NET ZERO CITIES

EU MISSION PLATFORM | CLIMATE NEUTRAL AND SMART CITIES

Climate City Contract

2030 Climate Neutrality Action Plan

Grenoble-Alpes Metropole

Version 1.1

GRENOBLE ALPES MÉTROPOLE

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Summary

In 2005, **Grenoble-Alpes Metropole was the first French urban area to adopt a Climate Plan**. A decision that demonstrates both an early awareness of climate risk and a desire to act strongly, and to define an ambition that is shared by all the stakeholders of the territory. Local authorities have an important role to play in the climate transition and **Grenoble-Alpes Metropole wish to be a pioneer and show the way for other European cities**. It was with this in mind that the metropole chose to candidate to be a part of the EU Cities Mission, "100 climate neutral and smart cities".

A territory already committed with a strong ambition

The determination of Grenoble-Alpes Metropole to fight global warming is clearly expressed in the Metropolitan Climate Air Energy Plan (SECAP) 2020-2030 adopted on February 7, 2020. Since 2008, the metropole has been a signatory of the Covenant of Mayors for Climate and Energy and its commitment was renewed as part of the European Green Deal in 2021. The SECAP, that has become the cornerstone of the metropolitan vision, has made a regulatory commitment to move towards carbon neutrality by 2050 and reach a first intermediate milestone of reducing greenhouse gases by 50% by 2030 compared to 2005 (ie -55% reduction of gross emissions compared to 1990). The **SECAP sets goals to reduce the territory's direct and indirect emissions through the consolidation of already engaged actions** (energy renovation, decarbonisation of energy and transport, waste reduction and treatment, etc.) and the implementation of new levers (urban planning, agricultural and food policy, etc.) to achieve the "Fit for 55" objective. The SECAP also sets targets for reducing energy consumption by 40%, producing more renewable energy to reach 30% of final energy consumption, improving air quality and adapting the territory to climate change, with a constant concern to support a just transition and the joint ambition of preserving biodiversity. The SECAP also calls for an unprecedented collective mobilization of all stakeholders and inhabitants of the territory, and invites committed stakeholders to join this dynamic through the Climate Plan's partners' charter. The **SECAP, together with the Multi-annual Investment Plan (PPI 2021-2026) of the metropole, that states climate as its main financial priority, gives the metropole a strong mandate to act on the climate actions**.

An unprecedented acceleration through the Cities Mission

By joining the Cities Mission, the metropole has committed to go further and accelerate towards climate neutrality. The action plan and investment plan outlined in this Climate City Contract are based on the SECAP 2020-2030, updated and enhanced by new local actions undertaken since 2020 or scheduled following the Citizens' Convention of the Climate, as well as on the lessons learned from the recent SECAP Mid-Term Review and the Carbon Neutrality Scenario Study from 2023. Added to this are also recent national levers and exploratory levers developed in this Climate City Contract.

Direct greenhouse gas (GHG) emissions were estimated in 2021 at 1,700 ktCO2eq (decrease of 33% since 2005), energy consumption fell by 17% between 2005 and 2019 (-25% in 2021 but still affected by the COVID crisis), alongside continued improvement in air quality in the region.

The process of developing the City Climate Contract and the use of the NetZeroCities economic model made it possible **to explore pathways for accelerating towards carbon neutrality by 2030**. It has served as a tool for challenging current SECAP actions, modelling new national objectives and their expected impact on local emissions and integrating exploratory levers and new innovations available. The impact pathways towards carbon neutrality described in the Climate City Contract will be specified

in consultation with the stakeholders during the development of the next SECAP, with a planned official approval in 2026. Depending on their level of maturity or feasibility, exploratory actions may, be integrated into the new SECAP. **After the adoption of the SECAP, a new iteration of the Climate City Contract will be drafted to integrate the new objectives and actions** of the SECAP and continue the exploratory work, in close collaboration with the other cities and partners of NetZeroCities, in a logic of continuous improvement. The SECAP will remain the regulatory and main plan to move towards carbon neutrality.

Financial strategies as a strong condition of success

The investment plan of the Climate City contract has also permitted to dig deeper in the financial aspects of the climate transition, which are insufficiently covered by the existing SECAP. The first iteration of the economic model of NetZeroCities has permitted a macro-economic analysis of carbon-cost efficiency, co-benefit and stakeholder analysis that we hope to pursue in the coming iterations of the Climate City Contract. The model has also allowed us to further explore the investments needed for territorial climate neutrality, including all stakeholders.

An updated and reinforced Action Plan tackling the main obstacles

Using the economic model, the current SECAP gives an emission reduction of about 25% from 2019 to 2030. This is aligned with the reductions goal of the SECAP of -50% direct GHG emissions from 2005 to 2030. With the action plan developed in the Climate City Contract including the actions of the current SECAP, new local and national goals and the exploratory levers integrated into the model, a **total emission reduction of 81 % is achieved (2005-2030), excluding the industrial sector** (in accordance with the Info Kit for Cities). Including large industry gives a reduction of 72 % 2005-2030.

The City Climate Contract action plan is based on a portfolio of actions composed of the actions of the **SECAP 2020-2030, updated and enriched by new actions undertaken since 2020 or planned following the Citizens' Convention for the Climate**, as well as on the lessons learned from the recent mid-term review of the SECAP and the 2023 Carbon Neutrality Study.

The territory does not currently have an action program to capture or compensate for residual emissions, priority being given on the one hand to the reduction of direct and indirect emissions from the territory, on the other hand to the preservation and if possible strengthening the natural sequestration capacity of the territory. However, particular attention will be paid to the ongoing work **to develop carbon capture solutions at the national level, with in particular the exploratory project of capturing carbon at the outlet of the waste incinerator in Grenoble**.

The systemic obstacles described in the action plan arise from the mid-term review of the SECAP developed in 2023. In summary, the main obstacles are:

- **Financing** climate actions (accentuated by diminishing public resources, rising interest rates, the rising prices, etc.)
- Barriers to **behavioural change** and investment decision-making by citizens and stakeholders (change in mobility habits, lifestyle and consumption)
- The absence to date of **economic models for climate beneficial investments** (renewable energy production installation, extension of the district heating system, change towards

carbon-free heating, level of tertiary premises rents in relation to renovation costs, development of public transport infrastructure)

- The **multiplicity of decision-making scales** and the need for a convergence of actors to move forward (eg to encourage multi-modality, bringing together tickets and services of the Metropole/SMMAG/Region)

- Building retrofitting capacity and **non-availability of skilled labor** (this theme will be covered in the Call "Enabling City Transformation" with the project JET-CITIES – Jobs for Ecological Transition)
- The **restructuring of economic sectors** (ensure the support and transformation of the sectors to support climate transition)

In order to accelerate towards climate neutrality, **6 impact pathways have been chosen, to overcome the barriers**, based on the main emission sectors (industry, buildings and transport) and the mid-term review of the SECAP and the carbon neutrality study:

1. Decarbonize heating, relying primarily on 100% decarbonized and extended district heating networks
2. Renovate residential and tertiary buildings to reduce heating needs and increase the resilience of the territory
3. Accelerate the transition towards decarbonized mobility
4. Decarbonize the industry
5. Reinforce the sorting and valorization of waste, reduce the quantities of waste produced and develop the circular economy
6. Favor carbon sequestration and nature-based solutions

The focus of the impact pathways are the direct emissions, but beyond these 6 impact pathways, several additional areas of interventions are also addressed in the portfolio of actions, such as food and agriculture, consumption habits and adaptation. These themes can be further developed in the future iteration and be quantified in terms of financial resources to be mobilized.

Governance at the heart of the ambition

The metropole has set up a governance framework based on a multi-stakeholder structure with climate action as the main objective. Firstly, internally in the metropole, the Climate Transitions and Contractualization Department, directly attached to General Management Directorate, has a mission of steering, monitoring and animating the implementation of the SECAP within the administration as well as mobilizing financing for the climate transition. In addition, the metropole has set itself the goal of becoming an exemplary administration in terms of climate and environmental impact and so it has developed an Exemplary administration plan (PAE), implemented since 2020.

Lately the metropole carried out a GHG Assessment of its buildings, processes and activities, enabling prioritization of climate actions between the industrial public services (heating, waste, water and sanitation) and its administration.

In terms of external governance, the metropole works with a multitude of governance and mobilization tools to create a partner ecosystem for carbon neutrality. Some important tools are the monitoring committee of the SECAP, the Municipality Commitment Charter and the Partner Commitment Charter,

the yearly climate plan forum, and more recently the Local Economic Pact, the Economic Strategy of Grenoble Alpes 2030, the Climate Convention of Enterprises for the Climate.

Social innovation, and the engagement of citizens and civil society, has long been a distinctive characteristic of the territory and a key aspect of the governance framework of the metropole. The recent Citizens' convention of the climate, where 100 randomly selected citizens deliberate and work to come up with measures to reduce greenhouse gases, has been a success story beyond expectation and a best practice we are happy to share with other European cities. The European Green Capital Award in 2022 was also a successful year of collective mobilization of all community stakeholders, businesses, associations and citizens.

The work has been fruitful and as a result of the continuous effort, the metropole has recently been awarded the Gold level of the European Energy Award.

To monitor progress, the Observatory Letter of the SECAP provides an annual overview of the evolution of greenhouse gas emissions in the Grenoble-Alpes Metropole area, of energy consumption and production, as well as of atmospheric pollutant emissions. Some indicators have been added or adapted, to be aligned with European standards with the creation of the Climate City Contract. However, some indicators are still based on regional averages, in the absence of more detailed data. More precise data could help to better guide the local action. The Observatory Letter is publicly available in order to provide transparency and learning.

Neutrality scenario modelled by the NetZeroCities Economic model

When developing the Climate City Contract, the economic model of NetZeroCities was used to better understand the macroeconomic implications of carbon neutrality, based on two scenarios: the SECAP scenario (only SCEAP levers) and the exploratory scenario of the Climate City Contract, integrating an update of the levers strengthened since the adoption of the SECAP (at local or national level) and exploratory acceleration levers for achieving carbon neutrality. This model has the advantage of allowing a comparison with other European cities, but the disadvantage of not taking into account all the levers deployed on the territory (for example sobriety) and of operating with unit costs not adjusted with regard to real local costs. The estimate of the incremental financial investments required to implement the Climate City Contract scenario (in comparison to the business as usual case with no climate actions), based on 58% emission reduction including industry (with baseline 2019) is 1.6 billion euros (cash basis, incremental costs 2020-2030). Calculated in net present value this equals 1.8 billion euros, of which 176 million euros represents the metropole's part and 53 million euros the public transport operator part. This equals approximately 4,000 euros of investment per inhabitant of the metropole.

A previous modelling to estimate the investment costs necessary to achieve carbon neutrality by 2050 was carried out in 2023 in the carbon neutrality study with another model, this time non-incremental. **The result of two modelled scenarios C1 and C2 are around 25 billion**, over the period 2020-2050 (or 8.5 billion over 10 years).

The main sectors where investment is needed are electrification of vehicles, building renovations and decarbonizing of the heating generation. The costs of the industrial sector and nature-based solutions are not quantified. More information is provided in the Investment Plan.

This document constitutes the first version of the City Climate Contract of Grenoble-Alpes Metropole. Since the development of the Climate City Contract took place a few months before

starting the revision of the SECAP, it was not the subject of specific consultation with the stakeholders. But it includes in its commitments those of the SECAP and thematic plans and strategies, developed in consultation with the stakeholders, charters or partnership pacts put in place in the territory, as well as those echoing the proposals of the citizens' convention for the climate. In total, the engaged actors are 34 municipalities signatories to the Municipality Commitment Charter, public operators, social landlords, neighbouring territories, the 31 of the largest employers in the territories united within the Local Economic Pact, the 150 companies mobilized in the development of the Grenoble Alpes 2030 economic strategy, the partner members of the circular economy network, the 70 local companies engaged in climate roadmaps after their participation in the Business Convention for the Climate and 100 citizens of the Citizens' Convention for the Climate, the transition component of the new city contract, the State within the framework of the CRTE, the CPER Region and the ADEME (COT).

As the process is iterative, the contract will be updated and revised with the new objectives and actions following the adoption of the revised SECAP. The next iteration will also be complemented by a more detailed and in-depth investment plan and greater attention paid to the industrial sector and the commitment of its stakeholders.

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Abbreviations and acronyms

Abbreviations and acronyms	Definition	French translation
ADEME	French Agency for Ecological Transition	Agence de la transition écologique
AFOLU	Agriculture, Forestry and Other Land Use	Agriculture, forêt et autres occupations des sols
ANCT	National Agency for Territorial Coherence	Agence nationale pour la cohésion des territoires
BAU	Business as Usual – statu quo	Tendenciel
CAPEX	Capital expenditure	Coûts d'investissements
CNAP	Climate neutral action plan	
CRTE	Contract for a successful ecological transition	Contrat pour la réussite de la transition écologique
EPCI	Public establishments for intercommunal cooperation	Etablissement public de coopération intercommunal
IPPU	Processes and Product Use (Industry, Ports, Airports, Freight and Rail)	Industrie, ports, aéroports, fret et rail
LTECV	The energy transition law for green growth	Loi de transition énergétique pour la croissance verte
OPEX	Operational expenditure	Coûts de fonctionnement/opérationnels
OREC	Regional Energy and Climate Observatories	Observatoires régionaux de l'énergie et du climat :
SECAP	SECAP of Grenoble Alpes Metropole	Plan climat / SECAP / Plan Climat Air Energie Métropolitain
PCAET	Territorial climate, air and energy plan	Plan climat-air-énergie territorial
PLH	Local housing plan	Plan Local Habitat
PLUI	Intercommunal local urban development plan	Plan local d'urbanisme intercommunal
PNACC	National climate change adaptation change	Plan national d'adaptation au changement climatique :
PPE	Multi-annual energy planning	Programmation pluriannuelle de l'énergie
SCoT	Territorial coherence plan	Schéma de cohérence territorial :
SECAP	Sustainable Energy and Climate Action Plan	Plan climat / SECAP / Plan Climat Air Energie Métropolitain
SNBC	National low-carbon strategy	Stratégie nationale bas carbone
SRADDET	Regional scheme for planning and sustainable development of territories	Schéma régional d'aménagement, de développement durable et d'égalité des territoires
SUMP	Sustainable urban mobility plan	Plan de mobilité
TETE	Territory committed to ecological transition	Territoire engagé pour la transition écologique

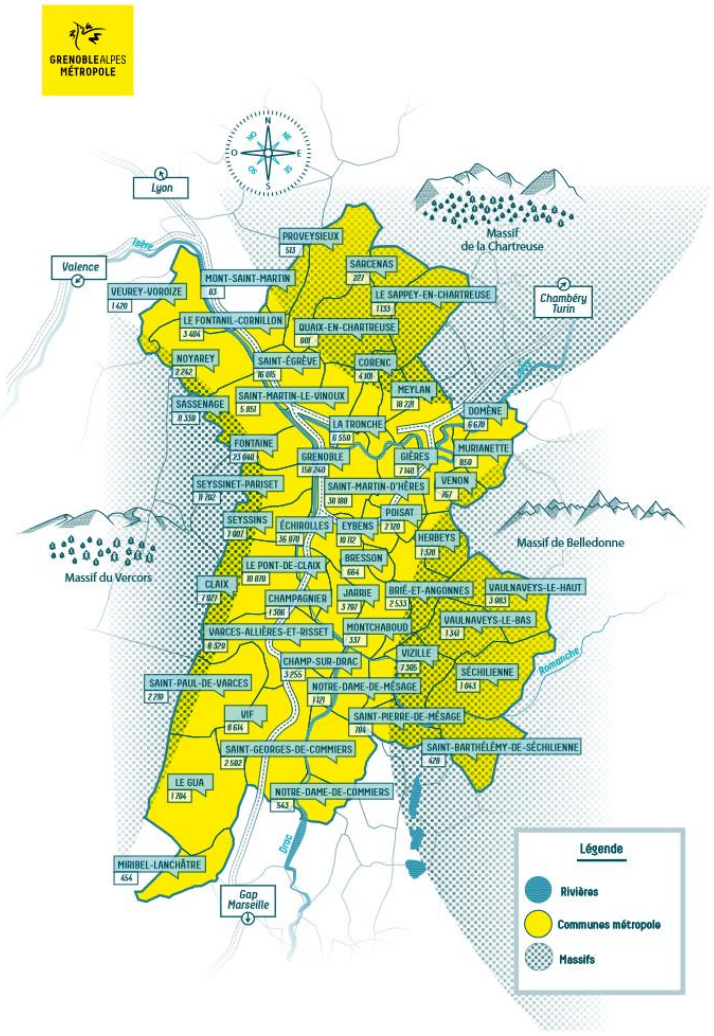
1 Introduction to the metropole and the climate city contract

Grenoble-Alpes Metropole is located in the heart of the Alps, at the crossroads of France, Switzerland and Italy. It benefits from a privileged location in the center of the Auvergne-Rhône-Alpes region, one of the most thriving and dynamic regions of Europe.

The eleventh largest French urban area and the second largest metropole in the Auvergne-Rhône-Alpes region, Grenoble-Alpes Metropole brings together 49 municipalities of different sizes (from 76 to 158,000 inhabitants) and has a total of 450,000 inhabitants.

The Grenoble metropolitan area has developed around the city of Grenoble, in the valleys of the rivers of Isère and Drac. Situated between the mountain ranges of Belledonne, Vercors, Chartreuse and Oisans, the alpine metropole benefits from a remarkable landscape and mountain environment. Its economic dynamic and the potential of its research centers makes it an attractive territory for many French and international companies, which have set up their headquarters or research and development centers there.

Figure 1 Map of the municipalities of Grenoble Alpes Metropole



Its diverse territory, both urban and rural, geographically on the plains or in the mountains, is a strong asset and forms its unique character. But its diversity also means that solutions to the challenge of climate neutrality must be tailored to different geographic situations.

The urban centre has an already well-developed public transport system, a dense cycle network and an efficient district heating system. However, the urban centre of the metropole suffers from the heat in summer. Its geographical location, between several mountain ranges, tends to retain pollutants in the air and weather conditions, such as temperature inversion, can also contribute to the stagnation of pollutants. But for 10 years, air quality has been constantly improving and there has been no exceedance of regulatory thresholds for 3 years.

These conditions contrast with the rural landscape around the urban centre, with villages in the plains or in the surrounding mountains, which benefit from cooler summer temperatures, but for which it is more complicated to deploy decarbonised public transport, and for which efficient decarbonised transport solutions need to be developed.

At the same time, the metropole benefits from an exceptional mountain environment that offers a wide range of outdoor activities, both winter and summer. On the mountain ranges, the protection of biodiversity and the support of tourist and agricultural activities is structured thanks to the establishment of the Chartreuse and Vercors Regional Natural Parks. Sentinels of climate change, the mountains become a field of observation, research and experimentation of the transition.

Industry, research and innovation

The Grenoble metropolitan area benefits from an industrial and research ecosystem that has made its reputation beyond its borders. Historically anchored around the energy sector with the development of hydroelectric power (locally called “houille blanche”, “white coal”), the territory can now rely on the flagship sectors of chemistry, digital technology, health and the historical presence of cement and on a renowned innovation and research ecosystem (CEA, Grenoble-Alpes University , etc.).

Grenoble Alpes Metropole has renowned engineering schools such as the Polytechnical Institute of Grenoble and Polytech'Grenoble on its territory, and also has research centers such as CEA Grenoble, CNRS, INRIA, ESRF, ILL, Clinatec or Minatec, specialized in micro and nano-technologies, which attract researchers from all over the world. This territorial singularity places Grenoble as a champion of innovation, as demonstrated by the Grenoble Innovation for Advanced New Technologies campus, which brings together 30,000 people on the scientific polygon to forge close links between research, education and industry.

Industry now represents about 40 % of direct emissions and therefore represents a major challenge for the territory. The general decline in the territory's emissions since 1990 is mainly due to the decline in activities/closure of certain industries as well as the improvement of processes in terms of energy efficiency. Despite very limited land available, the territory stick to the idea of welcoming new companies and relocating transition industries, particularly start-ups, to its territory. However, this can lead to an increase in energy consumption and direct GHGs.

The fight against global warming and the Metropolitan Air Energy Climate Plan

Grenoble Alpes Metropole has long been committed to the fight against global warming. In 2005, it was the first French urban area to adopt a Climate Plan, a SECAP. The ambition to significantly accelerate the energy and ecological transition is now expressed in the commitments made in all of

our public policies through master plans and strategic plans for 2030 (energy, waste, mobility, water and sanitation, housing, urban planning, etc.), articulated within the 2020-2030 Climate Air Energy Plan, the cornerstone of the metropolitan vision. This climate plan sets ambitious objectives and an action plan to reduce the territory's direct and indirect emissions through the upscaling of actions (energy renovation, decarbonisation of energy and transport, reduction and treatment of waste, etc.) and the development of new levers (urban planning, agricultural and food policy, etc.) to achieve the "Fit for 55" objective, and beyond that, move towards carbon neutrality.

The territorial climate-air-energy plans, created in 2015, are operational tools for coordinating the energy transition in the territory, and fall under the jurisdiction of public inter-municipal cooperation establishments, and therefore of Grenoble-Alpes Metropole. The law requires a review of the SECAP every 6 years and a review work will begin in 2024, with a planned adoption in 2026. A review of the Energy Master Plan and the Mobility Plan are also planned for 2025-2026.

The competences of Grenoble Alpes Metropole and national and European influence

At the administrative level, the Metropole includes 49 municipalities with an area of 546 km2, it has had the status of Metropole since 2015. The metropolitan council is made up of 119 councillors, representing each of the member municipalities, elected for a period of six years. The powers of the Metropole include the joint management of public facilities and services (waste collection and treatment, drinking water supply, sanitation, urban heating/cooling networks, electricity and gas distribution concessions, etc.), economic development, urban planning, urban development/housing, roads and public spaces, tourism, etc. The territory was extended from 28 to 49 municipalities in 2014 and many competences were acquired during the transition to become a Metropole in 2015 (including energy, economic development, urban planning and development and roads/public spaces).

For the field of mobility (public transport, carpooling, cycling and walking), the transport operator SMMAG (Syndicat mixte des mobilités de l'aire grenobloise) has brought together since the beginning of 2020 the mobility organizing authorities of the Grenoble metropolitan area, the Grésivaudan community of communes and the Pays Voironnais urban community and ensures the skills on mobility services, trams and bus infrastructure. On the other hand, intercity coaches and train services are the responsibility of the Auvergne-Rhône-Alpes region and train infrastructure of the State through the SNCF. The creation and maintenance of cycle paths and bus lanes are the responsibility of the Metropole. Several other public companies participate in the operational management (SEM, SPL, etc.) and are described in chapter 4.1.2 External partnership governance.

The metropole is acting firmly within the framework of its competences and has made the climate emergency the priority of its ongoing mandate. It is deploying an ambitious climate policy, however, the emission reductions at the scale of the metropolitan territory stays highly dependent on decisions and regulations taken at other scales: regional, national, European or even global.

For example, for its electricity supply, the metropole is dependent on the French national grid. Even if the French mix is already highly decarbonized, in particular due to the importance of nuclear and hydraulic production, the metropole has very little influence on this area. Also for the industrial sector, the regulations are under national or European influence and sometimes the decision-making centers are even beyond Europe for large international industrial companies.

Finally, according to the Carbon Neutrality Scenario Study by Enerdata, ~70% of the carbon footprint is imported (50% from abroad and 20% from France), these emissions coming from purchasing

practices on which the Metropole has little impact beyond its own purchases, and so its acts on awareness campaigns and promotion of good practices. The metropole has only a limited possibility to influence its total footprint.

The Climate City Contract

The action and investment plans set out in this Climate City Contract are based on the SECAP 2020-2030, updated and enhanced by new actions undertaken since 2020 or scheduled following the Citizens' Convention of the Climate, as well as on the lessons learned from the recent Mid-Term Review of the SECAP and the recent Carbon Neutrality Scenario Study.

The Metropole has begun the revision of its SECAP in 2024, integrating strategies for achieving carbon neutrality and reinforced actions for reducing the carbon footprint. The process of developing the Climate City Contract and the use of the NetZeroCities economic model has made it possible to explore pathways for accelerating towards carbon neutrality by 2030 which, depending on their level of maturity or feasibility, may be integrated into the revised SECAP. The SECAP will remain the regulatory action plan and the politically validated strategy for working towards carbon neutrality. The Climate City Contract will be revised every 2 to 3 years and act as a tool to challenge the current SECAP action plan and integrate exploratory levers and new innovations available.

Commitments

Through the SECAP 2020-2030 adopted on February 7 in 2020, Grenoble Alpes Metropole committed to moving towards carbon neutrality by 2050 and reaching a first intermediate milestone of -50% greenhouse gases by 2030. To this end, the metropole adopted an ambitious action plan and is acting resolutely through the implementation of its competences (energy, waste, urban planning, roads and public spaces, economy, air quality) and for the mobilization of local stakeholders (European Green Capital dynamic, SECAP partnership charter, Local Economic Pact, Convention of Enterprises for the Climate, Social support fund for transitions, calls for projects, etc.).

The metropole organized a Citizens' convention for the climate, in order to solicit citizens' proposals for achieving carbon neutrality and adopted new commitments in response to its proposals. At the same time, it initiated a Carbon Neutrality Study, in order to identify the breakthrough or ruptures levers for achieving carbon neutrality, which will nourish the revision of the SECAP.

By joining the Cities Mission and the European dynamic of 100 climate-neutral and smart cities, as deliberated by the Metropolitan Council on February 9, 2024, and by the President signing this Climate City Contract, Grenoble Alpes Metropole reiterates its commitment to:

- Act with all the levers at its disposal and mobilize all the stakeholders to drastically reduce greenhouse gas emissions by 2030 and accelerate the systemic transformation of its territory towards carbon neutrality;
- Contribute to exploring all pathways of acceleration towards carbon neutrality by 2030;
- Actively collaborate with other French and European cities and communities, as well as the structures and representatives of the State and the European Union, in order to identify the regulatory, financial, legal, behavioral and operational obstacles and levers to achieve carbon neutrality;

- Continue and develop the dynamics of innovation and cooperation, already carried out through numerous national and European projects and networks, in all sectors at stake (energy, mobility, waste, decarbonisation of industry, food, circular economy, behavioral change, etc.).

To this end, by building the Climate City Contact, Grenoble Alpes Metropole has drawn up an ambitious action and investment plan to explore ways of accelerating the achievement of carbon neutrality by 2030. Those plans are based on the SECAP 2020-2030, updated and improved by new actions undertaken since 2020 or planned following the Citizens' Climate Convention, new national targets in the draft SNBC 3, as well as the lessons learned from the recent SECAP mid-term review and Carbon Neutrality Study.

The Climate City Contract thus presents an ambitious trajectory for reducing the territory's GHG emissions by 81 % compared to 2005 (scopes 1 and 2, within the metropole's administrative boundary, but excluding large industry).

The action plan and the investment plan

This action plan includes three parts: first part A describing the current state of climate action (GHG inventory, review of current policies and assessment of barriers and opportunities), secondly part B showing the systemic pathways to achieve carbon neutrality (scenarios, portfolio of actions and indicators) and lastly part C that describes the framework in terms of governance innovation and social innovation necessary to achieve carbon neutrality.

The SECAP also covers a broader spectrum than carbon neutrality; notably on issues of air quality, adaptation and biodiversity. We have chosen to establish the impact pathways in the Climate City Contract based on the SECAP actions with the greatest impact in terms of decarbonisation.

The portfolio of actions is based on the structuring projects of the SECAP action plan updated by integrating new actions undertaken since 2020 or planned following the Citizens' Convention of the Climate. The lessons from the recent Mid-Term Review of the SECAP and the recent Carbon Neutrality Study have been used to complete the chapters on obstacles and levers, as well as the choices of exploratory levers for achieving carbon neutrality.

The Climate City Contract investment plan draws up an economic assessment of the action towards carbon neutrality and estimates the financial needs to achieve it according to the different stakeholders (public, private, citizens, etc.). To estimate the cost of carbon neutrality, the metropole used the economic model proposed by NetZeroCities, developed by the Polytechnic University of Madrid and compares it to the estimations of the Carbon Neutrality Study. The investment plan is the tool to highlight the financial support needed to implement the climate transition.

Geographical boundaries and scopes

This Climate City Contract takes into account scopes 1 and 2 according to the definition of NetZeroCities but our priority will be to reduce our total carbon footprint of the territory according to terms to be specified in the next iterations of the Climate City Contract and the next SECAP.

