CLIMATE CHANCE 2021

GLOBAL OBSERVATORY
ON NON-STATE
CLIMATE ACTION

LOCAL ACTION REPORT

GLOBAL SYNTHESIS REPORT ON LOCAL CLIMATE ACTION

ASSESSING CLIMATE ACTION LED BY LOCAL AND SUBNATIONAL GOVERNMENTS

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DIRECTOR OF PUBLICATION
Ronan Dantec, *Chair of Climate Chance Association*

CLIMATE CHANCE EDITORIAL TEAM
Amaury Parelle, Coordinator, *Climate Chance Observatory*
Antoine Gillod, Research officer, *Climate Chance Observatory*
Samuel Laval, Research Assistant, *Climate Chance Observatory*
Tania Martha Thomas, Research Assistant, *Climate Chance Observatory*

CONTRIBUTORS

We also thank the following contributors for their contributions: Agnès Rivet, Mikaël Lux, Yves Zimmermann (**Eurométropole de Strasbourg**); Anahi Reyes Gomez (**Federation of Canadian Municipalities**); Anne Barre (**Women Engaged for Common Future - WECF**); Ariane Luttenauer (**European Energy Award**); Daniel Morchain (**International Institute for Sustainable Development - IISD**); Dini Laraswati (**United Cities and Local Governments Asia Pacific - UCLG-ASPAC**); Eric Vesine (**ADEME**); Henry Quintana (**The Climate Group**); Iryna Horodyska (**Covenant of Mayors East**); Jimena Eyzaguirre, Andrew Thompson, Caitlin Semmens (**ESSA**); Johanna Theilmann, (**North Rhine-Westphalia**); Mayra García-Blásquez (**Regions4**); Michel Ramonet, Thomas Lauvaux (**LSCE-Institut Pierre-Simon Laplace**); Myriam Makdissi (**Clima-Med**); Lisa Keusen, Lia Weitz, Julika Davideit (**Adelphi**); Pedro Bizarro, Sébastien Leclef (**Council of European Municipalities and Regions - CEMR**); Rebecca Borges (**International Urban Cooperation Latin America and the Caribbean - IUC-LAC**); Simeran Bachra, Arminel Lovell (**CDP**); Roland Ries (**ex-Mayor of Strasbourg**); Thomas van Laake, María Camila Lozano (**Despacio**); Vaia Tuuhia (**Association 4D**); Victor P. Goncalves, Débora Luisa (**I-Care Brazil**).

GRAPHIC CREATION AND LAYOUT

Elaine Gressant-Guillemot LATELIERDELESTUAIRE.COM

Hewan Goethals

TRANSLATION
Eva Radek, French-English translator
SOLTEN

COVER
Photo courtesy of Bavaria Pictures on Shutterstock

SECTION I
Progress made through international climate initiatives

1. Global Covenant of Mayors (GCOM) 15
2. Regional Covenants of Mayors 21
Case study 1: Turin - Italy 23
Case study 2: Slavutych - Ukraine 29
Case study 3: San Carlos de Bariloche - Argentina 33
Case study 4: Palembang - Indonesia 36
3. European Energy Award 37
4. Climate action of regions and subnational governments 40
5. Sectoral Initiatives from the NAZCA 44

SECTION II
Local governments' climate action: innovation and progress in times of a pandemic

Introduction 47
1.Climate action planning: from carbon accounting to net-zero targets, local governments flesh out their climate action steering 49
Case study 5: Mexico City - Mexico 54
Case study 6: City of ManchesterUnited Kingdom 60
2. Regulation and direct investment: the first arm of cities to densify services at local levels. 62
Case study 7: Rufisque - Senegal 68
3. Sourcing renewable energy and EV fleets through public procurements 71
Case study 8: Australia - Melbourne 73

SECTION III
Multilevelclimate governance & the integration of local governments

1. Definition and stakes around the multilevel governance 77
2. The articulation of adaptation policy 82
3. Multilevel governance in G20 countries: Germany, France, Canada and Brazil 85
Case study 9: Ontario - Canada 86
Case study 10: North Rhine-Westphalia - Germany 88
Case study 11: Occitania - France 90
Case study 12: Bahia - Brazil 93
4. Renewal of NDCs and integration of local governments 95

SECTION IV
Local Governments, SDGs & climate action

1. A growing appropriation of the SDGs by the local governments 103
Case study 13: Scotland 107
2. SDGs and climate action at the local level: pilot areas harness numerous synergies 110
Case study 14: Bogotá - Colombia 114
Case study 15: Strasbourg - France 116
3. Tools for local governments for SDG-climate alignment 119
Case study 16: Côte d'Ivoire 120

PRESENTATION

Reporting on the climate action of cities and regions in the context of the pandemic and the renewal of national contributions to the Paris Agreement.

Each year, the Climate Chance Observatory proposes a summary of the progress made in terms of climate action and published by cities and regions around the world. Although the absence of consolidated and comparable data remains a challenge, this does not mean that there is no action or mobilisation. The analysis of the remarkable evolution of emissions at the local level, the monitoring of the development of the main international initiatives led by networks of local authorities, and publications of academic and specialised literature, make it possible to draw global trends.

The formulation, implementation and monitoring-evaluation of local climate actions is a complex process that requires both the support of States and a proper consideration of the inhabitants' needs. This is why our monitoring is accompanied by analyses of multi-level governance and the localisation of Sustainable Development Goals.

Climate Chance

Since 2015, the Climate Chance Association has been participating in the mobilisation against climate change. It is the only international organisation that aims to bring together all the non-state actors recognized by the UN (the 9 groups of actors: local authorities, companies, NGOs, trade unions, scientific community, agricultural, youth, indigenous peoples and women organisations), to develop common priorities and proposals and to strengthen stakeholders dynamics through networking (thematic coalitions, summits, action portal).

The Climate Chance Association and its Observatory are supported by

Key Takeaways of the 2021 Synthesis Report on climate action led by local and subnational governments

1 The reduction of GHG emissions by European cities is encouraging. However, in a context of mass adoption of carbon neutrality objectives, the monitoring of the impact of local climate policies remains scattered and poorly consolidated, even at the national level.

The action of European cities is particularly well documented. After 10 years of the Covenant of Mayors for Climate and Energy in Europe, a voluntary initiative launched by the European Commission in 2008, a consolidation of data from 1,800 cities and 90 million inhabitants shows a 25% reduction in their greenhouse gas (GHG) emissions between 2005 and 2017, surpassing the European States' 2020 targets of -20% (JRC, 2020). These cities, which accounted for 15% of EU-28 emissions in 2017, are also on track to exceed their own target of -30% in 2020. For example, Turin in Italy reduced its emissions by 44% between 1990 and 2017, due to its tertiary sector development but also to its mobility policies and decarbonisation of the district heating network. Generally, small cities use more internal levers (public procurement, energy demand management), while larger cities make more use of regulations and financial tools. All of them use awareness-raising policies, and show an active participation of citizens (Palermo V. et al., 2020).

Many cities around the world have only recently started calculating their GHG emission inventories, or are refining their methods and data. At the same time, data collected and reported across cities, and over different time periods does not cover the same parameters, and is difficult to consolidate. Thus, since 2015, nearly 150 cities have reported their emissions data to the CDP at least four times, but despite the growing usage of carbon accounting tools, the data does not allow many conclusions to be drawn: Porto, for example, reduced its emissions by 30% between 2004 and 2017, Chicago by 7% between 2010 and 2015, or Wellington by 26% between 2013 and 2017.

Finally, 86 regions, provinces and other sub-national governments, united in the "Under2MoU" initiative, show an average reduction in their territorial emissions of 7% from their respective base years to their last emissions inventories. They represent 600 million people and 10% of global emissions. Some of them are on track to meet their 2020 targets, such as Andalusia, which was aiming for a 26% reduction, Scotland for 75%, and South Australia for 50%.

2 The mobilisation of local governments and the structuring of their climate action is continuing. Although international initiatives show a certain dynamism in Latin America, Europe and North Africa, they do not account for the action of Asian cities and regions.

The relative stability in the number of cities committed to the Global Covenant of Mayors (~10,500 in 2021) hides a rapid increase in the membership and deliverables of the Regional Covenants of Mayors, initiated by the European Union in coordination with the Global Covenant and main local government networks. Signatory cities now represent almost 14% of the world's population, compared to 11% in 2019. The momentum is particularly strong in Latin America and the Caribbean, where more than 100 cities have joined the initiative since 2019, with a current total of over 519 signatories representing 31% of the region's population. In contrast, in Asia, signatory cities represent only 8% of the continent's population.

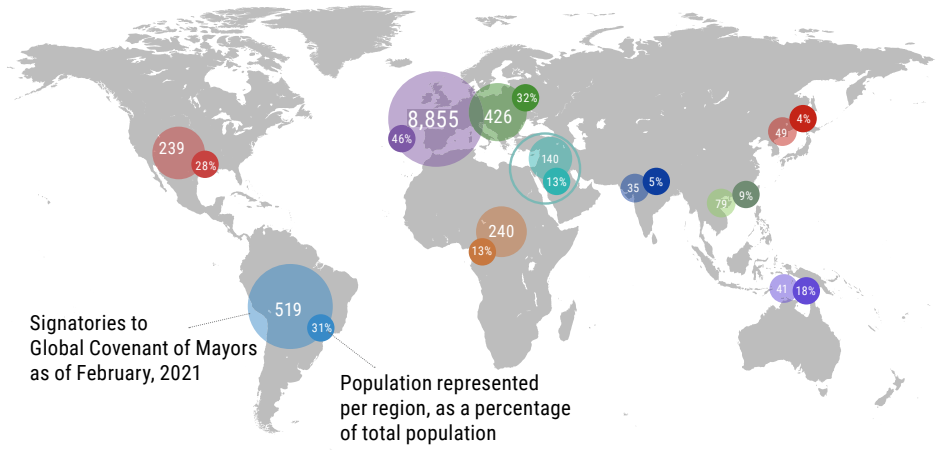
The implementation of mitigation and adaptation plans is progressing at a slower rate, but in some regions the Covenant of Mayors initiative is significantly structuring the climate action of cities—such as in the Maghreb and Mashreq[1], where more than 100 cities are preparing to publish their climate plans which include mitigation and adaptation components. The countries of the region are also setting up a common database for the signatories of the convention, demonstrating a rapid structuring of the monitoring and evaluation of their actions. In Latin America, the adoption of action plans is also showing clear progress, with over 50 mitigation and adaptation plans published since 2019. In South-East Asia and Sub-Saharan Africa, few cities beyond the funded pilot projects have been able to complete their mitigation/adaptation plans.

While by October 2020 more than 900 cities and regions around the world had made some form of commitment to carbon neutrality (NewClimate Institute, 2020), careful monitoring of the refinement of measurement tools will be important to give credibility to these commitments.

FIGURE 3

SIGNATORIES TO GLOBAL COVENANT OF MAYORS AS OF MARCH, 2021

Sources: GCoM portal, n.d.; data collected from regional covenants



- SOUTH ASIA
- EAST ASIA
- SOUTH EAST ASIA
- OCEANIA
- MIDDLE EAST & NORTH AFRICA
- SUB SAHARAN AFRICA
- LATIN AMERICA & CARRIBEANS
- NORTH AMERICA
- EASTERN EUROPE & CENTRAL ASIA
- EUROPEAN UNION & WESTERN EUROPE

1. 10 countries concerned: Algeria, Egypt, Jordan, Lebanon, Libya, Israel, Morocco, Palestine, Syria, Tunisia

3 Even in times of Covid-19, local governments remain places of innovation and experimentation for climate policies. At the city level, the densification of services is now seen as the remedy to the health and climate crises.

From planning to regulation, through direct investment and public procurement, the instruments available to cities and regions to steer their transition are increasingly varied, and mobilise the whole range of their skills. In the background, the management of the pandemic has accelerated reflection on the densification of urban services and their local governance.

The concept of the "15-Minute City", where all essential services are within reach of everyone by bike or on foot, was at the heart of the municipal campaign in Paris, but is also being emulated across the Atlantic (Portland, Minneapolis), and has even been adapted into the "1-minute city" in the Swedish metropolises of Stockholm and Göteborg. While the fears raised by the pandemic on food security have been allayed in Europe by the resilience of the agro-industrial system, the commitment of 31 cities in the Glasgow Declaration on Food and Climate reminds us that the climate challenge requires a reconnection of our urban centres with agricultural land, as Rufisque in the Dakar region is trying to do with its future Local Food Plan, or the Edinburgh Fish City project to encourage Scottish fishermen to locally sell seafood products derived from more sustainable practices.

What truly symbolises cities' responsiveness to the pandemic is the widespread deployment of bicycle lanes and, above all, the perpetuation of bicycles across the globe which have gone from being a low-cost social resilience measure to a genuine instrument for mitigating urban transport emissions in the long term, in a context where public transport use and finances are in dire straits.

By 2020, 617 cities around the world had pledged to 100% renewable energies, most of them in Europe and the United States, with populations between 100,000 and 500,000 (REN21, 2021). By the end of 2019, 58 cities and regions, including 44 in Europe, reported being supplied with 100% renewable energy (IRENA, 2020). Melbourne is one of them and is notable for its use of power purchase agreements (PPAs), which are emerging as a strategic tool for securing renewable energy supplies for cities while providing stable funding for local power generation projects.

Manchester's carbon budget, which staggers its emissions reduction trajectory until 2050, or Oslo's local climate budget, which votes on quantified sectoral mitigation objectives each year as part of its budgetary procedure, are all innovative approaches that testify to the professionalisation of local public climate action.

4 Multi-level governance in G20 countries: our first case studies (Germany, Canada, France, Brazil) show that few cities are subject to climate obligations, whose action relies on the disparate support of federal and federated states. The lack of harmonisation of monitoring methods makes it difficult to integrate the potential of cities into national strategies.

These analyses do not seek to compare the effectiveness of a country's institutional arrangements or strategy, but rather to provide an understanding of what motivates local governments' climate action in different contexts. A first conclusion concerns the obligations imposed on local governments.

In Germany, Canada and Brazil, the federal state legislates little or nothing on the climate obligations and competences of municipalities, whose action depends much more on the level of ambition and disparate policies of intermediary governments, and on calls for projects or specific funds available, most often sectoral ones. Few of them are therefore required to adopt and monitor the implementation of a climate plan. For example, Canadian cities have carried out most of their climate plans as voluntary initiatives. Ontario imposes action plans for the Toronto area alone, while Quebec funds their formulation in more than 200 cities without it being an obligation. Only Nova Scotia imposes climate action on its municipalities. In Germany, no Länders have made the adoption of a climate plan mandatory. However, North Rhine-Westphalia, for example, provides strong support leading many municipalities to adopt binding targets and action plans. They benefit from guidelines, free tools and access to regional data.

The second conclusion concerns the way to organise the articulation of the different climate policies and especially their monitoring and evaluation. Local governments are more willing to be involved in the formulation phases and as vectors of national and sectoral policies. Few experiences show that their achievements are taken into account to re-evaluate and adjust national policies, prevented by poorly harmonised monitoring-evaluation methods and poorly centralised information.

In Brazil, since the federal government has reduced its efforts to combat climate change, each entity seeks to lead the subject. However, the lack of top-down regulation does not allow a clear and explicit articulation between the federated entities, and nor does the National Policy, or any other policy establish clear parameters in all sectors for achieving the goals, or distributing national goals to state and local levels. In France, almost all of the 760 entities subject to the obligation to have a climate plan are in the implementation process. To articulate these local, regional, national and sectoral climate plans, the law sets different levels of compliance. However, the monitoring of indicators commonly shared by cities and regions is not required and the different revision schedules make it difficult to link them. The regional climate-energy observatories partly compensate for this lack of harmonisation at the regional level, but they can also be a space for consultation and proposals for the municipalities, as shown by the example of "OREO" in Occitania.

5 Few of the renewed national contributions to the Paris Agreement mention governance mechanisms that integrate local and sub-national governments, except in Latin America. Their sectoral approach to tackling local emissions reduction masks the potential of spatial planning and local governance.

Analyses of the first round of national contributions (NDCs) to the Paris Agreement in 2015 show that few countries have sufficiently involved local and sub-national actors in defining their climate strategies. Only 10% of countries report having integrated their national climate objectives into local and regional climate policies and budgets (UNDP, 2019). The analyses also point out that countries do not recognise cities as systems in their strategies, but adopt sectoral approaches that do not take into account the mitigation potential associated with the spatial concentration of people, infrastructure and economic activity.

The observation of the second round of updated NDCs by some 40 countries and the EU-27 in 2020 leads to similar conclusions: a handful of them mention local governments, often as an example but not in connection with the governance of the national strategy. This is the case for large emitting countries such as Australia, Brazil, the UK or Russia. Rwanda, Vietnam and South Korea which mention local government consultation mechanisms, but the full integration of their potential and needs is the most evident in Latin America (Peru, Chile, Argentina, Cuba, Colombia, Mexico), in some cases as early as in the first round of NDCs. The Peruvian State has set up a "Multisectoral Working Group" to integrate the contributions of the different ministries but also of non-state actors in the country's new NDC in 2020, approved by the Presidency of the Council of Ministers, thirteen ministries, but also by the National Assembly of Regional Governments and the Association of Municipalities of Peru (AMPE).

Even if this does not yet have a direct impact on the NDCs, the Regional Covenants of Mayors have also given rise to interesting experiences. To ensure the financing and implementation of climate plans formulated by cities in the Maghreb and Mashreq, national coordination groups form consultation spaces in each country, bringing together ministers, associations and all other key actors. From these groups, climate action strategies have emerged and guide the action of cities in relation to the mitigation and adaptation strategies of each country.

6 Agenda 2030: after a few years in the adoption phase, local governments are embracing the Sustainable Development Goals (SDGs) to cushion the socio-economic shocks of climate policies.

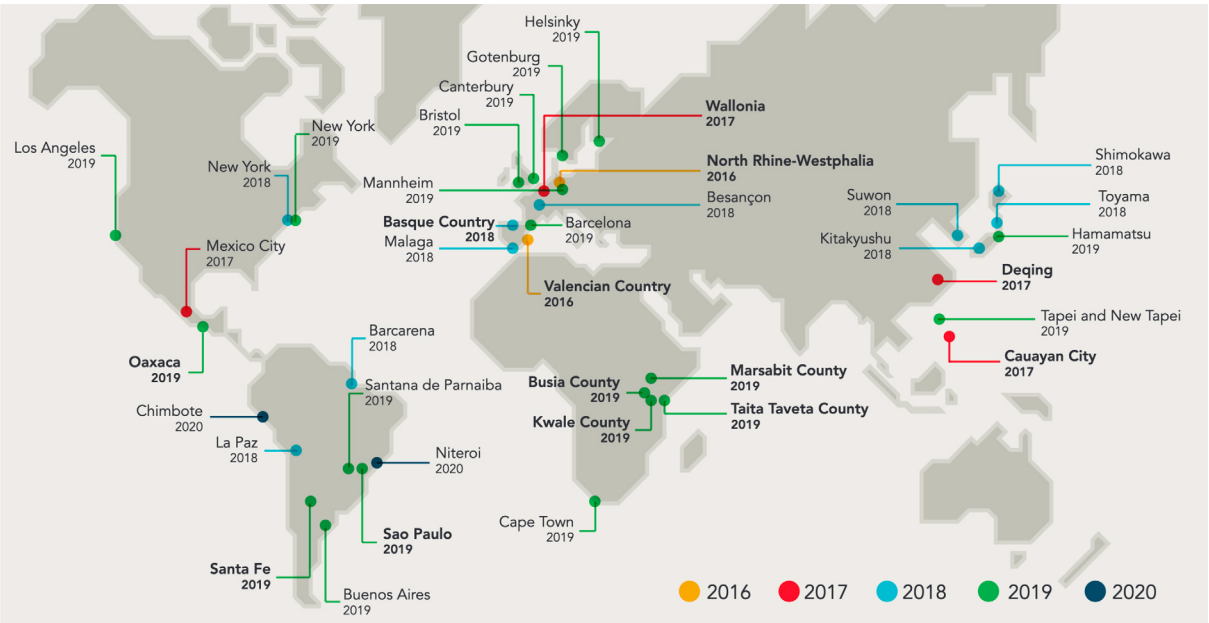
According to the UN, the pandemic has reversed the progress made in poverty reduction, health care, education and access to energy. Nevertheless, there are several signs of increased localisation of the SDGs, with communities playing a key role in ensuring access to essential services during the lockdown measures and acting as privileged interlocutors for citizens and locale-conomic actors.

In Europe, of the 34 local government networks from 28 European countries surveyed, 82% are aware of the SDGs and regularly refer to them in their activities, up from 31% the previous year (CEMR, PLATFORMA, 2020). The SDGs provide an opportunity to break down silos between departments and jurisdictions, through the formulation of new strategic plans based on the SDGs, the adaptation of existing plans or the evaluation of implementing projects through the lens of the 2030 Agenda. On the other hand, local governments are now associated to more than half (55%) of the Voluntary National Reviews presented by states in 2020 to demonstrate progress in the implementation of the 2030 Agenda (compared to 40% in 2019), a sign of increased vertical integration of governance levels in this area too.

For climate, this integration of the SDGs as close as possible to local governments makes it possible to strengthen the alignment of low-carbon transition policies with the population's expectations in terms of social justice. In Bristol, for example, the climate plan is integrated into the city's socio-economic development strategy, while Strasbourg analyses the contribution of its climate policies in relation to each of the 17 SDGs. Bogotá, one of the pioneer cities in the deployment of "Corona Cycleways", is committed to reducing gender inequalities in urban cycling.

LOCAL GOVERNMENTS THAT SUBMITTED A VOLUNTARY LOCAL REVIEW (VLR) TO THE UN ON THE IMPLEMENTATION OF THE SDGS IN THEIR TERRITORY BETWEEN 2016 AND 2020.

Source: UCLG



7 Despite the lack of funding, driven by the dynamic exchanges between scientists and decision-makers, adaptation to climate change is accelerating within regions and cities

A recent analysis of the adaptation plans adopted by nearly 500 cities within the framework of the Covenant of Mayors for Climate and Energy in Europe shows that, to date, only 70% of them report implementing adaptation plans. A majority of these actions are only at the formulation stage or in the process of being implemented. On the other hand, while almost all of these cities produce analyses of the climate risks they face, only half of them formulate adaptation objectives and less than 350 of them dedicate funding to adaptation. While the integration of local skills into national adaptation plans is progressing, access to financing and technologies that are still immature and costly remain the main obstacles noted by the cities.

By making it possible to go beyond local administrative boundaries, regions are proving to be the preferred scale for planning adaptation to climate change at ecosystem scales. Like RECO, created in 2019 in Occitania, or the Climate Risk Institute in Ontario, the model of regional adaptation agencies is spreading everywhere to strengthen the connections between science and policy. Of the 28 RegionsAdapt member-regions that reported on their adaptation practices, 90% of the regions say they have experienced a socio-economic impact due to climate change, related to public health or the increased economic costs of disasters. 80% have already developed or are developing risk vulnerability assessments, and 70% have already put an adaptation plan in place. Seven Brazilian regions, five Canadian provinces, five regions in West and Southern Africa, two Australian states, and California are among these regions, which together account for 233 million people worldwide.

SECTION I

SECTION I

Progress made through international climate initiatives

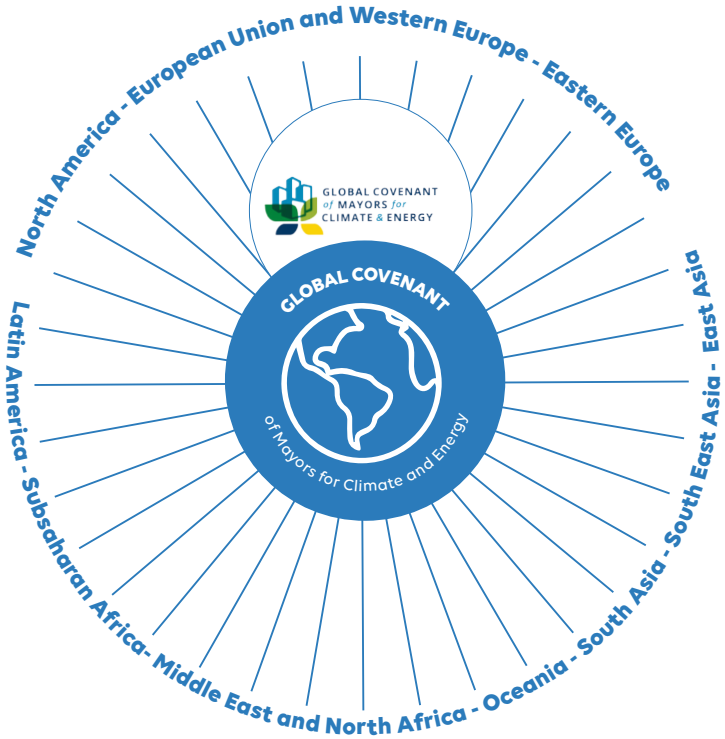
1. Global Covenant of Mayors (GCOM)

A. Signatories and achievements in 2021

The Global Covenant of Mayors (GCOM), became in 2017 the largest coalition of cities committing to reduce their greenhouse gas emissions and adapt to the impacts of climate change (Climate Chance, 2019). The GCOM is organised by regions, into several regional Covenants of Mayors, and now counts more than 10,000 signatories across 6 continents and 138 countries.

FIGURE 1

REGIONAL COVENANTS OF MAYORS IN 2020



By signing the GCOM, cities commit to delivering a Sustainable Energy and Climate Action Plan (SEACAP) within 3 years, covering three pillars: mitigation, adaptation, and access to energy. Each regional covenant preserves a certain flexibility in the data and information required from cities, but they share a common timeframe of the implementation and monitoring of their action plans (**fig. 2**). Read our Local Action report 2019 for more details on the functioning of the GCOM.

As of today, the initiative has around 10,500 signatories, and has gained more than 300 signatories in 2020 (GCOM, 2019; GCOM portal, n.d). In total, the initiative represents more than 1 billion inhabitants, or 14% of the global population, compared to 11% in 2019.

FIGURE 2

TIMEFRAME OF THE REPORTING ELEMENTS REQUIRED WITHIN THE GCOM

Source: Presentation of the GCOM Secretariat March 2019

REPORTING ELEMENTS	Year 1	Year 2	Year 3	Year 4	Year 5
1. Measuring GHC emissions - GHG emissions inventory	WITHIN 2 YEARS				
2. Assessing risks and vulnerability	WITHIN 2 YEARS				
3. Setting targets for reducing emissions and goals for increased resilience	WITHIN 2 YEARS				
4. Climate action planning, including mitigation and adaptation	WITHIN 3 YEARS				
5. Energy access planning	TO BE DEFINED				
6. Reporting progress (incl. GHG emissions inventory)				EVERY 2 YEARS AFTER SUBMITTING THE CLIMATE ACTION PLAN	

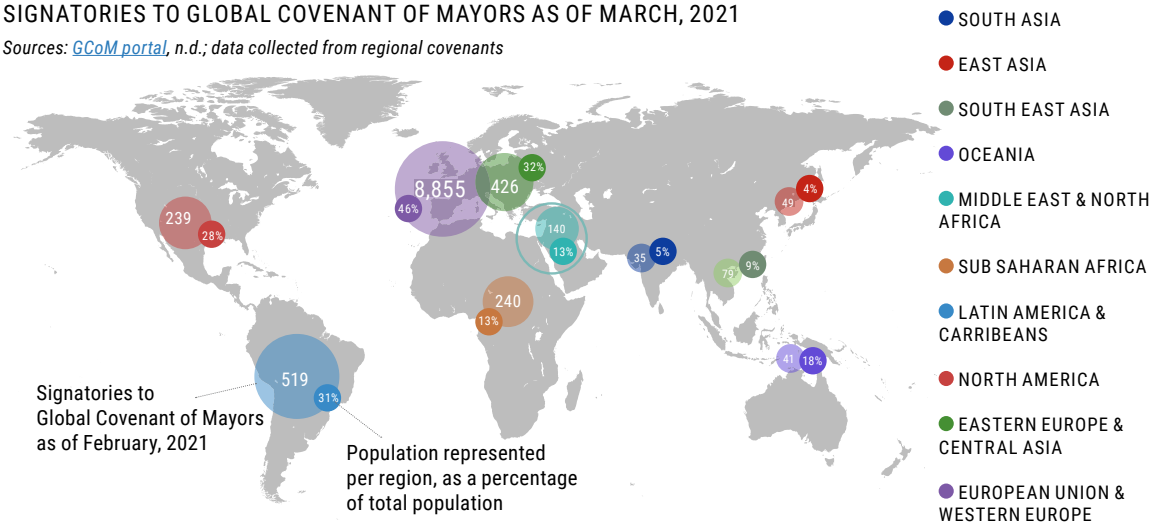
A large majority (~8,800) are cities in European Union member countries, where the Covenant was first launched in 2008 (**fig. 3**). The most dynamism is observed in Latin America and the Carribean with +100 members since December 2019, reaching 519 signatories as of March 2021. The initiative remains poorly represented in Asia with less than 8% of the population represented and 163 signatories.

The Covenant in the European Union has the particularity that it gathers many small and medium-sized cities and towns, and so in terms of represented population, the gap is not too large between the European covenant and other regional Covenants more recently put in place. In Europe 46% of the population is covered by signatories, while in Latin America or North America, signatories cover 31% and 28% of their population with respectively 519 and 239 signatories (**fig. 3**).

FIGURE 3

SIGNATORIES TO GLOBAL COVENANT OF MAYORS AS OF MARCH, 2021

Sources: GCoM portal, n.d.; data collected from regional covenants



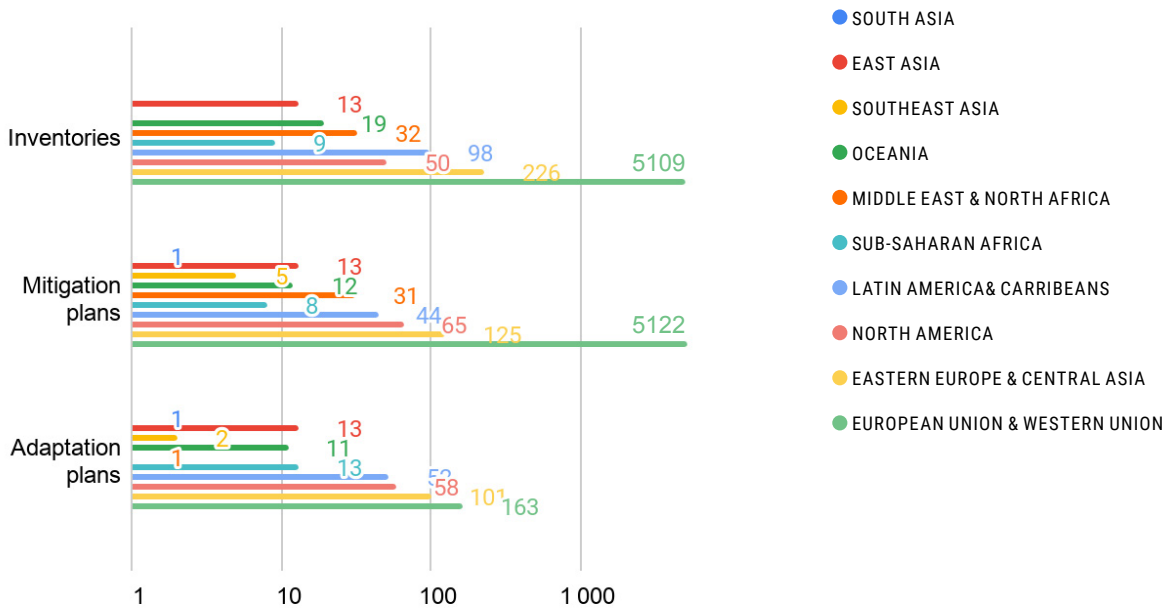
In the implementation of the Covenant and the monitoring of their actions (emissions reduction, energy consumption etc.) there is no aggregated data available in 2021 at the GCOM scale. The online portal of the initiative provides some data on the numbers of inventories or action plans published (**fig. 4**), but these are not always up to date nor representative of the state of "advancement" of the initiative in regional covenants, since they adopted different approaches to disseminate the initiative across the countries of their regions. A more qualitative analysis of the regional covenants follows this section.

Possible comparisons between regional data are therefore limited, but observing the evolution from data in our 2019 Edition indicates that in Asia or Africa few new inventories, mitigation or adaptation strategies have been released. Here too Latin America and the Carribean seems to be the most dynamic covenant with more than 50 additional mitigation and adaptation plans reported to the GCOM in 2020.

FIGURE 4

INVENTORIES, MITIGATION AND ADAPTATION PLANS REPORTED IN 2021

Sources: GCoM portal, n.d.



B. Latest data from the "Unified Reporting System"

Since 2019, CDP and ICLEI have merged their reporting platforms to form the "CDP-ICLEI Unified Reporting System", which offers a single reporting space for cities, and more specifically, for the signatories of the GCoM. As 72% of the cities reporting through the CDP-ICLEI Unified Reporting System are signatories of the GCOM, this database offers a complementary perspective of the profile of signatory cities, the GHG emissions represented, and the population covered.

Our assessment of the yearly city-wide emissions dataset[1] shows a slight decrease in the number of cities reporting to the CDP, with more than 770 cities having reported in 2020. But there is a growing number of cities reporting emissions data, with 400 cities reporting in 2020 as against 330 in 2019, now representing 367 million inhabitants. The decrease in reporting cities in 2020 could be attributed to the Covid-19 crisis, yet there is more data available, and more complete and comprehensive inventories, which could account for the increasing emissions reported.

1 2020 City-wide Emissions, accessed from the CDP Open Data Portal on 29/01/2021

The total GHG emissions reported has increased between 2019 and 2020 reaching 2.19 $GtCO_2e$ (tab 1.). This figure could, however, have been affected by a higher number of big cities reporting, a wave of new inventories recently made, changes in methodologies used or emission types between various years, or non-uniformity in data points. It is also important to note that CDP does not verify the data, which is reported by cities themselves.

Over time, a growing number of cities, including ones from lower income countries, are reporting GHG emissions originating outside their boundaries related to imports and goods consumption of their inhabitants. However, the sources of indirect emissions covered greatly differ from one city to another and cannot be compared. In addition, the total emissions reported are still very low (233 millions of tons CO_2 equivalent) considering that for many cities, especially in high-income countries, consumption-based emissions surpass their city-wide emissions (**see Section II**).

TABLE 1

REPORTING ELEMENTS FROM THE 2020 CITY-WIDE EMISSIONS DATASET[2]

Year	Number of cities having reported their territorial emissions to the CDP			Total of GHG emissions reported ($GtCO_2e$)	Population represented (millions)	Cities reporting emissions outside boundaries (Scope 3)	Total emissions outside boundaries reported
2015	119	46	31	1.25			
2016	187	84	36	1.29	260		
2017	229	101	45	1.41	279		
2018	284	115	45	1.91	315		
2019	332	176	94	1.84	332	207	89 $MtCO_2e$
2020	401	191	120	2.19	367	253	233 $MtCO_2e$

NUMBER OF CITIES REPORTING OF A REDUCTION IN THEIR EMISSIONS COMPARED TO THE PREVIOUS INVENTORY

NUMBER OF CITIES REPORTING OF AN INCREASE IN THEIR EMISSIONS COMPARED TO THE PREVIOUS INVENTORY

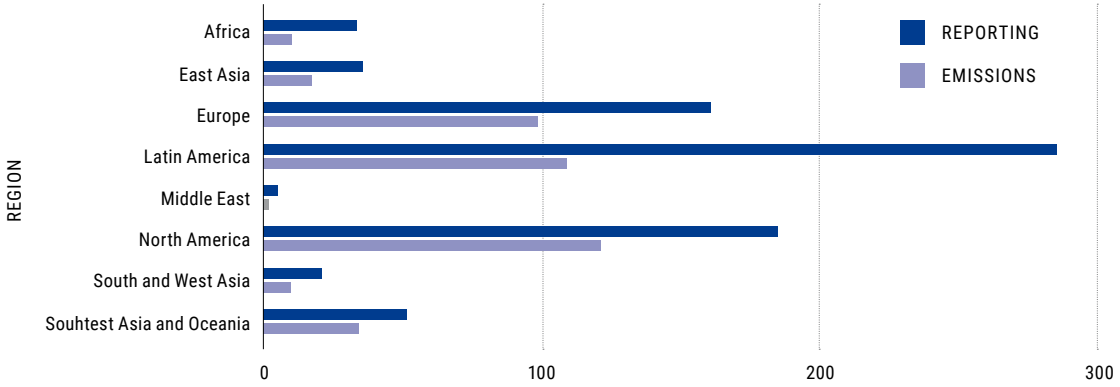
The geographical distribution of reporting cities reflects the legacy of the Compact of Mayors[3], with a majority of cities in North and South America. We observe also the poor representation of Asian cities but also African cities. Most European cities report to their dedicated platform MyCovenant and not to this unified reporting system, and some other covenants such as in Middle East and North Africa are also launching their own platform to ensure the regional governance and management of local data.

2 2020 City-wide Emissions, accessed from the CDP Open Data Portal on 29/01/2021

3 The Compact of mayors merged with the Covenant of Mayors to form the Global Covenant of Mayors, see the history of City level climate initiatives in our 2018 Edition.

FIGURE 5

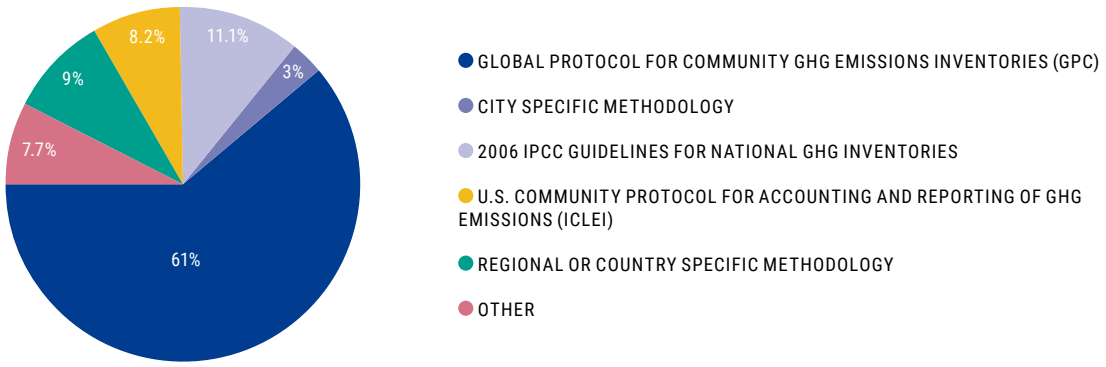
GEOGRAPHICAL DISTRIBUTION OF CITIES REPORTING THROUGH THE CDP-ICLEI UNIFIED REPORTING SYSTEM IN 2020 - *Source: 2020 City-wide Emissions, accessed from the CDP Open Data Portal on 29/01/2021*



Most of the cities reporting data (61%) use the Global Protocol for Community Greenhouse Gas Emissions Inventories (GPC), a global method adapted in 2014 from the GHG Protocol created by the WRI and the World Business Council for Sustainable Development (WBCSD) in 1998 for business (**see Section I for GHGH accounting methodologies**).

FIGURE 6

SHARE OF DIFFERENT METHODOLOGIES USED BY REPORTING CITIES IN 2020 - *Source: CDP-ICLEI dataset*



The changes in methodologies and scopes of emissions over the years have affected the evolution of emissions data over the last few years. Following the evolution of data also allows us to underline some progress.

Some cities have reported a remarkable trajectory such as Porto who reduced its emissions by 30% or Wellington by 26% (**tab. 2**).

While the reduction of emissions in some cities is evident from the emissions data (**tab. 2**), in other cases, the total emission figures have increased with more refined methodologies, the inclusion of more gases in calculations, and more available data, but actual emissions have been on the decline (**tab. 3**). Most of the cities in Table 3 have reported declining emissions, though changes in methodology show significant jumps in last-reported total emissions.

Evident progress made in terms of more detailed inventories is encouraging, and contributes greatly to the improvement of actions plans which follow.

TABLE 2

EVOLUTION OF EMISSIONS OF SELECTED CITIES, FROM 2015-2020

Sources: City-wide Emissions datasets, 2015-2020

Emissions reported in $MtCO_2e$

City	Country	2015 (accounting year)	2020 (accounting year)	Net % change from 2015
Melbourne	Australia	5.8 (2014)	5 (2019)	-14 %
Vancouver	Canada	2.6 (2013)	2.6 (2019)	-1 %
Hong Kong	China	42.7 (2011)	40.14 (2018)	-6 %
Wellington	New Zealand	1.3 (2013)	0.95 (2018-19)	-26 %
Warsaw	Poland	12.7 (2012)	13.14 (2016)	3.5 %
Porto	Portugal	1.3 (2004)	0.9 (2017)	-30 %
Chicago	USA	33.5 (2010)	31 (2015)	-7.3 %
New Taipei	Taiwan	18.1 (2013)	19.5 (2018)	7.6 %
Stockholm	Sweden	2.5 (2012)	2.4 (2018)	-4.2 %

TABLE 3

CITIES SHOWING "JUMPS" IN TOTAL EMISSIONS REPORTED, OWING TO CHANGES IN METHODOLOGY

Sources: City-wide Emissions datasets, 2015-2020

Emissions reported in MtCO2e

City	Country	2015 (accounting year)	2020 (accounting year)	Net % change from 2015
Rio de Janeiro	Brazil	20.3 (2012)	26.3 (2017)	30%
Cape Town	South Africa	22.7 (2012)	23.5 (2018)	3.4%
Mexico City	Mexico	24.1 (2012)	47 (2018)	95%
Buenos Aires	Argentina	11.4 (2013)	20.5 (2017)	79%
Rotterdam	Netherlands	28.2 (2014)	38.7 (2018)	37%

C. GCOM - Governance

The Board, that provides the strategic direction for the initiative, is co-chaired by the two main funders of the initiative: the European Commission, represented by the Executive Vice President for the European Green Deal Frans Timmermans, and the former New York City Mayor Michael Bloomberg (GCOM, 2021). 10 mayors are members of the Board, representative of all the regional covenants : Hobart (Australia); Surabaya (Indonesia); Seoul (South Korea); Accra (Ghana); Colombo (Sri Lanka); Heidelberg (Germany); Paris (France); Pittsburgh (USA); Lima (Peru) ; Chefchaouen (Morocco).

