeipzigMOVE), city-wide mobility stations, low- car district planning, and private sector engagement. Notably, the city addresses trade-offs in mobility decarbonisation and explores innovative governance.
Nantes Métropole	The strategy and action portfolio to decarbonise the transport sector are comprehensive, i.e. tackling all the sources of emissions concerning transport and mobility present in the city, with particular emphasis on reducing car dependence and developing alternative modes of transport at the city level.
Riga	The city of Riga's transport actions portfolio presents a multi-faceted approach, prioritizing a shift away from private car usage and towards sustainable modes of transport, including public transport, cycling, and walking. The plan engages a wide range of stakeholders and forecasts significant investments.
Athens	The CCC offers a comprehensive transport policy portfolio, which prioritises reducing motorised traffic and promoting public transport and active mobility. It effectively addresses barriers by engaging all relevant stakeholders and aligning measures with the city's competencies, despite limited authority over public transport.
Helsinki	The city's actions in the transport sector exhibit a strong innovation component, a commitment to mitigating the carbon footprint of major transport investments, and a strong ambition on electrification. Further, the city's efforts to engage citizens and stakeholders in the transition process are also notable.
Istanbul	The city is notable for its comprehensive strategy to decarbonise the transport sector, emphasising infrastructure measures, public transport development, and the use of alternative fuels and electrification.
Vilnius	The city is notable for the well-aligned and ambitious policies, plans, and laws to decarbonise the transport sector, with a strong focus on infrastructure measures, developing and improving public transport, promoting active mobility, and pursuing bold fuel replacements towards sustainable and low-carbon options.
Sofia	The city has taken a proactive approach to addressing emissions within its own boundary, with a strong focus on reducing energy use at the Sofia Airport and improving the sustainability of airport operations. This initiative demonstrates the city's commitment to reducing emissions from aviation-related activities.

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Common challenges and recommendations

The shared challenges in this section are not evidence that the theme is less important; rather, they indicate where future CCC iterations can deepen the level of detail and improve the plan's usefulness for implementation, monitoring and peer learning.

Common challenge	Pattern across Window 4 cities	Recommendation for future CCC iterations
Freight and logistics underdeveloped	11 cities received transport-specific recommendations.	Include urban freight, last-mile logistics, cargo bikes, electric vans and delivery consolidation.
Major infrastructure dependencies	Common where metro, rail, tram or public transport expansion is central to the emissions pathway.	Create contingency plans for delays and define interim measures.
Ports, airports and waterborne emissions unclear	Relevant for port, airport and coastal cities.	Clarify inclusion in inventories and targets and develop cooperation with operators and higher levels of government.
KPIs not sufficiently specific	Some plans include transport objectives without clear indicators.	Monitor modal share, vehicle electrification, public transport uptake, cycling infrastructure and freight emissions.

Overall, this section suggests that Window 4 cities are moving towards more comprehensive CCCs, but the next iteration should focus on implementation readiness. The most useful improvements would be to strengthen the connection between the stated ambition, the action portfolio, stakeholder responsibilities, investment planning, and the monitoring framework.

Transport is one of the most consequential sectors in the Window 4 cohort because it often accounts for a large share of remaining emissions and is frequently affected by jurisdictional complexity. City plans typically include measures related to modal shift, public transport, walking and cycling, vehicle electrification, traffic management, freight, parking policy, low-emission mobility and urban planning. However, many cities have only partial control over public transport systems, ports, airports, regional roads or national vehicle policy, making governance and partnership particularly important.

The strongest transport sections combine a clear diagnosis of current mobility patterns with a credible set of interventions across avoid-shift-improve or optimise-shift-improve logics. These plans do not rely only on vehicle electrification but also address demand reduction, active mobility, public transport attractiveness, freight logistics, parking management and behavioural change. They also identify where regional or national authorities need to be involved and where city-level actions can still create enabling conditions.

Athens is a strong example of a comprehensive transport portfolio focused on reducing motorised traffic, promoting active mobility and public transport, and creating a mobility observatory. Riga is repeatedly identified as a transport signpost, and Nantes Métropole, Helsinki, Istanbul, Vilnius and Sofia also provide useful examples. Leipzig is notable for its transport strategy, while Aarhus provides an important example of the challenges and opportunities associated with integrating a complementary Green Mobility Plan into the CCC.

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The shared challenge is that transport measures often remain less quantified than their expected importance would require. Some plans do not provide sufficient estimates of emissions reduction by action, timelines for public transport expansion, contingency plans for delayed infrastructure, or specific indicators for modal shift. Freight, port and airport-related emissions are also inconsistently addressed. Future iterations should therefore give greater attention to transport governance, operational milestones and monitoring indicators that track behavioural as well as technological change.

Transport is a high-impact sector in Window 4 and one of the most challenging areas for implementation because many cities depend on regional or national competencies for public transport, major infrastructure, freight systems, ports, airports or road pricing. The strongest plans combine modal shift, public transport improvement, active mobility, electrification, freight measures and smart mobility with governance arrangements that recognise these jurisdictional dependencies.

Athens provides a strong example through its comprehensive transport portfolio, which prioritises reduced motorised traffic, public transport and active mobility, while also proposing a mobility observatory. Nantes Métropole, Riga, Helsinki, Istanbul, Vilnius, Sofia, Oslo, Lund, Kraków, Budapest and Leipzig are also useful signposts for transport-related strengths. These cases show that Window 4 cities increasingly frame mobility as a systemic transition involving infrastructure, behaviour change, data, social equity and multi-level coordination.

Recommendations related to transport appear for 15 cities. Common issues include insufficient detail on action implementation, weak treatment of freight and last-mile delivery, limited indicators for walking and cycling, incomplete contingency planning for delayed infrastructure, lack of clarity on airport and port-related emissions, and over-reliance on national policy changes or external infrastructure decisions. Some cities also need to better connect transport measures with air quality, public health, road safety and social access.

The next generation of CCC transport sections should include a hierarchy of measures: avoid and reduce unnecessary travel, shift to public and active modes, improve vehicle and fuel technologies, and integrate logistics and freight. Cities should also specify where they have direct authority, where they need regional or national cooperation, and where stakeholder commitments from transport operators, businesses or logistics actors are needed.

- Develop transport action portfolios that combine public transport, active mobility, demand management, electrification, freight and urban planning measures.
- Clarify municipal responsibilities and dependencies on metropolitan, regional or national actors for public transport, ports, airports and road infrastructure.
- Quantify emissions reduction potential and specify KPIs for walking, cycling, public transport, vehicle electrification and freight logistics.
- Include contingency strategies for high-impact infrastructure measures where delays would affect the 2030 pathway.

Renewable Energy Systems and Local Production

Renewable energy strategies are a major strength in several Window 4 CCCs, but the cohort varies significantly in local production potential, grid context, district heating structures, and municipal influence over energy systems. Many cities focus on solar PV, while others combine solar, wind, geothermal, biomass, district heating and energy communities.