Also, given the importance of industrial emissions, the limited levers of the metropole on the decarbonisation of this sector and the fact that the metropole does not exclude welcoming new transition industries to contribute to the reduction of the global carbon footprint, the metropole plans

to work on carbon neutrality trajectories including and excluding industry. For consistency with the current SECAP monitoring system, the scope of emissions retained in this first Climate City Contract covers all emission sectors, including industry. The commitment is formulated excluding large industry but the emission gap table also presents the respective data including large industry.

Finally, the metropole's objective covers territorial emissions within the geographical limits of the 49 municipalities belonging to the Metropole. But given the configuration of the territory, it is possible that a different perimeter will be considered in future iterations of the Climate City Contract; allowing more ambitious objectives to be explored for achieving accelerated carbon neutrality for the urban area.

Stakeholders

Carbon neutrality is an unprecedented collective challenge, which will only be possible if there are significant changes in our lifestyles and consumption patterns. It requires the mobilization of each stakeholder, public institutions, economic sectors (companies, ESS actors, agricultural, etc.), and citizens, at the individual and collective levels. In addition to the necessary support through coherent developments and impulses, on a regulatory, economic or fiscal level, carried out at all levels, such a rupture will only be possible if collective choices are shared and carried by the greatest number of people, without exclusion, based on the perception of each person, their means and capacities for development. It is a question of building a collective vision, a real project involving institutions, economic actors, and citizens.

Actions are already underway to mobilize key stakeholders, namely the 49 municipalities (through the Municipality Commitment Charter), the large companies and employers in the area (industry, research, tertiary, including universities, hospitals) through the Partner Commitment Charter, and more broadly the socio-economic actors in the area, as well as the actors of social cohesion, culture and citizens (Citizens Convention for the Climate). New tools are being put in place to continue the mobilization to build a territorial ecosystem in transition.

A more detailed mapping of stakeholders according to their systems (technological, regulatory, financial, political etc.) is developed in chapter A-3 and an assessment of social innovations and participatory actions is available in chapter C-2.

1.1 Work process according to the transition map

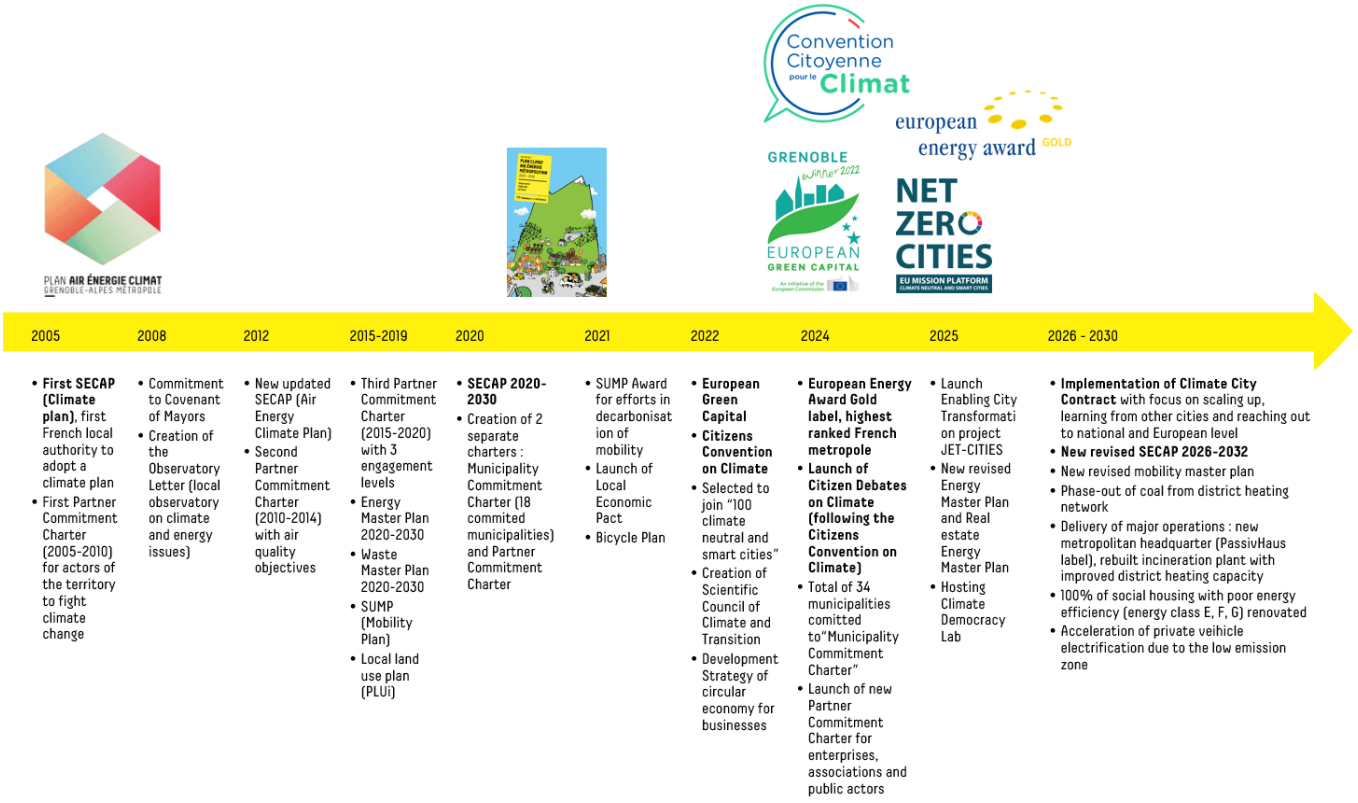
NetZeroCities proposes a methodology expressed through the Transition Map, to structure the implementation of the transition. In order to benefit from this methodology, this chapter explores and highlights the principles and processes that guide the Metropole in its implementation of transition actions, through the steps of the transition map, figure 2.

Figure 2. NetZeroCities transition map

History – a strong mandate that lasts over time

Grenoble has been committed to climate transition for many years. The key milestones of building a strong mandate are summarized in figure 3. In 2005, Grenoble-Alpes Metropole was the first urban area in France to adopt a Climate Plan. A decision that demonstrated its awareness of climate risk and its pioneering desire to act. This plan was based on a partnership approach, made up of voluntary stakeholders from the territory, individually committed by signing a charter (2005-2010) to act and implement actions to combat global warming. Since this period, the ALEC (Local Energy and Climate Agency of the Greater Grenoble Region) has assisted the Metropole in leading the partnership approach.

Figure 3. Key milestones of building a strong mandate



Then the Air Climate Plan Observatory was created: it records greenhouse gas emissions and the energy produced and consumed in the metropolitan area. In 2012, the Climate Plan became the Air Energy Climate Plan with the aim of reducing the exposure of the Grenoble population to air pollution. The partners of this plan implemented their own action plans to help achieve the territory's objectives by integrating respect for air quality (second commitment charter 2010-2014). This Air Energy Climate Plan was part of the expansion of the urban community to 21 new municipalities.

A third commitment charter for the period 2015-2020 was proposed to the partners: it introduced a progression in the commitment through a new pathway. Over time, the challenges of these action plans have evolved to arrive today at: energy efficiency and sobriety, production of renewable energies, adaptation to climate change and air quality.

By deliberation of February 7, 2020, Grenoble-Alpes Metropole adopted its Metropolitan Climate Air Energy Plan (SECAP) for the period 2020-2030. The SECAP defines the territory's strategy and roadmap for ecological and energy transition. It sets ambitious objectives for adaptation to climate change, reduction of greenhouse gas emissions and atmospheric pollutants on the scale of the metropole.
The SECAP 2020-2030 constitutes a reference framework for the intervention and commitment of the Metropole, but also calls for the unprecedented mobilization of all the actors in the territory. Its aim is to provide a coherent reading, consolidate the objectives and strengthen the complementarity between the different metropolitan strategic plans: the Intercommunal Local Urban Development Plan (PLUi), the Mobility Plan (PDU 2030), the Local Housing Program (PLH 2025-2030), the Energy Master Plan (SDE 2030) and the Waste Master Plan (SDD 2030). This SECAP is also linked to the Territorial Coherence Plan (SCoT), as well as to the Atmospheric Protection Plan (PPA) of the Grenoble region and the Regional Scheme for Planning, Sustainable Development and Territorial Equality (SRADDET).

Since then, it has led to a number of new plans and strategies, including the Bicycle plan, the Canopy Plan, the Exemplary Administration Plan, the responsible purchasing scheme (SPASER), the Grenoble Alpes 2030 Economic Strategy, the Circular Economy Strategy, a new Waste Prevention Plan, etc.
As part of its SECAP, the metropole works with "charters" to involve stakeholders (municipalities and external partners). While the Metropole has significant levers for action in the exercise of its powers, achieving these territorial objectives requires strong mobilization of inhabitants and all public, private and associative stakeholders. As such, the municipalities are essential partners of the SECAP, not only through the actions they are likely to undertake in the implementation of their powers and assets (buildings, land, vehicle fleet, etc.), but also through the role of relay and information that they can play, as a local actor, with citizens and businesses on their territory.

In this perspective, with the SECAP 2020, a new framework for the commitment of municipalities for the period 2020-2026, was developed in close consultation with them, called "Municipality Engagement Charter". This charter includes an action plan adapted to each municipality and has already been approved by 31 municipalities representing 94% of the population. For the implementation, the municipalities are supported within the framework of a network.
https://planclimat.grenoblealpesmetropole.fr/37-charte-d-engagement.htm

Also, in line with the partnership charter of the previous climate plan and in complementarity with the Municipality Engagement Charter, a Partner Engagement Charter is being put in place at the moment.
https://planclimat.grenoblealpesmetropole.fr/25-des-acteurs-engages.htm

For many years, the territory of Grenoble has been marked by its democratic vitality, its solidarity mechanisms and its citizen participation. To achieve carbon neutrality, it is necessary to collaborate, to work with all perspectives of sustainability and to be open to other stakeholders and people's ways

of thinking and acting. This includes learning and exchanging experiences with others and the ability to include new knowledge from others in our work. But the path is not pre-defined and it has been necessary, under the umbrella of the SECAP, to test, evaluate and rethink methods in an iterative manner to move forward.

The mobilization of economic actors has also been stepped up in recent years, notably through the Local Economic Pact, the co-construction of the Grenoble Alpes 2030 Economic strategy, the setting up of the Circular Economy Network, the annual "entreprises and transitions" meetings, and support for the Convention of Enterprises for the Climate.

At the heart of the steps already taken, collective mobilization is positioned as a key principle. It represents one of the five axes of the SECAP: "Mobilize collectively for the climate". Some key elements in our collective mobilization efforts since 2020 are the mobilization during the European Green Capital year 2022, the Citizens' Convention for the Climate (report in annex 14), the Local Economic Pact (annex 10), the Carbon Conversations, and the continuation of the dynamics of Commitment Charters. More details on these approaches and a complete list of other participation and mobilization actions can be found in chapter C-2.

Understand the system

To fully understand the journey towards carbon neutrality, we need to analyze GHG emissions and assess social, economic and environmental factors to ensure acceptance and the technical and financial feasibility of the transition. This includes analyzing policy gaps and capital needs by reflecting on current climate ambitions and policies and the progress made.

The Observatory Letter provides, for the metropolitan territory of 49 municipalities, annual monitoring of energy consumption, renewable energy production, greenhouse gas emissions and emissions of the main air pollutants with health effects. These indicators, monitored over time, makes it possible to measure compliance with the objectives set, and to alert on any deviations observed. https://planclimat.grenoblealpesmetropole.fr/23-observatoire-du-plan-climat-air-energie.htm (and available in the annex 6).

Several other observatories, surveys and thematic studies are also being conducted in the region (mobility survey and modelling, heat island study, cold study, carbon neutrality study, implementation of the transition barometer, housing/land/urban planning observatory by the Grenoble Region Urban Planning Agency, etc.). Also, based on current knowledge, both local and national, the work and publications of the OBS'y (Observatory Y) aim to share knowledge of the metropolitan territory and its population but also and above all, to inform on public policies, in order to adjust them to the needs and changing lifestyles of the inhabitants.

Each SECAP was developed from a territorial analysis including, in particular for the last SECAP, an investigation of vulnerability to climate risk. It is also based on studies carried out in the different fields and within the framework of the development of thematic action plans and schemes (energy, mobility, waste, food, etc.).

Co-create an action portfolio

Based on previous experiences in climate strategies, innovation projects and sustained partnership policy, the metropole has shown a great capacity to provide sustainable solutions. To go further, it is necessary to develop the organization and collaboration to be able to scale up the tested solutions.

The development of the SECAP 2020-2030 was carried out by involving all stakeholders in the territory. Achieving its objectives will indeed require ownership by all and unprecedented collective mobilization in its implementation. The development was thus the subject of prior consultation on the metropolitan participatory platform. In addition, the Metropole had involved all partners of the SECAP and the Metropole's consultative bodies in the reflection, in a spirit of co-creation and collaboration.

To establish the new SECAP that will be adopted in 2026, the metropole has just started the revision process. The recently completed mid-term review of the SECAP will serve as an evaluation of the actions implemented between 2020 and 2023. The work will also be nourished by the reflections in the Climate City Contract and in a new dynamic of co-construction.

Finally, The Citizens' Convention for the Climate process, based on a random selection of metropolitan citizens, allowed citizens to further enrich the portfolio of actions, with a bottom-up method. The propositions of actions of the citizens were all taken up for decision by the metropolitan council (8 deliberations). To ensure the continuity of the deliberated propositions, two measures were put in place, the Citizens' Debates for Climate and the Monitoring Committee. The Citizens' Debates for Climate will broaden the circle of citizens involved and raise the collective skills around climate issues. They will permit to engage in a dialogue with the community in order to continuously adjust metropolitan policies from design to evaluation. The Monitoring Committee, made up of citizens, academics and elected officials, will be responsible for ensuring the Metropole' commitments on the proposals of the Convention. (More information in chapter 4.2)

Take action

Since 2005, the implementation of actions to reduce emissions has been put in place and we have seen positive results. The nomination of European Green Capital in 2022 is proof of the efforts and rewards the quality of the territory's environmental policies. On the other hand, global warming has increased. Its consequences on the health of inhabitants, biodiversity, water resources and natural risks are increasingly visible and profound in our territory. These findings show that it is necessary to act harder and faster.

The mobilization of the metropole through its competences has thus been chosen as a priority of the mandate within the framework of its multi-year investment plan (PPI) 2021-2026. However, the most difficult parts remain, the main challenge is to scale up the deployment of the identified solutions and implement a demonstration and innovation dynamic, requiring significant investments.

Implementation involves a significant number of stakeholders both internally and externally to the metropole. The ALEC (Local Energy and Climate Agency), operated as a SPL (local public company), aims to raise awareness, advise and support different audiences (individuals, businesses, municipalities), through its various mechanisms (Espace Info Energie, general public events, Métroénergies, etc.). Highlighted during the citizens' consultation, the exemplary nature of the Grenoble Metropole is an important dimension in the perspective of engaging the population and all stakeholders in the environmental transition. In this sense, the actions in the Exemplary Administration Plan are implemented to reduce the carbon impact of the metropole' activities and agents. The ambition for the revision of the SECAP will be to extend this exemplary commitment to all stakeholders in the public sector in the territory.

Finally, monitoring of the implementation of the climate plan is also ensured through the Territoire Engagé Climat-Air-Energie (ex-Cit'ergie) label, the French version of the "European Energy Award"

program, coordinated by ADEME. Recently the metropole was awarded the Gold level, with 87.1 points, the highest score ever given to a French metropole. The European validation process is still ongoing.

Apart from achieving carbon neutrality, this Climate City Contract also brings co-benefits. Even if the European Cities Mission mainly focuses on climate change and reducing greenhouse gas emissions, the collective commitment also brings benefits in other areas. Air pollution is a major issue for the agglomeration. The reduction of individual motorized traffic and the evolution of motorization will have positive results on GHG emissions but also on air quality (with a significant drop in pollutants already observed over the last 10 years) and in consequence the health of the population. The reduction of cars in the city and the shift to walking and cycling for travel will also contribute to a more peaceful city, livelier streets and healthier citizens (MobilAir study). The planting of trees in the metropole will have a positive impact on thermal comfort and urban heat islands which are now major problems for the population of Grenoble during the summer months.

Learn and reflect

The Metropole, with the support of ALEC and ATMO (agreement with ATMO, contract with ALEC), carries out an annual GHG/Energy/Air assessment on a territorial scale as well as monitoring of observation indicators since 2005, all brought together in the Climate Observatory Letter.

According to French regulations, a Mid-Term Review must be carried out halfway through the validity of the SECAP. The Mid-Term Review is used to assess the progress of the actions of the SECAP Action Plan and was produced in the winter of 2023-2024 to assess the period 2020-2023. In terms of implementation of actions, at the end of 2023, 87% of the 312 sub-actions registered in the SECAP have been completed/completed (26%) or are currently being implemented (61%).

Also according to French regulation, a GHG Assessment of the metropoles buildings, processes and activities (BEGES) has recently been completed, which calculates the emissions related to the administration’s activities and work force.

The conduct of these regulatory exercises made it possible to update the diagnostic elements and to measure the positioning of the Metropole on the trajectory of achieving these objectives (impacts on the territory).

An assessment of indirect emissions was carried out during the Carbon Neutrality Study. In late 2021, Grenoble-Alpes Metropole launched a prospective exercise based on ADEME's Transition(s) 2050 work to roll out these transition scenarios across its territory, in order to identify the main levers at its disposal to contribute to the objective of achieving national and global carbon neutrality by 2050.

The main annual figures of the Climate Observatory Letter are communicated on the website of the climate plan partners, and formalized in a "SECAP Observatory Letter ". In addition, the Magazine de la Metropole (https://www.lametro.fr/26-magazine-metropole.htm) presents news on the SECAP every 2 months, being particularly clear, exhaustive and educational in terms of elements on Climate/ Air/Energy issues. The Climate Plan Forum, organized once a year by the Metropole, allows for indicators to be presented to all partners, particularly the municipalities and debates and discussions to be held.

Additional in-depth diagnostics (energy, usage, energy networks) of the SECAP were also carried out within the framework of the Energy Master Plan, enabling analysis of the final energy consumption of the territory and its potential for reduction.

Finally, to learn and progress together with the SECAP partners, joint reflection is a priority. Some examples are the annual realization of times for exchanges and feedback within the annual SECAP Partners Forum, more regularly in dedicated working groups for municipalities (ALEC animation within the framework of the charter) and also for businesses (local economic pact).

Make it the new normal

The implementation of actions and projects have fundamentally changed the metropolitan area and encouraged new habits and practices, which ultimately has changed the norms. Projects that were initially innovative have become commonplace projects. A good example is the Chronovélo, structuring cycle paths (comfortable, fast, safe), since the implementation of these paths, records for the number of cyclists have been broken every year.

To further accelerate towards carbon neutrality, it is now a question in several areas of scaling of the solutions already tested on a small scale. Thus, it is necessary to involve citizens to enable behaviors and practices to be changed, to spread the effects on a larger scale. Significant work has been undertaken with behavior change and design services experts, to develop the existing support/subvention systems and create new ones.

The metropole relies on all the socio-economic actors of the territory, mobilized as relay actors to raise awareness and share good practices with their inhabitants, employees, users. As an example, the intervention "The month of solutions" aims precisely to consolidate new practices and recall climate issues, in line with the annual themes of the European Green Capital in 2022. The metropole organizes thematic months throughout the year, with events offering practical solutions to inhabitants in order to support them in their transitions. www.grenoblealpesmetropole.fr/858-les-mois-des-solutions.htm

Table 1 : Sectors, scopes and geographical boundary

Sectors	Scope 1	Scope 2	Scope 3
Stationary energy + grid energy	Included	Included (for electricity)	-
	No exclusion	-	-
Transport	Included	excluded	-
	No exclusion	-	-
Waste/wastewater	Included	-	-
	No exclusion	-	(waste is treated inside the territory so considered scope 1)
IPPU	Included	-	-
	No exclusion	-	-
AFOLU	Included	-	-

	Includes agricultural emissions only, no change in land use	-	-
Other	-	-	-
Geographical boundary	**Same as metropolitan administrative boundary**	**Same as metropolitan administrative boundary**	**Larger than metropolitan administrative boundary**
	x	x	
Specify excluded/additional areas	No specific exclusion	No specific exclusion	No specific exclusion

Map

(Map source AURG)

2 Part A – Current State of Climate Action

Part A "Current State of Climate Action" describes the point of departure of the metropole towards climate neutrality.

2.1 Module A-1 Greenhouse Gas Emissions Baseline Inventory

The GHG inventory carried out on Grenoble-Alpes Metropole as part of the Metropolitan Climate Air Energy Plan observatory is limited to the administrative perimeter of the metropolitan area. Thus, the emissions measured within the territorial observatory are direct, "cadastral" emissions, i.e. emissions physically emitted on the territory. In addition, for electricity, indirect emissions generated outside the territory and associated with the production of electricity that is consumed on the territory are added (SCOPE 2).

The territorial inventory is carried out by ATMO AURA. The method used is standardized, based on the European EMEP/EEA guide, which is applied at the national level by the CITEPA OMINEA guide, then at the regional level through the PCIT guide[1].

The GHG emissions inventory in MyCovenant must be updated in the platform, for emissions for the year 2019.

The energy balance is based on 69% real data (gas and electricity consumption, district heating fuels, etc.) collected each year from network operators and 31% of statistical data for diffuse fuels (log wood, propane, fuel oil, butane) and motor fuels.

Energy consumption and greenhouse gas emissions are corrected for climate severity.

The estimation of road fuel consumption takes into account all travel within the territory: that of the inhabitants themselves, but also travel made within the metropolitan territory by people residing outside the territory (transit, external workers, etc.).

The cadastral inventory covers the emission areas of the methodology *Info Kit for Cities* from the Mission Villes for cities, but sometimes under different sectorizations. Thus the stationary energy sector is calculated by separate sector: residential, commercial, industrial. Emissions related to waste treatment are integrated into the industrial sector, because household waste is incinerated on the territory of the metropole. Scope 3 which could be associated with waste sent for recycling (cardboard, glass, plastic, metal, etc.) is not calculated in metropolitan territorial emissions. According to the inventory methodology used by Grenoble Alpes Metropole, the AFOLU sector only takes into account agricultural emissions, and does not take into account sequestration by biomass or changes in land use.

The category "Others" in the economic model of NetZeroCities includes emissions from industrial processes and product use such as manufacturing and chemical production, agriculture, ports, airports and rail freight. There is no airports or ports and limited agricultural production on the metropolitan

1 https://www.lcsqa.org/system/files/rapport/MTES_Guide_methodo_elaboration_inventories_PCIT_mars2019.pdf

territory and this category is composed of 97% industrial emissions. Therefore, in the Climate City Contract the category “Others” can be considered as industrial emissions.

Table 2 : Final energy use by source sectors			
Base year	**2019**		
Unit	Gwh		
	Scope 1	Scope 2	Scope 3
Buildings	4917		
(Fuel type/ energy used)	Gas, electricity, biomass, coal, fuel		
Transport	1883		
(Fuel type/ energy used)	Fuel, electricity, gas		
Waste	In industry		
(Fuel type/ energy used)			
Industrial Process and Product Use (IPPU)	3778		
(Fuel type/ energy used)	Gas, electricity, biomass, coal, fuel		
Agricultural, Forestry and Land Use (AFOLU)	11		
(Fuel type/ energy used)	Gas, electricity, biomass, coal, fuel		

This data of the energy consumption by sector comes from the annual air and GES observatory of the metropole, for the year 2019, calculated in 2023.

Table 3: Emission factors applied			
(Please specify for primary energy type and GHG emission factor according to methodology used).			
For calculation in t or MWh of primary energy			
(Please indicate method used, e.g., GPC, IPCC, CRF, national etc.)			
Primary energy/ energy source	Carbon Dioxide (CO_2) **kg/GJ**	Methane (CH_4) **g/GJ**	Nitrous Oxide (N_2O) **g/GJ**
Wood log	0	3,2	4
Heating oil	74,5	10	0,6
liquefied petroleum gas	63,1	5	0,1
Natural gas	56,3	5	0,1
Coal (PCS>23 865 kJ/kg)	94,6	300	1,5
Gas	72,3	77,1	2
Diesel (not for vehicules)	74,7	7	2
Electricity	33,8 (gCO2/kWh)		

Emission factors for F-gases, SF_6 and NF_3 are confidential and not shared to the metropole.

The source of the data comes from the CITEPA, the national French agency in charge of GES accounting: (see the guide OMINEA:).

As for the other gaz (F-gases, SF6 and NF3), they are not emitted by the different energy sources that are listed. They are directly emitted through specific activities, but do not result from combustion.

Table 4: GHG emissions by source sectors – Baseline year

Base year	**2019**				
Unit	tCO2e/year				
	Scope 1	**Scope 2**	**Scope 3**	**Total**	**% of Total**
Transport	433215			433215	23%
Buildings and heating	467257			467257	25%
Electricity		150929		150929	8%
Waste*	92935				5%
Other (incl. IPPU & AFOLU)	713393			713393	38%
Total	1707071	150929		1858000	100 %

** Includes Scope 1 Waste emissions (produced and processed in the city) since it is treated inside the metropolitan perimeter - solid waste only; wastewater falls under "Other" sector*

Table 5: GHG emissions by source sectors – Business as Usual (BAU) 2030

Base year	**2019**				
Unit	tCO2e/year				
	Scope 1	**Scope 2**	**Scope 3**	**Total**	**% of Total**
Transport	335636			335636	20%
Buildings and heating	450386			450386	26%
Electricity		168533		168533	10%
Waste*	43038			43038	3%
Other (incl. IPPU & AFOLU)	713393			713393	42%
Total	1542453	168533		1710986	100%

** Includes Scope 1 Waste emissions (produced and processed in the city) since it is treated inside the metropolitan perimeter - solid waste only; wastewater falls under "Other" sector*

Table 6: Activity by source sectors

Base year		2019	
	Scope 1	Scope 2	Scope 3
Transport			
Transport need - passenger cars + motorcycles (M km/year)	1785		
Transport need - buses (M km/year)	9		
Transport need - trains/metro (M km/year)	6		
Transport need - light duty trucks (<3.5 t) (M km/year)	208		
Transport need - heavy duty trucks (>3.5 t) (M km/year)	108		
Buildings & Heating			
Heating demand (space heating + domestic hot water) (GWh/year)	3893		

Electricity			
Electricity demand within city boundaries (GWh/year)		3458	
Waste*			
Collected and incinerated waste within city boundaries (tons)	191960		
Other (incl. IPPU & AFOLU)	713393		

** Includes Scope 1 Waste emissions (produced and processed in the city) since it is treated inside the metropolitan perimeter - solid waste only; wastewater falls under "Other" sector*

2.1.1 The Observatory letter of 2023: summary and main lessons

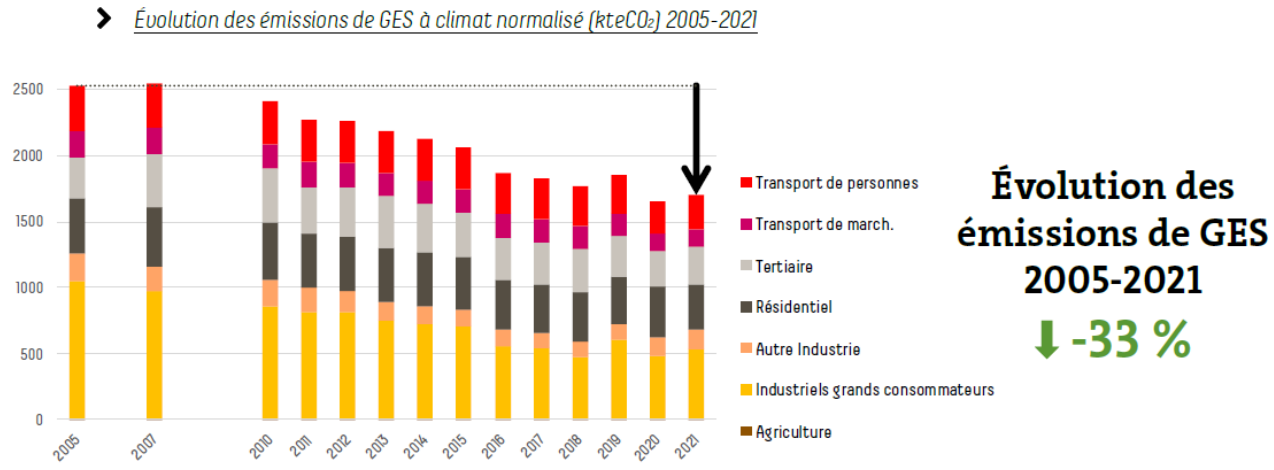
Since 2014, the Metropolitan Climate Air Energy Plan (SECAP) observatory letter has provided an annual overview of the evolution of greenhouse gas emissions in the Grenoble Alpes Metropole area, of energy consumption and production, and of atmospheric pollutant emissions. The following chapter is an extract taken from the 2023 Observatory Letter, with focus on greenhouse gas emissions and energy, the entire letter is available in annexe 6.

