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MS1 Part 2

Analysis of climate governance structures in pilot cities

Milestone overview report 1.2

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1 Introduction

The aim of this second part to the Milestone (MS) 1 report is to provide a preliminary overview of climate governance structures in the three pilot cities of Paris, Zurich and Munich. Together with Part 1 "Emission inventories for cities and available data", the report fulfils Milestone 1 of the Pilot Application in Urban Landscapes (PAUL) project. Part 1 was prepared by TNO, the leader of Task 1.1, while this second part was prepared by TUM, the leader of Task 1.2.

The overall objective of Task 1.2 (Science-Technology Policy Governance and Emissions Data - Information and policy needs of the pilot cities) is to investigate whether decision makers in the cities of Munich, Zurich, and Paris have previously used emissions data to inform decisions on climate action and if so, how. The research will also incorporate the question of how new emissions data could improve this process. The outputs of Task 1.2 will serve as input for Task 1.4, the goal of which is to develop prototypes for emissions monitoring services, as well as for Work Packages 2 (Modelling), 3 (Observations), 5 (Communication), and 6 (Integration into Research Infrastructures).

As a first step, this report consolidates information about the climate governance structures in the three pilot cities. It draws on the cities' official websites, reports prepared by international organizations such as Climate Chance[1], the German Corporation for International Cooperation (Deutsche Gesellschaft für Internationale Zusammenarbeit, GIZ), the Organization for Economic Cooperation and Development (OECD), and the European Union (EU), and relevant academic publications accessed through ScienceDirect, SpringerLink, and Taylor & Francis Online.

To identify relevant studies and content for the topic under consideration, an internet search was conducted between July and August 2022. Using keyword combinations that address climate governance in the three countries, and specifically the three cities, Google was used to search for available studies, reports and cities' official websites.

Chapter 2 begins with a brief introduction to the concept of multi-level governance and how it applies to climate governance in the three pilot cities. Next, the concepts of international and supranational climate governance are discussed in the city contexts of Munich, Paris, and Zurich, and the country contexts of Germany, France, and Switzerland. In Chapter 3, the climate governance structure of each city is analyzed, with separate sections devoted to vertical and horizontal governance. These climate governance structures are then compared to each other in Chapter 4. Chapter 5 concludes the report, outlining the main findings, some limitations, and an outlook for future research.

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[1] https://www.climate-chance.org/en/

2 Introduction to multi-level governance

Air pollution and climate policymaking at the urban level in Europe requires an understanding of how science and policy is made in and between different levels of governance – local, national, and international. For this reason, the following section turns to the concept of multi-level governance.

2.1 Theoretical background of multi-level governance

Governance refers to the processes by which policymaking and policy implementation occur (Mayntz, 1998; Mayntz & Scharpf, 1995; Rosenau & Czempiel, 1992). At the end of the 1990s and the beginning of the 2000s, multi-level governance (MLG) approaches emerged. This was in part to address policymaking in the supranational European context. The MLG approach draws on theoretical insights found in studies of supranationalism, federalism and European studies, and links them to the concept of "governance". The basic concept of multi-level governance involves a shift from a traditional and centralized governance system to a horizontal and vertical system of multiple stakeholders (OECD, 2017a).

Studies of MLG governance systems and approaches go beyond traditional state-centered analyses that focus primarily or exclusively on the role of governments in decision making processes to include the multiple actors who influence agenda setting and policy implementation. These include actors in the private-sector and civil-society and can also include international actors.

Within the supranational European context, it is important to understand the interworkings among all such actors at the European, national and sub-national levels. Governance thus involves both rules and processes established by constitutions and laws and non-constitutional, "soft" and informal forms of interaction and influence (Benz & Eberlein, 1999; Börzel & Risse, 2004; Knill & Lenschow, 2000; Schreurs 2002: Schreurs 2019). Multi-level governance involves institutional, territorial, and public management dimensions. In other words, it is not just a question of at which level policy is being made, but which actors are involved and which processes are being pursued (OECD, 2017b).

Bache and Flinders (2004) point out that as policy issues become more complex, as is the case with climate change, they often take on MLG dimensions. The growing complexity of climate change governance is evidenced by the many actors and institutions involved. This does, however, make it difficult to identify decision-making levels and bodies due to the overlapping of responsibilities and the increasing interdependencies and interconnections of different political-territorial levels.

Multi-level governance has what could be called vertical, horizontal, and cross-cutting dimensions to it. Vertical governance refers to the interactions among different levels of government, from the supranational to the national, state or prefectural, and local levels. Vertical governance can be top-down or bottom-up. National governments may thus set policies that must be implemented by lower levels of government. Alternatively, lower levels of government or non-governmental actors at the local level may develop policy ideas that influence policymaking at higher levels of government. The forms that vertical governance take vary somewhat among states depending on whether they are centralized states, as is the case with France, or federal states as is the case with Germany and Switzerland. Formally defined competencies may thus not always lie with the same level of government. Over time, there may also be some variation as a central government (as in France) may choose to delegate certain responsibilities to lower levels of government, or in federal systems, different government levels may negotiate changes in where and how decisions are to be taken.

Horizontal governance, in contrast, refers to the collaboration among actors at similar levels – for example, across ministries, within a city, with stakeholders, or also across cities, such as through city networks. Jurisdictional competencies can strongly influence whether vertical or horizontal governance structures predominate albeit often both are in play.

The extent to which and the ways in which businesses, experts, citizens groups, and the public are integrated into decision making processes, also varies substantially. This has much to do with political cultures and institutional designs.
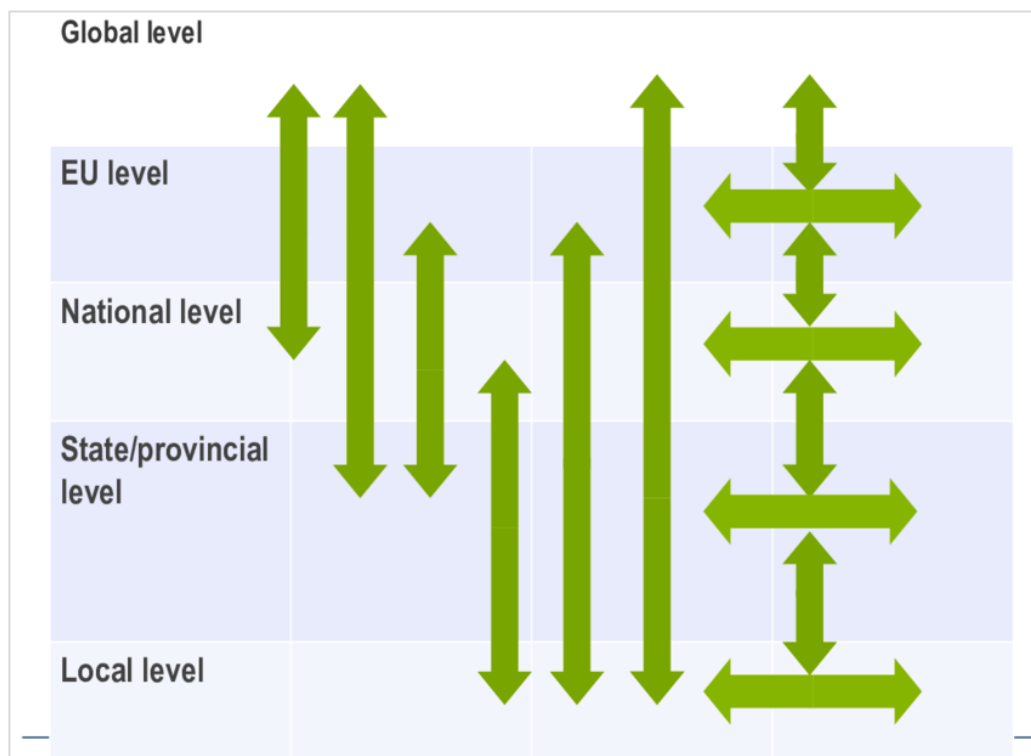
Figure 1: **Multi-level governance: possible horizontal and vertical interactions (Source: Jänicke, 2015, p.5789).**

Our focus is on cities within Europe's multi-level governance systems. European cities play a crucial role in climate governance. Europe is a highly urbanized continent with relatively few megacities and a large number of medium to large cities. A growing number of European cities are striving to become climate leaders. We will look at the governance structures of three such cities: Paris, Zurich, and Munich. Each of these cities is faced with the challenge of sharply reducing harmful pollutants and greenhouse gas (GHG) emissions in the matter of just a few short years. Paris, the largest of our three cities, plans to reach carbon neutrality by 2050, Zurich aims for climate neutrality by 2040, and Munich has set a target to be net-zero by 2035. To understand how these cities aim to achieve their targets, the report outlines their governance structures and provides initial findings.