The Strategic Advisory Committee members are composed of the European network funders of the European Covenant of Mayors and other global initiatives and networks, as well as representatives from the European Commission and the European Committee of the Regions. It helps set the strategic direction for the initiative for ultimate approval by the Board.

Currently the GCOM Secretariat supports the coordination of city network partners through five "Technical Working Groups" on the following areas: (1) Global and Regional Coherence ; (2) Data Management, Monitoring, and Reporting; (3) Finance; (4) Communications; (5) Research and Innovation.

The Covenant secretariat was managed by a team financed by Bloomberg Philanthropies and the Commission. As of 2021, following a call for tenders, a European based consulting firm "Human Dynamics" is carrying out the working of the secretariat.

2. Regional Covenants of Mayors

A. Europe

10,346 SIGNATORIES	244 MILLION PEOPLE REPRESENTED	6,200 ACTION PLANS AND 3,309 MONITORING PLANS

The Covenant of Mayors for Climate & Energy in Europe has been launched in 2008 by the European Commission, in cooperation with the main European networks representing local and regional governments and their national associations (CEMR, Energy Cities, FEDARENE, EUROCITIES, Climate Alliance, ICLEI Europe) and progressively extended to Eastern Europe and other cities in countries non members of the European Union.

Exact figures may differ from the ones used by the Global Covenant of Mayors, because of different historical methods of accounting signatories. But thanks to compilation of the yearly assessment reports of the European Commission (**tab. 4**) we can identify the following trends:

TABLE 4

EVOLUTION OF FIGURES OF THE COVENANT IN EUROPE - *Source: Joint Research Center*

EUROPE (EU-East-CoM-EFTA)			
COMMITMENTS			
	Signatories	**Including signatories of the 2030 objectives**	**Inhabitants represented (millions)**
2015	7,868	0	208
2016	8,787	520	213
2017	9,220	990	238
2018	9,510	1,411	253
2019	10,059	2,369	295
2020	10,346	3,445	279
IMPLEMENTATION			
	Action Plan and a Baseline Emission Inventory (BEI) submitted		**Adaptation Pillar**
2015	5,000		-
2016	5,630		-
2017	6,000		-
2018	6,096		92
2019	6,200		201
2020	7,544		576
IMPACT			
	Monitoring plans of Action Plans	**Monitoring Emissions Inventories (MEI)**	**Emissions reduction rates based on the MEI**
2015	800	122	-23%
2016	1,240	315	-23%
2017	1,850		-
2018	2,585		-
2019	3,209	1,877	-25%
2020	3,309	N/A	N/A

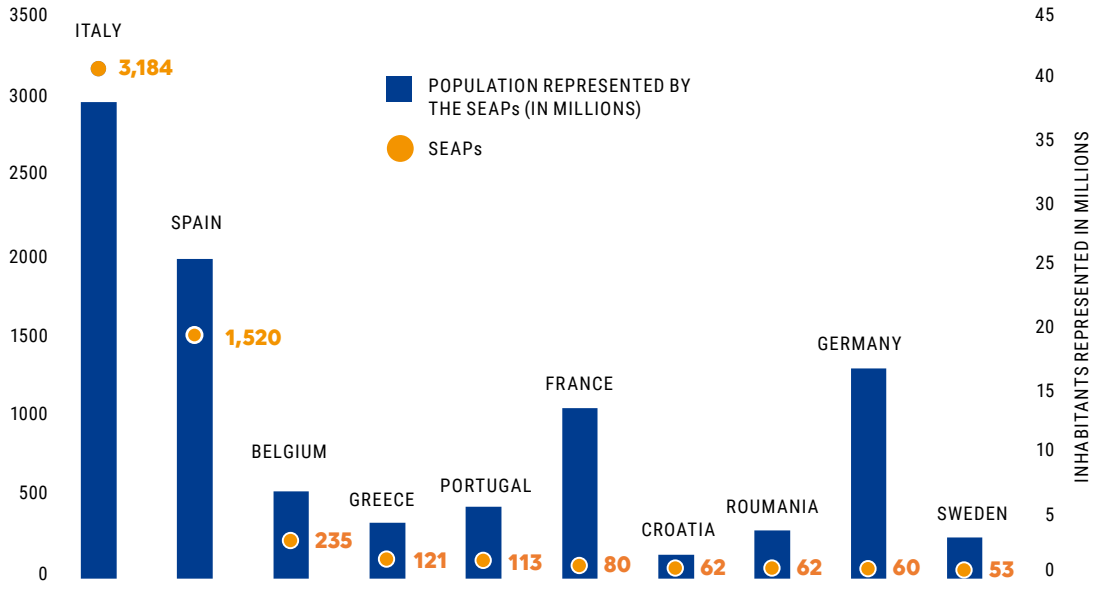
• COMMITMENTS • The level of ambition of European cities is higher than that of the EU Member-States. On average EU-28 cities have committed to a 31 % emissions reduction from 2005 levels by 2020, ten points higher than the minimum target required, and 47% by 2030. Honoring these commitments would already achieve 28% of the EU's overall 2020 emission reduction goal.

Around 90% of the signatories are small and medium sized towns. Large cities represent the highest proportion of inhabitants covered by the Covenant, of 53%. Wide disparities exist across the countries: in 2018 only 60 German local authorities had submitted SEACAPs but covered almost 17 million inhabitants, whereas the 3,184 action plans from Italian local authorities cover approximately 38 million inhabitants (**fig. 7**).

A 2020 study of 1,000+ CoM-EU cities (Hsu et al, 2020) also found that cities on track to meet their commitments have less-ambitious targets and higher baseline emissions at the city-level, and are in countries with more-ambitious national climate policies and higher realized emissions reductions.

FIGURE 7

THE 10 COUNTRIES WITH HIGHEST NUMBER OF SIGNATORIES WHICH HAVE SUBMITTED THEIR ACTION PLAN IN 2018 - *Source: compilation taken from Kona A. et al. 2018*



• IMPLEMENTATION • A cumulative total of 6,200 action plans have been submitted by European cities. A small share are concerning the 2030 commitments (318), meaning that most of the action plans would soon be updated.

These 6,200 baseline emissions inventories represent a total GHG emissions of 1,080 $MtCO_2e$/year, 12% more than the last estimation made in 2016, illustrating the growing importance of the initiative.

Turin - Italy

CITY PROFILE

Population: ~872,316 (2019)
Target emissions reduction: 45% reduction from 1991 levels by 2020, 60% by 2030, and net-zero by 2050
Last reported emissions: 3.48 $MtCO_2e$ (2017)

Turin is the capital of the Italian Piedmont region, and has been a signatory of the Covenant of Mayors since 2009. It is an important economic centre of Italy, and has significant automotive, service and aerospace industries. The city has made remarkable progress in reducing its CO_2 emissions from its 1990 baseline, having already reduced 44.5% by 2017. The economic restructuring towards the service sector has helped reduce industrial emissions, and the city's policies have been effective in reducing residential, transport and public buildings' emissions.

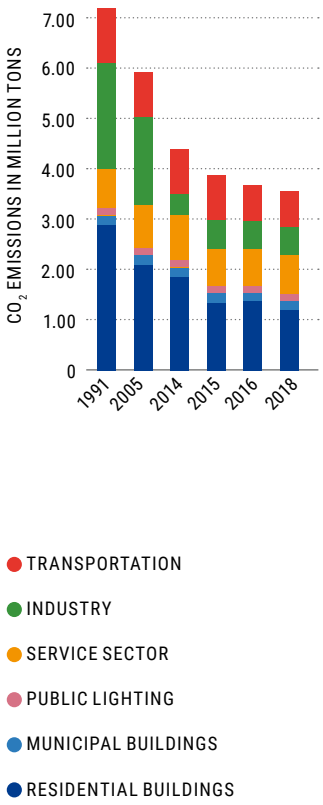
The city had in place since 2010 the Turin Action Plan for Energy (TAPE), which set the targets and identified the most suitable actions to reach them by 2020. In the energy sector, the most advances have been made due to the city's district heating network, which is the largest in the country, and a considerable share of hydroelectricity in the mix. The national level schemes of "Ecobonus" and the "Heating Fund" have also contributed, through financial incentives, to promote building energy efficiency and renewables in heating respectively. The city worked with the University Politecnico of Turin to collect data on energy efficiency, and based on the results, undertook renovations of public buildings and installed LEDs in street lighting. Going forward, a stricter revision of the Energy Efficiency and Sustainability Code is expected in 2021.

The Sustainable Urban Mobility Plan adopted in 2011 laid down the 2025 goals, covering the expansion of public transport (especially metro lines), bicycle and pedestrian infrastructure, and the promotion of greener vehicles in the private fleet. Currently the share of public transport in all trips made is around 23%, out of which 50% are by electric vehicles and another 20% by natural gas-powered vehicles. The city has also launched bike-sharing and car-sharing programmes, with further expansion of the charging network being planned.

Sustainable urban land-use is also extremely important in the city's planning. Turin has one of the highest rates of urban green area per inhabitant (18 m^2). The city actively promotes urban farming, and also participative urban forestry, along with incentivising green roofs.

EVOLUTION OF CO_2 EMISSIONS OF TURIN

Source: Città di Torino



Other areas of focus in the city's climate action include waste, water (from a more adaptation approach), and integrating nature and biodiversity as well.

Sources: Città di Torino, 2019; Covenant of Mayors Europe, 2019; Città di Torino, 2018.

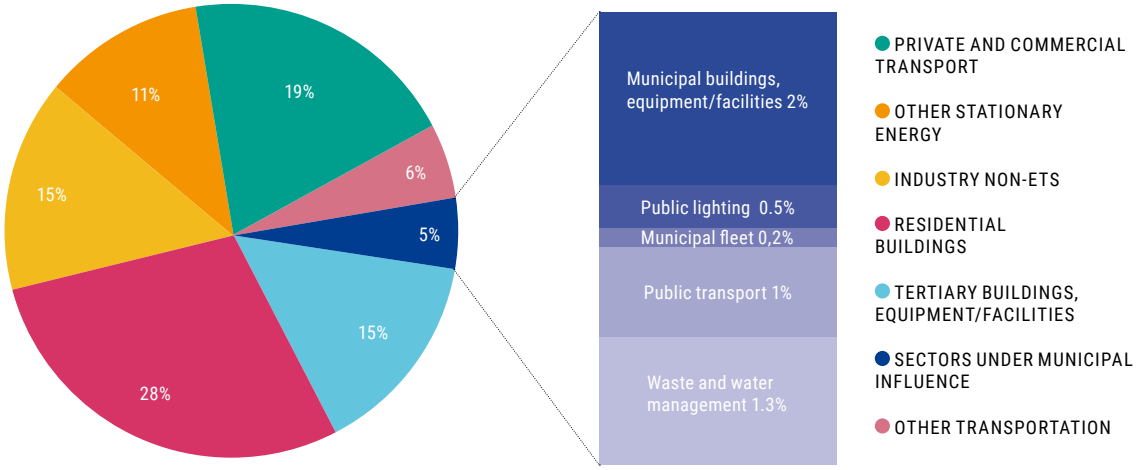
INDICATOR

Additional GHG emissions since last estimation made in 2016

These reported emissions are mainly related to energy consumption emissions in sectors that can be influenced by local authorities (housing, urban services, transport). Their breakdown is as shown in **figure 8**.

FIGURE 8

GHG EMISSIONS IN COM SUB-SECTORS REPORTED IN BASELINE EMISSIONS INVENTORIES (BEO) IN THE COM DATASET 2019 - *Source: European Commission - JRC, 2020*

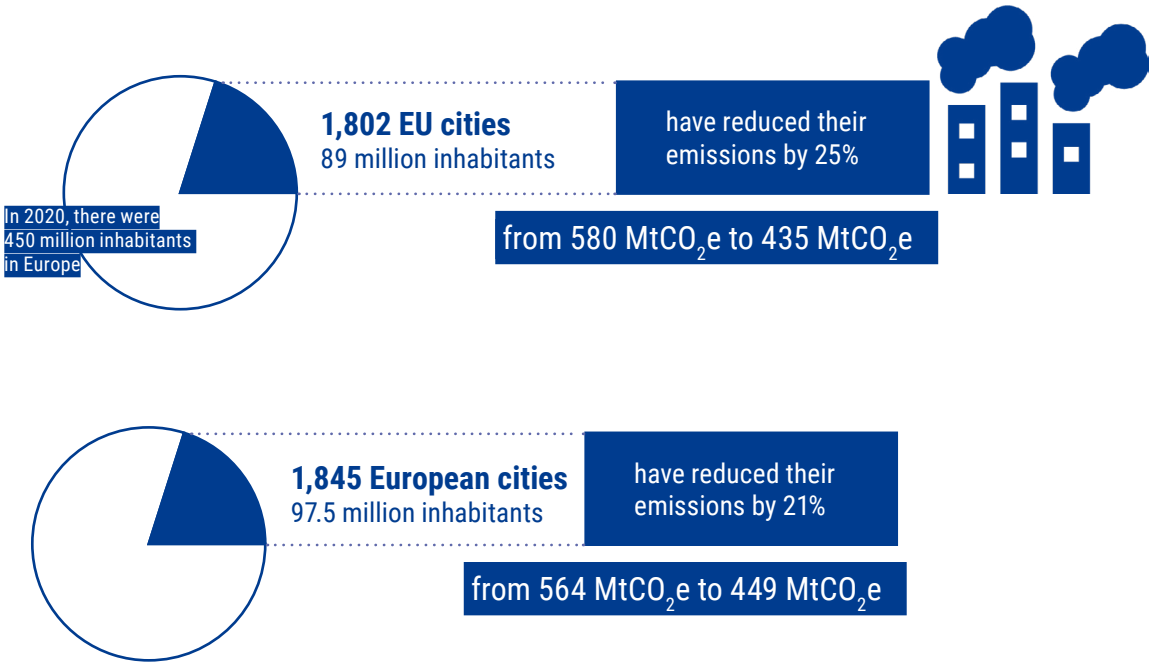


Territorial emissions are therefore the primary issue for municipalities. Direct emissions represent only 5% of the total emissions (municipal buildings and fleet, public transport and waste), the vast majority is composed of emissions from local private actors and inhabitants.

Monitoring reports have to be submitted by signatories every 2 years and Monitoring Emissions Inventory (MEI) every 4 years. In reality these dates are not met, due to difficulties in adapting local inputs to the Covenant of Mayors framework — data is also often incomplete or not entirely accurate.

• MONITORING AND RESULTS • Using a data methodology (statistical approach and projection model) developed by the Joint Research Center of the European Commission, progress can be observed between 2005 and 2017 for a sample of cities that submitted a monitoring emissions inventory (JRC, 2020).

INDICATOR



Besides having overpassed the 2020 minimum target by 6 points, municipalities from EU Member States are also well on track to meet their own target of -30% emissions reduction by 2020.

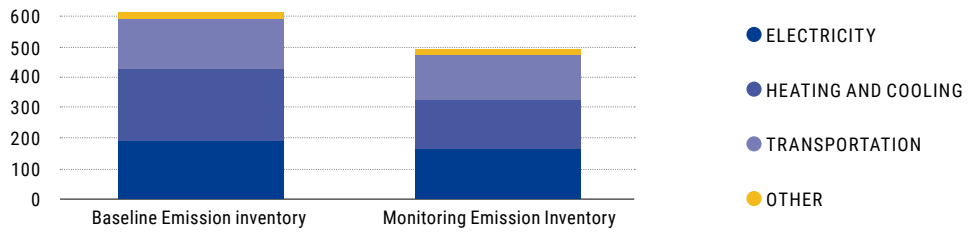
It confirms the earlier mentioned study that alsoshowed that around 60% of them were on track to achieve the targets which they had set for 2020 which were more ambitious than the EU target. (Hsu et al., 2020).

The drop in emissions is more obvious in the buildings sector -22%, particularly in heating and cooling, whose emissions felt by 27%. It is less pronounced in the transport sector with a 16% reduction (**fig. 9**).

FIGURE 9

EVOLUTION OF EU GHG EMISSIONS PER SECTOR FROM BASELINE TO MONITORING INVENTORIES

Source: JRC, 2020



This analysis confirms a previous study in 2018 based on a sample of 315 cities showing the Covenant's 2020 goals were well on the way to being achieved by signatories (Kona A. et al., 2018).

In a more recent study of the same sample of 315 cities analysed the distribution of policies adopted divided by the types of tools and field of action, and also looked at socio-economic and geo-demographic drivers of the policies. The study found that small and medium towns, in warmer or intermediate regions, form the majority of the sample who submitted the MEIs. Less populated

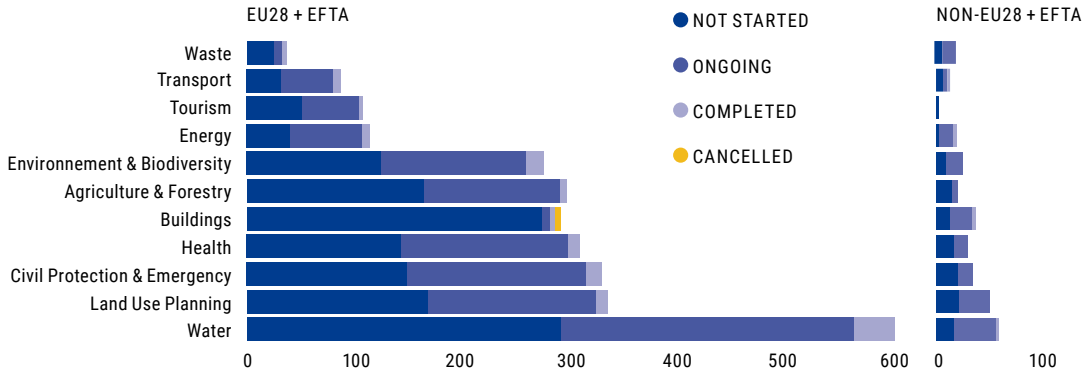
municipalities used more self-governing tools (like green public procurement or energy management), and less financial tools and provisions. More populated municipalities used Regulation, and financial tools and provisions more frequently (energy performance contracts, grants, loans etc.). Education and enabling tools were universally adopted, showing active community participation.

The study also saw that larger urban centers have been more successful in implementation, with more policies *ongoing* or completed, while smaller cities and towns require more support and time, particularly in using financing tools. Sectorally, the building and transport sectors respectively see the most policies, across all climate classes (Palermo V. et al., 2020).

• ADAPTATION • Only signatories to the Covenant who joined after 2018, when the adaptation pillar was incorporated in the Covenant, are required to report on adaptation. The early 2020 assessment of the Covenant is based on the 429 municipalities that provided information on their adaptation goals, risks and vulnerability assessment or their adaptation action plan, mostly from EU Member-States and Iceland, Liechtenstein, Norway and Switzerland (370) but also from Neighbourhood countries in Eastern Europe, Middle East or Central Asia (59). Among them around 50% of signatories have reported adaptation goals *"though the meaning of word goal has been misinterpreted by a number of signatories"*.

FIGURE 10

SIGNATORIES REPORTING IMPACTS ON SOCIO-ECONOMIC SECTORS AND THE ENVIRONMENT, AND STATUS OF ADAPTATION ACTIONS, BY SECTOR - *Source : JRC, 2020*



Around 44% of the signatories have reported active stakeholder and citizen participation (JRC, 2020). Yet signatories are still in the initial stages of their policy process. Most of the engagement is related to the contribution of the local authority staff, stakeholders at other levels of governance. Few are consulting external stakeholders (business, researchers, farmers, health services etc.) and no data are available for citizens.

Less than 70% of municipalities allocate funding for adaptation. Funding is sourced mainly through European funds and local funds, then governments grants and private sources. Limited financial sources are also reported as the main barrier for signatories, together with immature or high cost technology and lack of technical expertise. There is also an issue of making the municipalities aware of all available financing possibilities.

All signatories have reported climate hazards, in particular droughts, extreme precipitation and forest fires presently and with extreme heat and droughts as the most expected in the future. Municipalities have identified vulnerabilities to these climate hazards, but they almost all reported socio-economic impacts of climate change, mostly in health and water, while tourism is considered

as the least impacted sector presently and in the future.

Eventually, as of today 70% of signatories reported adaptation actions because many of them are still initiating their policy process, with a majority of actions being listed as "not started" or "ongoing". But municipalities often mainstream adaptation in their sectoral policies, for example in the areas of water and biodiversity (**fig. 10**).

B. Eastern Europe

426 SIGNATORIES FROM 6 COUNTRIES	72 MILLION PEOPLE REPRESENTED	226 ACTION PLANS AND 74 MONITORING REPORTS

The Covenant of Mayors in Eastern-Europe or "CoM-East" covers the countries of the EU's Eastern Partnership, in Eastern Europe and Central Asia, namely, Armenia, Azerbaijan, Belarus, Georgia, Moldova and Ukraine. CoM-East has 426 signatories (402 active signatories), representing a population of 72 millions. As per the most recent figures, 226 action plans (SEAPs and SECAPs) and 74 monitoring reports have been submitted.

The Covenant of Mayors - Demonstration project (CoM-DeP), started in 2014, has yielded several success stories in the region, on the energy efficiency and renewables front. The first phase from 2014-2018 saw 19 projects carried out, and the 2018-2021 phase has 14 projects. The project has resulted in an annual decrease of 19,878 tons of CO_2 emissions and annual energy savings of 31,024 MWh (CoM-DeP, n.d.). The case study on Slavutych, Ukraine highlights the success of energy efficiency programmes in the region.

C. Middle East & North Africa

109 SIGNATORIES REPRESENTING 145 CITIES IN 8 COUNTRIES	11 TO 15 MILLION PEOPLE REPRESENTED	100 ACTION PLANS BEING PREPARED

• **CLIMA-MED PROGRAMME** • The Clima-Med programme was created in 2018 to support low carbon and climate resilient transitions in 8 countries of the Mediterranean, covering the Maghreb and Mashreq regions, and also works to improve energy security and strengthen adaptation capacities. It provides technical support for climate and energy policies and specifically, to adopt and implement Sustainable Energy and Climate Action Plans (SEACAPs). Across the 8 member countries (Morocco, Algeria, Tunisia, Lebanon, Egyptia, Israel, Palestine, Jordania) around 100 action plans are currently being elaborated by the cities, to be in line with Global Covenant of Mayors principles.

Along the project's operations, climate change governance and mainstreaming climate action are improved, as country partners are supported in their quest to implement and update Nationally Determined Contributions (NDCs), to develop adaptation and mitigation plans and enhance capacities in the field of Measurement, Reporting and Verification (MRV); all in collaboration with relevant government bodies and in consultation with regional, national and subnational stakeholders.

Clima-Med is carried out by a team of experts performing on all levels related to climate change, local sustainable development, SEACAP Preparation, policy and finance strategy and communication and networking in both Mashreq and Maghreb regions. The project duration is until June 2022 with a total budget of €6,9 million from the European Union. Clima-Med is a project labelled by the Union for the Mediterranean (UfM)[4].

Concerning sustainable local actions, Clima-Med is working towards:

Empowering Local Authorities as innovators and facilitating their interaction with National Authorities (i.e. in terms of implementing national policies on energy sustainability and climate resilience at the local level).

Establishing effective and embedded institutional mechanisms:

- **The National Coordination Groups, NCGs:** so far 8 National Coordination Groups (NCGs) created. The NCG is an assembly of key national ministries , key climate actors, international organisations, NGOs and associations, who will lead climate action nationwide.

- **The SEACAP Support Mechanisms, SSMs**: 7 National SEACAP Support Mechanisms (SSM) are proposed. The SSM sets ways to support cities in preparing and implementing SEACAPs and facilitate the link between the national and local levels.

To build the capacity of local actors to act in a participatory way, a 'training of trainers' programme based on the principle of learning by doing has been set up, as well as an effective peer learning network and a range of regional workshops.

One of the priorities of Clima-Med is to facilitate access to climate financing for the implementation of projects - and to this end, the National Coordination Groups (NCGs) bring together the relevant ministries in each country, to be able to continue working beyond Clima-Med after the completion of the SEACAPs.

Clima-Med's challenge is to go beyond the traditional climate financing and to promote much needed innovative and effective climate finance solutions, by means of:

- Designing and testing innovative financing mechanisms, such as performance-based PPPs, preferential private sector investment and support to operators/service providers; Collaborating with IFIs and development actors, as well national financing actors (in addition to NCGs member institutions).
- Raising the project implementation capacity of public and private sector and cities to implement national SEACAPs.
- Identifying and assisting in the implementation of quick-win pilot projects that are easily replicable at multiple levels and by different actors.
- Prioritizing and developing funding for Adaptation actions
- Identifying and formulating innovative and well adapted and replicable pilot projects that have high potential to access financing.

Additionally, 8 Climate Action Roadmaps have been prepared per country. The Roadmap states the engagement of the NCG members to support the Clima-Med project, to implement and sustain the project's recommended Climate Actions.

4 The Union for the Mediterranean is an intergovernmental organization of 42 member states from Europe and the Mediterranean Basin: the 27 EU member states and 15 Mediterranean partner countries from North Africa, Western Asia and Southern Europe

CASE STUDY 2

Slavutych - Ukraine

CITY PROFILE

Population: ~24,783 (2020)
Target emissions reduction: 29% reduction from 2000 levels by 2020 as per the Sustainable Energy Development Plan, 30% by 2030[5]
Last reported reduction: 31% from 2000 levels (2019)

Slavutych is a small town in Ukraine that was built to accommodate those who were displaced by the Chernobyl nuclear disaster. It was the last planned Soviet city, planned to be "comfortable", with residential spaces integrated into public and green spaces. The town has no public transport, as it is planned to have all facilities within walking distances, and also has well-developed cycling infrastructure. From the year 2000, the social infrastructure of the town was rendered unsustainable and expensive, taking up almost a third of the municipal budget. Being established as a monofunctional town, nearly all of its emissions are energy-related (fig. 12), and its climate strategy is also largely energy-oriented.

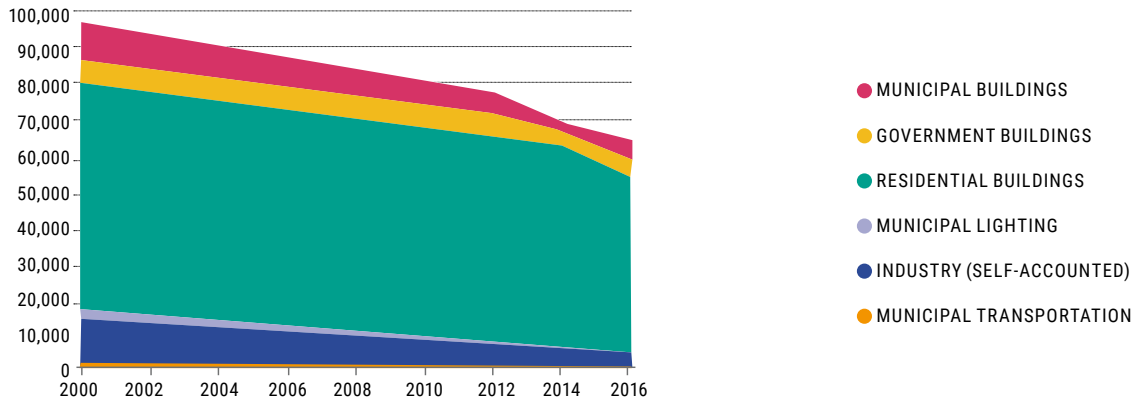
After being included in Ukraine's list of energy efficient towns and cities in 2007, and joining the Covenant of Mayors in 2007, Slavutych began several energy refurbishment projects. Being selected for the CoM-DeP, the town first installed an energy management system across all municipal institutions, and then identified the most inefficient ones - with international energy ratings of F. As a result of the refurbishment of these institutions, Slavutych's energy consumption reduced by 23% compared to 2014 and CO_2 emissions by 5%.

The town council is trying to promote energy efficient habits among residents, along with incentivising renovations of private residences through reimbursing upto 10% of credit taken for renovations from the municipal budget. This has already been used by around 200 households.

Slavutych has also made considerable progress in community renewables. The Solar Town project, with three solar power plants owned by a cooperative consisting of the city, residents and private organisations, had 200kW of capacity on three roofs rented by the municipality at the end of 2019.

Sources: Slavutych City Council, 2017; CoM-DeP, 2019; EU Neighbours East, 2018; Energy Cities, 2019; Brunn, Dronova & Kononenko, 2020.

EVOLUTION OF CO_2 EMISSIONS OF SLAVUTYCH, 2000-2016



5 Slavutych is a signatory of CoM-East and has committed to the 2020, 2030 and Adaptation targets (the 2030 target being a 30% reduction).

And **8 Climate Action Strategies (CAS) are being prepared**. The CAS is prepared with the NCG. It advances recommendations to mainstreaming climate actions. Each of the CAS includes nationally agreed actions to take and recommendations to follow on NDCs, NAPs, MRVs implementation.

• THE COVENANT OF MAYORS FOR THE MEDITERRANEAN, COM MED • Clima-Med has de facto established the Covenant of Mayors for the Mediterranean, CoM Med, which accounts for more than 10 countries, and stands to be enlarged to cover the whole Mediterranean region. Its main objective is to support local authorities in their quest to design and implement coherent Sustainable Energy Access and Climate Action Plans (SEACAP) in line with GCoM requirements.

To consolidate and sustain the role of this regional covenant, Clima-Med is setting up a CoM Med website as a main platform for the region in three languages (French, Arabic and English). The new initiative will provide a common reporting platform, MyCovenant, that brings together relevant data on cities' energy and climate actions. The website will provide an array of information about tools, manuals, benchmark examples, sources of funding; and a forum of exchange for applicant municipalities to share experience and join forces to conduct sustainable local climate mitigation and adaptation actions.

More than 100 cities are presently involved in CoM Med from 8 countries in the Maghreb and Mashreq regions (Algeria, Egypt, Jordan Lebanon, Libya, Israel, Morocco, Palestine, Syria, Tunisia)[6]; with additional countries from the Gulf (United Arab Emirates, Saudi Arabia, Qatar, Oman, Kuwait and Bahrain) the Middle East (Iraq) and Central Asia (Iran, Turkey). As of now, it has an expected 138 signatories, and would represent a population of 60.2 million.

All SEACAPS are validated by the EU's Joint Research Center (JRC), through a methodology in place that is unique to the South Mediterranean, which basically adapts to the local context.

D. Sub-Saharan Africa

240 SIGNATORIES FROM 35 COUNTRIES	422 MILLION PEOPLE REPRESENTED	6 VALIDATED ACTION PLANS

The Covenant of Mayors in Sub-Saharan Africa (CoMSSA) has been active since 2015. Presently, it has 240 signatories, covering a population of 142 million citizens, across 35 countries.

6 SEACAPs have so far been finalized and validated, while more are in the pipeline. The CoMSSA has also been considerably dynamic, with the signatories increasing by 26% from 2019 to the present, and nearly 18% increase in the population represented.

In 2020, the CoMSSA elaborated concrete sectoral finance roadmaps for different types of projects, to support local governments in financing and operating ten types of climate action projects, across waste management, energy, buildings, forestry and risk reduction. The CoMSSA is also continuing to hold workshops and taking other initiatives to help local governments in capacity building, data collection and putting in place SEACAPs.

6 At the time this publication was prepared, EU cooperation with Syria and Libya was suspended due to the political situation in the countries

It has put in place guidebooks, and a SEACAP toolbox, to provide step-by-step support to local authorities. An analysis done by ICLEI-Africa highlights the importance of having baseline data, in helping cities to leapfrog to low-carbon futures, as shown by the examples of Nacala in Mozambique, KwaDukuza in South Africa or Bobo Dioulasso in Burkina Faso (ICLEI-Africa, 2020).

E. Latin America and the Caribbean

519 SIGNATORIES FROM OVER 10 COUNTRIES	154 INVENTORIES, 67 MITIGATION PLANS AND 71 ADAPTATION PLANS	203 MILLION PEOPLE REPRESENTED

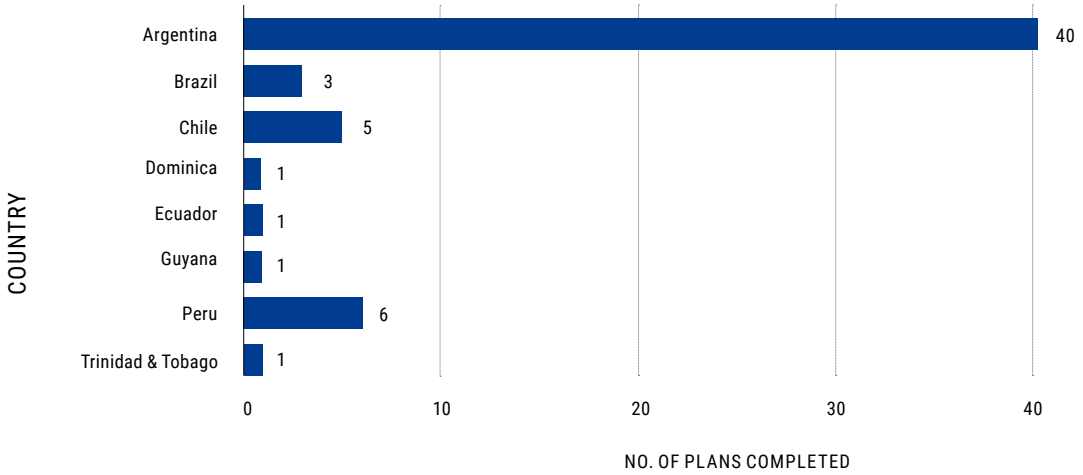
The regional governance of the GCoM in Latin America and the Caribbean (GCoM-LAC) is carried out by a secretariat and a regional steering committee consisting of European Union Delegation in Brazil, C40, ICLEI SAMS, the Latin American Development Bank, and UCLG, with the implementation until 2020 falling under the European Union's International Urban Cooperation (IUC) programme. There are also 2 sub-regional and 8 National Advisory Committees, and several national coordinators and technical coordinators working towards political coordination and elaboration of action plans in the region.

As mentioned in part 1. above, GCoM-LAC has shown the most dynamic growth in signatories in the last year, currently standing at 519 signatories, and representing a population of 203 million. In the 2020 reporting cycle, the region reported 154 inventories, 67 mitigation plans and 71 adaptation plans, which have since increased in number.

Among action plans already completed, the highest number are in Argentina, followed by Peru and Chile (**fig. 11**) The IUC-LAC also reported a potential to reduce GHG-emissions in the region by 27% by 2030[7] (IUC-LAC, 2020).

FIGURE 11

NUMBER OF ACTION PLANS COMPLETED PER COUNTRY IN LATIN AMERICA IN 2019 - *Source: IUC-LAC 2020*



Considerable progress has also been made by the country coordinator organisations in the various countries of the region. The Red Argentina de Municipios frente al Cambio Climático (Argentine Network of Municipalities against Climate Change), presently has 193 member municipalities, of

7 The value was extracted from the average of the NDCs assumed by the countries that integrate the initiative in the region. The minimum ambition of each city that becomes part of the initiative is related to its respective NDC, however there are cities that go beyond that ambition.

which 80 have GPC-regulated GHG inventories. **Case study 3** on San Carlos de Bariloche in Argentina, a member of the RAMCC, shows examples of how smaller and medium sized cities are acting to reduce emissions.

The Red Chilena de Municipios Ante el Cambio Climático in Chile, the Unión Nacional de Gobiernos Locales in Costa Rica, and the Foro Ciudades para la Vida, in Peru have been successful in this front, helping cities and communes develop action plans, including their SEACAPs, and build capacities for adaptation and mitigation.

F. North America

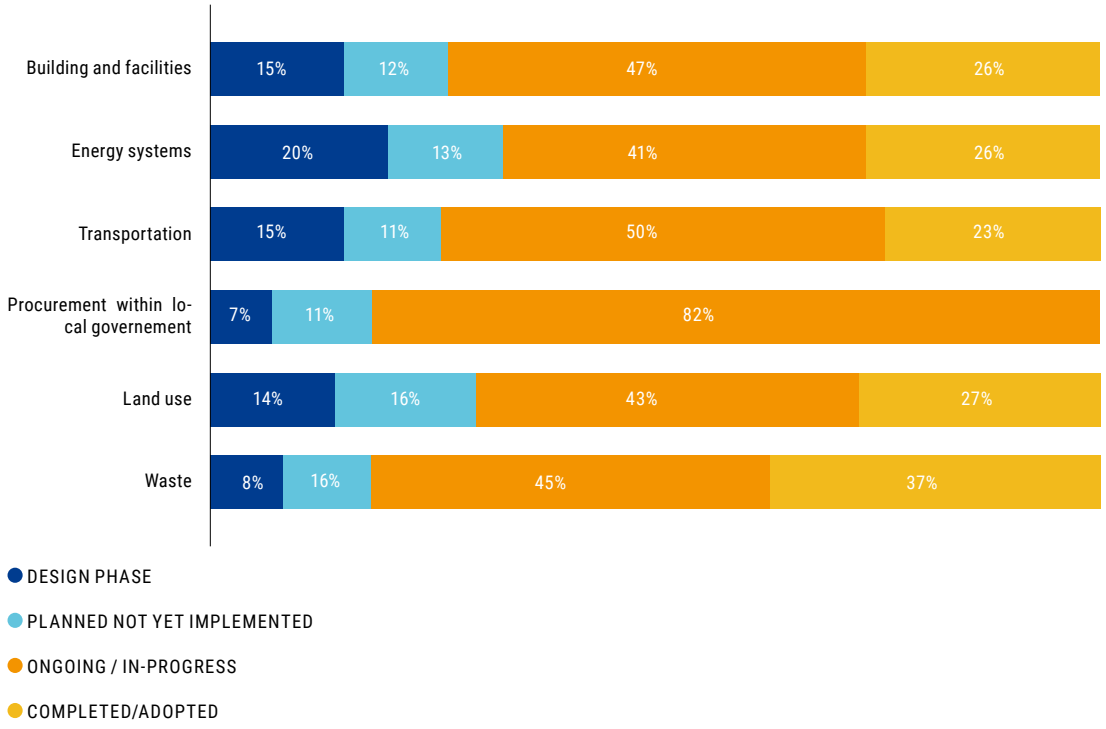
186 SIGNATORIES FROM THE USA, AND 53 SIGNATORIES FROM CANADA	101 MILLION PEOPLE REPRESENTED	65 MITIGATION AND 58 ADAPTATION PLANS REPORTED

The Covenant in North America consists of the Global Covenant of Mayors United States and the Global Covenant of Mayors Canada. In the USA, there are 186 signatory cities covering a population of 86 millions.

GCoM Canada is implemented through the collaboration between Federation of Canadian Municipalities (FCM), ICLEI Canada, the GCoM Secretariat and the EU-funded IUC. There are 53 signatory cities, representing a population of 15 millions. In December 2019, 25 signatory cities were selected for the Showcase Cities of GCoM Canada, to receive intensive mitigation and adaptation support.

FIGURE 12

IMPLEMENTATION STATUS OF MEASURES ADOPTED UNDER PARTNERS FOR CLIMATE PROTECTION IN CANADA, BY SECTOR - *Source: ICLEI-Canada & FCM, 2019*



CASE STUDY 3

San Carlos de Bariloche - Argentina

CITY PROFILE

Population: ~138,000 (2021 projection)
Target emissions reduction: 20% reduction from BAU scenario by 2030, net zero by 2050[8]
Last reported emissions: 973.031 $ktCO_2e$ (2016)

The city of San Carlos de Bariloche, or Bariloche as it is commonly referred to, is located in Northern Patagonia, and has a prominent tourism industry. Particularly of note are its plan for sustainable tourism by 2025, and its "Emergency Plan" for climate, which contains measures to be adopted in contingencies and specifies the responsibilities of actors in various key sectors of the city like health, tourism, and others, taken up through a letter of commitment.

The Climate Action Plan and its main areas of focus

In early 2020, Bariloche also developed a Climate Change Action Plan for 2030, covering various energy, transport and waste programmes across the public and private sectors, and adaptation action as well.

The energy sector is of utmost priority as it is the largest source of emissions. Following a pilot phase in 2016-17, the city's sustainable housing programme aims to generate energy savings in air conditioning and improve the overall air quality in precarious households, through diagnoses, technical interventions and follow ups. Beneficiary households have shown over 40% improvement with respect to air replacement rates, and 500% improvement in thermal transmittance of roofs. Bariloche is also piloting the use of geothermal energy for heating in winters, and also working on a forestry-waste to fuel programme with the INVAP foundation. The city is progressively replacing old street-lighting with energy efficient LEDs, expanding the existing lighting network, and using solar panels to power public spaces.

In transport, the city is working to expand radial connectivity across its public transport lines and also introduce shared-paths for soft mobilities like walking and cycling, given the existing infrastructure and the less than 1% of the population currently cycling. The city has been divided into 3 sectors- west, centre-south and east - each carrying out a renewal of its territorial planning with citizen engagement, to reduce dependence on the city centre, with dedicated indicators being developed to follow up on impacts.