DIRECT GREENHOUSE GAS EMISSIONS

After a record drop of -11% between 2019 and 2020, following the COVID 19 pandemic, direct greenhouse gas (GHG) emissions were estimated in 2021 at 1,700 ktCO2eq, i.e. 3% more than in 2020 but 8% less than in 2019. The territory's GHG emissions fell by 33% between 2005 and 2021 (including 27% between 2005 and 2019) and by 43% between 1990 and 2021. The territory's direct emissions amount to 3.8 tCO2e/inhabitant, compared to 6.3 tCO2e/inhabitant across France.

2021, marked by the COVID health crisis with a lockdown and travel restrictions, saw its GHG emissions linked to transport decrease significantly compared to 2019. We will have to wait until 2022 to find data confirming the trends observed before the health crisis. The main levers for reducing GHG emissions (efficiency and evolution of industrial processes, mix of the main district heating network) having been largely exploited, efforts will have to be intensified, in particular on reducing needs in the transport and building sectors and the decarbonisation of energy sources (abandoning fossil fuels in favour of biomass and electricity).

Figure 4: Evolution of GHG emissions (normalised climate, kteCO2, 2005-2021)



ENERGY CONSUMPTION

In 2021, the territory consumed 10.1 TWh of energy, of which 33% was electricity and 7% came from the district heating network. This level of consumption, close to 2020 (10 TWh), is 5% lower than in 2019. Fossil fuels remain the majority in the territory's energy mix (56% in 2021). The decrease observed since 2005 was -17% in 2019. It is -25% in 2021 but not representative of the trend, as it is still impacted by the health crisis.

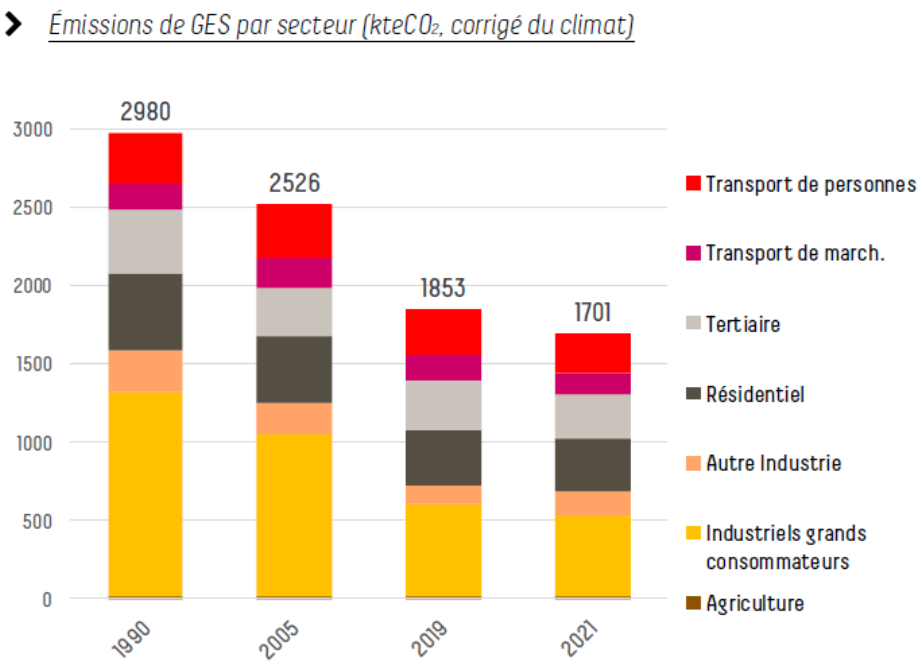
LOCAL RENEWABLE ENERGY PRODUCTION

The production of renewable and recovered energy from local resources - mainly biomass and hydroelectricity - was 2.3 TWh in 2021, i.e. +6% compared to 2020 and +64% compared to 2005. In 2021, biomass alone accounted for 87% of the increase in ENR&R production compared to the previous year, with the opening of the Biomax heating plant connected to the district heating network. As for solar energy, geothermal energy and biomethane, these renewable energies are only growing very slightly: they represent 5% of local production. The objective of increasing local ENRR production by 67% by 2030 seems achievable if the current dynamic of renewable heat development continues.

DISTRIBUTION BY SECTOR

In the territory, greenhouse gas emissions come mainly from three sectors. In 2021, they were distributed as follows: industry (large industries and other productive activities: 40%), buildings (residential and tertiary – including research, 37% of emissions) and transport (23%). Agriculture represents less than 1% of emissions.

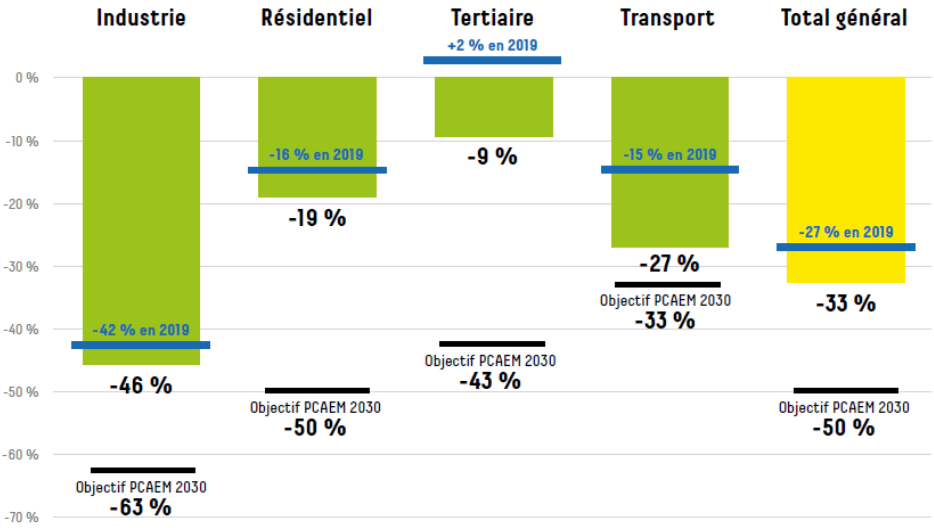
Figure 5: GHG emissions per sector (kteCO2, normalised climate)



While all sectors have contributed to the reduction in greenhouse gas emissions, industry remains by far the main contributor. Industry alone, under the combined effect of regulatory changes, process improvements and variations in economic activity, represents 69% of the total reduction observed in the territory between 2005 and 2021. The calculation of emissions from the tertiary sector will be refined in future letters of the Observatory.

Figure 6: Evolution of GHG emissions between 2005 and 2021 (normalised climate)

Évolution des émissions de GES entre 2005 et 2021 (corrigées du climat)



THE INDUSTRIAL SECTOR, THE MAIN CONTRIBUTOR TO ACHIEVING THE OBJECTIVES

With a decrease of approximately 46% in GHG emissions and 42% in consumption since 2005 (improvement of processes, decrease in economic activity, etc.), the sector explains the majority of the overall reductions observed in greenhouse gases, energy consumption between 2005 and 2019 as well as certain pollutants with health effects (NOx and SOx), with nevertheless an upward trend between 2017 and 2019 linked to an increase in activity.

After a notable drop of -14% linked to COVID between 2019 and 2020, there was a recovery in emissions linked to the industrial sector in 2021: +9% compared to 2020, these remaining below the emissions of 2019 (-6%). The trend will need to be confirmed for the coming years.

TRANSPORT AND BUILDINGS SECTOR, INSUFFICIENT RESULTS IN TERMS OF ENERGY CONSUMPTION

The transport sector experienced a slight decline in kilometres travelled until 2019 (-4% compared to 2005), before being heavily impacted by the COVID crisis in 2020 (-18% compared to the previous year). Distances travelled continue to be significantly lower than before COVID in 2021 (-13% compared to 2019).

For buildings, there is a stagnation in energy consumption (between 2005 and 2019: -3% for residential and +2% for tertiary). This trend is partly structural, as it is linked to the increase in building surfaces (+14% for residential, +21% for tertiary) while consumption per m² is decreasing (-14% for residential and -20% for tertiary).

The health crisis and remote working impacted these two sectors in 2020 (+9% for residential and -10% for tertiary compared to 2019) but also in 2021 (+2% for residential and -6% for tertiary compared to 2019).

While the energy conversion of heating systems to renewable energies allows residential sectors to show a significant drop in GHG emissions (-19% between 2005 and 2021), this is not the case for the tertiary sector, nor the transport sector. The latter is still very dependent on fossil fuels (88% of the sector's consumption in 2021).

2.1.2 Details regarding the industrial sector and EU ETS

Industry currently represents around 40 % of direct emissions and therefore represents a major challenge for the territory. Despite very limited land, the territory remains in a logic of welcoming new companies and relocating transitioning industries, particularly start-ups from the area. However, this presents a risks in increasing energy consumption and direct GHGs.

In the territory of the Metropole, ten sites are subject to the EU Emissions Trading Scheme (EU ETS), of which four sites are for heat production and six are industrial companies (Vicat Saint-Egrève, Arkema Jarrie, Pont de Claix Chemical Platform, AirLiquide Hydrogene etc.). According to the NetZeroCities Info Kit for Cities, these industries can be excluded from the greenhouse gas emissions inventory.

These industries are major emitters, but the decrease in emissions in the territory since 1990 is mainly due to decarbonization and the cessation of these activities. Even if the Metropole has no direct influence on industrial emissions, we have chosen to include large industry in the Climate City Contract to shed light on these emissions and develop more collaborations to reduce them. The main levers for the industrial sector are of national or even European competence.

2.2 Module A-2 Current Policies and Strategies Assessment

Module A-2 “Current Policies and Strategies” lists and assesses existing policies, strategies, initiatives, or regulations from local, regional, and national level, relevant to the city's climate neutrality transition. This assessment contributes to identifying the gap (if any) between the emissions reduction due to existing initiatives and the city´s 2030 climate neutrality target. Filling this gap by identifying additional actions and levers to achieve the city´s emission reduction target is the focus of this Action Plan. The assessment of current policies and strategies offers hence a starting point for exploring the impact pathways. We have also chose to include an introduction to the French framework related to climate issues.

2.2.1 Introduction to the French framework

This chapter presents the French framework and context in which French cities build the Climate City Contract for the Cities Mission. All acronyms are in French and full names are in English for a better understanding.

Cities versus metropolitan areas

The status of metropole was created in France as part of the reform of local authorities in December 2010. The aim was to boost the attractiveness and influence of major cities. There are 22 metropoles in France and four of French mission cities participate as a metropole: Nantes, Bordeaux, Dijon and Grenoble-Alpes. Angers and Dunkirk are urban communities but it is very close to the metropoles, so we will talk about metropolitan areas for these six towns. Metropolitan areas are larger than cities because they gather several municipalities working together on a joint urban development and land-use planning project. Paris, Lyon and Marseille are also part of metropoles but they responded to the call for expression of interest of the Mission within the perimeter of the municipality.

Metropolitan areas exercise the powers transferred to them by their municipalities. Consequently according to the Maptam law (2014), metropoles are in charge of these policies on their territories:

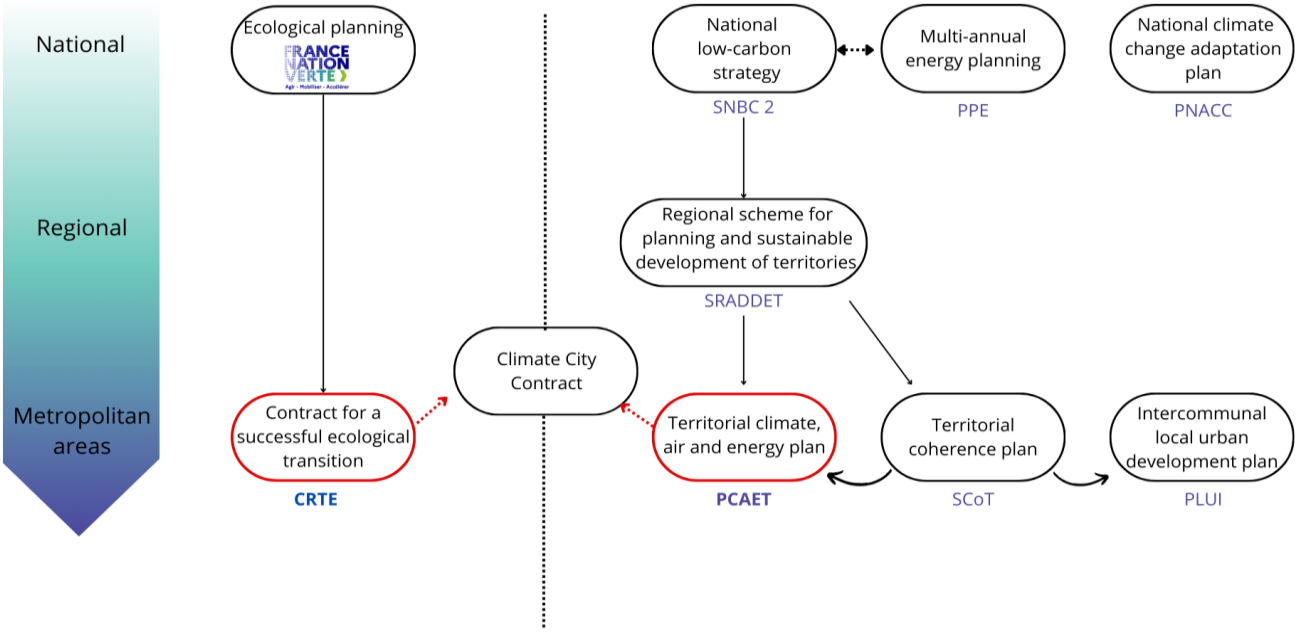
- Urban policy,
- Urban planning,
- Local housing policy,
- Air quality, noise prevention, waste management, flood and water risk management,
- Economic, social and cultural development,
- Management of services of public interest (for instance waste, energy, water, sanitation and transport (unless delegated to an operator).

Before the Maptam law, parts of these were the responsibility of the municipalities. The division of roles and responsibilities between cities and metropolitan areas can sometimes be unclear. It depends on each city and metropolitan area.

Metropolitan areas are responsible for urban planning and climate planning. The French framework detailed below only concerns metropolitan areas, as the cities have delegated this responsibility to them. But metropolitan areas work with cities. Moreover, metropolitan areas are a subcategory of a specific French status concerning cooperation between municipalities called public establishments for intercommunal cooperation (EPCI). In 2024, there are 1,254 EPCIs including 22 metropolees and 14 urban communities.

The diagram below summarizes the French framework of national, regional, and local climate strategies and plans, further described in the chapters to follow.

Figure 7: French framework of national, regional, and local climate strategies and plans



2.2.1.1 National strategies and plans

The energy transition law for green growth (LTECV, 2015) requires France to draw up a roadmap to fight global warming. The French climate plan (2017) strengthened targets of the energy transition law for green growth, to be compatible with the Paris agreement (carbon neutrality in 2050).

National low-carbon strategy

The national low-carbon strategy (SNBC, 2015 - SNBC 2, 2020) is the French roadmap for achieving carbon neutrality by 2050 and reducing the carbon footprint of French consumption. It sets out guidelines for implementing the transition to a low-carbon, circular and sustainable economy. The SNBC defines a trajectory in all sectors of activity for reducing greenhouse gas emissions until 2050 and sets short- and medium-term targets (carbon budgets). It has two ambitions: to achieve carbon neutrality by 2050 and to reduce the carbon footprint of French people. The national low-carbon strategy must be taken into account by local decision-makers at every scale, particularly when drawing up local climate plans because it is a legal obligation for local authorities. This national strategy also is the reference base to build the multi-annual energy plan (PPE, 2016 - PPE 2, 2020).

In addition to the low-carbon strategy, a national climate change adaptation plan (PNACC) defines concrete actions to adapt French territories to climate change.

Ecological planning

The Carbon print is addressed by the national strategy called “ecological planning” (among other issues that are also targeted: adaptation to climate change, biodiversity…). The strategy aims to:

1. translate national objectives (reduction in CO2 emissions) into concrete, coherent and achievable measures (number of electric vehicles, building renovation surface areas, etc.)
2. translate national objectives into local action, according to the specificities of each territory.

Objectives and action plans are defined by a dialogue between State and Region with the intermediary of regional COP (inspired by the international Conference of the parties system). Cities and metropolitan areas are not involved in the process. Every region launched their COP, except Ile de France and Bretagne regions but they will do it soon.

Regional COPs are following 3 steps:

1. Diagnosis phase
2. Debate phase with citizens, economic actors and local authorities
3. Regional roadmap

2.2.1.2 Regional strategies and plans

The regional scheme for planning and sustainable development of territories (SRADDET) is the main document for French regions concerning ecological transition. The SRADDET is elaborated and voted by the regional council but the regional prefect (representative of the State in each region) must approve the document. It defines mid-term and long-term targets in many areas, including air quality, the fight against climate change, energy management and resilience, the development of renewable and recovered energy sources, and the protection and restoration of biodiversity. The SRADDET must follow the national low-carbon strategy. Then, the SRADDET objectives apply to local planning documents such as the PCAET, SCoT, PLU, etc. Indirectly, national objectives are implemented at the local level, via the regional level.

2.2.1.3 Local strategies and plans

Territorial climate, air and energy plan (PCAET)

The territorial climate, air and energy plan is a strategic and operational planning tool to deal with climate, air and energy issues of a territory. It is mandatory for public establishments for intercommunal cooperation (EPCI) with more than 20,000 inhabitants. Moreover, municipalities with more than 50,000 inhabitants must draw up an assessment of GHG emissions every 3 years and set up an action plan to reduce them. They can integrate their greenhouse gas emissions assessment and their transition plan into this territorial climate, air and energy plan.

Every French city from the Cities Mission is concerned by a territorial climate, air and energy plan.

The objectives of the plan are:

- To reduce the territory's greenhouse gas emissions ("mitigation" component);

- To adapt the territory to the effects of climate change, in order to reduce its vulnerability (“adaptation” component)

- To decrease energy consumption, improve energy efficiency and develop renewable energies.

The document is divided into 4 mandatory parts:

1. Diagnosis and analysis of emissions, carbon sequestration, final energy consumption in the area, energy production and the territory's vulnerability to climate change.
2. Territorial strategy: strategic and operational objectives in specific topics and their socio-economic consequences.
3. Action plan: definition of all actions, all stakeholders involved, resources required, the target audiences, the desired partnerships and the expected results for the main planned actions.
4. Monitoring and evaluation system: description of monitoring indicators and connection of indicators with those of the regional plans (mentioned below), public report on implementation after 3 years.

The PCAET must be revised every 6 years.

The document is close to the Climate City Contract from the Cities Mission, except that the SECAP is a regulatory document and the feasibility of the trajectory must be demonstrated. Also the SECAP does not require an investment plan.

Territorial coherence plan (SCoT)

The territorial coherence plan is a strategic urban planning document, which defines the spatial organization and main development guidelines of the territory. The SCoT serves as a framework for sectoral policies, such as those focusing on spatial organization and urban planning, housing, mobility, commercial development, the environment, including biodiversity, energy and climate. The territorial coherence plan must follow objectives from the SRADDET but it also influences other local plans such as PCAET, which has to consider the SCoT.

Intercommunal local urban development plan (PLUI)

The intercommunal local urban development plan is a local document for urban planning that sets out the rules for land use and development. The conditions for land use must respect the principles of sustainable development. The SCoT remains the major document concerning local urban planning, and the PLUI has to consider it.

2.2.2 List of policies, strategies and regulations

The following table lists the policies, strategies and regulations relevant to the development of the Climate City Contract. The table describes the strategy/plan in question, its impact on the climate neutrality ambition as well as the revisions in progress or need for revision. The list goes from the top to the bottom hierarchical level (European to local) as well as mandatory to political (regulatory to voluntary).

Table 7: List of relevant policies, strategies and regulations					
Type	Level	Name and title	Description	Relevance	Need for action
Agreement	Global 2015	Paris Agreement	International agreement adopted by 196 States which commit to acting together to mitigate the effects of climate change.	2°C max, if possible 1.5°C Be carbon neutral by 2050 45% direct GHG in 2030 vs 2010 according to the IPCC	
Strategy	EU 2019	Green Deal for Europe / Climate Energy Law 2019	EU strategy aims to revise existing legislation and introduce new climate directives.	Reduction of -50 % in 2030 vs 1990 Carbon Neutrality in 2050	European parliament calls for higher ambitions
Strategy	EU 2021	Climate package “fit for 55”	Package of 12 legislative proposals which aims to propose concrete actions to achieve the EU's objectives in terms of reducing GHG emissions.	-55% reduction in 2030 vs 1990 Carbon Neutrality in 2050	
Law	National 2019	Climate Energy Law (Loi climat Energie)	Law that sets carbon neutrality targets.	50% GHG in 2030/1990 Carbon neutrality 2050	
Strategy	National 2020	National Low Carbon Strategy (Stratégie Nationale Bas Carbone)	Guidelines for implementing, in all sectors of activity, the transition to a low-carbon, circular and sustainable economy.	50% of energy consumption by 2050/2012 Carbon neutrality 2050	Revision in progress SNBC3 for 2025-2030
Regulation	National 2015	Energy Transition Law for Green Growth (Loi de transition énergétique pour la croissance verte)	Aims to ensure that France contributes more effectively to the fight against climate change, to the preservation of the environment and to strengthening its energy independence.	EPCI coordinators of the TEE at the local level	
Steering tool	National 2015	Multi-annual energy programming (Programmations pluri-annuelles de l’énergie)	Energy policy management tools, created by the law on energy transition for green growth	43 monitoring indicators on the themes of energy efficiency, primary energy consumption, particularly fossil fuels, renewable and recovery energies, etc.	Currently under revision (PPE 3)
Plan	Regional 2020	Regional development plan for sustainable development and territorial equality SRADDET	Land use planning document which merges several existing documents or plans.	30% direct GHG in 2030 vs 2015 Carbon neutrality target 2050	Currently under revision

		(Schéma régional d'aménagement, de développement durable et d'égalité des territoires SRADDET)			
Plan	Local	Territorial coherence plan for the Grenoble region (Schéma de cohérence territoriale de la région grenobloise (SCoT))	Urban planning document which establishes the major options for land use and development over a 20-year period: environment, housing, commerce, services, economy, agriculture, travel.		Revision started during the summer of 2024
Plan	Local 2020	Metropolitan Energy Climate Air Plan (Plan climat Air Energie Métropolitain) (Annex 4)	Local SECAP with climate objectives and actions from 2020-2030. The Plan also provides for the initiation of a "carbon neutrality 2050" study with a view to a mid-term revision of the Climate Plan.	50% direct GHG in 2030 vs 2005 (-54% vs 1990) Striving for carbon neutrality by 2050 Reduce energy consumption by 40%, achieve a % of renewable and recovered energy of 30% Reduce air pollution (WHO thresholds 2005) Adapting the territory to climate change	Revision started with adoption in 2026
Plan	Local 2019	Land Use Regulation Plan (Plan Local d'Urbanisme Intercommunal, PLUi)	Land use regulation plan which defines the rules for construction and land use in the 49 communes of the territory.	Reduction of land consumption More sustainable urban planning, ambitious energy targets for new construction and renovation Better management of agricultural land and natural areas Adaptation to climate change, enhancement of landscapes, taking into account natural and technological risks.	Strengthening the environmental performance objectives of buildings (amendment 2 of the PLUI) – currently undergoing regulatory procedure Provisions for adapting the territory to climate change (amendment 3 of the PLUI, OAP "bioclimatization")
Plan	Inter-territorial 2018	SUMP or Mobility Plan 2030 (Plan de Mobilité	Aims to anticipate developments in travel patterns and	Favor walking/ cycling (Chronovélo, parking, etc.) Bike travel x3.	Revision in progress, adoption

		2030) (Annex 18)	to promote the transition to active mobility and public transport.	Strengthening public transport (extension of the tramway network and an commuter train, etc.) " Peaceful metropole" , speed at 30 km/h.	planned for 2026
Program	Local	Local Housing Program (PLH) 2017-2022 (Programme Local Habitat)	Document for the observation, definition and programming of investments and actions in terms of housing policy on the scale of the 49 municipalities of the metropolitan territory.	Focuses on the production of public and private housing, on the improvement of the existing stock, and on the needs of specific populations (students, elderly people, travellers, etc.). Thermal renovation objectives	PLH 2017-2022 extended until 2024. Consultation phase of the next PLH 2025-2030
Master plan	Local 2017	Energy Master Plan 2020-2030 (Schéma Directeur Energie) (Annex 17)	Roadmap for metropolitan policies for: - reduce energy consumption - promote renewable and recovery energies - reduce fossil fuels - develop energy distribution networks	Reduce all energy consumption by 22% between 2013 and 2030 Promote renewable and recovery energies: + 60% renewable heat, + 35% ENR and R, - 30% fossil fuels between 2013 and 2030	Revision in progress 2024-2025
Master plan	Local 2017	Waste Master Plan 2020-2030 (Schéma Directeur Déchets) (Annex 19)	Roadmap for waste reduction, more sorting and a circular economy.	Ambition for 2030: 50% household waste by weight 2/3 of waste recycled + 25,000 t of raw materials saved per year Benefit of - 29% GHG / year	
Master plans	Local	Drinking water and sanitation master plans (Schémas directeurs eau potable et assainissement)	Multiple objectives with sanitation guidelines by 2030.	Technical objectives above all.	The next version will take climate issues more into account, for example Aquapole (water purification plant), responsible for a significant portion of the metropoles' emissions.
Strategy	Local updated in 2022	Grenoble Alpes Economic Strategy 2030 (Stratégie économique de Grenoble Alpes	80 actions brought together in a project to develop and support companies in their	4 Strategic axes: Support for innovation Promote sustainable jobs and the attractiveness of talent; Resilience, mobilization of economic actors in favor of	

		2030) (Annex 16)	environmental responsibility.	transitions Supporting economic players through responsible developments.	
Strategy	Local 2022	Development Strategy of circular economy among businesses 2023-2026 (Stratégie de Développement de l'économie circulaire auprès des entreprises)	Combining Economy and Ecology, and stimulating the social and solidarity economy (SSE), which offers inspiring models for producing a good or service as well as governance processes, collective intelligence and general interest.	- 20% waste produced on the territory (2030) 7500 t of waste redirected for reuse/repair 2025, +200 jobs, the majority of which are in the ESS 30% reuse rate on collected deposits (objective of the Reuse Repair Master Plan – SD2R) Material recovery rate of 65% (SD2R objective)	
Plans	Local 2020	Exemplary Administration Plan (Plan Administration Exemplaire)	Implementation of the "Exemplary Metropole" component of the SECAP (Axis 5). Implementation via an Employer Mobility Plan (2020) and a SPASER (2022), a training/awareness policy for agents and elected officials, in particular through the deployment of climate frescoes. A Metropolitan Heritage Real Estate Energy Master Plan and a responsible digital strategy are currently being developed.	7 strategic axes: Reduce and better sort our waste Consume less and buy better Reducing our energy consumption and building sustainably Moving differently Reducing our digital impact Adapting to climate change and promoting biodiversity Inform, raise awareness and train, to enable everyone to be an actor at their own level	Revision in progress with a PAE2 for 2024
Plan	Local 2022	Canopy plan (Plan canopée)	Sets an ambitious framework for action to plant, revegetate and de-impermeabilize towns and villages in the region.	Cover urban areas with 30% canopy by 2030 and 40% by 2050. 5000 trees planted since 2019 in metropolitan areas	
Master plan	Local 2023	Master plan for electric vehicle charging infrastructure and the development opportunity plan for NGV charging infrastructure Schéma directeur des infrastructures de recharge de véhicules électriques (SDIRVE) et du	Accelerate the deployment of electric vehicle charging infrastructure open to the public and ensure their territorial coherence.	1875 charging points for electric vehicles (including around 1000 in the metropole) by 2030 13 NGV stations in the region by 2030	

		schéma d'opportunité de développement des infrastructures de recharge GNV			
Strategy	Interterritorial 2019	Interterritorial forest and wood strategy "Forest horizon 2030" and dedicated cooperation agreement (Stratégie interterritoriale forêt bois « Forêt horizon 2030 »)	Strategy aimed at meeting the objectives of adapting forests and wood industries to climate change, by 2030.	Promotion and maintenance of the carbon storage capacities of forests. Sequestration capacity of 148,000 tonnes of CO2	Roadmap 2019-2023 then renewed for 2023-2030. 2022 cooperation agreement signed by the pinhabitants of the structures involved in the strategy: strengthening mobilization on the issue.
Plan	Local 2022	SPASER Scheme for promoting socially and environmentally responsible purchasing 2022-2026 (Schéma de promotion des achats socialement et écologiquement responsables) (Annex 20)	Roadmap for responsible public procurement (improving consideration of environmental, social and economic performance of purchases).	100% of markets will include environmental clauses or criteria by 2025 Strengthening consideration of ecological transition issues	
Plan	Local 2021	Bicycle plan (Plan vélo)	2021-2025 action plan to promote the development of cycling in metropolitan France.	Development of the cycle path network. Resorption of major blackheads. Maintenance of the cycle network. Secure cycle parking solutions Practical promotion of cycling.	
Strategy	Local 2024	Strategy for adapting buildings to summer heat (Stratégie d'adaptation du bâti à la chaleur estivale)	Adaptation to climate change. Cooling objectives for metropolitan buildings.	Support for energy renovation. Promote certain technological solutions compatible with SECAP objectives. Communication around summer comfort: sobriety, efficiency and development of solutions using renewable energies.	In progress, note to the Metropolitan Council of 02/09/24

Program	Local 2022	Local household and similar waste prevention program (Programme local de prévention des déchets ménagers et assimilés)	Action plan to reduce waste in the metropole by 2026. Document resulting from the waste master plan.	5 main axes: Generalize the practice of local composting and reduce the supply of plants to recycling centers. Support change of scale for reuse and repair. Develop alternatives to paper, packaging and single-use items. Amplify fights against food waste Engage dynamically with all stakeholders in the territory.	
Inter-territorial project	9 Local territories	Inter-Territorial Food Project (PAiT) of the greater Grenoble region (Projet Alimentaire inter-Territorial (PAiT) de la grande région grenobloise)	Striving for more quality and local products on our plates.	Preservation of agricultural land Farmer support and installation assistance Develop proximity circuits Local and organic products in school canteens.	