The strongest approaches provide evidence of current renewable energy shares, local production potential, quantified installation targets, enabling policy instruments, stakeholder

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partnerships and monitoring indicators. They also consider trade-offs around land use, storage, grid capacity and social acceptance.

A recurring challenge is that renewable energy plans often do not sufficiently address storage, grid connection, mobility electricity demand or how private renewable generation will be enabled at scale.

Renewable energy systems are a major area of ambition across Window 4 cities, but the form of ambition varies according to local geography, governance powers, grid constraints and available land or roof space. Many plans emphasise solar PV, district energy, wind, geothermal potential, green electricity procurement, energy communities or local production linked to municipal assets. The more advanced plans combine infrastructure deployment with governance, citizen engagement, spatial planning and monitoring arrangements.

A key trend in the cohort is the growing attention to feasibility and trade-offs. Several cities recognise that renewable energy development requires land availability, grid connection, social acceptance, storage, public-private coordination and clear rules for private installations. This is particularly important where the target depends on rapid increases in PV or wind capacity, or where local energy production is linked to social objectives such as energy poverty alleviation and revenue redistribution.

Aarhus provides a strong example through the Co-Shape project and Energy Park Spørring, which connects integrated energy production, land-use planning, co-creation and knowledge transfer. Athens is highlighted for a solar map, rooftop PV strategy, attention to storage and adaptive monitoring of the national grid. Riga, Bristol, Helsinki, Warsaw, Trondheim, Bordeaux Métropole, Nantes Métropole, Reykjavík and Stavanger provide further examples of RES-related good practice. Dijon Métropole is also notable for an innovative energy strategy, and Leipzig provides a renewable energy strategy connected to broader impact pathways.

The recurrent recommendations concern diversification, storage, grid integration and clearer quantification. Several plans are encouraged to move beyond a narrow focus on solar PV, explain where renewable electricity for mobility will come from, address storage and flexibility, quantify expected installed capacity, and consider potential social or environmental risks. Future CCC iterations should therefore strengthen the link between renewable energy measures, electricity demand growth, transport electrification, district heating, grid constraints and community acceptance.

Strengths and peer-learning examples

Window 4 provides several strong examples of renewable energy planning and enabling environments.

City	Peer-learning relevance
Bristol	The feedback identifies Bristol as a useful peer-learning reference for res. The example should be consulted because it illustrates practical approaches that other Mission cities can adapt when refining their own Climate City Contracts, implementation arrangements and future CCC iterations.
Helsinki	The CCC is strengthened by the advanced stage of renewable energy production in Finland and the commitment of the local energy company, Helen, to achieving carbon-neutral energy production by 2030, through a compelling mix of solar PV, wind energy, waste heat use, sustainable bioenergy, nuclear energy along with the deployment of heat pumps and energy storage provisions.
Warsaw	The RES strategy and action portfolio considers all relevant types of RES, technological options, and instruments for their deployment. The city's plan also shows a particular emphasis on storage and energy management, which is positively noted. Additionally, the city is commended for its intention to synergise activities through integrated projects, combining RES production, energy storage, and energy

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	management systems, which demonstrates a forward-thinking approach to holistic action.
Trondheim	The feedback identifies Trondheim as a useful peer-learning reference for res. The example should be consulted because it illustrates practical approaches that other Mission cities can adapt when refining their own Climate City Contracts, implementation arrangements and future CCC iterations.
Istanbul	The city's identification of key resources such as solar, wind, biomass, and geothermal energy as part of its roadmap is a positive step towards a low -carbon future. Participation in innovative projects like UP2030 (Horizon project) is also seen as a strength, given its aim to model the use of clean energy for building use and electric vehicle charging, while also promoting the use of renewable energy systems in daily life through innovative urban furniture and stakeholder engagement.
Sofia	comprehensive approach to renewable energy sources (RES) which includes a balance of infrastructure and soft measures. The city is promoting energy storage solutions, energy communities, electrification, and has adequate enabling measure in place, such as a spatial map of RES sites and a guide for the establishment of energy communities. The city is also leveraging EU funds to develop energy storage solutions and smart grid systems, which suggests a strong commitment to deploying RES and support their development.
Budapest	Noteworthy are projects to unite local stakeholders to explore the development of positive energy districts and energy communities in Budapest, the attention to multiple RES sources (solar, geothermal, and wind) and to multiple urban surfaces useful for RES production (including car parks).

Bristol provides a useful reference point for res within the Window 4 cohort. The feedback highlights that this practice is relevant for other Mission cities because it demonstrates how the CCC can be used to translate a strategic commitment into a more concrete governance, sectoral or implementation approach: Two notable approaches in the renewable energy sources sector deserve attention. One of these is the use of public-private partnerships, as seen in the Br istol City Leap program, to develop large-scale solar and wind systems. The second is the facilitation of market -based delivery of solar systems through group buying schemes.

Helsinki provides a useful reference point for res within the Window 4 cohort. The feedback highlights that this practice is relevant for other Mission cities because it demonstrates how the CCC can be used to translate a strategic commitment into a more concrete governance, sectoral or implementation approach: The CCC is strengthened b y the advanced stage of renewable energy production in Finland and the commitment of the local energy company, Helen, to achieving carbon-neutral energy production by 2030, through a compelling mix of solar PV, wind energy, waste heat use, sustainable bioenergy, nuclear energy along with the deployment of heat pumps and energy storage provisions..

Warsaw provides a useful reference point for res within the Window 4 cohort. The feedback highlights that this practice is relevant for other Mission cities because it demonstrates how the CCC can be used to translate a strategic commitment into a more concrete governance, sectoral or implementation approach: The RES strategy and action portfolio considers a ll relevant types of RES, technological options, and instruments for their deployment. The city's plan also shows a particular emphasis on storage and energy management, which is positively noted. Additionally, the city is commended for its intention to synergise activities through integrated projects, combining RES production, energy storage, and energy management system.

Trondheim provides a useful reference point for res within the Window 4 cohort. The feedback highlights that this practice is relevant for other Mission cities because it demonstrates how the CCC can be used

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to translate a strategic commitment into a more concrete governance, sectoral or implementation approach: A significant strength of the plan is its approach to renewable energy sources (RES), which leverages the city's abundant hydroelectricity resources and aims to electrify the system. The inclusion of energy analysis, digital maps, and scenario-building, as well as the incorporation of research and innovation (R&I), demonstrates a forward-thinking and comprehensive approach to energy planning.

Istanbul provides a useful reference point for res within the Window 4 cohort. The feedback highlights that this practice is relevant for other Mission cities because it demonstrates how the CCC can be used to translate a strategic commitment into a more concrete governance, sectoral or implementation approach: The city's identification of key resources such as solar, wind, biomass, and geothermal energy as part of its roadmap is a positive step towards a low -carbon future. Participation in innovative projects like UP2030 (Horizon project) is also seen as a strength, given its aim to model the use of clean energy for building use and electric vehicle charging, while also promoting the use of renewable energy systems.