2.2 The international climate governance context

The 1972 United Nations Conference on the Human Environment was the first major global conference on the environment. The conference addressed the threats to ecological systems and human health from the wide-spread pollution caused by industrialization and triggered the establishment of environmental governance institutions (environmental ministries and agencies) in national governments, first in more developed states and later in countries around the world. Prior to this time, environmental pollution was largely treated as a local issue. Paralleling these processes, international environmental themes began to take on more importance, including in relation to transboundary air pollution (the 1979 Convention on Long Range Transboundary Air Pollution, CLRTAP), stratospheric ozone depletion (the 1985 Vienna Convention and the 1987 Montreal Protocol), and the 1992 United Nations Framework Convention on Climate Change (UNFCCC) (United Nations, 2022b). Growing attention to the concept of sustainable development after the release of the 1987 Brundtland Report, *Our Common Future*, heightened awareness of the inter-connectivity of issues and the need for holistic approaches if problems like climate change, biodiversity loss, and world hunger were to be addressed (Brundtland, 1987).

The 1992 United Nations Conference on Environment and Development (also known as the Earth Summit) paved the path towards today's complex climate governance system and efforts to convince states to rethink their economic development goals and approaches and management of their natural resources (United Nations, 2022b). The summit concluded with four major achievements: the formation of the 1992 United Nations Framework Convention on Climate Change, the basis for both the 1997 Kyoto Protocol and the 2015 Paris Agreement; the Convention on Biological Diversity; a set of Forestry Principles; and, Agenda 21, a non-binding action plan for sustainable development. These agreements triggered action not only at the national level but also at the local level, giving birth to for example, Local Agenda 21 and some years later, the C40 Cities Climate Leadership Group[2], a network of the world's largest cities committed to addressing climate change, and the European Covenant of Mayors[3], the world's largest network of cities which aim to tackle climate change.

In 2015, the 17 Sustainable Development Goals were negotiated. At the national level, Switzerland launched the Swiss Sustainable Development Strategy (SSDS), Germany the National Sustainable Development Strategy (GSDS) (Bundesregierung, 2022), and France created posts for an Interministerial Representative for Sustainable Development and a General Commissioner for Sustainable Development and initiated a national SDG action plan (European Environment Agency, 2020a).

With heightening concern in the EU about global warming, pollution, inefficient material use, natural resource depletion, and import dependency for energy and natural resources, in 2019 the European Union launched the European Green Deal. The Green Deal aims to make Europe a leader in the development of clean energy, sustainable industry, building renovation, sustainable mobility, sustainable food production and consumption, and biodiversity protection. It also called for a climate neutral Europe by 2050.

Motivated by the findings of the Intergovernmental Panel on Climate Change (IPCC), the 2015 Paris Agreement urges states to hold the "increase in the global average temperature to well below 2°C

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[2] https://www.c40.org/

[3] https://www.covenantofmayors.eu/en/

above pre-industrial levels and pursuing efforts to limit the temperature increase to 1.5°C above pre-industrial levels." The Paris Agreement was built on the basis of voluntary commitments of action, known as Nationally Determined Contributions (NDCs). These are to be updated every five years in line with scientific evidence on climate change and the effectiveness of actions (United Nations, 2022b). The Paris Agreement also recognizes the role and importance of non-Party stakeholders, including cities, other subnational authorities, civil society, and the private sector, in addressing climate change and building resilience.

The EU's initial NDC set a GHG reduction target of 40% below 1990 emission levels by 2030. Moved by the increasingly dire warnings of the IPCC and the demands of citizens, in December 2020, the EU Commission proposed to enhance its emissions targets to achieve an at least 55% reduction of 1990 GHG emission levels by 2030. After negotiations among the Commission, Parliament and Council, this target became law with the passage of the European Climate Law in June 2021. The law sets a binding target to reduce GHG emissions by at least 55% of 1990 levels by 2030 and climate neutrality by 2050. A climate advisory body was then tasked with developing a GHG budget and a target for 2040 (Regulation (EU) 2021/1119).

The European Union is in the process of developing a package of climate and energy legislation intended to make Europe "Fit for 55", that is, in a position to achieve its target of reducing GHG emissions by 55% of 1990 levels by 2030. Measures being negotiated include a revision of the energy taxation directive, a carbon border adjustment mechanism, reducing methane emissions, the revision of the Renewable Energy Directive, the Energy Efficiency Directive, the Energy Performance of Buildings Directive, and many additional measures. As the energy sector accounts for over 75% of EU GHG emissions, increasing renewable energy use is central to its efforts. The EU's revised renewable energy directive (2018/2001/EU) of 2018 set a target of at least 32% renewables by 2030 with a possible upward shift in this target in 2023.

The Fit for 55 Package also involves revisions to the emissions trading system to expand its coverage to the maritime and other sectors previously not included in the Emissions Trading Scheme and will phase out free emission allowances for aviation. An additional emissions trading system is to be created to address fuel distribution for road transport and buildings. All funds derived from the pricing of CO_2 emissions are to be used to make progress on climate and energy projects and to cushion socially weaker segments of the population and small- and medium-sized enterprises from rising energy costs.

In 2019, with the launch of the European Green Deal, which aims to make Europe climate neutral by 2050, it became clear that this target would need to be strengthened. In light of Russia's invasion of Ukraine, REPowerEU, the EU Commission's plan to make Europe independent from Russian fossil fuels before 2030, sets a 45% target for renewables as a share of power generation for 2030. It further emphasizes the importance of saving energy, producing clean energy, and diversifying supplies and recommends that member states speed up permit-granting procedures for renewables deployment. The European Parliament backed the plans to raise the share of renewable energy to 45% by 2030 and energy savings targets to 40% of final energy consumption and 42.5% of primary energy consumption by 2030.

In addition to these binding measures, the EU provides a number of other supportive mechanisms to its member states and their cities, which aim to advance progress on climate neutrality. The Covenant of Mayors founded in 2008 engages with cities and supports them in sharing information on actions

which can be taken to lower emissions. It also empowers cities to speak with a stronger voice in European policymaking processes.

One of the latest EU Missions is "100 climate-neutral and smart cities", which will provide funding, advice, and other types of support to 100 selected cities in the EU. Munich and Paris are among those chosen. Under this program, they are invited to prepare Climate City Contracts, which set out their plans to achieve climate neutrality by 2030 and ensure high engagement of citizens and partners (European Commission, 2022c). There are several similar EU initiatives which aim at promoting climate protection measures in European cities, including the European Green Capital Award[4], the Green City Accord[5], the Circular Cities Declaration[6], and the Aalborg Charter.[7]

Table 1: International/supranational frameworks affecting climate governance in pilot cities

	Paris	Zurich	Munich
Paris Agreement	✓	✓	✓
Agenda 2030 for Sustainable Development with 17 Sustainable Development Goals (SDGs)	✓	✓	✓
European Green Deal	✓	x	✓
European Climate Law	✓	x	✓
EU Mission: 100 climate-neutral and smart cities	✓	x	✓

3 National Action Plans

European Union Member States were required to prepare National Energy and Climate Plans (NECPs) for the period 2021-2030 (European Commission, 2022b). France and Germany as members of the European Union and Switzerland as a country that aligns its targets closely with those of the European Union have all established national climate legislation.

