

# **4**

## **Assessing the implementation of a territorial approach to climate action and resilience in OECD countries**

---

This chapter assesses how national and subnational governments are implementing a territorial approach to climate action and resilience. The assessment focuses on three dimensions: i) integrating a place-based perspective into climate policy; ii) “climate-proofing” regional development policy at all territorial levels; and iii) enabling and scaling up local climate action. It applies the “actions and opportunities” indicators within the OECD territorial climate indicator framework presented in Chapter 2 and draws on an analysis of 36 leading practices from countries, regions and cities, mainly in the OECD area. The result of the assessment is summarised in a set of nine recommended actions for both national and subnational governments. Detailed and concrete sub-actions have been proposed and summarised in tables for each recommended action, serving as a policy checklist.

---

## Introduction

The assessment conducted in Chapter 3 has shed light on the substantial challenges that OECD cities and regions face while pursuing climate neutrality goals and adapting to climate change. Building on these findings, this chapter will analyse how national and subnational governments are implementing a territorial approach to climate action and resilience. It will specifically focus on three distinct but interrelated dimensions derived from the definition of a territorial approach<sup>1</sup> (Chapter 1):

- **Integrating a place-based perspective into climate policy.** The chapter will assess the extent to which national, regional and local climate policies can integrate a place-based perspective. The assessment focuses on three aspects. First, it looks at how governments can measure and better understand cities' and regions' potential to mitigate greenhouse gas (GHG) emissions as well as local climate risks and impacts. Second, it investigates how national governments are incorporating local climate action into national mitigation and adaptation plans and strategies. Third, it delves into how cities and regions reflect their local needs and interests into their own climate goals and targets while ensuring alignment with the Paris Agreement.
- **“Climate-proofing” regional development policy at all territorial levels.** The chapter will analyse how urban, rural, metropolitan and neighbourhood-level development policies are mainstreaming climate dimensions. The assessment will look at policies according to different territorial characteristics (e.g. city centres, rural areas) and scales (e.g. functional urban areas or FUAS, neighbourhoods). The analysis will focus on how cross-sectoral and integrated development projects can break down sectoral silos, ensure policy alignment and generate multi-faceted benefits to improve overall outcomes and impacts. In addition, the assessment will address how these development policies address inequalities across populations and places and how policy design could better anticipate and manage potential distributional trade-offs and enhance synergies.
- **Enabling and scaling up local climate action.** The chapter will look at how national and subnational governments can facilitate local climate action, notably by removing legal and institutional barriers, enhancing funding and financing mechanisms, engaging multiple stakeholders and sharing local knowledge.

In each dimension, the analysis will cover why it matters (rationale), what action different levels of government are taking (policy practices), what gaps and challenges remain and how to overcome them (policy implications). The assessment draws on a selection of 36 leading practices collected mainly from OECD countries, regions and cities through a literature review, which apply a territorial approach to drive systemic and transformative climate action and resilience (see Annex Table 4.A.1). These leading practices were analysed to identify success factors and lessons from the following perspectives:

- Impacts on GHG emission reduction.
- Preparedness against climate and transition risks, and capacity to reduce and manage potential local impacts.
- Effects on broader co-benefits generated across sectors, including long-term economic benefits (e.g. jobs, incomes), social benefits (e.g. health) and environmental benefits (e.g. avoided loss of biodiversity) while ensuring equal access to the opportunities of the net zero transition.
- Links between mitigation and adaptation measures to generate synergies and manage trade-offs to ensure that the net zero transition is also climate-resilient (and vice versa).
- Ability to identify and address potentially negative or regressive policy impacts on specific geographical locations and population groups.
- Making the most of existing funding mechanisms for climate action and promoting innovative financing mechanisms for climate investment at the subnational level.

- Improved institutional structures and multi-level governance (e.g. horizontal-vertical co-ordination).

This chapter also applies the “actions and opportunities” indicators within the OECD territorial climate indicator framework presented in Chapter 2. The preliminary results of the analyses of four out of six indicators (Existence of subnational climate mitigation and adaptation targets and compliance with national targets, Green areas in cities, Climate-significant expenditure and investments, and Existence of climate-related funds, grants and subsidies for subnational action) were presented and discussed in the assessment.

**Table 4.1. The list of indicators analysed in this chapter**

Indicator	Unit of analysis	Reference point
<b>Actions and opportunities</b>		
40. Existence of subnational climate mitigation and adaptation targets and compliance with national targets (to be estimated)	National scale	100% of subnational governments (e.g. TL2, TL3 levels) with climate mitigation and adaptation targets complying with national targets
42. Green areas in cities	FUA's urban centres, SAUs	Best performers
43. Climate-significant expenditure and investments	National scale	Best performers
44. Existence of climate-related funds, grants and subsidies for subnational action	National scale	To be defined

## Integrating a place-based perspective into climate policy

### ***Measuring and monitoring GHG emissions, climate risks and impacts at different territorial levels***

A better understanding of GHG emission reduction potential, climate risks and impacts at different territorial levels is the cornerstone of a territorial approach. For instance, measuring and monitoring national climate goals at the subnational scale in a comparable way will help national governments understand the context-specific conditions of each territory and how far cities and regions are from reaching national goals and targets (e.g. nationally determined contributions [NDCs], Long-Term Low Emission Development Strategies [LT-LEDS], national adaptation plans [NAPs] and national adaptation strategies [NAS]) to achieve the Paris Agreement. It can also help cities and regions understand where they stand with regard to their peers across and within countries. In addition, it allows both national and subnational policy makers to measure the impacts of specific climate policies (e.g. local adaptation actions). Local and regional authorities are at the forefront of collecting local data on climate impacts, while national governments have a key role to play in developing and operating a coherent climate measurement and monitoring framework across levels of government.

This chapter assesses how countries, regions and cities are measuring and monitoring GHG emissions, climate risks and impacts at different territorial levels through a literature review. A mapping of diverse programmes and initiatives across OECD countries, cities and regions has allowed for identifying the following common measuring and monitoring practices taking place, both for climate mitigation and adaptation:

- **National action measuring and monitoring GHG emissions at subnational scales.** The Australian Department of Climate Change, Energy, the Environment and Water estimates GHG emissions by sector for each state and territory in the national inventory submitted to the United Nations Framework Convention on Climate Change (UNFCCC) in 2021 (DCEEW, 2023<sup>[1]</sup>). The United Kingdom Department for Business, Energy and Industrial Strategy produces annual

GHG emission estimates by local authorities and regions. The estimates published each year relate to the calendar year two years earlier (e.g. the publication in 2022 covers emissions up to 2020) (BEIS, 2023<sup>[2]</sup>).

- **Development of internationally comparable GHG emission reporting mechanisms for cities and regions.** It has become easier to account for GHG emissions by sector and scope through standardised methods such as the internationally comparable GHG reporting methodologies for companies, organisations and local governments. An increasing number of cities are publicly reporting emissions data by sector and type of emission, with some even reporting emissions based on the consumption of goods and services imported from different jurisdictions (C40 Cities, 2018<sup>[3]</sup>; GHG Protocol, 2018<sup>[4]</sup>).
- **National action measuring and monitoring climate risks and impacts at local and neighbourhood scales.** Italy has developed a climate model with high spatial resolutions, which can help inform localities on their specific risks as it allows them to downscale the model and run regional climate models with kilometre (km)-scale grids (Raffa et al., 2023<sup>[5]</sup>). The Korea Adaptation Centre for Climate Change has developed a climate change vulnerability assessment tool (VESTAP) to help provinces and municipal governments assess their vulnerability. The geographic information system (GIS)-based tool helps municipalities visualise their climate risks by offering data on climate exposure, sensitivity and adaptation capacity. Aside from checking their vulnerability, local governments can also conduct their own assessment by modifying weights and adding new indicators (Case 1 in Annex 4.A) (OECD, forthcoming<sup>[6]</sup>).
- **Cities' action measuring and monitoring local climate risks.** A number of cities, such as Barcelona (Spain), Berlin (Germany), Copenhagen (Denmark), Helsinki (Finland), London (United Kingdom), Munich (Germany), New York (United States), Rotterdam (the Netherlands) and Vancouver (Canada), have also developed their own adaptation metrics, which can be either independent or linked to national adaptation indicator frameworks (Leiter et al., 2019<sup>[7]</sup>). The city of Boston (United States) has developed the Climate Ready Boston Map Explorer, a tool to identify areas at risk of flooding (due to sea level rise and increased precipitation) and extreme heat (due to rising temperatures and the urban heat island effect). The tool overlays climate data with demographic data to better understand the social factors that intersect with and contribute to vulnerability (City of Boston, 2023<sup>[8]</sup>) (Case 2 in Annex 4.A). In Athens, Greece, the Making Athens a Greener and Cooler City strategy has developed 81 adaptation-related indicators, such as the relative decrease in local surface and air temperatures, to measure progress in the implementation of the strategy's actions (e.g. implementation of green roofs, parks and blue corridors) (Goonesekera and Olazabal, 2022<sup>[9]</sup>; C40 Cities, 2016<sup>[10]</sup>).
- **Real-time monitoring systems,** including early warning systems, to monitor, forecast and inform all levels of government about imminent floods, storms, droughts, extreme heat and other events. For example, as part of its Local Climate Change Strategy and Action Plan, the city of Tatabánya, Hungary, has implemented a local heat and UV alert system to assess heatwaves and forest fires (Climate-ADAPT, 2016<sup>[11]</sup>). Similarly, the Emilia-Romagna region, Italy, has developed real-time hydro-meteorological monitoring technologies and a widespread risk communication programme to share information on hydrometeorological risks (Climate-ADAPT, 2018<sup>[12]</sup>; OECD, forthcoming<sup>[13]</sup>).
- **Open data platforms** to provide local authorities and non-expert stakeholders with access to reliable data on climate impacts, allowing for cross-learning and collaboration among stakeholders and facilitating evidence-based decision making and monitoring of adaptation actions. In the United States, the Climate Mapping for Resilience and Adaptation portal helps subnational stakeholders track real-time climate change impacts and find federal funding opportunities to cover their climate resilience projects (The White House, 2022<sup>[14]</sup>; CMRA, 2023<sup>[15]</sup>) (Case 3 in Annex 4.A). In France, the DRIAS Futures of Climate portal makes regionalised climate data available for a

variety of uses (French Ministry of Ecological Transition, 2023<sup>[16]</sup>). An initial “educational” section of the portal enables users to understand how data are constructed and their potential uses. Two other sections allow for viewing and downloading the data. For each hazard, the portal offers a preselection of indicators and climate scenarios, and a choice between a multimodal simulation or the results of a specific climate model. It can also be used to create maps at both the national and local levels for different time horizons (current, short-term, medium-term, long-term) and different time steps (yearly or monthly average). In Europe, Climate-ADAPT, a partnership between the European Commission and the European Environment Agency, is an online platform to provide cities, regions and other interested parties with information on climate adaptation measures and tools. As a part of the platform, the European Climate Data Explorer provides interactive access to a comprehensive collection of climate data, good adaptation practices and examples, indicators or maps, categorised by themes and sectors (e.g. agriculture, forestry, water and coastal) (Climate-ADAPT, n.d.<sup>[17]</sup>; OECD, forthcoming<sup>[13]</sup>) (Case 36 in Annex 4.A).

Despite these initiatives, persistent challenges remain to further advance measurement at the local scale in terms of data collection, data integration and comparability:

- Much data on GHG emissions in regions and cities are still lacking or have not yet been reported in a comparable manner due to a range of financial, regulatory and capacity challenges.
- On climate adaptation, the use of adaptation indicators is not yet a common practice at the local level. A study assessing adaptation plans from 136 cities found that only 11 set out indicators and metrics to measure progress on the plan (Goonesekera and Olazabal, 2022<sup>[9]</sup>; OECD, forthcoming<sup>[13]</sup>).<sup>2</sup>
- While knowledge of key areas such as sea level rise, flood risk exposure and the adaptive capacity of the built environment has substantially increased, there are still large data gaps at the sectoral and local levels that obscure public and private actors’ awareness of their full risk exposure. Some key features of climate change (e.g. temperature increases, sea level rise) are well captured in climate models but others demonstrate significant uncertainty in model projections, such as rainfall and extreme weather, which have major implications for physical risk assessment, adaptation and insurance, particularly at a regional or local level. Climate models have spatial resolutions of around 100 km, a scope that remains too large for most cities, and while methods have been elaborated to “downscale” climate modelling at lower resolutions, they often magnify uncertainties that may have already been significant at original scales (Shepherd and Sobel, 2020<sup>[18]</sup>).
- There is still only a limited understanding of the full impacts of climate change on biodiversity and ecosystem services.

Based on this assessment, three actions can be recommended for national and subnational governments to advance climate measurement and monitoring at different territorial levels. First, national governments can establish standardised and common indicator frameworks for quantifying GHG emissions as well as assessing climate impacts and risks at different territorial scales. This involves conducting a comprehensive review of all existing data and information sources related to local GHG emissions inventories, climate risks, impacts and vulnerabilities, thus assessing their comparability and identifying data gaps. It also means defining a set of indicators that can be consistently applied across different regions and cities within a country. Furthermore, it entails establishing uniform procedures for collecting data on GHG emissions and climate impacts and risks. While the role of national governments is to provide a common language across levels of government, cities and regions play a pivotal role in data collection, as they gather data on a regular basis on various factors driving GHG emissions, including energy consumption, transport and waste, as part of their local GHG emissions inventories. To the extent possible, consumption-based emissions should also be considered. The firsthand knowledge that local governments have gained from experiencing climate change and dealing with the consequences of extreme weather events is invaluable for refining broader climate and hazard models.

Second, by setting common and standardised indicators that ensure comparability between local, regional and national data, countries, cities and regions can obtain accurate information to measure their distance from achieving national and international climate goals and targets. The latter include the goals set in NDCs, LT-LEDS, NAS and NAPs. Chapter 2 offers an OECD methodology to measure the distance of cities and regions to reaching global targets (for climate mitigation) and “climate normal” (for climate adaptation), which can be used to benchmark cities and regions against their peers. Identifying and reporting GHG emissions at the regional and city levels – as well as relevant indicators and benchmarks for the net zero transition (e.g. energy efficiency retrofits in buildings, electric mobility infrastructure) – is crucial to accelerate action and enhance accountability to ensure national governments are on track to reach their climate targets. Setting such common and standardised frameworks can also be developed by using existing or creating new multi-stakeholder platforms that enable dialogue and exchange of good practices on climate data across different stakeholders.

Third, although climate risk and vulnerability assessments are increasingly becoming a common exercise at the local level, such assessments are not always covering different systems (e.g. economic, social) or different geographical scales (e.g. regional, national and international) (Matsumoto and Ledesma Bohorquez, 2023<sup>[19]</sup>). Assessing how direct climate impacts and risks are cascading and compounding to other climate and non-climate risks and across different geographical scales offers a great potential to bridge the gap between disaster risk and climate change adaptation (Lawrence, Blackett and Craddock-Henry, 2020<sup>[20]</sup>). This is particularly relevant to understand how climate risks make some populations more vulnerable and exposed than others, especially economically and socially marginalised communities.

Table 4.2 outlines a set of recommended actions for both national and subnational governments to address the policy gaps discussed above.

**Table 4.2. Recommended actions to measure and monitor GHG emissions, climate risks and impacts at different territorial levels**

Category	For whom	Recommended action
Stocktaking and mapping of existing climate measuring and monitoring frameworks	All levels	<ul style="list-style-type: none"> <li>Analyse existing data and information sources on GHG inventories, climate risks, impacts and vulnerabilities, etc. and examine whether they are comparable with other levels of government.</li> <li>Identify data and information gaps for local climate action to achieve the goals and targets set by national and subnational climate policies (e.g. NDC, LT-LEDS, NAP, NAS).</li> <li>Analyse existing local GHG emission inventories and reporting mechanisms and identify options for developing a compatible measuring and monitoring framework across levels of government.</li> </ul>
Creation and use of more granular data and information to measure and monitor local climate action	All levels	<ul style="list-style-type: none"> <li>Develop a framework to measure “cascading and compounding” impacts at different territorial scales.</li> <li>Develop data on consumption-based emissions at different territorial scales.</li> <li>Downscale GHG emissions inventories at a subnational scale.</li> </ul>
Creation of data at different territorial scales	All levels	<ul style="list-style-type: none"> <li>Develop climate data for FUAs.</li> </ul>
	Cities and regions	<ul style="list-style-type: none"> <li>Develop city-level climate risk assessments.</li> <li>Develop climate data at the neighbourhood scale.</li> </ul>
Alignment of data across territorial scales	All levels	<ul style="list-style-type: none"> <li>Agree upon or develop a common local GHG emissions inventory that is compatible with the national inventory and a monitoring and reporting methodology.</li> <li>Collect and disclose GHG emission data at different territorial scales.</li> </ul>
	National	<ul style="list-style-type: none"> <li>Collect local GHG emissions inventories and use them for developing national-level GHG emissions trajectories.</li> </ul>
Disclosure and dissemination	All levels	<ul style="list-style-type: none"> <li>Create multi-stakeholder platforms for dialogues and practice exchange on climate data.</li> <li>Create open data platforms.</li> </ul>

## Incorporating local action into national climate plans and strategies

### *Global recognition of local climate action and resilience is increasing*

The adoption of the Paris Agreement, the 2030 Agenda on Sustainable Development (2030 Agenda) and the Sendai Framework for Disaster Risk Reduction 2015-2030 in 2015 has generated strong momentum for all actors across countries, regions and cities to take action to achieve global commitments (Table 4.3). All three global climate-related agendas have clearly recognised the role of subnational action in their formulation processes and have incorporated it into the adopted documents. It is also worth noting that since the adoption of the Paris Agreement, the subsequent United Nations Climate Change Conferences have reinforced the importance of multi-level governance to accelerate the implementation of the Paris Agreement through several initiatives that call for more active participation of cities and regions (Table 4.4).

Within the framework of the UNFCCC, subnational governments (SNGs) are currently unified under the Local Governments and Municipal Authorities (LGMA) Constituency to the United Nations, although they are not “parties”, i.e. they are neither part of formal global climate negotiations nor in the implementation of the agreement (CoR, 2022<sup>[21]</sup>). Nevertheless, the assessment of current NDCs, LT-LEDs, NAPs and NAS suggests that, in practice, national governments are increasingly incorporating local climate action into their national pledges and policies, as described below.

**Table 4.3. Major global agreements in 2015 that recognise local climate action**

Initiative	How local climate action is recognised, supported and facilitated
Paris Agreement	The Paris Agreement acknowledges that climate change is a common concern of humankind and that local communities – among other groups such as Indigenous peoples, migrants and children – must be properly engaged when taking action to address it. The agreement also recognises that all levels of government play a pivotal role in the implementation of climate strategies, with emphasis on climate adaptation, loss and damage and capacity building. Various provisions related to the significance of subnational climate action, such as Article 4, underscore countries’ responsibility to outline their climate efforts in NDCs.
2030 Agenda	2030 Agenda outlines collaborations among various entities in the implementation of its endeavours. Article 45 advises public institutions to “work closely on implementation with regional and local authorities, sub-regional institutions, international institutions, academia, philanthropic organizations, volunteer groups”. Although the United Nations Sustainable Development Goals (SDGs) were not explicitly tailored for and by local and regional governments, except SDG 11, they provide a universal ambition and valuable framework that can enable authorities at all levels to align global, national and subnational priorities. Given cities’ and regions’ proximity to their residents and their assertion of influence on policies and public investments, it is imperative for cities and regions to take actions aligned with the SDGs for the successful implementation of 2030 Agenda.
Sendai Framework for Disaster Risk Reduction 2015-2030	The Sendai Framework underscores the importance of local action in great depth, beginning with emphasis on the fact that “international, regional, sub-regional and transboundary co-operation remains pivotal in supporting the efforts of States, their national and local authorities, as well as communities and businesses, to reduce disaster risk”. The key target to “substantially increase the number of countries with national and local disaster risk reduction strategies by 2020” is rendered more actionable at all levels of government with the recognition that “there is a need for focused action within and across sectors by States at local, national, regional and global levels” to achieve the framework’s priorities. The importance of local action is further embedded in three of the framework’s guiding principles under Article 19: <ul style="list-style-type: none"> <li>• “Disaster risk reduction and management depends on coordination mechanisms within and across sectors and with relevant stakeholders at all levels, and it requires the full engagement of all State institutions of an executive and legislative nature at national and local levels and a clear articulation of responsibilities [...]”.</li> <li>• “While the enabling, guiding and coordinating role of national and federal State Governments remains essential, it is necessary to empower local authorities and local communities to reduce disaster risk, including through resources, incentives and decision-making responsibilities, as appropriate”.</li> <li>• “While the drivers of disaster risk may be local, national, regional or global in scope, disaster risks have local and specific characteristics that must be understood for the determination of measures to reduce disaster risk”.</li> </ul>

Source: Based on UNFCCC (2015<sup>[22]</sup>), *Adoption of the Paris Agreement*, [https://unfccc.int/sites/default/files/english\\_paris\\_agreement.pdf](https://unfccc.int/sites/default/files/english_paris_agreement.pdf); UNDRR (2015<sup>[23]</sup>), *Sendai Framework for Disaster Risk Reduction 2015-2030*, <https://www.undrr.org/publication/sendai-framework-disaster-risk-reduction-2015-2030>; UN (2015<sup>[24]</sup>), *2030 Agenda for Sustainable Development*, <https://sdgs.un.org/es/2030agenda>.

**Table 4.4. Selected global initiatives to enhance local climate action**

Initiative (United Nations Climate Change Conference)	Year	Mandate/objective
Marrakech Partnership for Global Climate Action (COP22)	2016	The Marrakech Partnership's mission is to strengthen collaboration between governments and key stakeholders to reduce emissions and increase resilience against climate impacts.
Cities and Regions Talanoa Dialogues (COP23)	2017	At COP23, countries agreed to organise Talanoa Dialogues for cities and regions. These are a series of in-country climate consultations designed to kick off a collaborative process involving all levels of government. They convene national, regional and local governments to shape and strengthen NDCs, to take stock of global efforts to reduce GHG emissions and to increase countries' resilience to the impacts of climate change.
Glasgow Climate Pact (COP26)	2021	Adopted at COP26, the Glasgow Climate Pact, along with other COP26 outcomes, enshrined "multi-level collaboration" as a new normal for the implementation of the Paris Agreement. References to multi-level action appear more than 30 times in the outcome documents.
Sustainable Urban Resilience for the Next Generation – SURGe Initiative (COP27)	2022	Launched at COP27, the SURGe Initiative aims to enhance and accelerate local and urban climate action through multi-level governance, engagement and delivery through five integrated tracks, contributing to achieving the Paris Climate Goals and SDGs. The SURGe Initiative is developed in collaboration with the United Nations Human Settlements Programme (UN-Habitat) and facilitated by non-governmental organisation ICLEI and has been endorsed by more than 70 global partners. The initiative was officially launched at the Urban and Housing Ministerial Session on Cities and Climate Change at COP27.

Source: Based on LGMA (2023<sup>[25]</sup>), *About the Local Governments and Municipal Authorities Constituency: The Voice of Cities and Regions in the Climate Negotiation Process*, <https://www.cities-and-regions.org/about-the-lgma/>.

### *NDCs and LT-LEDS incorporating local action*

On climate mitigation, to investigate the extent to which cities and regions are acknowledged in terms of their targets, implementation of local climate action and participation in the planning process, this report has analysed all the latest NDCs (16 from OECD countries and the European Union). The analysis was conducted using the most recent NDCs submitted to the UNFCCC as of September 2023. The analysis focused on the section titled "information to facilitate transparency, clarity, and understanding of nationally determined contributions", as mandated by the Paris Agreement under Article 4 (Table 4.5).

The results revealed that most national governments have incorporated local perspectives on climate action into their NDCs in one way or another, although the extent varies across countries. New Zealand's NDC is the only one that has no reference to local perspectives. Key findings from the analysis of how local perspectives are included in NDCs are the following:

- On "GHG emissions reduction commitment", only a limited number of countries are paying substantial attention to the targets set by their regions or cities. For instance, Canada dedicated a section to discussing the diverse climate commitments and actions undertaken by its provinces and territories. Similarly, the United Kingdom underscored the distinct targets set by its devolved administrations. Moreover, the sector-by-sector assessment conducted in the United States to formulate its national GHG reduction target duly acknowledged the contributions from subnational actions. This underlines the substantial role of states and local governments in achieving national efforts to reduce GHG emissions.
- Regarding "implementation of local climate action", certain NDCs explicitly mention programmes designed to promote local climate action. For instance, Japan's Green Challenge, led by the Ministry of Land, Infrastructure, Transport and Tourism (MLIT), places emphasis on cross-sectoral decarbonisation with a special focus on urban development, transport and infrastructure. Likewise, Colombia has formulated a list of sector-specific mitigation measures and adaptation targets in its updated 2022 NDC, highlighting the crucial role of local governments in their implementation. In fact, Law 1931 mandates regional authorities to prepare Territorial Climate Change Management



Plans. To guide the preparation of these plans, the Ministry of Environment and Sustainable Development launched a guidance document in 2022 to support regional authorities in developing plans adapted to the context-specific needs and challenges (Colombian Ministry of Environment and Sustainable Development, 2018<sup>[26]</sup>) (Case 4 in Annex 4.A).

- On “engagement in the NDC planning process”, while there are encouraging signs of progress in terms of incorporating local governments into the design of NDCs, there remains room for improvement through the establishment of dedicated co-ordination mechanisms for future NDC developments and updates. For instance, in Canada, the Net-Zero Emissions Accountability Act mandates the Ministry of Environment and Climate Change Canada to facilitate opportunities for provincial governments to submit proposals when governments establish emission reduction targets or reduction plans. The Pan-Canadian Framework on Clean Growth and Climate Change serves as the dialogue platform on climate-related policies between the federal government and the provinces and territories (Case 5 in Annex 4.A). Chile’s NDC acknowledges the importance role of multi-level governance systems through the development of Regional Climate Change Committees (CORECC). These committees are currently developing and implementing regional climate action plans in close collaboration with the central government, municipalities and other non-state and subnational actors to implement the commitment. The CORECC are the main operational structure of regional climate change governance in the country and their mission is to co-ordinate efforts to align climate policies across levels of government and support the integration of long-term objectives related to climate change mitigation and adaptation in the different regional and municipal development plans (MMA, 2022<sup>[27]</sup>).

In addition to the NDCs, countries are also formulating LT-LEDS. These policy documents outline pathways for low-emission development, taking into account broader socio-economic objectives. While NDCs are mandatory for all parties of the Paris Agreement, LT-LEDS are voluntary (OECD, 2020<sup>[28]</sup>). A recent report analysing 53 LT-LEDS highlighted that cities and regions were engaged in the preparation process (UNFCCC, 2022<sup>[29]</sup>). Earlier OECD research on the LT-LEDS of Canada, France, Germany and the state of California (United States) confirms a considerable engagement of cities and regions (Matsumoto et al., 2019<sup>[30]</sup>). Several types of co-ordination mechanisms exist in the development and implementation of LT-LEDS and subnational climate plans, from which other countries or states could take inspiration in order to improve the effectiveness of their multi-level co-ordination:

- **Joint development of climate plans.** Germany’s national climate plan took into account the joint proposal of cities and regions. Local, regional and national governments jointly developed French regional climate plans. Similarly, Canada’s Pan-Canadian Framework on Clean Growth and Climate Change (PCF) was adopted by provincial governments and accounts for a range of subnational climate plans and actions.
- **Requirement for policy alignment.** In France, all levels of government are required to take the national climate strategy into account in their planning strategies. Similarly, local governments in France are in charge of setting their own targets to reduce GHG emissions, as is the case in the state of California.
- **Setting up a joint committee.** France created a network of co-ordinated national, regional and local committees to implement local climate plans. In Germany, an alliance of various stakeholders, including regional and local governments, plays a key role in implementing climate policies. Canada’s PCF serves as a strong basis for multi-level co-ordination.
- **Co-financing and financial incentives.** In Canada, the Ministry of Environment and Climate Change Canada has pledged CAN 31.5 million for municipal green grants and loans to 20 cities or towns for projects to improve air, water and soil quality, including reducing carbon emissions. In Germany, the National Climate Initiative (NKI) is one of the most important instruments of the German federal government to promote effective climate protection measures throughout Germany. Over 2008-20, it invested over EUR 820 million in over 18 700 projects domestically,

involving 3 975 local authorities. Funding guidelines for municipalities were updated in 2022 to provide further support for SNG personnel and a broader scope of projects to be supported, including feasibility studies for investment projects. In France, there are more than 28 instruments available to support cities and regions to fund both adaptation and mitigation projects. These instruments are a mix of earmarked grants, loans, funds and contracts. For example, in 2020, the national government launched its national recovery plan, France Relance, endowed with a budget of EUR 100 billion over 2 years, allocating 30% of its resources to the ecological transition and funding 7 instruments benefitting cities and regions (OECD, 2022<sup>[31]</sup>).

**Table 4.5. The role of cities and regions in the latest NDCs in OECD countries and the European Union**

Country	Assessment criteria: Is the role of cities and regions recognised in relation to:		
	GHG emissions reduction commitments	Implementation of local climate action	Engagement in the NDC planning process
	<i>Does the NDC commitment include any explicit references or acknowledgements to the local GHG emissions reduction commitments by its cities and regions?</i>	<i>Does the NDC make any reference to a specific programme/initiative/activity aimed at supporting the implementation of local climate action?</i>	<i>Does the NDC include any explicit mention of the participation of cities and regions in the planning processes?*</i>
<b>Federal states (5)</b>			
Australia	"National targets and federal emissions reduction policies are complemented by targets and measures implemented at the State and Territory level".	"As a federation, Australian States, Territories and local government also implement significant policies and programs to reduce greenhouse gas emissions and support clean energy technologies".	No specific programme for local climate action is mentioned.
Canada	"Several provinces and territories have committed to deep GHG emissions reduction targets – for both 2030 and 2050. E.g., British Columbia target to reduce GHG emissions below 2007 levels by 40% by 2030".	E.g. "2.6 CAD billion Canada Greener Homes Grant initiative with grants of up to CAD 5 000 and investing CAD 4.4 billion to help homeowners complete deep home retrofits through interest-free loans worth up to CAD 40 000; Invest CAD 964 million in smart renewable energy and grid modernisation projects, as well as continue to work with provinces and territories to help build key intertie projects".	Under the Canadian Net-Zero Emissions Accountability Act, the Minister of Environment and Climate Change s required to provide opportunities to provincial governments to submit proposals when the government is setting its emissions target or emissions reduction plans.
Mexico	No mention of city/regional GHG emissions reduction commitments.	No specific programme for local climate action is mentioned.	The NDC mentions the participation of states in the process of updating the NDC.
United States	The assessments included consideration of contributions from subnational actions, noting that states and local governments contribute substantially under the United States federal system to national efforts to reduce emissions.	"Local governments are charged with governance responsibilities at the corresponding level of SNG. This shared responsibility for policy in areas such as economic growth, energy development, transport, land use planning and natural resource use creates the opportunity for action at multiple levels".	The NDC was developed based on sector-by-sector assessments of emission reduction potential informed by a whole-of-government process via the National Climate Task Force, led by the White House Office of Domestic Climate Policy.
Switzerland	No mention of city/regional GHG emissions reduction commitments.	No specific programme for local climate action is mentioned.	No reference to the engagement of city/regional government in the planning process of the NDC.
<b>Unitary countries (11)</b>			
Chile	No mention of city/regional GHG emissions reduction commitments.	Regional Climate Action Plans.	"Regional Climate Change Committees (CORECC) plan and implement action to face climate change, in close collaboration with central government, municipalities and other non-state and sub-national actors".

Country	Assessment criteria: Is the role of cities and regions recognised in relation to:		
	GHG emissions reduction commitments	Implementation of local climate action	Engagement in the NDC planning process
	<i>Does the NDC commitment include any explicit references or acknowledgements to the local GHG emissions reduction commitments by its cities and regions?</i>	<i>Does the NDC make any reference to a specific programme/initiative/activity aimed at supporting the implementation of local climate action?</i>	<i>Does the NDC include any explicit mention of the participation of cities and regions in the planning processes?"</i>
Colombia	No mention of city/regional GHG emissions reduction commitments.	The NDC includes a portfolio of sectoral and territorial measures with mitigation and adaptation measures led by regional governments.	
Costa Rica	No mention of city/regional GHG emissions reduction commitments.	The NDC includes several "action areas" with direct implications on local actions (i.e. mobility and transport, territorial management and development).	No reference to the engagement of city/regional government in the planning process of the NDC.
Israel	No mention of city/regional GHG emissions reduction commitments.	No specific programme for local climate action is mentioned.	"The establishment of sectorial working groups consisting of representatives of relevant ministries, local authorities, public representatives, NGOs [non-governmental organisations], academia".
Iceland	No mention of city/regional GHG emissions reduction commitments.	No specific programme for local climate action is mentioned.	"The work on the Climate Action Plan was carried out by an interministerial working group, with the Association of Local Authorities also represented, led by the Ministry for the Environment and Natural Resources".
Japan	No mention of city/regional GHG emissions reduction commitments.	The MLIT's Green Challenge promotes efforts in cross-sectoral decarbonisation in national land, urban and regional spheres.	No reference to the engagement of city/regional government in the planning process.
Korea	No mention of city/regional GHG emissions reduction commitments.	The Korean Green New Deal 2.0 includes green transition in cities/spatial planning as one its four pillars.	No reference to the engagement of city/regional government in the planning process of the NDC.
New Zealand	No mention of city/regional GHG emissions reduction commitments.	No specific programme for local climate action.	No reference to the engagement of city/regional government in the planning process of the NDC.
Norway	No mention of city/regional GHG emissions reduction commitments.	No specific programme for local climate action is mentioned.	"In Norway, two Talanoa Dialogues were held. One between the Minister of Climate and Environment and mayors (municipalities) and one initiated by Norwegian environmental organisations and the Parliament".
Türkiye	No mention of city/regional GHG emissions reduction commitments.	"In the scope of Enhancing Adaptation Action in Türkiye Project, local climate change adaptation action plans are being prepared for 4 pilot cities (Konya, Muğla, Samsun and Sakarya) in Türkiye. Sectoral vulnerability and risk assessments have been completed, and actions are being identified".	No reference to the engagement of city/regional government in the planning process of the NDC.
United Kingdom	"The Devolved Administrations in Scotland, Wales and Northern Ireland have their own statutory emissions reduction targets, i.e. Scotland to reach the net zero GHG emissions by 2030".	"Government works closely with local government and has provided support to help them contribute to delivering net zero including: Local Net Zero Hubs and the Local Net Zero Forum for national and local senior government officials to discuss local net zero policy and delivery issues".	"Prepared in collaboration with government departments and Devolved administrations".
<b>European union</b>			
European Union	No mention of city/regional GHG emissions reduction commitments. However, it mentions the commitments	No specific programme for local climate action is mentioned.	"The enhanced target is based on an extensive impact assessment, as well as stakeholder input, collected via

Country	Assessment criteria: Is the role of cities and regions recognised in relation to:		
	GHG emissions reduction commitments	Implementation of local climate action	Engagement in the NDC planning process
	<i>Does the NDC commitment include any explicit references or acknowledgements to the local GHG emissions reduction commitments by its cities and regions?</i>	<i>Does the NDC make any reference to a specific programme/initiative/activity aimed at supporting the implementation of local climate action?</i>	<i>Does the NDC include any explicit mention of the participation of cities and regions in the planning processes?"</i>
of its member countries.		public consultation including national, regional and local authorities".	

Note: The European Commission's NDC covers all of its member countries and includes the following 22 OECD members: Austria, Belgium, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, the Netherlands, Poland, Portugal, the Slovak Republic, Slovenia, Spain and Sweden.

■ Strong attention; ■ Attention; □ No attention

Source: Based on NDCs.

### NAPs and NAS incorporating local action

In terms of adaptation, to assess the role of local governments in relation to climate risk assessment and dissemination of information, adaptation planning, implementation and measurement, this report analysed the national adaptation plans or strategies (NAPs/NAS) of all OECD countries (Table 4.6). In relation to climate risk assessment, several countries such as Belgium, Canada, Sweden and the United Kingdom have dedicated a section in their NAPs/NAS to the role of local governments in risk assessment or in disseminating information on climate risks. Some countries, such as Canada, went beyond and included specific actions in their NAP related to local risk assessment, such as community-based climate monitoring (Government of Canada, 2022<sup>[32]</sup>). When it comes to adaptation planning, all OECD countries have recognised the role of local governments. For example, New Zealand emphasises the importance of involving local governments and indigenous communities in adaptation planning, due to their responsibilities (e.g. land use planning, asset management, civil defence) and local knowledge and experience (New Zealand Ministry for the Environment, 2023<sup>[33]</sup>). The role of local governments related to the implementation of adaptation measures is also extensively discussed in the NAPs and NAS of most OECD countries. For example, Finland's NAP defined the responsibility of local and regional governments in relation to the measures that have to be implemented based on its objectives (Finnish Ministry of Agriculture and Forestry, 2014<sup>[34]</sup>). Regarding measurement, one-third of OECD countries mention the role of local authorities in measuring and evaluating adaptation progress in their NAPs and NAS. For example, the Netherlands set out a number of monitoring activities in its NAP, which mentions the role of municipalities and other subnational entities. The NAP set out an objective to develop a digital platform where municipalities, water authorities and other stakeholders can report their progress and provide guidance for monitoring. Other countries such as Belgium, Colombia, Ireland and New Zealand also highlight the importance of local authorities in measurement, although they do not specify the actions and measures that have to be carried out at the local level (OECD, forthcoming<sup>[13]</sup>).<sup>3</sup>

**Table 4.6. The role of local governments in national adaptation plans or strategies in OECD countries**

Country	Reference document(s)	Is the role of local government mentioned in relation to:			
		Climate risk assessment or dissemination of information	Adaptation planning	Adaptation implementation	Adaptation measurement
Australia	NAS 2021-2025 (2021)	○	○	○	○
Austria	NAS (2017)	○	○	○	○
Belgium	NAP 2017-2020 (2017)	●	●	●	●
Canada	NAP (2022)	●	●	●	○

Country	Reference document(s)	Is the role of local government mentioned in relation to:			
		Climate risk assessment or dissemination of information	Adaptation planning	Adaptation implementation	Adaptation measurement
Chile	Chile's Long-Term Climate Strategy (2021)	●	●	●	○
Colombia	NAP (2016)	○	○	●	●
Costa Rica	NAP 2022-2026 (2022)		●	●	
Czech Republic	NAS/NAP (2021)	●	●	●	
Denmark	Action plan for a climate-proof Denmark (2012)	●	●	●	
Estonia	Climate Change Adaptation Development Plan until 2030 (2017)		●	●	
Finland	NAP (2014)	○	○	●	●
France	NAP (2018)		○	●	
Germany	Adaptation Action Plan of the German Strategy for Adaptation to Climate Change (2011)	○	●	●	
Greece	NAS (2016)		●	●	
Hungary	National Climate Change Strategy 2018-2030 (2018)		○	○	
Iceland	Climate Change Adaptation Policy (2021)				
Ireland	National Adaptation Framework (2018)		●	●	●
Israel	NAP (2017)	●	●	●	
Italy	NAS (2014)	○	○		
Japan	NAP (2021)	○	●		
Korea	NAP 2021-2025 (2021)	●	●	●	
Latvia	NAP 2019-2030 (2019)			●	
Lithuania	National Energy and Climate Action Plan of the Republic of Lithuania for 2021-2030 (2021)	○	○	○	
Luxembourg	National Adaptation Strategy and Action Plan 2018-2023 (2018)				
Mexico	National Climate Change Strategy (2013)	●	●	●	
Netherlands	NAS 2018-2019 (2018)		●	●	
New Zealand	NAP (2022)	●	●	●	●
Norway	NAS (2021)	○	○		
Poland	NAS 2020 (2013)	○	●	●	
Portugal	Action Program for Adaptation to Climate Change (2019)	○	●	●	
Slovak Republic	NAS (2018)		●	●	
Slovenia	Strategic Framework for Climate Change Adaptation (2016)	○	○	○	
Spain	NAP 2021-2030 (2020)	○	○	●	
Sweden	NAS (2018)	●	●	●	
Switzerland	NAP 2014-2019 (2014)		●		●
Türkiye	National Adaptation Strategy and Action Plan 2011-2023 (2012)		●	●	
United Kingdom	NAP 2023-2028 (2023)	●	●	●	●

Note: The black dot means “mandatory or explicit requirement” and the white dot means “voluntary or encouraged”. The United States does not have a NAP/NAS at the federal level; therefore, it was not included in the list.