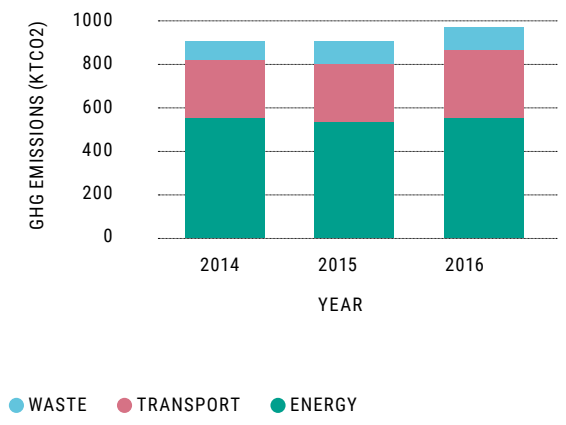
In the waste sector, the city is developing its strategy focusing on reducing waste generation at the source, improving segregation, re-valuing dry waste, renewing municipal landfills and also exploring waste-to-energy solutions. In adaptation, the focus is on risk management and reduction (as seen with the emergency plan), stormwater drainage, biodiversity and forest rehabilitation.

Monitoring progress

The city has laid its target to reduce emissions by 30% from the Business as usual scenario by 2030, with 2014 as the base year. This implies a reduction of 500 $ktCO_2e$ by 2030.

Sources: GCoM-LAC, n.d.; Bariloche Municipio, 2020; RNUN & Bariloche Municipo, 2017

EVOLUTION OF GHG EMISSIONS OF SAN CARLOS DE BARILOCHE - *Source: Bariloche Municipio, 2020*



8 The city of San Carlos de Bariloche is part of the RAMCC, which is part of Climate Ambition Alliance: Net Zero 2050, committing to reduce emissions to net zero by 2050.

The GCoM Canada initiative also combines and complements two existing domestic programmes, the Partners for Climate Protection (PCP) programme and Building Adaptive and Resilient Communities (BARC) programme. PCP supports municipalities in GHG emission reductions and promoting community energy, while BARC helps with capacity building and climate risk resilience GCoM-Canada provides a companion guide for municipalities using the PCP/BARC framework who wish to join the Covenant. As reported at the end of 2019, the most commonly reported measures adopted under the PCP programme for emissions reduction were building retrofits, public charging stations for electric vehicles and the promotion of walking and cycling lanes. A majority of the measures reported were already in progress or completed (**fig. 12**) (ICLEI-Canada & FCM, 2019).

G. Asia and Oceania

4 REGIONAL COVENANTS	222 MILLION PEOPLE REPRESENTED	WITH 204 SIGNATORIES

The continent of Asia is covered in different parts by different regional covenants. South Asia, East Asia and Southeast Asia each have their own, while Central Asia and Eastern Europe fall under the CoM-East, covered in the earlier Part 2. B which supports cities in the Eastern Partnership countries, working more closely with the European Union and the European Covenant.

The Covenant in South Asia covers India, Bangladesh, Pakistan, Sri Lanka, Nepal and Bhutan, with 35 signatory cities, representing over 90 million inhabitants. In East Asia, there are 12 signatory cities from Korea and 29 from Japan, representing populations of over 18 million and 26 million respectively.

The most dynamic in Asia has been the Global Covenant of Mayors in Southeast Asia. The GCoM-SEA secretariat is managed by UCLG Asia Pacific, and covers Indonesia, Malaysia, Vietnam, Thailand, and the Philippines. There are 79 signatories, representing nearly 58 million inhabitants. Most recently, through IUC-Asia, 12 pilot cities in Indonesia, Malaysia and Vietnam received support in mitigation and adaptation action planning, in the context of rapid, high density urbanization. Baseline inventories were created for all the cities, between 2017 and 2019, and their emissions profiles analysed, in order to set targets and work on action plans (**tab. 5**).

The analysis of all the pilot cities showed that the largest contributor to their emissions was the energy sector. The mitigation actions undertaken in the cities most commonly fall under the energy, transportation, waste and building sectors.

In Oceania, GCoM-Oceania is coordinated by ICLEI-Oceania, and has 40 signatory cities, representing a population of 7 millions. A large majority of the signatories are from Australia or New Zealand, and 4 signatories from the Pacific Islands.

TABLE 5

THE 12 PILOT CITIES IN INDONESIA, MALAYSIA AND VIETNAM, THEIR LATEST REPORTED EMISSIONS AND MITIGATION TARGETS - *Source: Climate Action Plan Development in Indonesia, Malaysia and Vietnam, IUC-Asia, 2020*

City, Country	Current Emissions (tCO_2)	Target
Palembang, Indonesia	5,049,469	15% emission reduction against the 2030 BAU scenario
Malang, Indonesia	1,343,913	12% emission reduction against the 2030 BAU scenario
Makassar, Indonesia	3,447,032	Yet to be defined
Denpasar, Indonesia	2,624,663	8% emission reduction against the 2030 BAU scenario
Depok, Indonesia	4,078,742	11% emission reduction against the 2030 BAU scenario
Muar, Malaysia	1,620,345	63% emission intensity reduction of GDP by 2030 relative to the base year 2010 emissions level
Hang Tuah Jaya, Malaysia	1,030,238	45% emission intensity reduction of GDP by 2030 relative to the base year 2010 emissions level
Penampang, Malaysia	455,416	
Tawau, Malaysia	1,561,104	
Can Tho, Vietnam	4,016,783	Yet to be defined, but will be consistent with the updated Vietnamese NDC - 9% reduction from BAU scenario with domestic resources, 27% with international support.
Da Nang, Vietnam	3,432,483	
Tam Ky, Vietnam	341,639	

CASE STUDY 4

Palembang - Indonesia

CITY PROFILE

Population: 1.8 million (2019)
Target emissions reduction: 15% reduction from BAU scenario by 2030
Base year emissions: 5,049,469 tCO_2e (2019)
Last reported emissions: 5,049,469 tCO_2e (2019)
Scope of emissions: Scope 1 & 2

Palembang's Mitigation Plan focuses in the energy sector on energy efficiency in the residential and commercial sectors, and directly involving the industrial sector. For example, the energy roadmap of the Pertamina Refinery Unit III Plaju, along with other climate actions taken by Pertamina, a state-owned oil and gas corporation have already largely contributed to reducing emissions, and other prominent companies in the city, such as a fertilizer producer, the electricity company, a light-rail transit company and others, have also made commitments to work with the city and submitted action plans to reduce their GHG emissions.

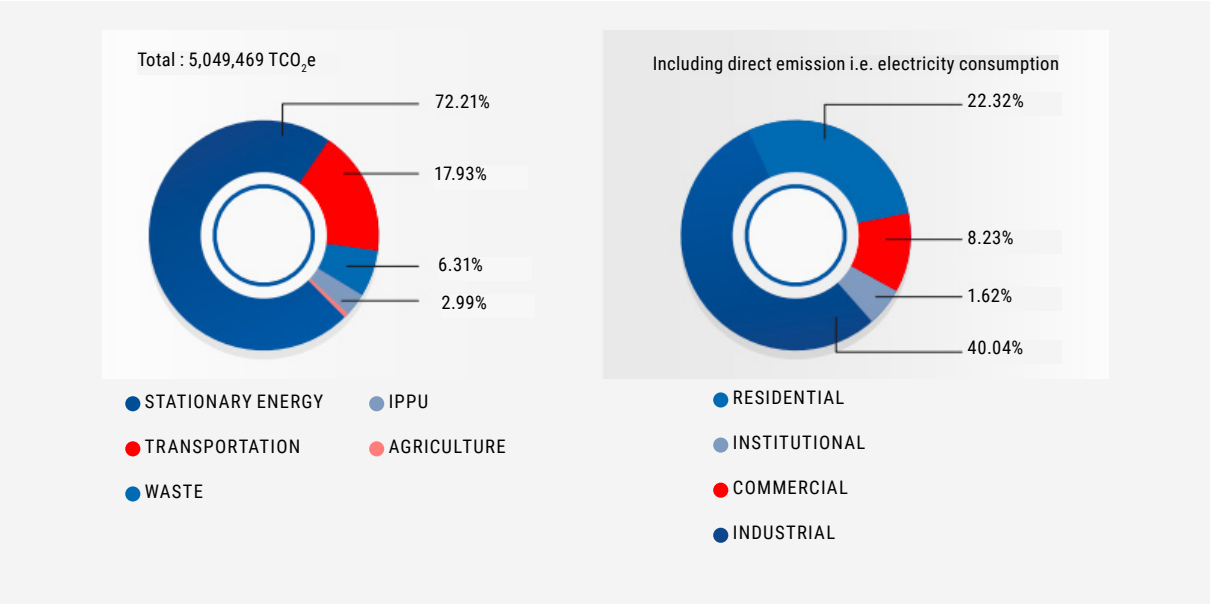
In transport, the actions taken are under the umbrella of Indonesia's Sustainable National Urban Transportation programme (SUTRI), which aims to replace individual transportation with shared, and non-motorised transport., and mitigate 0.9 to 1.7 Mt CO_2e of emissions per year by 2030 in the pilot cities (among which is Palembang). The city is also working to promote the use of biodiesel in its public transport.

Action in the waste sector is aimed at both environmental (i.e. waste management) and climate goals, with various policies being pursued for their co-benefits in both these areas. Practices adopted include Landfill Gas Recovery at solid waste disposal sites, the country's first waste-to-energy power plant, and a campaign of intense sensibilisation promoting composting, segregation and recycling.

Climate change adaptation is equally, if not more important to Palembang. While storm and flood risks have been identified, the higher probability is of landfire. Adaptation actions identified include socio-economic, educational and infrastructural ones, all aimed at increasing the resilience of the most vulnerable areas.These actions cover sectors of public health, small and medium enterprises, agriculture, food security, urban planning, and others.

Sources: IUC-Asia, 2020; Asian Mayors, 2020; Pertamina, n.d.; NAMA Facility, 2017

GHG EMISSIONS PROFILE OF PALEMBANG, 2019 AND SECTORAL BREAK-UP OF CONSUMPTION OF STATIONARY ENERGY - *Source: IUC-Asia, 2020*



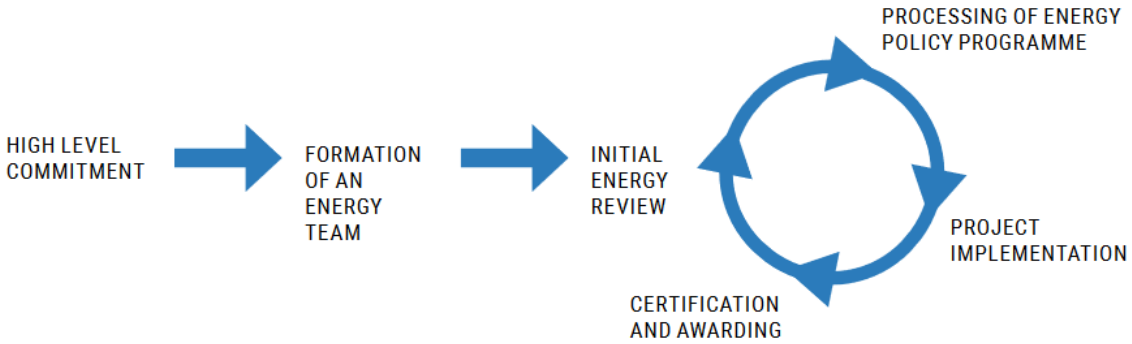
3. European Energy Award

European Energy Award (eea) launched in 1988 is a management and award system for municipalities and regions. It supports local authorities in establishing action plans and implementing energy and climate policy measures through the efficient energy usage and increased use of renewables. 8 national eea organisations lead the eea process at the national level and provide technical support to the municipality in the identification of its strengths and weaknesses and throughout the entire planning eea process by accrediting eea advisors.

FIGURE 13

6 STEPS TO FULFILL FOR A CITY TO GET AWARDED

Source: eea website, n.d



Once a city completes step 5 called "project implementation", it is either awarded "European Energy Award" if it implemented 50% of the standardised catalogue which comprises 79 mesures, and "European Energy Award GOLD" if it implemented 75% of the catalogue.

Presently, participating cities are from Switzerland, Austria, Germany, France, Italy, Lichtenstein, Luxembourg and Monaco, and from some of the pilot countries of Belgium, Croatia, Greece, Poland, Romania, Serbia and Ukraine. Some of them were added as a part of the EU-funded project IMPLEMENT which aims at setting up the necessary structures to carry out the eea programme in municipalities in the new targeted regions.

The cooperation with the european Covenant of Mayors, and the work on the EU project CoME EASY, which were covered in the 2019 Local Action Report, have also progressed, along with cooperation with the European Innovation Partnership on Smart Cities and Communities.

Connections were also created in 2019 with the Middle East and North Africa, where similar initiatives have been developed, namely the MEA Middle East & Africa Energy Award with pilot cities in Tunisia and Morocco. A memorandum of understanding was signed with the trustees of the Chilean Comuna Energética programme, which has been operational in 48 communities and since 2014, aligning its methodology more with that of the EEA (EEA, 2020).

TABLE 6

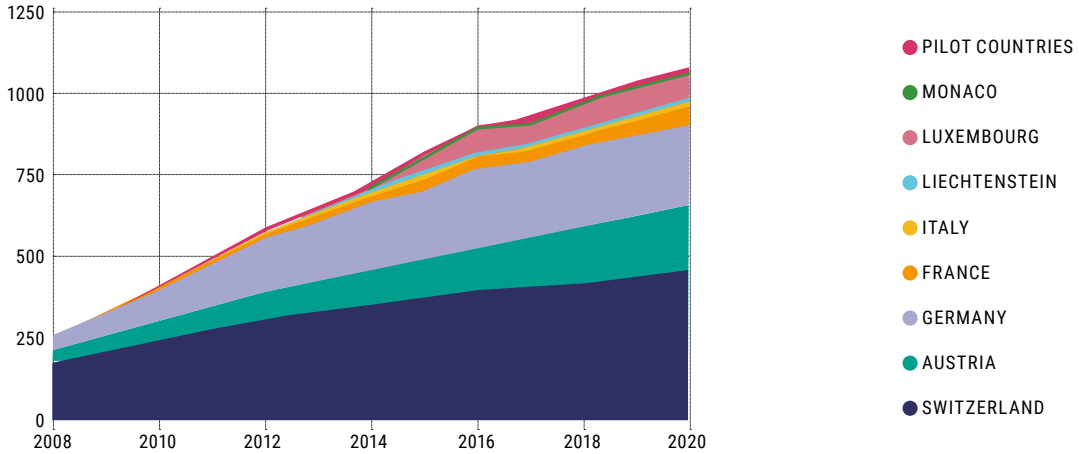
NATIONAL EEA PROGRAMMES' MAIN FIGURES - *Source: eea secretariat*

Country	Name of the national programmes (organisation)	Number of participating cities in 2020 (additional since 2019)	Cumulated Certified Cities in 2020 (certified GOLD)	Represented population
Austria	Programm für energieeffiziente Gemeinden (e5 Österreich)	335 (+ 5)	183 (29)	3,647,341
France	Cit'ergie (ADEME)	219 (+ 12)	64 (5)	29,100,319
Germany	European Energy Award® (Bundesgeschäftsstelle des)	310 (+ 25)	243 (53)	28,582,235
Italy	ComuneClima (SPES Consulting Srl & Agency for Energy South Tyrol – CasaClima)	40 (+ 8)	17 (3)	777,631
Liechtenstein	Energiestadt (Amt für Volkswirtschaft)	11 (=)	11 (2)	36,868
Luxembourg	PacteClimat (myenergy Luxembourg)	102 (=)	90 (13)	626,108
Monaco	European Energy Award (Principality of Monaco)	1 (=)	1	39,000
Switzerland	Cité de l'énergie (Trägerverein Energiestadt)	642 (+ 7)	456 (65)	5,904,917
Other EU countries	Belgium, Croatia, Greece, Poland, Romania, Serbia and Ukraine.	44	2	(956,248 in Romania, 1,902,068 in Ukraine)
Total		1,704	1,067	71,572,735

As of 2020, 1,704 participating cities, out of which 1,067 were awarded, and 170 of these were awarded the eea Gold. Switzerland continues to have the highest number of awarded cities, followed by Germany (see **tab. 6**, and **fig. 14**).

FIGURE 14

NO. OF EEA AWARDED BY COUNTRY, 2008-2020 - *Source: eea secretariat*



Among the awarded cities, a large majority are small and medium cities with a population of 5,000 and less or 5,000 to 50,000, with a smaller number of cities with over 50,000 inhabitants (**fig. 15**).

Additionally, in 2019, an optional innovation chapter on climate change adaptation was introduced, comprising 17 measures which work with existing measures or extend them, which were trialled in several pilot cities in 2020. The chapter will further improve the link of eea to the Covenant of Mayors for Climate and Energy Europe.

By the end of 2020, 170 local authorities were labelled eea Gold. In 2020, 20 local authorities received the eea Gold for the first time, while 25 other local authorities successfully renewed their eea Gold label. **Figure 16** presents the top 50 best performing cities of 2020 based on the progress made in the level of implementation of measures, of which the highest number are from Germany, Austria, Switzerland and France.

FIGURE 15

PERCENTAGE OF CITIES AWARDED EEA, BY POPULATION SIZE IN 2019 - *Source: eea secretariat*

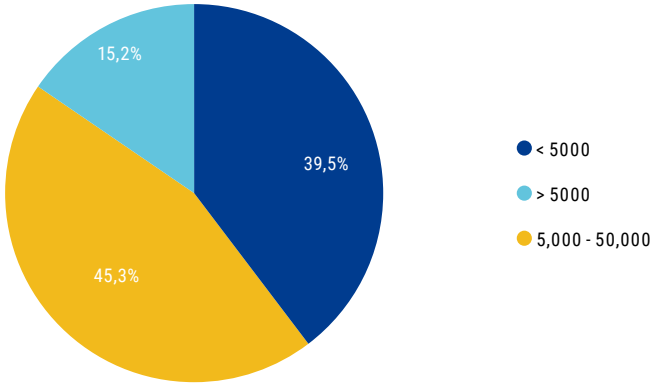
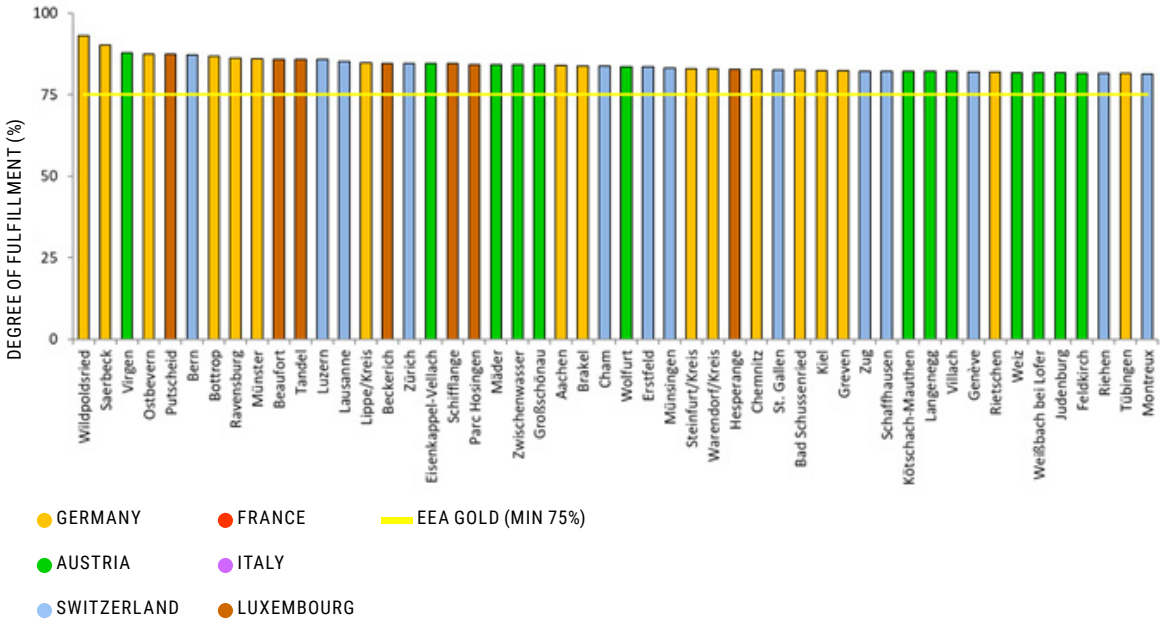


FIGURE 16

TOP 50 EEA CITIES BASED ON LEVEL OF IMPLEMENTATION, 2020 - *Source: eea secretariat*



4. Climate action of regions and subnational governments

A. The "Under2 Coalition"

The sub-national state and regional governments that are part of the Under2MoU, referred to as the Under2 Coalition since 2017, have committed to reducing GHG emissions by 80-95% by 2050. The Climate Group continues as the secretariat of Under2, working with CDP for the annual disclosures.

In 2020, 121 regions disclosed their climate and energy related data and actions, representing 599 million inhabitants. The GHG emissions data reported by 86 of them reach a total of 4.5 $GtCO_2e$, more than 10% of annual global emissions.

The year 2020 saw an average decrease of 7% compared to the base year, which is lower than the decrease seen in 2019 (**tab. 7**). This could be explained by the change in the set of regions reporting in each year, with some large emitters not reporting in a particular year. With some regions choosing not to report, and some reporting anew, the net reduction in the number of reporting regions could also be attributed to the fact that regional governments had to prioritise the Covid crisis, and not spend as much time and resources on disclosures.

TABLE 7

EVOLUTION OF REPORTING ELEMENTS FROM STATES AND REGIONS TO CDP'S PLATFORM

Sources: Annual Disclosure Reports, The Climate Group and CDP, 2015-2020; CDP Open Data Portal

	Regions reporting clim-energy data	Inhabitants represented (mn)	Emissions represented	Average decrease in emissions compared to base year	Reported Climate Actions
2015	44	325	2.8 $GtCO_2e$	6 %	348
2016	62	440	3.1 $GtCO_2e$	6.3 %	1,299
2017	110 (incl. 53 Under 2 members)	658	3.9 $GtCO_2e$	8.5 %	2,329
2018	120 (incl. 78 Under 2 members)	672	5 $GtCO_2e$	9 %	3,097
2019	124	669	5 $GtCO_2e$	14,2 %	3,562
2020	121 (incl. 86 Under 2 members)	599	4.5 $GtCO_2e$ (from 86 regions)	7 %	3,599 (across 11 sectors)

The 2020 Annual Disclosure Report states that 18 states and regions have made net zero commitments so far, and 21 have targets of 75% or higher reductions. 26 of the states and regions have set climate targets for 2030, which are IPCC compliant, and 40% of them have targets which are more ambitious than their respective national ones, and the IPCC recommended range of reductions (The Climate Group & CDP, 2020.) (**tab. 8**).

The statistical work done by CDP and the Climate Group shows many regions achieving great and fast progress to their emissions goals, a selection of which are covered in **Table 8** (The Climate Group & CDP, 2020). These selected 20 subnational territories show a rate of compliance with their own 2020 emissions reductions goals of 26%. Some of them should be able to reach their commitments such as Andalucia (Spain), Northern Territories (Canada) or Wales (UK).

TABLE 8

PROGRESS MADE TO 2030 GHG EMISSION REDUCTION TARGETS, SELECTED REGIONS

Source: The Climate Group & CDP, 2020

Region	Base Year	Base Year Emissions (millions of tCO_2e) *	Target (reduction %)	Target emissions 2030 (metric tonnes CO_2e)	% progress made, 2020
Andalucia	2005	67.7	26%	50,082,908	88%
ACT	1990	3.2	65%	1,118,880	19%
Azores*	2014	1.7	~50%*	864,165	-13%
British Columbia	2007	63.4	40%	38,040,760	-18%
California	1990	431	40%	258,600,000	3%
Catalonia	1990	41.4	40%	24,814,293	-16%
Connecticut	2001	49.2	45%	27,040,921	39%
Hesse	1990	50.8	55%	22,854,600	36%
Lower Saxony	1990	97.5	55%	43,859,700	25%
Navarra	2005	6.6	45%	3,649,391	33%
New York	1990	236	40%	141,714,000	32%
New Foundland and Labrador	2005	10.5	30%	7,317,128	-18%
North Karelia**	2007	1.7	~96%*	70,000	25%
Northwest Territories	2005	1.6	30%	1,110,200	75%
Québec	1990	86.1	37.5%	53,813,750	23%
Queensland	2005	121	30%	131,120,692	28%
Scotland	1990	85.5	75%	19,050,041	61%
South Australia	2005	32	50%	17,719,000	63%
Wales	1990	56.7	45%	30,964,878	69%
Washington	1990	90.5	45%	49,774,065	-17%

* These emissions figures are gross or net figures, depending on the methodology used by the particular region.

** These particular regions have set their targets as % reductions from the predicted BAU emissions for the target year. The % reduction from the base year is calculated here from the base year emissions and target year emissions, for the purpose of uniformity.

A more sectoral analysis reveals that the disclosing states and regions generate 47% of their electricity from renewables, compared to a global average of 26%. Out of this, 20% of electricity is generated from wind, geothermal and solar energy, with the potential to increase reliance on these sources. Hydropower remains the most used among renewables, while the phasing out of fossil fuels seems to be lagging. In the forestry sector, efforts to address deforestation remain low, with less than half the states and regions (37%) having a plan, and even fewer having set a target to tackle the issue.

Earlier this year, the Climate Footprint Project, an initiative of the Under2 Coalition, was launched in 2018 to help state and regional governments in tracking and reducing their GHG emissions. Under

this project, a toolbox is provided for these subnational governments, with resources to help compile economy-wide GHG inventories, and also to identify and track suitable mitigation actions with technical training and capacity building. The project has been directly working with the regions/states of Pernambuco (Brazil), Chhattisgarh and West Bengal (India), Baja California, Jalisco and Yucatán (Mexico), and KwaZulu-Natal (South Africa), and set to be completed later in 2021.

The Climate Pathways framework was developed to support states and regions develop their own 'pathway' or transformational process towards emissions reduction. The framework provides a nine-step process with political and stakeholder engagement at the base, and promotes dialogue with local communities, businesses and others, to achieve a threefold outcome of defining a vision for the process, identifying priority actions which have the most economic potential, and implementing these and monitoring progress. The framework is complemented by the Pathway Accelerator, which provides unique, tailored support in the understanding and achievement of these outcomes (The Climate Group, 2021). The idea behind this is to set a long term target, and then backtrack to identify what is feasible in the medium-term. Under the Climate Pathways project, Under2 has worked in countries like Peru, Mexico and South Africa to support regions. In Madre De Dios (Peru) and Queretaro, Quintana Roo (Mexico), work was done to help these regions better coordinate with the national governments, and Western Cape (South Africa) has developed a vision for its climate pathway.

B. RegionsAdapt

The RegionsAdapt initiative, launched at COP21 in Paris, supports the acceleration of climate adaptation by subnational governments. With over 70 signatory regions, the RegionsAdapt aims to inspire and support regional governments to take concrete action, collaborate and report on climate adaptation. The initiative offers a unique platform for regional governments to enhance their ambition on climate adaptation by facilitating cooperation and knowledge exchange between its members, and remains open for adhesion for all regions interested in advancing their climate adaptation efforts.

In 2020, 28 states and regions from 15 countries worldwide who are part of the RegionsAdapt Initiative disclosed their mitigation and adaptation data. Though the number of disclosing regions has remained unchanged from 2019, the regions that disclosed in 2020 represented a larger population (**tab. 9**).

TABLE 9

EVOLUTION OF DISCLOSING REGIONS AND POPULATION REPRESENTED, 2018-2020. SOURCE: REGIONSADAPT BRIEF REPORTS 2018, 2019, 2020 - *Source: RegionsAdapt Brief Report 2020*

Year	Members of RegionsAdapt disclosing to CDP	inhabitants (million)
2018	37	205
2019	28	200
2020	28	233

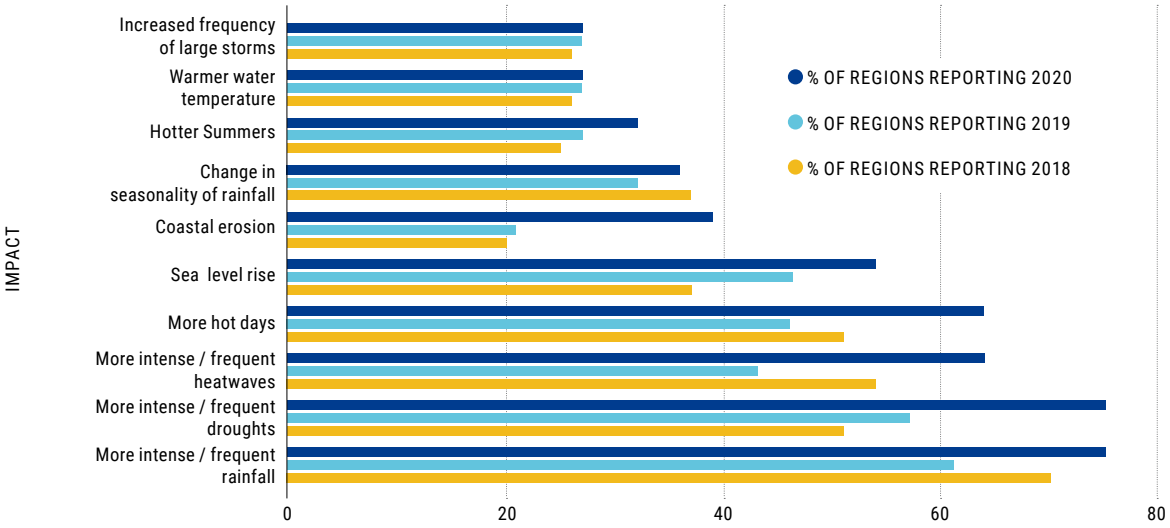
Out of the regions disclosing in 2020, 79% of them have already developed or are in the process of developing risk vulnerability assessments, and 68% already have an adaptation plan in place. There were a reported 185 climate change impacts and 232 adaptation actions. 89% of the regions also reported experiencing a socio-economic impact of climate change, with the most commonly reported ones being related to public health and expenditure, increasing economic costs of disasters, and risks to already vulnerable populations.

The percentage of regions reporting the most common climate change risks has increased across all categories in 2020, with more intense or frequent droughts and rainfall being the most commonly reported (**fig.17**). The seriousness of these risks as well as the high probability to experience them all in the medium-term, clearly indicate that adaptation strategies and actions are inevitable to achieve resilience.

FIGURE 17

10 CLIMATE CHANGE IMPACTS MOST COMMONLY REPORTED BY DISCLOSING GOVERNMENTS

Source: RegionsAdapt Brief Reports 2018, 2019, 2020

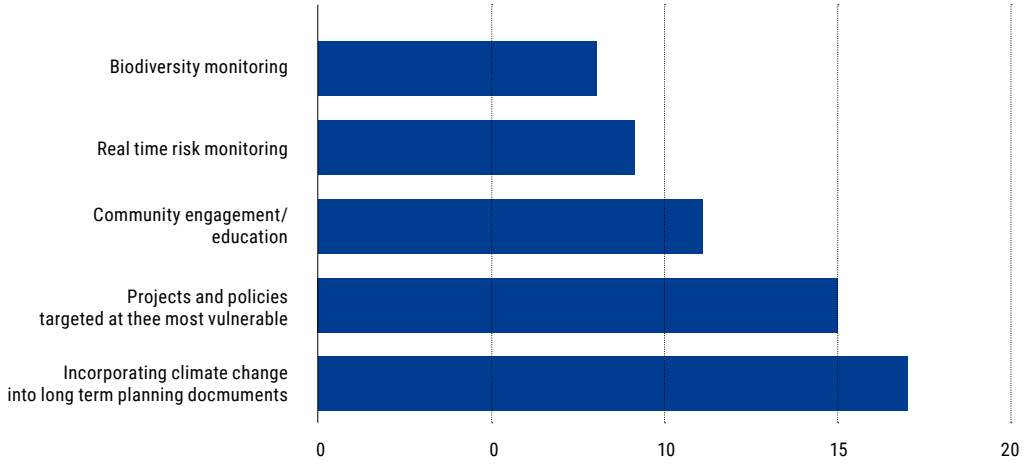


Among the most commonly reported adaptation actions in 2020 (**fig. 18**), incorporating climate change into long term planning remains the most adopted, and the most common priority areas addressed by the regions are forestry and biodiversity, resilience and disaster risk reduction, agriculture, water resources, and infrastructure (RegionsAdapt, 2020).

FIGURE 18

MOST COMMONLY REPORTED ADAPTATION ACTIONS IN 2020

Source: RegionsAdapt Brief Report 2020



The report also shows how regional governments are leading the way in fostering multi-level adaptation governance, with 25 of the 28 disclosing regions reporting to be collaborating with

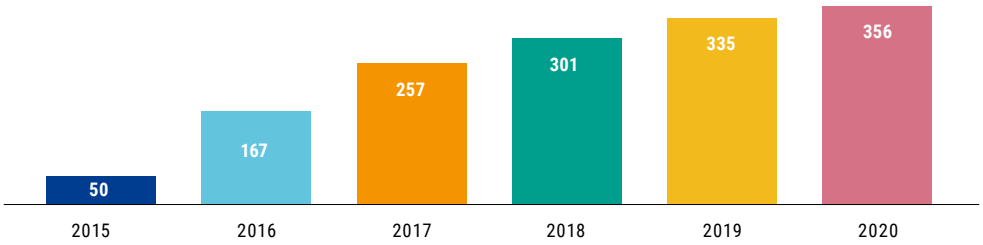
their national counterparts, while 100% of them reported to be collaborating with their local counterparts. This multi-level governance approach ensures local realities are reflected into regional adaptation plans, while also feeding into national climate policies. However, it is important to highlight that only seven reported to be collaborating in climate adaptation, while 12 reported to be collaborating in emissions reduction. More insights on multi-level governance can be found in **Section III** of this report.

5. Sectoral Initiatives from the NAZCA

UITP Declaration on Climate Leadership: This declaration by the International Union for Public Transportation is recognised as a non-stakeholder collaboration initiative under the Marrakesh Partnership. It essentially commits the public transport sector to contribute towards the Paris Agreement Goals, through 350 projects to climate action in over 80 cities around the world, doubling public transport use by 2025 and reducing per capita urban transport emissions by 25%. As seen in figure. 23, as of 2020, the projects pledged and delivered stood at 356, covering low carbon vehicles, new transport lines, BRT, cleaner and efficient fuels, and mixed mobilities (UITP, 2020).

FIGURE 19

PROJECTS PLEDGED AND DELIVERED 2015-2020 (CUMULATIVE) - *Source: page 2 UITP, 2020*



Building Efficiency Accelerator: In this initiative led by the World Resources Institute, businesses, NGOs and international organizations, and civil society commit to supporting building efficiency through tools, expertise, technical capabilities and financial support, while city and subnational governments commit to implementing at least one enabling policy and one demonstration project and track the progress. As reported on the NAZCA website, 44 cities and 8 regions have made progress in this aspect.

Net Zero Carbon Buildings Commitment: This initiative of the World Green Building Council calls upon cities, regions and states to have all buildings in their direct control to be net zero carbon by 2030, and advocate for all buildings to be net zero by 2050. The Commitment launched in 2018, now has 28 cities and 6 states and regions. Including businesses and local governments, the signatories account for a total floor area of 32 million m^2 (WGBC, 2020).

C40 Clean Bus Declaration/ Zero Emission Vehicle Network: The declaration is aimed at reducing emissions from mass public transport, and the ZEV Network brings together C40 cities to share best practices and policies, and also collaborate with other stakeholders. The Network has 4 focus areas of a citywide ZEV strategy, infrastructure development, promotion of ZEV fleets and incentivisation. The declaration has 37 signatory cities.

C40 Zero Waste Declaration: This declaration commits 20 cities and 3 regions to reducing the municipal solid waste generation per capita by at least 15% by 2030 compared to 2015, and to reducing the amount of municipal solid waste disposed to landfill and incineration by at least 50% by 2030 compared to 2015, and increase the diversion rate away from landfill and incineration to at least 70% by 2030. Out of the 18 cities that voluntarily disclosed their progress in 2019, 17 are on track to deliver these commitments by 2030 (C40 Cities, 2019).

SECTION II

SECTION II

Local governments' climate action: innovation and progress in times of a pandemic

Introduction

During its 43rd session in Nairobi (April 2016), the Intergovernmental Panel on Climate Change (IPCC) affirmed the key role cities are to play in the fight against climate change and suggested to dedicate a special report upon climate change and cities as part of its Seventh Assessment Cycle (AR7), due to begin after the 2023 Global Stocktake. For that purpose, the IPCC held a special Cities and Climate Change Science Conference in Edmonton, Canada (5-7 March 2018), to assess the current state of academic, policy and practice-based knowledge on climate change and cities. The conference gathered more than 700 participants from all fields and involved major networks of cities and regions such as ICLEI, C40, UCLG and Cities Alliance. The synthesis of outputs from the conference led to a proposal for a Global Research and Action Agenda on Cities and Climate Change Science with the aim to cover cities of different geographies, sizes, growth patterns and contexts. Published in time for the 2019 Climate Action Summit (Sept. 2019), the *Research and Action Agenda* (**fig. 1**) is organised in three sections:

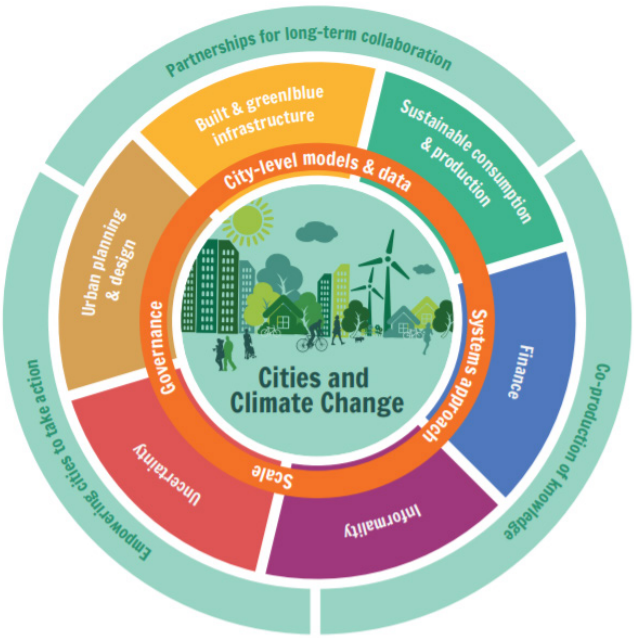
1. Crosscutting issues and knowledge gaps. The aim here is to identify the issues where cities could benefit from better uptake of existing science, such as the interaction and interdependent nature of cities within their regions and countries, capacity of local institutions in a multi-level perspective, informing integrated action at different spatial and temporal scales as well as data availability.

2. Key topical research areas where the availability of more evidence-based knowledge would support practitioners and decision-makers in addressing specific city-level challenges arising from climate change. This includes informality, urban planning and design, built and blue and green infrastructure, sustainable consumption and production, finance and uncertainty.

3. Suggested approaches to implement the *Research and Action Agenda* by strengthening the science, practice, and policy interface.

FIGURE 1

STRUCTURE OF THE GLOBAL RESEARCH AND ACTION AGENDA. THE INNER CIRCLE (ORANGE) REPRESENTS SECTION 1; THE MULTI-COLOURED INNER CIRCLE PRESENTS SECTION 2 AND THE EXTERNAL CIRCLE (GREEN) PRESENTS SECTION 3 - *Source: World Climate Research Program, 2019*



In parallel to the IPCC Conference, mayors signed the Edmonton Declaration, a political statement calling on cities to support evidence-based decision-making and action to address climate change in cities. Co-developed by the City of Edmonton and the Global Covenant of Mayors (GCoM), unanimously endorsed by ICLEI World Congress, the Federation of Canadian Municipalities and the United States Conference of Mayors, the Edmonton Declaration claims for 3,400 signatory municipalities from North America (City of Edmonton).

In the aftermath, the GCoM launched the *Innovate4Cities* initiative, a collaborative platform to gather national governments, private sectors, academia, cities and local governments in order to "*creating a shared understanding of the impacts climate change will have on cities and directly assist cities in identifying the optimal approaches to be implemented to both mitigate carbon emissions and adapt its infrastructure to a changing climate*." *Innovate4Cities* advocates national States to dedicate 1/3 of their investments to R&D in urban issues linked to climate change within 10 years; to 10 million additional students in climate change prior to 2025; and to collaborations between cities and businesses on data sharing. Scheduled for the 11-15 October 2021, the *Innovate4Cities* virtual conference will be co-hosted by UN-Habitat and the GCoM as a follow-up to the 2018 Edmonton Conference and to provide inputs to COP26 and to the IPCC AR7's Special Report on Climate Change and Cities (UN-Habitat, 04/03/2021).

In the perspective to fuel this collaborative dynamic with concrete examples and tangibles results of locally led initiatives, the following section is providing a review of some of the key trends of action from cities over the past year. Without aiming exhaustivity, we examine current research with some literature review and showcase remarkable examples of action in different policy areas cities can address through three leverages: planning, normative power and procurement.

1.Climate action planning: from carbon accounting to net-zero targets, local governments flesh out their climate action steering

A. New carbon accounting instruments open up conceptual and technological boundaries

Calculating the greenhouse gas (GHG) emissions of a territory, whether it is a State, a region or a city, is strategic to help the authorities steer mitigation efforts in the short and long term. On the one hand, carbon accounting is useful to spot the main sources of emissions at local level, then allowing the local authority to adopt the relevant policies to mitigate them. On the other hand, in a context of international cooperation to reach Paris Agreement targets, providing quantitative measures of implemented efforts has become a cornerstone of the main transnational initiatives and networks of cities and regions (cf. **Section I**). Carbon accounting is as much a *policy tool* to drive evidence-based action as a *political instrument* for greater accountability and transparency towards citizens. There are two main approaches for this:

- **The emissions inventory** is a statistical accounting tool for direct emissions produced by activities within the administrative or geographical boundaries of a territory. It is used to identify their sources. The French Agency for Ecological Transition (Ademe), compares it to a "land register" for emissions, as it focuses on GHGs "physically" emitted in the territory (Ademe, n.d.).