2.2.3 Evaluation of strategies, plans and regulations

To fully understand the current political context related to climate, we must first understand the competences and responsibilities of the Grenoble Alpes Metropole. The metropole has the competence of public facilities and services (waste, water, sanitation, etc.), economic development, development/urban planning/housing, roads, tourism, etc. For the field of mobility (public transport, carpooling, active modes), the Joint Urban Mobility Authority, SMMAG, brings together the organizing authorities.

This chapter aims to describe and assess current climate-related policies, strategies and plans by summarizing objectives and implementation concepts.

The SECAP is the main policy linked to climate neutrality for the metropole and it aligns on European policies such as the Paris Agreement and “Fit for 55” but also on regional mechanisms such as SRADDET and SCoT, with a carbon neutrality objective for 2050.

Description of the Metropolitan Climate Air Energy Plan

Committed since 2005 to the fight against global warming, Grenoble Alpes Metropole approved this SECAP on February 2, 2020, which became mandatory under the 2015 law on energy transition for green growth (LTECV), after extensive consultation with stakeholders and inhabitants of the territory. In accordance with Articles L.2224-34 of the General Code of Local Authorities and R.229-51 of the Environmental Code, the territorial climate air energy plans (PCAET), lasting 6 years, must be the subject of a mid-term report after 3 years. This assessment must be made public.

The SECAP defines an action program for the period 2020-2030, and is structured around 5 axes, 29 orientations and 85 actions and 307 sub-actions. The axes are as follows:

1. Adapt our territory to climate change
2. Reduce our greenhouse gases and improve air quality
3. Enhance the region's resources to reduce our carbon footprint and store CO2
4. Mobilize collectively for the climate
5. Build an exemplary Metropole

The SECAP has set ambitious objectives for the territory by 2030, which go beyond the objectives set at the national level within the framework of the National Low Carbon Strategy. The main objectives aim in particular to:

- Adapt the metropolitan area to the consequences of climate change while preserving and enhancing its resources;
- Reduce territorial greenhouse gas (GHG) emissions by 50% compared to 2005 (i.e. a reduction of around 55% compared to 1990, corresponding to the European climate-energy objectives for 2030)
- Reduce final energy consumption by 40% compared to 2005;
- Achieve 30% of renewable and recovered energy in the territory's final energy consumption
- Reduce emissions of major pollutants to meet the 2005 WHO reference thresholds for population exposure.

In Grenoble-Alpes Metropole, The SECAP has taken on the role of an umbrella plan for metropolitan policies, with the aim of being applied across all areas of competence and thus integrating other local strategies and plans (Energy Master Plan, Waster Master Plan, etc).

SECAP mid-term assessment and associated action plans

The SECAP was the subject of a mid-term review in 2023, available online on the Metropole's website. The summary (annex 5) was presented to the Metropolitan Council in March 2024.

The elements presented here are extracts from that summary:

"1/ SECAP mid-term review: what impact on local emissions?
The latest results from the SECAP observatory, published at the end of 2023, relate to 2021. They therefore do not allow us to assess the situation at the half-way point of the SECAP (2023). On the other hand, the years 2020 and 2021 were marked by the COVID crisis, which contributed to a significant drop in GHG emissions, particularly in the transport, industry and tertiary sectors compared with 2019 (1700 kteqCO2 emitted in 2021, i.e. a decrease of -.4% compared with 2019 and -33% compared with 2005 - see more details in the 2023 climate plan observatory letter.
These data, so far consistent with the 2030 GHG reduction targets, do not allow us to predict trends for 2022 and 2023, and call for continued efforts in all areas.

2/ Mid-term review: transversal lessons
The beginning of the SECAP's implementation was particularly marked by major changes outside the local context. The COVID epidemic resulted in the postponement of worksites and projects, the freezing of investment decisions by households and businesses, impacting schemes such as MurMur

and the Prime Air Bois, and a sharp drop in public transport ridership, but it also had the effect of accelerating changes in practices, such as the widespread use of telecommuting and videoconferencing, the significant development of walking and cycling and the acceleration of local purchasing practices. The energy crisis linked to the war in Ukraine in 2022 led to a rise in the price of energy and materials, but also to a strong mobilization around the challenge of energy sobriety, with the implementation of sobriety plans, the almost generalized extinction of public lighting at night, and an explosion in demand for support in the thermal renovation of buildings. 2023 was marked by inflation and rising interest rates, which put the brakes on investment. Finally, the increasing number of heatwaves, fires, droughts and floods, and the publication of the IPCC reports, all contributed to a heightened awareness of environmental issues throughout society (citizens, economic players, etc.).
Against this backdrop, the vast majority of the actions set out in the climate plan have been implemented, and new dynamics have been set in motion. 89% of the measures (sub-actions) scheduled in the climate plan were underway or completed by the end of 2023. Actions still to be undertaken have been identified, and special attention is being paid to their implementation between now and 2026.

The main structuring projects set out in the SECAP have been implemented, are underway or are in the pre-operational phase: Biomax, heating networks, ZFE, Pôle R sorting center, Murianette composting and methanization center, Athanor, etc.

New dynamics of action and mobilization have been initiated: bicycle plan, Canopée Plan, food waste collection, Projet Alimentaire Interterritorial, "bioclimatization" of the PLUi, Local Economic Pact, economic strategy, network of circular economy players, European Green Capital, charter of commitment of communes, mobilization/training of relay players, citizen convention for the climate and its follow-up, scientific committee, PCIS, exemplary administration plan, employer mobility plan, SPASER, SDIE, internal deployment of frescoes for the climate.

Existing technical and financial support schemes for local players and inhabitants (Espaces Info Energie, MurMur social housing and condominiums, Prime Air Bois, Fonds chaleur, Fonds Air Véhicules, MPro, etc.) have been continued, adapted to the context and strengthened.) and new schemes have been set up (SPEE, Murmur for single-family homes and VSE/SMEs, investment support for shops and craftsmen, assistance with bicycle purchases, ZFE support, creation of the FAST and transition assistance funds for municipalities, etc.). At the same time, support for innovation and economic development has been strongly redirected towards transitions.

The ambition of the region's climate action is recognized on a national scale (ADEME's "Climat-Air Energie Gold" and "Circular Economy" labels), and on a European scale: "Grenoble European Green Capital 2022" and "100 climate-neutral and intelligent cities" labels.

However, despite the scale of the actions undertaken, they do not always achieve the results expected or necessary to reach our objectives, particularly when these actions are based on investments for individuals and economic players, or on a significant change in behavior or practices (e.g. waste sorting, reduction in kilometers traveled, change of heating system, energy renovation...). The new actions undertaken in recent years to better support changes in behavior, in conjunction with experts, must be pursued and amplified in line with the commitments of the Citizens' Climate Convention.
3/ Mid-term review: thematic review (adaptation sections are not reproduced here)

3.1. Reduce energy consumption in buildings

The Climate Air Energy Plan and the SDE set a target of a 40% reduction in energy consumption by 2030 compared with 2005, including -30% for housing and -10% for tertiary buildings. Heating accounts for 70% of energy consumption in buildings. Since 2020, the Metropole has continued and expanded its efforts to support private individuals and professionals in the thermal renovation of buildings, notably through the establishment of the Public Energy Efficiency Service in 2020, operated by ALEC, which supports municipalities, inhabitants (energy info spaces) and businesses alike. The MurMur thermal renovation subsidy scheme for condominiums and social housing has been continued, strengthened and adapted to changes in the economic climate and government subsidies. MurMur assistance has been extended to 2021: assistance for work on single-family homes and the introduction of MurMur TPE-PME. Since 2021, these metropolitan schemes have supported more than 12,000 condominiums, 1,800 single-family homes and 178 VSE/SME businesses, and financed the renovation of more than 1,800 social rental housing units since 2020. The MurMur VSE/SME assistance scheme has recently been extended to associations, and the levels of assistance have been increased. An evaluation of the schemes was carried out in 2023, and a service design study is underway to continuously improve the system.

After a sharp slowdown during the COVID period, and a sharp upturn in 2022 with the rise in energy costs, the pace of renovation remains buoyant in 2023, but needs to be consolidated and amplified to achieve the targets set by the Energy Master Plan.

However, the pace of renovation remains limited, notably due to the difficulty of making decisions on the part of condominiums, households and VSEs/SMEs, reinforced by a changing context (COVID, multiple changes to the Ma Prime Rénov scheme, inflation, etc.), a lack of RGE-qualified professionals, and a shortage of manpower in the building renovation sector, which is currently insufficient to meet demand.

Lastly, beyond energy efficiency, the challenge is to support the evolution of uses and practices towards greater energy sobriety: a dynamic that has greatly benefited from the context of a sharp rise in energy costs in 2022, and is supported by local authorities through their heritage and public lighting management (on average, consumption fell by 10 to 20% in winter 22/23 compared with the previous winter). The Métroénergie platform, which will include 2,450 inhabitants by the end of 2023, is the concrete expression of this support effort. However, the move towards greater sobriety is still difficult to achieve on a large scale, and is highly dependent on the energy context. The winter of 2022/2023 demonstrated the importance of national communication on the subject.

3.2 Produce and consume more renewable energy

While the potential for developing renewable energy in the region is limited by its geographical context, the Climate Air Energy Plan sets the objective of developing renewable and recovered energy (ENR&R) and increasing their share to 30% of the region's energy consumption.

To achieve this, the Metropole is relying on the second largest linear urban heating network (RCU) in France, whose energy mix it has continued to green to reach 82% renewable and recovered energy in 2022-2023, thanks to the commissioning of the Biomax wood-fired power plant. This effort will continue in the coming years with the transformation of the Villeneuve and Poterne power plants with

the aim of phasing out coal in 2027, which represents less than 15% of the energy used but two-thirds of the CO2 emissions from district heating.

The last 3 years have also seen the commissioning, launch or study of heat network projects on a more local scale (Gières, Pont de Claix, Meylan, Varces, Vizille, Seyssins and Fontaine), the rise of renewable heat projects on a district or building scale (48 Fonds Chaleur projects supported with a production capacity of 17,600 kWh) or the development of solar photovoltaic, the renewable electrical energy with the greatest potential in the territory (creation of a metropolitan solar photovoltaic authority, support for citizen projects, etc.), the experimentation and then launch of a reinforced support system for private solar thermal projects (35 bonuses awarded since 2022), support for citizen companies producing renewable energy (Forest ENR Energy Citoyenne, Parkosol, SCIC Enercoop) and the establishment of a solar cadastre and a geothermal cadastre. Finally, the installation of a methanisation unit at the Murianette composting centre will enable the production of 7 GWh of biomethane, which will be added from 2024 to the 24 GWh produced at Aquapole, of which 20% is self-consumed and 80% injected into the public distribution network (corresponding however to 0.9% of the territory's gas consumption).

In 2021, ENR&R production in the territory had thus increased by 64% compared to 2005 (SECAP objectives + 67% in 2030) and represented 23% of the territory's energy consumption.
Efforts must therefore be continued to achieve the objectives and remove the obstacles identified to the deployment of renewable energy production in the territory: land constraints, regulations (urban planning rules), insurance, technical complexity of projects on existing sites (solar thermal, geothermal, wood with space requirements, photovoltaic: weight, waterproofing and insulation of roofs, etc.), insufficient economic profitability (solar thermal in particular). The deployment of urban heating by decarbonized heat network remains dependent on the price of gas and the lack of possibility of control for the Metropole of the obligation of connections limits the scope of the classifications. Furthermore, the actions of recovery of fatal heat of Vicat and the LNCMI have not been able to succeed to date due to lack of acceptance of potential takers (CHAI), or the achievement of a minimum profitability threshold. Finally, if the consumption of green energy has been developed in addition in the territory, in particular in the metropolitan heritage, the share of ENR&R in the energy consumption of the territory cannot be monitored to date due to the lack of access to the data, despite recurring requests from the Metropole.

3.3. Air quality

Improving air quality is a key objective of the Climate Air Energy Plan, due to its impacts on health, the environment and the attractiveness of the territory. While ozone concentrations tend to stagnate or even increase, due to global warming, the decline in nitrogen oxide (NOx) and fine particle (PM10 and PM2.5) emissions has been significant over the last 15 years, with concentrations of these atmospheric pollutants decreasing by -66%, -43% and -45% respectively, and no longer exceeding the national regulatory thresholds set by the European Union. No regulatory thresholds were exceeded at the stations and no inhabitants exposed to concentrations higher than the WHO 2005 recommendations for NOx and PM 10 were observed in 2021 and 2022.

To support and amplify the reduction of fine particle pollution, the Metropole has continued and strengthened its action aimed at replacing inefficient wood-burning heating appliances (the main source of PM emissions): 1,800 appliances replaced with the help of the Prime Air Bois since 2020

(3,300 since 2015), strengthening of communication on the system and establishment of a partnership with voluntary municipalities (municipal co-financing, door-to-door approach experiments), awareness-raising workshops on good wood heating practices and animation of the network of professional wood-burning heating installers, with implementation of compliance audits. The increase in requests observed since the end of the COVID crisis should continue in 2024, supported by the experimentation of a sponsorship system, the establishment of a system for advancing aid to low-income groups via professionals and in a context of a ban on the use of open fireplaces in the fall of 2024, then of non-performing closed fireplaces from 2026 (in accordance with the Atmosphere Protection Plan co-constructed with communities and stakeholders and adopted by the State in 2022). Concerning the reduction of pollutants linked to mobility (47% of NOx emissions and 13% of fine particle emissions in the territory), the Metropole has continued the action taken to limit the circulation of the most polluting vehicles. The implementation of the Low Emission Zone (LEZ) for utility vehicles and heavy goods vehicles established in 2019 was continued, with support for the professionals concerned (263 files eligible for the Air Vehicle Fund since 2020, i.e. €762k paid) and is now producing results. As planned in the climate plan, a LEZ for private cars and motorized two-wheelers has been studied and implemented over a perimeter of 13 municipalities since July 2023, after consultation with inhabitants, municipalities and neighboring territories, with an initial stage of banning CQA5 and NC in July 2023, followed by the banning of CQA4 in January 2024. The Metropole and the SMMAG have set up a support system for changing mobility or vehicles, based on an individualized path. Finally, awareness-raising efforts on air quality and its effects among the general public are continuing (website, bus shelters, deployment of a network of micro-sensors in municipalities and for use by citizens, lighting of monuments, conferences and exhibitions, etc.) and aim to reduce emissions at source.

3.4. Sustainable mobility

The transport sector is the third largest emitter of greenhouse gas (GHG) emissions in the territory (29% of total emissions in 2019, behind industry and construction). Reducing energy consumption, greenhouse gas emissions and air pollutants linked to mobility requires reducing the use of private cars and moving towards low-carbon engines. The COVID crisis has had a significant impact on mobility practices: shift to active modes, impact of the rise of teleworking, etc. The Syndicat Mixte des Mobilités de l'Aire Grenobloise, created in 2020, has undertaken numerous actions aimed at reducing emissions from the transport sector and supporting the new dynamics implemented since 2020: continued development of the M'Vélo+ service, strengthening of the public transport offer (extension of line D to the station from September 2024, improvement of chronobuses and adjustment of the Proximo and Flexo lines) and intermodality (study of the development of multimodal exchange hubs (PEM) and park-and-rides), car sharing and carpooling (dedicated lane on the A48, implementation and development of M'Covoit services) and support for the development of the Business Mobility Plan (PDME) (250 establishments monitored via the M'PRO system). Studies have been launched on the extension of the tram and bus network.

The voluntary deployment of cycling infrastructure as part of the Bicycle Plan adopted by the Metropole in 2021 (34 km of Chronovélo built on 141 km planned in the long term, 32,300 bicycle parking spaces including 2,300 secure) is accompanied by a significant increase in the practice (+44% in 2023 compared to 2019 on the 9 metropolitan meters).

At the same time, partnership approaches are actively continuing around the RER in the Grenoble area.

In addition to the Low Emission Zones (ZFE) deployed across the territory and their support systems (see air quality paragraph), the energy conversion of the vehicle fleet was accompanied by the opening of 3 new NGV stations in Saint Egrève, Meylan and the MIN between 2021 and 2022 and the deployment of charging infrastructure for electric vehicles. A Master Plan for the Development of Electric Vehicles (SDIRVE) was adopted in 2020 and updated in 2023. To date, 133 on-street and P+R charging points have been installed. The deployment of more than 260 new charging points in parking lots is scheduled from January 2024.

Taking into account the environmental impact of vehicles, requested by the Citizens' Climate Convention, has been integrated into the pricing of metropolitan car parks with the adoption of an environmental rate (increase for the heaviest vehicles). Support for the transition of freight transport to decarbonized urban logistics (example: "Colis Activ'" program since 2021, extended until the end of 2025) will be strengthened through the new urban logistics roadmap, deliberated at the end of 2023 after consultation with stakeholders.

In addition, 45 of the 49 municipalities in the area are involved in the "Peaceful Metropole" approach. In addition, the Metropole is continuing its action, in collaboration with the municipalities, to create pedestrian zones, green and de-impermeable public spaces and improve the living environment, within the framework of CVCM projects (13 completed projects and 5 upcoming projects) and the development of "school streets" since 2021.

Finally, the future SMMAG Mobility Plan on the scale of the greater Grenoble region will extend the actions undertaken.

3.5. Waste, circular economy

The extraction of materials, the production of raw materials and the manufacture and transport of the objects and foods that we consume, as well as the collection and incineration of waste in the territory are consumers of energy and emitters of greenhouse gases. To reduce them, an ambitious waste prevention and collection policy is being deployed at the metropolitan and catchment area levels as part of the 2020-2030 Waste Master Plan, which aims to reduce the quantity of waste generated annually by 20%, improve sorting and a final reduction in the weight of the incinerated residual waste bin (gray bin) by 50%.

For 3 years, the collection of food waste has been deployed with a solution offered to all inhabitants of the territory (collection in urban areas and deployment of composting in residential areas). The modernization of major metropolitan facilities has been initiated, with the increase in capacity of the sorting center (+12,000 tonnes), the project of which is shared with the 6 inter-municipalities of South Isère (commissioning 2024), the modernization of the composting center and the creation of its biowaste methanization unit (2024), and the launch of the modernization project of the incineration plant in Athanor (shared project on the scale of South Isère, deadline 2028). Advanced studies for the process show that the improved energy performance of the future plant will allow a slight increase in the heat that can be used on the urban heating network, and above all a tripling of the electricity exported from the site, despite the reduction in incineration capacity of 20,000 T.

At the same time, the action of the Metropole on "throw less, consume better" is being strengthened, in particular through the 3rd Waste Prevention Plan (PLPDMA) adopted in 2022, the "Zero Plastic

Pollution Territory" program of the WWF association alongside 6 other French communities, the deployment of the OuiPub system, the call for projects "waste reduction and circular economy" (€100,000/year since 2021) and awareness-raising actions, in particular through the waste reduction month in 2022 and 2023. The metropolitan circular economy strategy, co-constructed in 2022 with 290 companies, is based on the Pôle R', a platform for the massification of reuse and the circular economy inaugurated in December 2023 and on the establishment of a network of dynamic actors, led by the Metropole.

A particular effort has also been made to strengthen sorting and material recovery, with the modernization of the network of recycling centers (new generation recycling centers: Échirolles and Sassenage commissioned since 2021), the establishment of a network of professional recycling centers and awareness-raising actions on waste sorting.
In 2022, a substantial drop in tonnages is observed for all waste streams: recycling centers, selective collection and residual household waste (gray bin), compared to previous years. On the other hand, the sorting refusal rate remains at 41% in 2022 for a target of 29% by 2030.
The action to improve sorting and drastically change consumption practices towards less waste, undertaken over the last 3 years with the support of behavior change experts, must therefore continue in the coming years by relying on the animation of a particularly dynamic network of circular economy players.

3.6. Agriculture, food, sustainable tourism
Agriculture-food and tourism are sectors of activity that contribute little to GHG emissions in the territory, but their carbon footprint is significant.
With nearly 8,600 hectares of agricultural land operated by 220 professional farms, the agricultural sector is essential to the quality of the metropolitan living environment, but only represents 1% of territorial GHG emissions. Food products, massively imported, represent 18% of the territory's carbon footprint.

To support and promote more sustainable local agriculture across its territory and the transition to a sustainable low-carbon diet (less meat and processed, seasonal and from organic or sustainable agriculture), the Metropole is acting through its land action (monitoring, acquisitions), through its support for installation (25 projects supported including 18 in organic since 2020) and investments in favor of agri-environmental measures (36 projects supported since 2020), by supporting the installation of farmers in organic market gardening on the agricultural land of La Taillat, in Meylan (27ha allocated out of 48), as well as by setting up spaces dedicated to local and sustainable agriculture within the National Interest Market MIN and the modernization of the slaughterhouse. It also addresses these issues in partnership with the Department and consular organizations within the "Pôle Agroalimentaire Isérois" (development of the Ishere brand, work with large and medium-sized retailers) and with the municipalities of the region: training and support for voluntary municipalities to improve their sustainable collective catering practices (Egalim law and food waste), 11 municipalities supported, 40 professionals trained.

The Inter-Territorial Food Project (PAiT) of the greater Grenoble region, certified by the State in 2020 and co-led with 9 partners (local authorities, stakeholders and inhabitants' groups) conducted a prospective study in 2022-2023 to develop a shared vision of a desirable scenario for 2050 for the transition to more sustainable and low-carbon local agriculture and food (less meat and processed,

seasonal and from organic or sustainable agriculture). It has been carrying out joint actions for 4 years, including in particular the annual organization of the food transition month (130 events in 2023).
GHG emissions from the tourism sector at the national level are mainly due to access to the territory and travel during the stay (77%), but also to accommodation (7%), purchases of goods and catering. Professional or leisure tourism, the question of services between the metropole and tourist sites is therefore central, as is tourist attendance with regard to the preservation of habitats favorable to biodiversity. To this end, the Metropole, via the Grenoble Alpes Agency, is promoting green, sustainable and responsible tourism, part of the strategy based on the development of metropolitan natural sites (Domaine de Chamechaude, Bois Français, Prémol, Parc de l'Ile d'Amour, des Vouillants, de l'Ovalie, etc.).

3.7. Preserving resources and biodiversity in a context of climate change, and sequestering carbon
The territory of Grenoble-Alpes Metropole is rich in natural and forested areas (55% of the territory's surface area), and in biodiversity reservoirs (more than 10,000 ha). The forest is the territory's main carbon sink and stores approximately 140 kteqCO2 annually, or the equivalent of 8% of the territory's emissions, but is weakened by rising temperatures. It has abundant and very good quality water resources, which should be preserved.

In order to combat the urbanization of agricultural and natural land (47 ha/year on average between 2005 and 2017), the PLUi makes it possible to reduce artificialization and preserve agricultural and natural land by increasing the areas classified as A or N zones (more than 100 additional ha when the PLUi was approved in 2019). This protection will be reinforced by the new Perimeter for the Protection of Agricultural and Natural Areas (PAEN), currently being set up on the left bank of the Drac and the foothills of the Vercors (over 9 municipalities and 12,000 ha), and future projects currently being defined, as well as by the gradual implementation of the law on Zero Net Artificialization.

Numerous actions to preserve aquatic environments and biodiversity have been carried out since 2020, including: the establishment of a biodiversity observatory and an observatory for monitoring the impact of climate change and anthropogenic pressure on the environments (Orchamps observatory), the restoration of 5,900m² of wetlands, the restoration or creation of 71 ponds, the implementation of the management plan for the regional nature reserves of the Drac Islands and the Haute Jarrie ponds and awareness-raising actions on these sites.

Furthermore, the new forestry and wood industry development strategy, adopted in September 2023, incorporates the challenges of adapting forests to climate change as well as carbon sequestration in forest biomass.

3.8. Mobilization of stakeholders and inhabitants
Faced with the climate emergency, the Climate Air Energy Plan calls for an unprecedented mobilization of all stakeholders and inhabitants in the territory.

To this end, the Metropole has endeavored to pursue partnerships with neighboring territories (SMMAG, SCOT, Positive Energy Territory project, Interterritorial Agricultural Project, structuring projects for shared waste treatment across southern Isère, partnership with the CAPV and the CC Grésivaudan on the Air Wood Bonus, etc.), to sustain the partnership dynamics initiated in the territory during previous climate plans (Annual Climate Plan Partners Forum, partners' website and dedicated

newsletter) and to strengthen the mobilization of municipalities, economic stakeholders, cultural, research and education stakeholders and the mobilization of citizens, through awareness-raising and citizen participation actions.

The title of European Green Capital 2022, which rewarded the climate action undertaken in the territory, was seized as an opportunity to accelerate the mobilization of all stakeholders and inhabitants of the territory. Co-piloted with the city of Grenoble, the Department and the State within the framework of a GIP, it allowed the implementation of 750 events by public and private stakeholders in the territory, the labeling of 350 stakeholder challenges, the dissemination of public awareness documents, the posting of resources for action online. The momentum has continued since then within the framework of the climate plan partnership and the network dynamics in place.

31 municipalities representing 94% of the territory's inhabitants are now signatories to the new charter of commitment of the municipalities and each develop a municipal action plan, with the individual and collective support of ALEC (guides, thematic workshops, resources). 24 municipalities representing 66% of the territory's light points are also committed through a charter for reducing public lighting consumption and light pollution, including 15 municipalities that benefit from the metropolitan public lighting service (€1.8 million of work financed since 2019). A Transition Support Fund for municipalities has been set up to finance their projects contributing to the implementation of the Climate Plan. The first 18 projects were supported in 2023 for an amount of €1.4 million.

The mobilization of economic players has accelerated since 2020 with the establishment of dynamics on several scales: The Local Economic Pact, launched in 2021, brings together 31 of the largest public and private employers in the territory, in a dynamic of solidarity action, targeting transitions in particular. The development in 2022 of the Grenoble Alpes 2030 economic strategy, which aims to reconcile economic development and ecology, mobilized more than 150 economic players. The Alpes route of the Convention des Entreprises pour le Climat, supported by the Metropole, brought together 75 companies in 2023, including 2/3 from the greater Grenoble region. The animation of the circular economy network and the industrial ecology project on the southern industrial park, the organization of the 1st forum for transition professions and a business and environment forum in 2022, the publication of a “businesses and transitions” guide are other examples of mobilization actions undertaken in addition to the personalized support of companies in transitions via thematic mechanisms (MurMur TPE/PME, aid for work by traders and artisans, vehicle air fund, M Pro network, etc.), and support for green and social innovations.