When they exist, the reference documents are countries' NAS or NAPs. For other countries, the reviewed documents are official climate-related documents that deal with adaptation.

■ Extensively discussed; □ Slightly discussed; □ Not discussed

Source: Based on OECD (forthcoming<sup>[13]</sup>), “Climate adaptation: why can't local governments do it alone?”, OECD Publishing, Paris; Matsumoto and Ledesma Bohorquez (2023<sup>[19]</sup>), *Building Systemic Climate Resilience in Cities*, OECD Publishing, Paris.

### *Policy implications*

As demonstrated above, only a limited number of countries are paying substantial attention in their NDCs to the GHG emission reduction targets set by their regions or cities. A possible direction is to set and include climate goals and targets not only for themselves but also for regions and cities, recognising their pledges. By taking stock of existing climate mitigation and adaptation commitments from cities and regions, national governments can identify synergies, gaps and opportunities for aligning policies and resources to implement national policy goals more effectively.

Despite positive signals and examples of cities and regions participating in the process of preparing national climate policies, there is potential to facilitate more proactive engagement. For example, national governments could conduct multi-stakeholder consultations with a particular focus on local authorities. This would help collect local information that is useful for the design of national policies, such as granular information on climate impacts, needs and innovations. They could also set concrete actions, where local governments can be engaged as implementation partners, and allocate resources (e.g. energy efficiency retrofits, expansion of green areas).

Table 4.7 outlines a set of recommended actions for both national and subnational governments to address the policy gaps.

**Table 4.7. Recommended actions to incorporate local climate action into national climate plans and strategies**

Category	For whom	Recommended action
Goals and targets	National	<ul style="list-style-type: none"> <li>Take stock of existing climate mitigation and adaptation commitments from cities and regions, including local and regional climate goals and targets. Set national goals and targets in NDCs, LT-LEDs, NAPs and NAS which consider regional and local climate goals and targets.</li> <li>Set dedicated and aligned goals and targets for cities and regions in NDCs, LT-LEDs, NAPs and NAS.</li> </ul>
	All levels	<ul style="list-style-type: none"> <li>Develop a multi-level framework/mechanism to align the baseline, data and methodologies to set goals and targets in a coherent manner across levels of government.</li> </ul>
Implementation	National	<ul style="list-style-type: none"> <li>Define the role of cities and regions in implementing NDCs, LT-LEDs, NAPs and NAS and include in these plans and strategies.</li> </ul>
	All levels	<ul style="list-style-type: none"> <li>Develop and include concrete projects/actions implemented by cities and regions in NDCs, LT-LEDs, NAPs and NAS.</li> </ul>
Process of developing plans and strategies	National	<ul style="list-style-type: none"> <li>Engage cities and regions in developing NDCs, LT-LEDs, NAPs and NAS.</li> </ul>
	All levels	<ul style="list-style-type: none"> <li>Create multi-stakeholder platforms and co-ordination mechanisms for developing and implementing NDCs, LT-LEDs, NAPs and NAS.</li> </ul>

### ***Developing subnational climate goals and targets reflecting local needs and interests and aligned with the Paris Agreement***

This subsection delves into how cities and regions develop and implement their climate goals and targets. Cities and regions are motivated to set their own climate mitigation and adaptation goals and targets, reflecting locally specific needs, interests and priorities for their constituencies, which is a key driver of a territorial approach. Thus, this subsection focuses on grasping the state of play of OECD cities and regions in their goal and target settings and analysing if their actions align with the global goals and targets set by the Paris Agreement. Another focus of the subsection is to understand what national governments are doing to support cities and regions in developing their own goals and targets and to identify policy gaps.

### *City and regional climate goals and targets and their alignment with those of national governments*

This report analyses how OECD cities and regions are setting net zero or carbon neutrality targets and compares them with those of their respective countries. The result demonstrates the existence of leading cities and regions that present more ambitious targets compared with their respective national governments. In 23 out of 38 OECD countries, at least 1 city or region has set a net zero or carbon neutrality target with a target year earlier than the respective national target (Table 4.8). At the city level, Adelaide (Australia), Copenhagen (Denmark), Bremen (Germany), Bari (Italy), Durango (Mexico), Nottingham (United Kingdom) and Akron (United States) are among the cities whose target years are in the 2020s, more ambitious than those of their respective national governments. Similarly, Alberta (Canada), Brittany (France), Bremen (Germany) and Delaware (United States) are among the regions with more ambitious net zero or carbon-neutral target years than their national governments.

These ambitious targets of cities and regions can be useful to raise the ambition of the national goals and targets set by the NDCs or LT-LEDS. However, as discussed in Chapter 1, it is important to be reminded that there are still a number of cities and regions which do not have net zero or carbon neutrality targets. Their plans or strategies may not be necessarily aligned with national goals and targets, and some cities and regions do not even have their own climate plans and strategies, implying the need for enabling and scaling up strategies.

**Table 4.8. Net zero or carbon neutrality targets across OECD cities, regions and countries**

Country		Region (with the earliest target year)		City (with the earliest target year)	
Name	Target year	Name	Target year	Name	Target year
Australia	2050	Tasmania	2030	Adelaide	2025
Austria	2040	n.a.		Vienna	2040
Belgium	2050	n.a.		Antwerp, Brussels, Liège	2050
Canada	2050	Alberta	2025	Toronto	2040
Chile	2050	n.a.		Santiago	2050
Colombia	2050	n.a.		Valledupar	2030
Costa Rica	2050	n.a.		San José	2050
Czech Republic	2050	n.a.		Praha	2050
Denmark	2050	n.a.		Copenhagen	2025
Estonia	2050	n.a.		n.a.	
Finland	2035	n.a.		Helsinki	2030
France	2050	Brittany	2020	Bordeaux, Grenoble, Lille, Lyon, Marseille-Aix-en-Provence, Nantes, Paris, Toulon, Toulouse	2050
Germany	2045	Bremen	2020	Bremen	2020
Greece	2050	n.a.		Thessaloniki	2030
Hungary	2050	n.a.		Budapest	2050
Iceland	2040	n.a.		n.a.	
Ireland	2050	n.a.		Dublin	2030
Israel	2050	n.a.		Haifa, Tel Aviv	2050
Italy	2050	Abruzzo	2030	Bari, Bergamo, Busto Arsizio	2020
Japan	2050	Fukuoka, Ibaraki	2030	Sendai	2030

Country		Region (with the earliest target year)		City (with the earliest target year)	
Name	Target year	Name	Target year	Name	Target year
Korea	2050	Jeju	2030	Incheon	2045
Latvia	2050	n.a.		Riga	2050
Lithuania	2050	n.a.		Vilnius	2030
Luxembourg	2050	n.a.		n.a.	
Mexico	2050	n.a.		Durango, Toluca	2020
Netherlands	2050	n.a.		The Hague, Utrecht	2030
New Zealand	2050	n.a.		Auckland	2050
Norway	2050	n.a.		Oslo	2030
Poland	2030	Masovia	2030	Łódź	2036
Portugal	2050	n.a.		Porto	2030
Slovak Republic	2050	n.a.		n.a.	
Slovenia	2050	n.a.		n.a.	
Spain	2050	Andalusia, Aragon, Castilla-La Mancha, Community of Madrid, Murcia	2030	Valencia, Zaragoza	2030
Sweden	2045	n.a.		Stockholm	2040
Switzerland	2050	n.a.		Basel	2037
Türkiye	2050	n.a.		Bursa, Denizli	2030
United Kingdom	2050	Scotland	2045	Nottingham	2028
United States	2050	Delaware, North Carolina, Wisconsin	2025	Akron, Sarasota-Bradenton	2025

Note: The analysis is primarily based on the Net Zero Tracker database, which includes regions in the top 25 emitting countries and cities with populations greater than 500 000 inhabitants. The information on Helsinki (Finland) was collected separately. Regions or cities with net zero or carbon neutrality targets but without an explicit target year were not included in the analysis. The blue shading indicates cities and regions which set net zero or carbon neutrality targets with a target year earlier than the respective national target. In the table, n.a. indicates that there no cities or regions with an explicit target year were found in the Net Zero Tracker database.

Source: Based on Net Zero Tracker (2023<sup>[35]</sup>), *Methodology*, <https://zerotracker.net/methodology>; City of Helsinki (n.d.<sup>[36]</sup>), *Making Helsinki Carbon-neutral*, <https://www.myhelsinki.fi/en/think-sustainably/making-helsinki-carbon-neutral>.

Turning to climate adaptation, comparing goals and targets among countries, regions and cities is not as straightforward as comparing GHG emission reduction targets, indeed, defining adaptation targets is a complex task in itself (see Chapter 2). However, the fact that a growing number of cities and regions are making their own climate adaptation plans and strategies can provide a unique opportunity to develop a methodology to compare their goals and targets and align them with national ones.

### *National governments' initiatives to promote subnational climate plans and strategies*

The report also analysed how countries are guiding and supporting cities and regions developing their goals and targets. Below are the key actions identified:

- **National initiatives combining multi-level dialogues with financial and technical support.** In 2021, Japan launched the Regional Decarbonization Roadmap programme to facilitate the collaboration between national and local governments in the journey to achieve climate neutrality by 2050. The programme came about from discussions at the Council for National and Regional Decarbonisation, led by the Prime Minister, which provided a forum where national and subnational governments can discuss effective collaboration programmes on an equal footing. The programme offers financial and technical support to local governments and private sector companies for decarbonisation projects. The initiative also aims to establish 100 Leading Decarbonisation



Regions, achieving net zero emissions from electricity consumption in households and business sectors by 2030, ahead of the national goal for 2050. This nationally-led initiative with financial support triggered strong motivation from cities and regions to take local decarbonisation actions. The final goal is to encourage neighbouring municipalities and foster a decarbonisation “domino” effect (Case 6 in Annex 4.A).

- **Policy tools translating national mitigation and adaptation goals into action plans or guidelines** are playing a pivotal role in guiding cities and regions to craft local climate plans and strategies that align with the broader national objectives. In Chile, the National Climate Adaptation Strategy for Cities 2018-2022 offered guidelines for cities to develop and implement local adaptation plans and strategies. The strategy is being revised in 2023 to further integrate the targets and goals of the Long-Term Climate Strategy, which sets specific targets for cities, encompassing various aspects such as nature-based solutions, urban mobility, transport and buildings. These targeted policies are instrumental in fostering coherent and co-ordinated efforts both at the national and local levels towards achieving climate goals (Government of Chile, 2019<sup>[37]</sup>; 2021<sup>[38]</sup>).
- **Guiding local climate adaptation strategies through explicit reference to the roles and responsibilities of local governments in NAPs.** For instance, Ireland’s 2018 National Adaptation Framework (NAF) dedicates a specific section to the role of local and regional governments. The framework establishes that each local authority should develop and adopt local adaptation strategies based on the regional approach to adaptation planning. The development of strategies must be undertaken in accordance with the Local Authority Adaptation Strategy Development Guidelines and the NAF. To support this endeavour, the NAF also delineated the need to develop four Climate Action Regional Offices (CAROs), which work with local authorities and co-ordinate regional and territorial adaptation planning (Case 7 in Annex 4.A). Similarly, other countries such as Belgium and the United Kingdom extensively discuss and set mandatory or explicit requirements for the participation of local governments in the preparation of climate risks assessment, adaptation planning, implementation and measurement.

Some regional governments are also taking strong leadership to support their local governments. The region of Flanders in Belgium has established a Local Energy and Climate Pact (LEKP) to translate the European Union (EU) climate ambition into tangible targets in four different areas including greening, energy, mobility and rainwater. The government of the region of Flanders provides financial support and facilitates knowledge exchange between municipalities to help them implement the commitments. So far, the initiative has attracted interest from more than 200 municipalities (Case 8 in Annex 4.A).

### *Policy implications*

Developing subnational climate goals and targets can be a key driver to raise the ambition of climate commitments and accelerate climate action at all government levels. A territorial approach can help cities and regions better reflect locally specific needs, interests and priorities in setting their climate goals and targets. The result of the assessment implies several policy interventions for national governments. First, they can provide long-term visions and roadmaps to demonstrate how countries, regions and cities can work together to achieve the goal of the Paris Agreement. Second, national governments can support cities’ and regions’ development of their own climate goals and targets through financial and technical support such as guidelines, the creation of regional offices and concrete collaborative projects. Third, countries, regions and cities can develop a pact or agreement that delineates the climate actions to be conducted at each level of government. These national actions can empower cities and regions to take ownership of their contributions to global climate efforts, fostering a sense of responsibility and accountability. Table 4.9 summarises a set of recommendations for both national and subnational governments.

**Table 4.9. Recommended actions to promote subnational climate plans and strategies reflecting local needs and interests and aligned with the Paris Agreement**

Category	For whom	Recommended action
City and regional climate goals and targets	Cities and regions	<ul style="list-style-type: none"> <li>• Develop dedicated climate mitigation and adaptation plans and strategies (e.g. locally determined contributions, local adaptation plans), that are aligned with the Paris Agreement as well as respective national goals and targets.</li> <li>• Cooperate with neighbouring municipalities to develop joint climate plans and strategies in a metropolitan area.</li> </ul>
National government initiatives to promote subnational climate goals and targets	National	<ul style="list-style-type: none"> <li>• Set and monitor a national target on the development of climate mitigation and adaptation plans and strategies at the local and regional level.</li> <li>• Create regional offices to support the implementation of local climate action.</li> <li>• Develop strategies/guidelines and support cities and regions in developing and implementing local mitigation, adaptation and resilience plans and strategies.</li> </ul>
	All levels	<ul style="list-style-type: none"> <li>• Identify concrete projects/actions as part of national climate policies that can be implemented in collaboration with cities and regions.</li> <li>• Develop climate and energy agreements/contracts/pacts across levels of government.</li> </ul>

## “Climate-proofing” regional development policy at all territorial levels

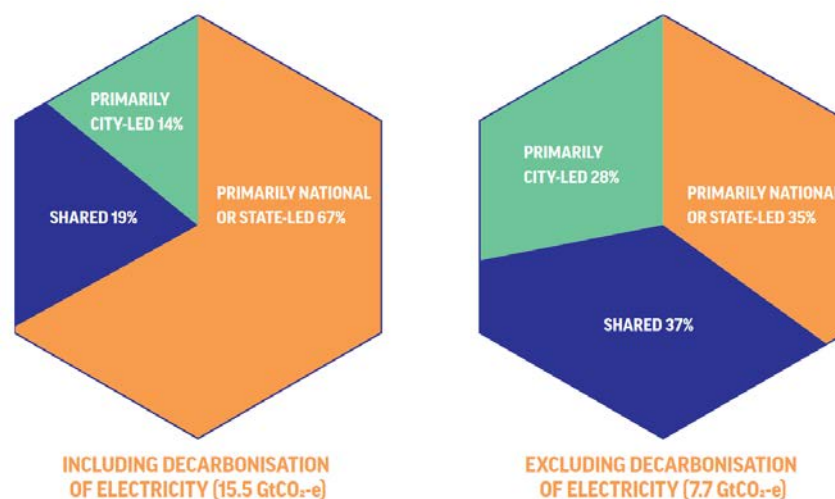
### ***Mainstreaming climate objectives in national urban, rural and regional development policies***

#### *The role of national urban policy in climate mitigation and adaptation*

Cities are currently home to 3.5 billion people and this number is projected to reach 5 billion by 2050. About 10 000 cities have been identified in the world (OECD/EC, 2020<sup>[39]</sup>). Cities are pivotal in global mitigation efforts, as they contribute over 70% of energy-related carbon dioxide (CO<sub>2</sub>) emissions and account for two-thirds of global energy demand (IEA, 2021<sup>[40]</sup>). If current trends continue, global urban primary energy use will grow by about 70% and global urban CO<sub>2</sub> emissions by about 50% between 2013 and 2050. Yet, cities also have significant potential for implementing impactful solutions. For example, it is estimated that 90% of urban emissions can be cut with existing technologies, at the same time creating 87 million jobs in 2030 and 45 million jobs in 2050 (CUT, 2019<sup>[41]</sup>). Other regional and local governments can also replicate climate action, as was the case with the Bus Rapid Transit system in Bogota, Colombia, which has been replicated in other Colombian and Latin American cities. It can even lay the groundwork for national regulations, as was the case with ambitious provisions for solar thermal systems in Barcelona, Spain. The city ordinance requires that all new constructions and significant renovations incorporate solar thermal collectors to provide a minimum of 60% of the energy required for water heating. This led to similar ordinances in over 60 other Spanish municipalities. Six years after its initial adoption in 2000, the national government officially incorporated this requirement into the National Building Code (IRENA, 2021<sup>[42]</sup>).

Local governments are estimated to have direct power over a third of urban GHG emissions reduction potential by 2050. However, the remaining two-thirds depend on either national and state governments or on co-ordination across levels of government (CUT, 2019<sup>[41]</sup>) (Figure 4.1). Local governments can mainstream climate action into their spatial planning, infrastructure, local economic and fiscal policies through locally tailored climate strategies in line with national objectives (OECD, 2010<sup>[43]</sup>; 2019<sup>[44]</sup>) but they also rely on multi-level co-ordination for other areas such as decarbonising the energy grid or rural-urban transport.

**Figure 4.1. Proportion of urban mitigation potential over which different levels of government have primary authority**



Source: CUT (2019<sup>[41]</sup>), *Climate Emergency, Urban Opportunity: How National Government Can Secure Economic Prosperity and Avert Climate Catastrophe by Transforming Cities*, <https://urbantransitions.global/en/publication/climate-emergency-urban-opportunity/>.

Smart city solutions, driven by digitalisation and data, can also play a crucial role in advancing the climate transition in cities. For example, they can help reduce energy consumption (e.g. through smart meters, digital twins and carbon emission maps), facilitate a shift to renewable energy (e.g. through flexible and smart power grids), improve resource efficiency (e.g. through Building Energy Management Systems), optimise transport demand and nudge behavioural change (e.g. through ride-sharing applications) (OECD, forthcoming<sup>[45]</sup>).

In addition, cities have distinct socio-economic characteristics that affect how climate policies are designed and implemented. For example, urban areas are characterised by a high concentration of buildings with limited space for nature. Therefore, as part of a city's climate strategy, green spaces can provide strong benefits of urban amenities to urban citizens. Similarly, the space constraint in cities poses specific challenges in terms of increasing clean power generation, although solutions such as the installation of photovoltaic panels and micro wind turbines in underutilised built-up areas may bring innovation to renewable energy production. Another important characteristic of cities is the cost of living and the affordability challenge, particularly in terms of housing. Cities also concentrate on low-income households. On climate mitigation, such characteristics may affect policy measures such as those aiming to promote compact urban development and decarbonise buildings, as these measures could face strong opposition if they create negative impacts on housing affordability, for example. Therefore, care must be taken to minimise such negative impacts when designing climate mitigation policies in cities.

On climate adaptation, people living in cities are exposed to climate shocks such as floods, storms and heat waves. As Chapter 3 demonstrates, cities are particularly affected by heat stress due to the urban heat island effect and are vulnerable to floods of large magnitude. Cities are also prone to sea level rise: by 2050, over 570 low-lying coastal cities are projected to face a sea level rise of at least 0.5 metres (C40 Cities, 2018<sup>[46]</sup>). These climate shocks present a systemic challenge in cities of all sizes, with far-reaching consequences that span multiple policy sectors (Matsumoto and Ledesma Bohorquez, 2023<sup>[19]</sup>). Coping with such challenges requires applying a “systems approach” that can help better identify, analyse and respond to complex challenges while recognising the social, economic and ecological aspects of our societies as part of an interconnected and constantly changing system.

Cities are understood as a “system” in the complex climate landscape. A systems approach thus offers urban policy makers a unique opportunity to understand and address the complexity of the urban climate

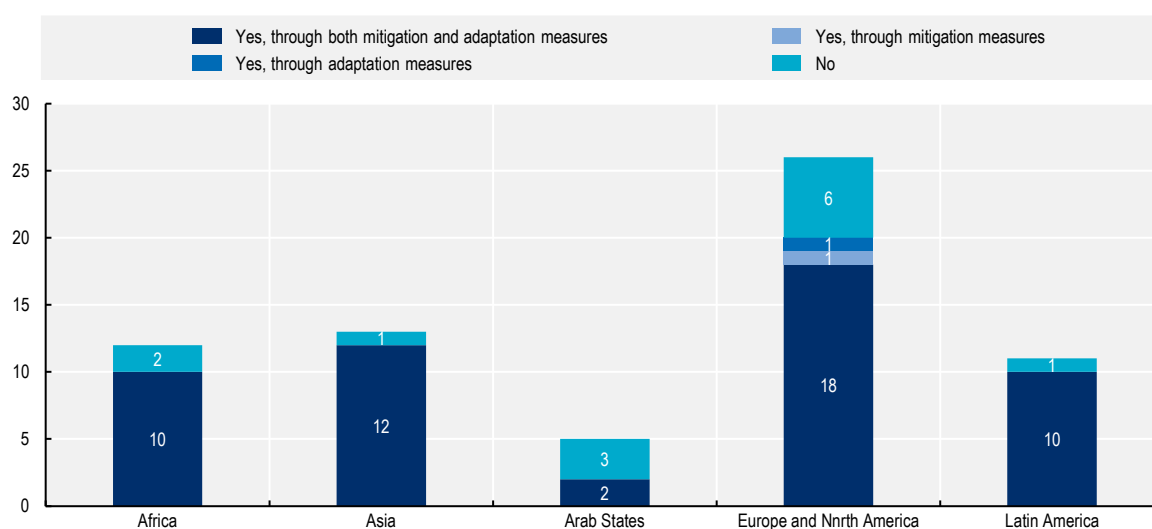
landscape. This approach can be highly effective by identifying untapped opportunities to maximise co-benefits and synergies and manage inevitable trade-offs across economic, social, environmental and other systems interacting in cities. However, national and subnational governments often lack concrete guidance to disentangle the different elements of complex systems in cities and how to approach them (Matsumoto and Ledesma Bohorquez, 2023<sup>[19]</sup>).

National urban policy (NUP) plays a critical role in guiding sustainable urban development together with efforts to advance net zero and enhance resilience. While formulating a common vision and strategy for sustainable urban development, NUPs can also encourage and incentivise actions to advance the net zero transition and enhance climate resilience in cities. According to global monitoring of NUPs conducted by the OECD, UN-Habitat and Cities Alliance in 2021, most NUPs address both climate resilience and the low-carbon transition: 54 out of 67 responding countries (81%) report addressing climate change and almost all of them (52) do so via both mitigation and adaptation measures (Figure 4.2). This underscores the growing recognition of the need to apply an urban lens to climate change.

NUPs address climate change in different ways, as illustrated by a selection of country examples below:

- In **the Netherlands**, the 2019 National Strategy on Spatial Planning and the Environment (NOVI) highlights the importance of a climate-resilient, water-robust built environment, accompanied by sufficient, open, green and blue infrastructure to mitigate heat stress and store water. Maintaining such open space demands the densification of housing and employment within existing city boundaries. The Dutch strategy applies a spatial lens to its economic, social and environmental goals. The strategy developed by the Netherlands pays close attention to the different needs and priorities of urban and rural areas, as well as the demands and preferences of different groups within those communities. The strategy further differentiates Dutch regions by their energy intensity, economic structure and connectivity to local and global markets. This analysis underscores different opportunities in a low-carbon transition, particularly the scope to generate renewable power and adopt different transport modes.

**Figure 4.2. Number of NUPs addressing climate change, by region, n = 67**



Note: Data are drawn from the OECD/UN-Habitat/Cities Alliance National Urban Policy Country Survey 2020. Regional groupings follow the new regional groupings based on United Nations Standard Country and Area Codes (M49) Classifications and UN Habitat regional groupings which are reflected in the UN Habitat World Cities Report.

Source: OECD/UN-Habitat/Cities Alliance (2021<sup>[47]</sup>), *Global State of National Urban Policy 2021: Achieving Sustainable Development Goals and Delivering Climate Action*, <https://doi.org/10.1787/96eee083-en>.

- In **Costa Rica**, the National Urban Development Policy 2018-2030 features “effective and efficient urban planning” as the first core pillar, focused on the importance of considering climate change and other environmental factors in a cross-sectoral way, specifically through three strategic areas: i) incorporating a range of environmental considerations in urban and territorial planning instruments; ii) improving the adaptation capacity of urban infrastructure to mitigate natural risks and threats such as those tied to climate change; and iii) promoting the construction and operation of urban buildings and infrastructure with a positive net effect on natural and urban environments (Case 9 in Annex 4.A).
- **Poland’s** National Urban Policy 2030 discusses extensively the challenges related to climate mitigation and adaptation in cities. To do so, it reviews existing climate-related indicators (i.e. accessibility to green areas, spatial distribution of fine particulate matter (PM<sub>2.5</sub>), average increase in impermeable surfaces in urban areas, change in average annual air temperature) and delineates concrete actions to address climate-related risks. For example, it aims to introduce legislative reforms that raise the profile of blue-green infrastructure for future urban development (Government of the Republic of Poland, 2022<sup>[48]</sup>) (Case 10 in Annex 4.A).
- In **Germany**, the Urban Development Support Programme – a historic national programme that provides financial support for investments in urban renewal and regeneration – was updated in 2022 to include climate mitigation and adaptation considerations in the eligibility criteria for the investments, in particular in relation to the improvement of green infrastructure (Case 11 in Annex 4.A).

The global monitoring of NUPs also found that countries are increasingly using NUPs to support the development of climate data and the use of fiscal instruments. Eleven NUPs (20% of responding countries in 2021) are linked to efforts to improve the evidence base for climate action by developing local GHG emission inventories and 10 NUPs (19%) are linked to carbon pricing and fiscal instruments to achieve climate objectives. Although such developments are not present in all NUPs, they indicate how NUPs guide non-traditional climate considerations in urban planning and pave the way for broader change (OECD/UN-Habitat/Cities Alliance, 2021<sup>[47]</sup>).

### *The OECD Rural Agenda for Climate Action*

Rural areas are key actors in accelerating the global transition to net zero. They are home to 30% of the OECD population and cover approximately 80% of the land mass of OECD countries. Against this backdrop, rural policies influence many of the activities that are essential in accelerating the transition to net zero, including land use, the deployment of renewable energy projects and circular economy strategies, amongst others. Of particular focus in this subsection is the OECD Rural Agenda for Climate Action (RACA) and its vision for sustainable mobility in rural areas. For instance, challenges for rural areas include addressing high GHG emissions from transport while ensuring that rural communities, markets and services remain accessible across expansive landscapes.

The OECD RACA underlines the pressing need for rural policies to accelerate actions towards net zero emission targets. Beyond the sole aspect of climate adaptation, the RACA envisions a thriving rural landscape that harnesses opportunities that the green transition offers, with an understanding of the unique characteristics, strengths and challenges of each rural region. It strives to chart a course for rural policies that align with overarching global climate objectives by exposing achievements and highlighting opportunities for further growth.

The RACA, which was endorsed by OECD member countries in November 2021 and discussed at the 2021 United Nations Climate Change Conference (COP26), calls for rural policies to play a more active role in achieving net zero GHG emission targets (OECD, 2022<sup>[49]</sup>). It aims to take a holistic approach to ensure that rural regions make the most of new opportunities in the transformation towards net zero and environmentally friendly economies. To that end, the RACA highlights six policy areas that can be levers

to reach the twin objectives of rural development and the transition to a net zero carbon economy. It also promotes a long-term dialogue on how rural policies and relevant stakeholders can support the transition to net zero emission economies. Furthermore, it encourages countries, regions, and communities to better integrate rural development opportunities into broader national and subnational climate strategies.

The six policy areas of the RACA are the following:

- **Developing better indicators and information.** Strengthen the evidence base by collecting and consolidating regional and local data, assessing how opportunities and challenges related to climate change will play out in all kinds of rural areas.
- **Increase the capacity of rural places.** Empower rural regions to develop and implement effective transition strategies, ensuring they are involved and have sufficient enabling conditions (i.e. knowledge, institutional capacity, good governance, data, digital infrastructure and funding) to adapt and build resilience to climate change as well as ensure the uptake of climate change mitigation actions that can create win-win situations for rural development.
- **Renewable energy deployment.** Build on the competitive advantage of rural regions in producing renewable energy, establish local innovation ecosystems and link them to new initiatives such as green hydrogen production.
- **Ecosystem services.** Support the sustainable management of natural capital, sustainable land-management practices and value creation from restoring, preserving and enhancing ecosystems for rural development.
- **Circular and bioeconomy deployment.** Support the shift to a circular economy and bioeconomy that minimise environmental pressures and promote resource efficiency to offer opportunities for new rural business models and create new markets.
- **Sustainable mobility.** Contribute to decarbonising transport in rural regions by accelerating the transition to more sustainable and innovative mobility options.

Many OECD countries are making progress in these six policy areas. The RACA also aims to support OECD member countries in implementing and effectively using available funds. Examples of recent commitments that could accelerate the transition to net zero in rural areas include:

- The new EU Common Agricultural Policy (CAP) (2023-27) allocated EUR 387 billion over 7 years to support farmers and rural populations to contribute more decisively to tackling climate change, protecting the environment and moving to more sustainable and resilient food systems (EC, 2021<sup>[50]</sup>).
- The United States Department of Agriculture (USDA) allocated over USD 914 million in 2022 to discretionary investments in climate-smart agriculture and forestry activities, as well as USD 564 million for clean energy activities across the United States (USDA, 2022<sup>[51]</sup>).
- In 2023, the Australian Government and the Government of South Australia finalised a grant agreement of AUD 100 million to develop the Port Bonython Hydrogen Hub near Whyalla, South Australia, which will create regional jobs and increase Australia's renewable energy capacity (Prime Minister of Australia, 2023<sup>[52]</sup>).

Within the scope of the RACA framework, improving sustainable mobility emerges as a pivotal axis for rural regions to reduce GHG emissions stemming from transport, given their higher per capita CO<sub>2</sub> emissions driven by higher usage of private cars and the lack of public transport in low-density areas. This requires policy makers in rural areas to take into account how people and goods move within broad rural landscapes and the potential implications of changes in transport policy on accessibility, community resilience and sustainable development.

### *Policy implications*

Cities, or urban areas, have a substantial potential to drive the net zero transition forward but policy gaps and untapped opportunities remain. National urban policies can enhance their own effectiveness by seamlessly integrating climate action as a fundamental guiding principle in urban development and making sure future urban development is promoting the net zero transition and enhancing climate resilience.

Rural areas, often challenged by limited access to modern infrastructures, are essential in the global climate transition framework, yet face unique difficulties. Notably, rural regions contend with the ‘distance penalty,’ a significant factor that affects service delivery and sustainable development. This penalty manifests in increased pollutant emissions and difficulties in implementing sustainable mobility solutions, due to the longer distances and less advanced infrastructure typical of rural areas. Thus, a major climate-related concern in these regions is transportation, a sector responsible for high levels of greenhouse gas (GHG) emissions. National rural development policies play a key role in tackling the challenges. Rural areas also hold a deep connection with nature and possess untapped resources crucial for combating climate change and promoting sustainable growth. Addressing rural mobility is therefore not just about connecting communities; it’s also a strategic approach to reducing overall transport sector emissions, while ensuring equitable access to markets and services. Table 4.10 outlines a set of recommended actions for both national and subnational governments to mainstream climate objectives in national urban, rural and regional development policies.

**Table 4.10. Recommended actions to mainstream climate objectives in urban, rural and regional development policies**

Category	For whom	Recommended action
National urban policies (NUPs), national rural development policies, national-level regional development policies	National	<ul style="list-style-type: none"> <li>Identify place-specific potentials and opportunities to drive the net zero transition forward and build climate resilience at the urban, rural and regional scales.</li> <li>Delineate clear climate mitigation and adaptation objectives and goals in NUPs, national rural development policies and national-level regional development policies which are aligned with the Paris Agreement goals.</li> </ul>

### ***Promoting climate action and resilience at the right territorial scale***

#### *Planning climate action and resilience at the metropolitan scale*

Metropolitan areas concentrate a wide range of networks and services, housing, transport, water and other public services extending to the administrative boundaries of a single city. This offers a distinct opportunity to implement metropolitan strategies that promote an integrated approach across various sectors. By adopting metropolitan governance planning, cities can integrate land use, transport and housing with the objective of reducing urban sprawl, thus reducing GHG emissions and curbing the negative effects of urban sprawl on land use and biodiversity. In addition, metropolitan governance can play a pivotal role in addressing the fragmentation of tasks and responsibilities related to water management.

Despite the growing recognition of metropolitan governance as a tool for climate action, there is limited evidence on designing and implementing metropolitan strategies for climate action and resilience. A few leading practices on climate adaptation can still be highlighted in this field:

- In 2012, the Helsinki Metropolitan Area became one of the first metropolitan areas in the world to put together an adaptation strategy with input from all four cities of the metropolitan area (Helsinki, Espoo, Helsinki, Kauniainen and Vantaa) and with the support of the Helsinki Region Environmental Services Authority (HSY). More recently, the actions set by the strategy were updated as part of the Sustainable Urban Living Programme (prepared between 2019 and 2021) (HSY, 2022<sup>[53]</sup>).

- In 2018, the Metropolitan Authority of Barcelona (Spain) adopted the Climate and Energy Plan of the Barcelona Metropolitan Area 2030, which integrates three pre-existing plans: the Carbon Management Strategy, the Roadmap for Energy Transition and the Climate Change Adaptation Plan. The plan proposes 43 adaptation measures, which include adapting buildings to extreme weather conditions, expanding green areas and improving ecosystem services. Its implementation spans the 36 municipalities of the metropolitan area, covering an area of 636 square metres (m<sup>2</sup>) and a population of around 3.2 million inhabitants (one of the biggest metropolitan areas in Europe) (Matsumoto and Ledesma Bohorquez, 2023<sup>[19]</sup>).

### *Integrating transport and land use through transit-oriented development (TOD) in FUAs*

Extensive built-up areas are associated with changes in land use patterns, resulting in challenges to carbon sinks, emissions and energy demand. As discussed in Chapter 3, in OECD metropolitan areas, there are significant variations in built-up area per capita, ranging from an average of 34 m<sup>2</sup> in Colombia to 484 m<sup>2</sup> in the United States. Built-up areas have also grown faster than populations in 90% of OECD cities, especially in Europe and the United States Midwest. Moreover, urban heat islands are more pronounced in metropolitan areas with over 250 000 inhabitants, as these areas experience an average temperature difference of 3 degrees Celsius (°C) compared to their surroundings, which is nearly twice that of cities with fewer than 100 000 inhabitants. In addition, the association of urban sprawl with car use has been established with socio-economic modelling and validated empirically in a series of econometric studies. The environmental relevance of the link between urban sprawl and private vehicle use is crucial, as vehicle kilometres translate into air pollution and GHG emissions. Theoretical work highlights two main channels through which urban development may translate to more vehicle kilometres and thus emissions: i) through changes in the spatial dispersion of residences, jobs and other key locations (e.g. shopping centres, schools); and ii) through changes in the modal split, i.e. the share of each transport mode in the total number of kilometres travelled (OECD, 2018<sup>[54]</sup>). Indeed, due to high density, integrating low-carbon transport infrastructure investments (public transport, active transport with bike lanes and pedestrian paths) in urban development is a major opportunity for urban built-up areas/urban centres to drive the net zero transition. These challenges related to land use and transport do not stop at the borders of local authorities but extend to an entire metropolitan area, implying that policies at the metropolitan scale would be necessary to tackle them effectively.

Several OECD metropolitan areas have been deploying TOD approaches linked with climate and energy goals. Urban areas developed under TOD often consist of a centre with a public transit station, surrounded by high-density, mixed-use development with lower-density development gradually spreading outward from the centre. Another characteristic of TOD is that it facilitates access to local jobs and services. For that, land use is mixed and most residents have access to services and goods either on foot or by public transport (OECD, 2020<sup>[55]</sup>; 2012<sup>[56]</sup>). For example, in Canada, “Metro Vancouver 2040: Shaping Our Future” is the Regional Growth Strategy (RGS) that set a goal to reduce GHG emissions by 33% below 2007 levels by 2020 and 80% below 2007 levels by 2050. The strategy aims to stimulate growth in centres and transit corridors, promote working and playing close to home, encourage transit, cycling and walking, adopt green infrastructure; establish mixed-use transit-oriented communities and reduce vehicle kilometres travelled (Melchor and Lembcke, 2020<sup>[57]</sup>) (Case 12 in Annex 4.A). Another example is Seoul, Korea, launching the Seoul Transport Vision 2030 in 2013, setting concrete goals to reduce transport CO<sub>2</sub> emissions from 1.2 tonnes in 2010 to 0.9 tonnes a year per capita in 2030, associated with an increase in green transport (public transport, walking, biking and zero tailpipe-emission vehicles) from 70% to 80% by 2030 (CLC, 2003<sup>[58]</sup>).

### *Greening cities: Linking climate mitigation and adaptation in FUAs*

Greening cities is one of the most desirable policy interventions as they have proved to be effective in linking mitigation and adaptation efforts. In this context, nature-based solutions (NbS) have emerged as a



key tool to help cities integrate nature into the urban fabric, generating multiple benefits. NbS aim to maintain, enhance and restore ecosystems to address a variety of social, economic and environmental challenges, including climate change and biodiversity loss. These solutions encompass a broad range of interventions, from green roofs and urban parks in cities to the restoration of watersheds, forests and degraded land. Well-planned, implemented and maintained NbS can provide key services to people – such as clean water and protection from flooding – with lower energy consumption and environmental impacts than their grey infrastructure equivalent. NbS can also yield co-benefits for the planet, such as increasing carbon storage, providing habitats for species and contributing to climate adaptation (OECD, forthcoming<sup>[59]</sup>).

Cities across OECD countries have been securing and enhancing green areas in different ways related to their specific characteristics. Cities in Ireland, Norway, Switzerland and the United Kingdom include three times more green areas relative to their total land area than cities in Chile, Japan or Mexico. Cities with the highest share of green areas are mostly located in Central and Western Europe, on the American East Coast, Midwest and Northwest. In Chile, Japan, Spain and Türkiye, almost all cities, apart from a few coastal cities, have very scarce vegetation areas (Figure 4.3 and Figure 4.4). In per capita terms, cities located in the United States record the highest green area per capita with 300 m<sup>2</sup> per person, compared to 26 m<sup>2</sup> per person in Chile or Türkiye.

However, a large share of green areas does not necessarily ensure an equal distribution of public green spaces within a city and fair access for the urban population. On average, in FUAs' urban centres located in Finland and Luxembourg, around 95% of the population has access to a public green area of more than 1 hectare (ha) within 400 m distance. Among large metropolitan areas (metropolitan areas with more than 1.5 million inhabitants), Calgary (Canada) and Stockholm (Sweden) have the highest accessibility rate, as almost 95% of their population has access to such public green spaces. On the other hand, in Mexico and Türkiye, this rate falls under 40% (Figure 4.5 and Figure 4.6).