- **The territorial carbon footprint** is another approach used to aggregate *direct emissions* generated by the territory's production activities and *indirect emissions* induced by its production outside its own boundaries. In some cases, a carbon footprint can also include emissions induced by consumption activities, through the accounting of emissions embodied in imports (EEI) and life-cycle assessments of products and services. Consumption-based or not, carbon footprint is a broader approach that aims to consider all the greenhouse gases that were necessary to support the territory's activities, regardless of their origin (Citepa, 2020).

Both approaches are included in **territorial carbon accounting**. Three "scopes" categorize the geographic boundaries of the emission sources (**fig. 2**). This scope framework was created by the Global Protocol for Community Scale GHG Emission Inventories (GPC)[1] and derived from the *GHG Protocol Corporate Standard*. Created by the World Resource Institute, C40 and ICLEI, the *GHG Protocol for Cities* is the most globally used methodology for city-level carbon accounting.

1 The Global Protocol for Community Scale GHG Emission Inventories (GPC), also called GHG Protocol for Cities, was created in 2014 by WRI, ICLEI and C40 to provide cities with robust emission accounting standards and methodologies.

FIGURE 2

SCOPES DEFINITION FOR CITY INVENTORIES IN THE GPC FOR CITIES - *Source: GHG Protocol, 2014; C40, 2018*

Scope	Definition
Scope 1	GHG emissions from sources located within the city boundary.
Scope 2	GHG emissions occurring as a consequence of the use of grid-supplied electricity, heat, steam and/or cooling within the city boundary.
Scope 3	All other GHG emissions that occur outside the city boundary as a result of activities taking place within the city boundary.

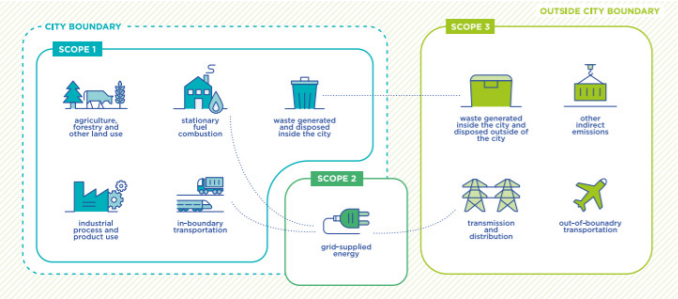


TABLE 1

CHARACTERISTICS OF THE 3 ACCOUNTING APPROACHES FOR LOCAL EMISSIONS - *Source: Association Bilan Carbone*

Approach	Territorial method	Global method	Consumption-based method
Scope	This calculation of GHG emissions emitted directly on the territory by all actors by activity sector (Scope 1) does not take account of indirect emissions caused by meeting the needs of territories, other than indirect emissions linked to the consumption of energy originating in a production unit on its territory (Scope 2). Scopes 1 and 2	Emission accounting taking account of all GHG emissions, whether direct or indirect, in other words, whether they are emitted by or for the territory. This is a more complex method because it requires a form of data collection that might prove difficult given the dispersed nature of information and a lack of statistical data at community level. A large degree of uncertainty is involved in accounting for indirect emissions. Finally, the use of scope 3, whose accounting methods are specific to each tool, renders comparisons impossible. Variable scopes 1, 2 and 3	Accounting for all goods and services required by the territory (from internal production and imports) and therefore all sectors required for the final consumption by the inhabitants of the territory (sectors present on the territory or otherwise). This approach essentially takes account of the issue of consumption-based emissions as this is an emission source. As emissions are related to the end consumer, actions will naturally focus more on citizens and consumption-based behaviours and production and service companies.
Advantages	More precise method Reductions target based on this method Robust No double counting	Comprehensive coverage of emissions Raises all problems	Easy to interpret Communications oriented towards the citizen
Disadvantages	It has a degree of bias in measuring emission reductions (e.g. outsourcing, electricity, etc.) Excludes international maritime and air transport	Not standardised Complex to interpret Double counting Integrated approach with other territories: enables identification of the degree to which the activity of a different territory can impact its emissions count and vice versa.	Difficult to calculate Calculations cannot be standardised
Uses	International standard Basis for all other methods Permits aggregation to higher levels	Design of a territorial action plan (PCET, PCTI etc.)	Citizen mobilisation
Existing tools	National inventory similar to UNFCCC or equivalent Basemis	Bilan Carbone® Territory Global Protocol for CommunityScale Greenhouse Gas Emissions Inventories (GPC) BEI/MEI US Community Protocol	PAS 2070

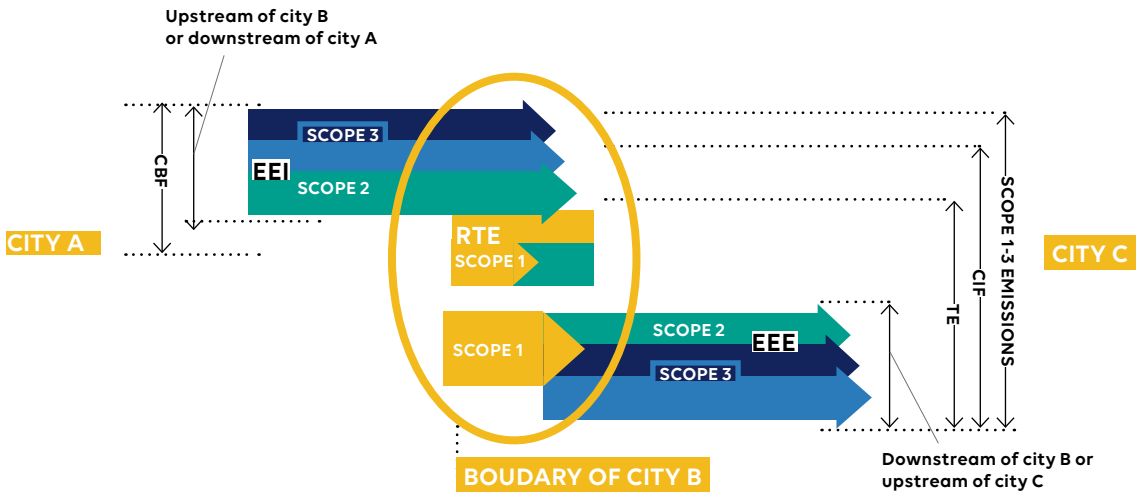
However, many different methodologies have been developed by specialized agencies and global standards, differing from one another according to their calculation perimeter, each with their advantages and disadvantages in terms of data access and aggregation, monitoring over time, transposition into concrete policies, etc. A summary of their features was drawn by the Climate Chance Observatory in the 2019 edition of the Synthesis report on local climate action (**tab. 1**).

From an empirical or political point of view, the credibility of the scenarios and public investments for low-carbon transition heavily rely on the robustness and consistency of carbon accounting. Which is why cities, academics and practitioners continuously work on new methodologies and approaches to extend the emission coverage and improve the accuracy of carbon accountings. In this edition, we choose to focus upon two of them: the boundary issue and the under-reporting issue.

• THE BOUNDARY ISSUE: FROM TERRITORIAL EMISSIONS ACCOUNTING TO CONSUMPTION-BASED ACCOUNTING? • In 2018, Consumption-based GHG emissions of C40 cities revealed that the consumption of 79 cities amounted to 3.5 $GtCO_2e$, 60% higher than the emissions from their production by local activities (2.2 $GtCO_2e$), meaning that two thirds of their emissions are imported, particularly for high-income cities (C40, 2018). *The Future of Urban Consumption in a 1.5°C World* updated these numbers and found that consumption-based emissions from nearly 94 of the world's biggest cities already represent 10% of global GHG emissions (4.5 $GtCO_2e$), whilst their total production-based emissions in 2017 are estimated at 2.9 $GtCO_2e$. These emissions are mostly hidden in territorial GHG inventories since 85% of the emissions associated with goods and services consumed in C40 cities are generated outside city boundaries (C40, 2019). This is what carbon accounting academics call the "*boundary issue*", illustrated by **figure 3**.

FIGURE 3

THE BOUNDARY ISSUE: THE RELATIONSHIP ANALYSIS FOR TERRITORIAL EMISSIONS, CONSUMPTION-BASED CARBON FOOTPRINT AND COMMUNITY-WIDE INFRASTRUCTURE FOOTPRINT - *Source: Chen et al., 2019*



SCOPE 1 & 2

- SCOPE 1
- SCOPE 2

SCOPE 3

- SCOPE 3: EMISSIONS RELATED TO KEY MATERIALS: WATER, WASTE, ENERGY, TRANSPORT, FOOD, AND CONSTRUCTION
- SCOPE 3: EMISSIONS RELATED TO OTHER GOODS AND SERVICES

NOTE: CBF = CONSUMPTION-BASED CARBON FOOTPRINT (CB METHOD); CIF = COMMUNITY-WIDE INFRASTRUCTURE FOOTPRINT (CIF METHOD); TE = TERRITORIAL EMISSIONS (PURE-GEOGRAPHIC PB METHOD); SCOPE 1-3 EMISSIONS = COMPLETE SCOPE 1-3 EMISSIONS DEFINED IN CITY PROTOCOLS; EEI = EMISSIONS EMBODIED IN IMPORTS, EEE = EMISSIONS EMBODIED IN EXPORTS; RTE = REST OF TERRITORIAL EMISSIONS.

Most of carbon accounting systems are based on a territorial approach (or *Pure-geographic production based approach*). These approaches only take account of emissions stemming from energy production located within the geographic or administrative boundaries of the territory (Scope 1) or include emissions from imported electricity necessary to in-boundary activities (Scope 2). As such, local governments can easily identify the sources of emissions, design relevant mitigation plans and target the biggest emitting sectors. Eventually, the territorial approach can also include emissions embodied in exports (EEE), namely the emissions produced outside the city boundary but induced by its in-boundary activities (Scope 3, incineration of waste for instance). In the end, the territorial approach makes it easier to allocate emissions, track the progress of each locations and aggregate data to take a wider perspective.

"*However, unlike the national accounts, cities are home to 50% of world's population but comprise only approximately 3% of land mass, which means they have to outsource a large number of emissions to outside the city boundary*", notice Chen and his colleagues. As a matter of fact stationary energy production only accounts for about 25% of global emissions (IPCC, 2014), while emissions embodied in trade are on the rise and now reach about one third of global GHG emissions (Wiedmann and Lenzen, 2018).

Territorial approaches thus fall short of reflecting emissions embodied in imported goods and services. Therefore, they do not take account of spatial, socio-economic inequalities embodied in the carbon footprint of consumption behaviours. To address this boundary issue, academic literature has paid increasing attention over the last years to **consumption-based carbon footprint (CBCF)** accounting. CBCF have a double advantage over territorial emissions: they allow to assess life-cycle and trans-boundary emissions. By projecting one policymaker's gaze beyond the "pure-geographic production based" emissions of its territory, CBCF better reflects power purchase inequalities on the one hand, and the local economic structure in relation to global markets on the other.

Heinonen et al. (2020) have identified two types of approaches to consumption-based carbon footprint (CBCF):

- **Area carbon footprint (ACF)** allocates to a location all emissions incorporated in products finally *purchased* on its territory (rather than *produced* in a territorial approach), including global production and supply chain (life-cycle assessment), regardless of whether it is purchased by local residents, tourists, visitors or commuters.

- **Personal carbon footprint (PCF)** allocates emissions to local residents of the territory, wherever happen their final purchase act, be it at the corner's drug store or during their trips at the other end of the world. Centred on people's monetary consumption, this approach excludes public sector's emissions (infrastructure expenses and governmental consumption). But it also better reflects purchasing power inequalities between territories.

The inclusion or exclusion of public sector's emission is likely to reflect geo-economic inequalities. For instance, infrastructure expenses are often higher in regions undergoing rapid development and urbanization rather than in urbanized, tertiary economies with low capital intensity. Likewise, the size of the public sector can greatly influence the calculations in the PCF approach. For example, the health sector is one of the largest sources of individual carbon footprint emissions calculated in the US as most of the costs are privatised, while they almost disappear in the Nordic countries where this sector is highly subsidized. Carbon footprint calculations can also vary whether they only take account of CO_2 or other types of greenhouse gases, that make up 25% of global annual emissions (IPCC, 2014).

To sum up, even within consumption-based carbon footprint accountings there is a broad range of approaches limiting possibilities of comparisons. These limitations necessarily push to trade-off the geographic coverage of their study and the granularity of the information used. For example, in 2018, Daniel Moran and fellow colleagues came up with a stunning statement: over 13,000 studied cities, "*100 cities account for 18% of the global carbon footprint*" (Moran et al., 2018). To find this number, the study downscaled national carbon footprints using proxy data such as population, purchasing power and other studies on subnational carbon footprint. To date, this is the only study that has intended to assess carbon footprint upon such a large range of cities at global level. Which means that, in return, the assessment is more approximate as the array of available data and their granularity is weaker.

These difficulties for calculating consumption-based carbon footprints make it very few common at city-scale, but we have underlined their complementary to territorial emission accounting. Presently, more concrete pathways are explored to enhance the accuracy of statistical inventories and fix an under-reporting issue that is drawing more and more attention in the academic field.

• THE UNDER-REPORTING ISSUE: BRIDGING THE GAP BETWEEN STATISTICAL INVENTORIES AND ATMOSPHERIC MEASUREMENTS • On average, U.S. cities underestimated their fossil fuel related CO_2 emissions by 18.3%. This is the result of a recent study that compared voluntary GHG emissions inventories from 48 of the 100 highest emitting cities in the U.S. with data produced by *Vulcan*, a tool which aggregates emissions data from national public databases between 2010 and 2015. The largest differences observed by the authors of the study and developer of *Vulcan* range from -145.5% to 63.5%. Cumulatively, these underestimated emissions represent 129 $MtCO_2$, or 25% more than the emissions of the State of California. Taken together, the 48 cities surveyed represent 13.7% of city emissions and 17.7% of the US population in 2015 (Gurney et al., 2021).

The article points out that there is no systematic, peer-reviewed methodology to assess the quality of a voluntary emissions inventory. Consequently, they are likely to present large differences in approach that can lead to significant gaps in the consideration of certain emission sources in a territory. The most common differences concern the omission of petroleum fuel use, industrial and commercial emissions on site ("*point source emissions*"), differences in the consideration of marine and aviation emissions, and methodological differences for estimating road emissions.

Such discrepancies are meaningful, as a miscalculation of emissions from a territory can distort one local government's judgement when adopting mitigation strategies. With all the more reason when it has set itself the objective of achieving carbon neutrality.

However, cities are not to be blamed, say the authors: inventories are perfectible, and could be improved by further documenting the boundaries of the urban system. They suggest that one solution could be to combine these voluntary bottom-up reporting systems with atmospheric observation and modelling systems. This is what Mexico City, for example, is trying to do today (**case study 5**).

Mexico City - Mexico

MERCI-CO_2 an example of atmospheric accounting of emissions in Mexico City

The last time Mexico City published an inventory of GHG emissions was in 2016, with data relating to 2014. At the time, emissions amounted to 56.2 $MtCO_2$ in Mexico City metropolitan Area (MCMA), with 78% originating from transport and industries. According to its latest reporting to CDP in 2020, Mexico City's emissions amounted to nearly 47 $MtCO_2$ in 2018, up from 24 $MtCO_2$ in 2012. Yet, the magnitude of this increase is largely explained by changes in accounting methodologies and improved data accuracy. Indeed, Mexico is driving cutting-edge research to enhance its carbon accounting methodologies, testing new approaches, like atmospheric emissions measurement.

Mexico City Regional Carbon Impacts (MERCI-CO_2) is a French-Mexican research project led by the Laboratoire des Sciences du Climat et de l'Environnement (LSCE) and the Institut Pierre Simon Laplace (IPSL) on the French side, and the Grupo de Espectroscopía y Percepción Remota (EPR), the Centro de Ciencias de la Atmósfera (CCA) of the Universidad Nacional Autónoma de México (UNAM) on the Mexican side. Financed through a call for tenders launched by French National Research Agency (ANR), the project is supported by the Secretaria del Medio Ambiente (SEDEMA) of Mexico City. It started in early 2017 and now due to finish by the end of 2021.

The project aims at the deployment of a dense network of CO_2 sensors at ground-level and altitude within the Mexico City Metropolitan Area to measure CO_2 concentration gradients and their change in time. Modelling is then run with computers to compare results from the censors and the atmospheric model implied by the city's statistical inventory. Through atmospheric inversion, this comparison allows to precisely spot the locations and activities where statistical inventory have failed to match the atmospheric model, and then help to find ways to improve the statistical method. In the end, atmospheric measurement could even help verifying the effectiveness of CO_2 emission reductions taken by the city authorities. It also allows faster update of the information, whereas statistical inventory always need a few years perspective to collect data. In the case of Mexico, the city supports the project by allowing installing sensors on the local city air quality stations. Sensors were due to be set up in Spring 2020, but the pandemic delayed the deployment.

Atmospheric measurement has the advantage to provide high-precision pictures of the GHG concentrations over a territory, identify nearly real-time evolutions and spot the sources of variations. Yet, it is limited when it comes to distinguish the territorial origins of emissions in dense urban area, since gases circulate with winds. From this point of view, Mexico City geography – located in high-altitude basin at 2,000m and surrounded by mountains up to 5,000m – prevents emitted pollutants to be dispersed by winds. This is a plus to get more atmospheric signals, but in the other hand makes it harder to precisely differentiated the sources of emissions. Which is why remote sensing is not meant to replace statistical inventories, but to provide additional information to complete them. Atmospheric systems are also limited to territorial emissions, and other approaches like consumption-based accounting can bring useful perspectives to understand one city's footprint.

The atmospheric approach applied to urban CO_2 emissions is relatively recent and still in the evaluation stage and focused on big cities. Indeed, the most precise analyser stations are costly (up to €100,000), but low-cost censors are more affordable (up to €5,000). Such a project also requires high-skilled expert to run modelling software, as well as political support from the local government to be sustainable. Therefore, Mexico City is one of the only few cities testing this system in the world. Paris city council also voted the *Météo Carbone®* project in July 2020 to provide monthly measures of GHG emissions in the city, in partnership with Origin.earth, a subsidiary start-up of Suez.[2]

2 Thanks to Michel Ramonet, CNRS Researcher from the Laboratoire des Sciences du Climat et de l'Environnement (LSCE) at Institut Pierre-Simon Laplace (IPSL), coordinator of MERCI-CO_2 project, and to Thomas Lauvaux, CNRS Research scientist in atmospheric and carbon cycle sciences at the LSCE-IPSL for their inputs to this case study. May Michel Grutter from the Centre for Atmospheric Sciences of the Universidad Nacional Autónoma de México (UNAM) be thanked too.

B. The quest for global climate neutrality through local engagement

• WHAT IS CARBON NEUTRALITY? THROWBACK TO THE IPCC 1.5°C REPORT • Back to summer 2018, the IPCC released a *Special Report on Global warming of 1.5°C* to explore the impacts entailed by limiting global warming to 1.5°C above preindustrial levels, the most ambitious target set by the Paris Agreement. The report also assesses the available pathways to stay within the limits of the carbon budget induced by a 1.5°C trajectory, and concludes:

> *"Staying within a remaining carbon budget of 580 GtCO_2 implies that CO_2 emissions reach carbon neutrality in about 30 years, reduced to 20 years for a 420 GtCO_2 remaining carbon budget (high confidence)."*
>
> IPCC (2018). Special Report on Global warming of 1.5°C, p. 33

In this context, carbon neutrality consists in reducing net CO_2 emissions to zero: "*This means the amount of CO_2 entering the atmosphere must equal the amount that is removed*". As being the largest source of global GHG (~72%), this objective is sometimes limited to CO_2, or extended to other greenhouse gases with greater global warming potential (GWP) such as methane (CH_4), nitrous oxide (N_2O), sulphur hexafluoride (SF_6), etc. Whatever the pathway or the scope of gases included in the strategy, three main instruments must be considered to limit climate change:

1. Reducing, preventing, and absorbing emissions of greenhouse gas (mitigation)
2. Carbon capture and storage (CCS)
3. Offsetting emissions with the use of certified emission reduction credits

None of these approaches is neglected by any of the scenarios imagined by the IPCC. Yet, considering the existing science and knowledge, mitigating flows of greenhouse house gases sent into the atmosphere every year through **direct carbon emission reduction, prevention and absorption** is the most certain way to limit magnitude of climate change. **Carbon capture and storage** (CCS) consists in directly removing CO_2 from the atmosphere or, more frequently, from industrial facilities exhaust stacks (waste incineration plants, cement plants, steel works...), to store them into geological reservoirs. However, none of the CCS existing pilot projects have proved neither profitable nor scalable yet, and some scientists also warn against the risk that betting too much on an immature technology may only delay the adoption of measures to cut emissions (Climate Chance, 2018). As for **voluntary carbon offsetting**, it is a market instrument which consists in balancing remaining emissions through the purchase of credits certifying that some emission reduction, or negative emission (through carbon removal or investment in a carbon sink) has been implemented elsewhere.

• THE OXFORD PRINCIPLES, ONE STANDARD TO RULE THEM ALL? • Too often, carbon offsetting is understood as a substitute to reducing its own carbon emissions or suffer from a lack of high-standard certifications. In this context, several initiatives have emerged to set the standards for a common, high ambition understanding of climate neutrality for non-state actors in general, including local governments.

The **Oxford Principles for Net Zero Aligned Carbon Offsetting** are one of them. Released in September 2020, the Oxford Principles outline an approach of carbon offsetting aligned with net-zero targets. The aim is to answer some issues related to the use of carbon credits, i.e. payment to receive credit for a certified unit of emission reduction or removal carried out by another actor. These Principles are meant to provide purchasers of credits with a consistent understanding of the role of offsetting among a global mitigation strategy (University of Oxford, 2020).

- **Principle 1. Prioritise reducing own emissions, use high-quality offsets and regularly revise offsetting strategy as best practice evolves.**
This principle aims at re-establishing an order of priority of action for mitigation strategies. Before using carbon offsetting, actors shall maximise their direct emission reductions opportunities. When offsets are used, the actor should ensure they meet quality requirements (complying best standards) and maintain a high-level of transparency in their accounting, targets and types of employed offsets to track and monitor progress.

- **Principle 2. Shift from emission reduction offsetting to carbon removal offsetting.**
Most of available offsets certify *emissions reductions*, which to date are not sufficient to achieve net zero. The Principles recommend that users of offset increase demand for *carbon removal* offsets to send market signal to encourage development of carbon capture and storage (CCS) technologies. Although nearly all IPCC scenarios to reach Paris Agreement targets partly rely on deployment of CCS, only very few, unprofitable pilot projects exist today.

- **Principle 3. Shift from short-lived storage to long-lived storage.**
Long-term storage offsets should be prioritised over short-live storage to guarantee no reversal in the following decades.

- **Principle 4. Support the development of net zero aligned offsetting.**
The Principles encourage actors to actively support the development high-quality offsets through relevant levers as long-term agreements, sector-specific alliances, support to restoration and protection of ecosystems in their own rights (rather than for the mere purpose of carbon offsetting) and integrate these Principles into regulations and standard-setting approaches for offsetting and net-zero.

The Principles proposed by the study are intended to be applicable to all non-state actors who, on the demand side, wish to use offsetting in their carbon neutrality plans. These principles were integrated into *Race to Zero*, the UNFCCC-led, science-based umbrella campaign aggregating net zero commitments from businesses, investors, universities, cities, states and regions (UNFCCC, 2020). Among the objectives of *Race to Zero* is the promotion of common consensus-based principles for all net-zero commitments to converge towards same assumptions.

• CARBON NEUTRALITY AT CITY-LEVEL: BEYOND COMMITMENTS STARTS ACTION • Since IPCC's report, and just like other nations or companies, many local and subnational governments have committed to reach carbon neutrality by 2050 or even before. **According to NewClimate Institute's and Data-Driven EnviroLab's account, 826 cities and 103 regions had taken some form of "net-zero pledges" by October 2020** (NewClimate Institute, 2020). This is up from 65 cities and regions overall recorded in 2019, among 6,000 analysed (NewClimate Institute et al., 2019). Based on data from the World Resources Institute, the report estimates that all cumulative commitments from these cities and regions cover 6.5 $GtCO_2$ in annual emissions, i.e., more than the United States' annual emissions. Globally, these commitments encompass about 880 million people, yet with huge regional gaps depending on multiple factors such as the size and population density of cities, importance of climate change in the political agenda, technical ability to set credible net-zero strategies and differentiated responsibilities in historical and present emissions. And the trend has continued since then: among the latest recorded cities having taken pledges in 2021, we can mention Philadelphia (1.5m inhab.) in the United States (WHYY, 15/01/2021) and Sunderland (174k inhab.) in the United Kingdom (Sunderland Echo, 11/01/2021).

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local governments throughout the world have a net-zero pledge

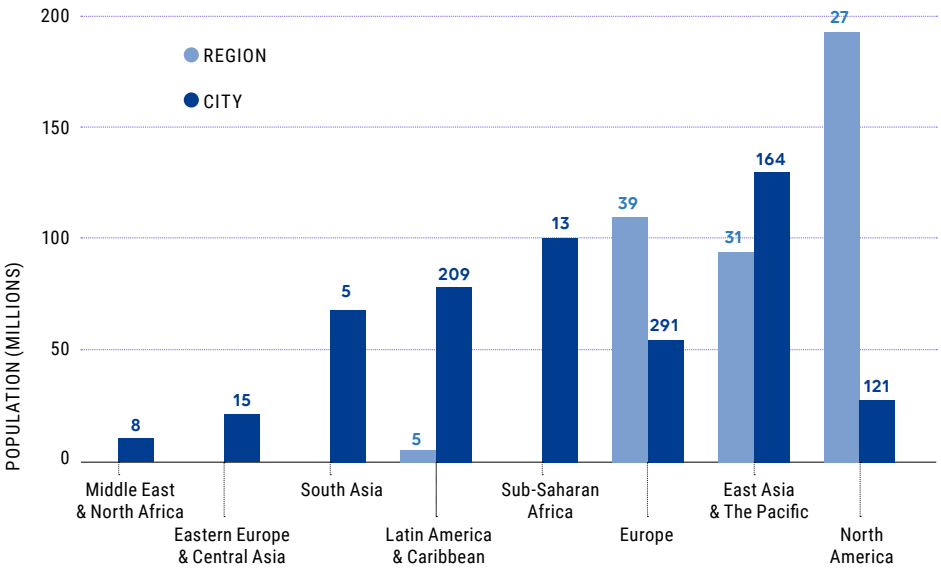
However, there is no single way to reach carbon neutrality. Cities and regions, just like private sector and other actors, use different words and concepts to talk about their commitments which tend to blur the lines between the science-based meaning of carbon neutrality, the political use it is made of it, and the technical implementation of policies to meet the objective. "Net-zero emissions", "carbon neutrality", "climate neutrality", "zero carbon"... The NewClimate Institute offers a summary of the different existing vocabulary, based on the definitions provided by the IPCC when available or existing academic literature (NewClimate Institute, 2020, p. 12-13).

In the absence of a standardized approach to carbon neutrality, it is difficult to compare local governments strategies, aggregate their contributions to global mitigation and track their progress regarding the heterogeneity of their commitments, scope of emissions covered and institutional capacities. Which is why NewClimate Institute intended to "Navigating the nuances of net-zero targets" in this report.

FIGURE 4

POPULATION OF CITIES AND REGIONS WITH NET-ZERO TARGETS, BY GEOGRAPHIC REGIONS

Source: NewClimate Institute, 2020 from Data-Driven EnviroLab

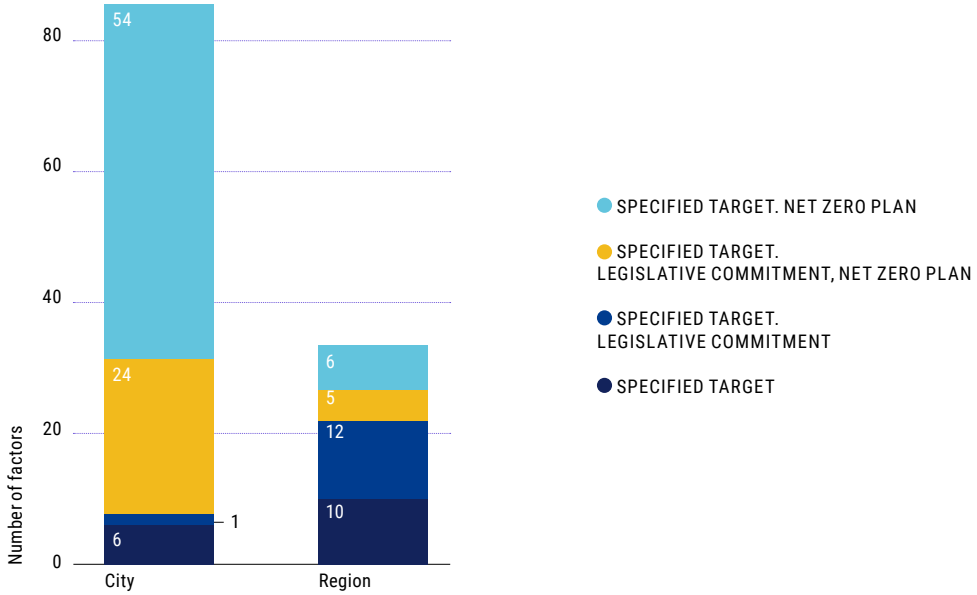


• HOW ABLE ARE LOCAL GOVERNMENTS TO DEPLOY RELEVANT POLICIES TO MEET THERE TARGETS? • Many different decarbonization pathways can be considered, varying according to the stringency of near-term CO_2 emissions phase-out policies (strict cutting of emissions) and the extent of expected contribution of carbon-dioxide removals (CDR) by the Agriculture, Forestry and Land-Use sector (AFOLU) or technological options such as Bio-energy with carbon capture and storage (BECCS) (IPCC, 2018).

Of the 929 local governments committed to net-zero emissions, only 460 have pledged a reduction by a certain percentage by a specific year (NewClimate Institute, 2020). Most of cities and regions have fixed 2050 as their deadline to reach carbon neutrality, but some have set ambitious plans to reach it before (Copenhagen by 2025, Turku by 2029...). Yet, setting a specific reduction objective is a prerequisite to give credibility to net-zero target, although not sufficient. Interim targets are much needed to allow regular tracking of progress and ensure accountability of policymakers, as well as specific sector-targeted plans to reach net zero. From this point of view, **85% of cities and regions where targets were identified by the NewClimate Institute are backed by a published plan or a legislative commitment** (**fig. 5**).

FIGURE 5

HOW WELL PLANNED ARE TARGETS FOR EMISSION REDUCTIONS? - *Source: NewClimate Institute, 2020*



Beyond climate neutrality, the CDP Cities A-List is regularly invites cities to report their climate planning practices. In 2020, 88 cities in the world were scored "A" by CDP and therefore qualified as "Leadership cities" regarding their climate mitigation and adaptation action. This means that the city "*demonstrates best practice standards across adaptation and mitigation, has set ambitious but realistic goals and made progress towards achieving those goals. Cities in the Leadership band have strategic, holistic plans in place to ensure the actions they are taking will reduce climate impacts and vulnerabilities of the citizens, businesses and organizations residing in their city.*" This year's record is down from 105 in 2019, but still twice as much as in 2015 regarding the number of cities setting targets (44) and more than three times the number of cities with adaptation plans (26). This ranking is based on voluntary reporting provided by cities when answering a questionnaire from CDP.

Among criteria, a "A" city *must*:

- Have a vulnerability assessment;
- Have an adaptation plan;
- Have an action plan;
- Have a fully reported GHG emissions reduction target.

Each of these criteria is broken down into sub-criteria, for which scoring methodology was tightened in 2020 compared to 2019 to "better align with the climate emergency" (CDP, 2020). This partially explain the fewer number of A-listed cities. Besides, when the ranking is publicised, only cities having received a A-score are highlighted; others' score remaining private. It is thus hard to identify the reasons why a city has not received the A-score.

In the following, we explore how carbon budgets can support climate plans and strengthen their credibility with robust governance instruments.

C. Budgeting climate efforts to support mitigation action planning and tracking results

• LOCAL CARBON BUDGETS TO PLAN INTERIM MITIGATION TARGETS • Carbon budgets appeared in IPCC's 2014 Synthesis Report on Climate Change, being defined as the "*cumulative amount of* CO_2 *emissions permitted over a period of time to keep within a certain temperature threshold*" (IPCC, 2014). With a carbon budget, an authority can plan the allocation of its mitigation efforts over a defined period to reach a science-based target aligned with a 2°C or 1.5°C scenario. Yet, a carbon budget is more a tracking tool setting a benchmark to assess one government's own efforts rather than a legally binding obligation, which means that missing out the targets often goes without direct consequences for the government.

As such, independent institutions and transparency are indispensable to track and monitor the progress. In the United Kingdom, the *Committee on Climate Change* established in 2008 by the Climate Change Act is the independent body in charge of setting five-year carbon budgets twelve years ahead at national level, recommend pathways to reach the targets in line with net zero objective, and monitor progress through the publication of yearly monitoring reports (Climate Chance, 2019).

To be efficient, a carbon budget must be science-based and stable over time. France for instance, one the few countries in the world with national-level carbon budget, recently received critics from non-state observatories when the government claimed it overshot its 2019 emission targets after ratcheting up the initial budget (Réseau Action Climat, 06/07/2020).

As underlined by Energy Cities in a note about carbon budgets published in April 2020, there is very few examples of cities or regions having adopted a carbon budget (Energy Cities, 2020). Yet, the note recalls, some universities and NGOs tried out to provide local governments with independent carbon budgets. This is the case in the City of Manchester (**case study 6**).

• LOCAL CLIMATE BUDGETS TO MAINSTREAM CLIMATE ACTION WITHIN DAY-TO-DAY EXPENSES • Since 2016, the city council of Oslo has adopted yearly "climate budgets", voted as part of the usual annual budget process (KlimaOslo, 2020). Climate budget is a different approach than carbon budget, rather complementary, as it does not cap ahead the long-term amount of emissions that the city must respect. Climate budget serves as a blueprint to plan yearly transformative actions aligned with the city's emission targets, within an upper limit of emissions.

City of Manchester United Kingdom

The local carbon budget of the City of Manchester

According to the city's 2020 Annual Report released in July 2020 by the Manchester Climate Change Agency (MCCA) – the body responsible for overseeing and championing climate change action at city level, Manchester's emissions have fallen by 4% in 2019. However, the city's has already spent 26% of its 2018-2100 local carbon budget in just 2 years.

The MCCA was established in 2015 by the City council and the Steering Group of the city's first climate change strategy (2010-2020) adopted in 2009 under the name "Manchester: A Certain Future". The MCCA is now responsible for overseeing and championing climate change action at city level. In 2018, the MCCA created the Manchester Climate Change Partnership (MCCP), "*a stakeholder group established to help advise the City on the actions required to reduce its emissions, mitigate the effects of climate change, and act as a focus for businesses, organisations and individuals wishing to take their own action.*" It comprises all sorts of non-state actors, including businesses, a faith group, citizen associations and public actors.

In July 2018, the Tyndall Centre for Climate Change Research, a multidisciplinary research centre, provided the MCCA with a carbon budget aligned with a 2°C scenario to support Our Manchester's Strategy 2016-2015, the city's overarching long-term vision. The carbon budget set three main goals to Manchester to stay within the 2°C carbon budget:

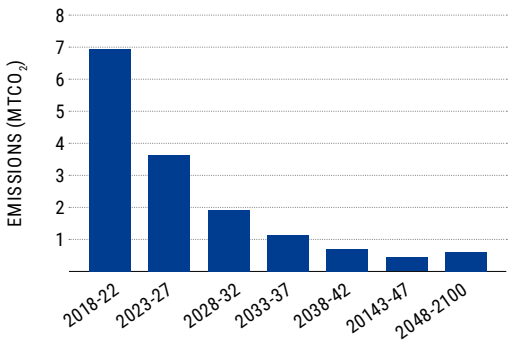
- Hold cumulative dioxide emissions from homes, workplaces, and ground transport (direct emissions) at under 15 million tonnes for 2018-2100
- Delivering an annual average of 13% cuts in emissions.
- Reducing emissions from LULUCF to zero by 2038.

Periodic 5-year, gradually decreasing carbon budgets were recommended and then formally adopted by the City Council in November 2018 (**fig. 6**), and Net Zero target was set for 2038 few months later for Greater Manchester.
A carbon budget is compelling tool as its key parameter is to settle an absolute limit to long-term emissions that requires immediate, ambitious actions from policymakers to find low-carbon pathways to drive its economy. Currently Manchester is on track to reach its 2020 targets of cutting emissions by 40% against a 2005 baseline. Yet, the 2020-2025 targets should be harder to achieve, as the city will need to halve emissions to avoid overshooting its 2023-2028 budget.

Which is why in February 2020, Manchester adopted the Climate Change Framework 2020-2025 to drive transformative action in seven areas: Buildings (existing and new), Renewable energy, Transport and flying, Food, "The things we buy and throw away", Green infrastructure and nature-based solutions; Supporting and enabling residents and organisations to act. On the advice of Tyndall Centre, the CCF also includes "*commensurate action on aviation*" CO_2 *emissions and [addresses] indirect /consumption-based carbon emissions*".

Besides, Manchester is cooperating with other European cities to share its experience as part of *Zero Carbon Cities*, a project financed by EU's URBACT program. By 2022, at the end of the 2-year long project, the cities of Frankfurt (Germany), Vilvoorde (Belgium), Zadar (Croatia), Bistrita (Romania), Modena (Italy) and Tartu (Estonia) are to set up alike local carbon budgets (Energy Cities, 09/10/2019).

LEFT: EMISSIONS PROJECTIONS CONSISTENT WITH THE 15 $MTCO_2$ BUDGET STARTING FROM COMMON YEAR (2017)
RIGHT: MANCHESTER'S 15 $MTCO_2$ BUDGET BY TIME PERIOD - *Source: MCCP, MCCA, 2020*



Time period	CO_2 budget ($MtCO_2$)
2018-22	6.93
2023-27	3.59
2028-32	1.95
2033-37	1.10
2038-42	0.64
2043-47	0.38
2048-20100	0.59
Total	15.17

The climate budget is broken down into sectoral emission targets, with specific measures and policies associated for different sectors that fall into the scope of competences of the municipality: Energy/ Buildings, Resources and Transport. It is the city's finance department that is responsible for drafting climate budgets rather than the environmental team, so that advanced emissions targets are achievable and consistent with municipal finance. Then subject to the same requirements of transparency as any other municipal policy, the success of climate policies of every municipal department can be evaluated and measured by the means allocated and the objectives that were set (Climate Chance, 2019).

When voting the first climate budget in 2016, Oslo vowed to cut GHG emissions by 95% in 2030 compared to 1990 levels, and 50% in 2020. The GHG-inventory published by the Norwegian Environment Agency in the spring of 2020 shows that Oslo will not be able to achieve its target of a 41% reduction in greenhouse gas emissions in 2020, compared with levels of 2009. The Climate Agency's estimates that the greenhouse gas emissions will be only reduced by 25% in 2020 (KlimaOslo, 05/11/2020). New 2021 budget includes the introduction of requirements on the construction industry for fossil free or zero emissions construction sites, investment in fast charging stations for heavy vehicles and coaches, parking restrictions and zero-emission zones. Following the Norwegian resolution on carbon capture and storage (CCS), Oslo is also experimenting CCS at Kemetsrud waste incineration plant.

2. Regulation and direct investment: the first arm of cities to densify services at local levels.

A. Boosting renewables at municipal levels through direct investment, regulation and community-ownership

More and more cities and regions are powered entirely by renewable electricity produced by various means. In 2020, 834 cities in 72 countries had set a renewable energy target. Among them, 617 cities had committed to the goal of 100% renewable energy supply for their municipal operations (REN21, 2021). This is up from the 671 cities IRENA recorded by 2019, including 428 with a 100% renewable energy target (IRENA, 2020). **By the end of 2019, 58 cities or regions, including 44 in Europe, reported to have achieved their 100% renewable energy targets**.

To achieve their goals, local governments have an ever-widening range of supporting strategies and policies. From the remote purchase of guarantees of origins and "green certificates" to power-purchase agreements (see **part 3.A.**), including direct investments and regulations to support local consumption and production of renewable power.

INDICATOR

59
cities or regions

have achieved 100% renewable energy targets.

INDICATOR

617
cities

have committed to supply their municipal operations with 100% renewable energies.

While photovoltaic (PV) panels have never been so cheap as now, building code regulation appears as an efficient way to progressively compel their adoption on all new buildings. As for regulations, The State of California has one of the most ambitious building codes with the obligation to install PV systems in new homes from January 2020. The State is the national leader in decentralised solar energy production with more than 1 million PV installations for a total capacity of 9,300 MW (California DG Statistics, 2020). In New Delhi the local building code was amended in 2020 with a relaxation of height standards in order to facilitate the installation of PV systems (Times of India, 14/07/20). South Delhi Municipal Corporation, one of the five municipalities in the territory of Delhi installed photovoltaic systems on 55 municipal buildings in 2018 and committed in 2019 to extending this measure to all of its buildings including municipal schools (REN21, 2019).