3.1 France

France aims to be a leader in European climate policymaking. France has played a powerful role within Europe and is one of the key states promoting ambitious European climate action. As host to the negotiations that led to the Paris Agreement, France has also played a role of global significance.

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[4] European Green Capital Award (europa.eu)

[5] CC Declaration | Green City Accord (circularcitiesdeclaration.eu)

[6] CC Declaration | Home (circularcitiesdeclaration.eu)

[7] European Sustainable Cities Platform | The Aalborg Charter

3.1.1 Vertical Governance and the Role of the Central Government of France

France has a centralized governmental system, a mixed presidential-parliamentary democratic system, and is home to 65 million people, making it the second largest country by population in the European Union after Germany. The central government delegates some governance responsibilities to three other tiers: regions (*régions*), departments (*départements*), and communes (Buswell, 2022). There are eighteen regions, 101 departments, and around 35000 municipalities. In terms of climate change governance, France has sought to enhance decentralized powers and to open decision making more directly to citizens. These efforts reinforced two governmental levels: intermunicipalities and regions (Climate Chance, 2021a).

Figure 2: Map of France with departments, regions and cities. Regions are in red, the capitals of regions are in black with a red dot, and the capitals of departments are in black with a black dot. (Source: https://en.cartes-2-france.com/cartographie/departements/04_carte-france-departements-villes.php).

The national government has played an active role in climate policymaking. In 2001, climate change was made a national priority area and in 2004, in order to meet France's commitments under the Kyoto Protocol, the French government issued its first climate plan with steps to be taken to stabilize GHG emissions. In 2005, with the passage of the POPE act, France committed to cutting its GHG emissions by 75% between 1990 and 2050. Three years later, during its presidency of the European Union, France led the negotiations for the European Union's Climate and Energy Package, which set a goal of reducing EU GHG emissions by 20% of 1990 levels, raising the share of renewables in EU energy consumption to 20% and improving energy efficiency by 20% all by 2020.

In 2015 in the months prior to COP21 where the Paris Agreement was signed, France issued the Energy Transition for Green Growth Act, setting a national target to reduce GHG emissions by 40% below 1990 levels and to increase the share of renewables to over 30% of final energy consumption by 2030. In the meantime, France's national climate targets have been amended (Mon projet pour la planète, 2021). France was one of the initial European states to back a climate neutrality target for the continent by 2050; has championed the notion of a carbon border adjustment tax, a proposal it is pushed during its presidency of the European Commission during the first six months of 2022; and set a date of 2040 for the end of sales of internal combustion engines.

Different actors are involved in the climate policymaking process. The Ministry of Ecological and Inclusive Transition (*Ministère de la Transition Écologique et Solidaire*) assists on the drafting and implementation of policies in the field of ecological transition. This actor is also responsible for policies that combat global warming and tackle atmospheric pollution (Mon projet pour la planète, 2021). Together with the Minister for Europe and Foreign Affairs (*Le ministre de l'Europe et des Affaires étrangères*), both actors contribute to the development and promotion of social and solidary economy programs (Mon projet pour la planète, 2021). Another significant actor is the Agency for the Environment and Energy (*Agence de L'Environnement et de la Maîtrise de l'Energie Management, ADEME*). ADEME is involved in the implementation of sustainable development policies, and provides the general public with expertise on such, under the supervision of the Ministry of Higher Education, Research and Innovation (*Ministère de l'Enseignement supérieur, de la Recherche et de l'innovation*)(Mon projet pour la planète, 2021). The French Agency for Biodiversity (*Agence Française pour la Biodiversité, AFB*) also takes on different responsibilities related to environmental measurements. For instance, together with public policies, AFB aims to preserve and recover the environment and biodiversity in the country (Mon projet pour la planète, 2021). France has an active environmental movement. Following the example of Dutch and German activists, four environmental NGOs – Greenpeace France, Notre Affaire à Tous, the Nicolas Hulot Foundation and Oxfam France – have sued the French government for failing to do enough to assure it will meet its own climate targets (Willsher, 2021).

In 2019 and 2020, France launched an initiative that gained global attention, The Citizens Convention for Climate (*Convention citoyenne pour climat*), a citizens' assembly which was asked to make proposals for how France could accelerate the reduction of its carbon emissions. Based in part on their recommendations, on May 4, 2021, France adopted a new climate law (Law No 2021-1104). Under the new Climate and Resilience law, legal modifications were made in order to reach the targets of a 40% reduction in GHG emissions by 2030, compared to 1990 levels, set by the Paris Agreements and the European Green Deal (International Atomic Energy Agency, 2021). The adopted articles are focused on seven different areas: consumption (articles 2 to 29), work and production (articles 30 to 102), transport (articles 103 to 147), housing (articles 148 to 251), food security (articles 252 to 278),

environmental protection (articles 279 to 297), and environmental monitoring (articles 298 to 305) (Jousseaume, 2022).

Local governments play a crucial role in climate governance in France (Climate Chance, 2021a). They must develop their own Regional Climate, Air, and Energy Action Plans (*Schémas Régional du Climat, de l'Air et de l'Energie, SRCAEs*) in coordination with the central government (Climate Chance, 2021a). As a national monitoring measure, an ADEME platform, Territoire-Climat, serves as a database to catalog local climate plans (*Plan Climat Air Energie Territorial, PCAETs)* in the country and other environment-related initiatives (Climate Chance, 2021a).

According to French law, the 11 metropolitan regions in France with more than 50,000 inhabitants, with the exception of the overseas regions and Île-de-France region, must create their own climate plan following a regional strategy set by the central government. The plan must be in accordance with the regional plans for planning, sustainable development and territorial equality (SRADDET) and have climate targets based on the PPE (*La programmation pluriannuelle de l'énergie*), PCAETs, 2030 EU and 2050 deadline SNBC (Climate Chance, 2021a).

The SRADDET defines regional mid and long-term goals to ensure the balance and equality of regions by establishing plans regarding their economical management of space, transportation, development of renewable energy, climate change fight, protection of biodiversity, and the management of waste (Cerema, 2022a). It also incorporates pre-existing regional strategies, in particular, the regional scheme for ecological coherence (SRCE) and regional climate, air and energy scheme (SRCAE) (Ministères Écologie Énergie Territoires, Ministère de la Transition Énergétique, 2021).

Similar to the regional requirements, Intermunicipalities with over 20,000 inhabitants must also follow the Territorial Climate-Air-Energy Plan (PCAET) (IEA, 2022a). The PCAET is a strategic and operational plan to assist local authorities on their air, energy, and climate issues (Cerema, 2022b). It is primarily focused on addressing climate change with the aim to provide actions to improve energy efficiency, increase renewable energy, promote biodiversity, and limit GHG emissions (Cerema, 2022b).

Municipalities with less than 20,000 citizens are not required to draft their own climate plan, and therefore, are more likely to implement a transnational city network plan, such as the ones within the Covenant of Mayors (Climate Chance, 2021a).

The Île-de-France region has crafted its own regional strategy for sustainable action, the Ile-de-France Region master plan (SDRIF). In accordance with the MAPTAM and Grenelle II laws, the region must have a leading role in its sustainable development (Région Île-de-France, 2021). Its plan is broken down into five action plans, differing in areas related to decarbonization, biodiversity preservation, health, equality, and consumption (Région Île-de-France, 2021).

3.1.2   *Horizontal Governance and the Role of Various Stakeholders in Paris*

Horizontal climate governance takes many forms in the city of Paris. The city administration has been led by the mayor, Anne Hidalgo of the Socialist Party (*Parti socialiste*), since 2014 (Ville de Paris, 2022a). Below the mayor are 32 deputy mayors, one of whom is in charge of the ecological transition, the climate plan, water and energy (Ville de Paris, 2022b).