Cities have been implementing diverse measures to increase the size of and accessibility to green areas. Some key actions identified include the following:

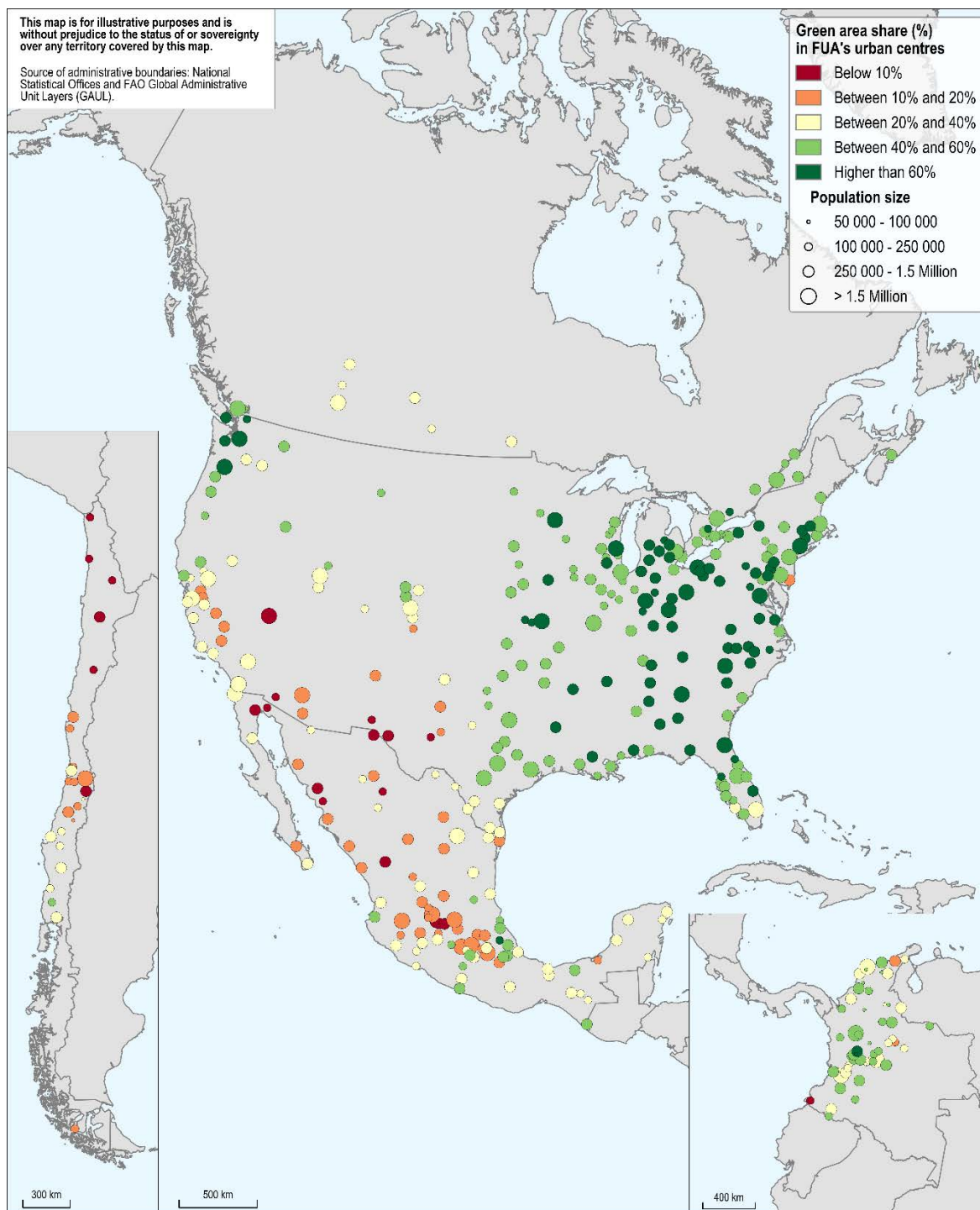
- **Innovative spatial planning tools.** For instance, Berlin (Germany), Malmö (Sweden) and London (United Kingdom) are using the Green Space Factor (GSF) to promote green spaces. The GSF offers a planning tool to ensure a designated amount of vegetation within residential courtyards. GSF schemes work by assigning a factor between 0 and 1 for various surface cover types, with sealed surfaces corresponding to 0 and the most natural cover to 1. To calculate a GSF for a site, the factor for a particular surface cover is multiplied by its area. This is repeated for each surface cover type. The multiplied sums are added and then divided by the overall site area to give an overall GSF score for a site between 0 and 1 (City of Malmö, 2023<sup>[60]</sup>; The Ecology Consultancy, 2017<sup>[61]</sup>).
- **Regulatory and planning frameworks to expand green areas.** For example, the city of Seoul (Korea) and the city of Toronto (Canada) have mandatory green roof regulations. Toronto requires all new developments that are greater than 2 000 m<sup>2</sup> in gross floor area to construct green roofs over 20-60% of the available roof space (City of Toronto, n.d.<sup>[62]</sup>). Similarly, the Green Roof Campaign in Basel, Switzerland, uses regulation and tax incentives to promote the installation of flora on roofs, which fosters cost-saving and richer biodiversity (Case 13 in Annex 4.A). The city of Copenhagen, Denmark, is increasing green spaces to enhance water retention as part of the Cloudburst Management Plan (Case 14 in Annex 4.A). The city of Lisbon, Portugal, is aiming at creating a water retention and drainage network, linked with the provision of green infrastructure with minimum water needs (Case 15 in Annex 4.A).

National governments often enforce such regulatory frameworks. For instance, the United Kingdom's Environment Act 2021 mandates a "biodiversity net gain" to ensure that each development leaves biodiversity in a measurably better state than before the development took

place. The mandatory biodiversity net gain requires development to deliver more for nature; setting a nation-wide requirement to increase biodiversity by a minimum of 10% compared to the baseline. This means that there will be more and better-quality places for wildlife to live and thrive and for people to enjoy (Case 16 in Annex 4.A).

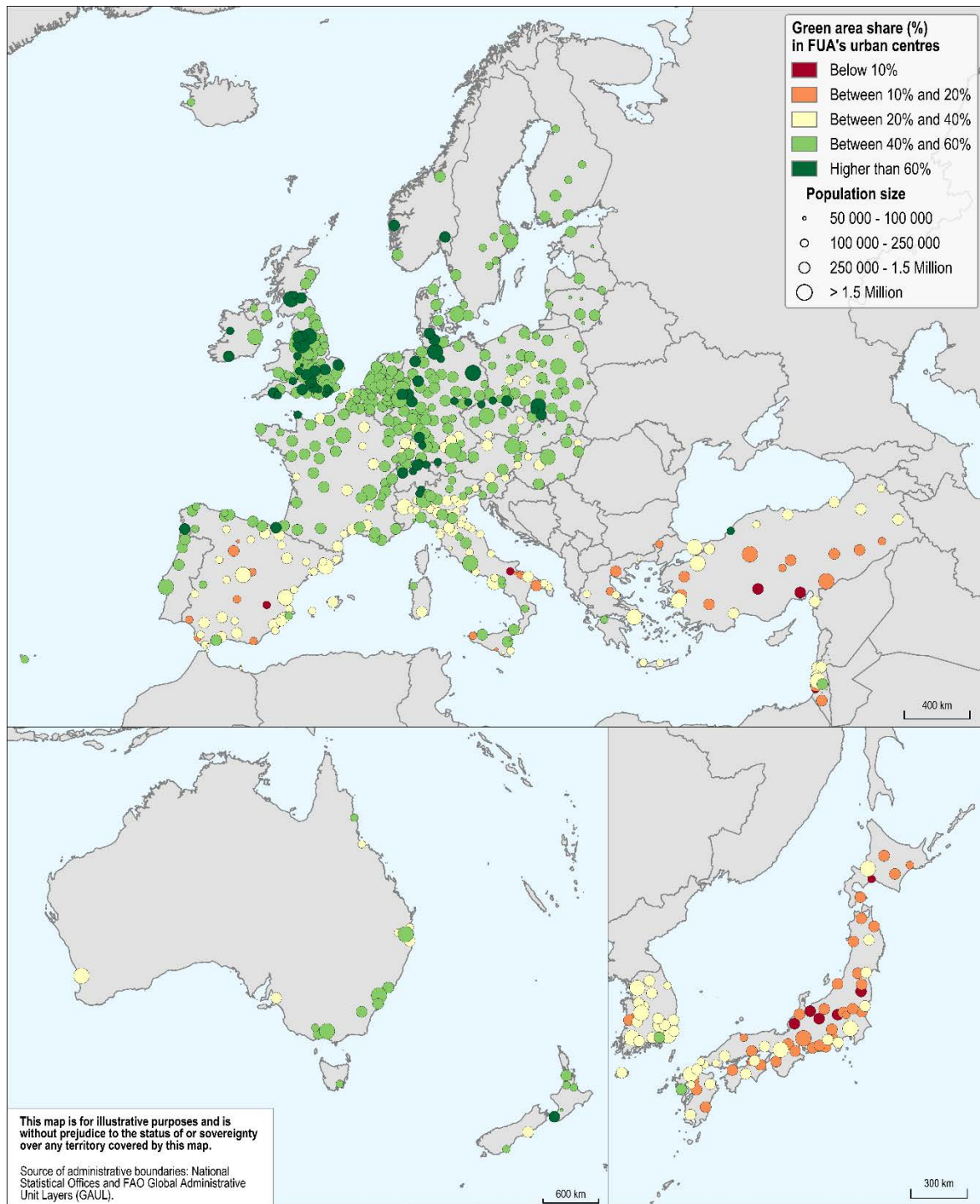
- **Setting targets for the expansion of urban green areas.** For instance, the city of Freetown, Sierra Leone, is implementing the Freetown the Treetown initiative that aims to plan and grow 1 million trees and restore 3 000 ha of land, sequestering approximately 69 000 tonnes of CO<sub>2</sub>. The initiative uses innovative, disruptive and low-cost digital technology for tree tracking. It also creates new jobs for women and young people in green sectors, as every tree has been assigned a unique identification code that can be transformed into “impact tokens” and sold as carbon offsets (Case 17 in Annex 4.A). Similarly, the city of Barcelona, Spain, has set a goal to expand its green areas by 1.6 km<sup>2</sup> by 2030. As of 2019, the city offers an estimated 17.50 m<sup>2</sup> of green areas per inhabitant. The proposed target seeks to increase this allocation by an additional 1 m<sup>2</sup> per person. Furthermore, the city has set an objective to enhance tree coverage by 5% by 2037 and establish 10 biodiversity refuges. These goals are incorporated in the city’s Climate Plan 2018-2030 and accompanied by concrete measures to achieve the goal, such as identifying areas that are in greater need of green areas due to their specific climate and spatial factors (e.g. high temperatures, intense use of public spaces) (Case 18 in Annex 4.A).

**Figure 4.3. Share of green areas in functional urban areas (FUA's) urban centres, 2020, Americas**



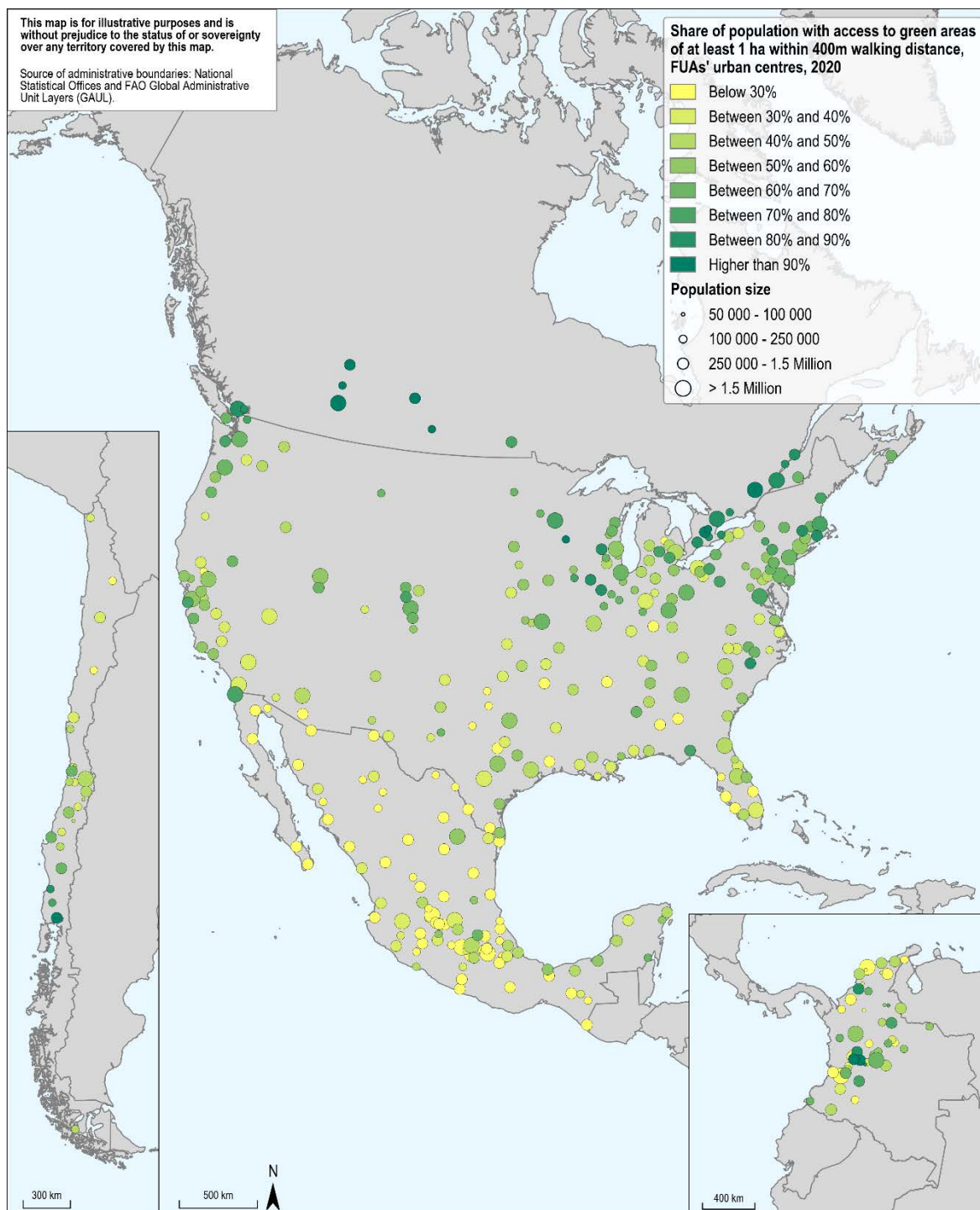
Source: OECD (2022<sup>[63]</sup>), *OECD Regions and Cities at a Glance 2022*, <https://doi.org/10.1787/14108660-en>; based on Zanaga, D. et al. (2021<sup>[64]</sup>), *ESA WorldCover 10 m 2020 v100*; Florczyk, C. et al. (2019<sup>[65]</sup>), *GHS Urban Centre Database 2015, Multitemporal and Multidimensional Attributes, R2019A*, <https://data.jrc.ec.europa.eu/dataset/53473144-b88c-44bc-b4a3-4583ed1f547e>.

**Figure 4.4. Share of green areas in functional urban areas (FUA's) urban centres, 2020, Europe, Asia, Pacific**



Source: OECD (2022<sup>[63]</sup>), *OECD Regions and Cities at a Glance 2022*, <https://doi.org/10.1787/14108660-en>; based on Zanaga, D. et al. (2021<sup>[64]</sup>), *ESA WorldCover 10 m 2020 v100*; Florczyk, C. et al. (2019<sup>[65]</sup>), *GHS Urban Centre Database 2015, Multitemporal and Multidimensional Attributes, R2019A*, <https://data.jrc.ec.europa.eu/dataset/53473144-b88c-44bc-b4a3-4583ed1f547e>.

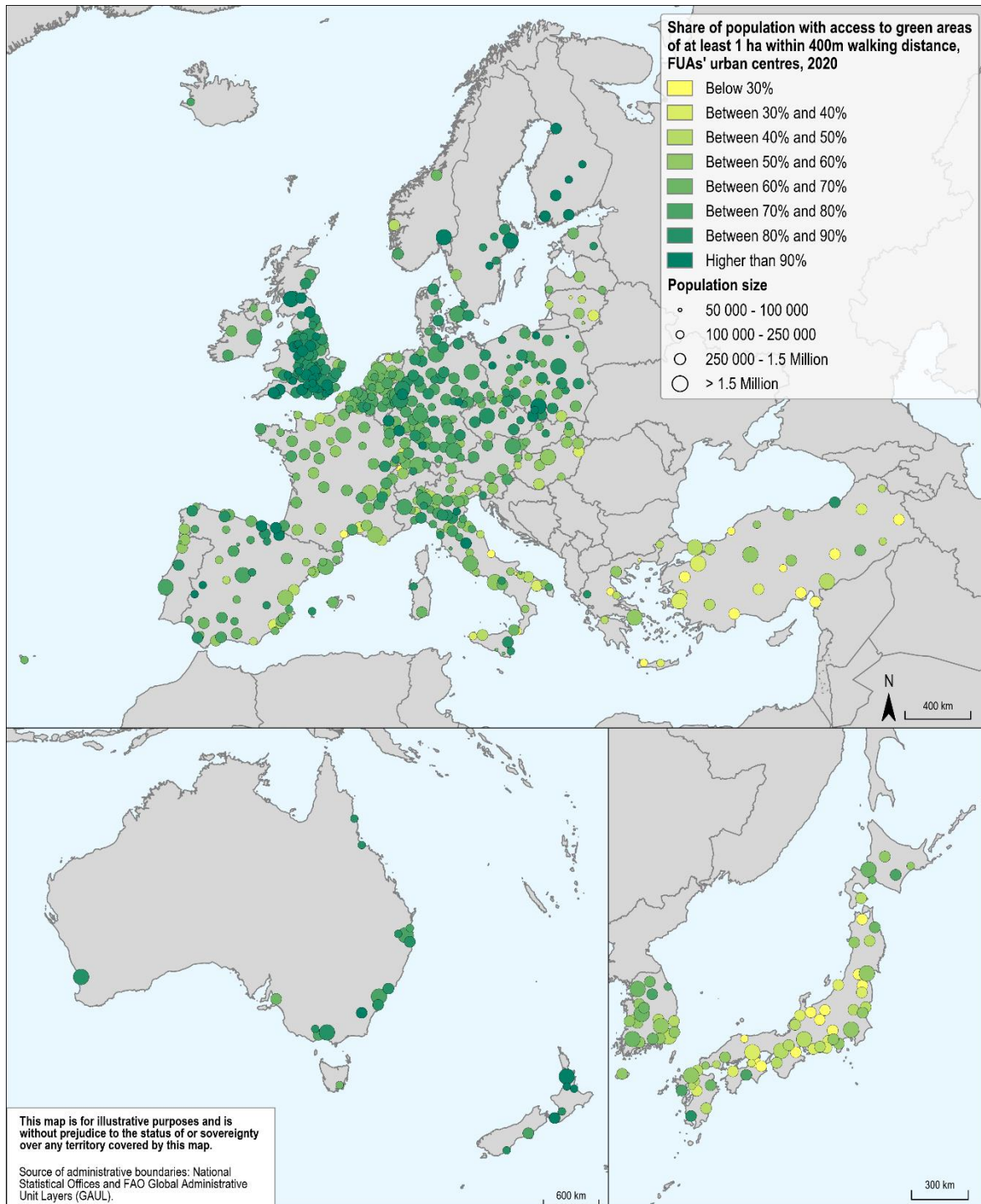
Figure 4.5. Accessibility to green areas, 2020, Americas



Note: Urban green space corresponds to the following tags in OSM: amenity: grave\_yard; landuse: cemetery, forest, recreation\_ground, village\_green; leisure: nature\_reserve, park, playground, recreation\_ground, garden; tourism: zoo; natural: wood, scrub, heath, grassland, wetland.

Source: Methodology based on Poelman, H. (2018<sup>[66]</sup>), "A walk to the park? Assessing access to green areas in Europe's cities", *DG Regional and Urban Policy Working Paper*, using OpenStreetMap (2023<sup>[67]</sup>), *Planet Dump*, <https://planet.osm.org> (accessed on 6 July 2023) to get urban green spaces and Schiavina, M., S. Freire and K. MacManus (2022<sup>[68]</sup>), *GHS-POP R2022A - GHS Population Grid Multitemporal (1975-2030)*, <http://data.europa.eu/89h/d6d86a90-4351-4508-99c1-cb074b022c4a>.

Figure 4.6. Accessibility to green areas, 2020, Europe, Asia, Pacific



Note: Urban green space corresponds to the following tags in OSM: amenity: grave\_yard; landuse: cemetery, forest, recreation\_ground, village\_green; leisure: nature\_reserve, park, playground, recreation\_ground, garden; tourism: zoo; natural: wood, scrub, heath, grassland, wetland.

Source: Methodology based on Poelman, H. (2018<sup>[66]</sup>), "A walk to the park? Assessing access to green areas in Europe's cities", *DG Regional and Urban Policy Working Paper*, using OpenStreetMap (2023<sup>[67]</sup>), *Planet Dump*, <https://planet.osm.org> (accessed on 6 July 2023) to get urban green spaces and Schiavina, M., S. Freire and K. MacManus (2022<sup>[68]</sup>), *GHS-POP R2022A - GHS Population Grid Multitemporal (1975-2030)*, <http://data.europa.eu/89h/d6d86a90-4351-4508-99c1-cb074b022c4a>.

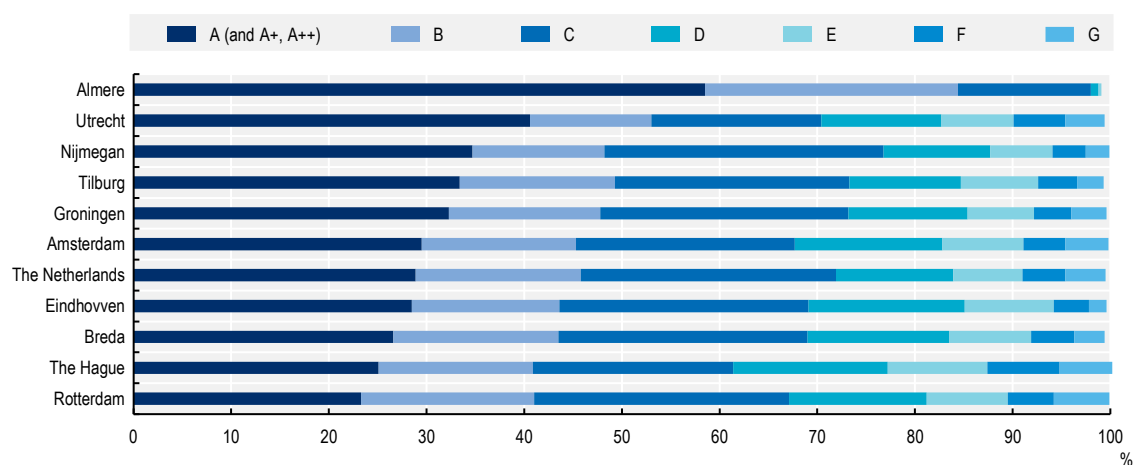
### *Decarbonising buildings while addressing the affordability challenge in urban areas*

Buildings are a major source of final energy consumption in urban areas. In 2021, buildings accounted for 33% of global energy-related and process-related CO<sub>2</sub> emissions (8% from the use of fossil fuels in buildings, 19% from the generation of electricity and heat used in buildings and 6% from the manufacture of materials used in buildings construction) (IEA, 2022<sup>[69]</sup>).

In most countries, national governments oversee the process of setting a framework for energy efficiency investments, including building standards. However, local actions are critical for decarbonising buildings due to the heterogeneity in local conditions. Buildings are local infrastructure by definition and reflect different ways in which the population takes shelter from local weather conditions. Houses in colder regions generally have better-insulated walls, while those in hotter areas have features such as long eaves to minimise exposure to heat (OECD, 2022<sup>[70]</sup>). Considering the heterogeneity of local climate conditions, local building stock and other factors can lead to a wide range of technically and economically viable pathways to building decarbonisation (OECD, 2023<sup>[71]</sup>).

However, the weather difference only partially explains the pressing need for local actions to decarbonise buildings. The energy label of building stock also differs across cities and regions. For instance, among the ten largest municipalities in the Netherlands in 2022, Almere had the highest share of homes within the range of the A to A++ energy performance certificate level (about 60% of the local housing stock), whereas Rotterdam had the lowest share (less than 25%) (Figure 4.7).

**Figure 4.7. Breakdown of residential buildings in the ten largest Dutch municipalities, by energy label, 2022**

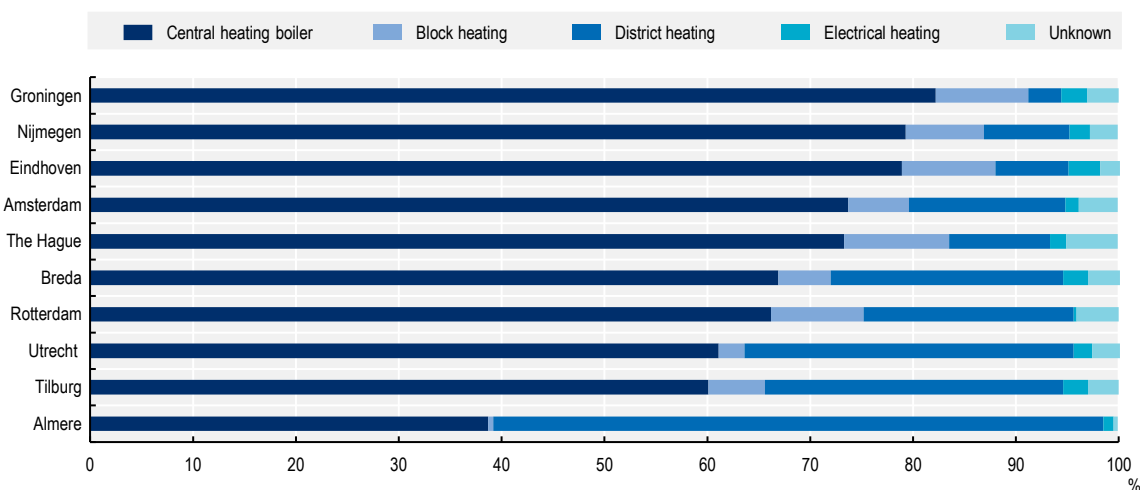


Source: OECD (2023<sup>[71]</sup>), "Decarbonising homes in cities in the Netherlands: A neighbourhood approach", <https://doi.org/10.1787/b94727de-en>.

Furthermore, the heating system differs across cities and regions. Figure 4.8 shows the share of heating systems in the top largest municipalities in the Netherlands and reflects the diversity across territories – despite the small sample – in terms of the share of central boilers and district heating. Moreover, the availability of local heating sources plays a vital role in shaping sustainable heating solutions. For instance, concerning district heating, certain municipalities, including Deventer, Rotterdam and Schiedam are close to facilities such as wastewater treatment plants or ports that can supply residual heat. Meanwhile, in other municipalities, such as Leusden, there is no readily accessible local heat source that they can use for district heating. Therefore, the municipalities with no possibility of residual heat need to seek other sustainable heating options such as heat pumps or renewable energy heating (OECD, 2023<sup>[71]</sup>).

## Figure 4.8. Heating systems used in the ten largest (by population) municipalities in the Netherlands

Breakdown by type of heating system in each municipality



Source: Drawing on data from CBS (n.d.<sup>[72]</sup>), *Woningen; hoofdverwarmingsinstallaties, regio (Homes; Main Heating Installations, Region)*, <https://opendata.cbs.nl/statline/?d=2238E#/CBS/nl/dataset/84948NED/table?ts=166299810934>.

Recognising these locally specific conditions, cities are adopting innovative policy instruments to decarbonise buildings, some of which are combined with renewable energy generation. Major policy practices are the following:

- In 2010, Tokyo, Japan, introduced an urban cap-and-trade programme, one of the first of this kind in the world, including mandatory targets for Tokyo's biggest emitters, namely commercial buildings and industrial facilities. All facilities covered by the programme successfully met their targets for the second compliance period (2015-19), achieving a 15-17% reduction below 2000-level emissions. By 2020, emissions had dropped by 33% below base-year levels, propelling the city towards its goal of climate neutrality by 2050 (OECD, 2020<sup>[73]</sup>; ICAP, 2020<sup>[74]</sup>).
- As of 2022, more than 1 300 cities had adopted renewable energy targets and/or policies, with nearly half of them setting the target year as 2030. These cities are actively undertaking measures to fulfil their commitments. For example, in 2019, the city of Valencia, Spain, inaugurated its first energy office. The energy office engages in various activities aimed at raising awareness of renewable energy among citizens. It offers information and training on topics such as energy bills, energy efficiency, home renovation and the right to energy and renewable energy generation. Thanks to these services, it is estimated that citizens have managed to save an average of EUR 226 per year (Covenant of Mayors - Europe, 2022<sup>[75]</sup>).
- In New York City, United States, under Local Law 97, buildings over 25 000 m<sup>2</sup> will be required to meet new energy efficiency and GHG reduction standards by 2024, with stricter limits coming into effect in 2030. The goal is to reduce the emissions from the city's largest buildings by 40% by 2030 and 80% by 2050. The law also established the Local Law 97 Advisory Board and Climate Working Groups to advise the city on how best to meet these aggressive sustainability goals (City of New York, n.d.<sup>[76]</sup>).



A major challenge of decarbonising buildings, in particular decarbonising homes, is associated with the upfront cost of energy efficiency investment, particularly for low-income households. Different local conditions encompass different levels of energy poverty and human resources dedicated to sustainable building measures. In particular, energy poverty is a pressing concern in many regions. According to the OECD Survey on Decarbonising in Cities and Regions, 89% of cities and regions recognise the significance of lowering energy costs for low-income families through building energy efficiency (OECD, 2022<sup>[70]</sup>). However, the initial investment required for energy-efficient upgrades may increase housing expenses for these vulnerable households. To overcome this challenge, British Columbia, Canada, offers a free energy assessment, installation of energy-saving equipment and personalised energy efficiency advice for low-income households (EERE, n.d.<sup>[77]</sup>). Such an incentive programme allows cities to pursue sustainability goals while ensuring housing affordability, as energy-efficient improvements not only reduce carbon emissions but also enhance living conditions and residents' overall well-being. Effective measures to decarbonise measures thus require: i) better understanding of local building stocks; ii) identifying solutions that address the local specificities; and iii) mobilising local actors (including local constructors, communities etc.) to implement the solutions. Many cities and regions are equipped to factor in such local elements and leverage their policy authority over buildings.

### *Managing water through metropolitan arrangements*

As discussed in Chapter 3, metropolitan areas with high population density around rivers and coastal zones are also particularly susceptible to significant floods. For example, Rotterdam in the Netherlands is the most exposed OECD metropolitan area with more than 1.5 million inhabitants in terms of river flooding, as more than 60% of its population is at risk, followed by Nagoya in Japan and Hamburg in Germany.

In most cases, hydrological boundaries cut across city administrative perimeters, calling for a functional approach to water management. Further efforts are needed to foster greater co-operation between cities and their hinterlands, and among cities of a given metropolitan area. The scale at which water is managed depends on the function: it can be at the local or metropolitan level for drinking water and sanitation; at the sub-basin or basin level for water resources management or at higher levels for flood protection. As functional geographies depend on the function in question, in the case of water resources management, appraising the metropolitan and hydrological logics is the key to addressing linkages between urban areas (where most people live) and the surrounding environments (rural and watersheds) that sustain them (OECD, 2016<sup>[78]</sup>).

Metropolitan governance can pool resources and capacity at a critical scale for effective water management. Several cities have developed metropolitan governance arrangements for water management. For instance, Glasgow, United Kingdom, has implemented the Metropolitan Glasgow Strategic Drainage Partnership to gather local authorities and national agencies to address the risks of flooding and improve water quality. Similarly, the Metropolitan Authority of Barcelona, Spain, has fostered an integrated perspective across local governments as well as shared infrastructure and expenses, while Nantes Métropole, France, has been engaging stakeholders to improve local services (OECD, 2016<sup>[78]</sup>). More recently, the state of Jalisco, Mexico, launched the Agenda for Water Resilience for the Metropolitan Area of Guadalajara. The strategy was designed collectively by the 9 municipalities that compose the metropolitan area, covering an area of 742 km<sup>2</sup>, the country's second-biggest metropolitan area. The strategy combines actions at the drainage basin and urban area scale and identifies a set of projects to increase water resilience. It aims to strengthen water management so that it can face the effects of climate change and the socio-economic challenges that put at risk the sustainable access of the population, the agricultural sector and industry to water resources (Matsumoto and Ledesma Bohorquez, 2023<sup>[19]</sup>).

### *Tackling sustainable mobility in rural areas*

Addressing sustainable mobility is an important focus for rural areas in reducing GHG emissions to meet net zero targets and ensuring equitable access to markets and services across vast landscapes. On a per capita basis, transport is a primary source of emissions in rural regions (Figure 4.9). While the vast amount of land and other characteristics of rural places are important drivers of biodiversity and carbon sequestration, they can also present bottlenecks to sustainable mobility. Rural regions, by definition, lack population density. They are often defined by their degree of accessibility to metropolitan regions or remoteness and peripherality. In sum, they share three distinct features:

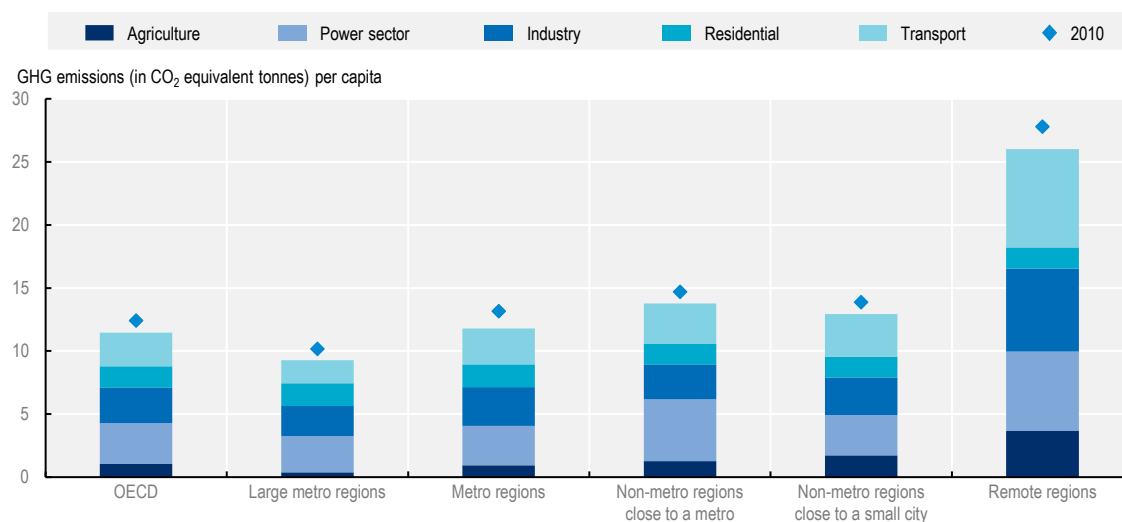
- **Physical distance to major markets.** Distance increases travel times and shipping costs, which must be borne by the buyer (in the form of higher prices) or seller (in the form of lower margins).
- **Economic connectedness.** A lack of economic integration not only reduces current trade opportunities but also the ability of agents in a place to identify new opportunities. Thus, there are both static and dynamic associated costs.
- **Degree of specialisation or lack of critical mass.** Production is concentrated in relatively few sectors since achieving “critical mass” in more than a few activities is impossible. A narrower economic base implies greater vulnerability to sector-specific shocks, whether positive or negative.

In this context, rural places have “low-density economies”, which tend to specialise in niche markets (e.g. tourism) or those linked to natural resources (e.g. agriculture, mining, forestry, etc.) with often capital-intensive forms of production. Geographical features and settlement patterns set rural areas apart from urban areas, as they differ in terms of local workforce size, sensitivity to transport costs, level of competition with similar regions, and reliance on innovations developed elsewhere. Although these characteristics pre-condition feasible forms of mobility, there is an urgent need to transform emission-intensive activities in rural regions into environmentally friendly and net zero alternatives. Indeed, available data confirms that emissions per capita are, on average, higher in rural regions, with the remote rural regions’ contribution to total emissions being the largest in transport and industry (Figure 4.9):

- Average emissions per capita in OECD countries in 2018 were 3 times higher in remote rural regions (26.3 tonnes of CO<sub>2</sub> per capita) compared to large metropolitan regions (9.3 tonnes of CO<sub>2</sub> per capita).
- Remote regions, home to about 8% of the OECD population, contributed 17% of total GHG in the OECD in 2018. In the same year, non-metropolitan regions, which are home to 28% of the population and include regions close to large metropolitan regions, small and medium-sized cities and remote regions, contributed 40% of total GHG in the OECD.
- In many OECD countries, including Chile, Finland, Germany, the United Kingdom and the United States, rural regions have the highest emissions per capita, often driven by the lack of sustainable alternatives and the demand of metropolitan areas for power generation, mineral extraction and agricultural production.

This illustrates the extent of economic activity transformations required in rural regions, especially in transport, mobility and industry, where emissions are highest. Rural regions have some commonalities, including smaller administrations, lower capacity to manage transitional processes, attract funding and develop effective strategies to mitigate and adapt to climate change. Nevertheless, not all rural regions are alike, with different sub-types of rural regions necessitating different policy responses. In broad terms, the Rural Well-being Policy Framework (OECD, 2019<sup>[79]</sup>) identifies three types of rural regions, each with stark structural differences and distinct challenges and opportunities: i) rural inside FUAs; ii) rural close to cities; and iii) remote rural.

**Figure 4.9. GHG emissions per capita by type of region, 2018**



Note: OECD countries, Bulgaria and Romania. GHG emissions, excluding emissions from land use and land use change.

Source: Calculations based on EC (2020<sup>[80]</sup>), *EDGAR - Emissions Database for Global Atmospheric Research*, Joint Research Centre, European Commission.

Taking into account this diversity can help shape policy responses for the transition to a net zero emission economy that ensure the accessibility of transport in all rural areas. For example, rural regions inside FUAs and rural places close to cities have much stronger linkages between transport networks, commuting flows, spatial planning and the provision of goods and services. These rural places can also benefit from good access to markets, services and agglomeration of talent present in urban areas. Multimodal transport can help integrate rural regions into the local labour market of cities and enable residents to move around by using a combination of walking, cycling and public transport. Multimodal transport infrastructure can also support a greater variety of job opportunities. Multimodal transport can increase affordability and add options for people who are unable to drive (i.e. elderly, people with disabilities and youth) (OECD, 2021<sup>[81]</sup>). Well-designed multimodal transport requires integrating different modes of transport and facilitating the switch between transport modes. Unique ticketing systems and other accommodations for travellers, such as public transport vehicles with space for bikes or scooters, can favour these systems.

In contrast, remote rural regions are much more dependent on private car use. This is also partly driven by the low-density and dispersed settlement patterns that lack the critical mass needed to deploy cost-effective public transport networks. Long distances and low ridership make it difficult to offer public transport options that are quick, reliable, affordable and efficient enough to attract rural consumers without requiring large-scale public subsidies.

Rural remote regions are also disproportionately vulnerable to national policies such as increasing taxes on fuel to disincentive car use. Thus, differential taxation of car usage, depending on whether it takes place in rural or urban areas, can help mitigate this asymmetric impact. Solutions will also need to focus on net zero engines and technological innovations to reduce emissions and on-demand transport and pooling solutions.