Community ownership of power production facilities has also attracted very much attention of the last years. Community-ownership is an innovative business model in which:

- Local stakeholders own most of the project;
- Democratic governance is applied with voting rights and control remaining community-based;
- Profits are locally distributed.

Community-ownership can deal with a large array of activities (power generation, district heating systems, energy storage, energy efficiency programs, electricity retail...), involve many sorts of actors (local governments, citizens, NGOs, energy utilities and retailers...) and be modelled upon different legal forms (co-operatives, partnerships, NGOs, community trusts, housing association...). Compared with centralized or privately-ran systems, community-ownership provides additional grid flexibility and resilience, while improving renewable energy access, increasing distributed renewable generation and eventually cutting energy cost for community through direct distribution. IRENA records about 4,000 community-owned projects providing power throughout the world, mainly in Australia, Europe and the United States (IRENA, 2020).

This movement was particularly strong in Europe, where the EU has recognised "energy communities" since the voting of the Renewable Energy Directive 2018/2001/EU as part of the "Clean Energy for all Europeans Package". Sizes of projects can vary from large-scale production, as the famous 2MW Middelgrunden offshore wind farm owned by a 8,553-citizen cooperative in Copenhagen, to smaller, off-grid village energy committees (VEC) as found in rural India.

Municipalization of electricity generation facilities as a form of community-ownership appeared as alternative to centralized and privately-ran systems. In this case, municipalities ran public utility companies through which they directly invest in local generation assets and manage the utility on behalf of their citizens. They got particularly developed in Germany where the majority of municipalizations are concentrated, with 90% of the 311 cases identified in 2017 according to the Transnational Institute (TNI, 2017). Seminal examples include Hamburg, where a referendum with binding results ended in the municipalization of electricity in 2014, gas in 2018 and long-distance heating in 2019 (EPSU, 2019); Nottingham, which created Robin Hood Energy in 2015, the first municipal energy company created by a local council in the United Kingdom in over 75 years (REN21, 2019); Barcelona, where the municipal company Barcelona Energía supplies electricity to city council buildings and facilities and to the citizens and companies of Barcelona and its metropolitan area, serving a maximum of 20,000 households (Barcelona Energía).

Yet, there has been some signals that council-owned power utilities may also represent some risk to municipal budgets. In August 2020, Nottingham had to selloff of Robin Hood Energy to British Gas, as the council-owned, not-for-profit appeared to lose about £34 million by March 2019 (BBC, 17/09/2020). Same last year, the City of Bristol had to sell Bristol Energy, debt-ridden by than £30 million (BBC, 03/06/2020).

Some cities are also going backwards for other reasons than financial meltdown. In March 2020, 44 Deutsch municipalities including Rotterdam, The Hague and Dordrecht sold all their shares of Eneco, a company involved in the development of renewables, to a Japanese consortium made up of Mitsubishi (80%) and Chubu (20%). The transaction, was valued at EUR 4.1 billion and was to the detriment of Royal Dutch Shell, which had long been positioning itself to acquire the public company as part of its renewable investment strategy (Eneco, 2020). The sale is the direct result of the unbundling of Eneco and Stedin, its network operator, in February 2017 following the liberalisation of the energy market in 2004, as the government required energy companies to get rid

of their electricity and gas networks. With very few production capacity, Eneco's 44 municipal shareholders found themselves with a retailing company for energy products and services, which they do not regard as a government task.

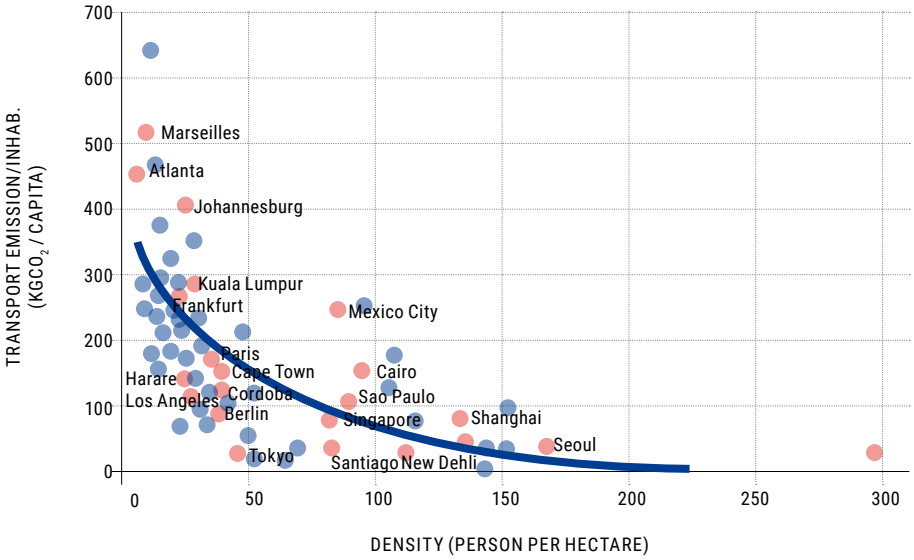
B. From "smart cities" to "15-Minute Cities" and "tactical urbanism": a new wave in strategic space management

If it were to be observed through a strict "climate prism", a prominent contribution urban planning can do to cutting GHG emissions can be boiled down to reducing fossil fuel consumption for transport of goods and persons through reduction of distances and providing proximity-based services and activities (**fig. 6**). Such a policy also contributes to reduce inequalities and reach the targets of SDG 11[3]. Indeed, medium- and low-wages households living in the outskirts or in residential areas bear the brunt of the economic and social cost of car ownership as basic urban amenities and services are located further away from their living place. Lack of spatial flexibility also impacts access to jobs[4]

Unexpectedly, Covid-19 outbreak has stressed cities' vulnerabilities and dependence upon trade and out-boundary productions to meets the basic needs of residents. In this perspective, the pandemic has given cities a necessary boost to accelerate an innovative approach shifting from increasing *mobility* to enhancing *accessibility* to densify local activities (OECD, 2020). Two approaches have raised particular attention: tactical urbanism and 15-Minute cities.

FIGURE 6

URBAN DENSITY AND TRANSPORT EMISSIONS - *Source: Liu, Z., 2012*



• TACTICAL URBANISM • In the immediate aftermath of the first lockdown, many cities throughout the world adopted emergency measures, including the building of temporary cycling lane, to ease traffic and encourage soft mobility (see p. XX). Media were rapidly keen into dubbing this movement "tactical urbanism". The word itself was coined in 2015 by Mike Lydon and Anthony Garcia, authors of *Tactical urbanism: Short-term action for Long-term Change* (Island Press, 2015), and defined as "*an approach to community-building using short-term, low-cost and scalable projects intended*

3 "Make cities and human settlements inclusive, safe, resilient and sustainable"

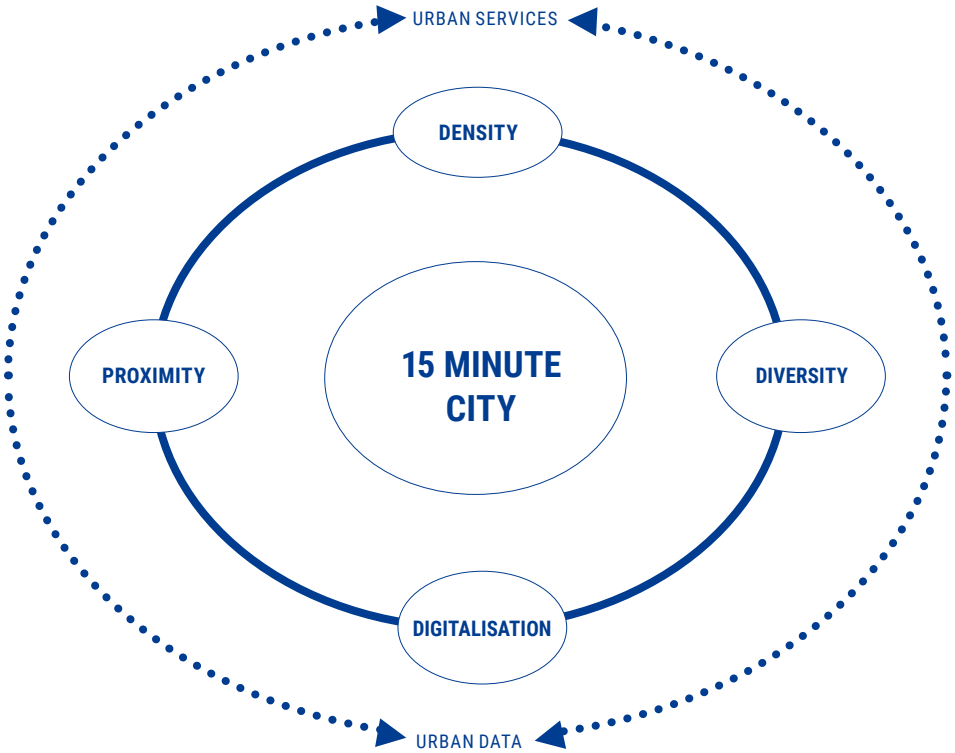
4 See Laboratoire de la mobilité inclusive (2017)

to catalyse long-term change". From demonstration projects to pilot projects and interim design, tactical urbanism can be sanctioned or unsanctioned by authorities, but is always intended to drive long-term change based on user experience rather than top-down design[5]. A successful example of bottom-up tactical urbanism movement that turned into a long-term policy is the *Park(ing) Day*, when cyclists invaded a parking lot of San Francisco in 2005 to temporarily turn it into a park, before it became a sanctioned, Mayor-supported event as soon as the next year (Herman & Rodgers, 2020).

• 15-MINUTE CITIES • Over the last years, the concept of "Smart cities" has long been dominating the discourse of urban planners in big cities, in the perspective to sustain a narrative around more liveable, resilient, sustainable cities. The idea of "Smart cities" aims at the *optimization* of urban fabric through the deployment digital technologies. The concept relies on the Internet of Things (IoT), Artificial intelligence or Big Data to address challenges currently faced by cities such as efficient resource management (energy, water...), reducing urban sprawling, cutting pollution, easing accessibility to basic services, and tackling climate change (Moreno et al., 2021).

FIGURE 7

THE 15-MINUTE CITY FRAMEWORK - *Source: Moreno et al., 2021*



It is Carlos Moreno, French-Colombian researcher in urban planning and specialist of "smart cities", who firstly coined the concept of "15-Minute City" in 2016, before it was popularised through experiments of several cities throughout the world and became a major focus of the 2020 Paris municipal election campaign. This concept is part of broader thinking about "chrono-urbanism", "*which outlines that the quality of urban life is inversely proportional to the amount of time invested in transportation, more so through the use of automobiles*" (Moreno et al., 2021).

5 See Mike Lydon presentation in Transformative Urban Mobility Initiative (03/04/2020). "Webinar on Tactical Urbanism as COVID 19 Response – April 02, 2020" [Video]. YouTube.

In a 15-Minute City, locals are able to reach within a 15-minute ride in bicycle or walk all their basic essentials and fulfil six essential urban social functions: living, working, commerce, healthcare, education and entertainment. To do so, Moreno advocates in his latest article "*the urban built environment needs to be restructured*" and the 15-Minute City to incorporate four dimensions: density, proximity, diversity, and digitalization (Moreno et al., 2021; **fig. 7**).

Some authors have then explored variations of the 15-Minute City to underline their different socio-economic benefits. For instance, Weng et al. (2019) introduced the idea of a "15-Minute Walkable Neighbourhoods" "*as a way of promoting the health dimensions of the residents especially in voiding non-communicable diseases like obesity*" in the Chinese context. Capasso Da Silva et al. (2020) argue that focusing attention to accessibility rather than transport connections during planning stages could lead to cities accessible within 20-Minute walk, cycling or transit.

In July 2020, the C40 issued a manifesto for an exit from the Covid-19 crisis, the *C40 Mayors' Agenda for a Green and Just Recovery*. The creation of 15-Minute Cities is one of the strategies put forward to strengthen cities' resilience. The document points to the need to create a legal environment that encourages inclusive zoning and mixed-use urban development (C40, 2020). Several cities have already adopted this concept in response to the Covid-19 crisis, such as the city of Milan, which is encouraging teleworking in companies, converting 35 km of roads into pedestrian and cycle zones and working with the Lombardy region to open medical centres in densely populated areas.

At neighbourhood level, it is about improving urban design to diversify usage so that people can not only live and work there, but also enjoy themselves, eat and drink and have access to education, culture, and health. In short, it is about going back to the urban design familiar to our cities before the advent of the car in the second half of the twentieth century. The city of Portland is one of the first to position the development of such neighbourhoods at the heart of its climate plan. In 2015, the city set a target of an 80% reduction in its GHG emissions by 2050, relative to 1990 levels, and one of the main strategies for achieving this is the creation of "complete neighbourhoods" for 80% of the population. The "complete neighbourhood" concept is defined as follows: "*a complete neighbourhood provides safe and convenient access to the goods and facilities needed for everyday life. It includes a variety of accommodation options, grocery stores and other shops, quality state schools, public green spaces and recreational facilities*" (Portland, 2015). Other cities will then follow this example: in 2018, Melbourne unveiled the "20-minute neighbourhood" principle, whereby people should have access to all essential services within 20 minutes; in 2019, Minneapolis made a commitment to ensure that its entire population lives in "complete neighbourhoods" by 2040 (Minneapolis) and in the same year Ottawa launched its "15-Minute neighbourhood" programme (CBC, 22/08/2019).

In Sweden, ArkDes, the national architecture and design museum, started to experiment in 2020 the *Street Move* national program, with the support of the national government and financed by Vinnova, the state innovation agency. The project consists in interactive kits designed in a similar style to Lego pieces or Ikea furnitures, to be built by local residents to transform their streets into more liveable places. Sitting places, soft-mobility hubs, playgrounds, plantings... the aim is to find new functions to parking places to densify hyperlocal activities and progressively turn those cities into a "One-Minute Cities". Firstly, tested in Stockholm and now Gothenburg, other units are to be set in Helsingborg (The Guardian, 08/02/2021; ArkDes, 2020).

C. Transport and mobility: aligning city-scale Covid-19 resiliency with climate change mitigation

As described in Climate Chance's 2020 Synthesis report on climate action by sector, Covid-19 has put municipal public transport financial schemes in dire straits. Pressure on public transports has been tighter in cities where the sector receives few public subsidies and mostly relies on user fares to fund the system. More than elsewhere, reduced demand for transport in these regions has had violent repercussions, cutting incomes while operating costs remained. In Brazil, operators in Salvador and São Paulo have already gone bankrupt, and half of the bus transport companies are threatening to file for bankruptcy by the end of 2021 according to the president of the NTU, the national association of urban transport companies (Folha de S. Paulo, 09/07/20).

However, some public transport systems proved much more resilient despite heavy reliance on user fares. For instance, Seoul financial model is highly dependent on users (between 70 and 75% of the operating budgets of the bus network, the same for the metro), but it resisted Covid-19 very well, limiting the drop in ridership to -30% at its peak in March 2020 compared to 2019 and recovered 84% of pre-pandemic levels in November.

In a comparative investigation, the online magazine City Monitor tried to figure out what policy choices made a difference in Seoul, compared to another city that suffered much more, San Francisco (SF). San Francisco recorded a drop of around -90% in April 2020 without having recovered normal levels since. The financial losses of the BART, the San Francisco Bay express train, are estimated at USD 975 million over the next three years (San Francisco Chronicle, 14/07/2020). While containment measures were much stricter in San Francisco than in Seoul, the latter recorded 23 times fewer cases than its American counterpart. The article proposes several explanatory factors: greater health discipline on the part of Koreans (and consent to privacy control) and transport operators (systematic disinfection of buses after each journey), a more widespread and accepted practice of teleworking in San Francisco, with lower rates of public transport use in the U.S. than in Asia (and already declining since 2014 in SF), and a more systematic reliance on cars in the U.S. than in Korea, whereas public transport is central for workers transit in Seoul. Finally, the fragmentation of transport services in the SF urban area and poor coordination between operators complicates the rebound in usage (City Monitor, 28/12/2020).

INDICATOR

2,570 km

of cycle paths have been announced by cities in Europe since the beginning of the pandemic, with half of them already completed.

In this context, direct investment in cycle lanes infrastructure not only appeared as a low-cost, efficient emergency measure to encourage soft mobility, but also as a long-term policy to mitigate transport emissions. As of February 2021, the European Cyclists' Federation has recorded the allocation of budgets totalling over €1.1 billion to promote bicycles since the beginning of the pandemic and exactly 2,571.84 km of cycle paths have been announced, more than half of which have actually been completed to date. 76.9% of these measures relate to the creation of bicycle lanes, 18.3% to calming and reducing traffic and 4% to opening pedestrian areas (ECF, 2020). In some European cities, these infrastructure investments have also been combined with subsidy programmes to purchase electric bikes, such as in Paris, Vienna, Guernsey, Lisbon or Madrid.

Rufisque - Senegal

A localized food system to encourage local demand of local products

While agriculture is the first emitting sector in Senegal (49%; UNFCCC, 2016), it is only a small share of Dakar's territorial emissions (1.6%), much less than food consumption resulting from imports (7.8%; ARENE, 2013). As any other urbanized city, this reveals the high dependence of the capital to suburban and farming lands of the countryside to sustain the food system.

Yet, at the country level, the primary sector (including agriculture, breeding, sylviculture and fishing) only accounted for 15% of the GDP in 2019, although it occupies 50% of jobs (ANSD, 2020). peanuts (5.9% of exports), canned and fresh fish (9.8%) as the main primary products sent to exports. Because of this gap, Senegal heavily relies on international imports to meet demand for food. Overall food products accounted for 29% of the country's total imports of goods, while they amount to 40.6% of the country's exports. Rice alone, which weighs 70% of a Dakari's alimentation (ARENE, 2013), amounts to 4.9% of national imports and is among the most imported products in the country, behind refined petroleum and machineries (ANSD, 2019).

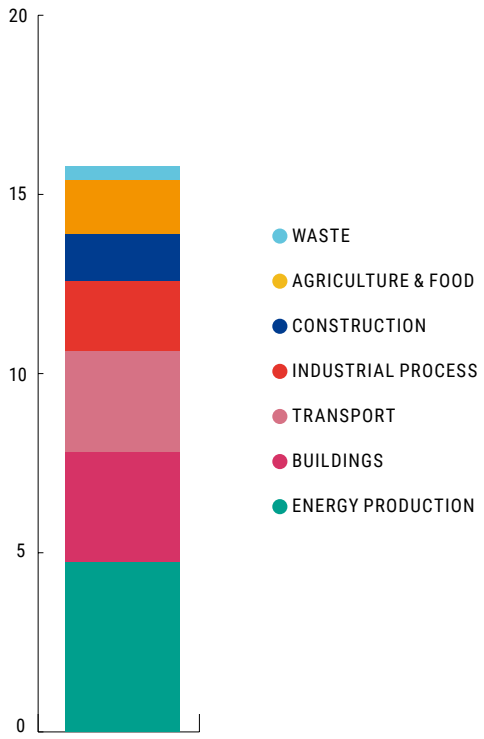
Rufisque is a 500,000-inhabitant department covering 2/3 of Dakar region's area and most of its agricultural lands. In 2017, a food system diagnosis revealed Rufisque's farming lands are threatened by the combined rapid urbanization of the cities Dakar, Thiès and Mbour. There, family farming rub shoulders with big, capitalistic crops, and women play a central role in food transformation and catering. While household dedicate most of their income to buying food, their purchase power and nutrition are subject to international speculation over raw food products. In the meantime, processed food products are more and more popular (GRDR, 2017). At national level, rainfall variability and climate change have been identified as major risks for key farming activities, as peanut culture (Plan Sénégal Émergent, 2014). Born out of the 2013 Decentralisation Act, the Departmental Council of Rufisque (DCR) has the relevant competences to protect farming lands and develop local economic fabric.

The DCR experiments an approach focused on encouraging local demand to support regional production called "*territorialized food system*." (TFS). TFS is an emerging approach relying on a food governance based on multi-actor participation, agroecology, reduction of food waste and fair share of added value at local scale (Alimenterre, 2019).

Implementing a TFS approach is the purpose of the AMOPAR program, which aims at delivering a Local Food Plan in Rufisque based on the diagnosis. Funded by AFD, and co-piloted by Senegalese association CICODEV, French-NGO GRDR and the DCR, the project is part of the broader programme SADMAD to strengthen resiliency of the populations in food insecurity in the suburbs of Dakar. Concretely, the Local Food Plan will seek to improve quality of meals in canteens, raise pupil's awareness about nutrition, provide consumers with relevant information about quality food, raise incomes of women in the supply chain, and develop a participatory-based governance of the Plan. The diagnosis also underlined the potential benefits for mitigating the food system's emissions of bringing consumers and producers closer through the supply chain. The project is due to end by February 2022 (GRDR, n.d.; AFD, 10/03/2021).

EX-REGION OF DAKAR EMISSIONS 2008 ($MTCO_2E$)

Source: ARENE, 2013



D. Food systems: the case for renewing city-region relationship in a context of pandemic

In the same vein, with the purpose to densify local economic activities and to tighten links between cities and their regions, Covid-19 has triggered a lot of thinking about food systems vulnerabilities. Panic-buy behaviours and empty shelves in the first days of lockdowns also put pressure on large retailers. Romania for example, although one of the EU's largest cereal exporter, decided to ban exports of wheat, corn, rice, sunflower and other food basics such as sugar and vegetable oils during Covid-19 state of emergency (Euractiv, 10/04/2020). Some political leaders at national levels and supranational levels then started to call for building "food sovereignty", such as French President Macron during a public speech in June 2020, or the European Union though the "Farm to fork" strategy introduced as part of the European Green Deal.

At local level, 31 cities from all over the world signed the Glasgow Food and Climate Declaration on 14th December 2020. Supported by several transnational local government networks as C40, Under2 Coalition and ICLEI, it was also endorsed by local initiatives such as the Spanish Red de Ciudades por la Agroecología[6] as well as the Milan Urban Food Policy Pact, an international agreement on urban food policies signed by over 200 cities in 2015. The Glasgow Declaration is a 16-point document advocating the integration of food policies into Nationally Determined Contributions (NDCs) that are due to be revised in the lead up to COP26 in Glasgow. The Declaration also insists on horizontal (between different sectors) and vertical (between different levels of governance) integration of food policies and advocate the building of food systems able aligned with the Paris Agreement and the Sustainable Development Goals. Indeed, food sovereignty is not only a matter of adaptation to climate change, since food systems today account for 21-37% of total GHGs (IPCC, 2019). Considering that "*the majority of food system innovation and change are occurring at local and regional levels*", the Declaration highlights the need to empower local governments to scaling and extending action.

In December 2020, the EuroChoice journal dedicated a special issue upon "Covid-19 pandemic impacts on agri-food systems" (vol. 19, issue 3). To one of the authors, building a resilient food system is a matter of trade-off between globalised, high-emitting food chains dependent on international transport networks (threatened by lockdowns in the pandemic context) and local chains dependent on few producers and purchasers (which is also a risk for food security as vulnerabilities are not shared) (Matthews, A., 2021).

Several initiatives sprang up. In Spring 2020, the French NGO Les Greniers d'Abondance edited a free guidebook for local policymakers entitled *Towards Food Resiliency. Face global threats at local level*, which provides diagnosis of the French food systems vulnerabilities and practical pathways to enhance resiliency at each stage of the food system. Les Greniers d'Abondance also developed CRATer, an online application that automatically calculates some indicators characterising the level of food resilience of a given territory: relation need/production; farming practices; farming population; and land-use policy.

In Scotland, the usually export-oriented fishing industry suffered from the overall falling of exports in the United Kingdom during the first six months of 2020 (-23.3% by value), combined with declining demand from restaurants during lockdown and issues raised by Brexit. In response, the Edinburgh Fish City project was launched in 2020 by the marine conservation charity Open Seas and Edible

6 "City Network for Agroecology"

Edinburgh, the city-wide, city council-led multi-actor partnership to build a sustainable food system in Edinburgh. The campaign aims to build relationships between traceable suppliers of sustainable fish and their local community. First, signatory businesses pledge to a charter including stating location and fishing gear used; stop selling seafood "red rated" by the Marine Conservation Society's Good Fish Guide; and procure certified or "green rated" seafood by the Good Fish Guide, promote small scale fishing and providing transparent information to consumers. Pledgers are then listed to an online directory of sustainable seafood businesses from which people can find details of the nearest supplier to directly buy from them (Nourish Scotland, 15/01/2021).

3. Sourcing renewable energy and EV fleets through public procurements

Green Public Procurements (GPP) have been well documented in the past years as for any act of purchase from a public authority to "*procure goods, services and works with a reduced environmental impact throughout their life cycle when compared to goods, services and works with the same primary function that would otherwise be procured*" (European Commission, n.d.). World Bank estimates that 12% of the global Gross Domestic Product is spent following some form procurement regulation, at a nearly identical level in low-income and high-income countries (Bosio, Djankov, 05/02/2020).

In Europe, these GPP are legally defined in two directives related to procurements (2004/18/EC and 2004/17/EC). In the European legal context, Ecolabels provide proofs of compliance with the environmental criteria the public authority is looking to meet. From printing equipment to data centres or textile products (to quote those products whose criteria were revised by the Commission in 2020), GPP norms cover a large range of products and services. The famous EU Energy Label rating the energy efficiency of appliances from D (red) to A+++ (dark green), or the Energy Performance Certificate for buildings, are some of them. Directive 2004/17/EC specifically rules the water, transport and energy sectors.

In a climate perspective, procurements and purchase power of local governments can be voluntarily oriented towards specific products and services to abate emissions through low-carbon goods and services. Public procurement from local authorities also constitutes a good indicator to identify how relationship between local governments and private sector is evolving. In the following we examine the case of two sectors where specific trends have emerged: energy with power-purchase agreements, and transport and with the rise of e-buses.

A. The trend of Power-Purchase Agreements reaches cities in Europe, Australia and United States

Power Purchase Agreements (PPA) are privately negotiated long-term contracts between renewable electricity producers and consumers ("offtaker"), without going through an electricity supplier. PPAs make it possible to secure a fixed price per KWh over time, reducing the risks associated with market prices for both sides. As renewable energy prices are dropping, PPAs appear as a good way to secure investments for facility developers. As municipalities are major consumers of electricity whether for public buildings, schools or urban lighting, municipal PPAs can also help cities reaching their renewable consumption targets without investing in local power facilities. However, apart from big cities, municipal PPAs remain an emerging practice, compared to those signed by the private sector[7].

For instance, in November 2020, the City of London signed a £40 million (€46 million) PPA with the French renewable power producer Voltalia to buy all the electricity produced by a new-build 95,000-panel solar farm in the county of Dorset, South of England, for 15 years. The solar farm is not built yet, which is the aim of a PPA: the contract helps the company to leverage cash to finance the project, while the city saves money (about £3 million here) in energy costs (City of London, 18/11/2020). Regarding the cases of Nottingham and Bristol, PPA also seem a less risky option than council-owned companies (see **part 2.A.**).

7 See Energy chapter in Climate Chance Observatory (2020). Global Synthesis report on climate action by sector. *Climate Chance*

Yet, to be profitable, a PPA must deal upon a large amount of energy to allow economies of scale – which can be excluding to smaller cities with smaller budgets, and other local actors. So, cities can facilitate group purchasing for other players in their region by forming new entities known as Community Choice Aggregations (CCA). Cities or groups of cities purchase wholesale electricity to meet the combined loads of residents and businesses in their region, benefiting competitive rates by aggregating demand (IRENA, 2019). The latter then have the choice of remaining in the programme or reverting to their former supplier. This makes it possible to negotiate competitive prices with suppliers and to choose your electricity mix. This is mainly the case in the United States, where eight States have CCA legislation allowing local government to consolidate the electricity loads of residents, businesses and municipal facilities, but there are also programmes in several municipalities in the prefectures of Yamagata and Gunma in Japan (IRENA, 2019). Melbourne's two successive PPA over the last three years is also providing a good example of how local government can lead their biggest energy-consuming facilities to turn towards low-carbon power (**case study 8**).

B. Deploying low-carbon vehicles through public tenders

Electric-vehicles are getting increasingly popular in Europe, Japan and China, and the market proved remarkably resilient to the pandemic (+40% in 2020 globally, while global car sales were plummeting by 14%), although still limited to small share of the global car markets (0,8% in 2019) (IEA, 2021). In this context, cities are playing their part. Since Shenzhen reportedly became the first city in the world with 100% electric bus fleet in 2017 (Climate Chance, 2018), many cities have made use of public procurement to shift their public transport fleet into e-vehicles.

Latin America in general, and Colombian cities in particular, have been leading the way to introducing electric buses (e-buses) into their public transport fleets (Climate Chance, forthcoming). Cali's *MIO* system was the first to implement electric buses with the first of a total of 136 electric vehicles starting operations in 2019. In Bogotá, where the pollution caused by the *TransMilenio* – the Bus Rapid Transit (BRT) system of the city – has been a highly salient political issue, a major step was taken towards electrification with the arrival of 379 e-buses in 2020, forming the largest such fleet on the continent. These vehicles are expected to cut emissions by 21,900 tons of CO_2 (Sustainable Bus, 2019). Across Colombia and the continent, most of tenders have been won by Chinese automakers like BYD, which has made a massive entrance into the South American electric vehicle market since 2019 (Diálogo Chino, 20/06/2020). As of March 2021, the E-Bus Radar recorded a total of 2,306 e-buses in Latin America (2.28% of the bus fleets of the cities on the platform), up by 170% since 2017. It estimates that it allows saving 234.71 $ktCO_2$ per year (E-Bus Radar, 2020).

INDICATOR

+170%

the growth of e-buses in Latin American cities since 2017

BYD, which only lost last year the number one seat of global EV producers to Tesla (Clean Technica, 10/12/2019), is also entering the European market, as evidenced by the 259 BYD e-buses operated by Keolis that entered service in several middle-cities and small towns of the Netherlands, recorded as Europe's largest e-bus order yet (Automotive World, 14/12/2020).

Australia - Melbourne

Melbourne, a 100% renewable-powered city at the vanguard of Power Purchase Agreements

Home to more than 5 million people, Melbourne reported emissions amounted to 4,9 $MtCO_2$ in 2019, down by 14% from 5,8 $MtCO_2$ in 20148. Changes of methodologies apart, City of Melbourne identifies the surge of renewable energies over the last years as the main driver of this success (CDP, 2020). Indeed, in early 2019, Melbourne claimed it became the first Australian Council to cover 100% of its infrastructures power consumption (universities, lighting, corporations, cultural institutions…) with renewable energies (City of Melbourne, 17/01/2019). An achievement consistent with the city's pledge to reach zero net emissions for all the Council's public operations by 2020 (City of Melbourne, 2014). From 2011-2012 to 2018-2019, the municipality of Melbourne alone (i.e. the Council representing 159,992 inhab.) reduced emissions from its operations by 54% (Scope 1, 2, 3), including a 65% drop in Scope 2 emissions, which includes energy purchase (City of Melbourne, 2019).

At the heart of this success is the use of Power Purchase Agreements (PPA) to supply the city with electricity from renewable sources. In 2017, a first PPA signed under the aegis of Melbourne supported the construction of the new 39-turbine Crowlands Wind Farm, operated by Pacific Hydro firm in Western Victoria, some 200 km away from Melbourne. The new farm opened in early 2019 with a capacity of 80 MW and proposed yearly generation of 264 GWh, of which 88 GWh were purchased by thirteen of Melbourne's biggest energy consumers. Gathered in a city-led consortium called Melbourne Renewable Energy Project (MREP), none of these actors had to make any direct capital investment into the project, as the agreement alone provides guarantee of financial returns on investment to Pacific Hydro. 40% will be purchased at a fixed price, while 60% will be a market-based price renegotiated every two years. In total, the PPA avoids the emissions of 96,800 tCO_2e a year in Melbourne and equates to the annual power consumption of 17,600 households or taking 22,500 cars off the road every year. The project now supplies energy to power town halls, bank branches, universities and street lights.

In June 2020, Melbourne facilitated the signing of a second collective PPA with seven local players including universities and businesses. The Melbourne Renewable Energy Project (MREP 2) will supply 110 GWh of renewable electricity per year to the purchasing group over 10 years, i.e. 22 GWh more than the first PPA. This electricity will supply fourteen shopping centres, nine office buildings, seven university campuses and four factories, equivalent to the consumption of 22,000 Australian households a year (City of Melbourne). This time, MREP2 sources power supply directly from existing Yaloak South Wind Farm, and the remaining from other wind farm projects in Victoria State. MREP 2 is expected to reduce the equivalent of 2.7% of the city's emissions every year, i.e. 1 $MtCO_2$ over the 10-year lifetime of the project. The two PPA combined lead to 5% equivalent reduction in City of Melbourne community emissions.

Melbourne's approach is close the Community Choice Agreements (CCA) that exist in the United States. As a local government of a big city, taking the lead of a consortium strengthens the application of smaller actors of the city, but also outside the city boundaries: the deal made in the first MREP only covered one third of the annual amount of power generated of Crowlands Wind Farm, but secures enough outlet for the farm to supply power to other places not part to the deal.

The City of Melbourne also edited a guide to advise corporate organisations of its territory on the different ways to purchase off-site renewable energy through PPAs but also renewable energy certificates and "contracts for difference".

8 Although these emissions are reported by "City of Melbourne" in CDP database, we reckon these figures cover all Greater Melbourne Area regarding their proportion. In this case study, the MREP is driven by the municip

SECTION III

SECTION III

Multilevel climate governance & the integration of local governments

1. Definition and stakes around the multilevel governance

A. A need for cooperation recognized by national governments

The need for cooperation between the different levels of governance, and in particular the integration of the potential of action by cities and regions, is now widely recognised as a necessary effort to reach the objectives of the Paris Agreement and to make its implementation credible. This was the main message of the International Conference on Climate Action (ICCA) in May 2019 in Heidelberg, which the Director of the World Resources Institute (WRI) summarised as follow: "*harnessing the full power of towns and cities to drive the shift to a low-carbon, climate-resilient future requires action at all levels of government, with strong supportive policy frameworks, incentive systems and financial resources for sustainable infrastructure*" (WRI, 2019).

National States recognised at various occasions the need to strengthen the capacities for climate action of local and subnational authorities and to cooperate further with them. The IPCC (Intergovernmental Panel on Climate Change) clearly identified multilevel governance as a lever to achieve the Paris Agreement's objectives: "*Strengthening the capacities for climate action of national and sub-national authorities, civil society, the private sector, indigenous peoples and local communities can support the implementation of ambitious actions implied by limiting global warming to 1.5°C*" and precises further "*Cooperation on strengthened accountable multilevel governance that includes non-state actors such as industry, civil society and scientific institutions [...]*" (IPCC; 2018). So does the "Paris Rulebook" - the guidelines for the implementation and monitoring of the Paris Agreement - which includes (amongst other things) guidance on inclusions in NDCs[1] and "*reaffirms the key role of a broad range of stakeholders, including regions, cities, the private sector, intergovernmental organisations, non-governmental organisations, decision makers, scientists, youth, women and indigenous peoples*" (UN-Habitat, 2020).

The greater attention given to the specific role of local authorities in the issue of climate change has been motivated by various arguments along the past decades: better suited and more agile than central governments to address sustainability challenges (air quality, local development, etc.) they are all confronted to; their capacity to innovate and experiment policies and tailored strategies; the failure of intergovernmental cooperation and the COP process, etc. (Hickmann, 2021). Other benefits of municipal action include short decision-making pathways, good knowledge of the local situation, and proximity to citizens and to visible results (GIZ, 2021).

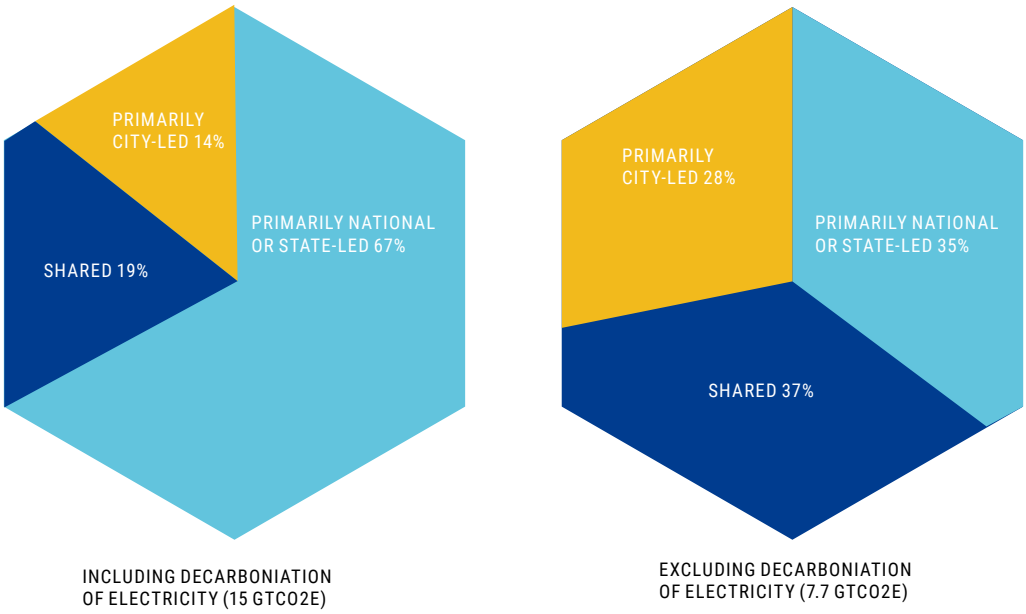
According to the *Coalition for Urban Transitions*, local governments in the world have in average direct power over less than one third of the emissions reduction potential in their cities (**fig. 1**). National and state governments have control over a further one third. More than one third relies therefore on different levels of government to work together to cut emissions, making the future of cities a vital collaborative effort (CUT, 2019).

1 Nationally Determined Contributions (NDCs) embody each country's efforts to reduce its national emissions and adapt to the effects of climate change (UNFCCC).

FIGURE 1

PROPORTION OF 2050 URBAN ABATEMENT POTENTIAL OVER WHICH DIFFERENT LEVELS OF GOVERNMENT HAVE PRIMARY AUTHORITY OR INFLUENCE

Source: Stockholm Environment Institute for the Coalition for Urban Transitions, 2019.



The way in which this cooperation between local, subnational and national governments is achieved differs greatly from country to country and depends on the institutional history of each country and the historical relationships between these different levels. The question of financial means, the technical expertise held by local governments, of course, greatly determines the possibilities. In this section, Climate Chance therefore analyses the issues related to a better integration of local, subnational and national climate planning processes, and highlights relevant experiences.

B. The different dimensions and characteristics of the multilevel climate governance

A multilevel governance is a complex cooperation system between actors at all levels of government with several dimensions, that shapes the decision-making process (Odysee Mur, 2018[2]; **fig. 2**). We will mainly focus on the reciprocal integration between local, subnational and national levels but other dimensions of cooperation ensure an effective multilevel governance such as:

- the ability of local governments to work together or cooperate transnationally or "horizontally". This is particularly the role of the initiatives and networks described and analysed in Section I of this Synthesis Report on Local Climate Action 2021.

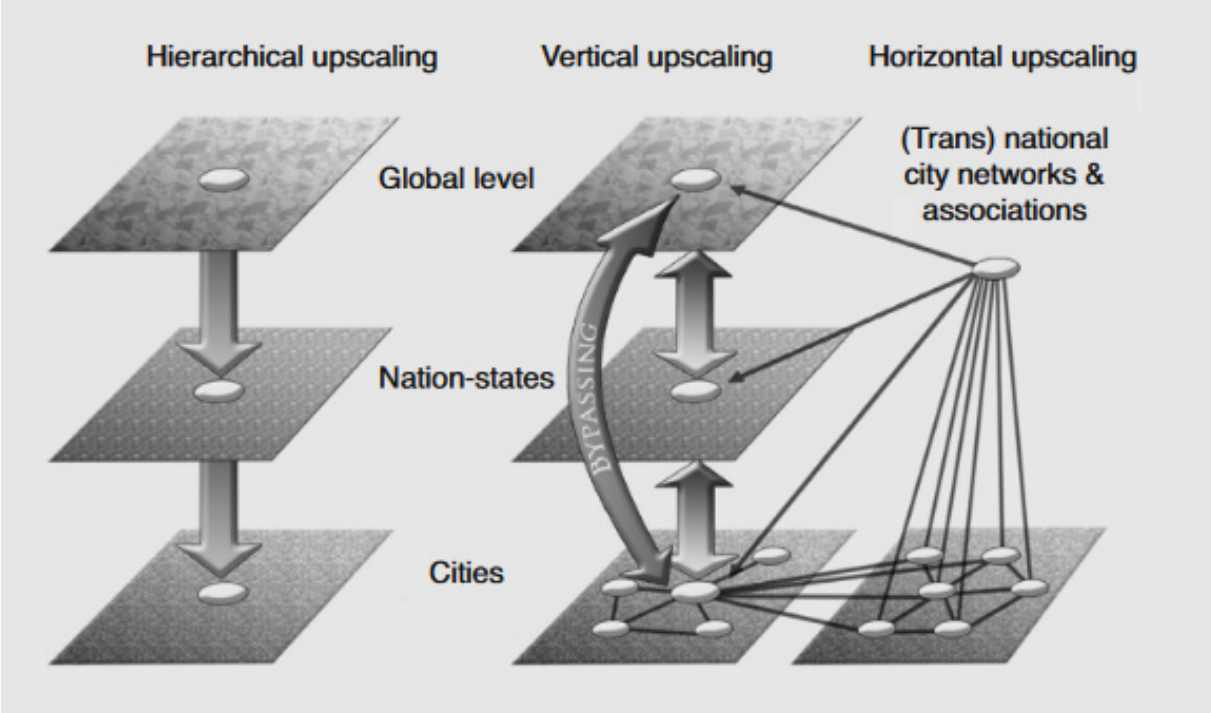
- the capacity to integrate citizens as well as private and local actors in the formulation of public policy, but also in its implementation and monitoring. Indeed, local authorities have often limited resources and are dependent on support from other governmental levels, but also "*international funding, civil society engagement and private corporations that all operate in the multi-level governance system*" (Hickmann, 2021).