All voluntary socio-economic stakeholders (companies, associations or institutions) are invited to act as relay actors to raise awareness among employees, users and inhabitants of the challenges of the transition and the changes to be made (training of 40 carbon conversation facilitators and 17 Inventons Nos Vies Bas Carbone facilitators, who have raised awareness among more than 500 people to date). A climate plan commitment charter intended for socio-economic stakeholders in the area is currently being finalized.

The mobilization of inhabitants was strengthened in 2021 by setting up “sobriety workshops” and via several voluntary consultation processes, including the consultation on the ZFE, with 1,726 online contributions and 1,250 meetings in public spaces. The citizens' convention for the climate, set up in 2022, mobilized a panel of 100 citizens, led by an independent operational committee during 5

sessions. Its 219 proposals, submitted on October 14, 2022, were examined during an extraordinary Metropolitan Council on April 28, 2023, during which 10 deliberations including new commitments were made. In order to ensure the implementation of the Metropole' commitments, a monitoring committee was set up. In particular, it will contribute to the establishment of citizen debates on the climate that will continue with the citizens' convention in 2024.

At the same time, work has been underway since 2020 within the Metropole with experts in supporting behavioral change and via service design studies to improve the effectiveness of high-stakes technical and financial support systems (wood air bonus, ZFE, MurMur single-family homes). Other tools, such as the "transition barometer" set up in 2022 in partnership with Grenoble Ecole de Management, or evaluation systems, are being used to better target and evaluate the action taken.
The environmental education program for raising awareness among schoolchildren was launched, and a diagnosis of the offer and needs in environmental education was undertaken with environmental education stakeholders in the area, in order to strengthen the system, in accordance with the recommendations of the citizens' convention for the climate, and extend it to secondary schools.
Finally, a social support fund for transitions (FAST) was set up in 2022, in order to support support actions, carried out by associations, donors, CCAS, etc., aimed at the most vulnerable audiences and areas, in connection with climate change issues. 135 projects were supported in 2023 via the annual call for projects or a targeted AMI (in 2023 on support for changes in mobility).

3.9. Exemplary Metropole
Underlined during the consultation prior to the development of the Climate Plan, the exemplary nature of the Metropole is an important dimension in the perspective of engaging the population and all stakeholders in the environmental transition.

As part of the "Exemplary Metropole" axis of the Climate Plan, Grenoble Alpes Metropole has thus committed to building an exemplary administration, reflecting the orientations of the SECAP, both in its policies and in its daily operation.

The Exemplary Administration Plan, co-constructed with the services in 2019/2020, has set out this commitment through an initial 3-year concrete action plan, the vast majority of which have been implemented by the end of 2023.

Among these we can cite:
Energy and sustainable construction:
- Thermal renovation of buildings: rehabilitation of the ice rink in 2020 (reduction of one third of energy consumption), ZA Peupliers, ESAD (in progress) ..., continuation of the exemplary project of renovation/extension of the metropolitan headquarters with the Passivhaus label (-80% of energy consumption and GHGs expected, 100 tonnes of materials redirected towards reuse);
- solarization of metropolitan heritage: deployment of 8 projects on metropolitan heritage (around ten under study),
- optimization of energy consumption on the sites of the Metropole, including the reduction of up to 10% of Aquapole's energy consumption, without degrading the level of decontamination and the implementation of an energy sobriety roadmap with 20% savings on administrative sites between winter 22/23 and winter 21/22,

- continued purchase of green energy: 100% green electricity (guaranteed origin) since 2020, including 6% with high environmental value, and 50% green gas (market currently being renewed with a target of 100%);
- a guide to sustainable construction (currently being finalized)
- the development of a Real Estate and Energy Master Plan (SDIE) in progress to complete the diagnosis and finalize in 2024 a work program to achieve the objectives of the tertiary decree.

Mobility:
- continued optimization and greening of the motorized vehicle fleet, in anticipation of the ZFE, including 40 BOMs with NGV, purchase of electric and NGV buses from SMMAG (difficulty with electric buses not yet operational), purchase of bicycles
- adoption in 2020 and implementation of the Metropolitan Mobility Plan: events, implementation of the sustainable mobility package and increase in employer participation, secure bicycle parking and repair areas, bicycle and carpooling training and workshops, supervision of business travel, support for professional cyclo-mobility

Waste reduction and sorting:
- dematerialization of bodies in 2020 (-1M pages/year),
- gradual elimination of disposables (zero bottles in 2020, zero pods in 2021, zero disposable cups outside distributors in 2022),
- deployment of collection points for centralized waste to replace individual trash cans, battery and compost collection points and donation cabinets.

Sustainable consumption and purchasing:
- adoption in 2022 of a Socially and Ecologically Responsible Purchasing Promotion Scheme (SPASER) and training of agents: 81% of markets with environmental criteria or clauses in 2023 (compared to 57% in 2020),
- a new supplies market with criteria on product sustainability and a limited catalog (69% eco-labeled products),
- new catering markets (zero waste, food transition) and cleaning (eco-labeled products and zero waste practices),
- evolution of practices towards repair and reuse (furniture)
- adoption of an internal eco-event charter.

Digital responibility: participation in the GreenIT network and diagnosis since 2021, extension of the lifespan of IT equipment, IT equipment from reuse (18% in 2023), elimination of individual printers, a new eco-designed website, launch of the development of a responsible digital strategy;

Awareness and training: communication campaigns, promotion of good practices, events, conferences, challenges with 4 annual highlights (Spring festival, May by bike, Sustainable Development week, Waste Reduction week), training: eco-driving, taking into account transition issues in the different professions, and more than 800 agents trained in the climate fresco (100% objective).

Steering: the “climate” assessment of the Metropole budget in 2023 on the 2022 CA, renewed in 2024 and the development of the Greenhouse Gas report relating to the heritage and skills of the community

(currently being finalized) will make it possible to prioritize the actions of the 2nd 2024-2026 action plan of the PAE. “

The Study of Carbon Neutrality Scenarios 2050

To go beyond the set target of -50% reduction in greenhouse gas emissions by 2030, the SECAP of Grenoble-Alpes Metropole has set itself the objective of moving towards carbon neutrality by 2050, and to do this, to identify the "breakthroughs" necessary to achieve this objective. To do this, the "Carbon Neutrality Study 2050" was launched.

In 2022, the first phase of the study focused on a territorial application of ADEME's "Transitions 2050" scenarios on the scale of the metropole. It was also necessary to define, as a first step, objectives consistent with this territorial application, echoing the difficulty of territorializing the notion of carbon neutrality, which is especially meaningful on a global scale. This is why the Metropole wanted to complete the analysis of territorial emissions (SCOPE 1 + 2) with an estimate of imported emissions (SCOPE 3), in order to identify the levers of Grenoble-Alpes Metropole to contribute to this international objective. The 2nd phase of work was undertaken to model 2 combinations of actions making it possible to discriminate, within a stabilized national framework, the main action levers among those available to the Metropole.

The results and learnings of the study can be read in annex 12. It will nourish the discussions of a future revision of the SECAP, in order to amplify the actions carried out by the Metropole in terms of climate change mitigation. In particular, it made it possible to identify key issues to be addressed in the next revisions of the SECAP and the Energy Master Plan and the Mobility Plan:

Revision of SECAP (launch 2024)

- How to further integrate the issue of reducing the carbon footprint, and integrate it into the definition of the territorial emissions reduction strategy?
- Study a territorial carbon neutrality trajectory 2050 with and without industry
- Accelerate the thermal renovation of buildings, in particular the most energy-intensive buildings
- What place for the electric car in the city in 2050? What parking policy, deployment of electric vehicle charging infrastructure compatible with the issue of greening and de-impermeabilizing the city?
- Support behavioral changes, especially dietary behavior
- How to preserve this carbon sink, in the face of the risk of a reduction in the storage capacity of forests induced by climate change?

Revision of Energy Master Plan (launch 2024):

- What impact will the reduction in gas use announced for residential and tertiary sectors have on the gas network? What development scenarios? What capacity will collective housing have to switch from gas to RCU?
- What development of heat networks? What economic balance?
- What support/supervision for the development of heat pumps to limit the negative effects (noise, warming of the city, aesthetics)?

- Accelerate the thermal renovation of buildings, particularly the most energy-intensive buildings

Mobility Plan (SMMAG, in progress)

- What place for the development of electric vehicles in the different areas of the territory

Other:

- Launch of a strategic master plan for parking in buildings

National and European perspective

The metropolitan strategy to achieve carbon neutrality depends on the strategies and regulations that will be defined at the national and European levels (e.g. ban on gas boilers, promotion of heat pumps, etc.). Territorial emissions represent only 30% of the carbon footprint (GHG emitted by the inhabitants of the territory) in 2019. The Scope 1 and 2 accounting of the SECAP masks the significant subjects on the climate footprint (scope 3) of the territory such as food, consumption of goods or extraterritorial mobility. Also, the question of industrial emissions cannot be considered on a territorial scale alone but on a minimal national or even European scale (ecological planning variation).

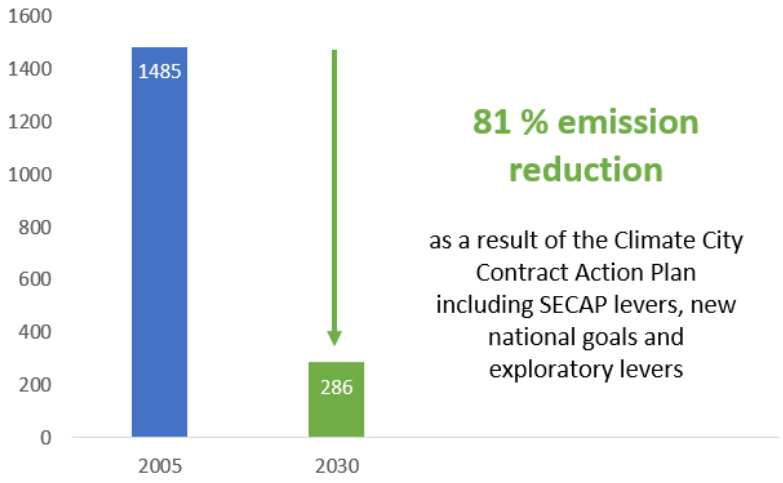
The strategy of the future SECAP must be fully articulated with European policies and national projections for the decarbonization of energy and the use of different energy vectors projected in the future Energy Climate Programming Law and its variations (SNBC and PPE) or ecological planning. In particular, the decarbonization of the national energy mix is crucial to achieving the objective.

2.2.4 Emission gap

To calculate the emission gap, we have used the economic model proposed by NetZeroCities. The model compares the emission reductions as a result of the Action Plan compared to a business as usual (BAU) scenario with no climate action and only taking into account population growth (0.22% in accordance with the local housing plan) and general energy efficiency.

With the Action Plan developed in the Climate City Contract an emission reduction trajectory of 81 % is achieved (scope 1 and 2 on the metropolitan territory, excluding large industry) compared to 2005. This year corresponds to the reference year of the current and preceding SECAPs**.** Including large industry, the emission reduction is 72%. The reference data from 2005 can be found in the Observatory Letter (annex 6) and "Baseline 2005 GHG data" (annex 24).

Figure 8 Emission gap (kt CO2e)



To push the ambitions further and to use the NetZeroCities economic model, for modeling the Action Plan the metropole has used a more recent baseline, 2019, and also include the industrial sector. Using a more recent baseline is important in order to reflect current reality and emission trends that evolve quickly. Also, to include the industry helps shed light on a sector with high emissions but where the metropole has few local levers and depend therefore depend largely on national and European levers and actions put in place. In table 8, Emission Gap, below, both the 2005 and 2019 baseline are shown. All other tables in the Action Plan and Investment plan are based on the recent baseline 2019, unless stated other.

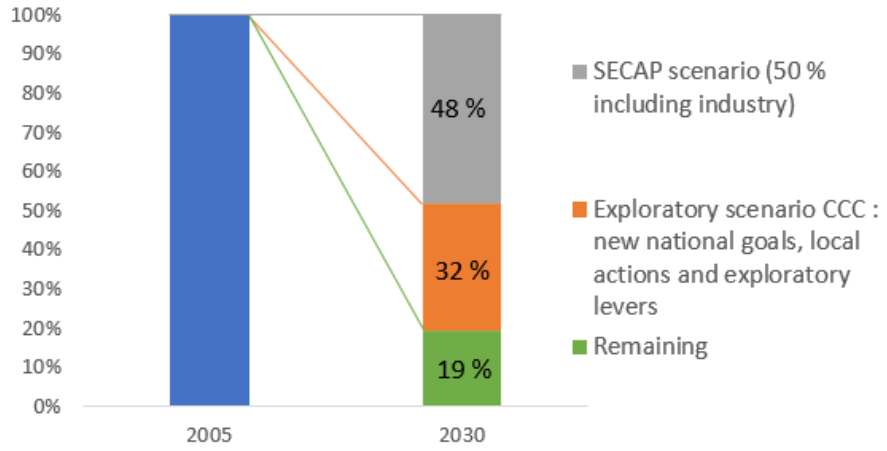
Including the actions of the current SECAP, new national goals and the exploratory levers integrated into the model, a total emission reduction of 81 % compared to 2005 (or 71 % compared to 2019) is achieved excluding the industrial sector, and 72% compared to 2005 (or 58 % compared to 2019) including the industrial sector. This corresponds to 0.62 tCO2e/capita excluding industry or 1.56 tCO2e/capita including industry (calculations can be found in annex 24, Baseline 2005 GHG data). **The emissions gap, the amount necessary to achieve net-zero, is estimated to an absolute value of 87 kt CO2e, or 9% of BAU 2030 (excluding the industrial sector).**

We have chosen to run the model with two sets of levers:

- SECAP scenario : only with the levers of the current SECAP (results presented in *gray italic*)
- Exploratory scenario CCC : the levers of the current SECAP, new local actions already put in place, recent national goals and the exploratory levers developed in the Climate City Contract

The reason for this is to be able to compare the two and evaluate the impact of the current SECAP and what is needed to accelerate. All the economical results presented in the Investment Plan are based on the Climate City Contract Action Plan with the exploratory scenario (combined effort of the SECAP levers, new local goals, new national goals and exploratory levers). Modeling only the current SECAP gives a reduction of about 48 % 2005-2030 excluding large industry (50 % including industry 2005-2030). This corresponds to a reduction of 21 % excluding large industry 2019-2030 (25 % including large industry 2019-2030).

Figure 9 Acceleration of emission reduction (excluding industry, baseline 2005)



The work of developing the Climate City Contract has made it possible to consolidate the lessons learned from the Carbon Neutrality Study (annex 12) carried out in 2023, and to identify the levers for rupture and a trajectory to achieve carbon neutrality (- 80%). The new national objectives and all the actions that can be implemented at the local level will be integrated into the revision of the SECAP, with a mobilization of stakeholders around these objectives. But local experience and the first consultation meetings show that despite the strong commitment of the metropole and its partners, the exploratory levers identified to achieve carbon neutrality, in particular on the decarbonization of heating, cannot be achieved without major changes at the regulatory, economic and organizational level (energy prices, economic models) which fall under national or European regulation.

In addition, the metropole is committed to acting at its level in order to reach the trajectory of carbon neutrality by:

- Activating all the levers under its responsibility and by mobilizing the actors around an ambitious revised roadmap, within the framework of the SECAP revision, aimed at implementing all possible actions at the territorial level;
- Identifying and sharing the obstacles that it cannot remove on its own with cities, the state and the EU, in order to achieve this 2030 carbon neutrality trajectory.

Table 8: Emissions Gap (kt CO2e)[1]											
	Historical emissions (2005)[2]	**Baseline Emissions (BAU 2030)**	**Emissions Reduction Resulting from CCC Action Plan - EMISSION REDUCTION TARGETS (2019-2030)**			**Remaining Emissions**		**Residual Emissions Offsetting [4]**		**Emissions Gap (amount necessary to achieve net-zero)**	
	(Absolute value)	(Absolute value)	*Resulting from SECAP levers only[3]*	Resulting from SECAP levers, national goals and exploratory levers of the CCC AP	(% of BAU 2030)	(Absolute value)	(% of BAU 2030)	(Absolute value)	(% of BAU 2030)	(Absolute value)	(% of BAU 2030)
Transportation		336	*86*	179	53%	156	47%	154	46%	2	1%
Buildings & Heating		450	*76*	447	99%	3	1%	3	1%	0	0%
Electricity		169	*45*	83	49%	86	51%	34	20%	52	31%
Waste		43	*2*	2	5%	41	95%	9	20%	32	75%
Other (incl. IPPU & AFOLU)		713	*215*	285	40%	428	60%	143	20%	285	40%
Subtotal without large industry		998	*209*	711	71%	286	29%	200	20%	87	9%
Total		1711	*424*	997	58%	714	42%	342	20%	372	22%
Subtotal without large industry (2005)[2]	*1485*		*717*	*1199*	***81%***	*286*	***19%***				
Total (2005)[2]	*2526*		*1257*	*1812*	*72%*	*714*	*28%*				

[1] The main data of this table is based on the results of the economic model with the baseline 2019.

[2] The data presented in the yellow cases of this table reflects data with the 2005 baseline. For calculations and details specific to 2005, please refer to the annex 24 "Baseline 2005 GHG data" (source Observatory Letter 2023)

[3] The results in this column are based on running the model with the SECAP scenario, i.e. only the levers of the current SECAP, for comparison.

[4] Residual emissions consist of those emissions which can't be reduced through climate action and are being offset. Residual emissions may amount to a maximum of 20% as stated by the Mission Info Kit.

2.3 Module A-3 Systemic Barriers and Opportunities to 2030 Climate Neutrality

This chapter aims to describe stakeholder systems as well as identify brakes/barriers and levers/opportunities to carbon neutrality. Stakeholders are mapped by system (technological, regulatory, governance, financial and behavioural, according to the NetZeroCities model in Table 9. Then, to identify systemic barriers and levers to carbon neutrality, we gathered the work of different services done as part of the mid-term review of the SECAP in 2023. These brakes and opportunities were sorted and prioritized by system (technological, regulatory, governance, financial and behavioral) and sector (energy, transport, waste, green solutions, built environment, industry and cross-cutting topics).

In conjunction with the GHG inventory (A-1) and current policy analysis (A-2 Current Policies and Strategies Assessment) in the previous two modules of Part A, the analysis presented after the tables serves as a basis for designing actions that address these barriers or exploit underutilized opportunities.

Table 9: Systems & stakeholder mapping

Description of the system	Stakeholders/actors involved	Network	Influence on the city´s climate neutrality ambition	Interest in the city´s climate neutrality ambition
Technology/ infrastructure	- Grenoble Alpes Metropole - Auvergne-Rhône-Alpes Region - Department of Isère - French state - neighboring territories and cities - Public companies (SMMAG, The Heating Company, Grenoble Alpes Water, EDF, etc.) - The Grenoble region urban planning agency - Private companies (Industry, Construction sector, etc.)	Road network, rail network, tram- and bus network, electricity network, digital network, urban heating system, waste management system, water treatment system…	Grenoble Alpes Metropole, SMMAG and its public or private companies influence services (waste, water, urban heating), urban planning and mobility services and therefore the city's carbon emissions. For technological innovation: academia	French state, Department of Isère, Grenoble Alpes Metropole, and its public/private companies globally have a strong interest in developing technological and infrastructural solutions that strive towards climate neutrality, although with a pace that can be considered insufficient. The region has a withdrawn role.

	- Universities, research centers and technological institutes (Grenoble-Alpes University, Grenoble Polytechnic Institute, CEREMA, CSTB Grenoble, INRAE, INRIA, CNRS, CEA, IMT, UGA Foundation)			
Regulatory/ Policy	- EU - French National Parliament - Region (SRADDET) - Departmental Prefect (SCOT) - Metropole (PLUi)	France urbaine France Villes et territoires surables The National City Information Point	Responsible for law and regulations related to emissions	Globally a strong interest in working towards climate neutrality
Governance/ Organizational	- Grenoble Alpes Metropole - SMMAG - Auvergne-Rhône-Alpes Region - Department of Isère - neighboring territories and cities - EU - French state - Ministry of Ecological Transition - Ministry for Territorial Cohesion and Relations with Local Government -Ministry of Agriculture and Food - Ministry of Higher Education, Research and Innovation -Ministry of Agriculture and Food	- ADEME Agency for Ecological Transition - The National Agency for Territorial Cohesion - The European Commission through the Mission Platform - NZC - European Platform of Cities for Climate Neutrality - Groupe Miroir, French cities participating in the “100 climate neutral and smart cities” - COPIL Climate Plan Grenoble Alpes Metropole	Sets up goals and targets by international policy frameworks Some driving forces (EU, Grenoble Alpes Metropole, French state) Collaboration and cooperation between cities, state and EU-level	Varying interest depending on the entity. EU, French state, Grenoble Alpes Metropole have a strong interest in governing the path towards climate neutrality. The region has a withdrawn role.
Financial	- EU - French state - Auvergne-Rhone-Alpes Region - Department of Isère - Grenoble Alpes Metropole - Companies, SMEs, Cooperatives - Banks and financial institutions	The European Cities Mission program Horizon Europe European Bank of Investments	Allows the implementation of actions for climate neutrality through different financing solutions.	Varying interest depending on the entity. EU, French state, Grenoble Alpes Metropole, some specific banks and financial institutions have a strong interest in financing climate neutral

	- Municipalities of the metropole - Citizens			projects. The region has a withdrawn role which limits the metropole's access to "Structural Funds"
Behavior	- Grenoble Alpes Metropole - SMMAG - Companies, Cooperatives, Start-ups - Academia: universities, research centers: Grenoble Management School - Media - Associations, Partnerships, Foundations -Citizens and Civil Society	- Chair of Territories in Transition - Scientific Council on Climate and Transitions - Citizens' Convention for the Climate - PACT - CEC ALPES - Partners of Partner Charter - Local Economic Pact - Clim'air Project	Driving force for changing behavior and practices of all users of the city through awareness making, mobilization, education, learning, testing, research, innovation, transforming economical models etc.	

Table 10: Barriers					
	Systems				
Sectors	Technology/infrastructure	Regulatory/ Policy	Governance/ Organizational	Financial	Behavior
Energy systems	Geographical configuration with low renewable energy potential (non-existent wind potential, hydroelectricity already developed, programmed reduction in the quantity of waste (prevention and recycling), very little livestock farming and agriculture. Balance to be found in the use of biomass for wood energy and preservation of forest.	No police to enforce the classification of district heat networks, which is an obligation of connection for buildings located within the perimeter of the heat network unless there is an exemption (the Metropole is not competent to enforce this obligation)	Expansion of heating network : Search for short term profitability and lack of commercial dynamism by the concessionaire are barriers for extension and densification of the heating network Difficulty in obtaining data on the purchase of green	The district heating network is not competitive compared to gas. (except 2022)/ with the consequence of low profitability of network extensions below a significant number of connectable housings. 2 fatal heat recovery project suspended	Decision-making inertia in condominiums, individual housing and businesses concerning changes in heating systems towards renewable energies.

	Renewable heat projects Technical complexity of projects on existing buildings (solar thermal, geothermal, wood with need for space for storage Technical difficulty to replace individual gas boilers by heat network in collective housings (80% of housing). Difficulty in finding land (particularly for heating network boiler rooms) Photovoltaic solar: structural: and insurance problems (capacity of building structure to support the weight; phasing with work programs (waterproofing and insulation of roofs)	Possible exemptions if much cheaper solution Solar panels: land and urban planning constraints	energy for monitoring the consumption of green energy on the territory (requests to national state services)	because to low financial profitability Thermal solar panels, photovoltaic and micro-hydropower development projects still not attractive enough in actual economic conditions	
Mobility & transport	A large territory and partly in the mountains, difficult to cover with efficient and sustainable public transport and difficult to access by bike and on foot. Physical or land constraints (crossing rivers, highway, railtrain,…) delaying the rapid deployment of certain dedicated cycle paths and increase their cost	Rail network maintenance, modernization and development insufficient nationwide. Air Vehicle Fund ZFE Light and Heavy Goods Vehicles: conversion bonus, blockage linked to the scrapping obligation	Multiple decision-makers involved in mobility: SMMAG for urban transport, bicycle and car-sharing services, multimodal exchange hubs; Metropole: cycle lanes and parking, parking structures, Region: intercity bus and regional train services, State: rail	High investment and maintenance costs for the railways. Under-investment for over 20 years by the State (SNCF réseau) in financing the maintenance and development of rail infrastructure and a lack/ageing of rolling stock (Region).	The culture of the car, which has long been a symbol of freedom, progress and social status. Difficulty changing behavior, particularly regarding abandoning the car as a mode of transport.

	Recurring malfunctions on intercity rail lines around Grenoble and with Lyon and Paris (old trains and network). Motorization of commercial vehicles and trucks : few alternatives in view of the ban on Crit'Air 2 vehicles scheduled for 2025. Adapted vehicle electric models with new engines (NGV, electric) are not always present on the market, particularly for heavy machinery and vehicles, if so they are still very expensive and with little autonomy in mountain Abandonment by many manufacturers of gas vehicle models, to adapt to the requirements of the European Union favoring electric.	Automated control-sanction for non-compliance with ZFE: delays in obtaining regulatory approval to implement the system at national level. Regulatory limit on the number of automated speed cameras allowed (1 per 42 km) Lack of regulatory framework for congestion charging	infrastructure, communes: road parking.	Lack of a sustainable economic model for public transport services. High cost of deploying dedicated cycle lanes on major roads, involving the redevelopment of public space, and numerous crossings. High acquisition costs of private and professional electric cars	Numerous parking lots still installed by employers. Very little impact of local communication tools Car-sharing: many more offers from drivers than from passengers, the social norm of car-sharing has yet to be developed..
Waste & circular economy	Very limited levers for reducing the amount of waste and especially plastic waste, generated by consumerism, over-packaging and programmed obsolescence. Difficulty in finding recyclers for certain types of waste (plastic. Wood waste,...) Recycling is technically very difficult for certain sectors (example: electrical, electronic).	There is no possibility in France of imposing fines for poor sorting (unlike in other countries)	80% of housing on the scale of the metropole is collective. Numerous intermediaries between the resident and the waste collector, rendering ineffective the refusal of poorly sorted garbage cans, or the Household Waste Collection Tax incentive (TEOMi), [tested on 36,000 inhabitants but the result is not conclusive		Difficulty in getting people to change their behavior and adopt the right sorting habits. Still high rate of sorting refusals : Difficulty in changing social norms to reduce waste at source, fight against food waste, change consumption practices : repair and reuse, make things last

	Lack of space in some apartment blocks/neighborhoods for waste sorting.		in collective housing due to the impossibility of individualizing the tax.]		longer, buy second-hand, rather than throwing away and buying new Very little impact of local communication tools.
Green infrastructure & nature-based solutions	Lack of space in urban areas for vegetation, competition between different uses of space (cycle, walk, car (road and parking), housing, vegetation,…) Greening and waterproofing projects still too small, a change in the scale of the projects is necessary in view of the adaptation challenge (e.g. in 10 years). Sequestration : Increased dieback and fire risk in the context of global warming Fragmentation of private forests is an obstacle to the structuring of a collective vision	PLUI regulations apply only to new projects or major renovations: No obligation for vegetation and waterproofing on existing buildings Balance to be found between carbon sequestration in the soil and on the standing ground and exploitation of the forest	The Metropole can only intervene in public spaces and assets / many stakeholders to mobilize Issues of maintenance of green spaces are the responsibility of the municipalities	Greening brings additional costs to projects Impermeable areas (e.g.parking lots) are more fragile, and therefore more difficult and costly to maintain: and this is the responsibility of the municipalities. Financial brake concerning protection projects to be carried out in private forests	Complexity of mobilizing stakeholders, particularly the log wood sector (very high demand which does not encourage commitment to more virtuous approaches) Greening spaces require changes in design and management practices meaning a new culture and new skills for public space planning professionals, and Acceptance of risk and collective responsibility for overflows in the event of extreme weather events (e.g. flooding of private properties, cellars).