In some cases, classic modes of public transport become uneconomical as regions undergo demographic change (De Jong et al., 2011<sup>[82]</sup>). On-demand pooling can help address this challenge while securing an important public service for the local population. Open data and mobile information platforms are rapidly changing the options available when it comes to public transport provision in rural areas; this holds particularly true for the rise of big data (Box 4.1). Big data can indeed help deliver demand-responsive transport (DRT) to meet public transport needs in rural areas. There are essentially two models of DRT:

door-to-door or predefined pick-up and drop-off points, with service provided only if there is demand. Several examples of deploying DRT include:

- In Spain, on-demand pooling transport services have been introduced in the municipalities of Sant Cugat del Vallès and Vallirana (Case 19 in Annex 4.A). The services replace former regular services by introducing a technological pooling platform, with positive results in terms of occupancy and cost. In Sant Cugat, the average occupancy of vehicles increased from 6 passengers per trip to 16 with the new service and the flexible service's operational costs are 15% lower than the former conventional line (OECD, 2021<sup>[81]</sup>).
- In the Czech Republic, Radiobus operates like a conventional bus in that it has a regular timetable but it runs only when users confirm demand (by phone or Internet) and only on the part of the route required (OECD, 2016<sup>[78]</sup>) (Case 20 in Annex 4.A).

Information and communications technologies are used to adapt collective transport routes, stops and timing to the actual needs of customers. In addition to working well in sparsely populated areas or at periods of low demand, such schemes can operate effectively in denser areas to meet the needs of specific groups that are dispersed among the general population, such as the elderly or people with disabilities. Local transit authorities may fully or partially fund DRT schemes, as they are often providers of socially necessary transport and may be selected by public tender. However, these schemes can also be funded privately, operate with a profit motive or through community-operated non-profit enterprises.

#### Box 4.1. Big data and public transport provision

Big data hold much promise for improving the planning and management of transport activity by radically increasing the amount or near-real-time availability of mobility-related data. Transport authorities will need to ensure an adequate level of data literacy for handling new streams of data and novel data types. Traffic operations, transport planning and safety are areas where authorities must critically evaluate where and how new or newly available data and data-related insights can improve policy.

Big data can help governments, businesses and individuals make more informed decisions. Better data can help transport authorities understand commuters' behaviour, provide targeted information and identify policy interventions. In fact, the biggest gains from using big data may come from changing user behaviour. From the government's perspective, there is a need for better data to support decision making, at least for the following purposes:

- Better understanding the demand (needs by different user groups).
- Better planning services to match user needs.
- Making the market case for privately operated services (profitability).

Source: OECD/ITF (2015<sup>[83]</sup>), *International Experiences on Public Transport Provision in Rural Areas*, [https://www.itf-oecd.org/sites/default/files/docs/15cspa\\_ruralareas.pdf](https://www.itf-oecd.org/sites/default/files/docs/15cspa_ruralareas.pdf).

Municipalities in Japan are also active in this sphere. Indeed, on-demand buses have operated in Japan since the 1970s (Takeuchi et al., 2003<sup>[84]</sup>). What has changed in recent years is technology and uptake. Computer-assisted scheduling, routing, and dispatching have made operations much more efficient, while mobile applications have made such services far easier for users. In response to these changes and in an effort to deal with pressure on public transport services, Japanese municipalities have increased their DRT provision. Between fiscal years 2006 and 2013, the number of DRT schemes nearly doubled (OECD, 2016<sup>[78]</sup>), with more than 200 municipalities offering on-demand bus services of three types:

- The first are essentially bus services with fixed routes that operate only based on customer demand.
- The second involves some flexibility along a fixed route in response to customer demand.
- The third involves a much freer route, based on customers' demand for pick-up and drop-off; since the area of operation is defined and the number of customers is small, the operator selects the route that minimises inconvenience to passengers.

In addition, ride-sharing services allow door-to-door service with no fixed routes or stops in certain areas. For example, the Migon shared taxi service around the Tohkadai Newtown in Komaki (Aichi Prefecture) is based on flat rate fares, shared rides, limited area of operation and door-to-door service.

A number of Japanese locales have shown how identifying service levels based on customer needs can help plan the supply so as to meet actual demand. Such customer-based planning has resulted in the revitalisation of several public transport services in Japan, resulting in increased numbers of users. In some places, the local private sector has also been involved in designing routes and financing initiatives in co-operation with local authorities. For example, Hidakagawa-cho (Wakayama Prefecture) has integrated its bus routes with shared taxis, allowing variation in vehicle size depending on demand at different times, as well as enhanced feeder services and greater frequency. Niseko-cho in Hokkaido has integrated the routes of private buses, municipal welfare buses and school buses (OECD, 2016<sup>[78]</sup>). The buses stop on demand and there is some variation of routes at times of peak demand (e.g. early morning school runs). The resulting increase in frequency and reliability then led to an upward trend in use by the general public. In a number of places, community bus services now operate on a not-for-profit basis, sustained partly by fares but with support from municipal budgets and, most importantly, local businesses along the routes.

Car- and ride-sharing programmes are also widespread and growing fast. While this is often seen chiefly as an urban phenomenon (and matching is certainly easier where passenger and vehicle densities are higher), it can also work very well in rural areas, particularly for key routes to and from centres of employment or essential services. By the beginning of 2014, it was estimated that almost 500 000 Japanese had registered for car-sharing services and the numbers were rising fast, with private companies entering the market alongside municipalities, which in some cases have launched services of their own or in collaboration with private firms, in an effort to make better use of their official vehicle fleets.

Deploying electric vehicles (EVs) can also help deliver sustainable forms of mobility and will require investments in charging infrastructure, especially in rural regions. While new electric cars typically offer ranges of 800 km or higher, the lack of charging stations can pose barriers to rapid EV adoption. Most governments continue to provide financial incentives to increase demand rather than invest in charging infrastructure (ITF, 2019<sup>[85]</sup>). In rural regions, the dispersed nature of residences and infrastructure requires recharge points to be placed strategically, for instance, at supermarkets and schools. Governments also need to consider increasing demand for total electricity with increasing market penetration of EVs, which calls for more co-ordinated charging and local reinforcements of grids. A leading example of investments in EV infrastructure can be found in Southern Alberta, Canada. In the province, civil society groups, local businesses and local and regional governments collectively invest in EV charging infrastructure to facilitate emission reductions, economic development and tourism. The project has installed 22 charging stations powered using renewable energy sourced from the region (Peaks to Prairies, 2019<sup>[86]</sup>).

Green hydrogen production can offer rural regions specialised in renewable energy an opportunity for economic development. Many rural economies require heavy-duty transport, including trucks, maritime and aviation, to export their tradeable goods. At the same time, projections see road freight activity at least doubling by 2050, offsetting efficiency gains and increasing road freight CO<sub>2</sub> emissions (ITF, 2018<sup>[87]</sup>). Green hydrogen can be used to produce alternative fuels for heavy-duty transport and decarbonise industrial processes at the same time. The first hydrogen-fuelled trucks have recently been put onto the road and governments have started to invest strategically in this technology. In March 2023, the Marubeni Corporation launched the first green hydrogen injection demonstration project in the natural gas distribution

network of Portugal, distributing hydrogen by electrolysis to a customer base of 80 residential, commercial and industrial locations (Marubeni Corporation, 2023<sup>[88]</sup>). The Netherlands unveiled a hydrogen strategy in late March, outlining plans for 500 megawatts (MW) of green electrolyser capacity by 2025 (EBRD, 2020<sup>[89]</sup>). While prices are not yet competitive, increased demand could reduce the cost.

Finally, remote working can also reduce the frequency and intensity of mobility in rural regions. Although the uptake in remote working was lower in rural regions than in cities during the COVID-19 pandemic, it doubled in towns and semi-dense areas; in rural areas, it increased by 70% between 2019 and 2020. Improving digital skills and quality broadband in rural places can help increase remote working in rural places. Although the gaps between urban and rural areas in access to broadband have substantially declined in recent years, the gaps in download speeds remain significant. Download speeds over fixed networks in rural areas in Group of Twenty (G20) countries are, on average, 31 percentage points below the national average, against 21 percentage above the national average in cities.

### *Accelerating the deployment of renewable energy sources in remote rural areas*

Rural regions, particularly remote areas, are at the forefront of renewable electricity production. The decreasing cost associated with renewables has made the latter more accessible, allowing a larger group of individuals to become owners of renewable energy production facilities and potentially increase profit margins. Utility-scale solar photovoltaics and onshore wind are the cheapest options for new electricity generation in a significant majority of countries worldwide (IEA, 2022<sup>[90]</sup>). This presents an opportunity for the establishment of more decentralised and community-owned energy co-operatives, as well as the potential for integration with net zero innovations. These include the production of green hydrogen, the implementation of circular economy and bioeconomy practices, and the adoption of electric vehicles that rely on renewable energy. However, promoting local ownership and ensuring local benefits will also be needed to address the current resistance to renewable energy developments in rural areas. The lack of consultations and engagement with local communities has often been identified as a bottleneck to ensure greater acceptance of renewable energy deployments.

### *Policy implications*

In terms of climate mitigation, the FUA approach is particularly important to promote low-emission spatial development structure by integrating land use and transport planning. In terms of climate adaptation, metropolitan adaptation and resilience strategies can leverage the spatial continuity and functional relationships between urban and rural areas to better identify and address climate shocks as their impacts may span administrative boundaries and geographic realities.

However, the analysis revealed that there are very few climate plans and strategies at this territorial scale. National governments have a key role to play in promoting the FUA approach for the development of metropolitan climate plans and strategies.

Climate mitigation and adaptation actions require a localised perspective that takes into account the unique characteristics and needs of individual cities and regions so that they can be tailored to be most effective at different geographical locations. For instance, as demonstrated above, sustainable mobility presents distinct challenges across urban and rural areas. Similarly, cities can benefit most by combining mitigation efforts with adaptation strategies, particularly through the development of nature-based solutions, to deliver more integrated and comprehensive climate action. The building sector plays a pivotal role in the pursuit of GHG emissions reduction and presents one of the most significant opportunities to achieve net zero in cities, while remote rural areas have unique opportunities to boost renewable electricity production.

Enhancing rural mobility through greener transport options can help accelerate the adoption of sustainable practices and bridge the urban-rural divide. Rural development policies, therefore, do not merely serve an economic goal but can also offer an essential piece in achieving overarching environmental and climate

ambitions. This entails a comprehensive strategy that considers the specificities of rural contexts, ensuring their socio-economic advancement while bolstering their pivotal role in global sustainability.

Table 4.11 outlines a set of recommended actions for both national and subnational governments to address the policy gaps discussed above.

**Table 4.11. Recommended actions to promote climate action and resilience at the right territorial scale**

Category	For whom	Recommended action
Metropolitan strategies for climate action and resilience	All levels	<ul style="list-style-type: none"> <li>Collect and analyse climate data at the metropolitan scale to identify opportunities for GHG emission reduction, climate change risks and impacts, etc.</li> <li>Develop a mechanism for co-ordination among local municipalities within a metropolitan area.</li> <li>Use the OECD-EU methodology to define FUA approaches for the development of climate action and resilience strategies.</li> </ul>
Integrate transport and land use	All levels	<ul style="list-style-type: none"> <li>Adopt transit-oriented development (TOD) approaches at the metropolitan scale.</li> </ul>
Urban planning and design	Cities and regions	<ul style="list-style-type: none"> <li>Delineate clear climate mitigation and adaption objectives and goals in urban masterplans.</li> </ul>
Greening urban areas	Cities and regions	<ul style="list-style-type: none"> <li>Use innovative planning tools to expand urban green spaces such as the Urban Green Factor.</li> <li>Create mandatory regulatory frameworks for green roofs.</li> <li>Set concrete targets for the expansion of green areas and reflect them in existing plans and strategies.</li> </ul>
	All levels	<ul style="list-style-type: none"> <li>Design labelling and certification schemes for urban development/neighbourhood improvement.</li> </ul>
Decarbonising buildings in cities	Cities and regions	<ul style="list-style-type: none"> <li>Understand the different types of local building stock.</li> <li>Examine locally available heating sources in shaping decarbonisation policies and initiatives.</li> <li>Provide incentives for energy assessment, installation of energy-saving equipment and personalised energy efficiency advice for low-income households.</li> </ul>
Water management at the water basin scale	All levels	<ul style="list-style-type: none"> <li>Assess climate impacts and risks at the water basin scale and identify projects to increase water resilience.</li> <li>Co-ordinate across municipalities within the same water basin to develop a common strategy for water resilience.</li> </ul>
Sustainable mobility in rural areas	All levels	<ul style="list-style-type: none"> <li>On-demand services: use big data to enhance DRT and integrate shared taxis with bus routes to optimise transport at varied times and frequencies.</li> </ul>
	Regions	<ul style="list-style-type: none"> <li>Integrate different modes of transport and switch between them seamlessly. Develop unique ticketing systems to accommodate varied travellers' needs.</li> <li>Implement differential taxation based on car usage in rural vs. urban areas to mitigate policy impacts.</li> <li>Offer incentives for investing in EV charging infrastructure and strategise locations like schools for charging points.</li> </ul>
	Cities	<ul style="list-style-type: none"> <li>Advocate for public transport vehicles that can carry bikes or scooters, boosting green travel options.</li> <li>Collaborate with private entities to amplify car- and ride-sharing service offerings.</li> <li>Foster co-ordination between government levels to co-invest in EV infrastructure.</li> </ul>
Renewable energy deployment in rural areas	All levels	<ul style="list-style-type: none"> <li>Support establishing more decentralised and community-owned energy co-operatives.</li> <li>Promote consultations and engagement with local communities.</li> <li>Form public-private partnerships (PPPs) to boost production and promote a shift towards green hydrogen.</li> </ul>

## **Supporting neighbourhood projects generating co-benefits and synergies beyond climate**

*Prioritising investment in integrated development at the neighbourhood scale that can generate co-benefits and synergies*

Neighbourhoods exhibit unique territorial characteristics that influence the potential of a given city for achieving net zero emissions and enhancing resilience to climate impacts. One of the advantages of neighbourhood-scale climate projects is that they can combine multiple sectoral measures to create integrated development. Integrated development implies a comprehensive and co-ordinated approach combining social, economic, environmental and spatial considerations (Matsumoto and Ledesma Bohorquez, 2023<sup>[19]</sup>). Integrated policy can better address multiple policy objectives, generate co-benefits and manage complex trade-offs. It can often identify hidden complementarities across sectoral interventions. For example, addressing both climate mitigation and adaptation measures through integrated urban development is likely to receive more political support and cost less money than implementing separate mitigation and adaptation measures (Matsumoto and Ledesma Bohorquez, 2023<sup>[19]</sup>).

In France, the ÉcoQuartier National Programme supports the implementation of net zero and resilience solutions at the neighbourhood scale by using a labelling system (Case 21 in Annex 4.A). As an example, in Rouen, France, the former industrial area Luciline along the River Seine has been fully redesigned into an eco-district (*écoquartier*) covering 125 000 m<sup>2</sup>, where a mix of green and blue infrastructures are improving drainage from the built environment and generating groundwater geothermal energy to heat and cool homes in summer and winter respectively, thus reducing energy demand from residential buildings.

*Using neighbourhood-scale projects for innovative solutions*

Neighbourhood-scale climate projects can be particularly useful in experimenting with decarbonisation solutions. In the Netherlands, for instance, a national project called the Natural Gas-free Neighbourhood Programme (*Programma Aardgasvrije Wijke*, PAW) provided up to EUR 5 million to each of 66 selected neighbourhoods in 59 municipalities from 2018 to 2022 to help them experiment with and scale up natural gas-free measures. The success of PAW can be attributed to three key factors: multi-stakeholder partnerships with co-ordinated government staff, a flexible funding approach and a commitment to long-term support, as evidenced by the evolution of the programme into the National Programme for Local Heat Transition (NPLW) in January 2023. Overall, the PAW provides an example of the national government supporting local governments in adopting the neighbourhood approach and gathering valuable insights for the transition process (OECD, 2023<sup>[71]</sup>) (Case 22 in Annex 4.A).

*Supporting vulnerable residents and communities with a participatory approach*

Another potential advantage is that neighbourhood-scale climate projects can better target the most vulnerable communities, which tend to be concentrated in specific neighbourhoods in cities and meet specific needs for climate action. Importantly, such projects are also well suited to engage communities and reflect their voices into projects. An illustrative example can be found in the United States, where the Department of Housing and Urban Development (HUD) is handling the United States Community Development Block Grant Disaster Recovery (Case 23 in Annex 4.A). Through these funds, various states, cities and counties receive flexible grants that they tailor to aid their recovery efforts following disasters, including climate-related disasters. The allocated funds empower the recipients to take charge of designing and executing recovery initiatives that effectively address the unmet needs arising from the disasters. A key aspect of this approach is ensuring the inclusion of low-income residents throughout the process. To do so, HUD developed two toolkits to enhance citizen participation processes (HUD, 2023<sup>[91]</sup>; n.d.<sup>[92]</sup>; n.d.<sup>[93]</sup>). The city of Ahmedabad, India, has been tackling against extreme heat through its Heat Action



Plan, in partnership with Mahila Housing Trust (MHT), a women-focused non-profit organisation. MHT helped the city better understand the challenges that informal communities face and co-create viable solutions. For example, MHT pioneered cool roofing solutions, which were adopted into the city's 2017 Heat Action Plan (Case 24 in Annex 4.A).

### *Policy implications*

As demonstrated by several examples above, neighbourhood-scale projects offer a distinctive opportunity to craft tailored climate solutions that directly address specific territorial characteristics through a participatory approach. This leads to increased efficiency and more inclusive solutions for all. It is, however, important to note that the process of tailoring solutions at the neighbourhood scale is inherently complex, requiring careful consideration of local specificities, available resources and community engagement.

Table 4.12 outlines a set of recommended actions for both national and subnational governments to design and implement climate action at the neighbourhood scale, generating co-benefits and synergies beyond climate and making sure the transition is just.

**Table 4.12. Recommended actions to support neighbourhood projects generating co-benefits and synergies beyond climate**

Category	For whom	Recommended action
Prioritising investment in integrated development at the neighbourhood scale	All levels	<ul style="list-style-type: none"> <li>• Mainstream climate change considerations into wide neighbourhood development projects.</li> <li>• Use a labelling system to evaluate and promote innovative net zero and resilient solutions.</li> </ul>
Spurring innovation by neighbourhood-scale decarbonising measures	All levels	<ul style="list-style-type: none"> <li>• Pilot and experiment with new clean energy solutions at the neighbourhood scale.</li> </ul>
Supporting vulnerable residents and communities with a participatory approach	Cities and regions	<ul style="list-style-type: none"> <li>• Develop and use data and statistics on the risk of extreme heat and flooding at the neighbourhood level.</li> <li>• Engage the most vulnerable communities and population groups (e.g. low-income residents) throughout the neighbourhood project process.</li> <li>• Partner with local NPOs to better understand the challenges local communities face and co-create viable solutions.</li> </ul>

## **Enabling and scaling up local climate action and resilience**

### ***Creating a legal and institutional environment for local climate action and resilience***

#### *Reviewing national regulatory frameworks*

Cities and regions often encounter obstacles within broader national frameworks as they advance their climate action. First, national standards and regulations are not always designed to accommodate new local solutions. For example, in Hungary, the implementation of nature-based solutions (NbS) in urban infrastructure is hindered by national regulatory frameworks, as the latter require technical specifications that do not fit with small-scale adaptation measures such as NbS. According to current regulatory practices in the Hungarian water sector, a water authority can have only one function in its operating license, which limits the recognition of the multifunctionality of blue infrastructures and other similar adaptation measures (OECD, forthcoming<sup>[59]</sup>). Such regulatory barriers can limit the implementation of blue infrastructure, which local authorities typically plan and implement. Second, national governments are responsible for many critical policy areas for achieving climate goals and there can be misalignments between national and

subnational actions in a given place. For example, national laws often do not give authority to subnational governments to oblige retail electricity operators to supply certain amounts of renewable energy in their jurisdictions, which makes it uncertain to meet the net zero targets (OECD, 2019<sup>[94]</sup>). Regulations that are designed for a centralised energy system can limit cities' ability to fully harness their renewable energy potential. Such regulatory frameworks can be reviewed from the point of view of climate action while making sure they serve their own purpose. In some other cases, complex administrative procedures introduced by national legal and institutional frameworks may slow down cities' and regions' efforts.

#### *Clarifying roles and responsibilities for climate action across levels of government*

Unclear allocation of responsibilities across levels of government may also undermine subnational climate action. For example, while local authorities could invest in adaptation measures to limit damages from climate events, post-disaster damage is often covered by national entities, which does not encourage local authorities to bear the cost of adaptation. Such disaster recovery funds at the national level are available in Australia, Germany, Japan, the United States and many other countries (Australian Government, 2023<sup>[95]</sup>; Carrel, 2021<sup>[96]</sup>; DOI, n.d.<sup>[97]</sup>; OECD/World Bank, 2019<sup>[98]</sup>). Political instability at the national level may also create frequent changes in the responsibility of cities and regions in climate action, which in turn affects cities' and regions' willingness and capacity to take own climate action. These challenges highlight that a clear legal, institutional and administrative environment at the national level can help cities and regions tap into their potential for local climate action.

Many OECD countries have been advancing multiple measures to overcome these barriers. Below are some key actions identified:

- **GHG emission reduction targets adopted by law.** Countries and cities are enshrining local emission reduction targets by local decrees and ordinances, thereby ensuring that they are legislative decisions and securing policy continuity across administrations. In Mexico, the national government adopted the General Law on Climate Change in 2012 to legalise its commitment to climate action. The law was updated in 2018 to integrate the NDC's commitment to emission reduction (Case 25 in Annex 4.A).
- **Clear responsibilities for local governments to be accountable for climate adaptation.** In Norway, municipalities are responsible for conducting climate risk assessments before authorising new building developments and are legally committed to prohibiting new buildings in areas at risk (Climate-ADAPT, n.d.<sup>[99]</sup>). Many countries, such as Denmark, France, Ireland, Korea and the United Kingdom, also have national legislations that make it mandatory for municipalities to develop their local adaptation plans or policies (Reckien et al., 2023<sup>[100]</sup>; Tuhkanen, Piirsalu and Lahtvee, 2019<sup>[101]</sup>; Government of Denmark, 2012<sup>[102]</sup>; Lee, Paavola and Dessai, 2023<sup>[103]</sup>; Ministry of Environment of Korea, 2021<sup>[104]</sup>). In the state of Victoria, Australia, the responsibilities of local governments are defined under the Local Government Act 2020, which states that councils are required to promote the economic, social and environmental sustainability of the municipal district, including mitigation and planning for climate change risks (O'Donnell et al., 2020<sup>[105]</sup>; OECD, forthcoming<sup>[13]</sup>). In France, the national government adopted the MAPTAM "Modernisation Law", which facilitates interventions at the local scale and ensures that defined institutions oversee specified tasks (Case 26 in Annex 4.A).

#### *Aligning and co-ordinating climate action across levels of government*

Some national governments are actively creating mechanisms to align and co-ordinate climate action across levels of government, which is crucial for all actors to effectively work together towards the same goal of the Paris Agreement. A common mechanism is setting co-ordination bodies across levels of government. Countries such as Canada, France and Germany have established strong co-ordination mechanisms across levels of government in developing and implementing long-term low-emission

development strategies and subnational climate plans (OECD, 2019<sup>[94]</sup>). Similarly, in Denmark, municipalities are actively encouraged to draft local adaptation plans as a complement to the national-level strategy and action plan. They have been supported in this process by a specially created “climate change adaptation squad” and a mobile task force, as well as through a legislative change allowing municipalities to cite adaptation as a basis for local plans (OECD, 2015<sup>[106]</sup>).

### *Building local technical and human capacity*

National governments play a key role in addressing the capacity gap in terms of technical and human resources, in particular at the local scale. Developing and implementing climate policies tailored to local-specific conditions require strong knowledge and expertise in climate policies (both in mitigation and adaptation) and in urban, rural and regional development policies. With regard to adaptation, the lack of expertise, technical skills and available staff time is considered to potentially prevent the implementation of adaptation policies at the local level (Covenant of Mayors - Europe, 2023<sup>[107]</sup>). With the increasing frequency and intensity of extreme climate events, new and innovative technical knowledge and capacity may be needed, which goes well beyond resources available at the local level (Corfee-Morlot et al., 2011<sup>[108]</sup>). Some adaptation options, especially those related to the upgrade or construction of resilient infrastructure, often need a wide set of specific competencies and external expertise that are not always easily accessible at the local level (Tuhkanen, Vilbiks and Piirsalu, 2020<sup>[109]</sup>). Many adaptation competencies, particularly those relating to the installation or construction of adaptation solutions (e.g. building a dyke, insulating buildings, etc.), are one-off actions that may not justify the development of skills at the local level, particularly in small municipalities. Local authorities will, therefore, not invest in training their staff and developing these technical skills, otherwise available at the national or state level (OECD, forthcoming<sup>[13]</sup>).

National governments can use pilot projects to help build local technical capacities. In Switzerland, the National Centre for Climate Services has been implementing a Pilot Programme on Adaptation to Climate Change. As of October 2023, the programme has benefitted more than 80 local adaptation projects that aim to adapt to more frequent and intense extreme weather events (i.e. heat stress, droughts) but also to raise awareness among citizens about the consequences of climate change (NCCS, 2023<sup>[110]</sup>). Similarly, the Natural Gas-Free Neighbourhood Programme in the Netherlands has provided support to more than 60 projects to phase out natural gas from heating. The lessons learned from this programme have inspired the National Programme for Local Heat Transition, launched in 2022 (Case 22 in Annex 4.A) (OECD, forthcoming<sup>[13]</sup>).

**Table 4.13. Recommended actions to create a legal and institutional environment for local climate action**

Category	For whom	Recommended action
Delineation of roles and responsibilities of cities and regions	National	<ul style="list-style-type: none"> <li>Use a clear legal framework to set clear roles and responsibilities for cities and regions in national climate policies, building on their competencies/mandates over key sectors and policy areas for climate action.</li> </ul>
Goals and targets by law	All levels	<ul style="list-style-type: none"> <li>Adopt GHG emissions reduction goals and targets by law.</li> </ul>
Technical assistance for building capacity	National	<ul style="list-style-type: none"> <li>Create regional offices for co-ordinating climate action across different levels of government.</li> </ul>
Sectoral/multi-level co-ordination for policy coherence	National	<ul style="list-style-type: none"> <li>Set inter-ministerial co-ordination bodies addressing subnational climate action.</li> <li>Establish requirements for policy alignment encouraging cities and regions to take national strategies into account.</li> </ul>
Experiment/pilot programmes to boost innovation	All levels	<ul style="list-style-type: none"> <li>Design piloting programmes for testing innovative net zero and resilience solutions at different territorial scales.</li> </ul>

## ***Enhancing funding and financing mechanisms for local climate action and resilience***

Cities and regions play a pivotal role in many policy areas that are crucial to economic growth, social inclusion and well-being, as reflected by the level of public expenditure and investment carried out by local and regional governments (37.1% and 54.5% respectively, in the OECD on average in 2021) (OECD, 2023<sub>[111]</sub>). In particular, regional and local governments are responsible for policy domains that are critical for the net zero transition, such as environmental protection, land use planning, waste and water management, housing, transport or energy and can design and implement ambitious policies and infrastructures to mitigate and adapt to climate change. This makes them key players in the green and climate transition, in collaboration and co-ordination with the central government and other stakeholders.

The capacity of cities and regions to assume these roles is largely contingent on the financial resources at their disposal and their room to manoeuvre with these resources. In addition to traditional sources of subnational finance (funding), access to external resources (financing) for climate change adaptation and mitigation initiatives is, therefore, a key lever for accelerating territorial climate action. Subnational climate finance provides cities and regions with resources to develop and implement the policies and infrastructures laid out in their climate and environment action plans. Mobilising further funding and financing resources at the subnational level can ensure the fiscal feasibility of net zero strategies at that level, making them resilient over the long term (OECD, 2023<sub>[112]</sub>).

### *The state of SNG climate finance*

There is an increasing recognition of the critical role of cities and regions in climate-related spending and investment to make territories more resilient and sustainable. However, despite the importance of subnational expenditure and investment to drive the net zero transition, their magnitude remains relatively unknown and difficult to compare in OECD countries. This is due mainly to a lack of data at the national and subnational levels on climate finance, both at a macro level (national accounts) and micro level (subnational budgets). There are significant methodological challenges in assessing climate-related expenditure and investment using the international Classification of the Functions of Government (COFOG) and assessing the alignment of expenditure budget lines with green and climate objectives, due notably to fragmented definitions of what is climate-related. There is also a data gap on the revenue side. There are no fiscal data on climate-related revenue sources. For example, the extent to which tax revenues or intergovernmental transfers are earmarked for climate objectives or, on the contrary, can harm them remains largely unknown.

These knowledge gaps are problematic as they hinder efforts to track and measure the progress that cities and regions are making towards their climate adaptation and mitigation objectives, both at the aggregated level and individual government level. This is why COP28 aims, among other priority objectives, to set a new collective quantified goal (NCQG) on climate finance (UNFCCC, 2023<sub>[113]</sub>). While several public climate finance tracking exercises currently exist at the international and national levels, there is a notable lack of work to track and compare climate finance at the SNG levels (OECD, 2022<sub>[114]</sub>). In order to develop a common terminology and understanding of subnational climate finance, the OECD developed a pilot methodology in 2022 to track SNG climate expenditure and investment in the framework of a project in collaboration with the European Commission DG REGIO Directorate-General for Regional and Urban Policy (DG REGIO),<sup>4</sup> which resulted in the creation of the Subnational Government Climate Finance Database (OECD.Stat, n.d.<sub>[115]</sub>).

According to this database, in 2019, cities and regions accounted for 63% of climate-significant public expenditure and 69% of climate-significant public investment, which corresponds to respectively 1.1% and 0.4% of gross domestic product (GDP) across the 30 OECD and EU countries covered in the sample. These ratios have been increasing on average since 2009, by 2.5% annually for expenditure and by 1.4% for investment, with stark disparities between countries (OECD, 2022<sub>[114]</sub>).

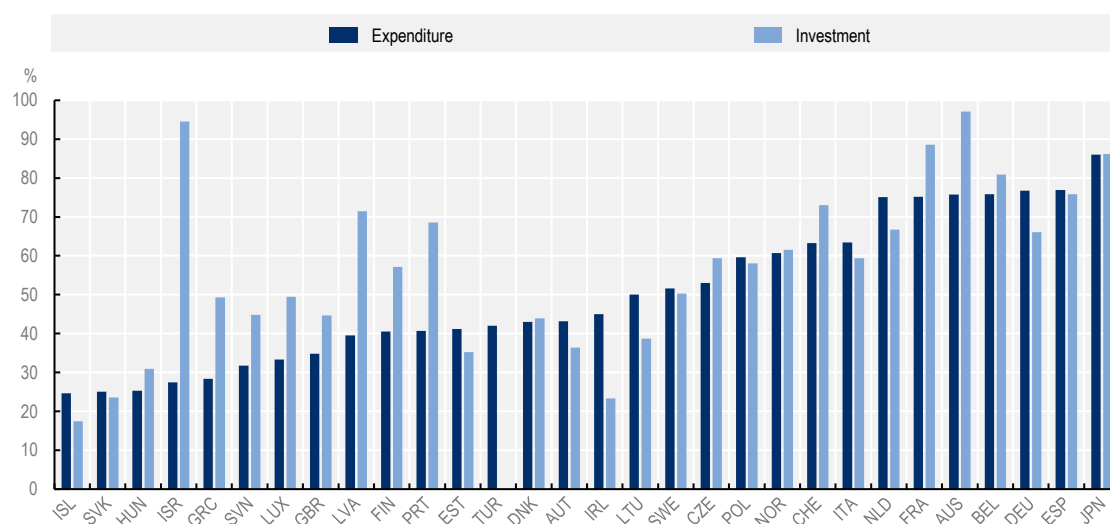
Such disparities in SNG climate-significant expenditure and investment across OECD countries reflect different levels of spending decentralisation as well as the involvement of cities and regions in key areas relevant to the carbon-neutral transition (Figure 4.10). Subnational climate-significant expenditure ranges from 24% of general government climate-significant expenditure in Iceland to more than 80% in Japan, and investment from 17% in Iceland to 97% in Australia. In countries such as Greece, Hungary, Iceland, Israel or the Slovak Republic, the central government covers more than 70% of climate-significant expenditures. Most of the countries with the highest ratios of both subnational climate-significant climate expenditure and investment are federal countries, although some unitary countries such as France or Japan also record high levels of climate-significant spending.

In the past decade (2009-19), SNG climate expenditure and investment have increased overall, with a great majority of the countries sampled recording a positive annual average rate of change. However, strong variations exist between countries. Regarding climate expenditure, some countries have an annual average increase of over 6% (France, Hungary, Norway, the Slovak Republic and Türkiye), while there was a decline in Greece, Ireland, Latvia and Spain (Ireland and Latvia seeing annual declines of 4% and -6% respectively). Disparities are even greater when it comes to climate investment over the same 2009-19 period, with some countries registering an annual average increase between 7% and 10% (Denmark, Hungary, Norway), whereas other countries saw a significant annual decline: -15% in Ireland, -10% in Lithuania and -8% in Spain.

On the one hand, downward trends can be explained by austerity measures that were put in place in response to the 2008 financial crisis but also by the recentralisation of some responsibilities (e.g. functions related to water services and waste management in Ireland). On the other, upward trends can refer to the devolution of additional responsibilities to cities and regions (e.g. granting environmental responsibilities related to soil pollution and the mapping and planning of raw materials extraction to regions in Denmark) and access to new sources of funding (green funds) or financing (green bonds and loans).

#### Figure 4.10. SNG climate expenditure and investment compared to general government

SNG expenditure and investment as a share of general government climate-significant expenditure and investment, 2019



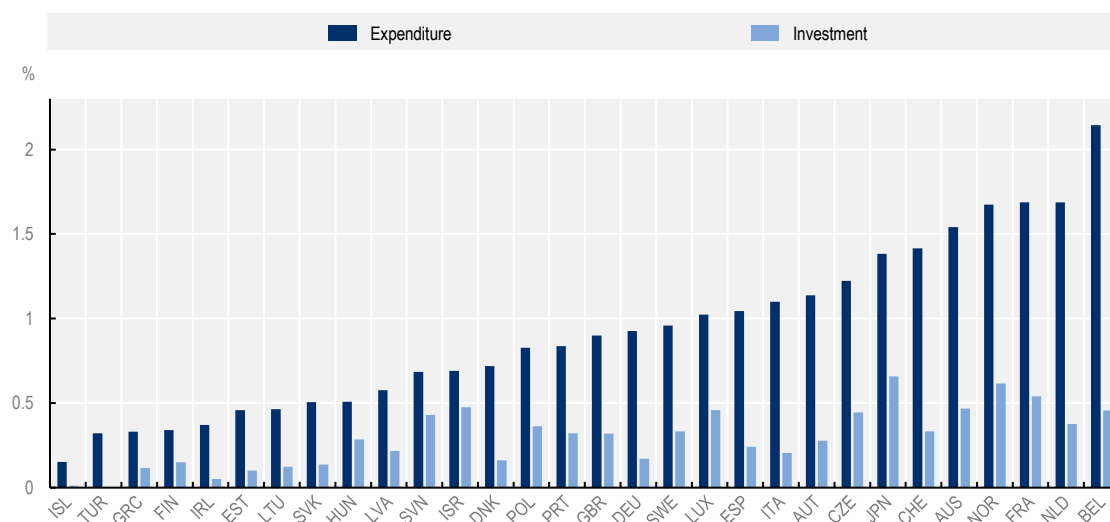
Note: For Austria, Germany and Japan, the methodology was adapted as these countries do not provide second-level COFOG data.

Source: OECD.Stat (n.d.<sup>[115]</sup>), *OECD Subnational Government Climate Finance Database*, [https://stats.oecd.org/index.aspx?DataSetCode=S\\_GCFD](https://stats.oecd.org/index.aspx?DataSetCode=S_GCFD).

However, in terms of GDP share, SNG climate expenditure and investment remain relatively low, accounting for 1.1% and 0.4% of GDP respectively in 2019. Belgium recorded the highest subnational climate-significant expenditure (2.2% of GDP) and Japan the highest investment (0.7% of GDP). Iceland recorded both the lowest ratio of subnational climate-significant expenditure (0.1%) and investment (0.01%) (Figure 4.11).

**Figure 4.11. SNG climate expenditure and investment as a share of GDP**

SNG climate-significant expenditure and investment as a share of GDP (%), 2019



Note: For Austria, Germany and Japan, the methodology was adapted as these countries do not provide second-level COFOG data.

Source: OECD.Stat (n.d.<sup>[115]</sup>), *OECD Subnational Government Climate Finance Database*, [https://stats.oecd.org/Index.aspx?DataSetCode=S\\_GCFD](https://stats.oecd.org/Index.aspx?DataSetCode=S_GCFD).

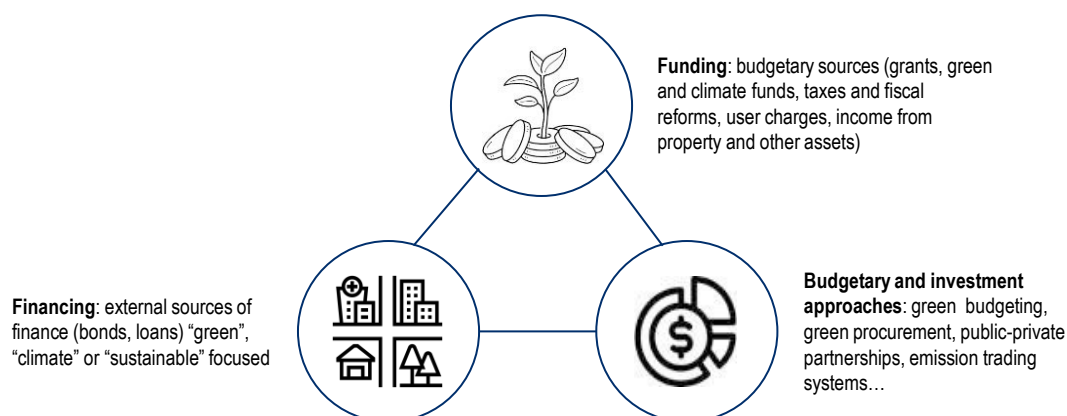
These amounts have only slightly fluctuated over the past decades, with an annual average rate of change of +1.4% for climate investment between 2009 and 2019, with significant variations among countries. These figures are confirmed by the 2022-23 European Investment Bank Municipalities Survey (EIB, 2023<sup>[116]</sup>). According to this survey, most municipalities (60%) view their infrastructure investments in climate mitigation and adaptation infrastructure between 2020 and 2023 as insufficient and plan to increase them in the upcoming 3 years. This is, however, mostly the case for municipalities from more economically developed regions, whereas municipalities from less developed regions are less inclined to increase their climate investment. This reflects the fact that there is a lack of funding and financing for subnational climate action in general. Going forward, there is a critical need to scale up climate spending and investment if governments are to attain the targets they set at the subnational, national and global levels.

#### *Diversifying sources of funding for climate actions at the subnational level*

Implementing climate action at the territorial level requires increasing both current and capital SNG expenditure by adopting a comprehensive approach to climate finance. This requires mobilising a broad basket of revenue streams for cities and regions, both from budgetary sources (e.g. grants and own-source revenues, such as taxes, user charges, etc.) and from external sources of finance (e.g. bonds, loans, loan guarantees, etc.). Funding (grants and own revenue) and financing (external resources) are closely related when it comes to implementing territorial climate action, as sufficient, balanced and sustainable funding is crucial to enhance subnational creditworthiness and unlock access to finance, in particular climate finance (Figure 4.12). Similarly, traditional finance and specific so-called “climate” finance are mutually dependent.

For instance, grants, loans and bonds can have a “green”, “climate” or “sustainable” focus, but even those without an explicit “climate” focus can be used for climate adaptation or mitigation projects.