The strongest examples in this section are useful because they show how a specific CCC component can be made more actionable, credible or transferable. The named cities should be read as signposts for peer learning, not as the only cities performing well in this area.

City	Why this is useful for peer learning
Aarhus	the Co-Shape project funded within the NetZeroCities Pilot Cities programme, is a notable initiative in the renewable energy sector, boasting innovative features like the Energy Park Spørring, a 1,000-hectare hub for integrated energy production. The project also includes holistic energy planning, co-creation and engagement.
Bordeaux Métropole	Renewable energy is well integrated in the action portfolio, both for thermal energy (i.e. new district heating networks using renewable energy and heat recovery from industrial sites) and electricity generation (e.g. small- and large-scale photovoltaic installations at rooftops and car parks). The city is commended fo.
Dijon Métropole	Notably, the plan emphasizes the decarbonisation of the gas system through the integration of sustainable sources like biogas, green hydrogen, and syngas. These are produced through methods such as mechanization of organic waste, electrolysis of water using renewable electricity, and the valorisation of agricultural re.
Leipzig	Leipzig demonstrates strong commitment to expanding renewable energy through concrete projects, such as the installation of PV systems on municipal buildings, the identification of suitable areas for solar deployment, and mixed- use approaches like agri-PV and industrial rooftops.
Nantes Métropole	The strategy and action portfolio for the deployment of RES are comprehensive, with a variety of RES systems considered, especially solar systems. The city is notable for considering new bold applications, such as the solarisation of Nantes' ring road to overcome barriers on limited land/surface availability for RES.
Reykjavík	the city is already in a strong position with regards to renewables, with 100% penetration in electricity and heating systems, and therefore does not require further measures to increase production or penetration in these areas. The city's focus on promoting the use of renewables in other sectors, such as transport and.
Riga	Renewable energy sources are a key element in the plan and the document presents a comprehensive approach, with a clear focus on increasing the share of RES in the energy system, promoting decarbonisation, and addressing barriers to RES adoption. The plan includes a range of actions, such as promoting photovoltaic systems.

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Stavanger	Stavanger's plan demonstrates a comprehensive approach to integrating electrification and decarbonisation in relation to waterborne transport, incorporating battery- powered vessels and exploring opportunities for increased onshore electricity generation, such as solar installations in the port and industrial area.

Common challenges and recommendations

The shared challenges in this section are not evidence that the theme is less important; rather, they indicate where future CCC iterations can deepen the level of detail and improve the plan's usefulness for implementation, monitoring and peer learning.

Common challenge	Pattern across Window 4 cities	Recommendation for future CCC iterations
Storage and grid flexibility underdeveloped	9 cities received RES-specific recommendations.	Include storage, demand response, grid capacity and flexibility mechanisms.
RES potential not fully quantified	Some cities provide measures without quantified MW or production estimates.	Provide technology-specific potential and installation targets.
Mobility electricity demand not linked to RES strategy	Common where vehicle electrification is planned separately from renewable supply.	Explain how clean electricity for mobility will be generated or procured.
Social acceptance and land-use trade-offs need more attention.	Relevant for wind, solar parks and energy infrastructure.	Use co-creation, compensation mechanisms and spatial planning to manage trade-offs.

Overall, this section suggests that Window 4 cities are moving towards more comprehensive CCCs, but the next iteration should focus on implementation readiness. The most useful improvements would be to strengthen the connection between the stated ambition, the action portfolio, stakeholder responsibilities, investment planning, and the monitoring framework.

Renewable energy systems are a major area of ambition across Window 4 cities, but the form of ambition varies according to local geography, governance powers, grid constraints and available land or roof space. Many plans emphasise solar PV, district energy, wind, geothermal potential, green electricity procurement, energy communities or local production linked to municipal assets. The more advanced plans combine infrastructure deployment with governance, citizen engagement, spatial planning and monitoring arrangements.

A key trend in the cohort is the growing attention to feasibility and trade-offs. Several cities recognise that renewable energy development requires land availability, grid connection, social acceptance, storage, public-private coordination and clear rules for private installations. This is particularly important where the target depends on rapid increases in PV or wind capacity, or where local energy production is linked to social objectives such as energy poverty alleviation and revenue redistribution.

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Aarhus provides a strong example through the Co-Shape project and Energy Park Spørring, which connects integrated energy production, land-use planning, co-creation and knowledge transfer. Athens is highlighted for a solar map, rooftop PV strategy, attention to storage and adaptive monitoring of the national grid. Riga, Bristol, Helsinki, Warsaw, Trondheim, Bordeaux Métropole, Nantes Métropole, Reykjavík and Stavanger provide further examples of RES-related good practice. Dijon Métropole is also notable for an innovative energy strategy, and Leipzig provides a renewable energy strategy connected to broader impact pathways.

The recurrent recommendations concern diversification, storage, grid integration and clearer quantification. Several plans are encouraged to move beyond a narrow focus on solar PV, explain where renewable electricity for mobility will come from, address storage and flexibility, quantify expected installed capacity, and consider potential social or environmental risks. Future CCC iterations should therefore strengthen the link between renewable energy measures, electricity demand growth, transport electrification, district heating, grid constraints and community acceptance.

Renewable energy is one of the most widespread strength areas in Window 4, but it also reveals a transition from project-level deployment towards system-level energy planning. Many cities now include solar PV, wind, district heating decarbonisation, geothermal potential, energy communities, local production and grid interactions. The strongest cases also address land-use trade-offs, social acceptance, storage, private deployment and the relationship between local renewables and the national electricity mix.

Aarhus is a leading signpost through the Co-Shape project and Energy Park Spørring, which combines energy production, land-use optimisation, co-creation and replicability. Athens is notable for using a Solar Map, rooftop potential analysis and storage provisions. Bordeaux Métropole, Nantes Métropole, Riga, Bristol, Helsinki, Warsaw, Trondheim, Reykjavík and Stavanger provide additional examples of renewable energy strengths. These cases show that Window 4 cities are increasingly linking renewable energy deployment to governance innovation and spatial planning.

Recommendations related to renewable energy appear for 34 cities, making this one of the most common areas for further refinement. The main issues include insufficient detail on storage, missing MW or GWh estimates for individual measures, uncertainty about grid connection and energy selling, limited discussion of renewable energy for mobility, weak treatment of hydrogen or biomass assumptions, and insufficient assessment of negative impacts or public acceptance risks. This indicates that RES strategies are present across the cohort, but often need to become more technically and socially robust.

Future iterations should treat renewable energy as an integrated system. Plans should explain how local generation interacts with demand reduction, electrification, storage, grid capacity, energy communities, district heating and mobility electrification. They should also include spatial information on potential sites, stakeholder responsibilities, social acceptance strategies and risk mitigation for delays in grid or infrastructure upgrades.