Both the mayor and deputy mayor are members of the Council of Paris (*Le Conseil de Paris*), an assembly comprising 163 councilors which governs the city of Paris. The Council is supported by eight

committees who inform and advise councilors on different topics. The 8th Committee is dedicated to the environment, climate and biodiversity, and cleanliness (Ville de Paris, 2022c).

In addition to these committees, the city of Paris has 22 departments or directorates (*directions*) dedicated to affairs such as housing and public health. The most important department for climate governance is the directorate of the ecological transition and climate (*Direction de la Transition écologique et du Climat, DTEC*), which was created in 2021 (Ville de Paris, 2022d).

Another important institution is the Paris Council of Europeans (*Le Conseil parisien des Européen·ne·s*). Made up of 61 members from different EU countries, it advises the city of Paris, in particular on issues that affect all European citizens, for example climate change (Ville de Paris, 2022e).

Citizen participation is at the heart of Paris' climate policymaking. Since 2019, Parisians are invited to participate in a debate before any meeting of the municipal councils. Through this so-called Paris citizens' council (*Le Conseil de Paris citoyen*), citizens can express their opinions on issues debated by the Council of Paris, ask questions, and propose ideas. (Ville de Paris, 2019a). The city took further measures to involve citizens in policymaking in 2019, establishing a permanent citizens' assembly (*l'Assemblée citoyenne*) which consists of a demographically-representative group of 100 Parisians over the age of 16 (Ville de Paris, 2022f). Elected for a term of one year, members of the citizen's assembly are actively involved in political decision making, for example by proposing issues for the political agenda, drafting *délibérations* (local draft laws), and requesting the critical examination of an issue. The establishment of this assembly was triggered by the Yellow Vest (*Gilets Jaunes*) protests and the related distrust in institutions (Bürgerrat, 2021). Besides these two platforms, citizens can get directly involved in the city's climate action by joining the community of Climate Volunteers (*Volontaires du Climat*). Volunteers have the opportunity to participate in workshops, challenges, and the Climate Agora (*l'Agora du Climat*), one of the shared governance tools established with the Paris Climate Plan (Ville de Paris, 2019b).

The Paris Climate Action Plan (*Plan Climat de Paris*) is the overarching framework in Paris' climate governance. It was first adopted in 2007 and was revised in 2018. Developed in consultation with citizens, the plan outlines 500 concrete measures which can lead the city towards achieving its goal: carbon neutrality and 100% renewable energy by 2050 (Ville de Paris, 2021).

The city of Paris encourages the active participation of not only citizens but also companies. Paris-based companies and institutions can become partners in the climate plan by signing the Paris Climate Action Charter (*Charte Paris Action Climat*). On signing, they commit to helping the city to achieve carbon-neutrality and 100% renewable energy by 2050. Partners can choose from three different levels of commitment (silver, gold, platinum), depending on how much they want to get involved (Ville de Paris & Agence Parisienne du Climat, 2022).

The Paris Climate Charter project is jointly managed by the City of Paris and the Paris Climate Agency (*Agence Parisienne du Climat,* APC), another important actor in Paris' climate governance. The APC is an operational agency dedicated to the ecological transition of the city. It was founded in 2011 by a mix of public and private stakeholders to support the implementation of the Paris climate plan. The agency's main function is to inform and advise citizens in their own efforts against climate change, particularly in the area of building renovation (Agence Parisienne du Climat, 2017).

There are several other institutions which play a key role in Paris' climate governance, including the Department of Green Spaces and the Environment (*La Direction des Espaces Verts et de*

l'Environnement, DEVE), the Ecologist Group of Paris (*le Groupe Écologiste de Paris*), and the Urban Ecology Agency (*l'Agence d'Écologie Urbaine,* AEU).

Furthermore, Paris is a member of several transnational city networks, including Energy Cities[8], the Covenant of Majors, C40 Cities, and ICLEI – Local Governments for Sustainability[9]. Here, the focus is mainly on collaboration, knowledge-sharing and example-setting.

Finally, the City of Paris works in close cooperation with the Greater Paris Metropolitan Area in matters of climate action. Several of the initiatives outlined in the Paris Climate Plan were even designed with the Metropolitan in mind, for example bicycle sharing schemes and funding to improve wood heating. Efforts are also made to ensure that the Paris Climate Plan is compatible with the Metropolitan Climate Plan (City of Paris et al., 2020).

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[8] https://energy-cities.eu/

[9] https://iclei.org/

3.2 Zurich

The city of Zurich has a population of close to 400,000, making it the largest city in Switzerland (Zürich Tourismus, 2022). Although not a member of the European Union, Swiss environmental policies are heavily influenced by EU developments.

3.2.1 Vertical Governance in Switzerland

Switzerland has a well-functioning federal system. The federal government, or Swiss Confederation, is technically the highest political authority in the country. But Switzerland's 26 member states, the cantons, of which Zurich is the largest, are very powerful. As a federation, legislative and political powers are shared between the Confederation (central state), cantons (member states), and communes. Each canton has its own constitution, government, parliament, courts, and police force. The city of Zurich falls into the smallest unit of government structures in Switzerland, the communes, also known as municipalities (Presence Switzerland PRS, 2021). Climate governance requires substantial coordination across governmental levels.

Figure 3:   **Cantons and Cities of Switzerland (Source: https://swisskarte.ch/en/)**

The Swiss embrace direct democracy. The Swiss political system is characterized by a very high level of citizen participation in climate governance. Municipal voters have a say on proposed laws and candidates (Stadt Zürich, 2019b).

In response to the growing urgency of climate action and international frameworks such as the Paris Agreement, the Swiss national government has developed numerous strategic plans, laws and policies to both mitigate and adapt to climate change. In 2014, the Federal Council passed a Swiss National

Adaptation Strategy to Climate Change for the country to reach net-zero emissions by 2050. This strategic pathway is divided into two parts. The first section ("Goals, Challenges and Fields of Action") is based on strategic goals and adaptation challenges at the federal level and covers the fields of action in the sectors of water management, natural hazard management, health, agriculture, forestry, energy, biodiversity, soil protection, tourism and spatial development. The second section, the Action Plan 2014-2020, outlines a basic structure for meeting climate governance challenges and contains/includes 63 measures with which the federal government contributes to achieving the adaptation goals, as well as 12 cross-sectoral measures. It outlines how policies and measures are to be coordinated between the Federal Council, cantons, cities, and municipalities (BAFU, 2017; LSE, 2014). In 2020, the Federal Office of the Environment (BAFU) published an updated action plan to cover the implementation of adaptation measures in the years 2020–2025 (BAFU, 2020).

Mitigation measures are equally important in the fight against climate change. On August 28, 2019, the Federal Council approved Switzerland's Long Term Climate Strategy. Drawn up by Federal Department of the Environment, Transport, Energy and Communications (DETEC), the strategy has as its main aim to reduce Swiss GHG emissions to net-zero by 2050 in line with the Paris Agreement and the European Union's climate neutrality goal. There are 10 key strategic principles which are designed to guide Switzerland towards its net-zero target. The first principle is that Switzerland will seize the opportunities offered by the transition to net zero. This means that it will use the opportunity to develop emissions-reduction technologies and to build a reputation as a center of climate innovation. In the second principle, Switzerland outlines a commitment to assuming its climate policy responsibility in line with global frameworks such as the Paris Agreement. Principles 3 and 4 relate to emissions reduction. They state that reducing emissions in Switzerland will take priority over reducing emissions abroad but that efforts will be made to reduce emissions across entire value chains, including emissions from imported goods and services. Principle 5 outlines Switzerland's commitment to the efficient use of all energy sources, while Principle 6 states that the Swiss Confederation and cantons are to focus their plans on achieving net-zero in all climate-relevant areas. In Principles 7-9, it is mentioned that the transition to net zero should be implemented in a way that is socially acceptable, economically viable, and improves environmental quality. The last principle outlines an openness to all types of technology that can facilitate the net-zero transition (Bundesrat, 2021).