**Figure 4.12. Basket of resources to finance subnational climate action**



Not all OECD countries are equal when it comes to access to revenue, hence the different strategies and leeway for mobilising resources for climate action across countries. The OECD Compendium of Financial Instruments that Support Subnational Climate Action in OECD and EU Countries (OECD, 2022<sup>[31]</sup>) shows that more decentralised and populous countries provide a greater diversity of public funding instruments to cities and regions for climate action. Federal countries tend to have an average of 13.5 climate-related instruments available for cities and regions per country versus 5.5 instruments in unitary countries. The degree of decentralisation, in particular the degree of devolution of environment and climate competencies to cities and regions, are key factors contributing to the number and diversity of funding instruments available to cities and regions in a given country (e.g. 11 instruments were found in Italy, against 1 in Türkiye) (OECD, 2022<sup>[31]</sup>).

#### *Own-source revenue to fund climate action*

Increasing own-resources can enable cities and regions to finance their climate actions in two ways: by raising additional subnational revenue and by improving their creditworthiness and their access to external financing. Subnational own-source revenues come from three main streams: i) tax revenue; ii) user charges and fees; and iii) land and assets.

Tax revenues (including shared and own-source taxes) are the main source of SNG revenue in the OECD. In 2021, they accounted for the bulk of SNG revenues on average in OECD countries (42.2%). However, this share varies greatly from one country to another – from around 2-3% in Estonia and Lithuania to 79% in Iceland – leading to various degrees of fiscal leeway and opportunities for reforms (OECD, 2023<sup>[111]</sup>).

There are different ways for “green” subnational tax systems to foster environmental and climate priorities. All categories of taxes can potentially be used to finance climate objectives, using them to advance green practices or by eliminating their “anti-green” bias. A classic example is the property tax on land and buildings, which is the “local tax” by excellence and the main source of tax revenue for cities and regions in many countries, accounting for 1.0% of GDP in OECD countries (OECD/UCLG, 2022<sup>[117]</sup>). Depending on how they are designed, property taxes can favour more sustainable urban development patterns while raising additional revenue for cities and regions.

Governments can also design taxes that specifically target environmental protection, foster green practices and change behaviours. So-called “environmental taxes”, earmarked for financing environmental protection, can be classified into four broad sectors: energy (carbon taxes, taxes on energy products, tax on electricity, etc.), transport (car sales/registration taxes, annual vehicle circulation taxes), pollution taxes

(including waste taxes and taxes on the use of pesticides and/or fertilisers) and taxes on water abstraction and resources extraction (OECD, 2019<sup>[44]</sup>). At the same time, such environmental taxes can aim to foster green practices and change behaviours, thereby contributing to GHG emission reduction or climate adaptation, and thus have the paradoxical effect of reducing revenues. For example, taxes and excise duties on fossil fuels aim to reduce fossil fuel energy consumption. In Mexico, five states have introduced a carbon tax as part of a green fiscal reform. Measures adopted include new taxes that provide incentives to invest in green, low-carbon technologies and infrastructure as well as to finance government-sponsored climate change adaptation measures while reducing inefficient subsidies and distortionary taxation (World Bank, 2023<sup>[118]</sup>). As another example, waste taxes can encourage emission reduction by encouraging circular economy practices, helping reduce demand-based emissions in high-income cities for instance. In Spain, autonomous communities have quite extensive responsibilities in taxation and environment policy and, therefore, have used their taxing powers to mitigate negative environmental outcomes while maintaining (or raising) tax revenues. Andalusia, for example, is using its tax competencies to pursue environmental goals in key environmental areas, namely GHG emissions and air pollution, water usage and pollution, as well as waste and circular economy (OECD, 2023<sup>[119]</sup>). However, the capacity of cities and regions to use fiscal resources to pursue environmental and climate priorities depends on their taxation powers (ability to modify tax rates and bases), which are often limited, except in federal and quasi-federal countries. Reforming tax systems at a subnational level mostly depends on the decision of central or federal governments (OECD, 2021<sup>[81]</sup>). National governments could allocate the full benefit (or a share) of certain national environmental taxes to cities and regions, providing them with more flexibility on rates and bases and tax creation power to implement a regional or local climate-friendly tax policy.

Revenue from user charges and fees, which accounted for 13% of SNG revenue in 2021 (OECD, 2023<sup>[111]</sup>), are a source of own revenue that is complementary to tax revenue to support the net zero transition. User charges and fees may include congestion charges, parking fees, high occupancy toll lanes, water and wastewater user fees, urban tolls or utility fees (water, waste and energy) (Merk et al., 2012<sup>[120]</sup>; OECD, 2019<sup>[44]</sup>; 2021<sup>[81]</sup>). Cost-reflective water charges will be important in the context of climate adaptation, as many regions will face rising drought risk as well as increasing water demand in agriculture. Road user charges will need to replace fossil fuel taxes when fossil fuel vehicles are phased out, both to replace revenue streams from fossil fuel taxes and to price negative externalities related to vehicle use, such as congestion, accidents and noise. Road use charges that are time- and place-contingent can price externalities more efficiently, especially in urban areas, where external costs are much higher than typical fuel tax rates. In the waste sector, a pay-as-you-throw system has been in place in Seoul, Korea, since the 1990s. It enables charging households, businesses and office buildings for general waste on a volume-based fee system. There are, however, several limitations attached to the development of user charges and fees, including the legal ability of cities and regions to create and determine the level of such fees, in particular in sectors considered as essential (e.g. energy), the capacity and willingness of users to pay and capacity management (OECD, 2021<sup>[81]</sup>).

Other sources of funding can include the use of “land value capture” instruments and harnessing the revenues from existing infrastructure assets. Although revenue from land and other assets accounts for a relatively small share of SNG revenue (2% in 2021), it can represent a significant source of own revenue for cities and regions to close some of the funding gaps of the net zero transition (OECD, 2023<sup>[111]</sup>). Cities and regions can reclaim gains from investments or changes in land regulations through land value capture instruments and use them to fund infrastructure investment (OECD/Lincoln Institute of Land Policy, PKU-Lincoln Institute Center, 2022<sup>[121]</sup>). Provisions can be made upfront so that funding is put aside for future maintenance interventions. Cities and regions can also use their power over urban development strategies, local land use decisions and development control to plan the effective use of local and regional assets and thus minimise investment costs (OECD, 2023<sup>[122]</sup>).



### *Grants and subsidies as a major funding instrument for subnational climate action*

Grants and subsidies are the second source of SNG revenue in the OECD in 2021 (41.9%) and the main source of revenue for cities and regions worldwide (51.5% in 2019) (OECD, 2023<sup>[111]</sup>; OECD/UCLG, 2022<sup>[117]</sup>). Grants and subsidies offer key instruments for cities and regions to finance their climate action and a major vehicle for supra-national, national and state governments to influence subnational spending and investment towards climate priorities. The OECD Compendium of Financial Instruments that Support Subnational Climate Action in OECD and EU Countries (OECD, 2022<sup>[31]</sup>) has identified earmarked grants and funds as the most common type of climate-related funding instruments available to cities and regions in the OECD and the European Union, with large variations in how constrained the use of the funds is. Several European countries rely heavily on EU funds (in particular, the EU Cohesion Fund and Modernisation Fund) to encourage climate action at the subnational level.

Making the most of grants and subsidies to deliver on the objectives of the net zero transition can occur by introducing conditionalities in the general system of intergovernmental transfers. In such cases, national or state governments (in federal countries) integrate environmental and climate objectives as indicators in the design of the transfer system (including general and/or earmarked grants) to provide incentives for local governments to contribute to the net zero emissions target. Using conditionalities in the national transfer system contributes to ensuring policy coherence across levels of government and sectors (e.g. energy, agriculture, transport and land use planning) to pursue country-specific climate objectives (e.g. afforestation, transition to renewable energy, etc.). Grant conditionalities can also enable tackling social, economic and territorial inequalities related to climate change (e.g. EU Just Transition Mechanism). This has been the case in particular in the context of green recovery plans that were developed in the aftermath of the COVID-19 pandemic (e.g. France Relance). Conditionalities can also be used to address fiduciary and accountability concerns and to promote minimum public service standards. Some countries have also introduced environmental conditionalities in the allocation of grants and subsidies for infrastructure projects (e.g. Canada's Climate Lens programme).

Conditionalities must, however, be used with caution in order to be efficient in a decentralised context. It is important to keep a certain degree of flexibility in how grant funds can be used to allow cities and regions to implement projects relevant to their local climate adaptation and mitigation needs. Overly restricting the use of grant funding can lead to inefficient use of funds and hinder the low-carbon investments needed to ensure a carbon-neutral transition (OECD, 2022<sup>[114]</sup>).

Central, federal or state governments can also support local climate action by establishing climate or green funds. Green or climate funds that cities and regions can access exist at the national level in Canada, France, Germany and at the state level in Jalisco, Mexico, or California, United States. The international community and national/state governments could further develop specific or matching grants to support climate-related projects developed by regions and municipalities, focusing on targeted policy areas or infrastructure that align with the net zero policy target. Currently, most of the funds established by multilateral or bilateral banks and other international donors are not directly targeted at cities and regions. Most resources are channelled through international implementing entities and the national governments of recipient countries, which may cause delays and extra administrative costs.

### *Accelerating local climate action through better access to external financing*

External sources of financing are crucial for cities and regions to mobilise enough resources to finance climate and green infrastructure and investment projects. Globally, infrastructure investment needs between 2016 and 2040 are forecasted at USD 94 trillion and, looking specifically at cities in emerging markets; the cumulative climate investment needs to mitigate and adapt to climate change are estimated at USD 29.4 trillion between 2018 and 2030 (OECD, 2023<sup>[122]</sup>).

Financing is essential for cities and regions to complement self-financing and capital transfers, to help spread the high upfront capital expenditure of infrastructure over time and to bridge the gap between the timing of payments for construction and future revenues. A variety of instruments are available to match the different types of subnational governments and projects to be financed, such as loans earmarked for green, social and sustainable investments, loan guarantees but also several types of subnational bonds, and the recent emergence of tools that are specific to climate action and resilience such as catastrophe bonds (Table 4.14).

However, access to climate or green external resources remains relatively limited at the subnational level. As shown by the OECD Compendium of Financial Instruments that Support Subnational Climate Action in OECD and EU Countries, climate-related loans and contracts are the two less common climate-related instruments available to cities and regions (OECD, 2022<sup>[31]</sup>). Overall, access to external financing is conditioned by two main prerequisites, to various extents depending on each instrument:

- First, an enabling environment that encompasses fiscal and regulatory frameworks, institutional capacity, co-ordination and co-operation mechanisms and developed financial institutions and capital markets.
- Second, sufficient and predictable sources of funding to help cover operational expenses, including maintenance and to repay financing.

**Table 4.14. Selection of sustainable financing instruments for cities and regions, potential uses and barriers**

Instrument	Green, social and sustainable (GSS) loans	Subnational bonds (general obligation bonds)	GSS bonds	Sustainability-linked bonds (SLB)	Catastrophe bonds
Description	GSS loans are granted via financial institutions, earmarked to finance specific projects (eligibility criteria determined by the Green Loan Principles).	Subnational bonds (or sub-sovereign bonds, local authority bonds, etc.) are general obligation bonds emitted on the capital market.	GSS bonds are subnational bonds whose proceeds are earmarked for defined green, social and sustainable projects (eligibility criteria determined by the Green Bond Principles).	SLB are subnational bonds whose proceeds are linked to the achievement of specific, predefined objectives (sustainability performance targets or key performance indicators).	Catastrophe bonds are insurance-linked securities that allow the issuer to get proceeds from the capital market only if a catastrophic condition occurs.
Uses and benefits	Can be used to finance small-size investments and to support SNGs who cannot access capital markets. They can be matched to a GSS bond issuance or grants through blended finance mechanisms.	Better financing rates on the capital market from both domestic and international investors over a longer time. Respond to financing needs of larger SNGs (e.g. state, provincial, regional and large local governments). Provide the basis for accessing other types of bonds.	Similar to “subnational bonds”. Enhanced transparency on investment project evaluation, selection and reporting.	Proceeds are available for general purposes, which provides SNGs with more budget flexibility. Potential to align financing with long-term policy objectives while providing budget flexibility and reducing compliance costs for SNGs.	Can transfer defined risks from catastrophic events off their balance sheet to manage exposure. Provide an alternative form of insurance against future risks, such as hurricanes, floods, bushfires or earthquakes.

Instrument	Green, social and sustainable (GSS) loans	Subnational bonds (general obligation bonds)	GSS bonds	Sustainability-linked bonds (SLB)	Catastrophe bonds
Barriers to use	Higher financing rates than through bond issuances. Requires good SNG creditworthiness and enabling framework at the national level.	Require regulatory frameworks in place, local financial market and good SNG creditworthiness and fiscal discipline. High transaction costs (e.g. credit ratings, auditing, etc).	Similar to “subnational bonds”. More limited budget flexibility. Require additional expertise for reporting and auditing and co-ordination for identifying suitable projects.	Lower transparency of the use of the proceeds. Require specific expertise for monitoring the key performance indicators.	High transaction costs, “niche” investor base. As a result, catastrophe bonds have most commonly been issued by national or state governments.

Source: Based on OECD (2023<sup>[122]</sup>), *Financing Cities of Tomorrow: G20/OECD Report for the G20 Infrastructure Working Group under the Indian Presidency*, <https://doi.org/10.1787/51bd124a-en>; Ando, S. et al. (2022<sup>[123]</sup>), *Sovereign Climate Debt Instruments: An Overview of the Green and Catastrophe Bond Markets*, International Monetary Fund.

Despite rapid growth, green bonds still account for a small share of the global bond market. Cities and regions are increasingly active in the green bond market (Case 27 in Annex 4.A) but there is significant room for scaling up (they accounted for only 4.4% of total green bond issuance in 2019). In many countries, SNGs, or certain categories of SNGs, are not allowed to issue bonds on capital markets. This said, even in countries where SNGs are allowed to issue bonds, the practice is not widespread. In some countries (e.g. France, Japan, Sweden and the United States), cities and regions are becoming significant issuers of green bonds or climate bonds, yet there is still significant scope for improved use of these instruments (OECD, 2023<sup>[122]</sup>).

To scale up the use of green bonds, borrowing frameworks could be adapted to allow borrowing for SNG investments, especially if investments support the net zero transition. Central governments could also develop guidelines, standards, reporting and certification practices to create the foundations for a green bond market. They could also provide technical assistance to develop bankable green projects and support for capacity building at the local level (Case 28 in Annex 4.A). Another way to support the development of a local green bond market is credit enhancement from governments and multilateral institutions, possible provision of tax incentives for an initial period to foster market development and the development of green banks and green funds (Climate Bonds Initiative, 2015<sup>[124]</sup>).

### *Supporting new budgetary and investment approaches for subnational climate action*

In addition to mobilising public and private resources, cities and regions of all kinds and sizes can also finance their climate actions through other instruments, whether budgetary via green budgeting or based on partnerships with the private sector through climate-oriented PPPs and green public procurement (GPP) or by setting up regulatory frameworks for companies, through emission trading systems.

Contract agreements between national and subnational governments are, for example, interesting multi-level governance instruments to foster place-based, long-term action for reaching climate objectives. Based on data from the OECD compendium (OECD, 2022<sup>[31]</sup>), contracts with green and climate lenses exist primarily in Canada and European countries (Belgium, Denmark, France, Sweden and Switzerland). In particular, France has a longstanding practice of contractual arrangements, which in recent years have incorporated environmental and climate priorities with the launch of Recovery and Ecological Transition Contracts (*contrats de relance et de transition écologique*) for inter-municipal co-operation bodies in 2020 (OECD, 2022<sup>[31]</sup>).

Another example of an innovative approach is green budgeting. Subnational practices have emerged in recent decades at the national, regional and local levels, taking into account country specificities and environmental objectives and commitments. Behind the broad definition of “green budgeting” as “using the

tools of budgetary policymaking to help achieve environmental and climate objectives” (OECD, 2020<sub>[125]</sub>), green budgeting encompasses a variety of environmentally-related budgeting practices, including carbon budgets, eco-budgets, climate budgets, environmental and climate impact analysis, green budget tagging and more.

Green budgeting is a relatively new practice in many OECD countries, both at the national and subnational levels, and the number of experimentations has been growing steadily across the world. According to a stocktake of existing subnational green budgeting practices in OECD and EU countries, these were identified at the regional level in France (Bretagne, Grand-Est, Occitanie), Italy (Sardinia), Spain (Andalusia and Catalonia) and the United Kingdom (Scotland) but also at the municipal level in Austria (Vienna), Norway (Bergen, Oslo), Sweden (Stockholm) and in several municipalities and associations of municipalities in France. These countries are pioneers in the use of subnational green budgeting (OECD, 2022<sub>[126]</sub>).

Fully incorporating environmental and climate concerns into the budgetary process can play a pivotal role in complementing the mobilisation of funding and financing by cities and regions for concrete climate action (Case 29 in Annex 4.A) yet it is not easy to put into practice. Green budgeting presents several opportunities and challenges (Table 4.15).

**Table 4.15. Opportunities and challenges of subnational green budgeting**

Opportunities	Challenges
<ul style="list-style-type: none"> <li>• <b>Aligning</b> their expenditure, investment and revenue-raising decisions with environmental and climate objectives.</li> <li>• <b>Fostering</b> a whole-of-government approach for policy making.</li> <li>• <b>Instilling</b> a science-based understanding of climate and environmental issues across the administration.</li> <li>• <b>Improving</b> the evaluation of public policies.</li> <li>• <b>Enhancing</b> transparency and accountability of government climate action.</li> <li>• <b>Prioritising</b> low-carbon and resilient investment and spending.</li> <li>• <b>Identifying</b> funding and financing gaps for their green objectives.</li> <li>• <b>Mobilising</b> additional sources of public and private finance to bridge financial gaps.</li> </ul>	<ul style="list-style-type: none"> <li>• <b>Methodological challenges:</b> defining and measuring the needs for reaching their green objectives; adapting accounting and reporting tools to the specific budgeting contexts of SNGs and ensure that the methodology can adapt to changing scientific evidence and climate challenges.</li> <li>• <b>Resource challenges:</b> training of SNG staff to carry out the exercise in a timely manner; allocating sufficient resources to upgrade existing information management systems in line with green budgeting needs.</li> <li>• <b>Operational challenges:</b> establishing a dedicated organisational structure based on horizontal co-ordination amongst departments; involving stakeholders and communicating widely; implementing internal and external auditing processes.</li> <li>• <b>Political challenges:</b> ensuring sustained, high-level political support for from both administrative and elected officials; reconciling green and social objectives; ensuring follow-up to identify trends and implement medium- and long-term strategies.</li> </ul>

Source: OECD (2022<sub>[126]</sub>), “Aligning Regional and Local Budgets with Green Objectives: Subnational Green Budgeting Practices and Guidelines”, <https://doi.org/10.1787/93b4036f-en>.

Green budgeting is most effective when combined with other means of government action (e.g. regulation, public procurement, environmental planning) and aligned with a regional/local climate strategy. To support the implementation of green budgeting practices by cities and regions, the OECD has developed six guidelines, accompanied by a self-assessment tool:<sup>5</sup>

- **Guideline 1:** Conduct a diagnostic of local environmental and climate challenges as a prerequisite to launching a green budgeting practice.
- **Guideline 2:** Ensure strong, high-level involvement and support from both the administrative and elected sides of government.
- **Guideline 3:** Ensure the practice has a robust, shared scientific basis to facilitate public trust and ensure the practice can adapt to changing scientific evidence.

- **Guideline 4:** Adopt a step-wise approach to implementing green budgeting in order to learn from previous steps and reinforce the alignment of the practice with local strategic priorities.
- **Guideline 5:** Integrate the green budgeting practice into existing public financial management procedures and tools to help ensure the practice endures.
- **Guideline 6:** Include revenues within the scope of the green budgeting practice to ensure the entire budget aligns with green objectives.

*Mobilising the private sector through climate-related public-private partnerships and green public procurement*

The challenges of attracting private sector financing are important both at the national and subnational levels but even more so at the latter level, given the capacity constraints and lack of creditworthiness. Potential instruments for tapping private finance for the net zero transition include practices such as PPPs and green public procurement.

PPPs are a long-term contract between a private party and a government entity for providing a public asset or service, with part of the risk and management responsibility shifted to the private party. Climate-related PPPs may offer added value. For example, in Slovenia, the city of Ljubljana developed two PPPs through energy performance contracting (PPP EPC). These are recognised as successful PPP EPC across the European Union and have been replicated by other Slovenian cities. These projects are based on the principle of retrofitting and introducing renewable energy sources in the majority of building stock owned by the SNG (e.g. schools, cultural centres, sports and healthcare facilities, etc.). Consequently, their GHG emissions are being reduced. For the first project batch, 25 deeply retrofitted buildings have received 51% of their funding from private partners, 40% from EU Cohesion Policy funds and 9% from the city (OECD, 2021<sup>[81]</sup>).

Subnational PPPs, however, are not without risks. Challenges emerge in areas such as financing and funding. Private borrowing costs might be higher than public ones for example, raising the costs of the PPP project overall. PPPs require intergovernmental regulatory coherence, cross-jurisdictional co-ordination, economies of scale and asymmetric information between the contracting parties, which may put local governments at a disadvantage. It also requires management capacity in cities and regions. Challenges associated with climate-related PPPs may incur even lower returns on green investments. In addition, the economic benefits that green investments generate may be difficult for investors to grasp. Climate-resilient investments face an additional hurdle in that it is difficult to monetise the avoided costs associated with climate-related damages (OECD, 2019<sup>[44]</sup>).

GPP is another manner for cities and regions to support environment-friendly policies and investment strategies by integrating environmental and social considerations into the procurement process. On average, in the OECD, cities and regions are responsible for half of total public spending on public procurement (OECD, 2023<sup>[111]</sup>). In addition to greening public consumption and investment policies, GPP can provide the industry with incentives for developing environmentally friendly products and services, particularly in markets where public purchasers represent a large share, such as construction or public transport. GPP is most effective when integrated into broad subnational emission reduction strategies with concrete net zero benchmarks. These benchmarks should apply throughout the whole procurement cycle (including the pre-procurement phase, procurement process and continuous monitoring and evaluation) and be integrated into policy and regulation (EC, 2014<sup>[127]</sup>).

Finally, emissions trading systems (ETS) are part of “carbon pricing”, together with carbon taxes. ETS, also referred to as cap-and-trade systems, can be used to help cover climate investment needs by generating revenues while reducing emissions. ETS are a policy mechanism based on which high-polluting industries are required to pay when they exceed predetermined emission amounts. In order to emit over the prescribed amount, companies are forced to purchase emission allowances. As of 2023, there are

73 carbon pricing initiatives in place across the world. While many systems operate at the national level, some ETS are operated by cities and regions, for example in Canada, the United States and more recently in eight pilot provinces in China. Most recent initiatives include the newly started ETS in the state of Washington (United States).

In the United States, ETS are almost entirely implemented at the subnational level. The Regional Greenhouse Gas Initiative (RGGI), launched in 2012 as a co-operative effort among several US states (as of 2023, 12 states: Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, Vermont and Virginia), was the first mandatory market-based programme to reduce GHG emissions from the power sector. Another example is the California Cap-and-Trade Program, which is the main source of funding for the state of California's climate investments. At the city level, as part of a local law that sets emission intensity limits for most large buildings starting in 2024, the New York City government released findings from a study on the feasibility of a citywide ETS for the building sector in 2021 and started developing regulations in 2023 (World Bank, 2023<sup>[118]</sup>).

Despite the increase in carbon prices in many jurisdictions, they remain substantially low and come with social limitations that need to be addressed. For instance, some jurisdictions have delayed measures to strengthen their carbon pricing instruments and have extended compliance deadlines. To ensure the efficiency of the system, carbon pricing should be as uniform as possible at an international or at least national level. In this regard, the Canadian federal government sets minimum national stringency standards (federal “benchmark”) that all subnational systems must meet if they choose to have their own pricing system. If the system set up by a province or a territory does not meet these standards, the federal system is put in place (World Bank, 2023<sup>[118]</sup>).

### *Policy implications*

Despite the significant role that cities and regions play in expenditure areas that are key to the net zero transition, such as environmental protection but also transport or housing policies, their role remains poorly understood due to a lack of comparable data and analysis. By building on the pilot methodologies developed by the OECD, it is crucial to enhance the tracking and measuring of climate finance flows at the national and subnational levels. In addition, the action of cities and regions to contribute to the net zero transition remains limited by a lack of access to reliable and diversified funding, including grants, tax revenues and user charges, undermining their creditworthiness and access to external financing options. Central governments can reform subnational fiscal frameworks to promote more diversified funding and facilitate access to external resources for cities and regions, including through innovative climate finance mechanisms. By implementing initiatives such as green budgeting and GPP, cities and regions can also better align their expenditure and revenues with climate and green objectives as well as mobilise further resources to accelerate local climate action.

Table 4.16 outlines a set of recommended actions for both national and subnational governments to address the policy gaps discussed above.

**Table 4.16. Recommended actions to accelerate local climate action through innovative finance**

Category	For whom	Recommended actions
Tracking of subnational climate finance	National	<ul style="list-style-type: none"> <li>Enhance the tracking and measurement of subnational climate finance, both for climate-related expenditure and revenue, to better understand cities' and regions' needs for climate action.</li> </ul>
Green budgeting and GPP	National	<ul style="list-style-type: none"> <li>Support the emergence of green budgeting practices and green procurement systems at the subnational government level.</li> </ul>
	All levels	<ul style="list-style-type: none"> <li>Adopt climate/environmental considerations for locally procured public goods and services.</li> </ul>
Taxation and user fees	All levels	<ul style="list-style-type: none"> <li>Develop and optimise taxation and user fees and charges and make the most of grants and subsidies to support climate objectives.</li> </ul>
Land value capture	All level	<ul style="list-style-type: none"> <li>Adopt land value capture mechanisms to finance sustainable urban infrastructure.</li> </ul>
Financing instruments	All levels	<ul style="list-style-type: none"> <li>Improve the ability of cities and regions to access financing for climate and green investments, e.g. through GSS municipal bonds and loans, etc.</li> </ul>
Carbon pricing	National	<ul style="list-style-type: none"> <li>Facilitate the adoption of carbon pricing instruments ("cap-and-trade") at the subnational level.</li> </ul>

### ***Engaging local actors, building partnerships and sharing knowledge***

#### *Citizen's engagement and awareness raising*

A co-production approach allows sharing and recognising varied interests, living experiences and knowledge among different stakeholders such as the public and private sectors, citizens and academia, making climate action more inclusive. The Strategic Plan 2016-2028 in Umeå, Sweden, was built on multi-stakeholder partnerships and policy alignment between different levels of government. It involved the private sector, public companies, academia and the municipality to build and share knowledge and promote innovation and experimentation to advance the circular economy (Case 30 in Annex 4.A). Engaging the private actors. Similarly, Barcelona, Spain, has adopted a co-production approach to delineate its Climate Plan 2018-2030, working with hundreds of city organisations and citizens. It enabled the city to acknowledge the local impacts of climate change, especially how it affects different groups in the city (Case 18 in Annex 4.A). Engaging building owners and developers is a key strategy to accelerate decarbonisation of buildings. For example, In New York, the NYC Retrofit Accelerator, a citywide programme launched in 2015, provides free, personalised advisory services, one-on-one expert advice on building upgrades, local law compliance, incentives and financing to building owners to decarbonise the city's building stocks. The programme uses extensive datasets created by the city's energy benchmarking and audit laws to identify and prioritise updates in privately-owned buildings (Case 31 in Annex 4.A).

Indigenous communities are a key actor. In New Zealand, the Climate Change Commission (He Pou a Rangi in Māori) provides the central government with independent, evidence-based advice to help transition to a low-emissions and climate-resilient economy, based on extensive stakeholder consultation including indigenous communities. In 2021, the commission provided a report to the Minister of Climate Change with 33 recommendations, collaboratively developed through engagement and quantitative analysis, including 4 246 responses from a range of stakeholders, including individuals, businesses, the public sector, Iwi/Māori, NGOs and youth (Case 32 in Annex 4.A).

Cities are also using communication strategies such as awareness-raising campaigns to communicate the policy impacts and trade-offs in a transparent manner, thereby building trust and confidence with citizens. The Day Zero campaign in Cape Town, South Africa, was implemented in 2018 to reduce citywide water usage. The campaign deployed an extensive communication strategy to raise awareness. It combined different tactics, including: i) sending simple messages; ii) offering concrete examples; and iii) making the water reduction activities somehow enjoyable (Case 33 in Annex 4.A).

*Facilitating knowledge sharing through city networks and programmes*

Many cities have formed international city and regional networks to join forces to achieve their net zero targets (Table 4.17). These networks have served as powerful platforms for collaboration and knowledge sharing. The Global Covenant of Mayors for Climate and Energy is the largest global alliance for city climate leadership, built upon the commitment of over 10 000 cities and local governments from 6 continents, 140 countries and representing more than 900 million people. Another example is the Race to Zero Campaign, which has engaged 1 136 cities and 52 regions (as of September 2022) (Race to Zero, 2023<sup>[128]</sup>). Through these collaborative efforts, cities and regions are demonstrating their commitment to being at the forefront of the global fight against climate change.

**Table 4.17. Major city and regional networks for climate action and resilience**

Name of the network	Year established	Mandates/ objectives	Members	Reference
C40	2005	C40 is a global network of nearly 100 mayors of the world's leading cities that are united in action to confront the climate crisis. The cities that join the initiative are committed to using an inclusive, science-based and collaborative approach to cut their fair share of emissions in half by 2030, help the world limit global heating to 1.5°C and build healthy, equitable and resilient communities.	96 cities/ municipal actors	(C40 Cities, 2023 <sup>[129]</sup> )
Global Covenant of Mayors for Climate and Energy (GcoM)	2008	Engage and support cities and towns to commit to reaching the EU climate mitigation and adaptation targets, bridging the gap from climate ambition to action delivery. The three key areas of the GcoM involve supporting local governments and the participation of cities and local governments in city networks, reducing emissions and fostering local climate resilience.	12 825 cities and local governments, 14 countries and representing more than 900 million people	(GcoM, 2023 <sup>[130]</sup> )
Under2 Coalition	2015	This initiative brings together ambitious states and regions willing to make key commitments to accelerate climate action, with the commitment to reduce their GHG emissions by 80% to 95% or limit them to 2 metric tons of CO <sub>2</sub> -equivalent per capita by 2050.	167 states, regions, provinces and cities, alongside several other national and subnational entities	(The Climate Group, 2023 <sup>[131]</sup> )
Climate Ambition Alliance	2020	The objective of this initiative is to build momentum and advocate for governments to engineer their commitments to the Paris Agreement with the goal of reaching (net) zero in the 2040s or sooner, or by mid-century at the latest, in line with global efforts to limit warming to 1.5°C and fostering a more inclusive and resilient economy.	1 136 cities/ municipal actors	(Climate Ambition Alliance, 2023 <sup>[132]</sup> )
Race to Zero Campaign	2020	The Race to Zero Campaign rallies non-state actors – including companies, cities, regions, financial, educational and healthcare institutions – to take rigorous and immediate action to halve global emissions by 2030 and deliver a healthier, fairer zero-carbon world. The cities and regions that are signatories of the Race to Zero Campaign commit to pledging to reach net zero GHG emissions as soon as possible (2050 at the latest), phasing out fossil fuels and setting interim targets to achieve in the next decade. Within 12 months of joining the campaign, the signatories need to publicly disclose a transition plan that outlines how the Race to Zero criteria will be met, including specific actions and timelines. The signatories are also required to take immediate action through all available pathways towards the net zero goal, publish their progress against both interim and long-term targets and align their external policy and engagement to the Race to Zero goals.	1 147 cities	(Race to Zero, 2023 <sup>[128]</sup> )

Source: Based on the references listed in the right-hand column.



City-to-city collaboration is a powerful tool that can help cities implement innovative solutions to climate challenges. Several international and national programmes have been at the forefront of this endeavour. In 2022, the European Commission launched the EU NetZeroCities programme as part of the implementation of the EU Green Deal. The programme includes a twinning programme that offers support to participating cities in replicating net zero solutions from other cities (Case 34 in Annex 4.A). Similarly, the EU Climate-ADAPT provides a database of case studies on climate adaptation from which cities and regions can learn to tailor and adapt their own policies (Case 35 in Annex 4.A).

Some national governments are also fostering city-to-city partnership programmes to facilitate experience exchange. In the Netherlands, the former Ministry of Infrastructure and the Environment (currently the Ministry of Infrastructure and Water Management) hosted the Climate Adaptation City Deal between 2016 and 2021. The initiative facilitated collaboration between different stakeholders, including civil society organisations, universities, private companies and local governments, to design innovative solutions to climate adaptation in cities. The initiative benefitted several cities, including Amersfoort, Amsterdam, Breda, Deventer, Dordrecht, Eindhoven, Groningen, Rotterdam, The Hague and Zwolle, where different technological solutions and capacity-building activities were tested, including permeable pavements to avoid the risk of flooding and “water coaches” to inform house owners about water conservation methods (Case 36 in Annex 4.A).

### *Policy implications*

When acting alone, cities and regions may not be able to leverage their full potential to make a significant difference in transitioning to net zero and enhancing climate resilience. Engagement with different stakeholders at the local level is critical to build on their wealth of “bottom-up” knowledge and experiences. Such engagement can be facilitated at various levels and in different forms, including citizens and other cities (nationally and internationally). Table 4.18 outlines a set of recommended actions for both national and subnational governments to address the policy gaps discussed above.

**Table 4.18. Recommended actions to engage local actors, build partnerships and share knowledge**

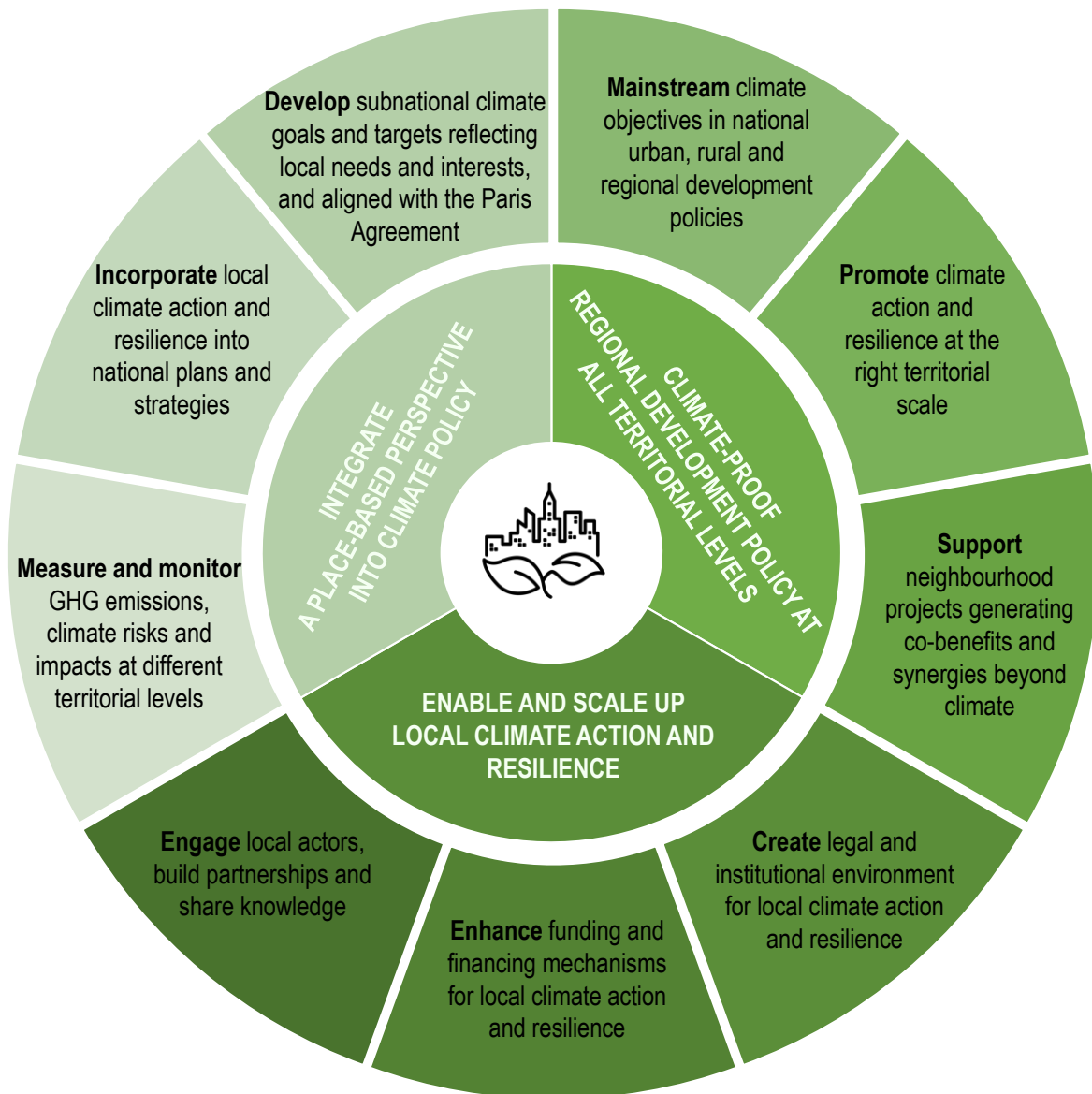
Category	For whom	Recommended action
Engaging local actors	All levels	<ul style="list-style-type: none"> <li>• Enable citizens' participation in the design of national and subnational climate policies.</li> <li>• Create “experts commissions” to inform national and subnational climate action planning.</li> </ul>
	Cities and regions	<ul style="list-style-type: none"> <li>• Engage with universities and research institutions to build knowledge on local climate action.</li> <li>• Adopt local green and energy deals or pacts among local governments, local businesses and industries and other stakeholders.</li> </ul>
Vertical partnerships	All levels	<ul style="list-style-type: none"> <li>• Co-develop climate action plans between local, regional and national governments.</li> <li>• Create co-ordinated national, regional and local committees.</li> <li>• Develop co-financing agreements for the implementation of climate action between national, regional and local governments.</li> </ul>
Horizontal partnerships	Cities and regions	<ul style="list-style-type: none"> <li>• Adopt city-to-city collaboration agreements.</li> </ul>
Knowledge sharing across governments and stakeholders	Cities and regions	<ul style="list-style-type: none"> <li>• Create knowledge centres with relevant information on climate mitigation and adaptation at the regional/city scale.</li> <li>• Develop communication campaigns to raise awareness of residents about the importance of the net zero and resilient transition.</li> </ul>

## Conclusions

This chapter has assessed how cities, regions and countries in OECD countries are implementing a territorial approach to climate action and resilience. Drawing on a selection of 36 leading examples (presented in further detail in Annex 4.A), this assessment can be translated into the following 3 pillars subdivided into 9 recommended actions (Figure 4.13). Detailed and concrete sub-actions have been proposed and summarised in tables for each recommended action, serving as a policy checklist.

- **Pillar I: Integrate a place-based perspective into climate policy**
  - Measure and monitor GHG emissions, climate risks and impacts at different territorial levels.
  - Incorporate local action into national climate plans and strategies.
  - Develop subnational climate goals and targets reflecting local needs and interests and aligned with the Paris Agreement.
- **Pillar II: “Climate-proof” regional development policy at all territorial levels**
  - Mainstream climate objectives in national urban, rural and regional development policies.
  - Promote climate action and resilience at the right territorial scale.
  - Support neighbourhood projects generating co-benefits and synergies beyond climate.
- **Pillar III: Enable and scale up local climate action and resilience**
  - Create a legal and institutional environment for local climate action and resilience.
  - Enhance funding and financing mechanisms for local climate action and resilience.
  - Engage local actors, build partnerships and share knowledge.