- Quantify expected renewable capacity, energy generation, emissions impact and investment needs for major RES measures.
- Explain the role of storage, demand response, grid connection and flexibility in enabling higher renewable shares.
- Clarify how renewable energy for electric mobility and heating will be supplied.
- Address public acceptance, land-use conflicts, energy communities and social value creation as part of the RES enabling environment.

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Waste, Wastewater and Circular Economy

Waste, wastewater and circular economy are treated unevenly across the Window 4 cohort. Several cities provide strong circular economy measures, recycling strategies, composting, waste prevention and waste-to-energy optimisation, while others provide only limited status quo information or do not sufficiently distinguish waste and wastewater emissions.

The strongest plans connect waste management to broader circular economy systems, public-private partnerships, urban mining, repair infrastructure, bio-waste, wastewater resource recovery and behavioural change. In these cases, waste is not simply a residual sector but a source of systemic circularity and resource efficiency.

Common gaps include limited wastewater actions, weak disaggregation of waste data, insufficient monitoring of waste-related GHG emissions, and limited treatment of incineration and waste-to-energy emissions in long-term neutrality strategies.

Several Window 4 cities provide good practice in waste and circular economy.

Waste, wastewater and circular economy appear as a mixed area of maturity across Window 4. Some cities provide comprehensive measures for recycling, composting, urban mining, circular procurement, wastewater treatment and resource recovery, while others give limited attention to the sector because direct emissions appear small in the baseline. The CCCs nevertheless show that the sector remains important for Scope 3 emissions, material efficiency, construction, food systems, energy recovery and long-term climate-neutrality credibility.

The strongest plans treat circularity as a cross-sectoral lever rather than a narrow waste-management issue. This is particularly relevant for construction materials, food systems, procurement, building renovation and industrial symbiosis. Where circular economy is linked to emissions accounting and action-level implementation, it becomes a bridge between territorial emissions, consumption-based emissions and wider urban transformation.

Dijon Métropole is an important signpost for circularity and sustainable food, including imported emissions and life-cycle perspectives. Aarhus is noted for circular economy actions linked to construction, procurement and food systems, including consumption-based emissions targets that go beyond the Mission minimum. Athens is notable for comprehensive measures on recycling, composting and circular economy, while Nantes Métropole and Warsaw also provide useful examples. Istanbul and Vilnius are signposted for waste/wastewater, and Aarhus provides strong practice through integrated waste/wastewater measures, circularity and innovative projects such as ReWater and biocovers.

The shared challenge is that waste and wastewater are often under-described relative to other sectors. Some plans do not provide sufficient information on waste composition, treatment pathways, wastewater and sludge reuse, organic waste management, incineration emissions, data gaps or sector-specific monitoring indicators. Future iterations should treat this sector not only as a residual emissions category, but as an opportunity for circular economy, Scope 3 reduction and resource-efficiency gains.

Strengths and peer-learning examples

City	Peer-learning relevance

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Warsaw	The plan demonstrates a strong focus on optimising waste -to-energy processes and exploring all sources of waste heat within dedicated partnerships.
Istanbul	The feedback identifies Istanbul as a useful peer-learning reference for waste/wastewater. The example should be consulted because it illustrates practical approaches that other Mission cities can adapt when refining their own Climate City Contracts, implementation arrangements and future CCC iterations.
Budapest	Budapest is notable for its Prevention Platform, focusing on expanding awareness centres and community repair shops, and considering policy interventions and public-private partnerships, alongside developing an Integrated City Food Strategy aimed at providing sustainable food options, reducing food waste, and promoting urban agriculture to contribute to decarbonisation efforts and support socially vulnerable groups.
Nantes Métropole	The city is pra ised for integrating circular economy principles with inclusive local development. Fostering reuse, supporting repair networks, and embedding job integration objectives into climate policy demonstrates a forward-thinking, socially grounded form of innovation.

Warsaw provides a useful reference point for waste within the Window 4 cohort. The feedback highlights that this practice is relevant for other Mission cities because it demonstrates how the CCC can be used to translate a strategic commitment into a more concrete governance, sectoral or implementation approach: The plan demonstrates a strong focus on optimising waste -to-energy processes and exploring all sources of waste heat within dedicated partnerships..

Istanbul provides a useful reference point for waste/wastewater within the Window 4 cohort. The feedback highlights that this practice is relevant for other Mission cities because it demonstrates how the CCC can be used to translate a strategic commitment into a more concrete governance, sectoral or implementation approach: The plan offers a comprehensive strategy and action port folio for decarbonising the waste/wastewater sector, reflecting a strong commitment to circular economy principles. The action portfolio includes significant infrastructure investments, ambitious initiatives, and proactive approach to innovation and sustai nability, particularly in wastewater management and waste -to-energy projects. The city's clear focus on b.

Budapest provides a useful reference point for waste within the Window 4 cohort. The feedback highlights that this practice is relevant for other Mission cities because it demonstrates how the CCC can be used to translate a strategic commitment into a more concrete governance, sectoral or implementation approach: Budapest is notable for its Prevention Platform, focusing on expanding awareness centres and community repair shops, and considering policy interventions and public-private partnerships, alongside developing an Integrated City Food Strategy aimed at providing sustainable food options, reducing food waste, and promoting urban agriculture to contribute to decarbonisation efforts and support socially vulnerable groups..

Nantes Métropole provides a useful reference point for waste within the Window 4 cohort. The feedback highlights that this practice is relevant for other Mission cities because it demonstrates how the CCC can be used to translate a strategic commitment into a more concrete governance, sectoral or implementation approach: The city is pra ised for integrating circular economy principles with inclusive local development. Fostering reuse, supporting repair networks, and embedding job integration objectives into climate policy demonstrates a forward-thinking, socially grounded form of innovation.

The strongest examples in this section are useful because they show how a specific CCC component can be made more actionable, credible or transferable. The named cities should be read as signposts for peer learning, not as the only cities performing well in this area.

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City	Strength / practice area	Why this is useful for peer learning
Dijon Métropole	Circularity	The feedback identifies Dijon Métropole as a useful peer-learning reference for circularity. The example should be consulted because it illustrates practical approaches that other Mission cities can adapt when refining their own Climate City Contracts, implementation arrangements and future CCC iterations.
Nantes Métropole	Waste	The city is notable for integrating circular economy principles with inclusive local development. Fostering reuse, supporting repair networks, and embedding job integration objectives into climate policy demonstrates a forward-thinking, socially grounded form of innovation.
Athens	Waste	The plan includes comprehensive measures for recycling, composting, and circular economy strategies, reflecting a notable increase in ambition compared to the current status. It demonstrates a commitment to capacity building, aiming to bolster the Cleaning and Recycling Department's workforce and infrastructure to enha.
Warsaw	Waste	The plan demonstrates a strong focus on optimising waste-to-energy processes and exploring all sources of waste heat within dedicated partnerships.
Istanbul	Waste/wastewater	The plan offers a comprehensive strategy and action portfolio for decarbonising the waste/wastewater sector, reflecting a strong commitment to circular economy principles. The action portfolio includes significant infrastructure investments, ambitious initiatives, and proactive approach to innovation and sustainability.
Vilnius	Waste/wastewater	The strategy and action portfolio to decarbonise the waste/wastewater sector addresses critical emission sources through advanced waste treatment and recycling practices. The city is also commended for its innovative approach to waste management, including the use of insect larvae to process household food waste and pl.