2 Faberi,S (2018). Multi-level governance: linking up local, regional and national levels to deliver integrated sustainable energy action plans and projects. Odysse-mur project.

FIGURE 2

EMBEDDED UPSCALING IN MULTI-LEVEL CLIMATE GOVERNANCE

Source: Fuhr, H., Hickmann, T., & Kern, K. 2018. Based on Kern 2014.



The dimension we are interested in sometimes referred as "vertical integration" that can be defined as "*the efforts of coordination and reciprocal consideration of climate policies by the different levels of administrative governance of a country, in order to jointly develop, implement or monitor a climate mitigation or adaptation strategy*" (GIZ, 2018).

In a more recent report, the same author organisation defines the principle of Collaborative Climate Action (CCA) as a "*politically intended, well-organised cooperation across different levels of government to achieve defined climate targets, ideally through joint action*". By well organised, it also means a cooperation able to prevent contradictory measures (GIZ, 2021).

There is an undoubtable growing acceptance that cities and territories are an unavoidable level of action for both the formulation and implementation of national mitigation and adaptation policies, but thinking their cooperation beyond the mere top-down approach or each level respective approach, and identify better the resources and capacities of each authorities, has additional benefits.

Through the existing literature we can identify a series of objectives and gains (Biermann et al.,2009; Broekhoff et al.2015; Andonova et al.,2009; Fuhr, H., Hickmann, T., & Kern, K. 2018; GIZ, 2021), of which the most commonly posted are:

- greater efficiency in the local implementation of national or regional climate programmes;
- preventing contradictory measures and thus support coherence between policy and municipal action;
- a catalytic effect on the will and action of regional and local governments, eased by a stronger ownership;
- avoiding policy gaps between the different levels of climate planning;
- a better allocation of human and financial resources between different levels;
- the sharing of information and experience between different levels of governance.

Experiences and possibilities for integration are different according to the institutional, national, and even regional contexts. However, still based on this literature, we identified three main characteristics that can be used to assess the cooperation between levels of authorities.

1. THE RECIPROCAL CONSIDERATION OF AUTHORITIES

- a "top-down" approach with the integration of national climate strategy by local and subnational levels through the adoption of common objectives, or the implementation and adaptation to local context of priorities, policies, tools.

- a "bottom-up" approach with the integration of local and subnational policies into national strategies, by encapsulating the diversity of local characteristics that could be put to good use with adapted tools and policies.

Local and subnational governments are more likely to be integrated by National States as actors in the implementation of national objectives, as a vehicle at local level for national and often sectoral orientations. Consultation with local and sub-national governments - and through them the actors in their territories - during the design of national climate policies is progressing, as shown by our recent case studies on multi-level governance in the G20 countries (see **part 3**). However, little experience shows that their implementation and impacts are really taken into account in order to contribute to national policy cycles, their evaluation and their renewal and adjustment.

This is the objective of initiatives such as the Climate Action Aggregation Tool (CAAT). This online tool distils the step-by-step process laid out in the ICAT Non-State and Subnational Action Guide and was developed to support government experts, analysts and policymakers to identify, quantify and aggregate the impact of non-state and subnational actions. As a result, they can be integrated into mitigation targets, projections, and scenarios in support of policy development, policy evaluation and target-setting. Specifically, the CAAT enables users to (1) better quantify the impact of region, city, and business emissions reduction efforts, (2) evaluate how they overlap with or complement national policies, and (3) determine the impact of combined national and subnational efforts for integration into more holistic target-setting (ICAT, n.d).

2. STAGES OF A CLIMATE PLANNING PROCESS

Vertical integration can be facilitated at different stages in the implementation of a climate policy:

- Formulation: the most observed form of integration, consisting in adopting similar climate objectives and priorities, given by the higher administrative level.

- Implementation: some policies can benefit from a common implementation between different levels to preserve coherence in the territory. This is for example the case for mobility programmes and transport-related infrastructures, since the inhabitants cross several communities daily. Cooperation is also needed to use respective competencies.

- Monitoring-evaluation: integrating the monitoring evaluation process (M&E) of local policies at intermediate and national levels allows a more accurate vision of the progress and difficulties of implementation by local and regional authorities, a vision often weakened at national level. It also strengthens the coherence of measurement and accounting tools, as for now most cities and regions use different reporting systems from those used by national governments , or from one local government to another.

3. NATIONAL REGULATIONS AND THE COMPETENCES DEVOLVED TO CITIES AND REGIONS

National governments can create favourable conditions for local and subnational climate change mitigation through reporting systems, awarding environmental labels, certificates and prizes, or increasing municipal incomes that can be used for climate change measures as well as the coordination and cooperation among local authorities (UN-Habitat, 2020). The national legal, technical, and financial national frameworks greatly influence first the level of integration of local climate action into the national strategy, and secondly the level of articulation between local, subnational, and national climate planning processes. In parallel, the competences devolved to local and subnational authorities may also differ greatly from one country to another and can hamper cross-level interactions.

2. The articulation of adaptation policy

The cooperation between local, subnational, and national authorities – and through them non-state actors at these levels – is of particularly importance for the formulation and implementation of national adaptation strategies. The impacts of climate change manifest locally and can vary greatly from one territory to another, and so can the solutions and the adaptation pathways. These adaptation strategies should eventually not be limited by political boundaries, but rather by an understanding of the landscape and its interactions (e.g. transboundary watersheds). Consequently, the implementation of adaptation measures is largely the responsibility of local authorities and stakeholders.

Local and subnational governments and actors are often poorly associated when it comes to framing the problem and even designing adaptation measures. As an illustration the Coalition for Urban Transitions found that only 50 countries refer to urban adaptation efforts and urban resilience in their Nationally Determined Contributions (NDC) (CUT, 2019). In 2019, Climate Chance Observatory also gathered the most recent data to show that a growing number of cities were making public adaptation commitments towards international climate initiatives and networks, but cities are still struggling to get out of the diagnostic stage and enter the planning and implementation phases. We also point out the "silent adaptations'' occurring elsewhere in the world and not included in the aggregated data. Not listed as such, these actions are struggling even more to access funding (Climate Chance, 2019).

To ensure a proper consideration of adaptation issues, it is therefore important that adaptation components of the NDCs, which provide direction and principles for climate action, are informed by structured adaptation processes, e.g. the National Adaptation Plans (NAPs), which elaborate adaptation options and strategies for implementation (NAP Global Network, 2019). In the first round of NDCs, though not mandatory 131 out of 176 countries opted to include adaptation in their first NDC, but only 57 NDCs (44%) with an adaptation component referenced the country's NAP process (GIZ, 2017), a trend that appears to be picking up in the new round of NDCs (NAP Global Network, 2021).

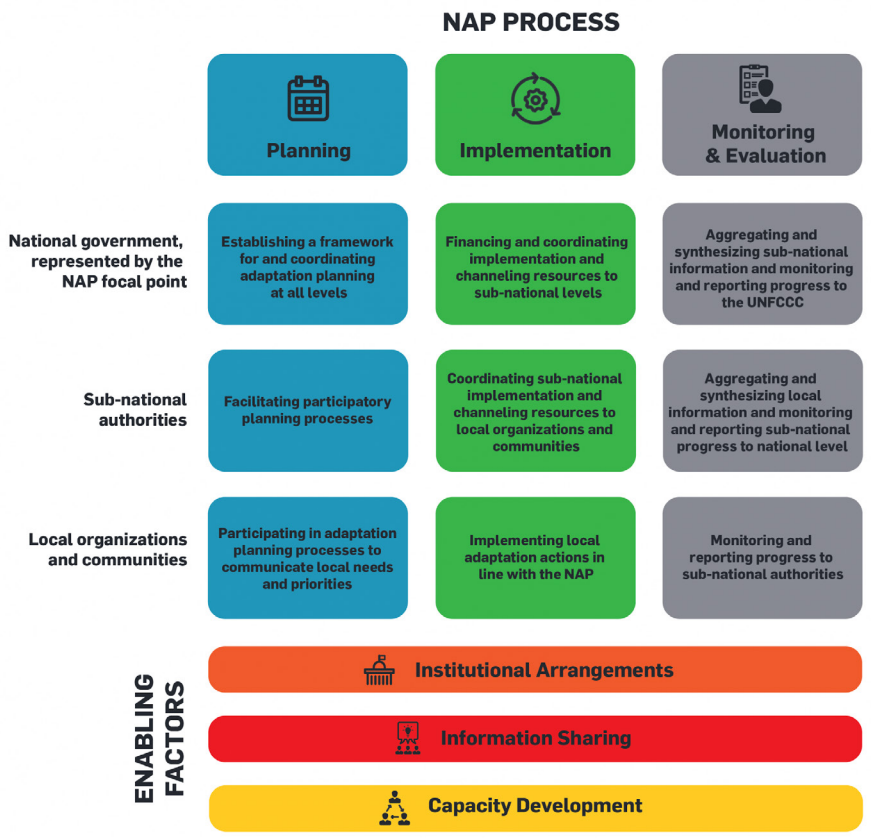
As described by the NAP Global Network platform, it is essential that NAPs reflect the issues and experiences of local governments, and provide the information, resources and tools that specifically strengthen their actions. "*The question now is how to ensure that NAP processes build on these experiences, further empowering sub-national actors with information, capacity and resources to support local adaptation into the future. This process, called vertical integration, aims to create intentional and strategic linkages between national and sub-national adaptation planning, implementation, and monitoring and evaluation (M&E)*" (NAP Global Network, 2017).

The following table proposes a sort of standard division of responsibilities to facilitate the implementation of an integrated adaptation strategy at the national level, for each level of governance and for each stage of the NAP process (**tab. 1**).

A guide further develops the factors enabling this vertical integration, which are **institutional arrangements** (decentralization, spaces for dialogue and cooperation, distribution of roles, etc.), **information sharing** (measuring the need for information, making it accessible and manageable, etc.), **capacity development** (integrating training and the mastery of tools by stakeholders throughout the process, etc.), and **financing** (tools to channel financing to local authorities) (NAP Global Network, 2016).

TABLE 1

FUNCTIONS AND ROLES OF THE DIFFERENT LEVELS OF AUTHORITIES IN A NATIONAL ADAPTATION PLAN PROCESS - *Source: WeAdapt, 2017*



Less institutional factors influence the implementation process according to NAP Global Network recent research, such as the representation of minorities that enhances effectiveness of adaptation or the way adaptation is talked about and framed, as well as the nature of knowledge that is invited to the discussion (scientific, indigenous, etc.). Vertical integration processes should be built in a way that equity is pursued, and marginalized groups, youth, women, and other minorities are part of the conversation and that their concerns are acted upon, should be a driving force of the process.

Peru has been particularly keen on integrating stakeholders during its NAP development process over ten workshops in 2019 and 2020, to ensure the inclusion of the perspective of indigenous people, civil society, private sector, academia, regional governments but also cross-sectoral national level (governmental). Workshops continued despite the pandemic, serving as a confirmation of Peru's commitment to making the NAP and the adaptation process as participatory as possible (NAP Global Network, 2020).

The weight of the institutional system on the capacity of local, national governments and stakeholders to cooperate is highlighted in a study covering 10 OECD countries, showing that advanced decentralization of powers and responsibilities facilitates the vertical integration of adaptation strategies since decision-making mechanisms at the local government level already exist and are all the more relevant when it comes to locally adapted adaptation measures (Bauer et al., 2012). Across the 10 countries studied, integration and support for local governments is particularly strong in federal countries such as Germany or Australia, where local governments either have

adaptation-related competencies or benefit from adaptation commissions or working groups that bring together all levels of governance. Unitary countries such as Denmark, Finland or Norway show comparatively stronger centralization of these competences.

Two countries, the United Kingdom and Sweden, were already using monitoring and evaluation as a means of integrating local adaptation policies. The United Kingdom is noteworthy, being one of the few countries where there is an obligation to report on climate-risks (Nachmany et al., 2020). In the 2000s the government invested in research to improve the quality and accessibility of climate information, and made local authorities able to assess climate change risks and opportunities. However, better knowledge has not translated into tangible adaptation actions and "*budget cuts and a lack of political support from the central government have sapped institutional capacity and political appetite to address long-term climate vulnerabilities*" (Porter, J. and al., 2015). Additionally, between 2007 and 2010, "National Indicator 188" played a key role in making local authorities across the UK familiar with climate change adaptation by requiring them to report on local adaptation. It measures the progress made in terms of evaluation and management of risks by local governments and by actors in their territories. But because local budgets were cut and the National Indicator 188 was abolished in 2011 (presently, it is voluntary), local adaptation processes faded and demand for respective support declined accordingly (Clair, C. Steuner, R., 2018).

Decentralisation of decision making can bring obvious prominence to local and subnational actors, but the real impacts of decentralization should be determined case by case. In all cases, when an ambitious climate agenda for local governments does not come along with adequate resources (budgets, staff, capacity building) or does not recognise capacity differences among them, it reaches the implementation stage with difficulty. To remedy this, the German Federal Government funds since 2008 more than 760 "climate managers" in municipalities across the country, an expert hired up to 6 years to coordinate local climate activities (Climate Chance, 2021).

Regions4, a network of subnational governments on adaptation, made similar observations on the barriers to implementation through a survey conducted in 2019 over 33 member regions on their experience of adaptation planning, implementation and monitoring (Regions4, 2019):

- Most regions having formulated an adaptation plan and report have competences in areas related to adaptation. However, while most were able to participate in the development of the national strategy, 20% were not involved and 30% received little support in their formulation process.

- Joint implementation of action is rare, and funding and technical capacity are the main barriers identified by the regions that could be further addressed by the national government.

- Monitoring and evaluation are provided for in 50% of the regional plans, and for the most experienced regions this monitoring of implementation also includes evaluation of results. Here, the lack of common metrics and methods is naturally the greatest challenge that national governments could partly solve by proposing coordination of monitoring and evaluation data and processes across the different levels.

- At the global scale, the Grantham Institute made a recent survey in 100 countries about their framework laws and policy on adaptation. It estimates that about half of them explicitly delegate some responsibility for managing adaptation to local governments. Around 50% also include regulatory measures to incentivise adaptation (building code, land use requirements, etc.), but only 10% include economic incentives such as subsidies for resilient technologies (Nachmany et al., 2020).

3. Multilevel governance in G20 countries: Germany, France, Canada and Brazil

G20 countries are responsible for 80% of GHG emissions (German Watch, n.d.) and strong evidence is needed to show how national governments are integrating actions led by local and subnational governments in their national climate strategy.

Voluntary or mandatory national policies can incentivize the adoption of climate plans by local and subnational governments, in a more or less structuring way, whether they provide methods, tools, or a reporting platform. We therefore wish to provide an overview of various institutional contexts and approaches that facilitate the articulation between climate local, subnational, and national policies, and to understand whether the highest emitting countries provide the necessary legislation to their local governments to design, implement and monitor their climate plans.

The first case studies cover Germany, France, Canada and Brazil (Climate Chance, 2021). These analyses do not seek to compare the efficiency of institutional arrangements or their national climate strategies, but to provide instead an understanding of what drives climate action at municipal and subnational levels in different contexts. We offer here a synthesis of these cases highlighting the major points and based on the analyses carried out by our national partners: ESSA in Canada, Adelphi in Germany, I-Care in Brazil.

A. In federal countries, municipalities' capacities and competencies depend mostly on the climate ambition of subnational governments.

In Germany, legislation on energy, environment and climate change is a shared function, which leaves certain leeway for Länders to regulate issues at their level, but the power to regulate local governments lies exclusively with Länders, the federal level cannot legislate local government issues or transfer tasks directly to municipalities. The federal Climate Change Act explicitly ensures that Länders may enact their own legislation on climate change and that existing ones will continue to apply if it is compatible with federal law.

In Canada, local governments' competencies are established by provincial legislation and mandating and tracking their climate actions is a task that falls to the provinces/territories. It is therefore difficult to synthesize and compare approaches, and local governments must comply with provincial/territorial regulations which differ in scope, approach, and requirements. However, increased support for climate planning at the provincial level and the adoption of provincial emissions targets, was found to be associated with more ambitious local climate planning and with higher local government GHG emissions targets (Zukowski, 2016). To streamline efforts to achieve Canada's climate objectives, the Federal government in 2016 set up minimum climate goals in 2016 with the Pan-Canadian Framework on Clean Growth and Climate Change, which allows provinces/territories flexibility in implementing their own carbon pricing systems, if they meet the federal targets.

In Brazil, since the federal government has reduced its efforts to combat climate change, each entity seeks to lead the subject. However, the lack of top-down regulation does not allow a clear and explicit articulation between the federated entities, and nor the National Plan, the National Policy, or any other policy does establish clear parameters in all sectors for achieving the goals, nor how the national goals will be distributed to state and local levels. Like Germany, the Brazilian Federal government mostly focused on sector-based climate strategies rather than defining roles and responsibilities of states and municipalities.

Ontario - Canada

Multilevel Climate Governance in Ontario

To know more about multilevel governance in Canada, read our case study here.

In 2007 Go Green: Ontario's Action Plan on Climate Change established GHG emissions reduction targets (15% below 1990 levels by 2020 and 80% by 2050), replaced in 2015 by the Climate Change Strategy which added a 2030 target (37% below 1990 levels) and instituted an emissions cap-and-trade system. Ontario requires climate change mitigation and adaptation policies in municipal official plans but did not specify reporting requirements. Despite a 2016 audit of Ontario's Climate Change Strategy, which concluded that local governments should be given additional resources to enable local mitigation and adaptation strategies, its 2018 Made in Ontario Environment Plan does not address the role of local governments.

The Community Emissions Reductions Plan established in 2017 common methods for municipal climate planning, and Ontario introduced in 2019 specific requirements for municipalities in the Toronto region to develop GHG inventory and reductions plan. But funds for municipalities are inconsistent: the Atmospheric Fund for carbon reduction and air quality, is only available in the greater Toronto and Hamilton area, and funding through the Ontario Climate Change Action Plan limit the way municipalities can spend the funds (Hill and Perun, 2018).

Monitoring Ontario's mitigation policy

Annual emissions reporting has been required since 2009. A decrease can be observed for the last 10 years particularly from the electricity production that fell by 8-fold since 2005 as well as heavy industry (-20% since 2005 and -46% since 1990). Ontario has led in phasing out coal fired electricity generation by permanently banning it in 2015.

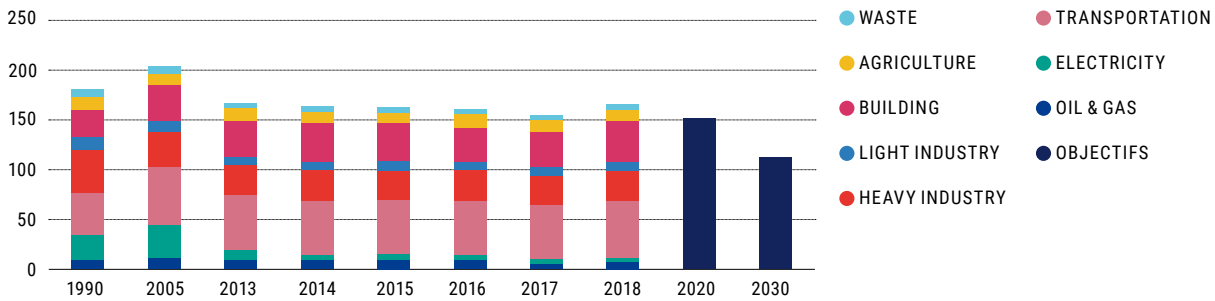
Transportation and building increased between 1990 and 2005 and are quite stable since then. Ontario is on its way to reach its 2020 goals if the 6% increase in 2018 remains an exception. But the cancellation in 2018 of the cap-and-trade program and other programmes to shift consumer choices like GreenON (rebates for insulations and energy efficiency in households) or the Green Commercial Vehicle (helps diesel trucks shifting to electric/cleaner vehicles) may have hampered efforts such as limiting SUV growth, on the rate of retrofitting or renewable energy installation (Environmental Defence, 2020). The 2018 cold winter and hot summer also provoked a higher use of natural gas and air conditioners.

Ontario's emissions performance standards (EPS) program came in 2019 as an alternative to the federal "carbon tax and dividend" strongly opposed by Ontario (Climate Chance, 2018). It requires large industries emitting more than 50,000 tCO_2e/year, to reduce emissions or purchase compliance units to cover the unreached annual reductions goals, which price starts at \$20/tCO_2e in 2020 to reach \$50 by 2023.

Adaptation

The Climate Risk Institute in Ontario delivers services related to climate change risk assessment, adaptation planning, policy evaluation and resiliency. Three CRI flagship programs include the Infrastructure Resilience Professional (IRP) training engineers and other professionals; the Program on the Public Infrastructure Engineering Vulnerability Committee (PIEVC) Protocol; and Canada's Climate Change Adaptation Community of Practice, an online platform where researchers, experts, policy-makers and practitioners from across Canada can come together to ask questions, share knowledge on adaptation (CRI, n.d.).

ONTARIO'S ANNUAL GHG EMISSIONS IN KT CO_2E. *Source: Canada Government, 2020.*



B. Few local governments are required to adopt a climate plan and goals in the federal countries observed, where climate action is more funds-based.

In France, a unitary country, the State has been imposing planning obligations since 2010 that apply now on regions and inter-municipalities with more than 20,000 inhabitants. It does not set specific emission reduction targets but the requirements and content of climate plans, the emission sectors that must be covered, and the regularity of GHG inventories. Many mandatory tasks were initially voluntary, and have been extended progressively to more local governments. It concerns now more than 760 of them.

In Germany, Climate change mitigation and adaptation have to a certain extent been integrated into federal and Länders' legal frameworks, which in turn influence municipality's scope of action, yet they do not constitute mandatory municipal tasks. The federal level simply aims to "*examine how regional and local authorities can successfully be persuaded to accord greater importance to climate action and how the activities of those authorities can be reinforced*" (BMU, 2016). As for Länders, some impose to incorporate climate goals into urban planning tools like Bremen, or specific tools such as a heat supply plans to reach carbon neutrality like Baden-Wuerttemberg, or technically support them to plan and report as in North Rhine-Westphalia (**cf. case study 10**). But Länders mostly refrain from defining mandatory climate tasks, as in Germany, any new competence devolved to municipalities must entail relevant financial transfer. Therefore, most municipal planning and action rely on funding support programmes like in Canada.

Canadian cities mostly do not have obligations, making how and to what extent they address climate change uneven (Guyadeen et al. 2019). Various experiments are taking place at provincial level. Nova Scotia is the only province that requires municipalities to develop a climate action plan. The Ontario Community Emissions Reductions Plan establishes common methods for municipal climate planning, while in Quebec, Climate Municipalities Program funding and support for 235 local governments to inventory GHG emissions and develop climate change mitigation and adaptation plans.

Most local climate plans have been made with the support of the voluntary "Partners for Climate Protection (PCP)" program, managed by ICLEI and the Federation of Canadian Municipalities (FCM). It provides funding resources, from the Government of Canada and ICLEI Canada to member municipalities that are developing climate change actions plans. Membership reached 500 municipalities (70% of the population), with 85 having reached the final milestone: quantifying and reporting on GHG emissions reductions from action plan measures.

In Brazil, despite the advancement of climate policies, there was little connectivity between the National Climate Policy with states and municipal policies. It provides some guidelines for states and municipalities but does not require them to formulate climate plans or adopt specific objectives. Climate policies differ among Brazilian states and municipalities, and not any states have made it mandatory for municipalities to adopt emissions reduction goals or a climate plan. Since 2001, municipalities above 20,000 inhabitants have been required to formulate a Master Plan, representing the basic instrument of urban development policy. Some cities are integrating climate and environmental priorities in these plans on a voluntary basis. All the sector-based climate Plans have no explicit obligation or guidance to states and municipalities.

North Rhine-Westphalia - Germany

Multilevel Climate Governance in NRW

To know more about multilevel governance in Germany, read our case study here.

NRW enacted in 2013 its *Climate Protection Act,* making emissions reduction targets legally binding and defining adaptation targets. The Climate Protection Plan approved in 2015, is NRW's current roadmap to reduce GHG emissions by 25% below 1990 levels by 2020, and by 55% by 2030. It initially includes 154 measures, previously identified, and elaborated through an innovative participation process: six working groups moderated by independent think-tanks organised workshops for municipalities, citizens, and businesses. Stakeholders can also follow the state of implementation of these 154 (NRW). NRW adopted in early 2021 the first Climate Adaptation Act of the whole country, along with a "climate protection audit", a new instrument to continue the current Plan and to check on a regular basis the efficiency of measures (NRW, 2020).

NRW does not state any binding meeasures for municipalities but greatly support them and 358 of the 396 municipalities developped a plan or employed a climate protection manager. They also benefit from guidelines, free tools and access to data through NRW's Energy Agency (EnergyAgency.NRW) or the State Agency for Nature, Environment and Consumer Protection (LANUV).

The State Lander does not directly fund local climate plans, but the "KommunalerKlimaschutz.NRW" project call of €160m from State and European funds selected in 2018 28 projects that pursued "a *holistic strategy and a model approach*" (KKS.NRW) and to be achieved by 2021. The KlimaExpo.NRW is running from 2014 to 2022 to showcase climate projects from around 500 municipalities and companies.

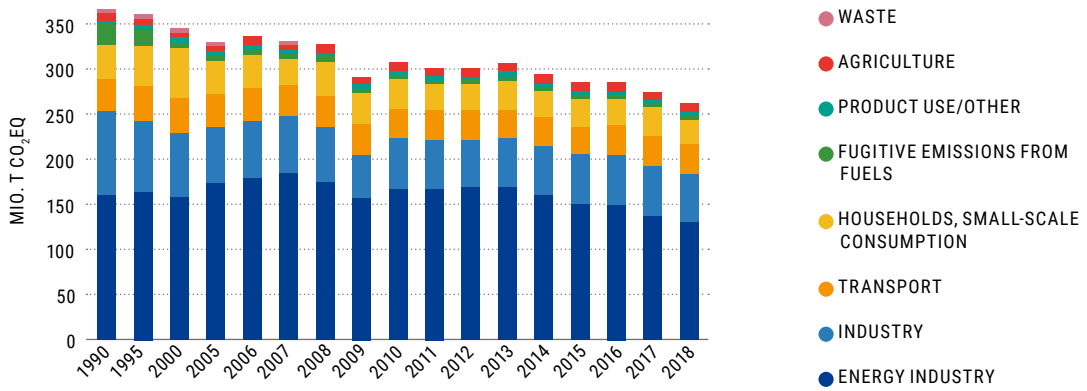
Monitoring NRW's climate policy

With most of Germany's hard coal and lignite production, NRW emissions represent about 1/3 of nationwide emissions. In 2018, 261.2 MtCO2e were emitted in NRW, 5% less than in 2017 and 29% less compared to 1990. Half of 2018's emissions are from the energy sector followed by the industry (21%), transport (12.5%) and households (11%). Since 2014 emissions have mostly decreased from power generation, except in 2016 when new gas-fired power plants opened. Transport's emissions fell by 3% in 2018 despite the rise in vehicles, a fall mostly coming due continuous tightening of exhaust gas emissions values and improved fuel qualities. The number of registered hybrid and electric vehicles also increased significantly in 2018. As for households, emissions decreased by 12% in 2018 due to lower energy consumption, mild weather, and energy efficiency gains. Conversely, emissions from product use increased by 13% due to cars and building air conditioning systems (NRW, 2020).

Adaptation

Impact of climate change on all areas of environment and human living is currently monitored through more than 30 indicators related to seven fields: atmosphere, water, ecosystems and biodiversity, ground, and agriculture and forestry. NRW is therefore able to monitor the slow evolution of the humas, tropical nights, weathering, etc (LANUV, 2021).

EMISSIONS EVOLUTION OF NRW 1990-2018 (IN $MTCO_2E$) - *Source: NRW, 2020*



C. Coordination or vertical integration mechanisms seem to focus on consultation upstream of the implementation of climate plans, with little during implementation or monitoring.

In Germany, the federal Climate Chance Act states that national climate programmes will be developed in consultation with Länders and local governments – along with other private and civil society actors. This has to date not been specified further. Biannual sectoral conferences that bring together line ministers from both federal and Länder level, for example the Conference of Environmental Ministers (Umweltministerkonferenz). These conferences are prepared by multi-level technical committees and working-groups that facilitate discussion and the development of joint sector-based recommendations. The joint conferences and working committees are important vertical coordination mechanisms that also offer room for discussions on how to best leverage climate action at municipal level. As for Länder governments, all have set up inter-ministerial climate change coordination units and/or climate and energy agencies (Klima- & Energieagenturen).

In France, the law provides for a national consultation body with local authority's associations, but the articulation between plans is generally organised by regulation, since local climate plans observe different levels of predefined conformity with regional or national climate plans and tools. The same applies to other local or regional planning tools on other climate-related competencies (mobility, urban planning etc.). The law also provides for the validation of local plans by the central administration, but for the High Council on Climate (HCC) "*the constitutional principle of non-supervision limits regions' capacity to organize actions concerning the jurisdictions of other local authorities and their groupings, and therefore to make concrete the climate strategies that they establish.*" (HCC, 2020) More dialogue at regional level on subjects related to the transition is recommended both to feed into regional strategy and to facilitate its acceptance by stakeholders and ensure their cooperation.

On implementation and monitoring, although the local and regional plans are seen by the National Low-Carbon Strategy as "effective tools" for implementing this strategy, the parallel timetables for drawing up these plans limit their full coordination once adopted.

Brazil has institutionalised several climate change dialogue forums since 2000. In 2000, the Central Government created the "Brazilian Forum on Climate Change", a hybrid scientific body (federal government, local governments, civil society) to assist the Presidency of the Republic on climate policy. Given its replication at subnational levels, with about 23 state or municipal forums, the Brazilian Forum focuses efforts on articulating itself with these forums and coordinating the different regions' climate agendas and policies. It coordinates with the Presidency of the Republic the Interministerial Committee on Climate Chance to ensure the participation of local actors. In 2013, the Federative Articulation Center for Climate (NAFC) shortly attempted to articulate national policies with states and municipalities within the various climate sectoral policies, but its results were never internalized by higher levels and its work stopped in 2014. More recently, the private sector has gained higher representation in existing concertation mechanisms (i.e. Forums; National Fund...), and collegiate bodies of the federal public administration have been weakened such as the Amazon Funds which projects aimed to support federal, state and municipal governments in actions to strengthen forest management.

Occitania - France

Multilevel governance in Occitania

To know more about multilevel governance in France, read our case study here.

In France, local and regional authorities are required to adopt a climate plan. The Regional Plan for Spatial Planning, Sustainable Development and Equality (SRADDET) must consider the National strategy and incorporate its targets. Conversely, local climate plans must be compatible with the SRADDET. In 2020, the Occitania region adopted its new SRADDET and aims to cover 100% of final energy consumption with renewables, compared to 20% in 2020, to reduce energy consumption of transport by 40% and by 20% for buildings and achieve net-zero artificialisation.

Before it was adopted, a public consultation gathered local authorities, economic actors, the national State, etc. A regional citizens' convention also took place and submitted proposals to the regional council. At the operational level, the Regional Energy and Climate Agency (AREC) co-finances energy saving projets and pilots a Regional Energy Observatory (OREO), a monitoring tool as well as a platform for discussions between regional energy players and with a capacity for proposals. It supported 84 municipalities in Occitania to adopt local climate plans, whose monitoring though remains a national competence.

Climate policy monitoring

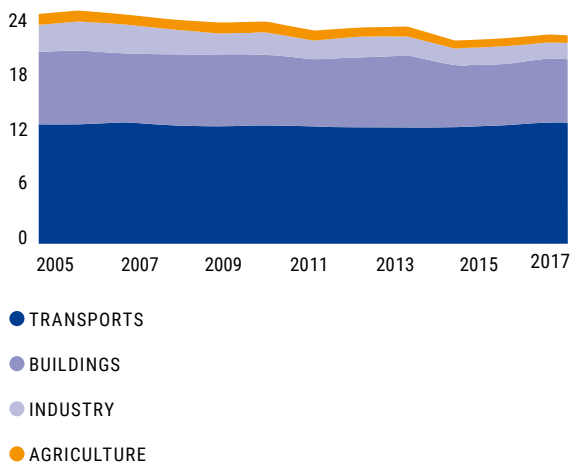
In 2017, an Occitan emitted an average of 3.6 tCO_2e/year. Following a significant increase between 1990 and 2005, energy-related CO_2 emissions have been falling since 2005 (-9%), then stagnating or even increasing since 2014 due to transport. While the building sector, the second largest sectoral emitter, stabilised, industry more than halved its emissions since 1990. Energy efficiency efforts and the substitution of fuel-oil by RE largely explain this decrease. Energy consumption keeps increasing, but at a lesser pace than GHG emissions due to increasing use of RE, up to 33.5% of the mix (mostly wood and hydro).

In the agricultural sector, Occitania experiments the setup of a the "Parliament of the Sea" and the "Parliament of the Mountain" gathering local stakeholders and local authorities which have enabled their contribution to "Littoral 21" and " Montagne" plans, two tailor-made plans for these two economic ecosystems. In the Housing sector, the "Ecocheque logement" supports low-income households for renovation up to €1,500 and can be combined with national funds. In mobility, ridership by train has increased by 60% since 2002 and to keep up efforts the "Rail and Intermodality General Assembly", a major consultation in 2016, identified 10 projects to be carried out by 2030 to improve intermodality, upgrade regional network, maintain small lines opened, harmonise tariffs. Occitania also implemented "Rezo Pouce", a local car-sharing network with more than 1,500 users and 500 stops to cover short distances.

Adaptation

The approach launched in 2017 "H2O 2030, water shared" with the regional water agencies, the State, the departments, the natural parks, and the citizens, resulted in an integrated water management intervention plan to preserve water resources, reduce risks, and eventually create a regional public water service. It consists in implementing 21 priority projects such as the creation of a regional water information system (SIRE) or the optimization of storage and underground resources. It is setting up local calls for projects to support investments aimed at saving water, protecting water environments, and preventing flooding. More recently, the network of expertise on climate change in Occitania "RECO" was created to mobilize networks of researchers and territorial actors to assist decision-making.

GHG EMISSIONS PROFILE OF OCCITANIA, 2005 - 2017 IN MTCO2E - *Source: OREO, 2020*



D. Harmonisation of accounting methods is quite rare, as are monitoring and evaluation methods. Information is also rarely centralised.

In Germany, national climate policies have to date not harmonised targets, planning, and accounting methods across government levels. There is no central database that tracks the total number of local governments that have adopted climate action plans and inventories, nor any specific reporting mechanisms for municipalities to report achievements to national or Länders governments. Reporting obligations merely exist for LGs that receive support from a regional or national funding programme such as the "Masterplan 100% climate protection".

In France, local climate plans were required to closely follow the ambitions and deadlines defined by EU and national objectives. They must explicitly interface with the existing regional plan, including their indicators with regional ones. However, regional and local reporting mechanisms and monitoring tools are different, making difficulte for local data to be integrated into the regional monitoring process.

The law says "*The calculating method shall be defined by regulation in a way that is easy to apply, verify and compare with other territories.*" (LTECV, 2015) but this article has to date not been implemented by the State and there is currently no mechanism to ensure that the sum of territorial strategies is consistent with the national ambition. At local level, the French Agency for Ecologic Transition (ADEME) supports the use of the method "Bilan Carbone", and animate the "Territoire-Climat" platform that catalogs local climate plans validated or implemented. At regional level, like in Germany, regional energy-climate observatories consolidate emissions and other energy and climate related data. But they have been constituted in different ways depending on the region and their GHG inventories are not standardized, and feature different calculation methods and data sources.

Canada maintains an official and annual GHG inventory that all provinces are required to submit to annual carbon accounting (Federal Government, 2020). Federal, provincial, and territorial governments work with the Canadian Council of Ministers of the Environment (CCME) to ensure consistent reporting of progress and emissions. A collaborative audit of federal, provincial, and territorial climate plans evaluated their content, and progress towards their goals. The audit determined that many provinces and territories were not meeting their climate goals and had little guidance on implementation. Furthermore, the audit reported that most provinces and territories were not reporting on climate progress in a regular or timely manner. No such platform for local data is available for municipalities.

In Brazil, the decentralisation, or the lack of federal piloting, creates a problem of compatibility and comparison between climate strategies. At Federal level, the absence of monitoring mechanisms and the National Climate Change Plan does not allow measuring the impacts of the Plan. States are developing plans and laws for climate action without precise federal guidance in a different way, usually developing laws and plans internally through their environmental departments. Cities and states follow different planning tools, mostly from international initiatives. However, the Climate Observatory in Brazil has built the Greenhouse Gas Emission and Removal Estimating System (SEEG) that estimates for each states and cities emissions based on the IPCC guidelines (IPCC), on the Brazilian GHG Inventories prepared by the Ministry of Science, Technology and Innovation (MCTI), and in data obtained from government reports, institutes, research centres, sector entities

and non-governmental organizations (SEEG, n.d). The SEEG method was adopted in India and Peru based on the Brazilian experience.

E. None of these countries impose or propose a method for analysing the accounting of local public expenditure and investment with local, and by extension national, climate objectives.

However, experiments are being conducted in France and Germany. In France, the Institute for Climate Economics (I4CE) is currently conducting several pilot projects with French cities (Lille, Paris, Lyon, Strasbourg) to co-construct a common methodology for evaluating a local budget from the perspective of climate issues (I4CE, n.d.). In Germany, municipalities who have decided to check their actions and spending against climate compatibility criteria. The German National Sustainable Development Strategy underlines the importance of sustainable public procurement (Federal Government, 2018) and Länder regulations do include binding criteria for sustainable public procurement processes for municipalities. Many municipalities also choose to adopt more ambitious sustainable procurement procedures, i.e. some are certified according to the Eco Management and Audit Scheme (Hermann et al., 2019).

Bahia - Brazil

Multilevel Governance in Bahia

Bahia established its State Policy on Climate Change in 2011. In the process of its renewal, Bahia wished to reactivate the Bahia Forum on Global Climate Change and Biodiversity (Inema, 2020). In Brazil since the 2000s, about 23 state or municipal forums have been created and coordinated by the "Brazilian Forum on Climate Change" at the federal level to assist the Presidency of the Republic. In Bahia, the renewed Forum will be composed of 14 governmental bodies and 14 representatives of business entities, academics and organized civil society, in charge of drawing up guidelines for the policy and approving the new State Plan to Combat Climate Change (Government of Bahia, 2020).

No representative of municipalities seem to be associated with the Forum, but Bahia's capital Salvador, also launched its first climate action plan in 2020 with 57 short, medium and long-term mitigation and adaptation actions, and with the goal to reach carbon neutrality by 2049. Because of the weak federal mobilisation, each government seeks to lead the subject, but the lack of top-down regulation does not facilitate the articulation between federated entities climate policies (Climate Chance, 2021).

Monitoring Bahia's mitigation policy

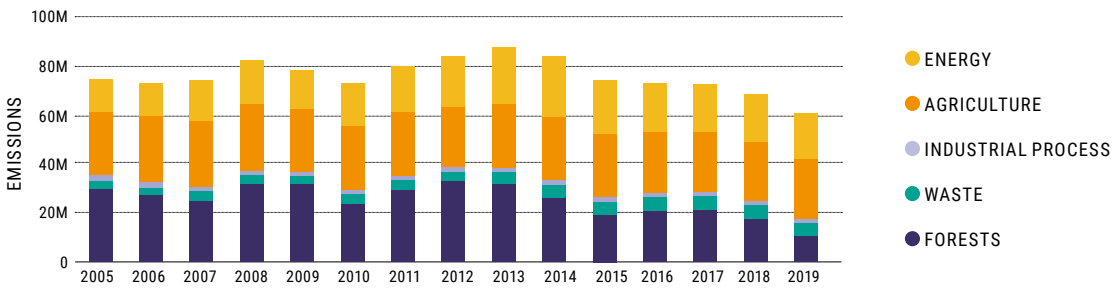
Bahia will start to monitor its GHG emissions with the new State Policy. In the meantime the spatialization tool created by the Climate Observatory in Brazil evaluates that Bahia, with 61 MtCO2e in 2019, concentrates around 3 % of the GHG emission of Brazil (SEEG). Emissions in 2019 have decreased by 30% since 1990 and 17,5% since 2005. Emissions from land use and forestry have sharply decreased in Bahia by 66 % since 2005, which is encouraging since 7 of the 10 cities with the highest emissions in Brazil are located in the North region, and these emissions are the result of activities associated mainly to deforestation (ICLEI, 2020). Salvador for example, beyond its Dial Atlantic Forest program, which provides native seeds for inhabitants, has planted over 51,230 trees, revitalized and expanded local parks and protected areas (Cityfix, 2019). The recent federal trend may have reversed this progress.

Conversely, emissions from energy increased by 40 % over the same period, mainly due to transport, which accounts for over 50% of these emissions. For electricity production, Bahia was one of the first states to map the solar potential of its territory about ten years ago, and has adopted an offensive strategy to facilitate investments in wind power (standards for land regularisation, tax incentives) (Inema, 2020) such as the on-going Statkraft's 520 MW wind capacity project (Statkraft, 2021), but not without consequences for land use (Turkovska, O; and al., 2021). Bahia now wishes to diversify its mix and invest in biomass for electricity and biogas production.