**Figure 4.13. Nine recommended actions to apply a territorial approach to climate action and resilience**



## Annex 4.A. Leading practices advancing a territorial approach to climate action and resilience

**Annex Table 4.A.1. List of leading practices of a territorial approach in OECD countries, regions and cities, by type of action**

Case no.	Location	Name of practice	Scope	Recommended actions									
				1	2	3	4	5	6	7	8	9	
1	Korea	Helping cities and regions develop adaptation measures: Vulnerability Assessment Tool to Build Climate Change Adaptation Plan (VESTAP)	Adaptation	■							■		
2	Boston, United States	Identifying local climate risk together with social factors contributing to vulnerability: Climate Ready Map Explorer	Adaptation	■		■							
3	United States	Tracking real-time climate change impacts: Climate Mapping for Resilience and Adaption (CMRA)	Adaptation	■							■		
4	Colombia	Integrating cities' needs and interests into national climate policies: Roundtable of Cities and Climate Change	Mitigation, adaptation		■	■					■		
5	Canada	Developing climate strategies in close collaboration with provinces: Pan-Canadian Framework on Clean Growth and Climate Change	Mitigation, adaptation		■	■					■		
6	Japan	Collaborative climate action across levels of government: Council for National and Regional Decarbonization, Regional Decarbonization Roadmap and 100 Decarbonization Leading Areas	Mitigation, adaptation			■					■	■	■
7	Ireland	Delineating a whole-of-government and society approach: National Adaptation Framework	Adaptation		■	■					■		■
8	Flanders Region, Belgium	Translating EU climate targets into local action plans: Local Energy and Climate Pact	Mitigation, adaptation			■					■		■
9	Costa Rica	Incorporating climate objectives into national urban policies: National Urban Development Policy 2018-2030	Mitigation, adaptation		■		■	■					■
10	Poland	Understanding local climate challenges to delineate action of national urban policy: Polish National Urban Policy 2030	Mitigation, adaptation	■			■	■			■		
11	Germany	Integrating climate considerations for urban development investments: Urban Development Support Programme	Mitigation, adaptation				■				■	■	■
12	Vancouver, Canada	Incentivising non-motorised transport at the metropolitan scale: Transit-Oriented Communities in Metro Vancouver	Mitigation					■		■			
13	Basel, Switzerland	A city-wide regulation on greening all flat roofs: Green Roofs Planning	Mitigation, adaptation			■		■				■	■
14	Copenhagen, Denmark	Enhancing water retention with green infrastructure in cities: Cloudburst Management Plan	Adaptation			■		■		■			
15	Lisbon, Portugal	Expanding green urban areas without increasing water needs: Strategic Plan for Water Reuse	Adaptation			■		■					
16	United Kingdom	Strengthening nation-wide planning requirements for enhanced biodiversity: Biodiversity Net Gain Planning	Mitigation, adaptation					■			■		

Case no.	Location	Name of practice	Scope	Recommended actions									
				1	2	3	4	5	6	7	8	9	
17	Freetown, Sierra Leone	Setting targets for the expansion of urban green areas: The Freetown the Treetown initiative	Mitigation, adaptation					Dark blue				Light blue	Light blue
18	Barcelona, Spain	Setting a local goal on green areas with a co-production approach: Climate Plan 2018-2030	Mitigation, adaptation			Light blue		Dark blue					Light blue
19	Spain	Promoting on-demand pooling transport in low-demand rural areas: Sant Cugat del Vallès and Vallirana	Mitigation					Dark blue	Light blue	Light blue	Light blue		
20	Czech Republic	Bridging the gap in public transport in rural regions: Radiobus	Mitigation					Dark blue	Light blue				
21	France	Promoting sustainable neighbourhood development: ÉcoQuartier label	Mitigation, adaptation		Light blue				Dark blue				Light blue
22	Netherlands	Enabling municipalities to innovate and develop energy transition measures: Natural Gas-Free Neighbourhood Programme	Mitigation				Light blue		Dark blue				Light blue
23	United States	Funding unmet needs post major disasters: Community Development Block Grant Disaster Recovery (CDBG-DR) funds	Adaptation						Dark blue			Light blue	Light blue
24	Ahmedabad, India	Tackling against extreme heat in informal communities in partnership with a women-focused non-profit organisation: Heat Action Plan	Adaptation			Light blue		Light blue	Dark blue				
25	Mexico	Safeguarding climate commitments with legislation: General Law on Climate Change	Mitigation, adaptation			Light blue				Dark blue			
26	France	Empowering municipalities to manage water: Loi de Modernisation de l'action publique territoriale et d'affirmation des métropoles (MAPTAM)	Adaptation					Light blue		Dark blue			
27	Mexico City, Mexico	Funding urban infrastructure with municipal green bonds: Green Bond Issuance in Mexico City	Mitigation, adaptation				Light blue	Light blue				Dark blue	
28	Region of Andalusia, Spain	Providing the basics for the issuance of green bonds: Sustainable Finance Framework for Issuing Sustainable Bonds	Mitigation, adaptation			Light blue						Dark blue	
29	Region of Brittany, France	Classifying climate expenditures: Climate Budget Tagging	Mitigation, adaptation			Light blue						Dark blue	Light blue
30	Umeå, Sweden	Multi-stakeholder partnerships and collaboration for the circular economy: Strategic Plan 2016-2028	Mitigation, adaptation									Light blue	Dark blue
31	New York, United States	Engaging building owners to boost the energy performance of buildings: NYC Retrofit Accelerator	Mitigation	Light blue			Light blue						Dark blue
32	New Zealand	Providing independent and evidence-based advice for climate policies: Climate Change Commission/He Pou a Rangi	Mitigation, adaptation	Light blue							Light blue		Dark blue
33	Cape Town, South Africa	Raising awareness on water conservation: Day Zero Campaign	Adaptation				Light blue			Light blue			Dark blue
34	European Union	Experimentation and innovation hubs for European cities: EU Mission for 100 Climate-neutral and Smart Cities by 2030 and NetZeroCities	Mitigation		Light blue	Light blue						Light blue	Dark blue
35	European Union	Facilitating knowledge sharing for climate adaptation: Climate-ADAPT	Adaptation	Light blue									Dark blue
36	Netherlands	Facilitating knowledge sharing among different actors: Climate Adaptation City Deal	Adaptation				Light blue			Light blue			Dark blue

Note: Dark blue corresponds to the most relevant action related to the case, whereas light blue signifies indirectly related actions.

## Action 1. Measure and monitor GHG emissions, climate risks and impacts at different territorial levels

### Case 1. Helping cities and regions develop adaptation measures: Vulnerability Assessment Tool to Build Climate Change Adaptation Plan (VESTAP) (Korea)

Scope	Climate adaptation
Most relevant action	Action 1
Other relevant actions	Action 7
Location	Korea
How a territorial approach is implemented	<p>In 2014, the Korea Adaptation Centre for Climate Change (KACCC) developed the Vulnerability Assessment Tool to Build Climate Change Adaptation Plan (VESTAP) to help provinces and municipal governments assess vulnerability and update their adaptation measures. It can be used as science-based evidence to analyse climate change status and vulnerabilities.</p> <p>This GIS-based tool helps provinces and municipalities visualise their local vulnerability and risk, offering data on climate exposure, sensitivity and adaptation capacity. It includes 2 725 vulnerability indexes covering 7 assessment categories: health, disaster, agriculture, forest, ocean, water management and ecosystem. Equipped with raw data for 17 provincial and 252 municipal governments, VESTAP allows users to assess the vulnerability of different spatial ranges from provinces to municipalities. After selecting climate change scenarios (RCP 4.5/8.5) and time range (10-year intervals from 2010-40), VESTAP displays a visualised vulnerability map and a list of indicators.</p> <p>Aside from checking the pre-assessed vulnerability, cities and regions can also conduct their own assessment by modifying weights and adding new indicators.</p>
Impacts/ success factors/ lessons learned	The customised assessment result will help cities and regions determine place-based adaptation priorities and budget allocations. This is a successful case where the national government provides the tool and information that help local governments (provinces and municipalities) understand their vulnerabilities, recognise their climate change adaptation priorities and develop contextualised measures to mitigate vulnerability by sector.
Sources	(KEI, 2018 <sup>[133]</sup> )

### Case 2. Identifying local climate risk together with social factors contributing to vulnerability: Climate Ready Map Explorer (Boston, United States)

Scope	Climate adaptation
Most relevant action	Action 1
Other relevant actions	Action 3
Location	Boston, United States
How a territorial approach is implemented	<p>Boston copes with rising sea levels, increased temperatures and intensified storms, which present challenges to the city's local communities, infrastructure and open spaces. As a result, the city initiated the implementation of Climate Ready Boston, starting with the publication of a report in 2016. This initiative endeavours to cultivate resilience strategies, encompassing comprehensive coastal resilience plans and strategies to mitigate the increasing temperatures. The Climate Ready Boston Map Explorer, an integral component, provides regularly updated spatial data, in turn enabling stakeholders at various levels to comprehend and effectively address climate risks in the city of Boston.</p> <p>The Climate Ready Boston Map Explorer is a tool that grants users access to comprehensive spatial data pertaining to the risks of flooding and extreme heat in the city of Boston, fostering a better understanding of vulnerability factors and acquiring access to information concerning climate resilience projects within the city.</p> <p>The initiative is aligned with the city's commitment to inclusive adaptation to ensure that all city dwellers can actively participate in building a more climate-resilient Boston.</p>
Impacts/ success factors/ lessons learned	The Climate Ready Boston Map Explorer has made substantial contributions to Boston's climate resilience endeavours. By providing accessible and consistently updated spatial data, it has bestowed upon stakeholders the capacity to identify vulnerabilities and give priority to resilience projects. It has played a pivotal role in enhancing readiness and engagement at multiple tiers, reflecting the importance of place-based climate action.
Sources	(City of Boston, 2023 <sup>[8]</sup> )

### Case 3. Tracking real-time climate change impacts: Climate Mapping for Resilience and Adaption (United States)

Scope	Climate adaptation
Main action	Action 1
Other relevant actions	Action 7
Location	United States
How a territorial approach is implemented	<p>In response to the ever-changing climate challenges in the United States, the Climate Mapping for Resilience and Adaptation (CMRA) initiative has emerged as a vital instrument. It endeavours to evaluate place-based exposure to climate-related hazards, recognising the significance of preventative climate mitigation measures and is the result of collaborations under the U.S. Global Change Research Program (USGCRP), showcasing an intergovernmental effort to advance climate resilience in the United States.</p> <p>The CMRA is an online platform that aims to address climate-related hazards effectively throughout the United States. It supports city dwellers and other stakeholders at multiple levels in comprehending and assessing communities' vulnerability to these risks. The portal serves as an extensive source of data pertaining to governmental policies concerning climate adaptation. Additionally, it provides valuable insights regarding federal funding prospects that can be utilised to strengthen projects aimed at enhancing climate resilience.</p>
Impacts/ success factors/ lessons learned	Positioned as an accessible source of information, the CMRA demonstrates notable benefits to individuals who are seeking federal funding opportunities. It has been found that proactive investments in climate mitigation have the potential to yield substantial cost reductions in post-major disasters and have played a pivotal role in augmenting climate resilience throughout the United States, highlighting the value of multi-tiered stakeholder partnerships. By fostering co-operation among essential federal entities, the CMRA facilitates the advancement of climate resilience at multiple levels.
Sources	(The White House, 2022 <sup>[14]</sup> ; CMRA, 2023 <sup>[15]</sup> )

## Action 2: Incorporate local action into national climate plans and strategies

### Case 4. Integrating cities' needs and interests into national climate policies: Roundtable of Cities and Climate Change (Colombia)

Scope	Climate mitigation, climate adaptation
Most relevant action	Action 2
Other relevant actions	Action 3, Action 7
Location	Colombia
How a territorial approach is implemented	<p>In 2018, the government of Colombia enforced Law 1931, which mandates districts and municipalities to prepare Territorial Climate Change Plans and implement and monitor them. Territorial entities must also incorporate climate change management into their development plans and other planning instruments. The law also delineates eight areas of action: i) provide urban infrastructure resilient to floods and rising sea levels; ii) reduce climate risk due to urban water shortages; iii) provide efficient public transport systems; iv) encourage constant reductions in the generation of solid and liquid waste; v) encourage residential and non-residential energy efficiency; vi) reduce flood exposure and transport emissions through controlled urban expansion; vii) promote conservation of local ecological systems; and viii) generate scientific knowledge to quantify CO<sub>2</sub> capture. A roundtable of cities and climate change enabled the national government to integrate cities' needs and interests into national climate policies by selecting indicators and identifying financial instruments to forward cities' low-emission initiatives and integrate them into national climate policies.</p>
Impacts/ success factors/ lessons learned	The law of 1931 and the roundtable helped align national and local climate policies. The stipulation of national commitment and legal action led Colombia to announce a more ambitious climate objective. In 2020, it announced the renewed NDC with a 51% reduction of GHG by 2030, compared to 20% below the business-as-usual scenario announced in 2017. The new NDC includes many city-level climate actions.
Sources	(Colombian Ministry of Environment and Sustainable Development, 2018 <sup>[26]</sup> ) (MinAmbiente, 2022 <sup>[134]</sup> )

### Case 5. Developing climate strategies in close collaboration with provinces: The Pan-Canadian Framework on Clean Growth and Climate Change (Canada)

Scope	Climate mitigation, climate adaptation
Most relevant action	Action 2
Other relevant actions	Action 7
Location	Canada
How a territorial approach is implemented	Canada launched the Pan-Canadian Framework on Clean Growth and Climate Change (PCF) in 2016, the first national climate plan developed with the provinces and territories and in consultation with indigenous communities to meet emission reduction targets, grow the economy and build resilience to a changing climate. It aims to drive innovation and growth by promoting technological development and adoption to ensure the country remains competitive in the global low-carbon economy, simultaneously advancing climate change adaptation and building resilience to climate impacts. The PCF is built on four main pillars: i) carbon pricing; ii) complementary measures to further reduce emissions; iii) measures to adapt to the climate change impact and build resilience; and iv) actions to accelerate innovation, support clean technology and create jobs. The PCF guarantees flexibility for provinces and territories to design their own policies and programmes to meet local emission reduction targets, supported by federal infrastructure investments, specific emission reduction opportunities and clean technologies. For instance, while the PCF requires provinces and territories to introduce a carbon pricing scheme, it can range from a carbon tax, a cap-and-trade system, credit trading programmes or a hybrid approach, depending on the local administrative capacity and emissions. The PCF supports locally tailored policy and action-making while setting out the wider agenda and strategies.
Impacts/ success factors/ lessons learned	The PCF has served as the dialogue platform on climate-related policies between the federal government and the provinces and territories. Driven by measures in the PCF alone, Canada is expected to see a 19% reduction in emissions below 2005 levels by 2030 (227 millions of tonnes decrease).
Sources	(Government of Canada, 2023 <sup>[135]</sup> ) (Government of Canada, 2021 <sup>[136]</sup> )

### Action 3: Develop subnational climate goals and targets reflecting local needs and interests and aligned with the Paris Agreement

#### Case 6. Collaborative climate action across levels of government: Council for National and Regional Decarbonisation, Regional Decarbonisation Roadmap and 100 Decarbonisation Leading Areas (Japan)

Scope	Climate mitigation, climate adaptation
Most relevant action	Action 3
Other relevant actions	Action 7, Action 8, Action 9
Location	Japan
How a territorial approach is implemented	In 2021, the Ministry of Environment of Japan launched the Regional Decarbonisation Roadmap programme to facilitate the collaboration between national and local governments in the journey to achieve climate neutrality by 2050. The programme came from Council for National and Regional Decarbonisation discussions, where the prime minister of Japan, other relevant ministers and selected mayors consulted on how to accelerate national decarbonisation. The Japanese government provides grants and technical support to help local governments and private sector companies implement decarbonisation projects. These are regions that achieve net zero emissions from electricity consumption in households and the business sectors by 2030 – earlier than the national goal of 2050. This initiative applies a territorial approach by supporting locally tailored solutions based on the collective action of national, regional and local governments. At the end of 2022, 46 plans have been selected as “decarbonisation leading areas” after the first and second rounds of applications and the aim is to select at least 100 of them by 2030. For example, the city of Nagoya was selected to build a wide-area renewable energy grid that connects distributed renewable energy resources within and around the city. The programme aims to create a “decarbonisation domino effect” whereby local initiatives catalyse similar efforts in neighbouring municipalities, leading to a nationwide movement towards carbon neutrality.
Impacts/ success factors/ lessons learned	The Council for National and Regional Decarbonisation provided a forum where national and subnational governments can discuss effective collaboration programmes on an equal footing. The 100 Decarbonisation Leading Areas national pilot programme, a nationally-led initiative with financial support, triggered strong motivation for cities and regions to take local decarbonisation actions.
Sources	(Japanese Ministry of the Environment, 2023 <sup>[137]</sup> )



### Case 7. Delineating a whole-of-government and society approach: National Adaptation Framework (Ireland)

Scope	Climate adaptation
Most relevant action	Action 3
Other relevant action	Action 2, Action 7, Action 9
How a territorial approach is implemented	<p>Ireland published its first statutory National Adaptation Framework (NAF) in 2018, which lays out the national strategy to reduce the vulnerability of the country to negative climate change impacts and amplify positive impacts. The NAF delineates a whole-of-government and society approach to climate action by improving the enabling environment for adaptation through ongoing engagement with civil society, the private sector and the research community. The NAF explicitly delineated the role of key sectors, including local governments, and recognised the need to ensure co-ordination of adaptation actions across sectors and government departments and agencies.</p> <p>The local adaptation plans and initiatives are built on multi-stakeholder partnerships. First, the NAF is subject to regular review, at least every five years. The latest review process in 2022 included a public consultation, in addition to feedback from key sectoral, department and agency stakeholders. The framework establishes that each local authority should make and adopt local adaptation strategies based on the regional governance approach to adaptation planning. The development of strategies must be undertaken in accordance with the Local Authority Adaptation Strategy Development Guidelines and the NAF. To support this endeavour, the NAF also delineated the need to develop four Climate Action Regional Offices (CAROs), which work with local authorities and co-ordinate regional and territorial adaptation planning. CAROs provide technical capacity training and financing to local authorities so they can develop and implement territorial climate plans. The NAF and accompanying initiatives, such as CAROs, align climate policies between local and national governments, but also across sectors.</p>
Impacts/ success factors/ lessons learned	Under the NAF, in 2019, all 31 local authorities prepared Local Adaptation Strategies. In 2021, over 13 000 local authority staff received training provided by the Local Authority Climate Action Training Plan.
Sources	(Government of Ireland, 2018 <sup>[138]</sup> ) (Government of Ireland, 2023 <sup>[139]</sup> )

### Case 8. Translating EU climate targets into local action plans: Local Energy and Climate Pact (Flanders, Belgium)

Scope	Climate mitigation, climate adaptation
Most relevant action	Action 3
Other relevant actions	Action 7, Action 9
Location	Region of Flanders, Belgium
How a territorial approach is implemented	<p>The region of Flanders launched a Local Energy and Climate Pact (LEKP) to set out concrete objectives for its signatories to tackle the global climate challenge at the local level. It refers to the European Climate Act, an initiative of the European Commission to invite “people, communities and organisations to participate in climate action and build a greener Europe”. The LEKP specifies four key areas: greening, energy, mobility and rainwater. By 2030, the pact aims to have 1 tree per person, 50 collective renovations per 1 000 residential units, 1 charging point per 100 inhabitants and 1 cubic metre of extra rainwater collection per inhabitant. The LEKP holds a stakeholders’ climate dialogue every two years, including cities, local governments and citizens’ organisations, to co-design climate objectives and actions, facilitating broad inclusivity at a grassroots level. Based on this, the Flemish regional government biannually engages with the Belgian national government to assess, evaluate and integrate local and regional plans into the national policy and NDC development. The Flemish government also promised subsidies for municipalities.</p>
Impacts/ success factors/ lessons learned	The LEKP aligns local climate objectives and action plans with the wider climate agenda of Belgium and the European Union. So far, 293 out of 300 municipalities have committed to the initial pact (LEKP 1.0) and 210 cities and municipalities have signed up for the renewed LEKP 2.0 so far. Signing the LEKP encompasses signing the Covenant of Mayors 2030; in this way, the Flemish government aligns local initiatives with European climate policies and strategies.
Sources	(Flemish Government, 2023 <sup>[140]</sup> )

## Action 4: Mainstream climate objectives in national urban, rural and regional development policies

### Case 9. Incorporating climate objectives into national urban policies: National Urban Development Policy 2018-2030 (Costa Rica)

Scope	Climate mitigation, climate adaptation
Most relevant action	Action 4
Other relevant actions	Action 2, Action 5, Action 9
Location	Costa Rica
How a territorial approach is implemented	<p>Costa Rica announced the National Urban Development Policy 2018-2030 and Action Plan 2018-2022, which recognise the importance of climate change and other environmental factors in a cross-sectoral manner.</p> <p>The policy and action plan set out three strategic areas: i) incorporate a range of environmental considerations in urban and territorial planning instruments; ii) improve the adaptation capacity of urban infrastructure to mitigate natural risks and threats such as those tied to climate change; and iii) promote the construction and operation of urban buildings and infrastructure with a positive net effect on natural and urban environments. The national urban policy prioritises implementing low-emission public transport, enhancing the treatment of organic solid waste and promoting sustainable and bioclimatic construction that makes use of natural lighting and ventilation.</p> <p>However, there is still an opportunity for improvement; the National Urban Development Policy does not include a specific evaluation and follow-up model, leaving a need for indicators to monitor and report on the progress of the 2030 Agenda.</p>
Impacts/success factors/lessons learned	The policy and plan institutionalise political will to integrate climate consideration into urban and territorial planning. The national urban policy covers human rights and social inclusion, requiring local governments to meet the needs of all citizens equally. Costa Rica also provides the entire population with free access to geospatial information, promoting greater engagement of citizens in urban policy.
Sources	(MIVAH, 2018 <sup>[141]</sup> ) (OECD/UN-Habitat/Cities Alliance, 2021 <sup>[47]</sup> )

### Case 10. Understanding local climate challenges to delineate action of national urban policy: Polish National Urban Policy 2030 (Poland)

Scope	Climate mitigation, climate adaptation
Most relevant action	Action 4
Other relevant actions	Action 1, Action 5, Action 7
Location	Poland
How a territorial approach is implemented	<p>National urban policy is one of the three pillars of Polish local policy, alongside the Strategy for Responsible Growth and the Strategy for Regional Development. In Poland, challenges pertaining to mitigating the negative effects of climate changes in cities, improving the quality of natural environment in cities and sustaining sustainable and integrated urban mobility systems are prevalent in urban areas across the country. Launched in 2023, the Polish National Urban Policy 2030 seeks to tackle these challenges effectively by placing climate at the forefront of urban development. At its core is the vision to strengthen the capacity of cities and urban areas, improve the quality of life for city dwellers and build resilience to climate change.</p> <p>The Polish National Urban Policy 2030 discusses extensively the challenges related to climate mitigation and adaptation in cities. To do so, it reviews existing climate-related indicators (i.e. accessibility to green areas, spatial distribution of PM<sub>2.5</sub>, average increase in impermeable surfaces in urban areas, change in average annual air temperature) and delineates concrete actions to address climate-related risks. For example, it aims to introduce legislative reforms that raise the profile of blue-green infrastructure for future urban development, by proposing legal empowerment of blue-green infrastructure as 'critical infrastructure' according to the 2007 Act on crisis management and by introducing a blue-green infrastructure plan as a tool to monitor and coordinate its development.</p>
Impacts/success factors/lessons learned	The national government's clear vision through the National Urban Policy 2030 can guide cities and regions, putting climate at the forefront of urban development. The use of local climate data provided an evidence-based understanding of local challenges.
Sources	(Government of the Republic of Poland, 2022 <sup>[48]</sup> )

### Case 11. Integrating climate considerations for urban development investments: Urban Development Support Programme (Germany)

Scope	Climate mitigation, climate adaptation
Most relevant action	Action 4
Other relevant actions	Action 7, Action 8, Action 9
Location	Germany
How a territorial approach is implemented	<p>In 1971, in West Germany, the Urban Development Support Programme was launched under the Urban Planning Funding Act to provide financial support for investments in the reformation and development of cities and communities. Since 2007, it has been one of the key instruments for delivering on the Leipzig Charter on Sustainable European Cities. The latest restructure was made in 2020, updating the eligibility to include measures for climate protection and climate change adaptation, including the improvement of green infrastructure.</p> <p>The programme is built on multi-level co-ordination, integrated planning, flexible needs-oriented measures, community participation and feedback. In terms of multi-level co-ordination, federal states are responsible for actual distribution of funding to towns, cities and communities based on their state-specific urban development policy, strategic support and local requirements. The ultimate authority for planning and implementation remains solely in towns, cities and communities. Local stakeholder engagement is another key to the programme, inviting various stakeholders from businesses to educational sectors to participate in development processes and individual projects. This contributes to creating an identity for the local community. This nationwide funding programme acknowledges the importance of a place-based planning approach grounded in local needs and voices.</p>
Impacts/ success factors/ lessons learned	<p>Since its inception, the programme has given a total of EUR 18 billion in funding to support municipalities in urban development adaptation processes. As of 2020, 9 314 joint projects received the funding. Every euro of the funding generates an average of EUR 7 of private or public construction investment, bringing monetary returns to the regional economies, in addition to positive social and climate impacts.</p>
Sources	(Federal Ministry for Housing, Urban Development and Building, 2023 <sup>[142]</sup> )

### Action 5: Promote climate action and resilience at the right territorial scale

### Case 12. Incentivising non-motorised transport at the metropolitan scale: Transit-Oriented Communities in Metro Vancouver (Vancouver, Canada)

Scope	Climate mitigation
Most relevant action	Action 5
Other relevant actions	Action 6
Location	Vancouver, Canada
How a territorial approach is implemented	<p>The Metro Vancouver Region (MVR) in British Columbia, Canada, is the third-largest metropolitan region in the country. It produces over 60% of the province's real GDP. Between 2013 and 2017, the MVR had an average annual real GDP growth of 3.9%, while the national average was 2.1%. However, despite having high levels of well-being, the region faces important challenges: underinvestment in public transit and road infrastructure, poor housing affordability, land scarcity for port expansion, low labour productivity levels and stalled educational attainment rates. Transport-related issues have been a priority for policy makers in the region for the last two decades as the conditions of streets and roads, traffic congestion, long commute times, the quality and level of public transit, road safety and parking deteriorate. The lack of affordable housing is a growing concern for citizens.</p> <p>To rise to the mobility and accessibility challenges, the MVR has had a consistent long-term development vision supported by transport investments. The Regional Growth Strategy (RGS) and the Regional Transport Strategy (RTS), the two main strategic planning documents, underpin the ten-year investment plans, as well as the municipal transport and economic development plans.</p> <p>The development of "transit-oriented development communities" is one of the strategic goals of both the RGS and RTS. This aims to incentivise people to drive less and walk, cycle and take transit more.</p>
Impacts/ success factors/ lessons learned	<p>A solid culture of community engagement, the existence of a co-ordinating body for transport planning and the links between transport and land use policy are the main assets MVR has to enhance accessibility. However, tackling the affordable housing deficit around transport hubs remains a challenge for local authorities.</p>
Sources	(Huerta Melchor and Lembcke, 2020 <sup>[143]</sup> )

### Case 13. A city-wide regulation on greening all flat roofs: Green Roofs Campaign (Basel, Switzerland)

Scope	Climate mitigation, climate adaptation
Most relevant action	Action 5
Other relevant actions	Action 3, Action 8, Action 9
Location	Basel, Switzerland
How a territorial approach is implemented	<p>The Green Roof Campaign is a local initiative in Basel, launched in 1996. The campaign initially aimed at energy saving but, over time, the objective shifted to biodiversity conservation while addressing climate change impacts, including high temperatures, exacerbating urban heat island effects, habitat loss and increasing GHG emissions.</p> <p>The campaign uses a combination of financial incentives and regulations. In the first instance, Basel's energy-saving law collected 5% of all customers' energy bills in an Energy-Saving Fund, which was then used to fund energy-saving campaigns and measures. In 2002, Basel passed a new building and construction law requiring all new and renovated flat roofs to be green and stipulating their design to maximise biodiversity. Since the beginning, stakeholder engagement with local businesses, environmental organisations and citizens played a key role in embedding the green roof concept and educating on the co-benefits of green roofing. The campaign has evolved over time, accommodating the changing place-based climate risks and challenges.</p>
Impacts/ success factors/ lessons learned	Blended incentives and statutory regulation mechanisms have helped embed the green roof concept in the city. In 2019, the city of Basel had the largest area of green roofs per capita in the world, at 5.71 m <sup>2</sup> /inhabitant. According to the Basel municipality, approximately 40% of the city's roof surface is covered by green roofs as of 2022.
Sources	(Climate-ADAPT, 2020 <sup>[144]</sup> )

### Case 14. Enhancing water retention with green infrastructure in cities: Cloudburst Management Plan (Copenhagen, Denmark)

Scope	Climate adaptation
Most relevant action	Action 5
Other relevant actions	Action 3, Action 6
Location	Copenhagen, Denmark
How a territorial approach is implemented	<p>The Cloudburst Management Plan was developed by Copenhagen in 2012, as part of its Climate Adaptation Plan to reduce the impacts of pluvial flooding, whose frequency and intensity are expected to worsen because of climate change. The plan was built on a detailed socio-economic assessment to ascertain whether cloudburst and stormwater management can pay off for society.</p> <p>Appropriate prioritisations and co-benefits analysis are the keys to the plan. Due to its administrative and financial capacity constraints, Copenhagen needed to prioritise in line with the Copenhagen Climate Adaptation Plan. Among the planned 300 projects, the city makes annual prioritisation decisions, considering: i) high-risk areas; ii) areas where measures are easy to implement; iii) areas with ongoing urban development projects; and iv) areas where synergistic effects can be gained. Around 15 projects will be carried out annually for the next 20-30 years accordingly. Adaptation measures are integrated with the existing and planned urban development, considering recreational value, biodiversity and social and health benefits. For instance, water reservoirs function as parks and recreational places when it is not raining.</p> <p>The estimated cost of full implementation over the 20 years is DKK 3.8 billion, which is still cheaper than the cost of the 2011 flooding alone (DKK 5 billion). However, several challenges remain. For example, some projects are planned in private roads, where road owners can decide whether or not to implement the project. Co-ordination with private landowners and developers is key to implementing projects.</p>
Impacts/ success factors/ lessons learned	The deployed functional approach has enabled Copenhagen to generate co-benefits by aligning climate objectives with other economic, social and environmental considerations.
Sources	(OECD, 2018 <sup>[145]</sup> ) (Climate-ADAPT, 2020 <sup>[144]</sup> )

### Case 15. Expanding green urban areas without increasing water needs: Strategic Plan for Water Reuse (Lisbon, Portugal)

Scope	Climate adaptation
Most relevant action	Action 5
Other relevant actions	Action 3
Location	Lisbon, Portugal
How a territorial approach is implemented	<p>The Strategic Plan for Water Reuse is Lisbon's strategy to create a citywide recycled water distribution network and a working group for water quality assurance. Non-potable use, such as street washing and irrigation, has been consuming 75% of the city's drinking water.</p> <p>The plan is aligned with a wider city vision, manifesting a strong commitment to managing water as a part of a wider Water Efficiency Strategy. The city invested EUR 20 billion to create a 55-km reclaimed water distribution network. It also introduced lower tariffs for recycled water, which would save EUR 26.8 billion by 2030. The Wastewater Reuse Plan, a part of the strategic plan, aims to reuse more than 1 million m<sup>3</sup> to irrigate many urban parks. Lisbon also constructed nine rainwater retentions as nature-based solutions (NbS) to store rainwater and reduce the impacts of floods, including small basins and changes to plant life. The plan is based on a territorial approach, considering synergies with other climate policies and addressing localised water challenges with NbS most appropriate to the local environment.</p>
Impacts/ success factors/ lessons learned	As of 2020, the city positions as one of the lowest water leakage rates in the world, at 11%. Lisbon is greening the city without increasing its overall water use, making it more resilient to heatwaves and flooding and reducing the urban heat island effect. The estimated saving of drinking water by 2025 could reach 6 million m <sup>3</sup> . The urban recycled water system is also expected to reach 25% of the green structure in 4 years.
Sources	(Lisboa E-Nova, n.d. <sup>[146]</sup> ) (C40 Cities, 2019 <sup>[147]</sup> ) (Copenhagen Centre, n.d. <sup>[148]</sup> )

### Case 16. Strengthening planning requirements for enhanced biodiversity: Biodiversity Net Gain Approach (United Kingdom)

Scope	Climate mitigation, climate adaptation
Most relevant action	Action 5
Other relevant actions	Action 7
Location	United Kingdom
How a territorial approach is implemented	<p>The United Kingdom passed the Environment Act 2021 to improve and protect the natural environment. It provides the government with powers to set new binding targets, including for air quality, water, biodiversity, conservation covenants and updates to laws on chemicals. The act is pertinent for the Department for Environment, Food and Rural Affairs' various environmental policies and lays out the legal framework for significant reforms to local authority waste and recycling services, as well as creating new statutory duties for local authorities on nature conservation. The act makes it mandatory for local plans to incorporate biodiversity consideration; from November 2023, all planning permissions in England (United Kingdom) will have to deliver at least 10% biodiversity net gain.<sup>6</sup> Local governments, local planning authorities and developers need to work with local communities, landowners and farmers to deliver benefits to biodiversity. The act also established a new environmental watchdog, the Office for Environmental Protection, which will hold the government and other public bodies accountable for nature and environment conservation. The act streamlines nature conservation and biodiversity into both national and local planning processes, reinforcing local climate resilience.</p> <p>Viewing protection of natural environment and climate change as twin challenges, the act intends to improve air quality, biodiversity, water quality and resource efficiency and reduce waste. Setting a minimum biodiversity net gain, the act strives to halt the decline of nature by 2030.</p>
Impacts/ success factors/ lessons learned	A legal framework provided ambitious targets cutting across different policy areas (e.g. water, agriculture) and a clear mandate to all actors engaged, including local authorities, local communities and landowners.
Sources	(Natural England, 2022 <sup>[149]</sup> )

### Case 17. Setting targets for the expansion of urban green areas: The Freetown the Treetown initiative (Freetown, Sierra Leone)

Scope	Climate mitigation, climate adaptation
Most relevant action	Action 5
Other relevant actions	Action 8, Action 9
Location	Freetown, Sierra Leone
How a territorial approach is implemented	The initiative aims to plan and grow 1 million trees and restore 3 000 hectares of land, sequestering approximately 69 000 tonnes of CO <sub>2</sub> . The initiative uses innovative, disruptive, low-cost digital technology for tree tracking. It also creates new jobs for women and young people in green sectors as every tree has been assigned a unique identification code that can be transformed into "impact tokens" and sold as carbon offsets. The campaign brought out multiple benefits, collaborating with a technology firm and a neighbouring municipality. The city partnered with a technology company to develop a localised system that creates a unique geotagged record for each tree planted so tree growers can document their plants' survival and growth. Upon verification of their growth, plant growers are entitled to receive supplementary money. Analysing the water pathways, the campaign worked with a neighbouring authority, the Western Area Rural District Council, which is home to a watershed that supplies Freetown's water and is also where the flooding begins. The campaign took a territorial approach to address disaster risk reduction by: i) analysing and creating local co-benefits beyond environmental impacts; and ii) applying a functional approach by working with an adjacent authority.
Impacts/ success factors/ lessons learned	Within 2 years after the campaign's launching, 560 000 trees have been planted, digitally tracked and tokenised, with 578 ha of urban land restored. It also helped the city create 1 000 green jobs, 80% of which for youth and 47% women, who started making money as community-based tree growers. The use of digital technology allowed the city to: i) build long-term climate resilience by tracking and monitoring tree growth; as well as ii) create accessible job opportunities for local youth and women.
Sources	(OECD, 2023 <sup>[150]</sup> ) (Freetown City Council, 2023 <sup>[151]</sup> )

### Case 18. Setting a local goal on green areas with a co-production approach: Climate Plan 2018-2030 (Barcelona, Spain)

Scope	Mitigation, adaptation
Most relevant action	Action 5
Other relevant actions	Action 3, Action 9
Location	Spain
How a territorial approach is implemented	Barcelona announced its Climate Plan 2018-2030 to set out the city's strategy to reduce emissions by 45% by 2030, to achieve 2050 carbon neutrality and alleviate climate change impacts such as extreme heat, reduced water availability and flooding. It proposes 242 actions grounded on 4 strategic goals: mitigation, adaptation, climate justice and promoting citizen action, with the most vulnerable people at the centre of its plan. Notably, the plan set a goal to expand its green areas by 1.6 km <sup>2</sup> by 2030, corresponding to an extra 1 m <sup>2</sup> per person. As of 2019, the city offers an estimated 17.50 m <sup>2</sup> of green areas per inhabitant. Hundreds of city organisations and lay citizens highly contextualised and co-produced the climate plan. Barcelona acknowledged that the local population will be affected by climate change unevenly. The city adopted a "co-production" approach where the city council and social actors jointly work for a specific action or policy of public interest to create a more just and inclusive climate plan for the local context.
Impacts/ success factors/ lessons learned	A range of several long-term and medium-term measures accompany the goals. These measures include identifying areas within the city that are in greater need of green spaces due to factors such as climate conditions and spatial considerations, such as high temperatures and intensive use of public spaces. Barcelona used two unique channels to ensure a co-production approach. First, it relied on the Barcelona and Sostenible network, a network of approximately 1 000 organisations (NGOs, private companies, schools and trade unions) to incorporate voices from civil societies. Second, the city launched Decidim Barcelona, a digital platform, in February 2016 to collect citizens' voices through proposal collections and share updates such as evaluation of a proposal's acceptance and rejection. It enhanced citizen participation and promoted democratic governance.
Sources	(City of Barcelona, 2018 <sup>[152]</sup> ) (Ajuntament de Barcelona, n.d. <sup>[153]</sup> )

### Case 19. Promoting on-demand pooling transport in low-demand rural areas: Sant Cugat del Vallès and Vallirana (Spain)

Scope	Climate mitigation
Most relevant action	Action 5
Other relevant actions	Action 6, Action 7, Action 8
Location	Spain
How a territorial approach is implemented	<p>In Spain, on-demand pooling transport services were introduced in the low-demand areas of Sant Cugat del Vallès and Vallirana, situated near the Barcelona conurbation, between 2017 and 2018. These services were specifically designed to replace previous regular bus lines deemed ineffective. For instance, conventional bus lines previously served the residential area of Can Barata in Sant Cugat and certain peripheral parts of Vallirana.</p> <p>Earlier, these areas faced transportation challenges. For example, Can Barata was connected through a conventional bus line in Sant Cugat, which is characterised by lengthy travel times and limited coverage outside peak hours. On average, the vehicles operated with an occupancy of around six passengers per trip. Similarly, Vallirana experienced issues with infrequent bus services, leading to less-than-optimal user satisfaction due to long wait times and accessibility concerns. The shift to on-demand pooling transport services, facilitated through a technological platform provided by the information technology company Shotl, led to changes in service dynamics. In Sant Cugat, there was an observed increase in the average vehicle occupancy from 6 to 16 passengers per trip with the introduction of the new service. Moreover, the operational costs of the flexible service were found to be 15% lower than the previous regular line.</p> <p>An essential feature of this transformation is the ability for users to book trips remotely through an application or, in the case of Sant Cugat, over the phone. The system's algorithms adjust the routes in real-time based on the prevailing demand and traffic conditions. The platform offers distinct interfaces for passengers, drivers and operators.</p>
Impacts/ success factors/ lessons learned	It is crucial to highlight the legal and organisational framework backing these services. Both Sant Cugat and Vallirana operations fall within the public transport concessions granted by their respective municipalities, adhering to the Spanish public transport regulations. While there are costs associated with the services, they are subsidised by the regional administration.
Sources	(OECD, 2021 <sup>[81]</sup> ).