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Common challenges and recommendations

The shared challenges in this section are not evidence that the theme is less important; rather, they indicate where future CCC iterations can deepen the level of detail and improve the plan's usefulness for implementation, monitoring and peer learning.

Common challenge	Pattern across Window 4 cities	Recommendation for future CCC iterations

Waste and wastewater status quo incomplete	12 cities received waste or wastewater recommendations.	Disaggregate waste and wastewater emissions, treatment routes, composition and origin.
Wastewater often missing	A recurrent gap across the cohort.	Include wastewater and sludge reuse, energy recovery and treatment plant efficiency.
Circular economy not fully linked to emissions	Some plans describe circularity without quantifying emissions effects.	Estimate GHG impacts of waste prevention, reuse, recycling and repair actions.
Incineration and waste-to-energy need long-term strategy	Relevant where waste-to-energy is present or possible.	Clarify treatment of incineration emissions and links to heat systems.

Overall, this section suggests that Window 4 cities are moving towards more comprehensive CCCs, but the next iteration should focus on implementation readiness. The most useful improvements would be to strengthen the connection between the stated ambition, the action portfolio, stakeholder responsibilities, investment planning, and the monitoring framework.

Waste, wastewater and circular economy appear as a mixed area of maturity across Window 4. Some cities provide comprehensive measures for recycling, composting, urban mining, circular procurement, wastewater treatment and resource recovery, while others give limited attention to the sector because direct emissions appear small in the baseline. The CCC materials nevertheless show that the sector remains important for Scope 3 emissions, material efficiency, construction, food systems, energy recovery and long-term climate-neutrality credibility.

The strongest plans treat circularity as a cross-sectoral lever rather than a narrow waste-management issue. This is particularly relevant for construction materials, food systems, procurement, building renovation and industrial symbiosis. Where circular economy is linked to emissions accounting and action-level implementation, it becomes a bridge between territorial emissions, consumption-based emissions and wider urban transformation.

Dijon Métropole is an important signpost for circularity and sustainable food, including imported emissions and life-cycle perspectives. Aarhus is noted for circular economy actions linked to construction, procurement and food systems, including consumption-based emissions targets that go beyond the Mission minimum. Athens is notable for comprehensive measures on recycling, composting and circular economy, while Nantes Métropole and Warsaw also provide useful examples. Istanbul and Vilnius are signposted for waste/wastewater, and Aarhus provides strong practice through integrated waste/wastewater measures, circularity and innovative projects such as ReWater and biocovers.

The shared challenge is that waste and wastewater are often under-described relative to other sectors. Some plans do not provide sufficient information on waste composition, treatment pathways, wastewater and sludge reuse, organic waste management, incineration emissions, data gaps or sector-specific monitoring indicators. Future iterations should treat this sector not only as a residual emissions category, but as an opportunity for circular economy, Scope 3 reduction and resource-efficiency gains.

Waste, wastewater and circular economy are more uneven in Window 4 than energy and transport. Some cities provide strong circular economy strategies, recycling measures, composting and waste-prevention actions, while others treat waste as a minor emissions sector and provide limited detail. The strongest cases show that waste can be used as a broader circular economy lever rather than only as a small residual emissions category.

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Athens is notable for comprehensive measures for recycling, composting and circular economy, alongside capacity building for the Cleaning and Recycling Department. Nantes Métropole, Warsaw, Istanbul, Vilnius, Dijon Métropole, Oslo, Reykjavík, Trondheim and Leipzig are further signposts for waste or circularity strengths. Aarhus also provides a strong example through ReWater, biocovers, CCS at the Lisbjerg plant and circularity across construction, procurement and food systems.

Recommendations related to waste and circular economy appear for 24 cities. Common gaps include weak status quo analysis, insufficient disaggregation of waste streams, limited action detail for wastewater and sludge, missing measures for biodegradable waste, weak treatment of waste-to-energy or incineration emissions, insufficient monitoring of sectoral GHG emissions, and unclear links between circular economy actions and emissions reductions. These gaps matter because circular economy measures are often cross-sectoral and can affect buildings, procurement, food, industry and consumption-based emissions.

Future CCC iterations should integrate waste and circular economy more systematically with procurement, construction, food systems, wastewater treatment, resource efficiency and Scope 3 emissions. Cities should identify waste streams, treatment methods, emissions sources, responsible utilities, circular economy actors, monitoring indicators and expected emissions impacts. This would make circularity a measurable part of climate neutrality rather than a general sustainability objective.

- Provide a clearer status quo analysis of waste streams, treatment routes, wastewater systems, circular economy policies and existing mitigation efforts.
- Include specific measures for waste prevention, reuse, recycling, organic waste, wastewater and sludge reuse, and resource recovery where relevant.
- Connect circular economy actions to Scope 3 emissions, construction, procurement, food systems and industrial/material flows.
- Develop KPIs that track not only waste quantities but also emissions reduction, material recovery, circular procurement and behavioural change.

AFOLU, Land Use and Nature-Based Solutions

AFOLU, land use and nature-based solutions remain uneven but increasingly visible in Window 4. Some cities provide detailed land-use strategies, agricultural measures, biodiversity links and carbon sequestration estimates, while others treat AFOLU as negligible or do not fully quantify emissions and sinks.

The strongest approaches treat AFOLU and NBS as multi-functional interventions that support mitigation, adaptation, biodiversity, recreation, health and social acceptance. These plans are valuable because they move beyond carbon accounting and show how urban land can support wider transition goals.

At the same time, residual emissions strategies sometimes depend on natural sinks without sufficient accounting of permanence, land availability, maintenance emissions, double counting or implementation timelines. This is an important issue for future CCC iterations.

AFOLU and nature-based solutions remain uneven across the Window 4 cohort, but the best examples show that this area can contribute to much more than residual emissions compensation. Cities use NBS for carbon sequestration, cooling, biodiversity, flood management, water resilience, air quality, recreation, public health and social value. This makes AFOLU and NBS

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important for integrated climate governance, especially where mitigation and adaptation are being brought together.

The degree of relevance differs by city. Dense urban municipalities may have limited land available for afforestation or agricultural measures, while metropolitan authorities and cities with peri-urban land can develop more extensive land-use strategies. However, even cities with limited space can integrate green roofs, green corridors, tree planting, soil protection and urban biodiversity into the CCC. The key issue is whether the action plan makes a clear distinction between emissions reductions, carbon sequestration, adaptation co-benefits and residual-emissions compensation.