Built environment	Thermal renovation: Not enough manpower (facade workers, waterproofers, etc.), and qualified professionals to meet the demand for renovation works. Need to strengthen the renovation sector and support skills development., (subject treated in the upcoming Call Enabling City Transformation) For companies, with MurMur TPE PME, the average time observed is significant (from 1 to 2 years) between entry into the system and the actual completion of the work. New construction: Lack of knowledge in the use of decarbonized materials (bio-sourced, geo-sourced, reused or recycled)	No controls associated with the implementation of the tertiary decree.	Multiplicity and regular evolution of schemes and interlocutors, which doesn't make it easy for the owner to understand. MurMur, has been constantly adapted, with a strong challenge of coordination and readability with State systems.	Effect of inflation which weighs heavily: increase in costs, and limit access to credits. Lack of self-financing and/or access to credit/debt capacity for households or public players. No economic profitability for renovation of private tertiary sector / no impact on rental prices. Lack of new economic models for building with biomaterials and renovating rather than building new.	Decision-making slowed by uncertainties: COVID, changes in prices and systems, despite an acceleration in 2022 (rise in energy prices) and after a strong recovery linked to the energy crisis, an inflation effect. Sobriety: Support for behavior change is difficult to mass and is closely linked to the energy context. Very little impact of local communication tools compared to National communication (which was a key factor in the success of the 2022 sobriety plan.) Risk of rebound effect following renovations, (increase in interior temperature)

Industry	Several industries with a large impact in terms of direct carbon emissions (cement, chemicals)	No local leverage / National/European regulations and tax mechanisms to be strengthened	Grenoble's "big industrialists" are small global players > international headquarters. Difficulties in reaching major transmitters despite numerous projects (local eco pact, economic strategy, partner charter, etc.) Desire to boost the local economy and welcome new industries, especially from local transition startups, without increasing emissions	Economic difficulties for the industrial sector in the agglomeration / no incentive to make long-term investments	
Transversal subjects	Lack of land Urban/rural territory, very diverse urbanization (barrier to mobility, heat networks, etc.)	Supportive policy at EU/Member State to be strengthened length and complexity of regulatory procedures	The monitoring and reporting tools of the various partners are not completely convergent (100 climate-neutral cities/covenant of mayors, TETE-CAE/EMT EEA reference framework) and the periods covered are rarely superimposable (climate plan 2020-2026	Lack of financial resources for communities in a context of inflation, recession, etc.?	Difficulty to change Social norms and behavior with contradictory injunctions between an ecological discourse but an ever-present consumerist society (need to change benchmarks, uses, for example, on car).

			then 2026-2032, COT 2022-2026, Citergie 2020-2024 then TETE-CAE 2024-2028, Climate City Contract 2024-2030, etc.). These juxtapositions of plans and programs considerably complicate the reporting of the Metropole' climate policy, to the detriment of the conduct of operational projects.		Sobriety: Support for behavior change is difficult to mass and is closely linked to the energy context. Very little impact of local communication tools compared to National communication (which was a key factor in the success of the 2022 sobriety plan.)

Table 11: Opportunities and unexploited resources					
System	Technology/infrastructure (technological/infrastructural)	Regulatory/ Policy	Governance/ Organizational	Financial (financial)	Behavior
Energy systems	Development of peripheral district heating networks: Continue feasibility studies for the construction of new heat networks in its territory and put 6 new heat networks into service by 2030. Possibilities to increase usage of the fatal heat produced by the industrial sector in the district heating network	Facilitate the installation of PV solar panels (PLUi relaxation and discussions with the Architecte des batiments de France)) The development of heat pumps must be supported to avoid the associated risks (noise, urban landscape, neighbourhood conflicts, reinforcement of heat islands)	Launch of the update of the Energy Master Plan (EMP) to study heat and gaz network-évolution scenarios / in progress- Deliberation of the Metropolitan Cold Strategy in early 2024 Facilitating energy production by citizen communities Bringing together nearby project developers to build economically profitable projects. Work with stakeholders to leverage obstacles to the extension/densification of the main network Monitoring the consumption of green energy on the territory (data requested to national state services)	Experimenting with direct renewable energy purchase contracts in compliance with public procurement rules Review the RCU pricing model to make it more incentive-based	Communicate more on the advantages of RCU (energy independence, price stability, green energy) Increased use of certified green energy purchasing practices by internal and public-sector players

Mobility & transport	Active modes: Continued development of Chronovélo routes: 8 routes and 141 km ultimately Expansion of carpooling: offer Reliability and modernisation of interurban and Lyon train lines (RER project) Electrification of buses Alternative energy charging infrastructure: Upcoming opening of the Pont de Claix 2024 (GEG) and Eybens (2024) GNV stations	Strengthening policies favourable to the development of the train at European and French level Strengthening the European and national framework for the decarbonisation of freight transport Implementation of the next stages of the 2 low-emission zones, Controls for ZFE Reduction of parking spaces by employers and businesses National ; include vehicle weight in the definition of vignettes for entry into low-emission zones (proposed by the citizens' convention)	Revision of the PDM on the scale of the greater Grenoble region and the PCAEM. Consolidation of SMMAG's perimeter as AOM for 3 neighboring communities (in progress) Delegation by the Region to SMMAG of intercity express bus routes on its territory (achieved in September) Urban logistics: implementing the roadmap with logistics players, Drawing up a master plan for underground parking lots Complete, shared parking observatory	At national level, Establishment of new financial or fiscal resources / a viable economic model for public transport services Finding new external financing for significant investment Vehicle fleets of public and private companies: reducing vehicle fleets while greening them Extension of the pay-per-use parking. Call for expressions of interest for the deployment of IRVEs by private players (programmed)	Business travel plan, management of nearby bicycle parking. Exemplarity of the Metropolis and other public players Work with expert researchers in behavior change and service design At a national level, promotion of sobriety in transport, including lighter vehicles

		Experience regulatory framework for congestion charging			
Waste & circular economy	Increase in the capacity of the sorting center (completed in 2024) modernization of the waste incinerator (Athanor) with new technologies (optimized heat production and cogeneration) Better knowledge of the GHG impact will make it possible to prioritize action and investments. Optimization of tours in relation to collection frequency, Elimination of downgraded tours: and continued replacement of refuse collection vehicles with CNG engines planned Adaptation of existing waste disposal sites for the establishment of new sectors with extended producer responsibility (EPR) New REP (collection at the top of the waste quay): games, toys, gardening, sports and leisure items (REP building not concerned) Flow study: cardboard (2024), electronic WEEE (2024), plastic (2025), industrial spare parts (2024-	New extended producer responsibility for construction waste Refusal of collection: refuse the yellow bin if incorrect sorting (alert sticker then refusal). Food waste collection rollout continues	continue to promote the waste prevention plan and the zero-plastic roadmap Deployment in 2024 of a collection strategy and action plan for the textile industry Promoting Ressourcerie and relay national initiatives (eco-organization, REP). Construction materials flow: upcoming construction roadmap Development of the ESS players network REP sport: partnership with sports and leisure structures		Strengthen support for waste sorting in order to reduce sorting refusals (36%) Raise awareness of more sustainable consumption, reuse, reparation, zero waste : new animations/events – planned-, communication Bring together all the players in the area (e.g. second-hand shops, sports recycling centres) and make them known to local residents (transition guide).

	2025). This depends on the mobilization of the actors.				
Industry	Industrial and territorial ecology (EIT) roadmap currently being developed. Relying on the southern industrial park for the various sectors, in particular the hydrogen sector New innovations for transitions, driven by the region's research and innovation ecosystem and start-ups	Strengthening of the European Emissions Trading System Local implementation of national ecological planning with major industries	climate plan review: a working group on major industries to be integrated into the local eco pact define a strategy for attracting new industries that is compatible with achieving carbon neutrality		
Green infrastructure & nature-based solutions	Continue the planting and desilting initiatives launched as part of the canopy plan and the training of the city's services concerned Implementation of tools for measuring and monitoring artificialization (AURG – MOS) Improving knowledge of forest carbon storage. A major challenge is maintaining the wooded state in a context of climate change, which calls for more in-depth work on the evolution of stands Soil decontamination	Evolution of the PLUI : creation of a Bioclimatic OAP Reduction of land consumption and implementation of ZAN Protection of large trees in the PLUi Implement the forest framework deliberation on the wood industry Ensure the development of low-carbon constructions with the inclusion of strong regulatory requirements in the PLUi (amendment 3 PLUI) in anticipation of,	Opportunity and feasibility study of a carbon cooperative	Find new economic models for projects, incluing greening and desilting costs	raise awareness among private-sector players of the challenges of revegetation and desilting, publicize successful examples Work with design offices, the construction federation and companies that operate in public spaces to encourage changes in practices et raise skills for greening and desilting.

		the regulatory thresholds of RE2020. New agricultural and environmental protection zones (PAEN) being studied for 12,000 ha, to be implemented			
Built environment	Strengthening the renovation industry and supporting the improvement of professionals' skills ('Enabling City transformation' call on the theme 'Professions to enable climate transition') Partnership with Ecowatt and Voltalis to work on shifting electricity consumption (sobriety) and mitigating peaks Promote the use of bio-sourced and decarbonized materials, / publish an educational document for project owners Test the reuse of existing premises, (studyi in 2023 - 2024 the feasibility of an experiment on two weakened co-ownerships of the Olympic Village in Grenoble) Decarbonize heating and air conditioning systems, in particular by continuing the development of	The strengthening of energy performance obligations in the amendment 3 of the PLUI (in progress) Accelerate the development of low-carbon construction, the rehabilitation of existing buildings (amendment 3 PLUI, PLH) Adaptation of the MurMur device for better articulation with the new France Rénov' system (2024) Exploratory : Study the avenues for developing a public energy service (similar to the public electricity service, instead of an individual choice of heat device)	New Local housing plan 2025-2030 soon to be adopted Work on a "sustainable building" roadmap with the construction and public works stakeholders Simplifying the aid application process / convergence between the metropolitan and State device/ support by the metropole for the management of the State aid system (ANAH) to strengthen the links with its own renovation platform MurMur (planned) Awareness-raising actions on the tertiary decree and on the challenges of	Prioritize support for the most energy-intensive homes (new PLH 2025-2030) Work with banks to facilitate access to renovation loans Experiment with new economic models for the renovation of housing/buildings such as the implementation of third-party investors, intracting Promote the use of bio-based and carbon-free materials, through subsidies for Murmur aid (existing on housing, to be generalised)	Continue the work undertaken by relying on experts in behavior change and service design Continuation of Métroénergies and development of collective sobriety support in co-ownership and social housing Communicate on renovation needs to adapt to high temperatures New national communication campaigns on sobriety and the need for building renovation Continuation of action taken on public lighting and awareness-raising among private stakeholders for the

	metropolitan heat networks and by continuing to support the use of renewable thermal energy on existing buildings		renovating private office tertiary real estate.	Study with stakeholders new economic models to rebuild the city on the city and renovate/reorient existing buildings instead of building new ones, (national and European calls for projects)	application of lightning regulations (signs, windows, etc.) The challenge is to invent solutions with stakeholders, in order to work as much on the intrinsic obstacles and motivations (specific to each) as on the systemic obstacles and motivations (for the entire chain and its physical, legal, institutional environment, etc.)
Transversal subjects	Mass action for energy sobriety and efficiency and energy decarbonization/Multiplying projects Technical and social innovations	Strengthening and Convergence of Climate Objectives and Priorities of Decision-Makers at Different Scales Allow the experimentation of new devices that are not currently provided for by regulation Facilitate the implementation of control mechanisms, or even fines for the	Better coordination of the different levels of governance Simplification of the distribution of the roles of the various public actors Mobilization of stakeholders for the revision of the climate plan	Estimation of the financing needs for the decarbonization of the territory in the context of the revision of the climate plan Empowerment of private actors	National communication campaigns

		implementation of regulations Finalisation of revision of the National regulatory framework (Low-Carbon Strategy (SNBC-3 and PPE 3, National Adaptation Plan) National implementation of the European directives of the Fit for 55 climate package			

Sector analysis based on identified obstacles and opportunities

Energy systems: The obstacles are the lack of available land, in the constrained geographical context of the metropole, but also structural, insurance and regulatory constraints to develop renewable energy production facilities on existing buildings, and above all an unfavourable economic context (gas prices, project costs, inflation). The greening of the heating network is well underway, but the classification of the main network is not enough to create a strong dynamic of densification/extension of the network. The creation of secondary networks, and projects to connect waste heat, are facing problems wioth access to land and the difficulty of reaching financial profitability thresholds. The energy master plan currently being revised should make it possible to study the levers for accelerating the development of the heating network and a sustainable gradual withdrawal from the local gas network. The development of heat pumps must be supported to avoid the associated risks (noise, urban landscape, neighborhood conflicts, reinforcement of heat islands). Better monitoring of renewable energy consumption depends on the recovery of data from green energy purchases subject to the agreement of the national services

Mobility & transport: The topographical situation of the metropole is both a barrier and an asset. In the plains, in the center of the agglomeration, the topography is very favorable to active mobility and especially to cycling, while in small mountain villages, with spread-out urbanization, the topography becomes a significant obstacle to the development of low-carbon mobility (sustainable public transport and easy access by bike/walking). The lack of an economic model for urban public transport services, which have been weakened after the COVID period, the cost of renewing tram rails and trams and the cost of equipment – after an initial acquisition of electric buses that were ultimately non-operational – are current obstacles to the massive electrification of buses and the deployment of new investments
The increase in project costs could slow down the deployment of high-performance cycle path projects: reflection on less expensive projects and the search for additional external funding are explored to maintain the pace of deployment. The interurban rail transport lines are in need of upgrading and the networks and trains should be made more reliable and modernised by 2040, but the projects are particularly expensive and depend on the State (SNCF network) and the Region, which also call for substantial local funding. The other major obstacle is related to changes in habits and practices in terms of mobile and the difficulty of inventing a social norm different from car culture. Even if the metropolis and the SMMAG are working on this subject through support for mobility change in parallel with the implementation of the LEZ, this development cannot be achieved at the local level alone, and must be undertaken at the French or even European level.

Waste & circular economy: major projects to modernize equipment have been completed or are underway (sorting, incineration, collection centers, waste collection centers), now the main obstacles in this area are linked to the difficulties of changing practices to improve waste sorting and above all to reduce the production of waste at source, particularly plastic waste. Actions to raise awareness among residents will be continued and accentuated to promote reuse, repair, fight against food waste and plastic packaging, but local action remains ineffective in a context of society largely dominated by the consumer society. The metropolis acts by structuring the territory's stakeholders around the cluster and the circular economy network. In this respect, national regulations (circular economy law) allow for real change and must continue to be strengthened.

Green infrastructure & nature-based solutions: On this aspect, obstacles are identified in all the systems analyzed (technological, regulatory, financial, etc.). The revegetation and de-waterproofing of public spaces must be accelerated to meet the challenge of adapting the territory to climate change.

But, despite a declared political will, they are still perceived as additional costs for urban projects and the maintenance of public space and the projects do not reach the necessary scale. It suppose a strong evolution of practices of all stakeholders. A major training and change support project for the technical services of the Metropolis and the municipalities has been initiated and will have to be generalized to the other actors. Another major challenge is the fight against land “artifialisation” (soil destruction, construction on agricultural land etc), through the Local Urban Plan and the ZAN law, and the implementation of strong protection mechanisms for strategic agricultural and natural areas. Another major challenge is the maintenance of sequestration in forests in a context of climate change, which requires improving knowledge on forest carbon storage and finding a balance between forest preservation and strengthening the wood energy and wood construction sectors.

Built environment: Despite the technical and financial support mechanisms in place for many years in the territory (Murmur), the pace of housing renovation is insufficient and is particularly hampered by the difficulty of decision-making in co-owned apartment buildings (80% of housing units). After an acceleration during the energy crisis, the recent increase in material prices and interest rates, as well as the regular changes in financing aid, have been additional obstacles to investment by households and other players. The territory will have to reinforce renovation, by simplifying the processes (support by the metropole for the management of the State aid system (ANAH) to strengthen the links with its own renovation platform MurMur, support from an expert in behavior change) and facilitate access to loans and experiment with a third-party investment system. The renovation of the most energy consuming housing classes will be prioritized
A significant effort must be made on the renovation of public and private tertiary sectors. The scaling up of the renovation of the public tertiary sector is hitting the limits of their investment capacity and that of the private tertiary sector is struggling in the absence of a fruitful economic model (no impact on the rental price or small reduction in energy costs)
Another important aspect in this sector is linked to the lack of qualified professionals working with building retrofitting, which is currently insufficient to meet the demand: a partnership is being set up with the building and public works sector to act quickly on this issue (the Metropole is developing a proposition based on this subject for the ongoing Mission Call Enabling City Transformation). It is also an objectif to work with the sector to build in a less emitting way (biosourced/decarbonized materials) and also built new economic models to rebuild the city on the city and renovate/reorient existing buildings instead of building new ones.

Industry: Major decarbonization efforts have been made in the industrial sector, but emissions remain important. A few industries in the chemical and cement sectors are established in the region and these players have a major impact in terms of energy consumption and direct greenhouse gas emissions. Today, the industrial sector is weakened and changing in Grenoble, which makes it difficult to mobilize companies and invest in virtuous projects. These players are all the more difficult to reach since on a global scale they are small local branches, attached to large international groups, with little local autonomy. At the same time, the metropole's competence is limited, despite numerous projects to mobilize economic stakeholders (Local Economic Pact, Economic Strategy, Climate Plan Partner Charter, CEC Alpes, etc.), the metropole has no direct leverage over these players and as a result we are dependent on French and European regulations. The metropole's desire is to develop industry in the region while aiming for carbon neutrality major emitters remain difficult to reach. The implementation of ecological planning will be an opportunity to work on the subject with the State services in the territory

Cross-sectional analysis of financial, regulatory and governance systems

France is characterized by shared governance between local authorities (metropole and municipalities), the State and the Regions, and Departement, which define frameworks for action and co-finance local policies. Despite very strong local voluntarism, frequent changes and lack of convergence in financial, fiscal and regulatory frameworks do not facilitate long-term planning and sustainable changes in the behavior of stakeholders, production and consumption habits.

At the political level, the recent disinvestment of the Auvergne-Rhône-Alpes region in financing climate policies is weakening local policies.

The financial organization of local authorities is based on declining state grants, limited own tax resources and subsidies. Support through project subsidies is taking a predominant place and makes operators dependent on one-off support, while the climate challenge will require long-term visibility, particularly on large-scale projects. The logic of calls for projects, more targeted on innovation than on supporting the deployment of policies and multiplication of projects, has too little leverage for our local authorities. Finally, support for engineering and animation is far too weak in relation to needs.

At the regulatory level, two major risks affect our policies. First of all, national regulations and their developments experience inertia and sometimes long time frames (transition from political decision to implementation) and the right to experimentation is also regulated. These elements are limiting factors for developing agile and ambitious policies. Some devices successfully deployed in other European countries are not available.

In France, organizations are well structured at the operational level as well as in the legal and financial functions. In addition to the direct action of the municipalities and the Metropole, we have operators (public companies, mixed companies) and support organizations (urban planning agency) that allow us to develop our analyses and actions. However, there are still difficulties in the ability to deploy public policies at the right speed due to a lack of the necessary human and financial resources.

The 2014 Law creating the metropoles has established a favorable framework for addressing climate issues on a more relevant scale than previously. While the organizational effort (integration of new competences, transfers of personnel) is complete, the Metropole still needs to strengthen its workforce to boost these strategic policies such as the thermal renovation of buildings (adaptation of the renovation sector). In addition, the different levels (UE, State, regional, local) must coordinate to strengthen and converge their respective actions. This requires reaching agreements and is therefore dependent on each party's willingness to collaborate, with weaknesses linked to political positions.

The social issue is fundamental to ensure that the climate transition does not lead to greater inequality. For Grenoble-Alpes Metropole, it is an essential consideration in the implementation of its policies, addressed through actions to combat energy insecurity, promote access to public transport through solidarity pricing, etc. In this regard, cooperation between the Metropole, the municipalities and the Department (in charge of social action) to limit negative impacts is essential and must be strengthened. The analysis and consideration of the social impacts of climate action (e.g. on restrictions on access to thermal vehicles) will be addressed in the climate plan revision.

Located at the crossroads of several alpine valleys, the territory is affected by pronounced warming, heatwaves and increasing natural risks. This changes the paradigm of public intervention with, for example, the exponential growth of air conditioning and its impacts on energy consumption or

aspirations to live outside the urban area that have increased with the pandemic. Forests (55% of the territory), essential for carbon sequestration, are weakened by climate change (warming and extreme episodes) and the emergence of diseases.

3 Part B – Pathways towards Climate Neutrality by 2030

Part B represents the core of the Climate City Contract Action Plan, comprising of the most essential elements: scenarios, strategic objectives, impacts, action portfolios and indicators for monitoring, evaluation, and learning.

3.1 Module B-1 Climate Neutrality Scenarios and Impact Pathways

Module B-1 "Climate Neutrality Scenarios and Impact Pathways" presents a diagram of direct impacts of the Action Plan and a table of impact pathways (early and late outcomes and direct and indirect impacts (co-benefits) – clustered by fields of action). We then describe the impact pathways in text, summarizing their relationship with key priorities and strategic interventions and with the analysis developed in Part A.

Figure 10: Direct impacts of the CCC Action Plan scenario (emission reductions in kt CO2e year 2030)

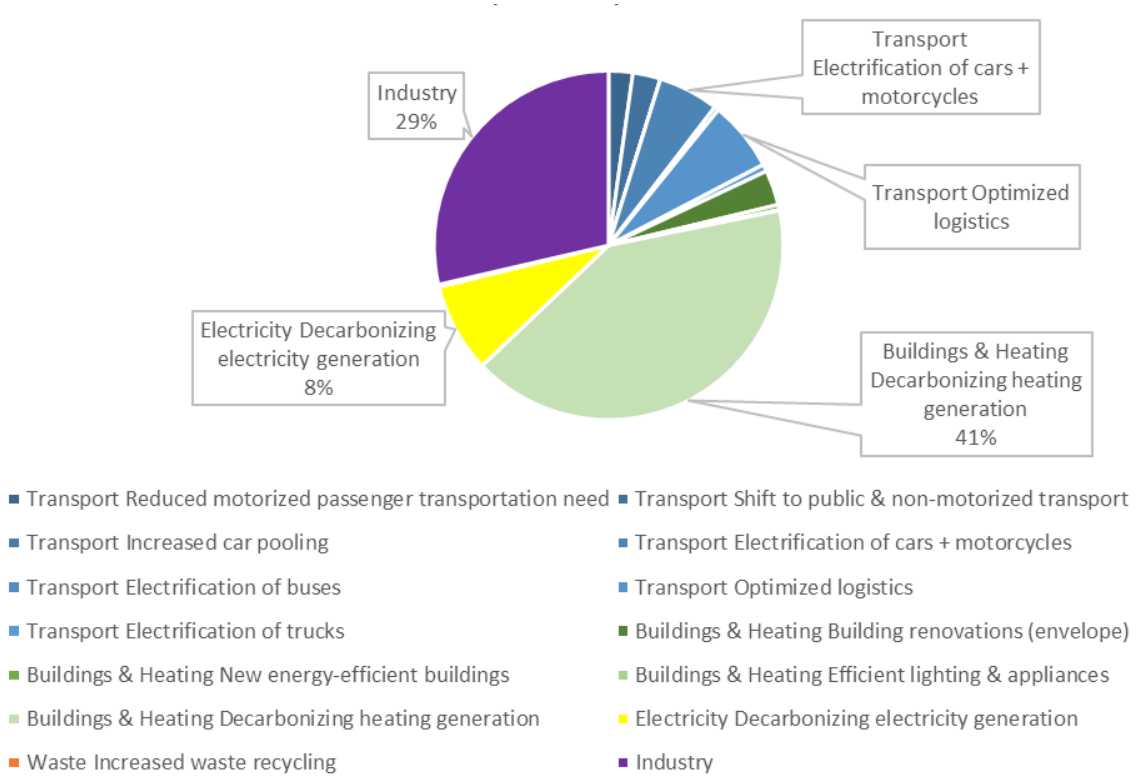


Table 12: Impact Pathways					
Sector	**Subsector**	**Early Changes (1-2 Years)**	**Late Outcomes (3-4 years)**	**Direct Impacts (Year 2030 Emission Reductions - kt CO2e)**	**Indirect Impacts (Co-benefits)**
Transport	*Reduced motorized passenger transportation need*	Start of diesel phase-out for buses (purchase of 24 NGV buses) Continued optimization of public transport system (BHNS / extension of line D- in progress) Limitation of road traffic: - Deployment of school streets - Deployment Bicycle Plan (Chronovélos) Integration of Pays Voironnais into SMMAG Deployment of constraints on parking Approval of new SECAP	Approval of new Mobility Plan Construction of bridges and tunnels for bicycles Major boulevards redesigned for more active mobility Reduction of car traffic Optimization of interurban public transport networks Deployment of constraints on employer parking (MPro) Improved accessibility to public transport Reduced parking spaces in commercial areas	22	Reduced air pollution Improved health Free up public space for active mobility and greening Improved quality of life Reduced congestion, better accessibility Reduced noise Improved physical activity and the health of citizens Reduced road accidents More livable neighborhoods
	Shift to public & non-motorized transport			26	Reduced air pollution Improved health Free up public space for active mobility and greening Improved quality of life Reduced congestion, better accessibility Reduced noise Improved physical activity and the health of citizens Reduced road accidents More livable neighborhoods
	Increased car pooling			0	
	Electrification of cars + motorcycles	Reduction of fossil car use thanks to the implementation of Low emission zone and charging stations	New goal on electrification in the new Mobility Plan, new actions	56	Reduced air pollution Improved health Reduced noise

					More livable neighborhoods
	Electrification of buses	Continued gradual replacement by electricity and bioNGV	Implementation of electric trolley buses	4	Reduced air pollution Improved health Reduced noise More livable neighborhoods
	Optimized logistics	Deployment of Action plan for sustainable urban logistics	Deployment of Action plan for sustainable urban logistics	65	Reduced air pollution Improved health Reduced noise
	Electrification of trucks	Continued deployment of LEZ for light and heavy vehicles	Continued deployment of LEZ for light and heavy vehicles Improved offer of electric light and heavy vehicles	7	Reduced air pollution Improved health Reduced noise
Buildings and Heating	*Building renovations (envelope)*	Approval of new PLH at the end of 2024: reinforced housing renovation objectives Continuation of MurMur and adaptation to MaPrimeRenov, ANAH Acceleration of building retrofitting,	Continuous retrofitting of energy classes E, F and G in social housing Accelerated retrofitting in apartment buildings, houses and tertiary buildings	32	Reduced air pollution Improved health Improved indoor comfort
	New energy-efficient buildings	Implementation of bioclimatic PLUi, RE2020 objective	Metropolitan headquarters Forum finished with PassivHaus label	5	Reduced air pollution Improved health Improved indoor comfort
	Efficient lighting & appliances	General evolution towards energy efficient appliances Deployment of LED lighting		1	Reduced air pollution Improved health

	Decarbonizing heating generation	New peripheral district heating network built or started Approval of new Energy Master Plan, with prospective scenarios for densification/extension, abolition of gas network, development of heat pumps, study of socio-economic impacts and associated GHG gains Acceleration of changed individual heating systems (fuel burners, gas burners)	Phase-out of coal at the Poterne and Villeneuve power stations by 2027 District heating network using 87% ENR 2027 New peripheral district heating network built. Densification/extension on main network	409	Reduced air pollution Improved health Improved indoor comfort
Electricity	*Decarbonizing electricity generation*	Approval of new Energy Master Plan Accelerated implementation of photovoltaic panels on metropolitan buildings Continued metropolitan ENR purchase for internal needs Implementation of a monitoring system for ENR purchases (subject to State support)	National relaunch of nuclear power, doubling of photovoltaic, onshore wind	83	Reduced air pollution Improved health
Waste	*Increased waste recycling*	Implementation of the waste prevention plan. Investigate Carbon Capture techniques linked to waste incineration Delivery of the new sorting center in 2024	Continued implementation of the waste prevention plan. Delivery of rebuilt incineration plant	2	Less need for new materials Improved circularity Improved air quality

		Improved waste sorting Increased biogas production			
Industry	*Decarbonizing industrial processes*	Implementation of the Local Economic Pact and Grenoble Alpes 2030 Economic Strategy New industrial strategies in SECAP 2026	Less industrial emissions Increased attraction of companies in green tech	285	Improved air quality Less need for new materials Improved circularity Economic prosperity Resilient economy Job creation
Green infrastructure & nature-based solutions		Implementation of PAEN, Plui and ZAN related to land use Implementation of the Tree Plan (more impermeable surfaces, trees in the city) Incentive for local stakeholders, landowners, to plant trees Co-construction of the adaptation component of the new SECAP Citizen debates on the climate on adaptation issues Projection studies of the national adaptation trajectory	Implementation of new SECAP Increased carbon stock Continuation and deployment	Not provided by the model	Improved biodiversity Reduction of heat islands Reduction of natural risks (floods etc.) Greener city Attractive city More livable neighborhoods
Total				997	

The 6 impact pathways presented in this Climate City Contract describe the main levers for action identified in above work, to accelerate towards carbon neutrality.