### Case 20. Bridging the gap in public transport in rural regions: Radiobus (Czech Republic)

Scope	Climate mitigation
Most relevant action	Action 5
Other relevant actions	Action 6
Location	Czech Republic
How a territorial approach is implemented	<p>In the Czech Republic, the Radiobus transportation service has been bridging the gap in public transportation since 2004. Unlike regular buses that run based on fixed timetables regardless of demand, Radiobus operates on a unique principle: it only takes the road when called upon by a passenger. By 2011, its efficiency and adaptability were recognised and it became an integral part of the general public transport system, specifically designed to supplement areas or times of low demand.</p> <p>To utilise the Radiobus, passengers simply place a request either via phone or the Internet. Once a demand is confirmed, the Radiobus will operate but only along the necessary route based on user requirement.</p>
Impacts/ success factors/ lessons learned	A demand-driven approach ensures minimal waste of resources, providing a cost-effective and environmentally friendly transportation alternative. In essence, the Radiobus stands as a testament to innovative solutions that cater to real-world transportation challenges, ensuring everyone has access to public transport, no matter the time or place.
Sources	(OECD, 2016 <sup>[78]</sup> )

## Action 6: Support neighbourhood projects generating co-benefits and synergies beyond climate

### Case 21. Promoting Sustainable Neighbourhood Development: *ÉcoQuartier* Label (France)

Scope	Climate mitigation, climate adaptation
Most relevant action	Action 6
Other relevant actions	Action 2, Action 9
Location	France
How a territorial approach is implemented	<p>In 2012, the French Ministry of Ecological Transition launched the <i>ÉcoQuartier</i> as a national labelling system aiming to create more environmentally friendly, socially inclusive and economically vibrant neighbourhoods to provide residents with a high quality of life while reducing the adverse ecological impact of urban development.</p> <p>To be considered as an <i>ÉcoQuartier</i>, a neighbourhood must meet certain criteria such as “zero net artificialisation of soils” and “RE 2020 regulations”. The <i>ÉcoQuartier</i> programme advocates 20 commitments covering the 3 pillars of sustainable development (social, economic and environment), governance and evaluation. The labelling consists of four stages: signing of the charter (<i>ÉcoProject</i>), <i>ÉcoProject</i> review, project delivery and experienced districts reviewed a few years after project delivery. The project leaders and developers have the sole liberty to choose the appropriate solution to satisfy the commitment to meet the major challenges of place-based climate risk, biodiversity and social inclusion. Awarded districts consist of <i>the ÉcoQuartier Club</i>, which works in the form of thematic working groups, offers training to the regions and districts, and organises conferences and site visits. To date, more than 1 000 development actors (local authorities, public and private developers, researchers, to name a few) are members. The club intends to: i) share their experiences; ii) discuss the difficulties encountered and reflect on the opportunities; and iii) support each project.</p>
Impacts/ success factors/ lessons learned	At the end of March 2023, 322 districts held <i>ÉcoQuartier</i> labelling; this means 277 330 dwellings had been built or renovated in <i>ÉcoQuartier</i> districts.
Sources	(French Ministry of Ecological Transition and Territorial Cohesion, 2023 <sup>[154]</sup> )

### Case 22. Enabling municipalities to innovate and develop energy transition measures: *Natural Gas-Free Neighbourhood Programme* (Netherlands)

Scope	Climate mitigation
Most relevant action	Action 6
Other relevant actions	Action 4, Action 9
Location	Netherlands
How a territorial approach is implemented	<p>The Dutch government mandated that all municipalities in the Netherlands submit Heat Transition Visions encompassing plans for home insulation and sustainable, natural gas-free heating and cooking at the municipal and neighbourhood levels by the end of 2021. However, transitioning from traditional heating methods to sustainable alternatives presents complex challenges in technical, social, regulatory and financial aspects. To address these challenges effectively, practical implementation is crucial, starting at the neighbourhood level.</p> <p>In this context, the Natural Gas-free Neighbourhood Programme (PAW) was established as a national pilot project in 2018 to help neighbourhoods transition away from natural gas and upscale natural gas-free initiatives across the country. As of 2019, natural gas accounts for approximately 85% of the total energy use in residential buildings in the Netherlands.</p> <p>The PAW provides financial resources and technical assistance for neighbourhoods to experiment with natural gas-free measures. Each selected neighbourhood can receive up to EUR 5 million in funding, with full autonomy to allocate the funds as needed. Additionally, national and local governments second experts to the PAW organisation for management, addressing local needs and challenges. The PAW website provides a range of thematic information to the districts, including guidance, research reports, podcasts, case studies, interviews and webinars. Multi-stakeholder partnerships and long-term policy continuity help national and subnational governments to align their visions and objectives while allowing flexibility for neighbourhoods to select and carry out locally tailored strategies and solutions.</p> <p>As of 2022, 66 neighbourhoods have been selected as pilots. To scale up the lessons learned at the national level, a new inter-administrative organisation called the National Programme for Local Heat Transition (NPLW) was introduced in January 2023 to support all municipalities in the Netherlands, especially those not involved in a pilot project. The NPLW intends to accelerate the national heat transition to help 1.5 million homes phase out natural gas by 2030.</p>



Impacts/ success factors/ lessons learned	The success of the PAW can be attributed to three key factors: multi-stakeholder partnerships with co-ordinated government staff, a flexible funding approach and a commitment to long-term support, as evidenced by the evolution of the programme into the NPLW in January 2023. Overall, the PAW provides an example of the national government supporting local governments in adopting the neighbourhood approach and gathering valuable insights for the transition process.
Sources	(PAW, 2023 <sup>[155]</sup> ) (OECD, 2023 <sup>[71]</sup> )

### **Case 23. Funding unmet needs post major disasters: Community Development Block Grant Disaster Recovery (CDBG-DR) Funds (United States)**

Scope	Climate adaptation
Most relevant action	Action 6
Other relevant actions	Action 8, Action 9
Location	United States
How a territorial approach is implemented	<p>The Community Development Block Grant Disaster Recovery (CDBG-DR) is a United States Ministry of Housing and Urban Development (HUD) fund to rebuild disaster-impacted areas and provide seed money for long-term recovery. Upon the presidential declaration of a major disaster, Congress may appropriate certain funding to the CDBG-DR. Subsequently, the HUD formally announces the CDBG-DR awards and publishes specific rules in a Federal Register notice.</p> <p>The programme focuses on ameliorating equity in disaster recovery processes by actively involving people who have been historically underserved, marginalised and adversely affected by persistent poverty and inequality, and prioritising their needs throughout planning and implementation. Appropriations limit the use of the funds to the “most impacted and distressed” areas resulting from a major disaster. Focus is placed on low-income areas, subject to the availability of supplemental appropriations. The programme advocates equitable local community engagement to address the hurdles and experiences of the vulnerable.</p>
Impacts/ success factors/ lessons learned	At the end of January 2023, Congress allocated USD 99.2 billion to the CDBG-DR, USD 92.4 billion of which is active in grants. After Hurricane Katrina, the costliest natural disaster in United States history, HUD appropriated USD 13.4 billion of the CDBG-DR to the state of Louisiana for recovery from hurricanes Katrina and Rita. Part of the fund was allocated to the Building Code Enforcement programme to alleviate a major impediment to housing development: the lack of building, electrical and plumbing inspectors and permit processing staff. The programme aimed to strengthen buildings’ resilience against future disasters.
Sources	(EERE, n.d. <sup>[77]</sup> )

### **Case 24. Tackling against extreme heat in informal communities in partnership with a women-focused non-profit organisation: Heat Action Plan (Ahmedabad, India)**

Scope	Climate adaptation
Most relevant action	Action 6
Other relevant actions	Action 3
Location	Ahmedabad, India
How a territorial approach is implemented	<p>Ahmedabad is the most populous city in the State of Gujarat, with more than 8.5 million people. With summer daytime temperatures expected to be in the high 40 °C, and after a heatwave in May 2010 when 1,344 people lost their lives on one week, the city has been tackling against extreme heat through its Heat Action Plan (HAP). In 2013, Ahmedabad became the first city in India, and in South Asia, to have such a plan which then became the template for other cities in developing countries. The HAP includes four strategy areas: building public awareness and community outreach, initiating an early warning system and inter-agency coordination, capacity building of healthcare professionals, and promoting adaptive measures. For example, a color-coded alert system (yellow means it’s going to be a hot day, between 41.1 °C and 43 °C, while red is the highest level, reserved for days above 45 °C) is linked a number of actions such as extreme heat campaigns and a shift of working hours for outside workers.</p> <p>In designing and implementing the HAP, the city has partnered with Mahila Housing Trust (MHT), a women-focused non-profit organisation to better understand the challenges that informal communities face and co-created viable solutions. Actionable solutions range from household-level interventions such as painting rooftops white (replacing metal roofs) and sprinkler taps to community-level interventions such as water meter installations. MHT also pioneered cool roofing solutions, which was adopted into the city’s 2017 Heat Action Plan.</p>
Impacts/ success factors/ lessons learned	<p>While India doesn’t have comprehensive cause-of-death data, Ahmedabad has reported fewer than 100 deaths every summer even during the worst daytime highest temperatures. This has been often attributed to the implementation of the HAP.</p> <p>Grounded in the knowledge of local women in informal communities, MHT helped the city develop viable and effective measures for women and the poorer communities who suffer most from extreme heat. MHT also provides trainings on</p>

	concepts like heat waves, indoor temperatures and ventilation, which has effectively raise awareness of extreme heat and its effect.
Sources	(Bloomberg, 2023 <sup>[156]</sup> ) (Desai, 2023 <sup>[157]</sup> ) (Mahila Housing Trust, 2023 <sup>[158]</sup> )

## Action 7: Create a legal and institutional environment for local climate action and resilience

### Case 25. Safeguarding climate commitments with legislation: General Law on Climate Change (Mexico)

Scope	Climate mitigation, climate adaptation
Most relevant action	Action 7
Other relevant actions	Action 3
Location	Mexico
How a territorial approach is implemented	In 2012, Mexico passed the General Law on Climate Change to institutionalise political commitment to climate action, becoming the first large oil-producing economy to adopt climate legislation. It promoted policy alignment across the different levels of government and established climate funding and regulations. Co-ordination across levels of government is managed through the National System on Climate Change (SINACC). It consists of different levels of government aligning policies: two entities from the federal level, the Inter-Ministerial Commission on Climate Change and the National Institute of Ecology and Climate Change; three entities from the regional and local level – the Federal Congress, state and municipal authorities; and the Climate Change Council as an adviser. The law was amended in 2018 to make it compatible with the Paris Agreement and aligned with the NDCs. The law established a climate change fund to channel public, private, national and international financial resources to finance climate change actions and the National Emissions Registry, mandating industries to report emissions and quantify mitigation actions annually. It helped stakeholders address local and sector-specific challenges by directing available funding and making emission information accessible.
Impacts/ success factors/ lessons learned	The law has made a visible impact in facilitating the low-carbon transition, assumably allowing Mexico to start generating half of its power from clean energy by 2034, 16 years earlier than the original target. It also promoted energy efficiency, reduced energy consumption and the development of energy policy instruments.
Sources	(Cámara de Diputados de México, 2022 <sup>[159]</sup> ) (LSE, 2018 <sup>[160]</sup> )

### Case 26. Empowering municipalities to manage water: Loi de Modernisation de l'action publique territoriale et d'affirmation des métropoles (MAPTAM) (France)

Scope	Climate adaptation
Most relevant action	Action 7
Other relevant actions	Action 6
Location	France
How a territorial approach is implemented	The 2018 MAPTAM Law, a French modernisation law, transferred the authority to manage aquatic environments and flood risk (GEMAPI) to municipalities and intercommunal services. This devolution intends to facilitate interventions at the local scale and ensures that defined institutions oversee specified tasks. Under GEMAPI, local governments are responsible for: i) hydrographic basin planning; ii) installation and maintenance of water streams, canals and lakes, including access to them; iii) flood and sea defence measures; and iv) the protection and restoration of water ecosystems. Municipalities or inter-municipal services can raise a maximum tax of EUR 40 per citizen annually, attached to the local property tax, to finance new responsibilities. This tax facilitates the necessary release of resources capable of financing the monitoring and maintenance of the dykes or even their complete rehabilitation responding to local needs to increase the level of protection. Under the law, the central government must submit a report to the parliament evaluating the outcome and effectiveness of GEMAPI. It promotes a place-based approach to managing the aquatic environment and flood prevention.
Impacts/ success factors/ lessons learned	In 2021, 664 municipalities implemented the GEMAPI tax paid by property owners. The collected tax amounts to EUR 204 million as of 2020.
Sources	(French Ministry of Ecological Transition and Territorial Cohesion/Ministry of Energy Transition, 2020 <sup>[161]</sup> ) (OECD, 2017 <sup>[162]</sup> )

## Action 8: Enhance funding and financing mechanisms for local climate action and resilience

### Case 27. Funding urban infrastructure with municipal green bonds (Mexico City, Mexico)

Scope	Climate mitigation, climate adaptation
Most relevant action	Action 8
Other relevant actions	Action 4, Action 5
Location	Mexico City, Mexico
How a territorial approach is implemented	<p>Mexico City is one of the largest cities in the world, with a population of approximately 21 million people across its FUA. Given its large and growing population, the city has had a substantial need for sustainable infrastructure investments to support population growth and improve quality of life. In recognition of the need for sustainable development, the city adopted a Climate Action Program in 2014 as a planning tool to help guide its climate change response. The programme accounted for the environmental, social and economic risks posed by climate change and related impacts on people. In line with the programme, a series of sustainable investments for the city were identified. These included a Green Corridor project along one of Mexico City's largest arterial roads, which included 100 electric buses, dedicated bus lanes, cycle paths and pavements for pedestrians to reduce carbon emissions and improve air quality.</p> <p>To help finance the green projects related to the Climate Action Program, Mexico City decided to issue its first municipal green bond in 2016. The USD 50 million bond issuance, with a 5-year maturity, was the first green bond issued by a city government in Latin America. Proceeds would help finance the Green Corridor project, an LED street lighting conversion and a water supply plant project.</p> <p>The city had previously issued around USD 200 million of municipal bonds each year and had a strong credit rating (AAA from Fitch Ratings). The decision to issue a green bond was made instead of municipal bond issuance to help guarantee that proceeds are used for the defined green projects, increase certainty and transparency to investors (due to certification and reporting requirements) and respond to investor demand. To support the issuance of the green bond, the city had to increase co-operation between its environmental and finance departments and achieve external certification of the green projects.</p> <p>Despite being issued in difficult market conditions, the bond was oversubscribed by 2.5 times and had a coupon of 6.02% (December 2016 issuance). Mexico City was awarded the Municipal Bond of the Year award by Environmental Finance and the Green Bond Pioneer Award by the Climate Bond Initiative in 2017.</p>
Impacts/ success factors/ lessons learned	<p>Key success factors included:</p> <ul style="list-style-type: none"> <li>• <b>Sustainable finance institutions:</b> In the years before the issuance, there were important efforts to grow the market for sustainable finance in Mexico by a variety of actors, including the Mexican Climate Finance Advisory Group, the Mexican Stock Exchange (including MexiCO2), the Climate Bonds Initiative and C40, among others. These organisations supported knowledge sharing, the development of local standards and the creation of local organisations for certification.</li> <li>• <b>Technical assistance:</b> Mexico City worked with the C40 Cities Finance Facility (CFF) to help develop bankable projects. The CFF works with cities to prepare urban climate change projects and to access financing instruments to help pay for the projects. Capacity building as part of the programme also aimed to put the city in a stronger position to finance future low-carbon projects.</li> <li>• <b>Creditworthiness:</b> Mexico City had substantial experience in issuing bonds to finance investments and had a good credit rating (AAA from Fitch Ratings), which can result in a lower cost of borrowing.</li> </ul> <p>Proceeds from the issuance of a green bond by Mexico City helped to support the Green Corridor project and other investments. By issuing a green bond instead of a municipal bond, Mexico City supported the achievement of other benefits, including increasing green finance knowledge and capacity, aligning internal processes with green investment objectives and strengthening internal and external co-ordination for sustainable investments. The issuance also linked the city to global climate agendas.</p>
Sources	(C40 Cities, 2017 <sup>[163]</sup> ) (Environmental Finance, 2017 <sup>[164]</sup> ) (OECD, 2023 <sup>[122]</sup> ) (University of Zurich, 2020 <sup>[165]</sup> ) (Reuters, 2017 <sup>[166]</sup> )

### Case 28. Providing the basics for the issuance of green bonds: Sustainable Finance Framework for Issuing Sustainable Bonds (Andalusia, Spain)

Scope	Climate mitigation, climate adaptation
Most relevant action	Action 8
Other relevant actions	Action 3
Location	Andalusia (Spain)
How a territorial approach is implemented	<p>The Autonomous Community of Andalusia has developed a Sustainable Finance Framework to serve as the basis for issuing sustainable bonds to fund green and social projects. Part of developing this framework included implementing green budget tagging within the regional budget in order to identify projects to be funded using the proceeds of sustainable (green and social) bond issuances. Andalusia's Sustainable Finance Framework follows existing GSS bond labels and includes rules on the use of proceeds, on evaluating and selection projects, and on the management of proceeds and reporting. It is subject to external review. In parallel, the autonomous community has developed a green budget tagging methodology to identify budget programmes to be funded by the proceeds of its sustainable bond issuances. Each budget programme was analysed in four ways:</p> <ul style="list-style-type: none"> <li>• Whether the programme has a social, climate or environmental impact.</li> <li>• Whether the programme can be linked to Green Bond Principles or Social Bond Principles.</li> <li>• Whether the programme meets the EU Taxonomy's technical screening criteria to be considered as significantly contributing to climate adaptation and mitigation.</li> <li>• Whether the programme's budget indicators are adequate to meet post-issuance reporting requirements and to follow-up on programme execution.</li> </ul> <p>The methodology allows the region to measure the amount of expenditure within each budget programme with a positive climate, environment or social impact and therefore the expenditure items that can be funded using sustainable bonds. More recently, the region has sought to align its regional tax framework with its environmental and climate strategies, in the areas of GHG emissions and air pollution, water usage and pollution, and circular economy and waste management.</p>
Sources	(OECD, 2022 <sup>[126]</sup> ) (OECD, 2023 <sup>[119]</sup> )

### Case 29. Classifying climate expenditures: Climate Budget Tagging (Brittany, France)

Scope	Climate mitigation, climate adaptation
Most relevant action	Action 8
Other relevant actions	Action 3, Action 9
Location	France
How a territorial approach is implemented	<p>The French region of Brittany began working on developing its own green budgeting practice at the end of 2020, inspired by the success of a few experiments conducted in France and other European countries. These efforts led to the development of a climate budget tagging methodology focused on climate adaptation and mitigation, which was piloted on the region's 2020 closed accounts and is now being consolidated in order to be applied to the 2023 draft budget. In total, more than 27 000 budget lines amounting to almost EUR 1.6 billion of actual operating and investment expenditure have been analysed according to their climate mitigation impact. The first phase (April to July 2021) focused on developing the reference framework for the green budget (scope, general methodology) and carrying out an initial analysis of the region's 2020 closed accounts. The second step consisted in finalising the exercise and gathering feedback on the methodology, in order to apply it to the 2022 provisional budget and define an operational process which would include integrating the results in the budgetary decision-making process, involving external partners (for example, by setting obligations to provide additional information to subsidised entities or include green conditionalities in third-party contracts).</p> <p>To facilitate the implementation of the exercise, the region relied on methodological support from the Institute for Climate Economics (I4CE) and took part in a working group co-ordinated by Régions de France and I4CE, composed of the French regions of Brittany, Grand-Est and Occitanie.</p>
Impacts/ success factors/ lessons learned	<p>Brittany's first climate tagging exercise has produced encouraging results. Current and capital expenditure were totally classified under the mitigation axis, enriching the I4CE methodology in order to adapt to regional specificities, and about a third of the analysed expenditure was classified as "potentially structuring" under the "adaptation" axis. The resulting pilot methodology is now being consolidated by the region in order to be replicated in the 2023 draft budget. Key success factors identified included strong political support and the capacity to mobilise personnel from various levels of the regional administration. Extensive communication and thorough training of all participants (both internal and external) were crucial to ensure, after a gradual roll-out, the total mobilisation of the region and its partners and an in-depth understanding of the local environmental and climate issues and objectives.</p>
Sources	(OECD, 2022 <sup>[126]</sup> )

## Action 9: Engage local actors, build partnerships and share knowledge

### Case 30. Multi-stakeholder partnerships and collaboration for a circular economy: Strategic Plan 2016-2028 (Umeå, Sweden)

Scope	Climate mitigation, climate adaptation
Most relevant action	Action 9
Other relevant actions	Action 8
Location	Sweden
How a territorial approach is implemented	<p>The Strategic Plan 2016-2028 is a municipal strategy to a more circular approach in response to the expected population growth, which will pressure housing, natural resources and waste production in Umeå. It aims to strengthen climate resilience through green transition, sustainable mobility and sharing economy.</p> <p>The strategy is built on multi-stakeholder partnerships and policy alignment between different levels of government. It involves the private sector, public companies, academia and the municipality to build and share knowledge and promote innovation and experimentation. The Faculty of Science and Technology of Umeå University has carried out several research and development projects focusing on future sustainable solutions, exchanging knowledge and creating interfaces between students, researchers, citizens and the private sector. Moreover, the city of Umeå created Circular Economy Business Accelerator North Sweden with a consultancy firm to accelerate business model innovation for circular economy. The plan co-ordinates policies towards circular economy across different levels of government and disseminates knowledge and technologies across stakeholders to plan, design and implement place-based solutions.</p>
Impacts/ success factors/ lessons learned	<p>The national government played a key role in creating an enabling environment with a reformed tax favouring repairs on used items and a roadmap to highlight the importance of co-operation across industries and urban areas.</p> <p>While Umeå has seen the flourishing new business models, some challenges remain. Considering the adequate scale is one of them. A circular economy requires rethinking processes along value chains, including production, distribution and consumption. City boundaries can be too limited to advocate and drive the circular economy, suggesting the need for a functional approach engaging with the national and adjacent cities and regions.</p>
Sources	(OECD, 2020 <sup>[167]</sup> )

### Case 31. Engaging building owners to boost energy performance of buildings: NYC Retrofit Accelerator (New York, United States)

Scope	Climate mitigation
Most relevant action	Action 9
Other relevant actions	Action 1, Action 4
Location	New York City, United States
How a territorial approach is implemented	<p>The NYC Retrofit Accelerator is a citywide service provider programme launched in 2015 to decarbonise the city's building stocks by boosting energy performance and savings, improving air quality and comfort for occupants, and helping building owners comply with local laws. It is sponsored by the city of New York and administered through the New York City Mayor's Office of Sustainability.</p> <p>The programme offers building owners and managers free, personalised advisory services, one-on-one expert advice on building upgrades, local law compliance, incentives and financing. The programme uses extensive datasets created by the city's energy benchmarking and audit laws to identify and prioritise updates in privately-owned buildings. The service is tailored to the specific conditions and needs of each building.</p>
Impacts/ success factors/ lessons learned	<p>Underlying data are key to the success of adequate assessment and prioritising across the buildings. New York City has building performance benchmarking policies requiring building owners to report their buildings' energy and water use, compiling the city's building portfolio datasets. The success also sits on the partnership with the city government, which funds and administers the project. NYC Accelerator also partners with local utility companies, which will act as service providers, offering energy upgrades to the city's buildings.</p> <p>Since 2015, the team has assisted over 9 000 buildings in the city; it is expected to cut 1 million tonnes of CO<sub>2</sub> and reduce utility bills by USD 360 million annually by 2025.</p>
Sources	(C40 Cities, 2018 <sup>[168]</sup> ) (MOCEJ, 2023 <sup>[169]</sup> )

### Case 32. Engaging indigenous communities to develop advice for national climate policy: Climate Change Commission/He Pou a Rangī (New Zealand)

Scope	Climate mitigation, climate adaptation
Most relevant action	Action 9
Other relevant actions	Action 1, Action 7
Location	New Zealand
How a territorial approach is implemented	<p>The Climate Change Commission (He Pou a Rangī in Māori) was founded in 2019 to set the country's climate targets alongside the National Climate Change Response (Zero Carbon) Amendment Act. It is responsible for providing the central government with independent, evidence-based advice to help transition to a low-emissions and climate-resilient economy. It delivers the next National Climate Change Risk Assessment and monitors the progress of the government's National Adaptation Plan. It explores the emissions reduction options and associated impacts from Iwi/Māori perspectives.</p> <p>The commission partners with Iwi/Māori in developing advice and incorporates their perspectives. This partnership allows the commission to understand their expectations, rights and interests and creates opportunities for their participation. It uses an online platform for consultation and engagement on the question of nationwide climate action. The learnings from stakeholder engagement with Iwi/Māori and others within and beyond the national boundary are integrated into the research and data, using economic modelling and quantitative and qualitative methods. It encourages a partnership between central and local government along with Iwi/Māori to develop and implement the measures to meet local climate goals.</p>
Impacts/ success factors/ lessons learned	In 2021, the commission provided a report to the Minister of Climate Change with 33 recommendations, collaboratively developed through engagement and quantitative analysis, including 4 246 responses from a range of stakeholders, including individuals, businesses, the public sector, Iwi/Māori, NGOs and youth.
Sources	(New Zealand Government, 2023 <sup>[170]</sup> ) (New Zealand Infrastructure Commission, 2021 <sup>[171]</sup> )

### Case 33. Raising awareness on water conservation: Day Zero Campaign (Cape Town, South Africa)

Scope	Climate adaptation
Most relevant action	Action 9
Other relevant actions	Action 4, Action 7
Location	Cape Town, South Africa
How a territorial approach is implemented	<p>The City of Cape Town initiated the Day Zero Campaign in 2018 to reduce citywide water usage. Following three consecutive years of meagre rainfall, the city was on the edge of running out of water supply.</p> <p>The campaign deployed an extensive communication strategy to raise awareness. It combined different tactics, including: i) sending simple messages; ii) offering concrete examples; and iii) making the water reduction activities somehow enjoyable. First, Cape Town delivered a clear message that the catastrophic crisis was approaching; it developed a water map to visualise the water usage per household. Second, the city created 2 two-minute shower songs to help citizens quantify their water consumption during showers and provide a clear guide on how much water they can use per daily activity. Lastly, Cape Town partnered with the water supplier and schools to advocate school competition on water consumption. The campaign kept evolving over time, changing its strategies from punitive measures (fining households with large water usage) to rewarding strategies (celebrating the residents with decent water reduction), raising citizens' awareness and enabling the city to avoid the potential crisis. It epitomises a territorial awareness-raising campaign, catering to local interests and living styles through tailored communication strategies.</p>
Impacts/ success factors/ lessons learned	The beginning of the campaign witnessed the non-compliance of Capetonians with water restrictions due to the lack of clarity on what would happen should they not reduce their water consumption. The research has shown that the campaign contributed to the 80% reduction in average water use among high-income residents. The crisis also encouraged the city to develop a water strategy in 2019 based on the enhanced understanding of the water system and the need for better water governance.
Sources	(Behavioral Scientist, 2020 <sup>[172]</sup> ) (City Of Cape Town, 2023 <sup>[173]</sup> ) (City Of Cape Town, 2023 <sup>[173]</sup> )

### Case 34. Experimentation and innovation hubs for European cities: EU Mission for 100 climate-neutral and smart cities by 2030 and NetZeroCities (European Union)

Scope	Climate mitigation
Most relevant action	Action 9
Other relevant actions	Action 2, Action 3, Action 8
Location	European Union
How a territorial approach is implemented	<p>EU Missions are a novelty of the Horizon Europe research and innovation programme for the years 2021-27. They will deliver impact by putting research and innovation into a new role, combined with new forms of governance and collaboration, as well as by engaging citizens. In this context, the European Commission launched in 2021 the Mission for 100 Climate-Neutral and Smart Cities by 2030. The mission aims to deliver 100 climate-neutral and smart cities by 2030 and to ensure that these cities act as experimentation and innovation hubs to enable all European cities to follow suit by 2050. The mission will provide financial support for pilot cities under a wide range of subjects such as zero-emission mobility, positive clean energy districts, urban greening and re-naturing, as well as associating Ukrainian cities to the climate-neutral and smart cities mission. In April 2022, the European Commission announced the 100 EU cities that were selected to participate in the EU mission. The 100 cities come from all 27 member states, with 12 additional cities coming from countries associated or potentially associated with Horizon Europe, the European Union's research and innovation programme (2021-27). The 100 selected cities are developing Climate City Contracts, which will include an overall plan for climate neutrality across all sectors, such as energy, buildings, waste management and transport, together with related investment plans. This process involves citizens, research organisations and the private sector.</p> <p>The cities will also benefit from tailor-made assistance from a dedicated mission platform run by NetZeroCities. The platform will provide the necessary technical, regulatory and financial assistance to cities, including those that the EU mission did not select. The platform offers a one-stop platform accessible to all cities with new and existing tools and resources. It also offers pilot projects to help drive rapid learning about how to achieve climate neutrality at the city scale, as well as a "twinning programme" to enable peer-learning.</p>
Impacts/ success factors/ lessons learned	A clear mission (i.e. delivering 100 climate-neutral and smart cities by 2030, ensuring that these cities act as experimentation and innovation hubs to enable all European cities to follow suit by 2050) with strong financial support has raised the ambition of many European cities and regions.
Sources	(EC, 2022 <sup>[174]</sup> ) (Net Zero Cities, 2023 <sup>[175]</sup> )

### Case 35. Facilitating knowledge sharing for climate adaptation: Climate-ADAPT (European Union)

Scope	Climate adaptation
Most relevant action	Action 9
Other relevant actions	Action 1
Location	European Union
How a territorial approach is implemented	<p>In 2012, the European Commission and the European Environment Agency (EEA) collaboratively launched Climate-ADAPT, a platform to build and update the knowledge base to support the European region in adapting to climate change. It consists of two components: the first provides information on vulnerability assessments, adaptation policies and strategies and funding opportunities, while the latter half is a database of case studies of regions, cities and towns implementing adaptation plans and solutions to address the adverse effects of climate change.</p> <p>Climate-ADAPT provides comprehensive guidance on adaptation policy by offering sector-specific information from EU sectoral policies and available investment and funds, including agriculture, biodiversity, buildings, coastal, disaster risk reduction, ecosystem-based approaches, energy, financial, forestry, health, marine and fisheries, transport, urban, water management as well as migration and social issues. Interested actors can customise the information based on their geographical scale – countries, transnational regions and cities. With the accumulated information from EU-wide cities and regions, Climate-ADAPT helps interested parties understand local contexts and address local-specific climate challenges.</p>
Impacts/ success factors/ lessons learned	As of March 2023, Climate-ADAPT shares 56 tools online that help cities, regions and countries assess climate risk, impacts and resilience. Users can obtain information on the policy framework (strategies, programmes and initiatives) and leading examples that were awarded EU funding; they can also customise appropriate scales from transnational, national and local (cities and towns).
Sources	(Climate-ADAPT, 2023 <sup>[176]</sup> ) (EEA, 2018 <sup>[177]</sup> )

### Case 36. Facilitating knowledge sharing among different actors: City Deal Climate Adaptation (Netherlands)

Scope	Climate mitigation, climate adaptation
Most relevant action	Action 9
Other relevant actions	Action 4, Action 8
Location	Netherlands
How a territorial approach is implemented	<p>The City Deal Climate Adaptation was a co-operation agreement launched in the Netherlands in 2016 between 37 parties, including 10 cities (Amersfoort, Amsterdam, Breda, Deventer, Dordrecht, Eindhoven, Groningen, Rotterdam, The Hague and Zwolle), other authorities, citizens, the private sector and the national government. It aimed to exchange good examples and encourage innovative solutions between and across the participating partners.</p> <p>The collaboration took place in a collection of pilot projects, where experts and administrators worked together on activities to develop, build and be climate-proof by 2050. In addition to the network of Dutch cities, the initiative worked with a range of stakeholders, from governmental organisations to engineering enterprises and universities. Through partnership and knowledge sharing, the agreement helped Dutch cities to understand and address place-based climate challenges and implement locally tailored measures.</p> <p>It identified seven themes that should be scaled up and pursued, based on the experiences from the pilot projects: i) integrated approach to public space; ii) climate-proof social housing; iii) role of the financial sector; iv) vital and vulnerable functions and networks; v) climate-proof and nature-inclusive construction; vi) green living environment; and vii) urban adaptation strategy and policy mix.</p>
Impacts/ success factors/ lessons learned	The City Deal's ambitions led the parliament to adopt a new Climate Act in 2019, which sets legally binding GHG emissions reduction targets. The Netherlands is now committed to a 49% reduction of GHG emissions by 2030, compared to 1990 levels, and a 95% reduction by 2050, outlining a clear goal for individuals and companies.
Sources	(Klimaatadaptatie, n.d. <sup>[178]</sup> )

## References

- Ajuntament de Barcelona (n.d.), *Decidim Barcelona*, [153]  
<https://www.decidim.barcelona/processes/placlima>.
- Ando, S. et al. (2022), *Sovereign Climate Debt Instruments: An Overview of the Green and Catastrophe Bond Markets*, International Monetary Fund. [123]
- Australian Government (2023), *Disaster Ready Fund*, Department of Finance, Australian Government, <https://www.finance.gov.au/government/disaster-ready-fund/#:~:text=The%20DRF%20Amendment%20Act%20renamed,reduction%20from%202023%2D24%20onwards>. (accessed on 27 July 2023). [95]
- Behavioral Scientist (2020), "How Cape Town used behavioral science to beat its water crisis", [172]  
<https://behavioralscientist.org/how-cape-town-used-behavioral-science-to-beat-its-water-crisis/#:~:text=The%20City%20made%20the%20messages,was%20a%20key%20mental%20Qaid>.
- BEIS (2023), *State and territory greenhouse gas inventories: annual emissions*, [2]  
<https://www.gov.uk/government/collections/uk-local-authority-and-regional-greenhouse-gas-emissions-national-statistics>.



- Bloomberg (2023), *An Indian City's Battle Against Extreme Heat*, [156]  
<https://www.bloomberg.com/features/2023-india-ahmedabad-extreme-heat/> (accessed on 28 November 2023).
- C40 Cities (2023), *Homepage*, [129]  
<https://www.c40.org/> (accessed on 12 April 2023).
- C40 Cities (2019), "Cities100: Lisbon is future-proofing its water supply with a recycled water programme and rain-fed greenspaces", [147]  
[https://www.c40knowledgehub.org/s/article/Cities100-Lisbon-is-future-proofing-its-water-supply-with-a-recycled-water-programme-and-rain-fed-greenspaces?language=en\\_US](https://www.c40knowledgehub.org/s/article/Cities100-Lisbon-is-future-proofing-its-water-supply-with-a-recycled-water-programme-and-rain-fed-greenspaces?language=en_US).
- C40 Cities (2018), *Consumption-based GHG Emissions of C40 cities*, [3]  
[https://www.c40knowledgehub.org/s/article/Consumption-based-GHG-emissions-of-C40-cities?language=en\\_US](https://www.c40knowledgehub.org/s/article/Consumption-based-GHG-emissions-of-C40-cities?language=en_US).
- C40 Cities (2018), *Sea Level Rise and Coastal Flooding: A Summary of The Future We Don't Want Research on the Impact of Climate Change on Sea Levels*, [46]  
<https://www.c40.org/what-we-do/scaling-up-climate-action/adaptation-water/the-future-we-dont-want/sea-level-rise/#:~:text=By%202050%2C%20800%20million%20people,risk%20and%20wreak%20economic%20havoc>. (accessed on 28 March 2023).
- C40 Cities (2018), *Successful Partnerships to Accelerate Efficiency: NYC Retrofit Accelerator*, [168]  
[https://www.c40knowledgehub.org/s/article/Successful-partnerships-to-accelerate-efficiency-NYC-Retrofit-Accelerator?language=en\\_US](https://www.c40knowledgehub.org/s/article/Successful-partnerships-to-accelerate-efficiency-NYC-Retrofit-Accelerator?language=en_US).
- C40 Cities (2017), *Cities100: Mexico City - Green Bonds for Climate Action*, [163]  
<https://www.c40.org/case-studies/cities100-mexico-city-green-bonds-for-climate-action/>.
- C40 Cities (2016), *Athens Plans for a Greener and Cooler City*, [10]  
<https://www.c40.org/case-studies/athens-plans-for-a-greener-and-cooler-city/> (accessed on 25 April 2023).
- Cámara de Diputados de México (2022), *Ley General de Cambio Climático*, [159]  
<https://www.diputados.gob.mx/LeyesBiblio/pdf/LGCC.pdf>.
- Carrel, P. (2021), "German cabinet backs 30 bln euro flood recovery fund", Reuters, [96]  
<https://www.reuters.com/world/europe/german-cabinet-backs-30-bln-euro-flood-recovery-fund-2021-08-18/> (accessed on 27 July 2023).
- CBS (n.d.), *Woningen; hoofdverwarmingsinstallaties, regio (Homes; Main Heating Installations, Region)*, Statistics Netherlands, [72]  
<https://opendata.cbs.nl/statline/?dl=2238E#/CBS/nl/dataset/84948NED/table?ts=166299810934>.
- City of Barcelona (2018), *Climate Plan 2018-2030*, [152]  
[https://bcnroc.ajuntament.barcelona.cat/jspui/bitstream/11703/109218/3/Climate\\_Plan\\_2018-2030.pdf](https://bcnroc.ajuntament.barcelona.cat/jspui/bitstream/11703/109218/3/Climate_Plan_2018-2030.pdf).
- City of Boston (2023), *Climate Ready Boston Map Explorer*, [8]  
<https://www.boston.gov/departments/environment/climate-ready-boston-map-explorer>.
- City Of Cape Town (2023), *Homepage*, [173]  
<https://www.capetown.gov.za/> (accessed on 5 May 2023).