Aarhus is a strong example because its AFOLU strategy integrates reforestation, set-aside of lowland soils, biogenic energy parks, biodiversity, recreation and land-use optimisation. Athens is notable for a systemic approach to NBS, including green infrastructure regulation, Cooling Havens, AthensTrees and blue infrastructure. Glasgow is noted for a comprehensive approach to NBS, while Nantes Métropole, Riga and Lund provide AFOLU examples. Warsaw and Vilnius also offer useful nature-based solution signposts, and Leipzig provides a green infrastructure strategy linked to broader transition pathways.

The main challenge is that AFOLU and NBS are often insufficiently quantified or insufficiently linked to implementation responsibilities. Several plans need clearer estimates of sequestration potential, hectares restored, trees planted, timelines, maintenance risks, impermanence, climate hazards and land-use conflicts. Future CCC iterations should avoid treating NBS as a generic co-benefit and instead define how land-use and nature measures contribute to mitigation, adaptation and social outcomes.

Strengths and peer-learning examples

A smaller number of Window 4 cities provide strong peer-learning examples in AFOLU and NBS.

City	Strength area	Peer-learning relevance
Warsaw	NBS	The feedback identifies Warsaw as a useful peer-learning reference for nbs. The example should be consulted because it illustrates practical approaches that other Mission cities can adapt when refining their own Climate City Contracts, implementation arrangements and future CCC iterations.
Lund	AFOLU	its strateg ic prioritisation of agriculture and land -use, which is a forward -thinking move. It recognises the sector's substantial emissions footprint and presents a valuable opportunity for the city to foster collaborative innovation with local farmers, landowners, academia, and thought leaders to drive a resilient, sustainable, and economically thriving agricultural future.
Nantes Métropole	AFOLU	The feedback identifies Nantes Métropole as a useful peer-learning reference for afolu. The example should be consulted because it illustrates practical approaches that other Mission cities can adapt when refining their own Climate City Contracts, implementation arrangements and future CCC iterations.
Riga	AFOLU	The feedback identifies Riga as a useful peer-learning reference for afolu. The example should be consulted because it illustrates practical approaches that other Mission cities can adapt when refining their own

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		Climate City Contracts, implementation arrangements and future CCC iterations.

Warsaw provides a useful reference point for nbs within the Window 4 cohort. The feedback highlights that this practice is relevant for other Mission cities because it demonstrates how the CCC can be used to translate a strategic commitment into a more concrete governance, sectoral or implementation approach: The city is notable for its commitment to preserving and enhan cing its urban greenery towards an integrated approach to mitigation and adaptation measures. It actively protects environmentally valuable areas from urbanization and enhances ecosystem services through initiatives like tree planting, expanding biological ly active areas, and revitalising water reservoirs. Warsaw effectively combines hard and soft measur.

Lund provides a useful reference point for afolu within the Window 4 cohort. The feedback highlights that this practice is relevant for other Mission cities because it demonstrates how the CCC can be used to translate a strategic commitment into a more concrete governance, sectoral or implementation approach: its strateg ic prioritisation of agriculture and land -use, which is a forward -thinking move. It recognises the sector's substantial emissions footprint and presents a valuable opportunity for the city to foster collaborative innovation with local farmers, landowners, academia, and thought leaders to drive a resilient, sustainable, and economically thriving agricultural future..

Nantes Métropole provides a useful reference point for afolu within the Window 4 cohort. The feedback highlights that this practice is relevant for other Mission cities because it demonstrates how the CCC can be used to translate a strategic commitment into a more concrete governance, sectoral or implementation approach: The strategy and action portfolio to decarbonise the AFOLU sector are comprehensive, with particular emphasis on reducing agricultural and natural space consumption, promoting local food production, and enhancing ecological resilience through carbon storage and environmental restoration projects. Nature-based solutions (NBS) are also well integrated. By combining governance innovations with social innovation interven.

Riga provides a useful reference point for afolu within the Window 4 cohort. The feedback highlights that this practice is relevant for other Mission cities because it demonstrates how the CCC can be used to translate a strategic commitment into a more concrete governance, sectoral or implementation approach: The plan has an adequate combination of hard measures, such as green infrastructure development and nature-based solutions, with soft measur es, including community engagement, education, and policy support, as well as the leveraging of different policy levers, regulatory frameworks, and financial incentives, defining a comprehensive and multi-faceted approach that is likely to yield significant reductions in emissio.

The strongest examples in this section are useful because they show how a specific CCC component can be made more actionable, credible or transferable. The named cities should be read as signposts for peer learning, not as the only cities performing well in this area.

City	Strength / practice area	Why this is useful for peer learning
Greater Dunkirk	AFOLU & NBS	The city has implemented a comprehensive strategy to restore and preserve natural ecosystems, including the creation of a Natural Site for Compensation, Restoration, and Renaturation and a green and blue framework to identify areas for restoration and ecological continuity. Additionally, Dunkirk has launched initiative.

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Glasgow	Comprehensive approach to NBS	Glasgow's initiatives, such as the GCV Green Network Partnership, Sustainable Glasgow Partnership, and Climate Ready Clyde, effectively support the deployment of Nature-Based Solutions (NBS) and actions in the AFOLU sector. The city's use of Geographic Information Systems (GIS) and consideration of expanding the digita.
Leipzig	Green infrastructure – strategy	Leipzig implements a broad green infrastructure strategy integrating urban forests, floodplain revitalisation, and community gardens with digital tools such as green digital twins. Key projects include the Elster-Pleiße-Luppe floodplain restoration, Tiny Forests, a Green Roof Funding Programme, and the 2024 Green Statu.
Nantes Métropole	AFOLU	The strategy and action portfolio to decarbonise the AFOLU sector are comprehensive, with particular emphasis on reducing agricultural and natural space consumption, promoting local food production, and enhancing ecological resilience through carbon storage and environmental restoration projects. Nature-based solutions.
Riga	AFOLU	The plan has an adequate combination of hard measures, such as green infrastructure development and nature-based solutions, with soft measures, including community engagement, education, and policy support, as well as the leveraging of different policy levers, regulatory frameworks, and financial incentives, defining a.
Athens	Systemic approach to NBS	The city is commended for its systemic approach to nature-based solutions, exemplified by the implementation of a new regulation on green infrastructure and by the successful "Cooling Havens" project, the real-time monitoring of tree planting through the AthensTrees app, and the dedicated geodatabase. Additionally, the.
Warsaw	NBS	The city is notable for its commitment to preserving and enhancing its urban greenery towards an integrated approach to mitigation and adaptation measures. It actively protects environmentally valuable areas from urbanization and enhances ecosystem services through initiatives like tree planting, expanding biologically.
Vilnius	NBS	The city is commended for its attention to nature-based solutions, notably as part of the ambitious Green Wave initiative, which systematically enhances urban greenery by planting thousands of trees and shrubs annually. Vilnius sets an impressive example with its ambitious goal to ensure green spaces are accessible wit.

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Common challenges and recommendations

The shared challenges in this section are not evidence that the theme is less important; rather, they indicate where future CCC iterations can deepen the level of detail and improve the plan's usefulness for implementation, monitoring and peer learning.