Switzerland's central piece of climate legislation is the Federal Act on the Reduction of Greenhouse Gas Emissions or CO_2 Act (*CO2-Gesetz*) and the related CO_2 ordinance. In force since 2013, the act mandated the reduction of GHG emissions by 20% in relation to 1990 levels by 2020, with the possibility of increasing this reduction to 40% in line with international commitments (Bundesgesetz über die Reduktion der CO2-Emissionen, 2011). In 2020 this act underwent substantial revision, in order to ensure sufficient progress by 2030. According to the revised act, Switzerland should halve its GHG emissions by 2030 in comparison to 1990 levels (BAFU, 2021a). It also includes additional measures such as the flight ticket levy to supplement the existing CO_2 levy. The flight ticket levy is a passenger tax of 30 Swiss Francs for short-haul flights, with the amount increasing proportionally according to the distance travelled, up the value of 120 Swiss Francs. The money collected from this tax would be funneled into the Climate Fund and used to, among other things, develop sustainable aviation fuel and invest in night trains (BAFU, 2021b).

Various measures of the 2013 CO_2 Act, such as the reduction obligations for exemption from the CO_2 tax and the CO_2 compensation obligation, were limited until the end of 2021. The total revision of the CO_2 Act approved by parliament on September 25, 2020, which provided for a new regulation of the

measures, was narrowly rejected by 51.6 % of the electorate in a referendum in June 2021, so that corresponding measures were in danger of being dropped (UVEK & BAFU, 2022).

In order to prevent a regulatory gap until the entry into force of the totally revised CO_2 Act by 2025, Parliament decided on December 17, 2021, to extend the undisputed provisions of the CO_2 Act and to continue the reduction target until the end of 2024. Accordingly, Switzerland is to reduce its emissions by 1.5 percent per year between 2022 and 2024 compared to 1990.

On April 7, 2022, the referendum deadline expired unused and the law will enter into force retroactively to the beginning of 2022. The Federal Council approved the corresponding CO_2 ordinance at its meeting on May 4, 2022.

In addition to Switzerland's reduction target, the revision extends important climate protection instruments until the end of 2024. For example, fuel importers will still be obligated to offset CO_2 emissions from transport with climate protection projects in Switzerland and now also abroad (UVEK & BAFU, 2022).

In 2017, the Swiss electorate voted in favor of the revised Energy Act. Its goal is to increase energy efficiency, promote the use of renewable energy, reduce energy consumption, and prohibit the construction of new nuclear power plants. The Energy Act forms part of the national Energy Strategy 2050, which was developed in response to the Fukushima nuclear disaster in 2011 (DETEC, 2022). Some specific targets set out by the revised Energy Act include a 43% reduction in average energy use per person by 2035 compared to 2020 and a 260% increase in domestic production of renewable energy (excluding hydropower) by 2035 (Bundesamt für Energie, 2018).

The phasing out of nuclear energy and ramping up of renewable energy production mean that Switzerland is currently undergoing an energy transition. As of 2020, the country obtains 34% of its energy from nuclear power and 57% from hydropower, with the remaining 9% coming from conventional thermal power plants and other renewable sources. This makes Switzerland the country with the cleanest energy supply among the 31 IEA (International Energy Agency) member countries (IEA, 2022b). Replacing the energy provided by nuclear with other sources will not be easy and will additionally require major improvements in energy efficiency. As outlined in the 2050 Energy Strategy, it will also be necessary to make significant investments into the modernization of the electricity grid in order to deal with bottlenecks and the increasingly decentralized nature of electricity production (Bundesamt für Energie, 2018).

According to Climate Action Tracker, an independent organization which assesses countries' climate performance, Switzerland's 2030 NDC target is "almost sufficient." This means that if Switzerland succeeds in reducing its domestic emissions by 33% compared to 1990 levels before 2030, as planned, models show that global warming could be limited to less than 2°C, but not to 1.5°C. Therefore, it is inconsistent with the 1.5°C temperature limit of the Paris Agreement. Furthermore, the policies and actions Switzerland has developed to meet this 2030 goal are considered insufficient, and move the country on a trajectory which aligns closer to a 3°C world. This is due in part to the rejection of the revised CO_2 Act in the 2021 referendum. Without the far-reaching measures proposed in this revised act, it is predicted that Switzerland will fail to achieve its 2030 goal. The country also received a particularly harsh appraisal from the organization in relation to climate finance, with major improvements needed in its commitments to financing climate projects in developing countries (Switzerland Targets, 2022).

In response to national and international climate targets, the Canton of Zurich adopted its own long-term climate strategy (*Langfristige Klimastrategie*) in 2022. The aim to achieve climate neutrality by 2040 and to halve GHG emissions by 2030 compared to 1990 levels. Key measures include the replacement of oil and gas heating systems with more environmentally-friendly alternatives, the incentivization of sustainable modes of transportation, and the use of carbon capture and storage technology (Kanton Zürich, 2022). The plan will require substantial coordination among multiple actors, including the federal government, cities, and municipalities.

The city of Zurich has been active in the area of climate protection for quite some time. In 2008, on approval of the 2000-Watt Society strategy, Zurich became the first Swiss city to set a climate protection target in its municipal code. This strategy envisions a fairer world where each person has access to 2000 watts of continuous power, the amount necessary to ensure a good quality of life. Currently, the average Zurich resident uses about 5000 watts. Therefore, the goal is to drastically reduce the primary energy consumption of Zurich inhabitants and limit the CO_2 emissions caused by this consumption to no more than 1 ton per person per year (City of Zurich - Office for Environmental and Health Protection Zurich, UGZ, 2011; Stadt Zürich, 2022c).

The City of Zurich adopted a new climate protection target on May 15, 2022. As part of the new proposal, the city aims to become climate neutral by 2040 and have a net-zero administration by 2035 (Stadt Zürich, 2022d). This target is more ambitious than the federal government's 2050 net-zero plan and matches the target of the Canton of Zurich. For the first time, the Zurich electorate approved a reduction target for GHG emissions that are emitted outside the city boundaries but are, to some extent, caused by citizens of Zurich. These so-called indirect, or grey, emissions stem from mobility outside the city, the procurement of food, textiles and building materials, and the energy supply chain. The goal is to reduce indirect emissions by 30% compared to 1990, by focusing on measures related to the circular economy and sustainable procurement (Stadt Zürich, 2022d).

3.2.2   Horizontal Governance and the Role of Various Stakeholders in Zurich

The city of Zurich's administration is separated into nine departments and governed by a nine-member City Council. The president of the executive department is analogous to a mayor in other cities. The City Council currently includes three members from the Social Democratic Party (SDP), two members from the Free Democratic Party (FDP), two members from the Green Party, one member from the Green Liberal Party (GLP), and one member of the Alternative Liste (AL) (Stadt Zürich, 2019b).

The Office for Environmental and Health Protection (*Gesundheits- und Umweltdepartement*) and the Office for Urban Development (*Stadtentwicklung Zürich*) oversee the city's climate action plan. The city's climate plan includes four concrete goals: Climate Neutral City, Healthy Urban Environment, Networked Urban Nature, and Intelligent Use of Resources. Each goal is distinguished by a different area of focus and composed of specific targets for which various strategies and projects are developed within different city departments (Stadt Zürich, 2022b).

The city's first climate goal is to become a Climate Neutral City by reducing GHG emissions to net-zero by 2040 and indirect GHG emissions by 30% by 2040, compared to 1990 (Stadt Zürich, 2022b). Within this goal, the city of Zurich implements specific strategies to tackle the issue, including a New Climate Protection Target which aims for the city administration to become net-zero by 2035 (Stadt Zürich, 2022b). Other strategies covered in the city's Climate Neutral City include a Food Strategy, aimed to analyze the production chain outside the city's borders and promote environmentally friendly

nutrition options, and an Energy Master Plan, aimed to provide resource-efficient energy supplies (Stadt Zürich, 2022b).