- City of Helsinki (n.d.), *Making Helsinki Carbon-neutral*, <https://www.myhelsinki.fi/en/think-sustainably/making-helsinki-carbon-neutral> (accessed on 23 October 2023). [36]
- City of Malmö (2023), *The Green City*, <https://malmo.se/Welcome-to-Malmo/Sustainable-Malmo/Sustainable-Urban-Development/Western-Harbour/Green-City.html>. [60]
- City of New York (n.d.), *Local Law 97*, <https://www.nyc.gov/site/sustainablebuildings/l197/local-law-97.page>. [76]
- City of Toronto (n.d.), *City of Toronto Green Roof Bylaw*, <https://www.toronto.ca/city-government/planning-development/official-plan-guidelines/green-roofs/green-roof-bylaw/#:~:text=Green%20Roofs%20are%20required%20on,is%20greater%20than%202%2C000%20m%C2%B2>. [62]
- CLC (2003), *Seoul Transport Vision 2030*, Singapore Centre for Liveable Cities, <https://www.clc.gov.sg/docs/default-source/urban-solutions/urb-sol-iss-6-pdfs/case-study-seoul-transport-vision.pdf> (accessed on 9 August 2030). [58]
- Climate Ambition Alliance (2023), *Climate Ambition Alliance: Net Zero 2050*, <https://climateaction.unfccc.int/views/cooperative-initiative-details.html?id=94> (accessed on 1 Oct 2023). [132]
- Climate Bonds Initiative (2015), *Scaling up Green Bond Markets for Sustainable Development*, <https://www.climatebonds.net/resources/publications/scaling-green-bond-markets-sustainable-development>. [124]
- Climate-ADAPT (2023), *Homepage*, <https://climate-adapt.eea.europa.eu/> (accessed on 30 November 2023). [176]
- Climate-ADAPT (2020), *Green Roofs in Basel, Switzerland: Combining Mitigation and Adaptation Measure*, <https://climate-adapt.eea.europa.eu/en/metadata/case-studies/green-roofs-in-basel-switzerland-combining-mitigation-and-adaptation-measures-1>. [144]
- Climate-ADAPT (2018), *Weather Alert Emilia-Romagna*, <https://climate-adapt.eea.europa.eu/en/metadata/tools/weather-alert-emilia-romagna> (accessed on 3 April 2023). [12]
- Climate-ADAPT (2016), *Tatabánya, Hungary: Addressing the Impacts of Urban Heatwaves and Forest Fires with Alert Measures*, European Climate Adaptation Platform Climate-ADAPT, <https://climate-adapt.eea.europa.eu/en/metadata/case-studies/tatabanya-hungary-addressing-the-impacts-of-urban-heat-waves-and-forest-fires-with-alert-measures> (accessed on 3 April 2023). [11]
- Climate-ADAPT (n.d.), *European Climate Data Explorer*, <https://climate-adapt.eea.europa.eu/en/knowledge/european-climate-data-explorer/european-climate-data-explorer-intro> (accessed on 15 June 2023). [17]
- Climate-ADAPT (n.d.), *Norway - Policy and Legal Framework*, <https://climate-adapt.eea.europa.eu/en/countries-regions/countries/norway> (accessed on 24 April 2023). [99]
- CMRA (2023), *Homepage*, Climate Mapping for Resilience and Adaptation, <https://resilience.climate.gov/> (accessed on 15 June 2023). [15]

- Colombian Ministry of Environment and Sustainable Development (2018), *Ley 1931*, [26]  
<https://www.minambiente.gov.co/wp-content/uploads/2021/06/ley-1931-2018.pdf>.
- Copenhagen Centre (n.d.), “Not a drop goes to waste with a recycled water programme and rain-fed greenspaces”, Copenhagen Centre on Energy Efficiency, [148]  
[https://c2e2.unepccc.org/kms\\_object/not-a-drop-goes-to-waste-with-a-recycled-water-programme-and-rain-fed-greenspaces/](https://c2e2.unepccc.org/kms_object/not-a-drop-goes-to-waste-with-a-recycled-water-programme-and-rain-fed-greenspaces/).
- CoR (2022), “COP27: Subnational governments must be empowered to deliver on the Paris climate agreement”, European Committee of the Regions, [21]  
<https://cor.europa.eu/en/news/Pages/COP27---Press-statement.aspx>.
- Corfee-Morlot, J. et al. (2011), “Multilevel risk governance and urban adaptation policy”, *Climatic Change*, Vol. 104/1, pp. 169-197, [108]  
<https://doi.org/10.1007/S10584-010-9980-9/METRICS>.
- Covenant of Mayors - Europe (2023), “What do cities need to successfully implement adaptation measures?”, <https://eu-mayors.ec.europa.eu/en/what-do-cities-need-to-successfully-implement-adaptation-measures> (accessed on 6 September 2023). [107]
- Covenant of Mayors - Europe (2022), “Valencia is creating a more democratic and sustainable energy system: Case study”, <https://eu-mayors.ec.europa.eu/en/node/445>. [75]
- CUT (2019), *Climate Emergency, Urban Opportunity: How National Government Can Secure Economic Prosperity and Avert Climate Catastrophe by Transforming Cities*, Coalition for Urban Transformations, <https://urbantransitions.global/en/publication/climate-emergency-urban-opportunity/> (accessed on 27 September 2023). [41]
- DCEEW (2023), *State and Territory Greenhouse Gas Inventories: Annual Emissions*, Australian Department of Climate Change, Energy, the Environment and Water, [1]  
<https://www.dceew.gov.au/climate-change/publications/national-greenhouse-accounts-2020/state-and-territory-greenhouse-gas-inventories-annual-emissions>.
- De Jong, W. et al. (2011), “The key factors for providing successful public transport in low-density areas in the Netherlands”, *Research in Transportation Business and Management*, Vol. 2, pp. 65-73, [82]  
<https://doi.org/10.1016/j.rtbm.2011.07.002>.
- Desai, D. (2023), *Ahmedabad’s Heat Action Plan has more hot air, less gas to propel it forward*, [157]  
<https://questionofcities.org/ahmedabads-heat-action-plan-has-more-hot-air-less-gas-to-propel-it-forward/> (accessed on 2023 November 28).
- DOI (n.d.), *Natural Disaster Response and Recovery*, United States Department of the Interior, [97]  
<https://www.doi.gov/recovery> (accessed on 27 July 2023).
- EBRD (2020), “Is green hydrogen the sustainable fuel of the future?”, European Bank for Reconstruction and Development, <https://www.ebrd.com/news/2020/is-green-hydrogen-the-sustainable-fuel-of-the-future-.html> (accessed on 8 October 2023). [89]
- EC (2022), *EU Mission: Climate-Neutral and Smart Cities*, European Commission, [174]  
[https://research-and-innovation.ec.europa.eu/funding/funding-opportunities/funding-programmes-and-open-calls/horizon-europe/eu-missions-horizon-europe/climate-neutral-and-smart-cities\\_en](https://research-and-innovation.ec.europa.eu/funding/funding-opportunities/funding-programmes-and-open-calls/horizon-europe/eu-missions-horizon-europe/climate-neutral-and-smart-cities_en).

- EC (2021), *The Common Agricultural Policy: 2023-27*, European Commission, [50]  
[https://agriculture.ec.europa.eu/common-agricultural-policy/cap-overview/cap-2023-27\\_en](https://agriculture.ec.europa.eu/common-agricultural-policy/cap-overview/cap-2023-27_en)  
 (accessed on 8 October 2023).
- EC (2020), *EDGAR - Emissions Database for Global Atmospheric Research*, Joint Research Centre, European Commission. [80]
- EC (2014), *European Procurement Directives*, European Commission. [127]
- EEA (2018), “EU’s Climate-ADAPT found to be a key tool for adaptation in Europe”, European Environment Agency, <https://www.eea.europa.eu/highlights/eus-climate-adapt-found-to>. [177]
- EERE (n.d.), *BC Hydro brings energy savings to low-income families in Canada*, Office of Energy Efficiency and Renewable Energy, United States Department of Energy, <https://www.energy.gov/eere/better-buildings-residential-network/bc-hydro-brings-energy-savings-low-income-families-canada#:~:text=ECAP%20provides%20qualified%20low%2Dincome,create%20a%20more%20comfortable%20home>. (accessed on 6 October 2023). [77]
- EIB (2023), *The State of Local Infrastructure Investment in Europe - EIB Municipalities Survey 2022-2023*, European Investment Bank, <https://doi.org/10.2867/84744>. [116]
- Environmental Finance (2017), “Bond of the year: Municipal - Mexico City”, <https://www.environmental-finance.com/content/awards/green-bond-awards-2017/winners/bond-of-the-year-municipal-mexico-city.html>. [164]
- Federal Ministry for Housing, Urban Development and Building (2023), “Supporting urban development in Germany”, [https://www.staedtebaufoerderung.info/EN/home/home\\_node.html](https://www.staedtebaufoerderung.info/EN/home/home_node.html). [142]
- Finnish Ministry of Agriculture and Forestry (2014), *Finland’s National Climate Change Adaptation Plan 2022*, [https://mmm.fi/documents/1410837/5120838/MMM-193086-v1-Finland\\_s\\_National\\_climate\\_Change\\_Adaptation\\_Plan\\_2022.pdf/582041ee-3518-4a63-bf60-7133aed95a9c/MMM-193086-v1-Finland\\_s\\_National\\_climate\\_Change\\_Adaptation\\_Plan\\_2022.pdf.pdf](https://mmm.fi/documents/1410837/5120838/MMM-193086-v1-Finland_s_National_climate_Change_Adaptation_Plan_2022.pdf/582041ee-3518-4a63-bf60-7133aed95a9c/MMM-193086-v1-Finland_s_National_climate_Change_Adaptation_Plan_2022.pdf.pdf). [34]
- Flemish Government (2023), *Local Energy and Climate Pact*, <https://www.vlaanderen.be/lokaal-bestuur/beleid-in-ontwikkeling-2019-2024/relanceprojecten/lokaal-energie-en-klimaatpact>. [140]
- Florczyk, C. et al. (2019), *GHS Urban Centre Database 2015, Multitemporal and Multidimensional Attributes, R2019A*, <https://data.jrc.ec.europa.eu/dataset/53473144-b88c-44bc-b4a3-4583ed1f547e>. [65]
- Freetown City Council (2023), *The Three Town*, <https://fcc.gov.sl/freetown-the-treetown/>. [151]
- French Ministry of Ecological Transition (2023), *DRIAS - Les futurs du climat*, [http://www.drias-climat.fr/decouverte/cartezoom/experience/EUROCORDERX2020\\_DISTRIBUTION\\_ELAB/Q05/RCP4.5/RCP4.5/H2/APAV/APAV/A1](http://www.drias-climat.fr/decouverte/cartezoom/experience/EUROCORDERX2020_DISTRIBUTION_ELAB/Q05/RCP4.5/RCP4.5/H2/APAV/APAV/A1) (accessed on 27 March 2023). [16]
- French Ministry of Ecological Transition and Territorial Cohesion (2023), *La démarche EcoQuartier*, <http://www.ecoquartiers.logement.gouv.fr/> (accessed on 30 November 2023). [154]

- French Ministry of Ecological Transition and Territorial Cohesion/Ministry of Energy Transition (2020), *Gestion des milieux aquatiques et prévention des inondations (GEMAPI)*, <https://www.ecologie.gouv.fr/gestion-des-milieux-aquatiques-et-prevention-des-inondations-gemapi>. [161]
- GcoM (2023), *Homepage*, Global Covenant of Mayors for Climate and Energy, <https://www.globalcovenantofmayors.org/> (accessed on 12 May 2023). [130]
- GHG Protocol (2018), *GHG Protocol for Cities: GHG Protocol for Cities*, <https://ghgprotocol.org/ghg-protocol-cities#:~:text=The%20Global%20Protocol%20for%20Community,on%20city%20greenhouse%20gas%20emissions>. [4]
- Goonesekera, S. and M. Olazabal (2022), “Climate adaptation indicators and metrics: State of local policy practice”, *Ecological Indicators*, Vol. 145, p. 109657, <https://doi.org/10.1016/J.ECOLIND.2022.109657>. [9]
- Government of Canada (2023), *Pan-Canadian Framework on Clean Growth and Climate Change*, <https://www.canada.ca/en/services/environment/weather/climatechange/pan-canadian-framework.html>. [135]
- Government of Canada (2022), *Government of Canada Adaptation Action Plan*, <https://www.canada.ca/en/services/environment/weather/climatechange/climate-plan/national-adaptation-strategy/action-plan.html>. [32]
- Government of Canada (2021), *Annex: Pan-Canadian Framework on Clean Growth and Climate Change – Progress Report*, <https://www.canada.ca/en/services/environment/weather/climatechange/climate-plan/climate-plan-overview/healthy-environment-healthy-economy/annex-pan-canadian-framework-clean-growth-climate-change-progress-report.html>. [136]
- Government of Chile (2021), *Estrategia Climática de Largo Plazo de Chile*, <https://cambioclimatico.mma.gob.cl/wp-content/uploads/2021/11/ECLP-LIVIANO.pdf> (accessed on 7 August 2023). [38]
- Government of Chile (2019), *Plan de adaptación al cambio climático en ciudades 2018-2022*, <https://cambioclimatico.mma.gob.cl/wp-content/uploads/2021/11/Plan-de-Adaptacion-Cambio-Climatico-para-Ciudades-2018-2022.pdf> (accessed on 7 August 2023). [37]
- Government of Denmark (2012), *How to Manage Cloudburst and Rain Water - Action Plan for a Climate-proof Denmark*, <https://naturstyrelsen.dk/media/nst/66845/how%20to%20manage%20cloudburst.pdf>. [102]
- Government of Ireland (2023), *Climate Action Regional Offices*, <https://www.caro.ie/> (accessed on 4 July 2023). [139]
- Government of Ireland (2018), *National Adaptation Framework: Planning for a Climate Resilient Ireland*, <https://www.nwra.ie/wp-content/uploads/2020/05/national-adaptation-framework.pdf>. [138]
- Government of the Republic of Poland (2022), *National Urban Policy*, <https://www.gov.pl/web/funds-regional-policy/national-urban-policy> (accessed on 8 August 2023). [48]

- HSY (2022), *Sustainable Urban Living Programme*, Helsinki Region Environmental Services, [53]  
<https://www.hsy.fi/en/air-quality-and-climate/sustainable-urban-life-programme/> (accessed on 29 March 2023).
- HUD (2023), *Community Development Block Grant Disaster Recovery Grant Funds*, United States Department of Housing and Urban Development, [91]  
[https://www.hud.gov/program\\_offices/comm\\_planning/cdbg-dr](https://www.hud.gov/program_offices/comm_planning/cdbg-dr) (accessed on 23 March 2023).
- HUD (n.d.), *Citizen Participation & Equitable Engagement (CPEE) Toolkit*, United States Department of Housing and Urban Development, [92]  
<https://www.hudexchange.info/programs/cdbg-dr/cpee-toolkit/introduction/>.
- HUD (n.d.), *Community Engagement Toolkit: Building Purpose and Participation*, United States Department of Housing and Urban Development, [93]  
<https://www.hudexchange.info/resources/community-engagement-toolkit/>.
- Huerta Melchor, O. and A. Lembcke (2020), “Developing transit-oriented communities for better accessibility and affordability: The case of the Metro Vancouver Region”, *OECD Regional Development Papers*, No. 07, OECD Publishing, Paris, <https://doi.org/10.1787/f2bb60fc-en>. [143]
- ICAP (2020), *Japan - Tokyo Cap-and-Trade Program*, International Carbon Action Partnership, [74]  
[https://icapcarbonaction.com/system/files/ets\\_pdfs/icap-etsmap-factsheet-51.pdf](https://icapcarbonaction.com/system/files/ets_pdfs/icap-etsmap-factsheet-51.pdf).
- IEA (2022), *Buildings*, International Energy Agency, <https://www.iea.org/reports/buildings>. [69]
- IEA (2022), *Renewables 2022*, International Energy Agency, [90]  
<https://www.iea.org/reports/renewables-2022>.
- IEA (2021), *Empowering Cities for a Net Zero Future*, International Energy Agency, [40]  
<https://www.iea.org/reports/empowering-cities-for-a-net-zero-future>.
- IRENA (2021), *Políticas sobre energías renovables para las ciudades: experiencias en Costa Rica*, International Renewable Energy Agency, [https://www.irena.org/-/media/Files/IRENA/Agency/Publication/2021/May/IRENA\\_Policies\\_Cities\\_Costa\\_Rica\\_2021\\_ES.pdf?la=en&hash=46AD4C457C51E7F740F91BB09EC51A4D902BBF8B](https://www.irena.org/-/media/Files/IRENA/Agency/Publication/2021/May/IRENA_Policies_Cities_Costa_Rica_2021_ES.pdf?la=en&hash=46AD4C457C51E7F740F91BB09EC51A4D902BBF8B). [42]
- ITF (2019), *ITF Transport Outlook 2019*, OECD Publishing, Paris, [85]  
[https://doi.org/10.1787/transp\\_outlook-en-2019-en](https://doi.org/10.1787/transp_outlook-en-2019-en) (accessed on 8 October 2023).
- ITF (2018), “Decarbonisation trends, measures and policies: Decarbonising transport”, International Transport Forum, <http://www.itf-oecd.org> (accessed on 30 November 2023). [87]
- Japanese Ministry of the Environment (2023), *Climate Action Towards Net-zero by 2050*. [137]
- KEI (2018), “Introducing Korea’s Supporting Tool of Climate Change Vulnerability Assessment (VESTAP)”, Korea Environment Institute, [133]  
[https://unfccc.int/sites/default/files/resource/CGE%235\\_Presentation\\_1.pdf](https://unfccc.int/sites/default/files/resource/CGE%235_Presentation_1.pdf).
- Klimaatadaptatie (n.d.), *City Deal Klimaatadaptatie*, [178]  
<https://klimaatadaptatienederland.nl/overheden/city-deal/klimaatadaptatie/>.

- Lawrence, J., P. Blackett and N. Cradock-Henry (2020), “Against this backdrop, some cities are using systems approaches to expand the scope of its resilience strategies from climate risks to also increase the focus economic, social and energy challenges, which can pave the way to more comprehensive risk assess”, *Climate Risks Management*, Vol. 20/100234, <https://doi.org/10.1016/j.crm.2020.100234>. [20]
- Lee, S., J. Paavola and S. Dessai (2023), “Deeper understanding of the barriers to national climate adaptation policy: The case of South Korea”, *Mitigation and Adaptation Strategies for Global Change*, Vol. 28/1, p. 4, <https://doi.org/10.1007/s11027-022-10038-1>. [103]
- Leiter, T. et al. (2019), “Adaptation metrics: Current landscape and evolving practices”, UNEP, Rotterdam and Washington, DC, <https://unepccc.org/wp-content/uploads/2019/09/adaptation-metrics-current-landscape-and-evolving-practices.pdf> (accessed on 27 June 2023). [7]
- LGMA (2023), *About the Local Governments and Municipal Authorities Constituency: The Voice of Cities and Regions in the Climate Negotiation Process*, Local Governments and Municipal Authorities Constituency, <https://www.cities-and-regions.org/about-the-lgma/>. [25]
- Lisboa E-Nova (n.d.), *Reutilização de águas residuais tratadas em Lisboa*, Agência de Energia-Ambiente de Lisboa, <https://lisboaenova.org/reutilizacao-de-aguas-residuais-tratadas-em-lisboa/>. [146]
- LSE (2018), *Mexico’s General Law: Key Achievements and Challenges Ahead*, London School of Economics, [https://www.lse.ac.uk/GranthamInstitute/wp-content/uploads/2018/11/Policy\\_report\\_Mexico’s-General-Law-on-Climate-Change-Key-achievements-and-challenges-ahead-29pp\\_AverchenkovaGuzman-1.pdf](https://www.lse.ac.uk/GranthamInstitute/wp-content/uploads/2018/11/Policy_report_Mexico’s-General-Law-on-Climate-Change-Key-achievements-and-challenges-ahead-29pp_AverchenkovaGuzman-1.pdf). [160]
- Mahila Housing Trust (2023), *Homepage*, <https://www.mahilahousingtrust.org/>. [158]
- Marubeni Corporation (2023), “First green hydrogen injection demonstration project in Portugal”, <https://www.marubeni.com/en/news/2023/release/00033.html>. [88]
- Matsumoto, T. et al. (2019), “An integrated approach to the Paris climate Agreement: The role of regions and cities”, *OECD Regional Development Working Papers*, No. 2019/13, OECD Publishing, Paris, <https://doi.org/10.1787/96b5676d-en>. [30]
- Matsumoto, T. and M. Ledesma Bohorquez (2023), “Building systemic climate resilience in cities”, *OECD Regional Development Papers*, No. 56, OECD Publishing, Paris, <https://doi.org/10.1787/f2f020b9-en>. [19]
- Melchor, O. and A. Lembcke (2020), “Developing transit-oriented communities for better accessibility and affordability: The case of the Metro Vancouver Region”, *OECD Regional Development Papers*, No. 07, OECD Publishing, Paris, <https://doi.org/10.1787/f2bb60fc-en>. [57]
- Merk, O. et al. (2012), “Financing Green Urban Infrastructure”, *OECD Regional Development Working Papers*, No. 2012/10, OECD Publishing, Paris, <https://doi.org/10.1787/5k92p0c6j6r0-en>. [120]
- MinAmbiente (2022), *Guía para la formulación e implementación de los planes integrales de gestión del cambio climático territoriales*, Ministerio de Ambiente y Desarrollo Sostenible de Colombia, [https://www.minambiente.gov.co/wp-content/uploads/2022/10/GUIA-PARA-LA-FORMULACION-PIGCCT-web-\\_ISBN\\_VF.pdf](https://www.minambiente.gov.co/wp-content/uploads/2022/10/GUIA-PARA-LA-FORMULACION-PIGCCT-web-_ISBN_VF.pdf) (accessed on 9 August 2023). [134]

- Ministry of Environment of Korea (2021), *3rd Country Climate Change Adaptation Measures 2021-2025*, [104]  
<https://www.aurum.re.kr/Legal/LegalSub.aspx?pcode=E14#:~:text=%EC%A0%9C3%EC%B0%A8%20%EA%B8%B0%ED%9B%84%EB%B3%80%ED%99%94%20%EC%A0%81%EC%9D%91%EB%8C%80%EC%B1%85&text=%EC%A0%9C3%EC%B0%A8%20%EC%A0%81%EC%9D%91%EB%8C%80%EC%B1%85,%EC%84%B8%EB%B6%80%EA%B3%BC%EC%A0%9C%EB%A1%9C%20%EA%B5%AC%EC%84%B1%EB%90%98%EC%97%88%EB%8B%A4>. (accessed on 4 August 2023).
- MIVAH (2018), *Política y Plan Nacional de Desarrollo Urbano 2018-2030*, Ministerio de Vivienda y Asentamientos Urbanos de Chile, [141]  
[https://www.mivah.go.cr/Biblioteca/Políticas/Política\\_y\\_Plan\\_Nacional\\_Development\\_Urbano.shtml](https://www.mivah.go.cr/Biblioteca/Políticas/Política_y_Plan_Nacional_Development_Urbano.shtml).
- MMA (2022), *Fortalecimiento de capacidades a nivel subnational. La experiencia de los Comités Regionales de Cambio Climático de Chile*, Ministerio del Medio Ambiente de Chile, [27]  
[https://cambioclimatico.mma.gob.cl/wp-content/uploads/2022/05/Policy-brief\\_CORECC-Chile.pdf](https://cambioclimatico.mma.gob.cl/wp-content/uploads/2022/05/Policy-brief_CORECC-Chile.pdf).
- MOCEJ (2023), *Building a Better NYC With Energy Upgrades*, New York City Mayor's Office of Climate and Environmental Justice, <https://accelerator.nyc/> (accessed on 30 November 2023). [169]
- Natural England (2022), *Biodiversity Net Gain: An Introduction to the Benefits*, [149]  
[https://naturalengland.blog.gov.uk/wp-content/uploads/sites/183/2022/04/BNG-Brochure\\_Final\\_Compressed-002.pdf](https://naturalengland.blog.gov.uk/wp-content/uploads/sites/183/2022/04/BNG-Brochure_Final_Compressed-002.pdf).
- NCCS (2023), *Pilot Programme Adaptation to Climate Change*, Swiss National Centre for Climate Services, <https://www.nccs.admin.ch/nccs/en/home/measures/pak.html>. [110]
- Net Zero Cities (2023), *Towards Climate Neutral European Cities by 2030*, [175]  
<https://netzerocities.eu/> (accessed on 30 November 2023).
- Net Zero Tracker (2023), *Methodology*, <https://zerotracker.net/methodology>. [35]
- New Zealand Government (2023), *Climate Change Commission*, [170]  
<https://www.climatecommission.govt.nz> (accessed on 30 November 2023).
- New Zealand Infrastructure Commission (2021), *Response to He Pou a Rangi, the Climate Change Commission's 2021 Draft Advice*. [171]
- New Zealand Ministry for the Environment (2023), *Adapt and Thrive: Building a Climate-resilient Aotearoa New Zealand*, New Zealand Ministry for the Environment, [33]  
<https://consult.environment.govt.nz/climate/national-adaptation-plan/>.
- O'Donnell, D. et al. (2020), *Local Government Climate Change Adaptation Roles and Responsibilities under Victorian Legislation - Guidance for Local Government Decision-makers*, State of Victoria Department of Environment, Land, Water and Planning, [105]  
[https://www.climatechange.vic.gov.au/\\_data/assets/pdf\\_file/0030/490476/Local-Government-Roles-and-Responsibilities-for-Adaptation-under-Victorian-Legislation\\_Guidance-Brief.pdf](https://www.climatechange.vic.gov.au/_data/assets/pdf_file/0030/490476/Local-Government-Roles-and-Responsibilities-for-Adaptation-under-Victorian-Legislation_Guidance-Brief.pdf) (accessed on 11 July 2023).



- OECD (2023), “Decarbonising homes in cities in the Netherlands: A neighbourhood approach”, *OECD Regional Development Papers*, No. 42, OECD Publishing, Paris, <https://doi.org/10.1787/b94727de-en>. [71]
- OECD (2023), *Environmental Tax Policy Review of Andalusia*, OECD Publishing, Paris, <https://doi.org/10.1787/fe6d8b45-en>. [119]
- OECD (2023), *Financing Cities of Tomorrow: G20/OECD Report for the G20 Infrastructure Working Group under the Indian Presidency*, OECD Publishing, Paris, <https://doi.org/10.1787/51bd124a-en>. [122]
- OECD (2023), *Global Trends in Government Innovation 2023*, OECD Public Governance Reviews, OECD Publishing, Paris, <https://doi.org/10.1787/0655b570-en>. [150]
- OECD (2023), *Net Zero+: Climate and Economic Resilience in a Changing World*, OECD Publishing, Paris, <https://doi.org/10.1787/da477dda-en> (accessed on 17 July 2023). [112]
- OECD (2023), *Regional and Local Finance*, OECD, Paris, <https://www.oecd.org/regional/multi-level-governance/mlgsgngpublicfinance.htm>. [111]
- OECD (2022), “Aligning Regional and Local Budgets with Green Objectives: Subnational Green Budgeting Practices and Guidelines”, *OECD Multi-level Governance Studies*, OECD Publishing, Paris, <https://doi.org/10.1787/93b4036f-en>. [126]
- OECD (2022), *Decarbonising Buildings in Cities and Regions*, OECD Urban Studies, OECD Publishing, Paris, <https://doi.org/10.1787/a48ce566-en> (accessed on 3 October 2023). [70]
- OECD (2022), *OECD Regions and Cities at a Glance 2022*, OECD Publishing, Paris, <https://doi.org/10.1787/14108660-en>. [63]
- OECD (2022), *OECD’s Rural Agenda for Climate Action*, OECD, Paris, <https://www.oecd.org/regional/rural-development/Rural-Agenda-for-Climate-Action.pdf> (accessed on 10 September 2023). [49]
- OECD (2022), “Subnational government climate expenditure and revenue tracking in OECD and EU Countries”, *OECD Regional Development Papers*, No. 32, OECD Publishing, Paris, <https://doi.org/10.1787/1e8016d4-en>. [114]
- OECD (2022), *The Compendium of Financial Instruments that Support Subnational Climate Action in OECD and EU Countries*, OECD, Paris, <https://www.oecd.org/regional/compendiumsubnationalrevenue.htm>. [31]
- OECD (2021), *OECD Regional Outlook 2021: Addressing COVID-19 and Moving to Net Zero Greenhouse Gas Emissions*, OECD Publishing, Paris, <https://doi.org/10.1787/17017efe-en> (accessed on 23 September 2022). [81]
- OECD (2020), “A territorial approach to climate action and resilience”, OECD, Paris, <https://www.oecd.org/cfe/cities/overviewTACAR.pdf>. [73]
- OECD (2020), “Aligning short-term climate action with short-term climate goals: Opportunities and options for enhancing alignment between NDCs and long-term strategies”, *Climate Change Expert Group Paper*, No. 2020(2), OECD, Paris, <https://www.oecd.org/environment/cc/LEDS-NDC-linkages.pdf>. [28]

- OECD (2020), *Improving Transport Planning for Accessible Cities*, OECD Urban Studies, OECD Publishing, Paris, <https://doi.org/10.1787/fcb2eae0-en> (accessed on 9 August 2023). [55]
- OECD (2020), *Paris Collaborative on Green Budgeting: OECD Green Budgeting Framework*, OECD, Paris, <http://www.oecd.org/environment/green-budgeting/>. [125]
- OECD (2020), *The Circular Economy in Umeå, Sweden*, OECD Urban Studies, OECD Publishing, Paris, <https://doi.org/10.1787/4ec5dbcd-en>. [167]
- OECD (2019), “An integrated approach to the Paris climate Agreement: The role of regions and cities”, *OECD Regional Development Working Papers*, No. 2019/13, OECD Publishing, Paris, <https://doi.org/10.1787/96b5676d-en>. [94]
- OECD (2019), “Financing climate objectives in cities and regions to deliver sustainable and inclusive growth”, *OECD Environment Policy Papers*, No. 17, OECD Publishing, Paris, <https://doi.org/10.1787/ee3ce00b-en>. [44]
- OECD (2019), *Rural Well-being: Geography of Opportunities*, OECD Rural Studies, OECD Publishing, Paris, <https://doi.org/10.1787/d25cef80-en> (accessed on 22 October 2021). [79]
- OECD (2018), “Climate resilient infrastructure”, *OECD Environment Policy Paper*, No. 14, OECD, Paris, <https://www.oecd.org/environment/cc/policy-perspectives-climate-resilient-infrastructure.pdf>. [145]
- OECD (2018), *Rethinking Urban Sprawl: Moving Towards Sustainable Cities*, OECD Publishing, Paris, <https://doi.org/10.1787/9789264189881-en>. [54]
- OECD (2017), “Harnessing innovation to reduce disaster risks in Austria, France and Switzerland: Synthesis”, Unclassified document, OECD, Paris, [https://one.oecd.org/document/GOV/PGC\(2017\)17/en/pdf](https://one.oecd.org/document/GOV/PGC(2017)17/en/pdf). [162]
- OECD (2016), *OECD Territorial Reviews: Japan 2016*, OECD Territorial Reviews, OECD Publishing, Paris, <https://doi.org/10.1787/9789264250543-en>. [78]
- OECD (2016), *Water Governance in Cities*, OECD Studies on Water, OECD Publishing, Paris, <https://doi.org/10.1787/9789264251090-en>. [179]
- OECD (2015), *Climate Change Risks and Adaptation: Linking Policy and Economics*, OECD Publishing, Paris, <https://doi.org/10.1787/9789264234611-en>. [106]
- OECD (2012), *Compact City Policies: A Comparative Assessment*, OECD Green Growth Studies, OECD Publishing, Paris, <https://doi.org/10.1787/9789264167865-en> (accessed on 1 July 2023). [56]
- OECD (2010), *Cities and Climate Change*, OECD Publishing, Paris, <https://doi.org/10.1787/9789264091375-en>. [43]
- OECD (forthcoming), “Climate adaptation: why can’t local governments do it alone?”, OECD Publishing, Paris. [13]
- OECD (forthcoming), “How can smart cities boost the net-zero transition?”, OECD Publishing, Paris. [45]
- OECD (forthcoming), *Measuring Progress in Implementing Adaptation Policies*, OECD Publishing, Paris. [6]

- OECD (forthcoming), *Promoting Nature-based Solutions in Municipalities in Hungary*, OECD Publishing, Paris. [59]
- OECD.Stat (n.d.), *OECD Subnational Government Climate Finance Database*, OECD, Paris, <https://stats.oecd.org/Index.aspx?DataSetCode=SGCFD>. [115]
- OECD/EC (2020), *Cities in the World: A New Perspective on Urbanisation*, OECD Urban Studies, OECD Publishing, Paris, <https://doi.org/10.1787/d0efcbda-en>. [39]
- OECD/ITF (2015), *International Experiences on Public Transport Provision in Rural Areas*, OECD, Paris, [https://www.itf-oecd.org/sites/default/files/docs/15cspa\\_ruralareas.pdf](https://www.itf-oecd.org/sites/default/files/docs/15cspa_ruralareas.pdf). [83]
- OECD/Lincoln Institute of Land Policy, PKU-Lincoln Institute Center (2022), *Global Compendium of Land Value Capture Policies*, OECD Regional Development Studies, OECD Publishing, Paris, <https://doi.org/10.1787/4f9559ee-en>. [121]
- OECD/UCLG (2022), *Third Edition of the World Observatory on Subnational Government Finance and Investment*, <https://www.sng-wofi.org> (accessed on 3 October 2023). [117]
- OECD/UN-Habitat/Cities Alliance (2021), *Global State of National Urban Policy 2021: Achieving Sustainable Development Goals and Delivering Climate Action*, OECD Publishing, Paris, <https://doi.org/10.1787/96eee083-en>. [47]
- OECD/World Bank (2019), *Fiscal Resilience to Natural Disasters: Lessons from Country Experiences*, OECD Publishing, Paris, <https://doi.org/10.1787/27a4198a-en>. [98]
- OpenStreetMap (2023), *Planet Dump*, <https://planet.osm.org> (accessed on 6 July 2023). [67]
- PAW (2023), *Programma Aardgasvrije*, Programma Aardgasvrije Wijken, <https://aardgasvrijewijken.nl/default.aspx>. [155]
- Peaks to Prairies (2019), *Homepage*, <https://peakstoprairies.ca/> (accessed on 8 October 2023). [86]
- Poelman, H. (2018), “A walk to the park? Assessing access to green areas in Europe’s cities”, *DG Regional and Urban Policy Working Paper*. [66]
- Prime Minister of Australia (2023), “Media release: Port Bonython Hydrogen Hub to boost Australia’s hydrogen industry”, <https://www.pm.gov.au/media/port-bonython-hydrogen-hub-boost-australias-hydrogen-industry#:~:text=Port%20Bonython%20Hydrogen%20Hub%20to%20boost%20Australia%27s%20hydrogen%20industry,-Media%20release&text=The%20Albanese%20and%20Malinas%20Governments,be>. [52]
- Race to Zero (2023), *Homepage*, <https://racetozero.unfccc.int/system/race-to-zero/>. [128]
- Raffa, M. et al. (2023), “Very High Resolution Projections over Italy under different CMIP5 IPCC scenarios”, *Scientific Data*, Vol. 10/1, <https://doi.org/10.1038/s41597-023-02144-9>. [5]
- Reckien, D. et al. (2023), “Quality of urban climate adaptation plans over time”, *npj Urban Sustainability*, Vol. 3/1, pp. 1-14, <https://doi.org/10.1038/s42949-023-00085-1>. [100]
- Reuters (2017), “Mexico City places bets on green bonds”, <https://www.reutersevents.com/sustainability/mexico-city-places-bets-green-bonds>. [166]

- Schiavina, M., S. Freire and K. MacManus (2022), *GHS-POP R2022A - GHS Population Grid Multitemporal (1975-2030)*, <http://data.europa.eu/89h/d6d86a90-4351-4508-99c1-cb074b022c4a>. [68]
- Shepherd, T. and A. Sobel (2020), “Localness in climate change”, *Comparative Studies of South Asia, Africa and the Middle East*, Vol. 40/1, pp. 7-16, <https://doi.org/10.1215/1089201X-8185983>. [18]
- Takeuchi, R. et al. (2003), “Feasibility study on Demand Responsive Transport Systems (DRTS)”, <https://www.researchgate.net/publication/228775369>. [84]
- The Climate Group (2023), *Under 2 Coalition*, <https://www.theclimategroup.org/under2-coalition>. [131]
- The Ecology Consultancy (2017), *Greater London Authority: Urban Greening Factor for London: Research Report*, [https://www.london.gov.uk/sites/default/files/urban\\_greening\\_factor\\_for\\_london\\_final\\_report.pdf](https://www.london.gov.uk/sites/default/files/urban_greening_factor_for_london_final_report.pdf). [61]
- The White House (2022), “Biden-Harris Administration launches new climate portal to help communities navigate climate change impacts”, <https://www.whitehouse.gov/briefing-room/statements-releases/2022/09/08/fact-sheet-biden-harris-administration-launches-new-climate-portal-to-help-communities-navigate-climate-change-impacts/> (accessed on 15 June 2023). [14]
- Tuhkanen, H., E. Piirsalu and V. Lahtvee (2019), *The Role of Local Governments in Adapting to the Climate: Overview of Regulatory Requirements and Support Mechanisms in the Baltic Sea Region*, Community Safety Action for Supporting Climate Adaptation and Development, [https://www.cascade-bsr.eu/sites/cascade-bsr/files/outputs/the\\_role\\_of\\_local\\_governments\\_in\\_adapting\\_to\\_the\\_climate.pdf](https://www.cascade-bsr.eu/sites/cascade-bsr/files/outputs/the_role_of_local_governments_in_adapting_to_the_climate.pdf) (accessed on 28 March 2023). [101]
- Tuhkanen, H., L. Vilbiks and E. Piirsalu (2020), *CASCADE Project: Community Safety Action for Supporting Climate Adaptation and Development*, Community Safety Action for Supporting Climate Adaptation and Development. [109]
- UN (2015), *Transforming Our World: The 2030 Agenda for Sustainable Development*, United Nations, <https://sdgs.un.org/2030agenda>. [24]
- UNDRR (2015), *Sendai Framework for Disaster Risk Reduction 2015-2030*, United Nations Office for Disaster Risk Reduction, <https://www.undrr.org/publication/sendai-framework-disaster-risk-reduction-2015-2030>. [23]
- UNFCCC (2023), *New Collective Quantified Goal on Climate Finance*, United Nations Framework Convention on Climate Change, <https://unfccc.int/NCQG>. [113]
- UNFCCC (2022), *LT-LEDS Synthesis Report*, United Nations Framework Convention on Climate Change, <https://unfccc.int/lt-leds-synthesis-report#Mitigation-measures>. [29]
- UNFCCC (2015), *Adoption of the Paris Agreement*, United Nations Framework Convention on Climate Change, [https://unfccc.int/sites/default/files/english\\_paris\\_agreement.pdf](https://unfccc.int/sites/default/files/english_paris_agreement.pdf) (accessed on 29 September 2023). [22]

- University of Zurich (2020), “Standards and SSOs in the contested widening and deepening of financial markets: The arrival of Green Municipal Bonds in Mexico City”, *Environment and Planning A: Economy and Space*, Vol. 52/7, pp. 1415-1433, <https://doi.org/10.1177/0308518x20909391>. [165]
- USDA (2022), *2022 Budget Summary*, United States Department of Agriculture. [51]
- World Bank (2023), *State and Trends of Carbon Pricing 2023*, World Bank, Washington, DC, <https://openknowledge.worldbank.org/handle/10986/39796>. [118]
- Zanaga, D. et al. (2021), *ESA WorldCover 10 m 2020 v100*. [64]

## Notes

<sup>1</sup> A territorial approach to climate action and resilience is defined as a comprehensive policy framework that integrates a place-based perspective into national and subnational climate policies and mainstreams climate objectives into urban, rural and regional development policies, to effectively drive the net zero and resilient transition at all territorial scales (see Chapter 1).

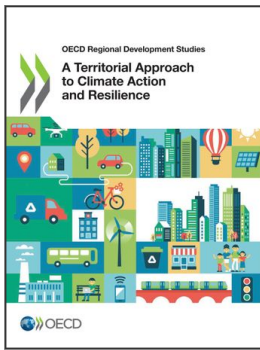
<sup>2</sup> Athens (Greece), Auckland (New Zealand), Barcelona (Spain), Glasgow (United Kingdom), Lima (Peru), Montreal (Canada), Nagoya (Japan), New York (United States), Portland (United States), Tokyo (Japan) and Vancouver (Canada).

<sup>3</sup> Another OECD survey also finds that 83% (25 countries) of the responding countries report that SNGs or authorities contribute to adaptation measurement.

<sup>4</sup> The joint OECD/EC project Measuring and Enhancing Subnational Government Finance for Environment and Climate Action in OECD and EU Countries.

<sup>5</sup> The OECD Guidelines and Self-Assessment Tool (in Excel format) are available on the Subnational Government Climate Finance Hub: <https://www.oecd.org/regional/sngclimatefinancehub.htm>.

<sup>6</sup> Biodiversity value attributable to the development needs to exceed the pre-development biodiversity value of the onsite habitat by at least 10%, which need to be secured for a minimum duration of 30 years.



**From:**  
**A Territorial Approach to Climate Action and Resilience**

**Access the complete publication at:**  
<https://doi.org/10.1787/1ec42b0a-en>

**Please cite this chapter as:**

OECD (2023), "Assessing the implementation of a territorial approach to climate action and resilience in OECD countries", in *A Territorial Approach to Climate Action and Resilience*, OECD Publishing, Paris.

DOI: <https://doi.org/10.1787/9e0751b0-en>

This document, as well as any data and map included herein, are without prejudice to the status of or sovereignty over any territory, to the delimitation of international frontiers and boundaries and to the name of any territory, city or area. Extracts from publications may be subject to additional disclaimers, which are set out in the complete version of the publication, available at the link provided.

The use of this work, whether digital or print, is governed by the Terms and Conditions to be found at <http://www.oecd.org/termsandconditions>.