Common challenge	Pattern across Window 4 cities	Recommendation for future CCC iterations
AFOLU emissions and sinks not fully quantified	3 cities received explicit AFOLU recommendations, but the issue appears more widely where AFOLU is treated as marginal.	Quantify gross AFOLU emissions, negative emissions and sequestration potential separately.
NBS impacts not linked to targets	Common where green infrastructure is presented mainly as co-benefit.	Define indicators for hectares restored, trees planted, biodiversity, cooling and sequestration.
Residual emissions rely on uncertain sinks	Relevant where nature-based compensation is central.	Assess permanence, land conflicts, double counting and certification.
Stakeholder responsibilities unclear	Land-use measures often depend on landowners, farmers or regional actors.	Identify responsible and affected stakeholders for each AFOLU or NBS action.

Overall, this section suggests that Window 4 cities are moving towards more comprehensive CCCs, but the next iteration should focus on implementation readiness. The most useful improvements would be to strengthen the connection between the stated ambition, the action portfolio, stakeholder responsibilities, investment planning, and the monitoring framework.

AFOLU and nature-based solutions remain uneven across the Window 4 cohort, but the best examples show that this area can contribute to much more than residual emissions compensation. Cities use NBS for carbon sequestration, cooling, biodiversity, flood management, water resilience, air quality, recreation, public health and social value. This makes AFOLU and NBS important for integrated climate governance, especially where mitigation and adaptation are being brought together.

The degree of relevance differs by city. Dense urban municipalities may have limited land available for afforestation or agricultural measures, while metropolitan authorities and cities with peri-urban land can develop more extensive land-use strategies. However, even cities with limited space can integrate green roofs, green corridors, tree planting, soil protection and urban biodiversity into the CCC. The key issue is whether the action plan makes a clear distinction between emissions reductions, carbon sequestration, adaptation co-benefits and residual-emissions compensation.

Aarhus is a strong example because its AFOLU strategy integrates reforestation, set-aside of lowland soils, biogenic energy parks, biodiversity, recreation and land-use optimisation. Athens is notable for a systemic approach to NBS, including green infrastructure regulation, Cooling Havens, AthensTrees and blue infrastructure. Glasgow is noted for a comprehensive approach to NBS, while Nantes Métropole, Riga and Lund provide AFOLU examples. Warsaw and Vilnius also offer useful nature-based solution signposts, and Leipzig provides a green infrastructure strategy linked to broader transition pathways.

The main challenge is that AFOLU and NBS are often insufficiently quantified or insufficiently linked to implementation responsibilities. Several plans need clearer estimates of sequestration potential, hectares restored, trees planted, timelines, maintenance risks, impermanence, climate hazards and land-use conflicts. Future CCC iterations should avoid treating NBS as a generic co-benefit and instead define how land-use and nature measures contribute to mitigation, adaptation and social outcomes.

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AFOLU and nature-based solutions are increasingly visible in Window 4, but they remain one of the areas where planning quality varies most. Some cities use AFOLU and NBS strategically to connect mitigation, adaptation, biodiversity, water management and residual emissions. Others include natural sinks only briefly or do not yet provide sufficient quantification, stakeholder analysis or monitoring indicators.

Aarhus is a particularly strong signpost because its AFOLU strategy integrates reforestation, lowland soil set-aside, biogenic energy parks, biodiversity, recreation and carbon sequestration. Athens is commended for its systemic approach to NBS, including green infrastructure regulation, the Cooling Havens project, the AthensTrees app and a dedicated geodatabase. Nantes Métropole, Riga, Lund, Warsaw, Vilnius, Reykjavík, Bristol, Cork, Dublin, Glasgow and Greater Dunkirk provide additional examples of AFOLU, NBS or biodiversity-related strengths.

Recommendations related to AFOLU and NBS appear for 23 cities. Common challenges include limited quantification of carbon sequestration, insufficient distinction between emissions reductions and compensation, weak monitoring indicators, incomplete stakeholder mapping for land-use actions, limited discussion of maintenance emissions or climate risks, and insufficient attention to peri-urban and rural areas. In several plans, green infrastructure co-benefits are well described, but the direct link to climate-neutrality accounting remains less developed.

Future iterations should develop AFOLU and NBS as both mitigation and adaptation strategies. Cities should quantify sequestration potential, identify land availability and ownership constraints, address biodiversity and water co-benefits, define maintenance responsibilities, and specify how natural sinks will be accounted for without double counting. Where NBS are used to address residual emissions, cities should also demonstrate permanence, resilience to climate hazards and consistency with carbon-removal certification principles.

- Distinguish clearly between emissions reduction, carbon sequestration, residual-emissions compensation and adaptation co-benefits.
- Quantify land-use, tree planting, soil restoration, green roof, green corridor and afforestation actions where relevant.
- Address implementation risks such as land availability, maintenance emissions, climate hazards, impermanence and potential land-use conflicts.
- Use AFOLU and NBS to strengthen integration between mitigation, adaptation, biodiversity, health and quality of life.

Industry and IPPU

Industry and IPPU remain among the least developed areas in the Window 4 cohort. Many cities either report that IPPU is not significant, include it in inventories without dedicated actions, or focus on energy-related industrial emissions rather than process emissions and product use.

This pattern is understandable for cities with limited heavy industry, but the CCCs suggest that future iterations should still provide a clearer status quo and justification. Where IPPU is relevant, cities should distinguish energy-related industry emissions from process emissions, and identify possible local levers such as procurement, circular construction, industrial partnerships and stakeholder engagement.

For industrial or port cities, the issue is more strategic because climate neutrality may depend on collaboration with industrial operators, ETS installations, regional authorities and national regulatory frameworks.

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Good practice in IPPU is less common, but some examples show how cities can begin to address industrial emissions within the CCC framework.

Industry and IPPU remain among the least consistently developed parts of Window 4 CCCs. This is partly because many cities have limited heavy industry within their administrative boundaries, and partly because industrial process emissions often sit outside direct municipal competence. However, even where IPPU emissions are small, the CCCs commonly recommend that cities provide a clear status quo analysis, justify exclusions and explain whether any city-level actions are relevant.

The cohort shows different industrial profiles. Some cities have significant manufacturing or port-related industrial activities, while others mainly face indirect industrial emissions through construction materials, procurement, waste incineration, energy systems or food systems. This means that IPPU should not be treated only as a sector to be included or excluded. It should also be linked to circular economy, industrial symbiosis, construction, procurement, Scope 3 emissions and stakeholder mobilisation.

Aarhus is recommended to expand its IPPU strategy, but it also provides a useful example of connecting construction and urban development to consumption-based emissions. Greater Dunkirk is useful because of its industrial profile and the need to align industrial decarbonisation with the CCC process, while Padova, Tauragė and Vilnius also provide relevant IPPU or industry-related signposts. Dijon Métropole contributes through carbon footprint and life-cycle perspectives. The recommendation themes identify Aarhus, Budapest, Gabrovo, Istanbul, Liberec, Lund, Padova, Paris, Stavanger and Warsaw among cities where IPPU or industrial emissions require further attention.