Zurich's second concrete goal, Healthy Urban Environment, focuses on the development of high environmental quality with the protection from sound and noise, temperature, light, and air quality (Stadt Zürich, 2022b). The goal incorporates a Heat Mitigation Plan, a Noise Protection Strategy, an Air Pollution Control Action Plan, and an Urban Trees Plan (Stadt Zürich, 2022b).

Zurich's third climate plan goal of a Networked Urban Nature is designed to provide a high level of biodiversity and high-quality environmental goods (Stadt Zürich, 2022b). The goal encompasses two main projects: the Green Book, and the Concept of Species and Habitat Promotion. Established in 2019, the Green Book's purpose is to aid in the development of green and open spaces in the city of Zurich while addressing population growth and climate change challenges (Stadt Zürich, 2022b). The Concept of Species and Habitat Promotion intends to provide arguments for a successful biodiversity promotion in urban areas (Stadt Zürich, 2022b).

The fourth concrete goal present in Zurich's climate plan, Intelligent Use of Resources, is designed for technological, economic, and social innovations to improve the city's circular economy (Stadt Zürich, 2022b). It is incorporated into three main projects: Sustainability Standards in Procurement, Greater Consideration of Climate Relevance in Purchasing, and Building and Waste (Stadt Zürich, 2022b).

Zürich's climate plan requires the collaboration of multiple actors. Under the leadership of the present City Councilor, the Health and Environment Department is responsible for monitoring progress towards meeting targets and submitting annual reports.

The Energy Officer (*Energiebeauftragte*) plays an important role in the integration of Zurich's cross-departmental Energy Master Plan. Updated every four years, this plan sets the municipal energy policy agenda on measurements and strategies that should be applied within departments (Stadt Zürich, 2021a*).*

In order to reach the target of a 30% reduction in indirect GHG emissions compared to 1990 levels by 2040, the Civil Engineering and Waste Management Department (*Tiefbau- und Entsorgungsdepartement*) has been implementing recycling management solutions and procurement of recycling of textiles and sustainable food (Stadt Zürich, 2022d). Two of its main projects are The Green City of Zurich (*Grün Stadt Zürich*) and City Traffic 2025 (Stadtverkehr 2025). The Green City of Zürich is a purpose-driven strategy committed to the preservation and promotion of biodiversity (Stadt Zürich, 2019a). Its main purpose lies within the plan to build and maintain public green spaces in the city of Zurich (Stadt Zürich, 2019a). As a founding member of the "Verbund Lebensraum Zürich"(VLZ), the Green City of Zurich also has a green lobby, together with the VLZ, with around 11,000 members and 20 clubs in order to build a network platform to support and care for green spaces in the area (Verbund Lebensraum Zürich, 2022). Together with the Civil Engineering Office of Zürich (*Stadt Zürich Tiefbauamt*), the City Traffic 2025 goal encompasses the new umbrella strategy "Urban Space and Mobility 2040"(*Stadtraum und Mobilität 2040*) for a livable and climate-neutral Zürich and lays a foundation for urban space and mobility in the city (Stadt Zürich, 2022d) The foundation is based on livable and climate-neutral targets and aims to increase the proportion of pedestrian, bicycle and public transportation in the city (Stadtrat von Zürich, 2022).

City networks play an important role in city management in Switzerland. The city of Zürich collaborates with different organizations and private companies. As part of their Eco-Compass project (*Öko-*

Kompass), the city of Zurich is working through the Clean Agency Switzerland AG to provide consulting services for small and medium businesses regarding environmental measurements (Stadt Zürich, 2021c). The service, free of charge, provides local companies with recommendations for a cost-efficient sustainable transition in relation to energy-efficiency, mobility, resources and corporate management (Stadt Zürich, 2021b). This service is in partnership with the companies Integrale Planung GmbH, Sinnform AG and the Myclimate foundation.

As a direct democracy, Swiss citizens vote on climate proposals. The city of Zurich implements a Climate Forum (*Klimaforum*) to involve multiple stakeholders in the development and discussion of climate protection programs for the city. In 2020, for example, around 100 people from different organizations and businesses joined the forum to discuss climate-related topics and possibilities for the city (Stadt Zürich, 2022e).

Within the Health and Environment department (*Gesundheits- und Umweltdepartement*), the city of Zurich has a number of funding initiatives to tackle climate change. Together with the UGZ, they supported 30 projects in 2020, in the field of environment and sustainability, with CHF 180,000 (Stadt Zürich, 2022a). One of these exemplary projects is the Climate Talks (*KlimaGespräche*). This initiative is aimed at citizens looking to make personal efforts toward their ecological footprint and CO_2 efficiency by introducing them to an educational method on how to achieve such (Stadt Zürich, 2022f). Another funded project is the Vegetable Academy (*GemüseAckerdemie*), with an endorsement of 12,000 CHF in 2020 from the city. This project assists schools in Zurich in building their own vegetable gardens and integrating those learnings in classrooms (Stadt Zürich, 2022f).

Zurich participates in various transnational city networks related to climate action. It is a member of ICLEI – Local Governments for Sustainability, Climate Alliance[10], and the Covenant of Mayors.

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[10] https://www.climatealliance.org/en/home.html

3.3 Munich

With a population of approximately 1.6 million, Munich is Germany's third largest city (Landeshauptstadt München, 2022a). Due to its ambitious climate policies and mitigation efforts, it is seen as a climate forerunner within Germany (Otto et al., 2021).

3.3.1 Climate Policymaking in Germany's Federal System

Germany is a federal state and is made up of sixteen federal states, collectively known as *Länder*. Each state has its own constitution and is largely autonomous in its internal organization. Germany is further divided into 401 districts at the municipal level, 294 of which are administrative districts and 107 of which are urban districts.

Figure 4: **Political division of Germany into federal states with administrative districts, urban districts and independent cities (Source: https://www.wikiwand.com/de/Landkreis)**

Germany has a mixed record in climate policymaking. In some areas, especially the development of renewable energy, it has been a global leader. In others, such as the transition towards a low-carbon

transport sector, it lags behind other states. In recent years, pressure on the federal government to adopt more ambitious climate measures has intensified.

In 2019, the German government issued its first national climate law (Bundes-Klimaschutzgesetz, 2019). The National Climate Protection Act adopted initially set a 2050 climate neutrality target for Germany. This was revised forward to 2045 in reaction to a ruling of the Constitutional Court in April 2021. The court determined that the law was unconstitutional as it did not protect the basic rights of younger generations because it put too much of the burden of reducing climate emissions to the period after 2030. In response to the court ruling, the government amended the climate law, shifting forward its climate neutrality target and setting mid-term targets (a 65% reduction compared to 1990 GHG levels by 2030 and an 88% reduction by 2040). The Climate Action Programme 2030 (Die Bundesregierung, 2019) and the Climate Action Plan 2050 (Die Bundesregierung, 2020) were also adjusted to account for the new targets. These plans set out specific targets to be reached on an annual basis by different sectors for the years through 2030.

Germany's Energiewende is at the center of the country's climate policymaking. The 1986 Chernobyl nuclear crisis and then the 2011 Fukushima nuclear accident led to the decisions to close the country's nuclear power plants and to expand renewable energy capacity. The last nuclear power plants are to be taken offline in 2022. The decision to shut down the country's coal-fired power plants followed. Based on the recommendations of the "Coal Commission", which was set up in 2018, the federal government set 2038 as a target date for shutting down the last of the country's coal-fired power plants. The Social Democratic – Green – and Free Democratic coalition that formed in 2021 moved forward the shut-down target to 2030.

The Russian war on the Ukraine has made it painfully clear how dependent Germany remains on fossil fuels and especially imported Russian gas. The war has had a major impact on German energy and climate policies, leading to nation-wide calls to contribute to energy saving and energy efficiency as well as a revamping of climate and energy laws. The so called "Easter Package", a set of legislative initiatives[11] intended to expand the use of renewable energy and accelerate renewable energy capacity development, was introduced in April 2021, approved by the parliament in summer 2022, and will enter into force in January 2023. By 2030, Germany now aims to achieve an 80 percent share of renewables in its electricity sector (BGBl l, 2022b: 1247). However, the law no longer provides a specific compliance date for achieving GHG neutrality. In the newly adopted § 1a Renewable Energy Sources Act 2023, however, the legislator clarifies that it is adhering to both the coal phase-out and GHG neutrality. Once this goal is achieved, the further expansion of renewables will only be market-driven (BGBl l, 2022b: 1247).