They represent significant changes that will have a profound impact on the reduction of GHG emissions, but **can only be achieved in a context of strong convergence with European and National policies**, the mobilization of all actors facilitated by this convergence, and by overcoming the regulatory, organizational and financial obstacles identified today.

These impact pathways will be explored in greater depth with the metropolitan services and local stakeholders as part of the revision of the SECAP which begins in 2024, alongside that of the Energy Master Plan and the Mobility Plan.

- **Impact pathway 1: Decarbonize heating, relying primarily on 100% decarbonized and extended urban heating networks**

The dense urban area is served by the second largest urban heating network in France, currently mainly supplied by heat from the waste incinerator, waste heat from the chemical platform and wood energy. During the 2022-2023 heating season, this urban heating network was supplied by 82% renewable and recovered energy, compared to 44% in 2005. It serves 100 000 housing equivalents (50 % of real housing) and several large tertiary complexes (University Hospital Center and more recently the university), and 7% of the territory's energy need and 16 % of the heating need. The objective is to continue the decarbonisation of this urban heating network to become coal free in 2027 and a 100% renewable and recovered energy heating network in 2030. Two associated flagship projects are the projects to transform the Villeneuve and Poterne coal power plants into wood and wood-waste power plants.
It will be necessary to accelerate the densification and extension of the main district heating network, in parallel with a gradual withdrawal of the local gas network. Also to develop secondary district heating networks in peripheral areas (three new projects have been validated and interconnections studied) and support the renewable energy heat production projects by local stakeholders (Heat Fund). The Energy Master Plan currently being revised will build a trajectory for decarbonizing heating and develop a strategy for the district heating networks, adapted to the different sectors and typologies of buildings, and being economically sustainable. Another challenge is to support the deployment of heat pumps to avoid the induced risks of worsening urban heat islands, noise pollution, and impact on historical neighborhoods.

At the same time, although its territory has limited development potential, the Metropole is deploys energy production on its buildings and support the deployment of renewable electricity and biogas production projects to contribute to the national effort (cogeneration, photovoltaic solar on roofs and car parks, biogas production on the purification plant since 2016 and soon to come on the composting plant, etc.).

- **Impact pathway 2: Renovate residential and commercial buildings to reduce heating needs and increase the resilience of the territory**

The Metropole guides and financially supports the renovation of social housing and private apartment buildings since 2010 through the MurMur platform. Nearly 9 000 social housing units and more than 10 000 collective housing units have been supported. The support has been adjusted and expanded to include individual housing and VSEs/SMEs and the platform is now provided by a recognized Public Energy Efficiency Service. Carbon neutrality requires at least doubling the renovation rate of housing,

particularly private housing, by prioritizing the least energy efficient buildings. The territory will have to meet three challenges to achieve this:

- Removing the obstacle of decision-making to renovate in co-owned apartment buildings (80% of the housing) by simplifying the processes (support by the metropole for the management of the State aid system (ANAH) to strengthen the links with its own renovation platform MurMur, support from an expert in behavior change)
- Facilitate access to loans and experiment with a third-party investment system
- Increase the number of qualified professionals working with building retrofitting, which is currently insufficient to meet the demand: a partnership is being set up with the building and public works sector to act quickly on this issue (the Metropole is developing a proposition based on this subject for the ongoing Mission Call Enabling City Transformation)

The renovation of the most energy consuming social housing classes (energy performance certificate E, F and G) is already planned.

A significant effort must be made on the renovation of public and private tertiary sectors. The scaling up of the renovation of the public tertiary sector is hitting the limits of their investment capacity and that of the private tertiary sector is struggling in the absence of a fruitful economic model (no impact on the rental price or small reduction in energy costs). The needs and levers of action will be specified with the stakeholders as part of the revision of the SECAP. The metropole is continuing its commitment to renovating its own buildings and facilities: the ongoing rehabilitation of the metropole headquarter, the Forum, aiming for the label PassivHaus (€108 million) is a demonstrator to inspire major tertiary building owners. To go further, the Metropole will adopt an ambitious Real Estate Energy Master Plan in 2024.

To support this development, the Land Use Regulation Plan includes energy performance and decarbonisation obligations for new buildings, ahead of national regulations (RE2020), solar panel installation on car parks and roofs and permeable soil measures. It includes, as part of its amendment no. 3, a "bioclimatic OAP", which aims to integrate new provisions in favor of adaptation to climate change and its mitigation. The new Local Housing Plan 2025-2030, known as "transition plan" currently being finalized, addresses the challenges of retrofitting and new methods of housing production, more focused on densifying the existing city, not only renovating existing buildings. The challenge is to mobilize all the actors of the construction sector, create a dynamic of shared transition and to build new economic models associated to this.

➔ **Impact pathway 3: Accelerate the transition towards low-carbon mobility**

Mobility is an important systemic factor in reducing greenhouse gas emissions, but also air pollutants, which are a real challenge in Grenoble. Transport represents 23% of the territory's emissions. For many years, the Metropole has been encouraging the reduction of private car use in favor of public transport, active mobility and shared cars through numerous projects (development of a tram network since 1987, cycle paths and bicycle rental services, speed limit of 30 km/h in urban centers, self-service bicycles and scooters, reserved carpooling lanes, carpooling services, deployment of park and ride facilities, etc.). Despite its actions, the reduction in kilometers traveled by car between 2005 and 2020 remains low and the drop in emissions in this sector is mainly driven by the improvement of the efficiency of the engines.

Given the size and diversity of the territory, both urban and rural, geographically in the valley or in the mountains, mobility solutions must be adapted accordingly and strategies adjusted to the different typologies of users. In the dense urban area, the priority is to reduce car use over short distances in favor of active mobility (walking, cycling, etc.) and public transport, and to reduce the space for cars,

allowing planting of trees and rainwater to infiltrate. With one of the most developed cycle networks in France, the use of bicycles has accelerated significantly in recent years, driven by the COVID crisis, the deployment of a new generation of two-way cycle paths on dedicated sites (cycle highways) and the arrival of the electric bicycle. Cycling still has very high development potential today, and presents significant co-benefits. Through its Bicycle Plan, the Metropole aims to deploy a large structuring network of these "chrono vélos", including bridges and tunnels, within the city center and towards the suburbs and small towns around. These infrastructures have already shown a very positive impact on the use of bicycles, co-benefits (health, air quality, energy vulnerability, etc.) and mark a profound change in public space. However, they are proven costly and without direct financial return. Thus, their full deployment will only be possible with the mobilization of substantial external financing.

For longer distance journeys in suburban and rural areas, from or to the urban area, the development of e-cycling and carpooling remains a solution without remorse, but with a limited impact on the challenges of decarbonisation. Since mid-2023 a Low Emission Zone has been established in 13 municipalities of the urban area. The goal is to progressively ban the most polluting vehicles, with a stated target of phasing out diesel in 2030. The electrification of vehicles undertaken at European and national level also constitutes an essential lever for accelerating the decarbonisation of the transport sector. Charging infrastructure for electric vehicles is being developed, based on a hypothesis of 25 to 35% electric vehicles by 2030. These measures are accompanied by the reinforcement of park&ride options and carpooling, fluidity measures for express buses on motorway as well as the improvement of the public transport from main towns towards the urban area.

In the medium term perspective, the reliability and modernization of the interurban rail transport network towards the city and airport of Lyon and Chambéry **to create a real express network for commuters**, is a long awaited project by all stakeholders with a key role for the decarbonisation of transport in the region. These investments with high capital mobilization (1 billion euros), dependent on the State (SNCF) and the Region and should gradually take shape between 2030 and 2040.
Finally, on the subject of logistics and freight transport, the Low Emission Zone for heavy and light trucks has been in place since 2019 and the Sustainable Urban Logistics Roadmap outlines a trajectory for decarbonizing freight transport. Although, still today the decarbonisation is delayed due to the lack of suitable electric vehicles and affordable prices.

A key issue for the territory remains strengthening the transport operator (SMMAG) which manages a dense and efficient urban transport network, but whose economic model has been seriously weakened since COVID. The operator faces a challenge as major investments for the renewal of its infrastructure, fleet and electrification are coming up. In the absence of new resources, its ability to finance the decarbonization of buses, express buses and multimodal interchange hub projects, tramway extension, etc. and to continue the current level of mobility services (shared bicycle, public transport, carpooling service, bicycle rental and lockers, etc.) will depend on the financial support of the metropole and the mobilization of external financing.

→ Impact pathway 4: Decarbonizing Industry

The territory has six companies subject to the European Emissions Trading System (EU ETS) (including a chemical platform, a cement plant), new transition industries (new generation batteries and LEDs), small industries and research and innovation centers in the fields of health, energy and microelectronics. Although the metropole has little leverage to directly influence the decision makers of the large industries, we have chosen to include this sector, which represents 40% of the territory's emissions, in our Climate City Contract. The aim of this is to continue to stimulate the economic ecosystem (already started with the European Green Capital 2022, the Local Economic Pact, the Grenoble Alpes 2030 Economic Strategy, the Convention of Businesses for the Climate) in a dynamic

of transition and ambitious decarbonization of the territory, while contributing to the relocation of industries in a logic of carbon footprint reduction. To be effective, it will need to rely on an incentive regulatory and economic framework at national and European level and on partnerships with other public stakeholders of the territory.

Because industrial strategies are not locally driven, this pathway need a strong commitment of European institutions with a view on territorial impacts and strategies. The support of circular industry is among other a huge challenge for the future decarbonisation of this sector.

➔ **Impact pathway 5: Strengthen waste management, reduce the quantities of waste produced and develop the circular economy**

The extraction of materials, the production of raw materials, the manufacturing and transport of the objects and foods we consume, as well as the collection and incineration of waste, consumes energy and emits greenhouse gases. To reduce this, an ambitious waste prevention and collection policy has been deployed within the metropolitan area and the surrounding cities/villages as part of the 2020-2030 Waste Master Plan. This plan aims to reduce the quantity of waste generated annually by 20%, to improve sorting, and to reduce by 50 % the weight of the residual incinerated waste.

Since three years, the collection of food waste has become generalized, with a solution offered to all inhabitants of the territory. Existing metropolitan equipment and devices for waste treatment and collection have also improved, with the increase in the capacity of the sorting center, the modernization of the biowaste composting unit and the installation of a new methanization unit, and the launch of the reconstruction of the Athanor incineration and energy recovery plant (completion planned 2028). Beyond waste management, a more global reflection on "throw less, consume better" is being strengthened, in particular thanks to the third Local Program for the Prevention of Household Waste and the Circular Economy Development Strategy launched in 2022. This strategy is based in particular on the “Pôle R” inaugurated in December 2023, a totem place of the circular economy, open to all economic actors in the reuse sector, which helps to consolidate their place within the local economy, and to offer citizens an incentive tool for more sustainable consumption.
Lastly, particular attention will be paid to the ongoing work to develop carbon capture solutions at the national and European level, an exploratory project has been identified with the aim to capture carbon at the outlet of the waste incinerator.

➔ **Impact pathway 6: Promote carbon sequestration and nature-based solutions**

In order to develop carbon sequestration and nature-based solutions, there are many levers for action: increasing the capacity of natural carbon sinks (forests, grasslands, etc.), limiting soil destruction by construction, contributing to ongoing innovations to capture CO2 to produce energy or materials and improving public and private forest management.

In the Grenoble Alpes Metropole area, the main carbon sinks are composed of the forest, which covers approximately 30,000 hectares, or 55% of its territory, and, to a lesser extent, agricultural soils and wetlands. The forest (its soil, living trees and dead trees) stores approximately 140 kteqCO2 annually according to an ENERDATA/ Solagro assessment based on 2018 data, or the equivalent of 8% of the territory's emissions. However, the latest studies on the national forest sinks show a reducing carbon storage capacity of the forest, after several consecutive warm years. **The Grenoble Alpes Metropole area, where beech and spruce are common trees, therefore risks losing part of its sequestration capacity**. Faced with this challenge, the Metropole is taking action, in particular through its 2030 Forest Strategy, its Agricultural Strategy and the Wetland Restoration Plan to consolidate these carbon sinks. To date, 24% of the territorial forest area is PEFC certified (sustainable management label).

Between 2005 and 2017, an average of 47 hectares of agricultural or natural land were urbanized each year. The new French law “Net zero land take” provides a legal framework for the objectives of limiting soil destruction. This helps to strengthen the biodiversity of the territory, combat urban heat islands and improve the health and well-being of the inhabitants. This work is reflected in the Metropolitan Land Use Regulation Plan (PLUI) where more than 100 hectares have been approved to be changed to A (Agricultural) or N (Natural) zones. 12,600 hectares of agricultural and natural areas are protected, or in the process of being protected, by PAEN classification (protected agricultural and natural area perimeter).
In parallel, the Canopy Plan, launched in February 2022, aims to enable the urban areas of the 49 municipalities of the territory to adapt to climate change by preserving and developing vegetation and permeable areas, to guarantee the health and quality of life of metropolitan inhabitants. Today, the urban area of the metropole is covered by nearly 27% canopy (in other words, the shade provided by tree foliage). The objective is to reach 30% canopy in 2030 and 40% in 2050 to allow for the trees to have a cooling effect on the city.

Lastly, discussions are underway to explore the possibility of elaborating carbon capture projects in the area, particularly on the waste incinerator.

In connection with these 6 impact pathways, a significant number of projects, both ongoing and planned, directly or indirectly address the reduction of emissions and carbon neutrality. The complete list will be found in the Action Plan.

Finally, according to the Carbon Neutrality Study, territorial emissions only represent 30% of the carbon footprint (GHG emitted by the territory's inhabitants) in 2019. For this reason, the Metropole is also taking proactive actions to reduce indirect emissions. In particular, it is acting to support the territory's food transition towards less carbon-intensive consumption patterns, through the interterritorial food project (in connection with the Foodtrail project), and to reduce the carbon and environmental impact of its purchases through the SPASER adopted in 2022 (responsible purchasing scheme). The future SECAP will pay particular attention to this issue.

3.2 Module B-2 Climate Neutrality Portfolio Design

The Climate City Contract action plan is based on actions from the SECAP (2020-2030), additional actions engaged since 2020, some as a result of the Citizens convention of the climate, and exploratory actions, resulting from the work of the Climate City Contract.

The SECAP (2020-2030) actions contains all the air, energy and climate issues of the territory and in particular supported by the organization's public policies. Beyond the climate change mitigation, these actions also contain the themes of adaptation, improvement of air quality and preservation of biodiversity even though those sectors are not the main focus of the Climate City Contract. Certain sectors such as waste or agriculture and food are part of scope 3, they are not part of the pathway impacts but they are included in this action plan since they are part of the SECAP.

The approach used to design the action portfolio is represented graphically in Table 13 in which we have crossed the individual actions (on the vertical axis) with the Impact pathways and systemic levers (on the horizontal axis). The systemic levers are based on the economic model levers and 7 additional levers treated in the SECAP.

Table 13: Visual of action portfolio

IMPACT PATHWAYS	HEATING AND ENERGY		ENERGY EFFICIENT BUILDINGS			TRANSPORT AND MOBILITY							DECARBONIZED INDUSTRY	CIRCULAR ECONOMY AND WASTE	CARBON SEQUESTRATION AND NATURE BASED SOLUTIONS			OTHER (out of impact pathways on direct emissions)		
SYSTEMIC LEVER	3.4 Decarbonizing heating	4.1. Shift to renewable electricity	3.1 Buildings renovations	3.2 Energy efficient new buildings	3.3 Efficient lighting & appliances	1.1 Reduced motorised passenger transportation need	1.2 Shift to public and non-motorised transport	1.3 Car pooling	1.4.1 Electrification of passenger cars and motorcycles	1.4.2 Electrification of buses	2.1 Optimisation of logistics	2.2 Electrification of trucks	9. Economy and industry	5.1. Increased recycling of waste	6. Climate change adaptation	7. Biodiversity and natural ressources	8. Urbanism	10. Air quality	11. Food and Agriculture	12. Planning, governance and mobilization
I. Less energy consumption																				
1. Support and intensify the energy renovation of buildings			X		X															X
2. Develop sobriety and energy management in buildings	X				X															X
3. Building the city differently : Local urban planning scheme (PLUi) and bioclimatic buildings			X	X													X			
4. Support municipalities in reducing the consumption of public lighting					X															X
II. More renewables																				
5. Develop renewable heat	X																			
6. Increase the production of renewable electricity and biogas	X	X												X						
III. Air Quality																				
7. Better understand air quality and reduce population exposure																		X		
IV. Sustainable mobility																				
8. Promote active mobility (cycling, walking)						X	X											X		X
9. Improve the public transport offer and promote modal shift							X											X		X
10. Improve carpooling and car sharing								X										X		X
11. Develop the use of electrical vehicles and charging infrastructure						X	X		X	X		X						X		X
12. Reduce the impact of professional mobility and promote carbon-free logistics											X	X						X		X
V. Waste, circular economy																				
13. Focus on the circular economy and reuse																				X
14. Reduce and prevent waste																				X
15. Improve waste collection, sorting and treatment systems														X						
VI. Agriculture, food																				
16. Towards more sustainable agriculture and food																			X	X
VII. Mobilization of stakeholders and residents																				
17. Manage and monitor the implementation of the climate plan																				X
18. Mobilize and promote the commitment of municipalities																				X
19. Mobilize citizens and economic actors													X							X
VIII. An examplary Admnistration																				
20. The Exemplary Administration Plan (PAE) : a concrete plan to take action														X	X	X				X
IX. Adapt to climate change																				
21. Better understand and anticipate the consequences of global warming on health and natural risks															X					
22. Plant trees, infiltrate rain water, investigate and reduce urban heat islands															X		X			
X. Preserve resources and biodiversity in a context of climate change and carbon sequestration																				
23. Limit soil destruction and preserve natural, agricultural and forest areas																X	X			X
24. Carbon sequestration, wood supply, biodiversity, leisure : develop sustainable forests																X				X
XI. Industry																				
25. Decarbonize the industrial sector													X							X

Table 14: Individual action outlines		
Action outline	Action name	**1/ Support and intensify the energy renovation of buildings**
	Action type	I/ Less energy consumption
	Action description	- *Intensify the thermal renovation of private homes (Mur/Mur program)* - *Develop thermal renovation of social housing* - *Mobilize professionals* - *Supporting companies in their energy transition*
Reference to impact pathway	Impact pathway	**Impact pathway 2**: Renovate residential and commercial buildings to reduce heating needs and increase the resilience of the territory
	Systemic lever	3.1 Buildings renovations (envelope) 3.3 Efficient lighting & appliances
	Outcome (according to module B-1.1)	A part of subsector 3.1 : 32 ktCO2eq A part of subsector 3.3 : 1 ktCO2eq A part of subsector 3.4 : 409 ktCO2eq
Implementation	Responsible bodies/person for implementation	Grenoble Alpes Metropole
	Action scale & addressed entities	All citizens, public actors and companies
	Involved stakeholders	Grenoble Alpes Metropole French government Occupant owners Private or social landlords Citizens
	Comments on implementation – consider mentioning resources, timelines, milestones	Grenoble Alpes Metropole has created a specific metropolitan systems to boost thermal renovation in its territory, called “MurMur”. These MurMur schemes, in addition to State aids, concern co-ownerships, individual houses (since 2021) and make it possible to finance the renovation of social housing. One challenge is to synchronize these metropolitan systems with the existing State system. Another metropolitan system called “MurMur TPE/PME” was created in 2020 and support businesses. Some figures of energy renovation : 3,000 social housing units financed between 2019 and 2023 2,850 collective housing units helped since 2020 750 individual houses helped since 2020 178 companies supported since 2020 Coming soon : ➢ 2024 is an adaptation year of MurMur for convergence towards the new France Rénov’ system ➢ Prioritize support for the most ambitious renovations and those with low energy consumption ➢ Growing the MurMur TPE PME system ➢ Working on a “sustainable building” roadmap with the construction industry
	Possible barriers and measures to address them	➢ Decision-making slowed down by uncertainties: COVID, price inflation (which weighs heavily : increase in costs, access to credit) ➢ The local System « Murmur » is in constant adaptation with a strong challenge of coordination and readability with State systems

		➢ Lack of professionals in certain renovation sectors (facade workers, waterproofers, etc.) and a decline in qualified professionals
	Exploratory actions	Reinforce thermal renovation action. Target : 750 individual houses, 2500 collective housing units, 1 000 social housing units per year.
Impact & cost	Generated renewable energy (if applicable)	Not applicable
	Removed/substituted energy, volume, or fuel type	Not available
	GHG emissions reduction estimate (total) per emission source sector	Sector Building & Heating : A part of subsector 3.1 : 32 ktCO2eq A part of subsector 3.3 : 1 ktCO2eq A part of subsector 3.4 : 409 ktCO2eq
	GHG emissions compensated (natural or technological sinks)	Not applicable
	Total costs	CAPEX (2020-2030) : A part of subsector 3.1 : 365 M€ A part of subsector 3.3 : 46 M€ A part of subsector 3.4 : 669 M€

Action outline	Action name	**2/ Develop sobriety and energy management in buildings**
	Action type	I/ Less energy consumption
	Action description	- *Supporting households experiencing fuel poverty* - *Create a Public Energy Efficiency Service (SPEE)* - *Lead the network of local energy stakeholders* - *Engage with inhabitants in energy savings* - *Supporting companies in their energy transition*
Reference to impact pathway	Impact pathway	**Impact pathway 2**: Renovate residential and commercial buildings to reduce heating needs and increase the resilience of the territory **Impact pathway 1**: Decarbonize heating, relying primarily on 100% decarbonized and extended urban heating networks
	Systemic lever	3.3 Efficient lighting & appliances 3.4 Decarbonizing heating 12. Planning, governance and mobilization
	Outcome (according to module B-1.1)	A part of subsector 3.3 : 1 ktCO2eq A part of subsector 3.4 : 409 ktCO2eq
Implementation	Responsible bodies/person for implementation	Grenoble Alpes Metropole, cities
	Action scale & addressed entities	All citizens, public actors and companies
	Involved stakeholders	Grenoble Alpes Metropole, associations (local agence of energy), citizens
	Comments on implementation – consider mentioning resources, timelines, milestones	Grenoble Alpes Metropole supports and advises its citizens through the public energy efficiency service (SPEE, 1.2 M€/year operating budget). Advice to citizens is provided in its « Espace Info Energie », which aims to be reinforced. Grenoble Alpes Metropole created and developped an online platform “Metroénergie” which provides information and advices on energy consumption (2,450 users in 2023, +10% compared to 2022). A “sobriety communication plan” was carried out from winter 2022-2023, linked to the context of stress on the French electricity network and the increase in energy costs. In this context, ALEC supported the municipalities, which allowed between -10 and -20% reduction in energy consumption (Grenoble Alpes Metropole organization and partner municipalities). Collective supports for sobriety were tested in social housing in 2023. The same approach will be planned for the collective housings for 2024. **Coming soon :** Partnerships with Ecowatt (electricity weather application) and Voltalis (connected energy management solution) will be established to promote the shift in electricity consumption and the mitigation of peaks (shedding). A metropolitan “cold strategy” is implemented since 2024. It will improve summer comfort and direct the different building typologies towards the most suitable solutions for cooling.
	Possible barriers and measures to address them	Support for behavior change is difficult to scale and it depends on the energy context (national communication is predominant). However, it would seem that the sobriety measures (notably the set temperatures) put in place in the winter of 2022-2023 are lasting over time.
	Exploratory actions	None

Impact & cost	Generated renewable energy (if applicable)	Not applicable
	Removed/substituted energy, volume, or fuel type	Not available
	GHG emissions reduction estimate (total) per emission source sector	Building & Heating : • A part of subsector 3.3 : 1 ktCO2eq • A part of subsector 3.4 : 409 ktCO2eq
	GHG emissions compensated (natural or technological sinks)	Not applicable
	Total costs	CAPEX (2020-2030) : A part of subsector 3.3 : 46 M€ A part of subsector 3.4 : 669 M€

Action outline	Action name	**3/ Building the city differently : Local urban planning scheme (PLUi) and bioclimatic buildings**
	Action type	I/ Less energy consumption
	Action description	- *Make health a strategic axis of the Local Intercommunal Urban Planning document (PLUi)* - *Build a resilient territory* - *Design bioclimatic neighborhoods and buildings* - *Impose energy performance requirements in new construction*
Reference to impact pathway	Impact pathway	**Impact pathway 2**: Renovate residential and commercial buildings to reduce heating needs and increase the resilience of the territory
	Systemic lever	3.1 Buildings renovations (envelope) 3.2 Energy efficient new buildings 8. Urbanism
	Outcome (according to module B-1.1)	A part of subsector 3.1 : 32 ktCO2eq A part of subsector 3.2 : 5 ktCO2eq
Implementation	Responsible bodies/person for implementation	Grenoble Alpes Metropole, municipalities
	Action scale & addressed entities	Municipalities, all citizens, city developers
	Involved stakeholders	Grenoble Alpes Metropole, cities, city developers, citizens
	Comments on implementation – consider mentioning resources, timelines, milestones	The local intercommunal town planning plan (PLUi) is the reference document which sets rules for all the cities. It sets strong requirements in terms of tree protection, urban greening or energy performances for buildings and renewable energies (better than the French standard « RE2020 »). This ambition is reinforced through successive modifications. Urban projects specifically carried out by Grenoble Alpes Metropole include exemplary environmental actions such as reduction of energy consumption, resale of materials during deconstruction or use of biosourced materials. **Coming soon :** PLUi will soon include a bioclimatic orientation, in order to fight against urban heat islands in each project. An issue is to accelerate the low carbon construction and the rehabilitation of existing buildings such as the production of social housing in the existing stock.
	Possible barriers and measures to address them	➢ High construction costs slow down operations and sometimes the environmental ambition ➢ The district heating network, due to its low carbon energy mix, does not encourage builders to fully invest in the decarbonization of construction.
	Exploratory actions	Application for the Mission City Call : Enabling City Transformation together with several other French cities. The proposal on the topic of “Transition professions” includes the development of a centre for learning, job matching and resources concerning sustainable construction and buildings.
Impact & cost	Generated renewable energy (if applicable)	Not applicable

	Removed/substituted energy, volume, or fuel type	Not available
	GHG emissions reduction estimate (total) per emission source sector	Building & Heating : • A part of subsector 3.1 : 32 ktCO2eq • A part of subsector 3.2 : 5 ktCO2eq
	GHG emissions compensated (natural or technological sinks)	Not applicable
	Total costs	CAPEX (2020-2030) : A part of subsector 3.1 : 365 M€ A part of subsector 3.2 : 134 M€

Action outline	Action name	**4/ Support municipalities in reducing the energy consumption of public lighting**
	Action type	I/ Less energy consumption
	Action description	- *Set up a lighting master plan*
Reference to impact pathway	Impact pathway	*Transversal action out of impact pathways*
	Systemic lever	12. Planning, governance and mobilization 3.2 Energy efficient new buildings
	Outcome (according to module B-1.1)	Not applicable
Implementation	Responsible bodies/person for implementation	Grenoble Alpes Metropole, municipalities
	Action scale & addressed entities	Grenoble Alpes Metropole, municipalities, companies (with illuminated signs)
	Involved stakeholders	Grenoble Alpes Metropole, municipalities, companies, neighboring territories
	Comments on implementation – consider mentioning resources, timelines, milestones	Grenoble Alpes Metropole has implemented a "Metropolitan Lighting Development Plan" (SDAL) which aims to support municipalities in better management of their public lighting. The municipalities sign a commitment charter (24 out of the 49 municipalities have signed, representing 66% of the territory's bright spots). To go further, Metropole organization has also set up a "metropolitan public lighting service" which offers reinforced support, particularly in the renovation of their lighting and allows the achievement of reduction objectives (15 municipalities involved, €1.8M of work financed since 2019). The generalization of nocturnal extinction by almost all municipalities has been in place since the winter 2022-2023. Awareness campaigns on lighting and light pollution are carried out annually as part of the "month of Night" in cooperation with neighboring territories.
	Possible barriers and measures to address them	Not identified
	Exploratory actions	None
Impact & cost	Generated renewable energy (if applicable)	Not applicable
	Removed/substituted energy, volume, or fuel type	Not applicable
	GHG emissions reduction estimate (total) per emission source sector	Not applicable
	GHG emissions compensated (natural or technological sinks)	Not applicable
	Total costs	Not applicable

Action outline	Action name	**5/ Develop renewable heat**
	Action type	II/ More renewables
	Action description	- *Develop a densified main district heating network using 100% renewable energy* - *Produce renewable heat by controlling its impact on air quality* - *Use the fatal energy potential of the territory*
Reference to impact pathway	Impact pathway	**Impact pathway 1**: Decarbonize heating, relying primarily on 100% decarbonized and extended urban heating networks
	Systemic lever	3.4. Decarbonizing heating
	Outcome (according to module B-1.1)	A part of subsector 3.4 : 409 ktCO2eq
Implementation	Responsible bodies/person for implementation	Grenoble Alpes Metropole (the delegated authority CCIAG), municipalities, building owners
	Action scale & addressed entities	Grenoble Alpes Metropole, cities, neighborhoods (city developers)
	Involved stakeholders	Grenoble Alpes Metropole, cities, landlords of collective housing building, citizen-developers
	Comments on implementation – consider mentioning resources, timelines, milestones	The urban heating network (RCU) achieved a rate of 82% renewable sources or recovery energy over the 2022-2023 heating season. This was possible thanks to the commissioning of the wood burning plant « Biomax » in 2020 (183 GWh produced per year). To go further, the 2 main thermal power plants « La Villeneuve » and « La Poterne » will be transformed since they still operate partially on coal (exit from coal expected in 2027). Beyond the main heating network, other secondary heating networks are being developed in the surrounding municipalities (Gières, Pont de Claix, Meylan, Seyssins, Fontaine, Varces et Vizille) which rely mainly on wood resources. Grenoble Alpes Metropole aims to develop or facilitate other thermal renewable energies such as geothermal, solar thermal on smaller scale (neighborhood, building) **Coming soon :** Exit of coal energy in 2027 Densification of the main district heating network Development of new secondary district heating networks Updating of the Energy Master Plan (SDE) in 2024 (new ambition, goals)
	Possible barriers and measures to address them	➢ Difficulties finding land for renewable heat projects (particularly for boiler rooms in heat networks). ➢ The economic competitiveness of the district heating network (RCU) is dependent on the price of gas, which is significantly instable. ➢ The obligation to connect to heating district for buildings in dedicated perimeter is not applied in the absence of a policy. ➢ There is a technical complexity to implement solar thermal or geothermal energy in existing buildings. ➢ The decisional inertia in co-ownership and companies concerning renewable heat projects
	Exploratory actions	Extension of the main district heating system to serve 30 % of the households.