The broader lesson is that future CCC iterations should make IPPU visible even when its emissions are limited. A short but transparent explanation can be sufficient where industrial process emissions are negligible; however, where industry, port activity, construction materials or waste incineration are relevant, the CCC should identify stakeholders, barriers, actions, expected impacts and monitoring indicators. This would improve the credibility of target boundaries and reduce the risk that hard-to-address emissions are deferred to later iterations without a clear strategy.

Strengths and peer-learning examples

Tauragė provides a useful reference point for industry and ippu within the Window 4 cohort. The feedback highlights that this practice is relevant for other Mission cities because it demonstrates how the CCC can be used to translate a strategic commitment into a more concrete governance, sectoral or implementation approach. Tauragė's climate neutrality target explicitly covers emissions associated with ETS installations operated by "Tauragės šilumos tinklai", demonstrating a commitment to addressing industrial emissions. It is further positively noted that the city considers end-use consumption of GHG emitting products such as solvents, dry cleaners, degreasers, and similar items, emphasising the necessity of addressing these practices.

The strongest examples in this section are useful because they show how a specific CCC component can be made more actionable, credible or transferable. The named cities should be read as signposts for peer learning, not as the only cities performing well in this area.

City	Strength / practice area	Why this is useful for peer learning
Vilnius	Industry	The city is commended for its comprehensive inclusion of industry in its climate neutrality target, addressing both stationary energy and IPPU emissions. Vilnius provides a detailed description of industrial emissions and trends and

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		offers a robust approach to emissions accounting (e.g. on the use of ozone-depleting su.
Tauragė	Industry and IPPU	Tauragė's climate neutrality target explicitly covers emissions associated with ETS installations operated by "Tauragės šilumos tinklai", demonstrating a commitment to addressing industrial emissions. It is further positively noted that the city considers end-use consumption of GHG emitting products such as solvents, d.

Common challenges and recommendations

The shared challenges in this section are not evidence that the theme is less important; rather, they indicate where future CCC iterations can deepen the level of detail and improve the plan's usefulness for implementation, monitoring and peer learning.

Common challenge	Pattern across Window 4 cities	Recommendation for future CCC iterations
IPPU status quo missing or underdeveloped	6 cities received explicit IPPU recommendations.	Describe whether IPPU occurs, quantify it where relevant and justify exclusions.
Industry actions focus mainly on energy use	Common where industrial process emissions are not separated.	Distinguish process emissions, energy emissions and product-use emissions.
Stakeholder engagement with industry limited	Relevant where industrial actors are important emitters.	Create mechanisms to engage industry in low-carbon roadmaps and circular economy actions.
ETS and city boundaries create ambiguity	Important for industrial and utility assets.	Clarify how ETS installations are treated in inventories, targets and implementation partnerships.

Overall, this section suggests that Window 4 cities are moving towards more comprehensive CCCs, but the next iteration should focus on implementation readiness. The most useful improvements would be to strengthen the connection between the stated ambition, the action portfolio, stakeholder responsibilities, investment planning, and the monitoring framework.

Industry and IPPU remain among the least consistently developed parts of Window 4 CCCs. This is partly because many cities have limited heavy industry within their administrative boundaries, and partly because industrial process emissions often sit outside direct municipal competence. However, even where IPPU emissions are small, the CCC materials commonly recommend that cities provide a clear status quo analysis, justify exclusions and explain whether any city-level actions are relevant.

The cohort shows different industrial profiles. Some cities have significant manufacturing or port-related industrial activities, while others mainly face indirect industrial emissions through construction materials, procurement, waste incineration, energy systems or food systems. This means that IPPU should not be treated only as a sector to be included or excluded. It should also be linked to circular

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economy, industrial symbiosis, construction, procurement, Scope 3 emissions and stakeholder mobilisation.

Aarhus is recommended to expand its IPPU strategy, but it also provides a useful example of connecting construction and urban development to consumption-based emissions. Greater Dunkirk is useful because of its industrial profile and the need to align industrial decarbonisation with the CCC process, while Padova, Tauragė and Vilnius also provide relevant IPPU or industry-related signposts. Dijon Métropole contributes through carbon footprint and life-cycle perspectives. The recommendation themes identify Aarhus, Budapest, Gabrovo, Istanbul, Liberec, Lund, Padova, Paris, Stavanger and Warsaw among cities where IPPU or industrial emissions require further attention.

The broader lesson is that future CCC iterations should make IPPU visible even when its emissions are limited. A short but transparent explanation can be sufficient where industrial process emissions are negligible; however, where industry, port activity, construction materials or waste incineration are relevant, the CCC should identify stakeholders, barriers, actions, expected impacts and monitoring indicators. This would improve the credibility of target boundaries and reduce the risk that hard-to-address emissions are deferred to later iterations without a clear strategy.

Industry and IPPU remain comparatively underdeveloped across Window 4, even though several cities include industrial activity in their emissions inventories or economic profiles. This is partly because many cities have limited industrial process emissions within their administrative boundaries, but it also reflects a broader planning challenge: cities often find it easier to address energy use in industry than non-energy industrial processes and product use.

Bordeaux Métropole, Greater Dunkirk, Padova, Tauragé and Vilnius provide the clearest Window 4 signposts for industry or IPPU-related strengths. Greater Dunkirk is especially relevant because the urban area has a strong industrial profile and therefore faces a more direct challenge of aligning industrial decarbonisation with the CCC process. These cases can support learning for cities that need to engage industrial actors, clarify emissions boundaries or address hard-to-abate sectors.

Recommendations related to IPPU or industry appear for 24 cities. The recurring issues are absence of a status quo analysis, limited quantification of IPPU emissions, unclear exclusion of F-gases, lack of dedicated pathways or actions, and insufficient engagement of industrial stakeholders. In some cases, IPPU is described as negligible, but the evidence base for this judgement is not fully explained. In other cases, industrial energy use is covered under stationary energy, while process emissions are not addressed.

Future iterations should include a short industrial and IPPU relevance assessment. Where emissions are negligible, the plan should explain why and identify any monitoring needs. Where industrial activity is material, the CCC should identify the main sources, relevant firms or clusters, available municipal levers, national or EU policy dependencies, stakeholder commitments and opportunities for circular economy, electrification, hydrogen, process innovation or industrial symbiosis.

- Provide a concise status quo assessment of industrial process emissions, even where they are expected to be negligible.
- Justify exclusions transparently and clarify whether F-gases or ETS-linked facilities are relevant to the city inventory.
- Where IPPU is relevant, link actions to industrial stakeholders, circular economy, construction, procurement and resource-efficiency measures.
- Include IPPU-related indicators or monitoring arrangements where industrial or process emissions form part of the residual emissions challenge.
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