As a result of the EU's Green Deal and Fit for 55, Germany has revised its Energy Saving Act (*Energieeinsparungsgesetz*, EnEG), which was first passed in 1976 and subsequently amended. It now requires all new buildings to be "nearly zero energy" buildings (LSE, 2022). In 2020, this act was amalgamated with two other energy-related acts into a single law: the Buildings Energy Act (*Gebäudeenergiegesetz*, GEG). The new GEG act echoes previous legislation, laying out obligations for the energy performance of buildings, the issuing of energy performance certificates, and the use of renewable energy for heating and cooling buildings (Federal Ministry of the Interior and Community, 2021).

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[11] For more details see BGBl I, 2022a.

The transport sector has failed to meet its sectoral GHG emission targets and thus, is now under pressure to take measures to address this. This has led to a new target for electric cars: 15 million by 2030.

At the regional level, the *Länder* are mandated to develop their own regulations that at least match those put forward by the national administration (Climate Chance, 2021b). In November 2020, Bavaria enacted its own climate protection law (Bayerisches Klimaschutzgesetz, 2020), which was revised in June 2022. It sets slightly more ambitious targets than that of the federal administration. According to the latest draft (Gesetzentwurf der Staatsregierung, 2022), the CO_2-equivalent GHG emissions per inhabitant should be reduced by 65% instead of 55% by the year 2030, relative to 1990 levels. In addition, the state of Bavaria should reach climate-neutrality by 2040 at the latest, instead of 2050, which was the deadline put forward in the first version of the law.

At the time of writing, it is not mandatory for local governments in Germany to prepare climate action plans, with the national government rather adopting an enabling governance approach to promote climate action in cities (Climate Chance, 2021b). The city of Munich (like many other Germany cities) has voluntarily prepared a climate action plan. Munich aims to reach climate neutrality by 2035, with the city administration aiming to reach this goal for itself already in 2030 (Landeshauptstadt München, 2022b). This is reminiscent of other cases where cities have set more ambitious climate targets than the EU and national governments and is not unique to Germany (Kern, 2018).

3.3.2   Horizontal Governance and the Role of Various Stakeholders in Munich

The city of Munich (*Landeshauptstadt München*) is currently governed by a red-green coalition, i.e., a coalition between the Green party (*Bündnis 90/Die Grünen*) and the Social Democratic party (*Sozialdemokratische Partei Deutschlands, SPD*). The city administration is led by the elected Lord Mayor (SPD), followed by the second mayor (Green party) and third mayor (SPD) (Landeshauptstadt München, 2022c).

At the core of Munich's climate strategy is the Integrated Action Program for climate protection in Munich (*Integriertes Handlungsprogramm Klimaschutz in München,* IHKM). This was first rolled out in 2008 with the intention of establishing cross-functional management of urban climate protection measures. The latest version was published in 2019. The development of the IHKM was the responsibility of the former Department of Health and Environment (*Referat für Gesundheit und Umwelt,* RGU), which is now split into two separate departments for the different areas (Landeshauptstadt München, 2021a).

Since 2019, the Department of Climate and Environmental Protection (*Referat für Klima- und Umweltschutz,* RKU) has led the city of Munich in the areas of climate and environmental protection, climate adaptation and sustainability (Landeshauptstadt München, 2021b). Under the leadership of the current Climate and Environmental Protection Officer (*Referentin für Klima- und Umweltschutz*), the department prepares climate action plans for the city of Munich and works closely with other departments and organizations. In order to extend the reach of the IHKM, ten climate protection managers (*Klimaschutz-Manager*innen*) work full-time in other city departments such as the Department for Urban Planning and Building Regulations (*Referat für Stadtplanung und Bauordnung*) and the Department of Labor and Economy (*Referat für Arbeit und Wirtschaft*).

Like most major cities, Munich is part of several transnational municipal climate networks, including Energy Cities, the Covenant of Majors, and the Climate Alliance. The focus of these networks is mainly on a shared commitment to climate protection as well as the sharing of knowledge and best practices. In a study by Busch et al. (2018), transnational city networks were found to have a significant influence on local climate governance in Germany by raising public awareness of the issue, institutionalizing climate policies, and facilitating direct exchange between cities. Munich is also a member of the Association of German cities (Deutscher Städtetag), an organization which represents Germany's cities at the national and EU level.

External knowledge actors are also important players in Munich's climate governance structure. Prominent scientific institutions such as the Institute for Applied Ecology (*Öko-Institut*) and the Research Institute for Energy (*and Forschungsstelle für Energiewirtschaft*, FfE) are instrumental in contributing to reports on climate neutrality and city action plans. For example, the two institutes recently collaborated on a report about possible solutions for climate-neutral heat supply in Munich (FfE GmbH & Öko-Institut e. V., 2021).

Achieving climate-neutral energy supply has been a key objective for the city of Munich for quite some time. A key player in this is the Stadtwerke München (SWM), Munich's public municipal utilities company and one of Germany's largest energy and infrastructure companies. Their contribution to the energy transition includes ambitious aims to produce enough electricity from renewable sources to cover Munich's energy needs by 2025 and to achieve CO_2-neutral coverage of Munich's district heating demands by 2040. The city of Munich has 100% ownership of SWM (Stadtwerke München, 2022).

Another central actor in Munich's climate governance is the Energy Commission (*Energiekommission*), which since the 1980s has been tasked with developing long-term energy strategies for the city (Zimmermann, 2018). Permanent members of the Commission include city councilors, the mayor, the heads of the Department for Climate and Environmental Protection (RKU) and other related departments, the CEO of the Stadtwerke München (SWM), and external experts (Landeshauptstadt München, 2017).

The city of Munich incentivizes private citizens to get involved in climate action through its funding programs, the most well-known of these being the Energy Saving Funding Program or FES (*Förderprogramm Energieeinsparung*). First established in 1989, FES incentivizes climate-friendly building by providing funding to private homeowners and the housing industry for the building of new energy-efficient homes, renovation of old buildings, and installation of renewable energy (Landeshauptstadt München, 2014). In October 2022, this long-established funding program will be replaced by a new funding program which reflects Munich's goal of achieving climate-neutrality by 2035. The focus of the Climate-Neutral Buildings funding program (*Förderprogramm Klimaneutrale Gebäude,* FKG) is similar to FES, with a special focus on the climate-neutrality goal (Landeshauptstadt München, 2022d).

In order to encourage local businesses to participate in climate action, Munich launched the Climate Pact for Munich Economy (*Klimapakt Münchner Wirtschaft*) as part of IHKM. Now entering its third implementation phase, the pact is signed by 15 of Munich's largest companies. On signing, the companies voluntarily commit to active climate protection. They also share knowledge and work together on sustainable projects (Landeshauptstadt München, 2022e).

The city of Munich also collaborates with the surrounding district of Munich (*Landkreis München*) on the area of climate protection, especially in the area of mobility (Landratsamt München, 2020).

4 Comparison of climate governance structures in pilot cities

Multi-level climate governance is to be seen in all three pilot cities. Paris, Zurich and Munich are subject to vertical influences from the supranational, national, and regional level as well as horizontal influences from local businesses, citizens, research institutes, and transnational city networks.

4.1 Comparison of vertical climate governance in pilot cities

Vertical climate governance differs across the three pilot cities, depending on the strength of the national government and the relative strength of regional and city governments. An overview of the main points of comparison can be found in Table 2 below.