Adaptation

The growing impact of climate change has been a motivating factor to renew the State Policy and address better adaptation. 87% of Bahia territory is in the Area Subject to Desertification (ASD), the largest in Brazil, where 289 municipalities and 4 millions of people are located. The drought between 2012 and 2018 that occured in Nordeste of Brazil was the longest in history. Bahia counts with 1,100 km long coastline, subject to erosion (PBMC, 2019).

GHG EMISSIONS OF BAHIA 2005-2019 BY SECTOR ($MTCO_2E$). *Source: SEEG, n.d.*



F. Summary table of the main characteristics of climate governance in the countries studied

	Germany	France	Canada	Brazil
General governance aspects				
Historical country governance	**Federal** State power shared between the national federal government and Länders governments. Municipalities enjoy self-government.	**Unitary** Began devolving powers towards local authorities from the 1980s.	**Federal** Very devoluted. The Constitution does not address municipalities' competencies.	Federal States are accountable to the Central Government and municipalities to the States.
Regulating authorities for municipalities	**Länders** Power to regulate local governments lies exclusively with the Länders.	**National State** The National State regulates both regional and municipal competencies.	**Provinces/Territories** Municipal competencies are exclusively established by provinces/territories.	**Local** Governments must comply with state and federal laws but are not a creation of the states, are granted the status of federal, and are ruled by an organic law.
Share of public investments by local and subnational governments	62%	58%	87%	75%
Climate competencies for local and subnational authorities	**Voluntary** Energy, environment, and climate change is a shared function between Federal and Länders. No specific climate competencies for municipalities.	**Mandatory** Mandatory climate competencies are set by the central State for both regions and municipalities.	**Voluntary** Provinces/territories are each engaged and responsible to develop their own climate change policies. No specific climate competencies for municipalities.	**Voluntary** Each State can define a climate law, policy and plan, but it is required. No specific climate competencies are defined.
Climate regulations and vertical integration				
Climate obligations from central State	**NO** Länders/municipalities must act within the framework of federal law and may enact their own policies on climate, but no specific obligations (target, etc.).	**YES** Municipalities above 20,000 inhabitants and regions must formulate a climate plan, including city-wide emissions for municipalities and patrimonial emissions for regions.	**NO** Provinces/territories must establish a carbon price, but have flexibilities as long as federal targets are met. No federal obligation to LGs.	**NO** National policy provides some guidelines for states and municipalities.
Climate obligations from subnational authority	**MOSTLY NO** Mainstreaming climate into local policies is supported by Länders through tools/guidelines. Länders refrain from mandating municipalities and climate planning is mostly motivated by national or state funding programmes.	**NO** Obligations to municipalities are made by the national government.	**MOSTLY NO** Only Nova Scotia province made climate plans mandatory for municipalities. Ontario and British Columbia require to include climate and GHG targets in municipal plans.	**NO** Not any States have made it mandatory for municipalities to adopt emissions reduction goals or climate plans.
National carbon budgets	**YES** Numerous climate sectoral plans.	**YES** Carbon budgets are legally binding for 4 year-periods	**NO**	**NO** Numerous climate sectoral plans.
Climate regulations and vertical integration				
Harmonized climate target / planning / monitoring	**NO / NO / NO** National climate policies have to date not harmonised climate change target setting, planning, implementation and reporting across government levels.	**YES / YES / NO** Law requires local climate plans to adopt quantitative objectives consistent with France's commitments. The planning method is imposed on both cities and regions. No harmonised monitoring.	**YES / NO / NO** Provinces can set targets if they meet Federal ones. No planning methodologies or monitoring process are harmonised.	**NO / NO / NO** Not any minimum target is required from States or municipalities.
Reporting and centralisation of information	**NO** No nationwide reporting modalities for municipalities or Länders. No central database that tracks the total number of local governments that have adopted climate action plans.	**YES** Online platform "territoire-climat" offers a national view on on-going or implemented climate plans, but no on emissions.	**NO** No Canada-wide database or summary of local climate plans has been developed? No reporting of action is required from provinces nor LGs at the Federal level	**YES** SEEG online platform offers a spatialization of climate data by states and cities regularly updated. No reporting of action is required from provinces nor LGs.
Carbon accounting obligation	**NO** No nationwide obligatory carbon accounting mechanisms in place for LGs or Länders. Standardised methodology proposed by some Länders for municipalities.	**YES** Regions and LGs are required to furnish GHG emissions balance at a regular pace.	**YES** Only provinces need to provide data for the Federal annual reporting. No obligations made for LGs.	**NO** But estimations are available with the SEEG program.

4. Renewal of NDCs and integration of local governments

A. Cumulated ambition of already-renewed NDCs

By 2021, all signatories of the Paris Agreement for the climate must submit a new Nationally Determined Contribution (NDC) raising their ambitions to limit global warming to 2°C or even 1.5°C.

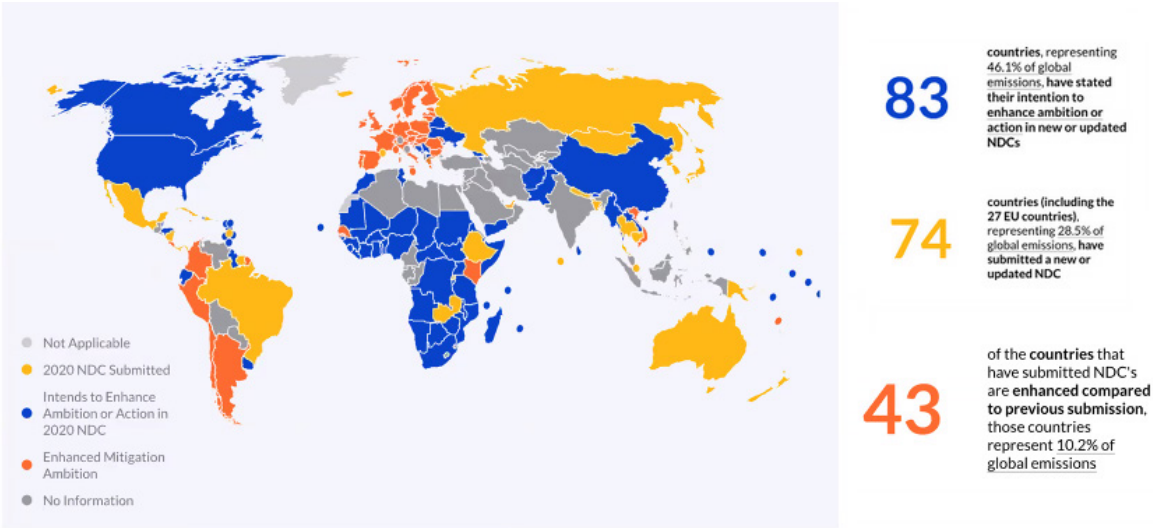
The annual review of the United Nations Framework Convention on Climate Change published in February 2021 indicates that very few countries have already renewed their NDCs and that the cumulative ambition of these NDCs is still far too low to hope to achieve the targets set out in the Paris Agreement (UNFCCC, 2021). Only 48 NDCs have been updated as of 31st December 2020, representing the commitments of 75 countries, i.e. 40% of the signatories to the Paris Agreement and 30% of global emissions. Among the countries that have submitted a new NDC but have not increased their level of ambition are several large emitters such as Russia, Australia, and Brazil (**fig. 3**).

The main message of the report is rather gloomy: if the new commitments of these 75 countries are met, global GHG emissions in 2030 will only be 0.7% lower than in 1990 and 0.5% lower than in 2010. However, to limit warming to 1.5°C, a 45% reduction is needed by 2030 compared to 2010, and 25% to limit it to 2°C.

FIGURE 3

2020 NDC SUBMISSIONS PROCESS - *Source: Climate Watch (WRI)*

Retrieved and modified by the authors from WRI online presentation on March 10, 2021



Yet many countries mention climate or carbon neutrality, or a net-zero strategy by 2050, and most have increased their emission reduction commitments by 2025 or 2030. But these additional commitments would only lead to an additional 0.3% reduction in emissions by 2025 for these 60 countries compared to their previous commitments, and 2.8% by 2030 (UNFCCC, 2021). Finally, it should be noted that the synthesis report makes no mention of the monitoring and evaluation mechanisms planned by the countries, which are certainly absent from most of the newly published strategies.

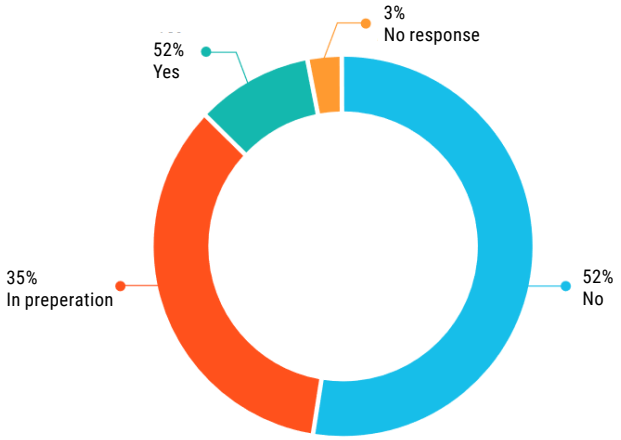
B. Integration of local and subnational governments into NDC renewal process

The renewal of these national long-term strategies also provides excellent opportunities to harness the benefits of cooperation across all levels of government. Indeed, drafting a long-term strategy requires taking stock of on-going action led by all levels of government and their potential of action. Such knowledge improves the quality of long-term strategies and, eventually, common targets are the best prerequisite for joint implementation of measures in order to reach climate targets (GIZ, 2021).

Very few NDCs initially formulated in 2015 speak about urban issues and mitigation - around 20 - even from some of the most urbanised countries (UN-Habitat, 2017; CUT, 2019). As a consequence, only 10% of countries said they have mainstreamed their NDC targets into subnational policies, and budgets (**fig. 4**), and 35% are in preparation to do so. "*There is less progress on ensuring that NDCs are part of budgets, especially at regional levels, and in regional development planning. This suggests that governments have not yet considered how to fund a long-term shift to net-zero carbon and have not sufficiently engaged sub-national actors.*" (UNDP, 2019).

FIGURE 4

MAINSTREAMING OF NDC TARGETS INTO SUB-NATIONAL PLANS AND BUDGETS - *Source: UN-Habitat, 2020, based on data from the NDC Global Outlook Report 2019 (UNDP, 2019).*



The *Coalition for Urban Transition* pointed out the limit of the sectoral approach as many countries have urban-relevant pledges in their NDCs, promising to reduce emissions from buildings, electricity generation, transport and waste. "*However, sectoral approaches miss two important opportunities in cities. First, they fail to capture the mitigation potential associated with spatially concentrating people, infrastructure and economic activity. For example, higher densities enable people to walk or cycle rather than using motorised transport. Second, sectoral approaches may not sufficiently empower local governments to pursue ambitious climate action within their jurisdictions. It is therefore important that national governments explicitly recognise cities as systems in their climate policies and plans.*" (CUT, 2019)

Of the more than 60 countries that have submitted an updated NDC in 2020 and 2021 on the UNFCCC portal, only a handful mention local and sub-national governments as actors in the implementation of their strategy. Several countries do not mention them at all or only as an example without this being related to the governance of their climate strategy, such as Australia, Bangladesh, Colombia, the European Union, Brazil, the United Kingdom, Russia, Thailand, New Zealand, Lebanon, Switzerland, and Angola.

Some countries document how their national strategy impacts or coordinates the strategy of local and sub-national governments, or simply identify the planning work undertaken by local and subnational governments and climate integration, but do not necessarily integrate them. For example, the Ministry of Local Government in Rwanda (MINALOC) "*provides coordination oversight in facilitating local government data management flows to central level institutions*" (Rwanda, 2020). In Vietnam, the Department of Natural Resources and Environment is responsible for advising and assisting the Provincial People's Committee in monitoring and evaluating the implementation of tasks at the local and community level in the province (Vietnam, 2020).

Japan says it promotes actions proposed by local governments in their action plans (Japan, 2020), while South Korea's NDC more formally recognises the importance of the role of local governments primarily in implementing adaptation measures. For this reason, the government has made it mandatory for communities to adopt an adaptation plan since 2012; to date 226 local governments have established and implemented their own adaptation measures (Republic of Korea, 2020).

It is in Latin America that the consideration and integration of the action of local authorities in the implementation of NDCs is most evident from their contributions: Peru, Cuba, Chile, Argentina and Mexico integrate local authorities into their governance to varying degrees, but all mention coordination between the different levels.

- **Peru:** The State set up a "Grupo de Trabajo Multisectoral" (GTM) for almost two years to structure the dialogue around the renewal of the NDC and to facilitate the integration of contributions from different ministries but also from non-state actors. The update of the NDC in 2020 was approved by the High Level Commission for Climate Change composed by the Presidency of the Council of Ministers, thirteen ministries, but also by the National Assembly of Regional Governments and the Association of Municipalities of Peru (AMPE) (Pérou, 2020).

- **Chile:** The Climate Chance Observatory had already analysed the multi-level governance implemented by the government in a case study on the country's energy production (Climate Chance, 2019). Chile makes the regions the keystone of the national-local articulation with the creation of Regional Climate Change Committees (CORECC) that contribute to the planning and implementation of mitigation actions in collaboration with municipalities and the government. Four pilot regions are currently developing Regional Climate Change Action Plans (Chile, 2020).

- **Argentina:** The National Cabinet for Climate Change is leading a Provincial Articulation Panel or "Mesa de Articulación Provincial" to help develop regional action plans. The State is also considering the creation of regional platforms to deal with extreme events according to the particularities of each region and to territorialise the national early warning system. Finally, the NDC explicitly mentions the need for national and provincial authorities to work together to strengthen the specific planning capacities and skills of local governments (Argentina, 2020).

- **Colombia:** the *Sistema Nacional de Cambio Climático* (SISCLIMA), established in 2016, is responsible for coordinating Colombia's climate action from the subnational to the supranational level. SISCLIMA also includes a platform for subnational actors – the Regional Nodes for Climate Change, the main network for Colombia's subnational climate policy, that accompanies the implementation of subnational climate strategies. On the other hand, municipalities are required by the climate change law to formulate climate change management plans

which address both mitigation and adaptation actions. Aside from subnational government levels, the Regional Nodes can include civil society stakeholders, indigenous communities and academic institutions relevant to the region (GIZ, n.d.).

Examples are also notable on the African continent. The platform *Partnership for Collaborative Climate Action* analyses the renewal of Kenya's strategy and its multilevel governance (GIZ, n.d.).

Kenya shows a devolved cooperative governance system, where county governments are not necessarily subordinate to the national government (National Climate Change Action Plans (NCCAP) mainstream climate change into national, sectoral and subnational development planning, and like the NDC itself are updated every five years. The Kenyan Climate Change Directorate oversees their implementation and lends support and technical assistance on coordinating the implementation of the plans, on reporting and on capacity building at county level. At the subnational level, counties are to establish so-called Climate Change Units (CCU), which coordinate county-level climate change action. Within the NDC revision process, Kenya assembled a broad coalition of stakeholders, from different governmental levels, civil society, academia, and the private sector to further facilitate stakeholder ownership and ease its implementation.

Regarding monitoring, reporting and verification (MRV), Kenya established an integrated system, where counties are to downscale and contextualise indicators into their planning, and are responsible for preparing county sectoral plans. "*This shows how, while targets and systems are prescribed by the national government level, the counties demonstrate ownership for MRV which creates ownership of climate change actions.*"(GIZ, n.d.)

On the African continent, Energies 2050 and the United Cities and Governments (UCLG) network have assessed the opportunities for territorialising the African NDCs via Local Determined Contributions or "LDCs" and the mobilising role that local governments can play in their territory to get closer to the targets set at national level (Energies 2050, CGLU Afrique, 2016). The study proposes five areas of intervention to strengthen the articulation between national commitments and local dynamics, as well as the capacities of local governments to formulate their own contributions:

1. Reconsidering multi-level governance and horizontal articulation between local governments.
2. Strengthen the exchange of experience (customary as well as scientific) on the specific aspects of each territory.
3. Carry out integrated climate-friendly territorial plans in quantity and quality.
4. Financing climate-friendly urban development in Africa, which requires facilitating access to international funds and streamlining administrative procedures.
5. Establish measurement, reporting and evaluation (MRE) systems for cities.

These LDCs have no concrete applications yet but a similar approach has been adopted within the Convention for Biological Diversity (CBD), the equivalent of UNFCCC for Biodiversity. Following the notion of National Biodiversity Strategies and Action Plans (NBSAPs), the united local and regional governments developed the term "LBSAPs", Local Biodiversity Strategies and Action Plans. While LBSAPs should also (but not only) translate the national biodiversity strategies into local actions, the NBSAPs should include the local targets, plans, strategies and actions while supporting these through national means (UNCBD, 2008 mentioned by GIZ, 2020)

C. National Energy and Climate Plans (NECP) in Europe

Partnership is one of the key principles in the management of European Union funds: all programmes "*should be developed through a collective process involving authorities at European, regional and local level, social partners and organisations from civil society.*". It also mentions the importance to consider this cooperation at "*all stages of the programming process, from design, through management and implementation to monitoring and evaluation.*" to ensure that action is adapted to local and regional needs and priorities (European Commission, n.d.). What about Member States' tools such as the National Energy and Climate Plans (NECP)?

EU Member States must formulate NECP, an obligation established by the 2018 Energy Union Governance Regulation (EU) 2018/1999. These plans cover the entire period 2021-2030 and must include both national climate and energy targets for GHG emissions, energy efficiency and renewable energy, as well as the policies and measures planned to implement them. These plans, which are to be reviewed every 5 years, provide an opportunity for the EU to better identify its capacity to raise its climate change ambition under its NDC.

In the new legislative framework adopted in March 2019 "*Clean Energy for all Europeans Package*", the Parliament has required from the Member States to set a multilevel dialogue at national level and to be able to integrate potential mitigation and adaptation actions from local actors (cf. article 11 of the Energy Union and Climate Action Governance Regulation), with a view to helping them to formulate their National Energy and Climate Plans (NECP).

The European network Energy Cities is part of a the *PlanUp* project that tracks the development of National Energy and Climate Plans in EU Member States. Their first analysis in 2018 dealt with the first draft of NECPs submitted in December 2019 and have shown a lack of recognition of local governments from States: only five NECPs (Belgium, Greece, Latvia, Romania and the United Kingdom) explicitly highlight at least one city's action, while seven of them recognize local actions without highlighting specific actions (Energy Cities, 2019). As for their practical integration in the drafting process, only five States set specific consultation processes for local authorities (Estonia, Hungary, Greece, Latvia, Portugal), while seven others indirectly consulted them through city associations.

A second analysis in 2020 on the definitive NECPs leads to the same observations with EU countries failing in leveraging cities' key role and the prevalence of a top-down perception in many plans (Energy Cities, 2020). Local and subnational authorities are mostly referred for their need to get higher technical and financial capacities and their key role to implement national laws and programmes. Conversely, the report acknowledges that Belgium, Ireland, and Luxembourg fully understand the key role of local authorities.

- 4 EU Member States explicitly mention at least one good practice by local authorities in their final NECPs : Belgium, Latvia, Italy, and Romania.
- 12 Member States recognize local authorities' actions in the implementation of the energy and climate transition in their final NECPs: Belgium, Bulgaria, Czechia, Greece, Ireland, Italy, Latvia, Lithuania, Luxembourg, The Netherlands, Portugal, Spain.
- 10 Member States mention the Covenant of Mayors (see **Section I**), up from 4 in the previous assessment. Luxembourg also mentions the European Energy Award.

These good practices are not systematic yet and the current lack of multilevel dialogue and recognition of local governments into National Energy and Climate Plans contrasts with efforts made by cities to overcome traditional top-down methods. The evolution of practises takes two forms (1) the direct involvement of citizens: from punctual actions (protests, etc.) to citizens and community projects (energy cooperatives) and citizens movement (Transition Towns, Alternatiba), to civil disobedience (Ende Gelande) and (2) the evolving role of cities: from a simple role of project leader to a role of local actors' projects facilitator (Energy Cities, 2019).

SECTION IV

SECTION IV

Local Governments, SDGs & climate action

1. A growing appropriation of the SDGs by the local governments

A. The key role of local governments in the achievement of the SDGs

FIGURE 1

THE 17 SUSTAINABLE DEVELOPMENT GOALS ADOPTED BY THE UNITED NATIONS IN 2015 - *Source: United Nations*

On 25th September 2015, a few months before COP21 and the Paris agreement, the United Nations (UN) adopted the *Transforming our World* resolution, in which it presented the *2030 Agenda*, its roadmap for the next 15 years, made up of 17 *Sustainable Development Goals* (SDGs) (**fig. 1**). Designed to guide UN action around cardinal values set out in the preamble of the resolution such as strengthening peace, seeking freedom, eradicating poverty, protecting the planet, building partnerships and leaving no one behind, these goals are associated with 169 *targets* for which 231 *indicators* have been identified to measure progress.

This resolution clearly points out the importance of local authorities in achieving the SDGs:

> *"We recognize that sustainable urban development and management are crucial to the quality of life of our people. We will work with local authorities and communities to renew and plan our cities and human settlements so as to foster community cohesion and personal security and to stimulate innovation and employment."*

Transforming our World, UN, 2015, paragraph 34

This is supported by figures: for example, the Organisation for Economic Co-operation and Development (OECD) estimates that within its members, mainly Western avec majuscule countries, local authorities are responsible for nearly 60% of public investment in 2016 (nearly 40% worldwide). Therefore, among the 169 targets of the 2030 Agenda, "*at least 105 of the 169 SDGs targets will not be reached without proper engagement and coordination with local and regional governments*" (OECD, 2020). Then, the localization of SDGs, defined by the local authorities network United Cities and Local Governments (UCLG) as "*efforts to mainstream the SDGs into local development plans and policies*" (UCLG, 2020), is essential for their achievement.

B. 2020, a pivotal year for SDGs and local governments

The year 2020, a decisive year to accelerate the implementation of the 2030 Agenda a decade away from the deadline, saw many SDGs jeopardized by the Covid-19 pandemic: "*the coronavirus epidemic reversed some of the progress made in poverty, health care and education*", points out a report by the United Nations Department of Economic and Social Affairs (UNDESA) (UN, 2020). The EU, in its 2020 statistical summary of progress towards the SDGs also shows unfavourable trend for gender equalitiy and women over the past five years (European Commission, 2020).

In parallel, the Council of European Municipalities and Regions (CEMR) and the coalition of European local actors PLATFORMA note in conclusion of a study published in September 2020 that the Covid-19 pandemic and the role taken by local authorities, both to ensure access to essential services during lockdown measures and as a privileged interlocutor for local actors, could have accelerated the localization of SDGs. This localization was already at work before the pandemic, as shown by the results of a consultation carried out at the very beginning of 2020, presented in the same study: out of the 34 networks of local authorities from 28 European countries surveyed, 82% are aware of SDGs and regularly refer to them in their activities, compared to only 31% the previous year (CEMR-PLATFORMA, 2020).

Thus, the Covid-19 pandemic has reversed some encouraging trends for SDGs, but may also have accelerated some others, such as the appropriation of the 2030 Agenda by local governments.

This localization of SDGs is carried out in very different ways from one area to another. The OECD distinguishes 3 main types of approaches (OECD, 2020):

• **Developing new plans and strategies based on SDGs**
For example, Strasbourg (France) has formulated a new long-term strategy based on SDGs in the document Strasbourg: un territoire, une vision, un futur (**case study 15**).

• **Adapting existing plans to the SDGs**
The Earth Summit in Rio in 1992 led to the adoption of Agenda 21, an action plan for sustainable development concerning local and regional authorities. Many of them have taken up this plan and developed their own Agenda 21. The adoption of 2030 Agenda led many local authorities to adapt their Agenda 21 and to rewrite it in the light of SDGs. This is the case of the department of Gironde (France), for example, which in 2018 adopted the 4th Act of its Agenda 21 under the title *Agenda 2030, amplifying the Gironde contribution to SDGs for the well-being of all* (Agenda 21 Gironde, 2020).

• **Using the SDGs as a "checklist"** to assess the extent to which existing projects are aligned with sustainable development strategies and why they are not. This matrix addresses the issue of the coherence of public policies.

In this respect, the Voluntary Local Review (VLR) movement, which has been gaining momentum in recent years, is emblematic of this type of approach and illustrates the growing appropriation of SDGs by local governments.

C. The VLR movement, an illustration of the growing localization of the SDGs

In 2018, New York City published a "Voluntary Local Review" (VLR), a reporting document on the progress of the 2030 Agenda in its territory (New York City, 2018). This document, the first of its kind, is in line with the Voluntary National Review (VNR), in which a country assesses its progress in implementing the SDGs, which are presented at the High-Level Political Forum held each year to monitor and evaluate the overall progress of the 2030 Agenda. Today, the UN website lists almost forty VLRs (**fig. 2**), counting similar documents submitted before the New York one under another name.

According to the Brookings Institution, which analysed seven VLRs published in 2018 and 2019, a VLR is not only another document to report on local action: it is also often an opportunity to break down silos and build new collaborations, both between the different departments of the authority concerned and between municipal departments and other local actors (private actors, academic institutions, civil society, etc.). In addition to many other benefits, these new links make it possible to reinforce a *No one left behind* logic, central to the 2030 Agenda, and mentioned in all VLRs (Brookings Institution, 2020).

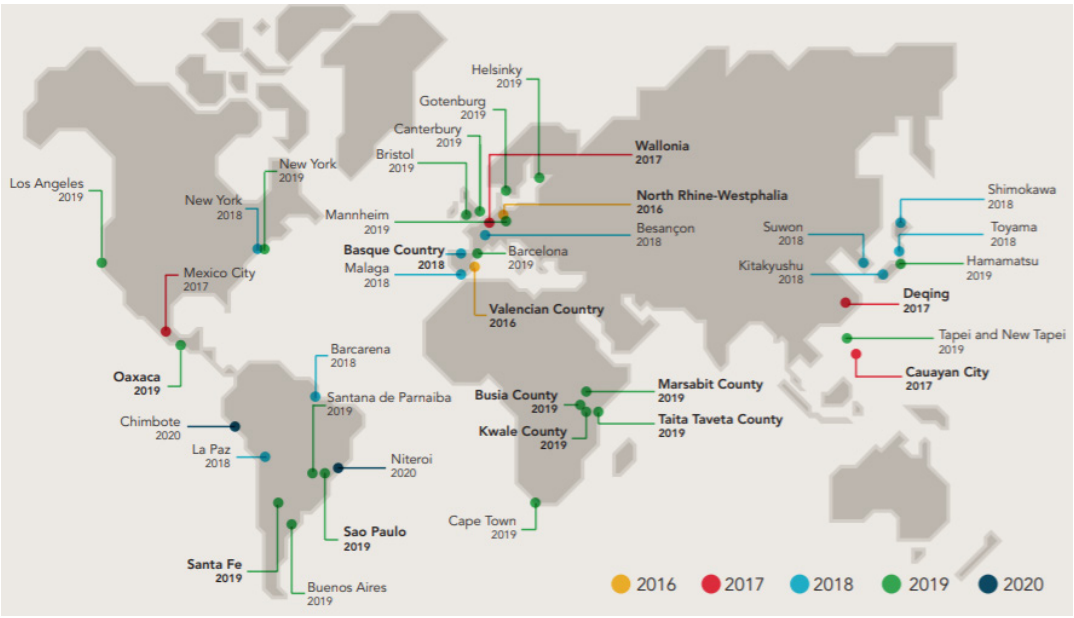
This observation is not unique to VLR, and seems to be a common denominator for SDG-based approaches. According to CEMR and PLATFORMA, working on or with SDGs favours cross-cutting approaches: among the European local authority networks surveyed, "*59% of the respondents informed us that they deal with the SDGs through interdepartmental working methods*" and "*more than two thirds of respondents develop joint activities with external partner organisations to foster SDG implementation, encouraging a real sense of partnership and cooperation to reach the global goals together*" (CEMR-PLATFORMA, 2020). This is also the analysis of Comité 21, the French association that acts for the implementation of the SDGs: based on an analysis of the appropriation of the SDGs by six French local authorities, note that the SDGs provide a common framework and language that facilitate partnerships, whether they are infra-territorial, supraterritorial or international (Comité 21, 2020).

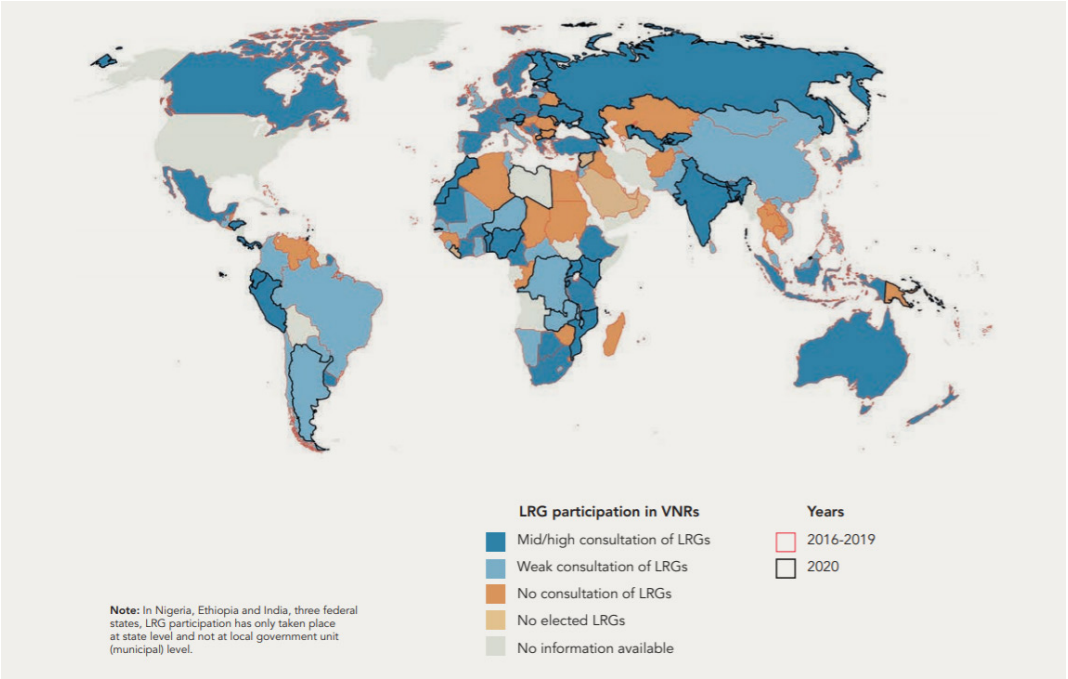
These partnerships brought about by voluntary reviews can also be vertical, between different levels of decision-making. Indeed, in 2020, for the first time since 2015, local governments contributed to VNRs in more than half (55%) of the countries that submitted such reports (**fig. 2**) (UCLG, 2020). In the previous year, this was only in 38% of cases. In some countries, such as Kenya, Peru, Germany or Finland, the contribution of local governments to VNRs is correlated with a rise in VLRs in the country. In others, the two processes were not observed together: in Russia, while no local government submitted an VLR, the All-Russian Congress of Municipalities (ARCM) and the Association of Volga Region Cities (AGP) were involved in the reporting processes for the development of the NRV; in the United States, the pioneering VNRs in New York and Los Angeles were widely reported, but no VNRs have been made since the adoption of the SDGs.

FIGURE 2

ABOVE: LOCAL GOVERNMENTS THAT HAVE SUBMITTED A VLR BETWEEN 2016 AND 2020.
BELOW: LOCAL GOVERNMENTS PARTICIPATION IN THE PREPARATION OF THE VNRs SINCE 2016.

Source: UCLG (p.49 et 26)





Voluntary reviews therefore enable local governments not only to highlight their action by translating it into SDGs, but also to experiment with new approaches and new partnerships, and to be in line with the values defended by the UN, such as leaving no one behind. Just transitions concept for instance at local scale can ensure that workers, frontline communities and the vulnerable are not left behind in low-carbon pathways (employment opportunities, cleaner energy, etc.).

For the elaboration of a VLR, access to robust and recent local data is essential. Local governments can rely on locally produced data, but also on data produced by reference statistical bodies.

Scotland

The Scotland SDG Network: a tool for multi-stakeholder governance of SDG policy in Scotland...

GHG Emissions

In the United Kingdom, strong decentralisation allows cities and the four constituent nations to set more ambitious targets than the London government and to experiment with measures and modes of governance for climate action within certain areas (Climate Chance, Case study United Kingdom - Energy, 2019). This is particularly the case in Scotland: enacted in 2009 and updated in October 2019, Scotland's Climate Change Act now sets an ambitious target of net-zero emissions of all greenhouse gases by 2045, with 2020 having an interim target of being at least 56% lower than 1990. The latest official GHG emissions inventory from 2018 shows that there has been a 45.4% reduction in emissions from the 1990 baseline, but a 1.5% increase from 2017, hence missing the 2018 target (**fig. 3**).

A collaborative and integrated approach for climate and SDG action

The Climate Change Plan lays out the collaborative approach: public engagement is a key pillar of Scotland's climate strategy, with Climate Week celebrations every year and large-scale public consultations like the Big Climate Conversation.

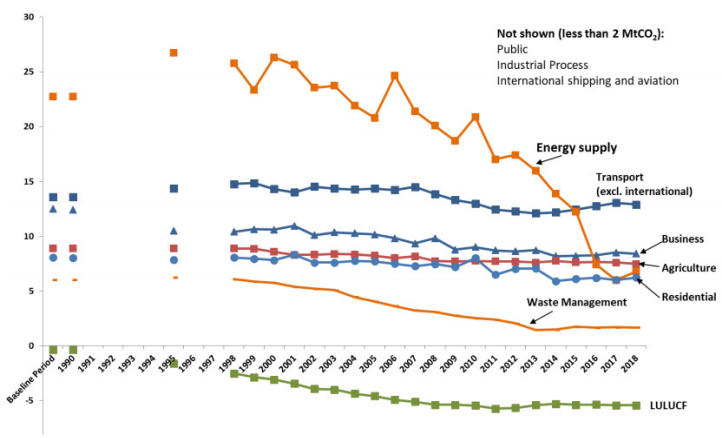
The collaborative approach is also a pillar of Scotland's SDG policy. The Scotland SDG Network, established in 2017, is made up of over 500 individuals and organisations working together to implement the SDGs. For the elaboration of the UK's VNR, the SDG Network joined forces with the network of Scottish local authorities (COSLA) and the Scottish Government to deliver Scotland's contribution. This initial work then led to the publication of a specific VNR for Scotland in 2020.

The chapter on SDG 13 in this Scottish VNR focuses on the links between climate action and SDGs: "*the range of commitments in our Climate Change Plan mean that our climate action also helps to deliver other SDGs [than SDG 13]*". The link is also made with the National Performance Framework (NPF) that predates the SDGs and sets out objectives to ensure people's well-being and quality of life: at the end of the chapter, a figure shows the alignment of the Scottish Climate Change Adaptation Programme with the NPF and the SDGs.

In 2018, the Scotland SDG Network published an open letter asking Scotland's 34 councils to report on their work in implementing SDGs. Five cities responded: East Ayrshire, Fife, Aberdeenshire, Glasgow and Dundee.

In its response, the city of Dundee, for example, states that it takes into account the 17 SDGs in its City Plan, its Council Plan and its Sustainable Dundee Plan. Its climate plan, published a few months later after important co-construction work with local stakeholders, sets out the links between the actions provided by this plan and the SDGs in a large table presented in an appendix to the document.

SCOTTISH GHG EMISSIONS, 1990 TO 2018 (IN $MTCO_2E$) - *Source: Scottish Greenhouse Gas Emissions 2018 (p. 2)*



D. Databases for monitoring

In order to support the localization of the 2030 Agenda, tools to monitor the progress of SDGs implementation at the local level have been developed. Here are three of them as examples, mainly intended for western local authorities:

• **OECD, Measuring the distance to the SDGs:**
Using its own databases (OECD Regional & Metropolitan Database) as well as those of Eurostat and the Joint Research Centre of the European Commission, the OECD has designed 135 indicators, different from the 169 established by the UN, to monitor progress in achieving the SDGs at the local level. The *Measuring the distance to the SDGs* tool assigns a score between 0 and 100 for each indicator to more than 600 regions and 650 cities, thus making it possible to visualise the progress of these areas on a graph, and to compare them with each other or with national scores (see the example of the city of Lyon - **fig. 3**).

• **SDSN, *SDG Index***
The Sustainable Development Solutions Network (SDSN), a UN agency, has developed the *SDG Index and Dashboards Report on European Cities*. Using UN or World Bank databases, a score between 0 and 100 is assigned to about 50 European cities for each SDG, as in the OECD tool. The scale is different, however: while the OECD gives a score of 100 to the cities with the best results according to the chosen indicator, the SDSN changes the definition of its ceiling score for each indicator. Thus, for SDG 13 (Climate Action), the city of Lyon has a score of 95 with the OECD tool based on the evolution of the city's temperatures, but has a score of 64.1 on the SDG Index because of the carbon footprint of its inhabitants, 5.6 tCO_2 per year on average (**fig. 3**).

• **ESPON** *SDG localising tool*
ESPON is a European applied research programme co-funded by the European Regional Development Fund (ERDF) within the Multiannual Financial Framework 2014-2020. Through local cooperation projects, ESPON enriches local public policies with evidence-based instruments and research to inspire local development with European best practices in various fields. In this perspective, the SDG Localizing tool project was launched in September 2019 with the aim of creating a web application to support local and regional governments in localizing the SDGs. The objective is to provide local government staff with a unique tool condensing the data and indicators needed to measure, compare and disseminate best practices and results of actions aimed at achieving SDGs at the local level. This tool is also addressed to national governments, to spot advanced local authorities and those that face more difficulties. It has a map to identify the progress of each European region for each SDG and indicator, as well as a library of resources on SDGs and case studies of implemented policies. Opened at the end of 2020, the application is called *ESPON's SDGs benchmarking tool* and is available at the following link[1]: http://sdg-dev.waat.eu/homepage.

• Platforms have been set up by governments to provide local data and indicators for local governments, like in France or Germany.

In addition to helping local governments in their reporting processes, these monitoring tools allow to draw overall conclusions on the localization and progress of the SDGs in the local areas. Accordingly, in the 2020 edition of the report *A Territorial Approach to the SDGs*, which synthesises the results of the OECD tool, we learn for example that "*cities and regions in EU countries tend to prioritise actions related to the environment (73%), closely followed by energy (67%) and mobility (63%) when implementing the SDGs*" (among a panel of responses corresponding to their competences). However, "*the SDGs where most cities lag behind relate to the environment (SDGs 13 about*

1 The user must log in using username = user and password = WaatUser.

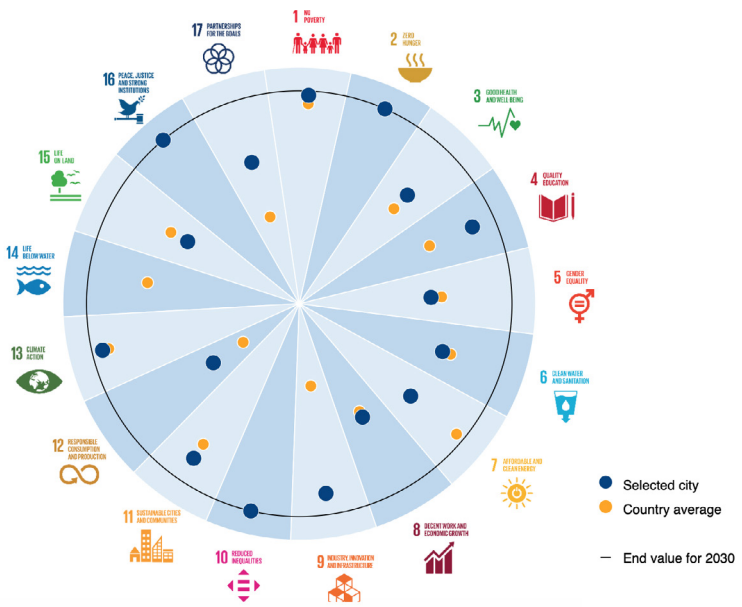
"Climate action" and 15 about "Life on land") and gender equality (SDG 5), where at least 95% of cities have not met the suggested end values" (OECD, 2020).

To monitor the implementation of the SDGs, because of their political nature and the consensus to reach on sutsainability, the discussion on SDG indicators can be participative, inclusive, and transparent. SDG monitoring and reporting process can guarantee an active role, to make sure that the most politically relevant indicators are included. Civil society organizations were included in the VNR in some countries (France, Spain...) This does not provide a final answer to the question which indicators are the most relevant, but it offers criteria to determine the relevance of indicators and what it is important to measure, regarding the challenge on the field (SDG Watch Europe, 2020).

Thus, even if it lags far behind the goals, climate action is one of the priorities of local governments in their action in favour of SDGs. How does the growing appropriation of the SDGs by local governments relate to climate action, which is itself present in the 2030 Agenda in SDG 13?

FIGURE 3

FOR THE CITY OF LYON (FRANCE) - *ABOVE: OECD Measuring Tool - BELOW: SDSN SDG Index*



Due to lack of data availability at the subnational level, SDG 14 (Life Below Water) and SDG 17 (Partnerships for the Goals) were not considered in the prototype report.