As both Switzerland and Germany are federal republics, there is a vertical separation of powers, with regions (cantons and *Länder* respectively) and municipalities enjoying a substantial degree of political and legislative freedom. Therefore, the cities of Zurich and Munich are relatively independent from the national government, and free to develop their own climate protection measures. Although both cities prepare climate plans, they are not obliged to do this by the national government. In France, by contrast, the national government requires local governments and regions to prepare climate plans. This is possible because France is a semi-presidential republic, characterized by centralization. Although some decentralization efforts have taken place since the 1980s, ultimately, the national government retains a high degree of power, leaving municipal governments like those of Paris with little autonomy compared to those of Zurich and Munich. These differences are reflected in the climate governance structures of the cities.

Despite these differences, all three cities are obliged to meet certain targets set out in national climate change legislation as well as in national climate action plans. Regional climate legislation and plans also influence climate governance at the city level.

As you can see in Table 2, the national governments of Germany, France and Switzerland are themselves subject to vertical influences from the global and supranational level. As EU member states, Germany and France are obliged to meet certain climate targets such as those outlined in the European Green Deal. They are also required by EU legislation to prepare National Energy and Climate Plans (NECPs). These obligations do not apply to Switzerland as it is not a member of the EU. As a signatory of the Paris Agreement, however, Switzerland is bound by a commitment to reducing their GHG emissions in order to limit the global temperature increase in this century to 2 degrees Celsius. France and Germany have also signed the Paris agreement. The Sustainable Development Goals (SDGs) are another international framework that influences climate governance on the national level. These international and supranational commitments trickle down to the regional and local level, indirectly influencing the climate governance of cities such as Munich, Zurich, and Paris.

Table 2:   Comparison of vertical climate governance in Paris, Zurich and Munich

	Paris	Zurich	Munich
International/supranational level			
Paris Agreement	✓	✓	✓
SDGs	✓	✓	✓
European Green Deal	✓	x	✓
European Climate Law	✓	x	✓
EU Mission: 100 climate-neutral and smart cities	✓	x	✓
National level			
System of government	Semi-presidential republic	Federal republic	Federal republic
Climate legislation	POPE Act; Energy Transition for Green Growth Act; Climate and Resilience law (Law No 2021-1104); Grenelle I & II	CO_2 Act; Energy Act	Federal Climate Protection Act; Renewable Energy Sources Act 2023; Energy Saving Act; Buildings Energy Act
Climate action plans	National Energy and Climate Plan of France; Regional Plan for Development, Sustainable Developer and Equality (SRADDET)	Long-Term Climate Strategy to 2050; Swiss National Adaptation Strategy to Climate Change;	National Energy and Climate Plan of Germany; Climate Action Program 2030; Climate Action Plan 2050
Mandate for cities to prepare climate action plans?	Yes, for regions over 20,000 inhabitants	Yes, cantons	No
Regional level			
Climate legislation	N/A	N/A	Bavarian Climate Protection Law
Climate action plans	Ile-de-France Region master plan (SDRIF); Regional Climate, Air and Energy Scheme of Ile-de-France (SRCAE)	Canton Zurich's Long-term Climate Strategy	Bavarian Climate Protection Program

4.2   Comparison of horizontal climate governance in pilot cities

Transnational municipal climate networks play an important role in the horizontal climate governance of all three cities. As you can see in Table 3 below, Paris has active membership in four such networks, while Munich and Zurich each participate in three. The only network of which all three cities are

members is the Covenant of Majors. Zurich and Munich are both members of the Climate Alliance, which primarily consists of cities in German-speaking countries. Paris and Munich are members of the Energy Cities network, while only Paris is a member of the C40 Cities network. Finally, Paris are Zurich are listed as members of ICLEI – Local Governments for Sustainability.

The three cities are obliged to meet national and supranational standards, and have voluntary (Munich and Zurich) and mandatory (Paris) climate action initiatives that contribute to an open-system perspective, thus, following a multi-governance and horizontal climate structure. Some of these initiatives include programs to encourage the participation of local businesses and associations in climate protection measures, such as the Climate Action Charter for Paris, Climate Forum in Zurich, and Climate Pact Munich Economy in Munich.

The three cities also take similar approaches to encourage cross-departmental collaboration. All three cities have departments dedicated to climate action, and implementation systems that set the ground for cross-departmental coordination. In the three pilot cities, it is possible to see multiple initiatives being taken with the collaboration of various stakeholders, departments and regions. Within this transdisciplinary policy-making environment, the cities all prepare climate action plans on a semi-regular basis. Table 3 gives an overview of the departments and climate plans in the three cities.

Some particular insights to take into account regarding each city's approach were how Munich's governance structure gives high importance to research institutions and program funding, while Paris and Zurich highly encourage citizen participation.

Table 3: **Comparison of horizontal climate governance in Paris, Zurich and Munich**

	Paris	Zurich	Munich
Climate action plan	Paris Climate Action Plan	2000-Watt Society Strategy; Zurich's Environmental Strategy; Energy Master Plan; Green City of Zurich	Integrated Action Programme for Climate Protection in Munich (IHKM)
Key department responsible for climate action	Directorate of the Ecological Transition and Climate (DTEC)	Department of Health and Environment	Department of Climate and Environmental Protection (RKU)
Initiatives for stakeholder participation	Climate Action Charter	Climate Forum	Climate Pact Munich Economy
Forums for citizen participation	Paris citizens' council; Climate Agora; Citizens' assembly	N/A	N/A
Membership of transnational municipal climate networks*			
Energy Cities	✓	x	✓
Covenant of Majors	✓	✓	✓
C40 Cities	✓	x	x
ICLEI – Local Governments for Sustainability	✓	✓	x
Climate Alliance	x	✓	✓

* "✓" means member, "x" means not a member.

5 Discussion and conclusions

This report has provided a first overview of climate governance structures in the three pilot cities of Paris, Zurich and Munich. Together with part 1 "Emission inventories for cities and available data", the report fulfils Milestone 1 of the PAUL project.

Through the use of a variety of sources, efforts were made to gather as much information as possible about the climate governance structures in the pilot cities. The main sources used were the official websites of the cities as well as the official websites of their respective regions and countries. Further information was extracted from reports prepared by external organizations, for example reports on multi-level governance from the international organization Climate Chance. Finally, some insights were gathered from relevant academic publications.

Through the report's multi-governance analysis of the three pilot cities, the following key findings were established:

- All three cities have departments dedicated to climate action and prepare climate action plans on a semi-regular basis.

- All three cities have measures towards the decentralization of government and the push for horizontal and multi-level climate governance, with France's climate governance being the most centralized of the three.

- Vertical climate governance differs across the three pilot cities. France has a stronger national climate governance, while Germany and Switzerland share horizontal approaches relative to the strength of their regional and city governments.

- The national governments of Germany, France and Switzerland are themselves subject to vertical influences from the global and supranational level.

These first findings on climate governance structures serve as input for other tasks and work packages of the PAUL project.

Nevertheless, these findings remain incomplete, and further research is required. Interviews with key stakeholders in the pilot cities will be necessary in order to gather further insights, especially regarding the use of emissions data by decision makers. This kind of information was difficult to access with the resources available to us at this time. Time restrictions meant that interviews were not yet possible.

A more detailed report will be prepared for the purpose of Milestone 2 "Analysis of city emissions, local climate governance structures, emission inventories and policy needs of Munich, Zurich, and Paris", which is due in June 2023. This report will further elaborate on the governance structures outlined here and integrate additional information on the policy needs of the cities. In order to gather such information, interviews will be conducted with relevant decision makers in the cities. They will be questioned on their current use of emissions data to inform climate policy decisions and on how new emissions data could improve these decision-making processes.

The information gathered from these interviews will also be used in Deliverable 1.3 "Preliminary findings on climate governance and the use of emissions data in the pilot", which is due in December 2023 as well as in Deliverable 1.4 "Report comparing emissions data use in climate governance in Munich, Zurich, and Paris", which is due in December 2025. Due for submission at the end of the project timeline, the latter report, along with four policy briefs for the pilot cities and EU, will form part of the final output of the project.

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