2. SDGs and climate action at the local level: pilot areas harness numerous synergies

Although it is the subject of a specific SDG (SDG 13), climate action has its own agenda, distinct from the 2030 Agenda, via the United Nations Framework Convention on Climate Change (UNFCCC), and even more since the Paris Agreement of December 2015. In front of these two parallel agendas, many are highlighting the synergies that exist between them, starting with the Intergovernmental Panel on Climate Change (IPCC) in its report on Global Warming of 1.5°C (IPCC, 2018). Trade-offs also exist: the Covid-19 pandemic showed that the drop in greenhouse gas (GHG) emissions could result from a sharp fall in economic activities accompanied by clear social setbacks (increased unemployment, increased poverty surge in gender-based violence and gender inequalities, etc.). It is therefore essential to couple climate action with SDG action in order to exploit these synergies and avoid these trade-offs (NewClimate Institute, 2018; Nerini, F. F., et al., 2019). Local authorities have a crucial role to play in this alignment: within the OECD, cities are responsible for 64% and 55% of environment and climate-related public investment and spending respectively (OECD, 2020).

How do local governments address these two agendas? What are their levers to implement their alignment, and what effects does this alignment have on their climate action?

A. Diverse approaches to align the local climate plans with the SDGs

Some local authorities have initiated structuring steps to align their climate action and the achievement of SDGs in their area.

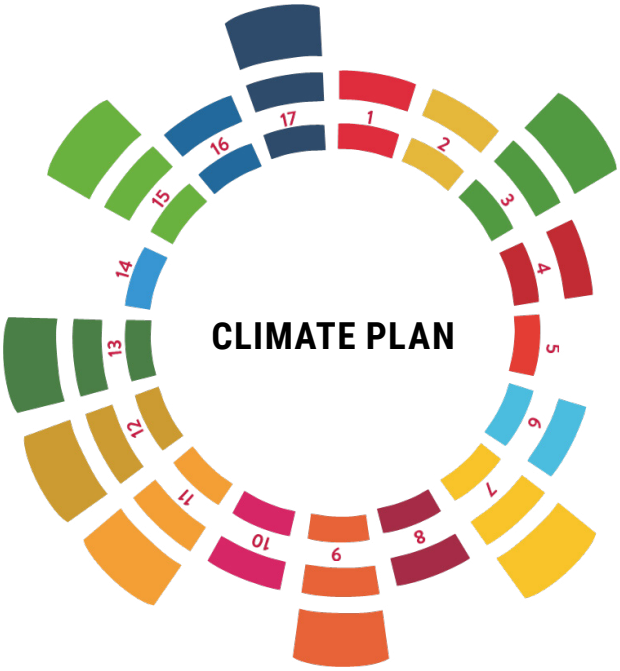
The action of Bristol (England) is noteworthy in this respect. In 2019, the city published the Bristol One City Plan, a roadmap to make Bristol "a fair, healthy and sustainable city" by 2050, broken down into numerous quantified objectives year by year, organised around six themes, including the environment. Thanks to the support of the Bristol SDG Alliance, made up of 140 members from various structures who meet several times a year to support the municipality in its SDG approach, all of the Plan's objectives are linked to the relevant SDGs in a Dashboard, and in the One City Plan and the SDGs document. The second version of the One City Plan, published a year later in January 2020, sets carbon neutrality and the achievement of SDGs as the final objectives of its 2020-2030 action plan. The city's climate action is presented as a component of the One City Plan: it is set out in the One City Climate Strategy and the One City Ecological Emergency Strategy, and inherits the systemic vision, collaborative approach and willingness to follow up that underpin the One City Plan and the SDGs.

On the other hand, several cities such as Dundee (**case study 13**), Strasbourg (**case study 15**) or Paris (Paris Action Climat, 2018) have analysed their climate plans in the light of the 2030 Agenda, in order to identify the SDGs to which they make a strong contribution and, on the contrary, those that their climate plan fail to take into account. For these three cities, the most affected SDGs are SDG 7 (Affordable and clean energy), SDG 11 (Sustainable Cities and Communities) and SDG 13 (Climate action). Conversely, SDG 5 (Gender equality) is barely affected. However, an increasing number of actions linking gender issues to the fight against climate change are emerging, whether at the state or local government level.

FIGURE 4

GRAPHICAL REPRESENTATION OF THE CONTRIBUTION OF THE CLIMATE PLAN TO THE SDGs

Source: Eurometropole de Strasbourg



B. Linking climate and gender (SDG 13 & 5)

In the previous edition of our Local Climate Action Report, we highlighted the lack of *methodological* connections between the SDG 5 targets, which focus mainly on violence and discrimination, and those of SDG 13. However, we also emphasised the strong interactions between these two analysis matrices: the increased vulnerability of women to the socio-economic impacts of climate change is very often highlighted in adaptation studies (they are up to 14 times more affected than men by extreme weather events (UNFPA, 2009), and the social functions of subsistence and transmission that they exercise in certain local communities are crucial.

The Covid-19 pandemic has accentuated gender inequalities: access to contraception has been made difficult by lockdown measures and domestic violence has increased (Cousins, 2020). According to Anne Barre, Gender and Climate Policy Coordinator at Women Engage for a Common Future (WECF), the Covid-19 pandemic revealed the strong intertwining of climate and gender issues, as the informal sector was excluded from the post-Covid recovery plans (Climate Chance, 2020). Yet this sector is a determining factor in climate mitigation and adaptation actions, because of its size (around 60% of workers worldwide are employed informally), especially in low-income countries where women represent the majority of informal workers (ILO, 2018).

Local authorities can play a key role in supporting informal structures at the intersection of gender and climate issues: for example, thanks to the work of Enda Colombia, the city of Bogotá now pays Women Waste Pickers as they provide public and environmental services. The city now includes elected women in its citizen committees for local planning and city budgeting; in the Democratic Republic of Congo, thanks to the advocacy and dialogue work of the Coalition of Women Leaders for Environment and Sustainable Development (CFLEDD), eight provinces have adopted new land and forestry legislation allowing the granting of property titles to women farmers, members of indigenous communities, thereby explicitly recognising the role of women in forest management (WECF, 2020).

Gender and climate issues are often intertwined within broader issues such as mobility. This is, for example, the challenge that Bogotá faces in its policy for soft mobility (**case study 14**). In Argentina, Buenos Aires has created a laboratory for data collection and analysis to improve women's mobility: this BA SDG 16+ Lab has led to a better understanding of how to transform public transport services to adapt to women's needs in terms of safety and access to essential places (Brookings Institution, 2020). These commitments underline the many synergies that exist between SDGs 5 and 13, which can be actively triggered at the local level.

At State level, the relationships between gender and climate issues are increasingly recognised. The United Nations Framework Convention on Climate Change (UNFCCC), the UN body that organises the Conferences of the Parties (COPs) during which international climate negotiations take place, adopted many decisions on mainstreaming gender into climate policies, and especially adopted a Gender Action Plan inviting Parties to integrate gender. "*Parties are increasingly recognizing gender integration as a means to enhance the ambition and effectiveness of their climate action. Most Parties referred to gender in the NDCs and to relevant policies and legislation, or affirmed a general commitment to gender equality.*" (UNFCCC, 2020) By October 2020, 34% of newly submitted NDCs integrated gender (WEDO, 2020).

Many of the approaches we have analysed so far do not mention SDGs: this does not, of course, prevent actions that harness synergies between climate action and other related issues. Among those that do mention SDGs, many fall under the second and third categories of SDG approaches that we presented in **Part 1**: adapting existing climate plans to SDGs, and using SDGs as a "checklist" to assess the contribution of climate plans to achieving SDGs. The first category, which would mean formulating a new climate plan based on the SDGs, does not seem to be favoured by local governments, perhaps for reasons of legislative frameworks and complexity. But then, isn't the use of SDGs just another analytical framework to highlight certain actions? Perhaps in some cases: this is one of the risks we identify later in this chapter. But beyond being a new communication tool that is probably useful for local governments, what benefits can these authorities derive from the 2030 Agenda when they associate it with their climate action?

C. The co-benefits of climate action and SDG action

Based on the conclusions of synthesis reports and feedback from local authorities, we have identified four main benefits that climate action presents when aligned with SDGs: prioritising actions, building new partnerships, taking into account populations needs and adopting a systemic vision.

• PRIORITISING ACTIONS AND ASSOCIATING THEM WITH APPROPRIATE INDICATORS • According to the OECD, "*the SDGs can help to prioritise climate goals and address them in conjunction with the social and economic pillars of sustainable development* " (OECD, 2020).
Moreover, using the SDG framework and thus the associated indicators can encourage local authorities to localize these indicators by adapting them to local realities, thus enabling monitoring of action and basing their decisions on evidence. The construction of monitoring indicators for the Strasbourg climate plan has been a driving force for the alignment with the SDGs (**case study 15**).

• BUILDING NEW MULTI-STAKEHOLDER PARTNERSHIPS • Already noted in the context of VLR (**Part 1**), building new partnerships, whether horizontal or vertical, in the local areas or between local areas, often goes hand in hand with the SDG approach. Climate action led by local governments that make efforts to align themselves with the SDGs can benefit from this partnership logic: in Strasbourg, for example, which is very committed to the SDGs, the climate plans have been drawn up in consultation with many local actors (**case study 15**).

The reverse also seems to be true: local authority policies which, by definition, are based on partnerships seem to be particularly appropriate areas for the SDG framework. Thus, the CEMR and PLATFORMA note that over half of the decentralised cooperation approaches reported by the European networks concerted are based on SDGs: nearly 40% on the 17 SDGs and nearly 20% of some specific SDGs, mainly SDG 5 (Gender equality), 10 (Reduced inequalities), 11 (Sustainable cities and communities), 13 (Climate action) and 16 (Peace, justice and strong institutions) (CEMR-PLATFORMA, 2020). However, SDG 13 seems to be mobilised unevenly depending on the country: in France, for example, in 2019, 14% of official development assistance from local authorities had a major or significant impact on the fight against climate change, while only 2% of expenditure explicitly associated with the SDGs mentions the SDG 13 (CNCD, 2021).

• NO ONE LEFT BEHIND: THE JUST TRANSITION • In their climate policies, States sometimes tend to act on large projects or programmes planned at the national level, but which poorly predict the consequences on populations (Barre, 2020). For example, the SDG & Climate Action Nexus Tool of the NewClimate Institute (**Part 3**), points to carbon and energy pricing tools as potential sources of conflict with SDG 10 (Reduced Inequalities) as they can lead to price increases for consumers and thus disproportionately affect the lowest income populations: "*Pricing interventions, if not carefully designed and implemented, carry a high risk of negative impacts relating in particular to affordability*" (NewClimate Institute, 2018). The Yellow Vest movement, a series of demonstrations and blockades in France beginning in November 2018, was triggered in part by the announcement of a fuel price increase by the French government.

Similarly, decisions to close down power plants that emit high levels of GHGs as part of energy transition policies can lead to economic and social challenges: how to support the reconversion of workers who lose their jobs to sectors that are both skilled and "green"? Local and regional authorities are often at the forefront of managing the social conflicts that can arise when the guarantees provided by decision-makers are not sufficient in the eyes of trade unions. Their competences and their proximity to the populations oblige them to take into account the realities on the ground, and thus show that their climate action is not to be carried out at the expense of the essential needs of the populations (housing, health, employment…).

In response to these issues, the "Just Transition" and "No one left behind" concepts (the latter being included in the preamble of the resolution Transforming our world) are rising to encourage public climate policies to consider the needs of populations both in the transition process (dialogue, co-construction…) and in the outcome of the transition (reduction of unemployment, reduction of inequalities…).

The reconversion of the Ruhr, a German region historically known for its mining area and coal and steel industry, is often cited as an example of successful just transition through long-term planning and continuous dialogue between all stakeholders (ACTRAV & ILO, 2018). Recently, the European Union launched a Just Transition platform in 2020, including a programme to assist coal regions in transition. In Canada, the Alberta region has committed to fully fund the retraining of workers in coal-fired power plants that will be closed until 2030, including training, relocation benefits, unemployment insurance top-up benefits and at least three years of income support for each worker

Bogotá - Colombia

In Bogotá, efforts to promote cycling are working but face gender inequalities[2]

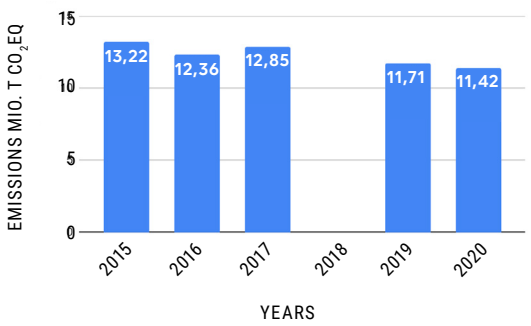
GHG emissions

Bogotá's GHG emissions have decreased slowly since 2015, from 13.22 $MtCO_2e$ in 2015 to 11.42 $MtCO_2e$ in 2020 (fig. 6). Road transport is one of the main sources of GHG emissions in the city (45% of total emissions) (IDEAM, PNUD, MADS, DNP, 2018).

Bogotá's actions in favour of cycling

Since the 1990s, two decades of pro-bike policies in Bogotá have resulted in more than 600 kilometres of cycling infrastructure in the city (IDRD, 2020). This success began with the car-free Sunday "Ciclovía", an event launched in 2001, which now brings together over 2 million people each time in a network of 127 kilometres of streets closed to car traffic.Cycling reached around 7% in 2019 (Secretaría Distrital de Movilidad de Bogotá, 2019). The enhancement of lanes combining several modes of transport builds hope, especially for the bicycle. More than 20 stations of the TransMilenio, the city's bus network, offer free bicycle parking. Each station of the future metro will have the same facilities. Bogotá's actions have created a national dynamic: outside the capital, many cities have set up cycle paths, car-free days and bicycle hire services.

BOGOTA ANNUAL GHG EMISSIONS



With the Covid-19 pandemic, Bogotá considerably expanded its network of bicycle lanes, transforming large parts of the 80 km "emergency" network set up during the pandemic into permanent extensions (El Tiempo, 20/05/2020).

Gender inequality in cycling

The widespread use of the bicycle in Bogotá still faces major obstacles, particularly with regard to its use by women: in Bogotá, only 24% of cyclists are women, and this proportion is similar or even worse in other cities. This reflects the serious safety problems on the road, where motor vehicles are still a threat, street harassment is common and the risk of theft remains high, especially in large cities. Despite the provision of infrastructure for cyclists, traffic conditions in most cities are generally very difficult (van Laake & Calderón Peña, forthcoming). Bogotá is committed to achieving gender parity in cycling, an ambitious goal that highlights the interdependence of sustainable development goals 5 (Gender equality), 11 (Sustainable cities and communities) and 13 (Climate action).

An ambitious and systemic climate action

In December 2020, the city of Bogotá declared climate emergency and committed to integrating the issues of climate emergency and human rights into each of its actions in order to correct the inequalities accentuated by climate change. There is also a plan to create an Expert Panel on Climate Change to advise the city, as well as the creation of citizens' groups to oversee the implementation of the elements detailed in the declaration: publications and then implementation in the coming years of plans to protect the city's natural spaces, to ensure food sovereignty and security, to increase the share of energy from renewable sources, to educate about climate change, to increase the resilience of the most vulnerable, and for integrated management of municipal waste. With regard to mobility, the city plans to implement a low and "zero emissions" motorised mobility policy and to no longer offer fossil fuel powered public transport before 31st December 2021 (C40, 2021).

2 Excerpts from the case study Sustainable urban mobility, rural accessibility and interurban connectivity: Colombia 21st century transport challenges (Climate Chance, 2021)

(ACTRAV & ILO, 2018). On the other hand, the Cumbria region will soon see the re-opening of a coal mine, whereas the United Kingdom had exited coal production in 2016 (Vox, 05/02/2021), as it has not been able to renew its labour pool.

Coupling the reduction of GHG emissions and the reduction of inequalities seems even more important as the pandemic has accentuated inequalities, particularly in emerging and developing countries (Cugat & Narita, 2020).

• ADOPTING A SYSTEMIC APPROACH • The researchers Amy Dahan and Stefan Aykut have shown that, at least until the Paris agreement, international climate negotiations "thought and institutionalised the climate problem as an exclusively environmental problem", sometimes reducing it to "quantified GHG emission reduction targets and a phased timetable for achieving them" (Aykut & Dahan, 2014). This reduction to the CO_2 metric has maintained the illusion of a problem that is separate and independent from the rest of economic and political life: "*The environmental reading of the climate problem has also isolated it on the international scene, separating it from other international regimes with which it regularly interferes, the most important of which are those of energy, international trade and development*" (Aykut & Dahan, 2014).

According to Aykut and Dahan, the risk of this approach is twofold: not only does it set aside issues intrinsically linked to climate change (such as inequalities in contribution and vulnerability), but it also focuses attention on externalities, thus partly obscuring reflection on the causes (energy system, mode of development).

Although it does not mention the 2030 Agenda, the Paris Agreement mentions "*sustainable development*" many times therefore stressing the need to consider economic and social issues in climate strategies. However, even today, many climate plans still formulate their objectives in terms of GHG emission reductions only. Linking climate plans to SDGs can make it possible to overcome this "silo" logic at the level of local authorities: the Strasbourg (**case study 15**) or Bristol (**see above**) climate plans are proof of this.

More generally, in its report *A Territorial Approach*, the OECD notes that SDGs can push states to assess their action according to indicators other than GDP, in order to pay more attention to well-being and the reduction of inequalities (OECD, 2020).

Of course, not mentioning SDGs in a climate plan does not mean that it ignores any effort to prioritise action, build new partnerships, leave no one behind or adopt a systemic approach. For example, Boston has published a Resilient Boston Plan in which it wants to guard against both the risks of extreme weather events but also against "slow-moving disasters", such as racism. Another example is Bogotá's action (**case study 14**). Similarly, aligning climate action with the SDGs is not automatically guaranteed in policies that reduce inequalities or adopt a systemic vision. Besides the potential benefits, the use of SDGs also entails some risks that deserve to be mentioned.

Strasbourg - France

Strasbourg, a laboratory for aligning climate action with SDGs

GHG Emissions

Between 1990 and 2017, Strasbourg's direct GHG emissions fell by 30%, mainly as a result of reduced economic activity (Strasbourg Climate Plan, 2020).

Localization of SDGs in Strasbourg

Two years ago, the city and the metropole of Strasbourg (*Eurométropole*) started work on the localization of SDGs in order to use 2030 Agenda to analyse and guide their action. To best adapt this framework to Strasbourg, an 18th SDG on access to culture was added to the UN SDGs, as well as 3 specific targets: reduction of noise pollution, European and international influence and civil security. This work on the localization of the SDGs, their targets and their indicators has made them more concrete and therefore easier to mobilise.

Since 2019, the city and the metropolis have been analysing their investment budget through the prism of the SDGs: the results have shown that SDG 11 (Sustainable Cities and Communities) benefits from significant financial resources while, on the contrary, some other SDGs such as SDG 5 (Gender Equality) were not subject to any investment expenditure. At the end of 2020, the city also analysed its budget using a tool developed by the I4CE institute to assess the effect of its spending on GHG emissions.

An SDG analysis was also carried out on the Climate Plan of Strasbourg (**fig. 5**), which shows that the plan's objectives and actions focus mainly on SDG 11 (Sustainable Cities and Communities) and 12 (Responsible Consumption and Production), also have strong impacts on SDGs 7 (Clean and Affordable Energy), 9 (Industry, Innovation and Infrastructure) and 13 (Climate action). However, SDG 5 (Gender equality) has been identified as absent from the Climate Plan, and should be the subject of future work. The city's 2021 budget contains for the first time a gender-sensitive investment expenditure: the renovation of schoolyards, undertaken with a view to adapting to climate change (creation of freshness islands), takes into account gender. In order to accentuate action in favour of the Climate Plan, the Eurométropole also launched at the end of 2020 the development of a Pact for a sustainable local economy, in partnership with private actors of the area.

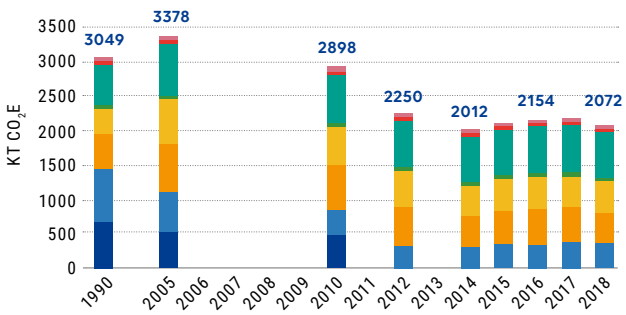
This Climate Plan illustrates the benefits of using SDGs, identified above:

- **Prioritising actions and building indicators**: Its action plan associates monitoring indicators to each action. In addition to the mandatory indicators for monitoring GHG emissions, there are many other indicators adapted to the area: number of recycled bicycles, number of companies involved in "industrial ecology approaches", number of actions carried out with the Regional Chamber of Agriculture in favour of agro-ecology, etc.
- **Building new partnerships**: The Climate Plan is the result of broad consultation between 2017 and 2019 with local stakeholders, which mobilised the general public, economic players and the city's 33 municipalities.
- **Just Transition**: The city wants to listen to its partners and their constraints for the implementation of climate policies. For example, aid for social landlords is planned to help them rehabilitate their housing stock so that it is better insulated.
- **Systemic approach**: The climate plan has four main themes. One is focused on reducing GHG emissions, and the other three are aimed at "well-being", "solidarity in economic transition", and "providing the resources to succeed". The analysis of this plan has shown that it covers 15 SDGs, so it is not limited to SDGs 13 and 11. Within the municipality, those in charge of the Climate Plan and the localization of SDGs regularly exchange views in order to compare and enrich their points of view.

Today, the city uses the SDGs as a strategic framework for the construction of municipal policies. The reference framework for sustainable cities (RFSC, **Part 3**) has been used twice in order to make the SDG profile of an Urban Development Zone and the Urban Natural Park. After Strasbourg joined the Milan Food Pact, the action plan for sustainable local food will also be built around SDGs.

GHG EMISSIONS OF STRASBOURG SINCE 1990

Source: Eurométropole de Strasbourg



D. Risks that these alignments may generate

• "JUST ANOTHER REPORTING LENS" • In a statement issued in April 2020, in the midst of the shock caused by the Covid-19 pandemic, the Director of SDG Impact of the United Nations Development Programme (UNDP) Elizabeth Boggs Davidsen warned that: "*Too often the SDGs are used as just another reporting lens to communicate existing activities differently, rather than to make different decisions.*" She then called for "*giving permission*" and the means to change with the post-Covid recovery plans. Indeed, many actions can be linked closely or remotely to one of the 169 targets of 2030 Agenda. Communicating on the use of SDGs does not automatically guarantee innovative and virtuous actions.

At the local level, setting up new bodies or dedicated services, such as the Scotland SDG Network (**case study 13**), or making commitments regarding the use of SDGs, can help to ensure that the use of SDGs is not restricted to communication actions. For example, in its analysis of several VLRs, the Brookings Institution think-tank noted that these documents all open with a "foreword" by the Mayor of the municipality, which shows both the importance of political will in the appropriation of SDGs, but also the dependence that this can create: will the next elected official want to continue a work strongly associated with the name of his or her predecessor? Long-term commitments such as the New York commitment to publish one VLR per year can help to ensure continuity of commitment (Brookings Institution, 2020).

• COMPLEX AND POORLY ADAPTED SDGs • The 2030 Agenda, even if it is intended to address everyone, is first and foremost a global agenda, broken down into global targets associated with macroscopic indicators. According to Yves Zimmermann, in charge of the localization of the SDGs in Strasbourg, it can be difficult for a local authority with a limited geographical area and specific characteristics to localize certain objectives. Indeed, how can we "*eradicate extreme poverty for all people everywhere*" (Target 1.1) or "*promote the rule of law at the national and international levels and ensure equal access to justice for all*" (Target 16.3) at the local level? If local governments adopt SDGs with no localization, there is a risk of no concrete action. Translating SDGs into local targets, such as the work done in Strasbourg, is often an indispensable step for local authorities who wish to take up the 2030 Agenda.

In addition, some major subjects for local authorities are notoriously absent from the SDGs: how can the SDGs be articulated around the digital revolution? Why is racism not mentioned? Why is access to culture not the subject of an 18th SDG, as recommended by UCLG's Culture 21 committee? Other global objectives, such as those of Africa 2063, a roadmap adopted by the African Union, may be more appropriate for some local authorities. They can also complement SDGs by defining specific local objectives or targets, like in Strasbourg where an 18th SDG on access to culture was created.

• FROM THE CONCEPT OF SUSTAINABLE DEVELOPMENT TO THE EMERGENCY OF TRANSFORMATIVE IMPLEMENTATION • Highlighted by the Bruntland Report (1987) as "*a development that meets the needs of the present without compromising the ability of future generations to meet their own needs*", sustainable development rests on three pillars: environment, economy and society. Often considered vague and ineffective: among its three pillars, it can be tempting to favour two and leave the third aside. It has been both appropriated and criticised within very different political and action fronts, for example, regarding the place of economic growth (Too central? not enough?), or environmental protection (A threat to growth? Principles not clear enough to lead to real progress?). The SDGs specify sustainable development actions, by breaking down each of the objectives into targets and associating them with a monitoring indicator. Nevertheless, being aligned with some of them says nothing about the effect on the others, and many studies have shown the potential conflicts that may exist between several of them (**Part 3**).

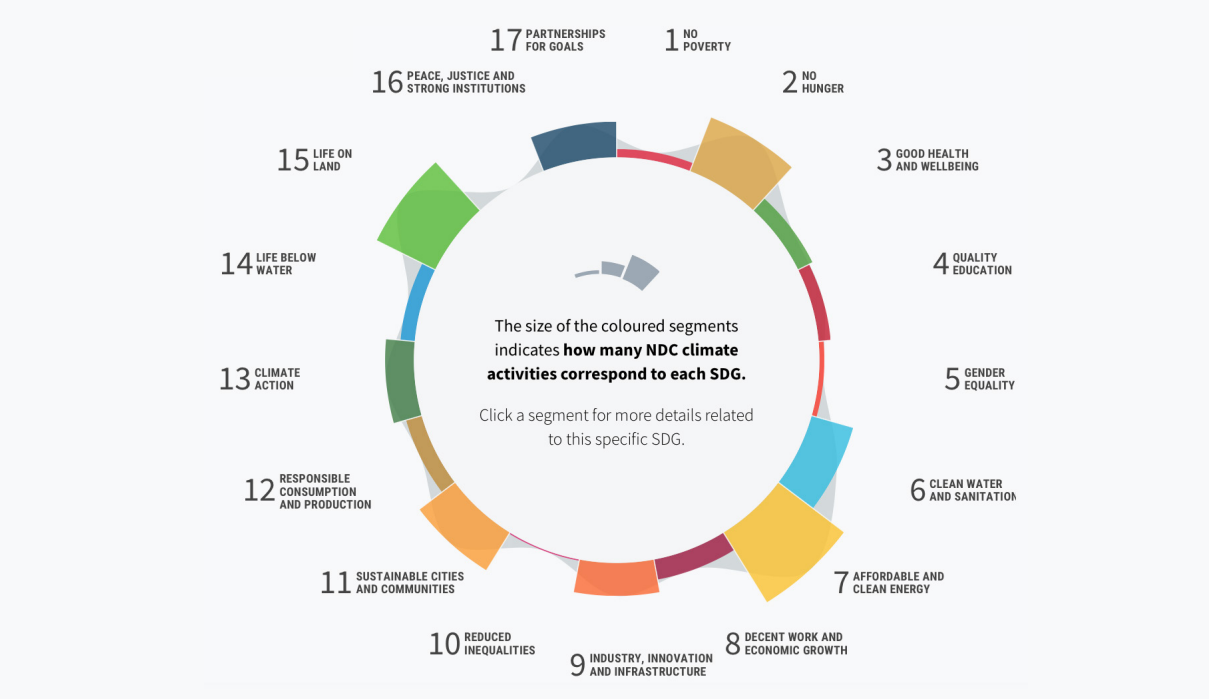
E. SDG-climate alignment within NDCs

States can also be the driving force behind the alignment of the climate policies with the SDGs. Indeed, in a report analysing new NDCs submitted before the 31st December 2020, the UNFCCC highlights: "*Some linked their NDCs to their commitment to transitioning to a sustainable and/or low-carbon and resilient economy, taking into account social, environmental and economic factors as well as the SDGs. [...] Most Parties highlighted policy coherence and synergies between their mitigation measures and development priorities, which include Long-Term Low Emissions Development Strategies (LT-LEDS), the SDGs and, for some, green recovery from the COVID-19 pandemic.*" (UNFCCC, 2021)

For this, States can use tools to model the contribution of their NDC to the 2030 Agenda. For example, the T21-iSDG model, developed by the Millennium Institute, and used in Senegal's NDC, makes it possible to visualise the effects of climate policies on some economic and social dimensions of a country. On the other hand, the NDC-SDG Connection Tool (**fig. 5**), which we already mentioned in our 2019 Report on Local Climate Action, is an initiative launched at the end of 2018 by the German Development Institute (DIE) and the Stockholm Environment Institute (SEI) aimed at "*revealing the connections and synergies*" between SDGs and NDCs, and thus "*identifying potential entry points towards more coherent public policy making and action*" (DIE & SEI, 2018).

FIGURE 5

GLOBAL GRAPHICAL REPRESENTATION OF THE NDC-SDG CONNECTION TOOL, SHOWING, FOR EACH SDG, THE NUMBER OF CLIMATE MEASURES PRESENT IN THE NDCS THAT HAVE SYNERGIES WITH THE SDG.



National policies can also be inspired by the actions led by local governments, as recommended by UCLG's Task Force of Local and Regional Governments in its latest report: "*Many countries could certainly increase their ambitions about NDCs by building upon existing city, region and company commitments in their national climate policy formulation processes. However, adequate tools to better coordinate, monitor and evaluate still need to be developed.*" Climate and SDG alignment approaches can then inspire national policies. For example, in partnership with local authorities,

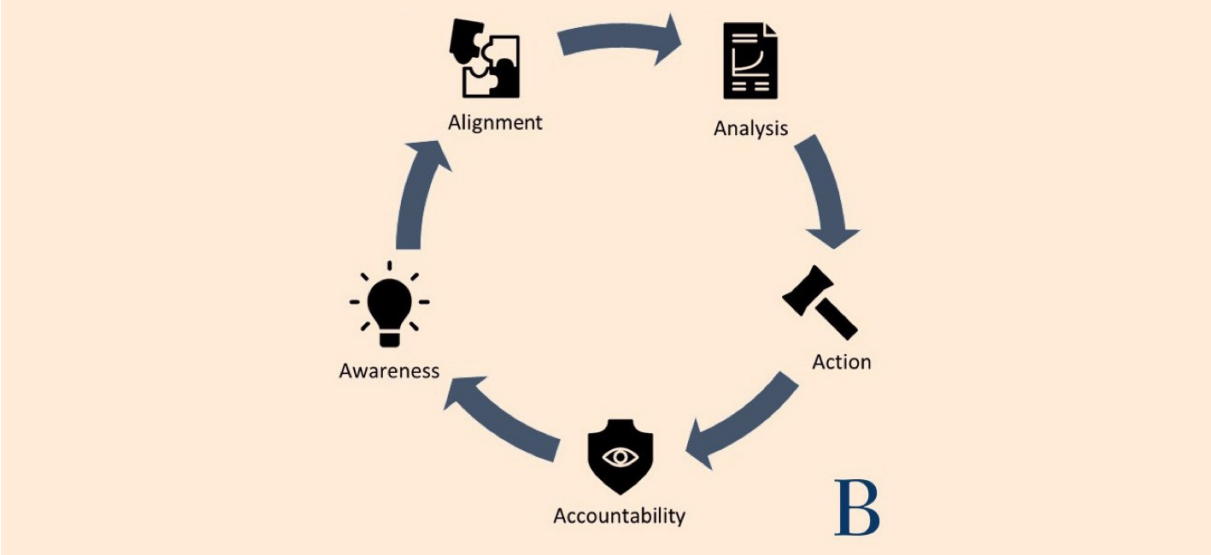
the Climate Chance Mobility Coalition recently built a Roadmap for Sustainable Mobility in Côte d'Ivoire, aligned with climate goals and SDGs, which could be integrated into the next NDC of Côte d'Ivoire (**case study 16**).

3. Tools for local governments for SDG-climate alignment

With its *Local Leaderships on the SDGs* project, Brookings Institution aims to foster the emergence of bottom-up approaches for the implementation of SDGs, through the promotion of best practices and the production of knowledge on the localization of SDGs. A recent report resulting from this programme identifies 5 stages in this localization of the SDGs (**fig. 6**): awareness, alignment, analysis, action and accountability.

FIGURE 6

THE 5 A'S: THE CYCLE OF LOCAL SDG ADAPTATION - *Source: Brookings Institution, 2020*



Local authorities must first become *aware* of the existence of the SDGs and their interest. Then, they generally develop an inventory of the *alignment* of their strategies, plans and policies with these SDGs, in order to *analyse* the opportunities or weaknesses of their action. Once this assessment is completed, they can take *action* to strengthen this alignment, and finally *account* for their action with the help of monitoring indicators in order to become *aware* of what is working and what is not, and to start a new cycle.

So far, we have mentioned several tools or approaches that can help local governments at each of these stages: VLRs, budgeting approaches, databases for the construction of indicators and monitoring, creation of new bodies or new positions specifically in charge of initiating and monitoring SDG-related approaches...

Côte d'Ivoire

The Climate Chance Mobility Coalition in Côte d'Ivoire: a Roadmap built by local actors for a mobility aligned with climate objectives and SDGs

Formed in 2018 at the Climate Chance Summit in Abidjan, the Climate Chance Coalition for Sustainable Mobility and Transport in Africa produced a Roadmap for Sustainable Mobility specific to Côte d'Ivoire. Under the supervision of the Ministry of Transport, this document is the result of a close collaboration between many non-state actors (local authorities, private sector, public partners and civil society organisations), led by the Climate Chance Association with the methodological input of the Paris Process on Mobility and Climate (PPMC) and the financial support of the Michelin Corporate Foundation. After an in-depth diagnosis of the mobility and transport sector in Côte d'Ivoire carried out between late 2018 and early 2019, a series of workshops in Abidjan in 2019 brought together some sixty Ivorian stakeholders in the sector. The diagnosis made it possible to define the various axes of a shared mobility strategy for the country, based on the objectives of the PPMC's World Roadmap and built on the actions already carried out in Côte d'Ivoire. Then, in 2020, and this despite the Covid-19 pandemic, a second series of workshops were organised to enable numerous local actors (around 50 at each workshop) from various structures linked to mobility to co-build an inclusive low-carbon strategy to transform the sector in Côte d'Ivoire. This roadmap aims at a "low carbon emergence in transport", and recalls how mobility is closely linked to the SDGs, in terms of economic development, access of populations to essential services or consumption of resources: proposals relating to road safety, the development of ecotourism or the strengthening of the country's regional economic poles illustrate these elements.

The local and regional authorities of Côte d'Ivoire have taken an active part in drawing up this roadmap, via the ARDCI (Assembly of Regions and Districts of Côte d'Ivoire). The roadmap calls for greater transfers of competences to local governments so that they can take an active part in transforming the mobility of their territories.

Three consultation workshops in three pilot cities (Cocody, Bouaké, Odienné), representative of mobility issues in Côte d'Ivoire, were organised to test and illustrate the approach of the roadmap for sustainable mobility. They provided an opportunity to present the roadmap approach and to collect feedback from participants so that the roadmap can be adapted to the needs of the local population. At the end of these workshops, the matrix of priority actions to be carried out was clarified.

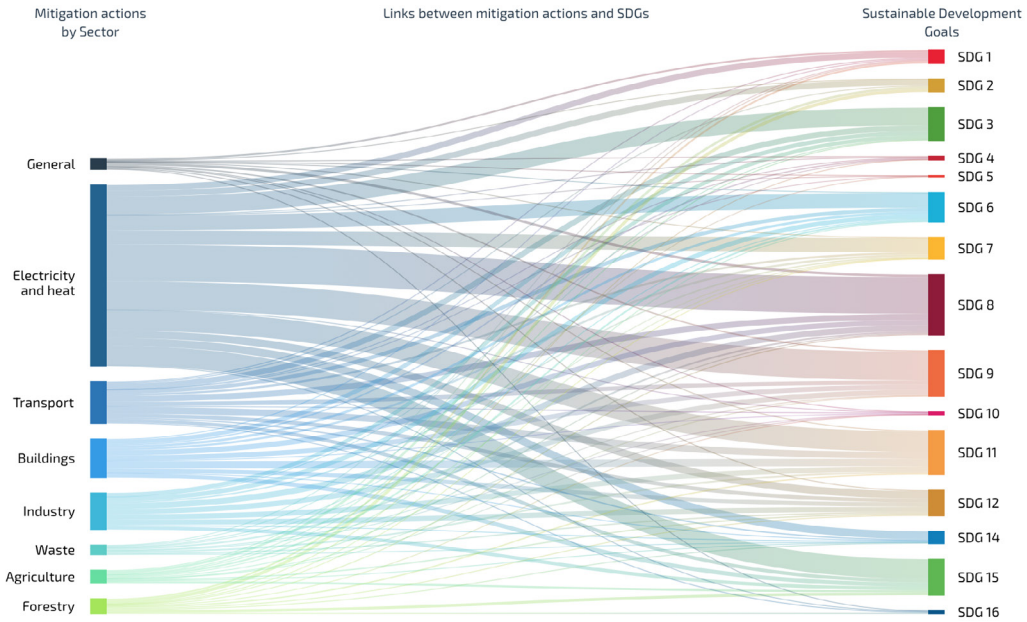
This roadmap will be officially presented to the Ivorian government in the coming months, and could eventually serve as a basis for the re-evaluation of Côte d'Ivoire's next national contribution to the Paris Agreement, expected at COP26 in Glasgow.

Regarding the localization of the SDGs specifically for climate action, here are some tools to model the synergies and conflicts that may arise between climate action and the 2030 Agenda, and thus help local governments in the alignment and analysis stages:

• **The SCAN Tool (SDG & Climate Action Nexus Tool),** already mentioned in **Part 2**, was developed by the NewClimate Institute in 2018. Hundreds of mitigation actions in 7 sectors (electricity and heating, construction, transport, industry, waste, agriculture, forestry and a general sector) are analysed to identify their synergies and conflicts with SDGs targets. On the dedicated website, it is possible to download a note detailing the methodology used, a report analysing the results of this tool published in 2018, and the set of tables listing the results. An interactive website has also been developed to make the results easily accessible to all (**fig. 7**).

FIGURE 7

GRAPHICAL REPRESENTATION OF THE LINKS BETWEEN MITIGATION ACTIONS AND SDGS BY THE SCAN TOOL



The Reference Framework for Sustainable Cities (RFSC) offers free tools specifically for European local authorities to profile their policies according to three different frameworks:

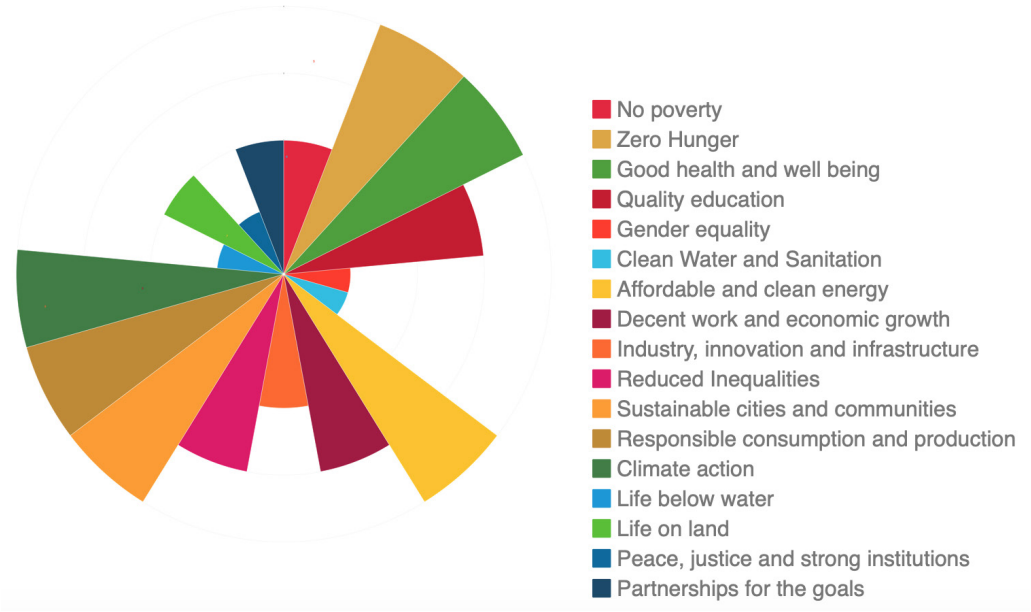
• **The European framework for sustainable cities**, developed by the RFSC, a series of 30 objectives in 5 dimensions (spatial, governance, social, economical, environmental) to define a European vision of tomorrow's cities.

• **The ISO 37101 - Sustainable development in communities standard** published in 2016 by the International Organization for Standardization (ISO), which aims to "*set out requirements and guidelines to help communities become more sustainable*". It explains "*the steps a community needs to take in order to achieve its sustainable development goals, such as creating an action plan, allocating responsibilities and measuring performance*". ISO 37101 certification requires "*the involvement of all interested parties in discussions to define and implement a sustainable development strategy*", including and especially citizens (ISO, 2016).

• **The SDG framework**. **Figure 8** shows, for example, the result for the city of Totnes in the United Kingdom, a pioneering city in the Transition Towns network, which is striving to combine the reduction of CO_2 emissions with the strengthening of links between the actors in local areas. The tool identifies which SDGs are affected and, on the contrary, which are neglected by a policy, a development project, an investment expenditure… Unlike the SCAN Tool, this tool does not allow visualising possible conflicts between the different SDGs.

FIGURE 8

SDG-PROFILE OF TOTNES (UK), MADE FROM THE RFSC



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SECTION IV • LOCAL GOVERNMENTS, SDGS AND CLIMATE ACTION

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