Impact & cost	Generated renewable energy (if applicable)	Not available
	Removed/substituted energy, volume, or fuel type	Not available
	GHG emissions reduction estimate (total) per emission source sector	Building & Heating : A part of subsector 3.4 : 409 ktCO2eq
	GHG emissions compensated (natural or technological sinks)	Not applicable
	Total costs	CAPEX (2020-2030) : A part of subsector 3.4 : 669 M€

Action outline	Action name	**6/ Increase the production of renewable electricity and biogas**
	Action type	II/ More renewables
	Action description	- *Produce renewable gas locally* - *Support the production of renewable electricity* - *Make the production of renewable energy mandatory for new constructions* - *Develop the purchase of renewable energy*
Reference to impact pathway	Impact pathway	**Impact pathway 1**: Decarbonize heating, relying primarily on 100% decarbonized and extended urban heating networks
	Systemic lever	3.4. Decarbonizing heating 4.1. Shift to renewable electricity
	Outcome (according to module B-1.1)	A part of subsector 3.4 : 409 ktCO2eq A part of subsector 4.1 : 83 ktCO2eq
Implementation	Responsible bodies/person for implementation	Grenoble Alpes Metropole ; public authorities, companies, cities, citizens
	Action scale & addressed entities	Grenoble Alpes Metropole, cities, companies, citizens
	Involved stakeholders	Grenoble Alpes Metropole, cities, companies, citizens, entreprises developping renewables
	Comments on implementation – consider mentioning resources, timelines, milestones	Grenoble Alpes Metropole supports the development of photovoltaic solar power on its territory through several actions: ➢ Creation of a solar cadastre in 2021 (free online tool addressed to citizens) ➢ Installation of solar panels on metropolitan buildings and facilities (goal of installing 4.5 MWp of capacity by 2030) ➢ Support for civic companies producing RE&R: Energy Citoyenne, SCIC Enercoop Grenoble Alpes Metropole developped in 2016 a methanisation plant on wastewater (20 GWh of biogas produced per year) and is developping a similar unit on a composting site (production of 7 GWh from organic waste) **Coming soon :** ➢ Facilitate the installation of photovoltaic solar panels (targeting already artificialized areas and in particular parking lots, experimentation with agrivoltaics, etc.) ➢ Facilitate energy production by citizen communities.
	Possible barriers and measures to address them	➢ For solar photovoltaic : classic constraints in the sector such as land, town planning and geographical (protection perimeters), insurance, structural roofing (phasing problem with work programs such as waterproofing, insulation). ➢ For biogas, few agricultural inputs in the territory (main input to supply the methanizer) which leads to a low potential (beyond wastewater and organic waste)
	Exploratory actions	Although not under direct metropolitan influence, a new national goal of reducing by 50 % the fossil content of the electricity mix by 2030 also supports this action.
Impact & cost	Generated renewable energy (if applicable)	Not available
	Removed/substituted energy, volume, or fuel type	Not available

	GHG emissions reduction estimate (total) per emission source sector	Building & Heating : A part of subsector 3.4 : 409 ktCO2eq Electricity : A part of subsector 4.1 : 83 ktCO2eq
	GHG emissions compensated (natural or technological sinks)	Not applicable
	Total costs	CAPEX (2020-2030) : A part of subsector 3.4 : 669 M€ A part of subsector 4.1 : 49 M€

Action outline	Action name	**7. Better understand air quality and reduce population exposure**
	Action type	III/ Air Quality
	Action description	- *Limit the exposure of populations to atmospheric pollution* - *Improve knowledge of the health impact of air pollution* - *Engage with inhabitants in energy savings* - *Reduce the impact of individual wood heating on air quality* - *Mobilize professionals* - *Study and implement a Low Emission Zone for private vehicles and support owners of old vehicles* - *Implement the Low Emission Zone for light commercial vehicles and heavy goods vehicles*
Reference to impact pathway	Impact pathway	Other (out of impact pathways on direct emissions)
	Systemic lever	10. Air quality
	Outcome (according to module B-1.1)	Not applicable
Implementation	Responsible bodies/person for implementation	French government, Grenoble Alpes Metropole, construction stakeholders
	Action scale & addressed entities	Grenoble Alpes Metropole, cities, neighborhoods, citizens
	Involved stakeholders	Grenoble Alpes Metropole, cities, construction stakeholders, citizens
	Comments on implementation – consider mentioning resources, timelines, milestones	Grenoble Alpes Metropole carries out communication and awareness-raising on the air quality index and lends microsensors to citizens. Metropole has created a guide "Air quality in buildings exposed to atmospheric pollution" used in the context of development and construction projects (renovation or rehabilitation). To reduce the air pollution, the 2 main mesures set up by metropole are : ➢ the « Prime Air Bois » is a financial aid and technical support to encourage people to give up their inefficient wood heating boiler (1700 aids paid since 2020) ➢ the low emission zone (ZFE) which prohibits the circulation of certain polluting vehicles (for 2019 for light utility vehicles and trucks and for 2023 for light cars) ➢ **Coming soon :** Development and improvement of the Prime Air Bois system and continuation of the progressive ban on vehicles within the framework of the 2 ZFEs
	Possible barriers and measures to address them	➢ Difficulty changing behavior, particularly regarding abandoning the car as a mode of travel. ➢ Costs of efficient wood heating systems or vehicles with little or no polluting engines. ➢ Electric motorization is still very expensive and with little autonomy, which is problematic for heavy vehicles. Abandonment by many constructors of gas vehicle models, to adapt to the requirements of the European Union favoring electric vehicles.
	Exploratory levers	None

Impact & cost	Generated renewable energy (if applicable)	Not applicable
	Removed/substituted energy, volume, or fuel type	Not applicable
	GHG emissions reduction estimate (total) per emission source sector	Not applicable
	GHG emissions compensated (natural or technological sinks)	Not applicable
	Total costs	Not applicable

Action outline	Action name	**8. Promote active mobility (cycling, walking)**
	Action type	IV. Sustainable mobility
	Action description	- *Continue implementing the cycling plan* - *Implement the pedestrian plan*
Reference to impact pathway	Impact pathway	**Impact pathway 3**: Accelerate the transition towards low-carbon mobility
	Systemic lever	1.1. Reduced motorised passenger transportation need 1.2. Shift to public and non-motorised transport 10. Air quality
	Outcome (according to module B-1.1)	A part of subsector 1.1 : 22 ktCO2eq A part of subsector 1.2 : 26 ktCO2eq
Implementation	Responsible bodies/person for implementation	Grenoble Alpes Metropole, Mobility Union (SMMAG), Cities,
	Action scale & addressed entities	Grenoble Alpes Metropole, cities
	Involved stakeholders	Grenoble Alpes Metropole, cities, urban planers, citizens
	Comments on implementation – consider mentioning resources, timelines, milestones	The modal share of cycling continues to increase in the city, with a strong acceleration since 2019. Grenoble Alpes Metropole has implemented an ambitious "bicycle plan" [2021 - 2025] (€5M/year) to support the action carried by the SMMAG : - development of secure cycle paths (34 km of Chronovélo, a "bike highway") - Bicycle parking facility (more than 30 000) - MVélo+ bike rental service - leisure activities around cycling - metropolitan funds for the purchase of a bicycle **Coming soon :** Continued development of the Chronovélo axes: 8 axes and 141 km in the long term.
	Possible barriers and measures to address them	Physical or land constraints delaying the rapid deployment of certain cycle paths (example: Combe de Gières)
	Exploratory levers	None
Impact & cost	Generated renewable energy (if applicable)	Not applicable
	Removed/substituted energy, volume, or fuel type	Not available
	GHG emissions reduction estimate (total) per emission source sector	Transport : • A part of subsector 1.1 : 22 ktCO2eq • A part of subsector 1.2 : 26 ktCO2eq
	GHG emissions compensated (natural or technological sinks)	Not applicable
	Total costs and costs by CO2e unit	CAPEX (2020-2030) : A part of subsector 1.1 : 0 M€ (just operational costs) A part of subsector 1.2 : 45 M€

Action outline	Action name	**9. Improve the public transport offer and promote modal shift**
	Action type	IV. Sustainable mobility
	Action description	- *Develop the public transport offer and improve the quality of service* - *Improve intermodality and complementarities with the structuring public transport network*
Reference to impact pathway	Impact pathway	**Impact pathway 3**: Accelerate the transition towards low-carbon mobility
	Systemic lever	1.2. Shift to public and non-motorised transport 10. Air quality
	Outcome (according to module B-1.1)	A part of subsector 1.2 : 26 ktCO2eq
Implementation	Responsible bodies/person for implementation	Mobility Union (SMMAG), Cities,
	Action scale & addressed entities	Grenoble Alpes Metropole, cities, citizens
	Involved stakeholders	Mobility Union (SMMAG), Grenoble Alpes Metropole, cities, citizens
	Comments on implementation – consider mentioning resources, timelines, milestones	The public transport policy aims to strengthen the public transport offer such as extend the tram lines, Chronobuses, adjust the classic bus lines, support the partnership initiatives around the metropolitan train project and support inter-modality (multimodal exchange centers and relay parks). Today more than 80% of buses have non-diesel engines (mainly CNG and hybrid). The main challenge is today to promote the modal shift from private cars to public transport. **Coming soon :** Tramway network extension studies Project to improve tram/bus timings Renewal of rolling stock (tramway) and extension of the depot
	Possible barriers and measures to address them	High investment and maintenance costs for rail (regular additional costs) and disengagement from certain public authorities (the Region) on the financing of rail infrastructure.
	Exploratory levers	None
Impact & cost	Generated renewable energy (if applicable)	Not applicable
	Removed/substituted energy, volume, or fuel type	Not available
	GHG emissions reduction estimate (total) per emission source sector	Transport : A part of subsector 1.2 : 26 ktCO2eq
	GHG emissions compensated (natural or technological sinks)	Not applicable
	Total costs	CAPEX (2020-2030) : A part of subsector 1.2 : 45 M€

Action outline	Action name	**10. Improve carpooling and car sharing**
	Action type	IV. Sustainable mobility
	Action description	- *Encourage the shift from individual cars to shared cars*
Reference to impact pathway	Impact pathway	**Impact pathway 3**: Accelerate the transition towards low-carbon mobility
	Systemic lever	1.3 Car pooling 10. Air quality
	Outcome (according to module B-1.1)	Subsector 1.3 : 0,2 ktCO2eq
Implementation	Responsible bodies/person for implementation	Mobility Union (SMMAG), employers (companies), citizens
	Action scale & addressed entities	Grenoble Alpes Metropole, companies, citizens
	Involved stakeholders	Mobility Union (SMMAG), Grenoble Alpes Metropole, companies, citizens
	Comments on implementation – consider mentioning resources, timelines, milestones	Car sharing is an effective solution to reduce the solo driving and thus the overall kilometers traveled by cars (58% of home-work trips are today by car). The SMMAG (local public authority for mobility) developps a dedicated carpooling services « M'Covoit », dedicated lane for carpooling on the highway or carsharing (with the existing service « Citiz ») **Coming soon :** Strengthening the carpooling offer by opening new lines (Vizille-Eybens line to Inovallée)
	Possible barriers and measures to address them	There is significantly more drivers compared to passengers being interested in carpooling. The socials norms around carpooling needs to shift. A main barrier is that using a private car is simpler and more comfortable.
	Exploratory levers	None
Impact & cost	Generated renewable energy (if applicable)	Not applicable
	Removed/substituted energy, volume, or fuel type	Not available
	GHG emissions reduction estimate (total) per emission source sector	Transport : Subsector 1.3 : 0,2 ktCO2eq
	GHG emissions compensated (natural or technological sinks)	Not applicable
	Total costs	CAPEX (2020-2030) : subsector 1.3 : 0 M€ (just operational costs)

Action outline	Action name	**11. Develop the use of electric vehicles and charging infrastructure**
	Action type	IV. Sustainable mobility
	Action description	- *Develop electric charging stations and natural gas stations for vehicles*
Reference to impact pathway	Impact pathway	**Impact pathway 3**: Accelerate the transition towards low-carbon mobility
	Systemic lever	1.1 Reduced motorised passenger transportation need 1.2 Shift to public and non-motorised transport 1.4.1 Electrification of passenger cars and motorcycles 1.4.2 Electrification of buses 2.2 Electrification of trucks 10. Air quality
	Outcome (according to module B-1.1)	A part of subsector 1.1 : 22 ktCO2eq A part of subsector 1.2 : 26 ktCO2eq Subsector 1.4.1 : 56 ktCO2eq Subsector 1.4.2 : 4 ktCO2eq A part of subsector 2.2 : 7 ktCO2eq
Implementation	Responsible bodies/person for implementation	Grenoble Alpes Metropole, cities, companies, citizens
	Action scale & addressed entities	Grenoble Alpes Metropole, cities, companies, citizens
	Involved stakeholders	Grenoble Alpes Metropole, cities, companies, citizens
	Comments on implementation – consider mentioning resources, timelines, milestones	Grenoble Alpes Metropole has a strategy for developing electric charging stations in public spaces in order to encourage the use of electric vehicles by individuals or businesses. Despite EU policy favoring electric mobility, there is also a challenge in maintaining NGV charging stations because electric mobility is not yet adapted for some heavy vehicles (trucks). The public transport operator (SMMAG) has 7 electric buses today in its fleet and plan to develop it in the future. One solution being studied is electric trolley buses, using fixed electric lines instead of batteries in the vehicles. **Coming soon :** Upcoming opening of new NGV stations Deployment of more than 260 new charging points for electric vehicles in existing car parks in 2024
	Possible barriers and measures to address them	There is a lack of proposals for heavy electric vehicles from car manufacturers.
	Exploratory levers	Accelerated electrification of buses
Impact & cost	Generated renewable energy (if applicable)	Not applicable
	Removed/substituted energy, volume, or fuel type	Not available
	GHG emissions reduction estimate (total) per emission source sector	Transport : A part of subsector 1.1 : 22 ktCO2eq A part of subsector 1.2 : 26 ktCO2eq Subsector 1.4.1 : 56 ktCO2eq Subsector 1.4.2 : 4 ktCO2eq A part of subsector 2.2 : 7 ktCO2eq
	GHG emissions compensated (natural or technological sinks)	Not applicable

	Total costs	CAPEX (2020-2030) : A part of subsector 1.1 : 0 M€ (just OPEX) A part of subsector 1.2 : 45 M€ Subsector 1.4.1 : 218 M€ Subsector 1.4.2 : 17 M€ A part of subsector 2.2 : 71 M€

Action outline	Action name	**12. Reduce the impact of professional mobility and promote carbon-free logistics**
	Action type	IV. Sustainable mobility
	Action description	- *Promote sustainable urban logistics and encourage experimentation* - *Implement the Low Emission Zone for light commercial vehicles and heavy goods vehicles* - *Mobilize professionals* - *Supporting companies in their energy transition*
Reference to impact pathway	Impact pathway	**Impact pathway 3**: Accelerate the transition towards low-carbon mobility
	Systemic lever	2.1 Optimisation of logistics 2.2 Electrification of trucks 10. Air quality
	Outcome (according to module B-1.1)	Subsector 2.1 : 65 ktCO2eq A part of subsector 2.2 : 7 ktCO2eq
Implementation	Responsible bodies/person for implementation	Grenoble Alpes Metropole, logistic companies
	Action scale & addressed entities	Grenoble Alpes Metropole, companies
	Involved stakeholders	Grenoble Alpes Metropole, companies
	Comments on implementation – consider mentioning resources, timelines, milestones	Goods transport contributes to 35% of GHG emissions from the transport sector on the territory. Although the metropole does not have concrete levers of action across the entire logistics chain, it focuses its action on encouraging low-carbon mobility for the last kilometers, in urban areas : - An urban logistics roadmap has been deliberated at the end of 2023 - A low-emission zone (ZFE) for Light Commercial Vehicles (LCV) and Heavy Goods Vehicles (LP) has been established in 28 municipalities since 2019. **Coming soon :** Implementation of a reception plan for logistics activities: - pooling of flows, - support for professionals towards low-carbon logistics.
	Possible barriers and measures to address them	Not identified
	Exploratory levers	None
Impact & cost	Generated renewable energy (if applicable)	Not applicable
	Removed/substituted energy, volume, or fuel type	Not available
	GHG emissions reduction estimate (total) per emission source sector	Transport : • Subsector 2.1 : 65 ktCO2eq • A part of subsector 2.2 : 7 ktCO2eq
	GHG emissions compensated (natural or technological sinks)	Not applicable
	Total costs	CAPEX (2020-2030) : Subsector 2.1 : 0 M€ (just OPEX) A part of subsector 2.2 : 71 M€

Action outline	Action name	**13. Focus on the circular economy and reuse**
	Action type	V. Waste, circular economy
	Action description	- *Develop the circular economy and reuse* - *Strengthen the role of the social and solidarity economy in the ecological and energy transition* - *Support the development of the local currency*
Reference to impact pathway	Impact pathway	**Impact pathway 5**: Strengthen waste management, reduce the quantities of waste produced and develop the circular economy
	Systemic lever	12. Planning, governance and mobilization
	Outcome (according to module B-1.1)	Not applicable
Implementation	Responsible bodies/person for implementation	Grenoble Alpes Metropole, companies, citizens
	Action scale & addressed entities	Grenoble Alpes Metropole, companies, citizens
	Involved stakeholders	Grenoble Alpes Metropole, companies, citizens
	Comments on implementation – consider mentioning resources, timelines, milestones	Beyond waste management, Grenoble Alpes Metropole tries to promote a global reflection on "throwing less, consuming better" : - Creation of « Pôle R » in 2023, a place dedicated to circular economy activities - Support for the opening of new recycling centers - Support for projects in the field of reuse, sustainable food and mobility - Opening of data centers and material libraries (Cadran Solaire development program and the "Forum", renovation project of the metropolitan headquarters), **Coming soon :** Strengthened awareness of more sustainable consumption
	Possible barriers and measures to address them	Obstacles to changing consumption practices and behavior : "repair and reuse" rather than "throwing away and replace"
	Exploratory levers	None
Impact & cost	Generated renewable energy (if applicable)	Not applicable
	Removed/substituted energy, volume, or fuel type	Not applicable
	GHG emissions reduction estimate (total) per emission source sector	Not applicable
	GHG emissions compensated (natural or technological sinks)	Not applicable
	Total costs	Not applicable

Action outline	Action name	**14. Reduce and prevent waste**
	Action type	V. Waste, circular economy
	Action description	- *Strengthen the incentive for sorting* - *Reduce waste* - *Support the reduction, sorting and recovery of professional waste*
Reference to impact pathway	Impact pathway	**Impact pathway 5**: Strengthen waste management, reduce the quantities of waste produced and develop the circular economy
	Systemic lever	12. Planning, governance and mobilization
	Outcome (according to module B-1.1)	Not applicable
Implementation	Responsible bodies/person for implementation	Grenoble Alpes Metropole, companies, citizens
	Action scale & addressed entities	Grenoble Alpes Metropole, companies, citizens
	Involved stakeholders	Grenoble Alpes Metropole, companies, citizens
	Comments on implementation – consider mentioning resources, timelines, milestones	Grenoble Alpes Metropole adopted a 2020-2030 Waste Master Plan, which strongly encourages users to change their behavior, with the objective of reducing the quantity of annual waste generated by 20%. Here are some actions carried out by the metropole : - Avoid the use of single-use plastics - Creation of a “Packaging-free purchasing guide for consumers” - Support for the call for projects “waste reduction and circular economy” - Reduce food waste (recovery of unsold food, collection from professionals, municipal collective catering market) - Provision of composter for local inhabitants **Coming soon :** Deployment in 2024 of an action plan for the textile sector
	Possible barriers and measures to address them	Not identified
	Exploratory levers	None
Impact & cost	Generated renewable energy (if applicable)	Not applicable
	Removed/substituted energy, volume, or fuel type	Not applicable
	GHG emissions reduction estimate (total) per emission source sector	Not applicable
	GHG emissions compensated (natural or technological sinks)	Not applicable
	Total costs	Not applicable

Action outline	Action name	**15. Improve waste collection, sorting and treatment systems**
	Action type	V. Waste, circular economy
	Action description	- *Develop new collections and strengthen glass collection* - *Improve the quality of sorting of recyclables* - *Strengthen the recovery of waste in recycling centers* - *Renew waste sorting and recovery tools* - *Support the reduction, sorting and recovery of professional waste*
Reference to impact pathway	Impact pathway	**Impact pathway 5**: Strengthen waste management, reduce the quantities of waste produced and develop the circular economy
	Systemic lever	5.1. Increased recycling of waste
	Outcome (according to module B-1.1)	2 ktCO2eq
Implementation	Responsible bodies/person for implementation	Grenoble Alpes Metropole, companies, citizens
	Action scale & addressed entities	Grenoble Alpes Metropole, companies, citizens
	Involved stakeholders	Grenoble Alpes Metropole, companies, citizens
	Comments on implementation – consider mentioning resources, timelines, milestones	Grenoble has created a Waste Master Plan 2020-2030, which aims to reduce the quantity of waste generated annually by 20%, improve sorting and a final reduction in the weight of the residual waste bin (gray bin) incinerated by 50%. The structuring actions are the renewal and modernization of the incinerator and the sorting center, and the increase in capacity of the organic waste composting center with the addition of a methanization unit. A permanent challenge is also to improve the quality of sorting by inhabitants and professional actors **Coming soon :** New composting center in 2024 New incinerator in 2028 Strengthen support for waste sorting
	Possible barriers and measures to address them	Recycling is still technically very difficult in certain domains (e.g. plastics, electronics) The sorting refusal rate is still high, particularly for food waste.
	Exploratory levers	Experiment with carbon capture on the site emitting the most direct CO2 “the Athanor incineration plant”. According to initial estimates, there would be a possibility beyond 2030 of capturing up to 90% of GHG emissions. A feasibility assessment is necessary before considering this solution, in particular to estimate the induced energy consumption.
Impact & cost	Generated renewable energy (if applicable)	Not applicable
	Removed/substituted energy, volume, or fuel type	Not available
	GHG emissions reduction estimate (total) per emission source sector	Waste : Subsector 5.1 : 2 ktCO2eq

	GHG emissions compensated (natural or technological sinks)	Not applicable
	Total costs	CAPEX (2020-2030) : Subsector 5.1 : 1 M€

Action outline	Action name	**16. Towards more sustainable agriculture and food**
	Action type	VI. Agriculture, food
	Action description	- *Reorient agricultural practices to adjust to global warming* - *Avoid fragmentation and encourage the maintenance and renewal of farmers* - *Develop a food project with neighboring territories* - *Support the structuring of quality local agricultural food sectors* - *Structure local and less energy-intensive food consumption* - *Promote the consumption of organic and local products in collective catering*
Reference to impact pathway	Impact pathway	Other (out of impact pathways on direct emissions)
	Systemic lever	11. Food & Agriculture
	Outcome (according to module B-1.1)	Not applicable
Implementation	Responsible bodies/person for implementation	Grenoble Alpes Metropole, farmers, cities, food players (food industry, restaurant owners, supermarkets), citizens
	Action scale & addressed entities	Grenoble Alpes Metropole, companies, citizens
	Involved stakeholders	Grenoble Alpes Metropole, farmers, cities, food players (food industry, restaurant owners, supermarkets), citizens
	Comments on implementation – consider mentioning resources, timelines, milestones	The agricultural sector represents only 1% of GHG emissions on the territory (nearly 8,600 hectares of agricultural land operated by 220 professional farms) but food products are massively imported and represent 18% of the carbon footprint. Grenoble Alpes Metropole acts through land activity (settlement of farmers) and has initiated an Inter-Territorial Food Project (PAiT) to establish a desirable scenario for 2050 of transition towards more sustainable agriculture and food. **Coming soon :** Training of farmers in the evolution of resilient practices and support for the development of agroforestry Launch of citizen debates for the climate on the theme of sustainable food.
	Possible barriers and measures to address them	➢ Difficulty of access to land for farmers to set up ➢ Complexity, delays and costs of converting to organic farming, aggravated by the current inflationary situation ➢ A cultural barrier to switching to a less meaty diet for citizens
	Exploratory levers	None
Impact & cost	Generated renewable energy (if applicable)	None
	Removed/substituted energy, volume, or fuel type	Not applicable
	GHG emissions reduction estimate (total) per emission source sector	Not applicable
	GHG emissions compensated (natural or technological sinks)	Not applicable
	Total costs	Not applicable

Action outline	Action name	**17. Manage and monitor the implementation of the climate plan**
	Action type	VII. Mobilization of stakeholders and inhabitants
	Action description	- *Study a disruption scenario for the period 2030-2050* - *Provide the territory with decision-making and consultation structures* - *Sustain and lead the partnership bodies of the Climate Air Energy Plan* - *Strengthen the connection between social policies and environmental policies* - *Expanding the fields of evaluation of the PCAET through an observatory increases new indicators* - *Monitor the implementation of the action plan with the CIT'ERGIE framework*
Reference to impact pathway	Impact pathway	Other (out of impact pathways on direct emissions)
	Systemic lever	12. Planning, governance and mobilization
	Outcome (according to module B-1.1)	Not applicable
Implementation	Responsible bodies/person for implementation	Grenoble Alpes Metropole
	Action scale & addressed entities	Grenoble Alpes Metropole, cities, companies, citizens
	Involved stakeholders	Grenoble Alpes Metropole, cities, companies, citizens
	Comments on implementation – consider mentioning resources, timelines, milestones	This action is detailed in the part 4.1 Module C-1 Governance Innovation Interventions The « Grenoble Alpes 2030 Economic Strategy » is a new action not scheduled in the 2020's Climate Plan.
	Possible barriers and measures to address them	
	Exploratory levers	None
Impact & cost	Generated renewable energy (if applicable)	None
	Removed/substituted energy, volume, or fuel type	Not applicable
	GHG emissions reduction estimate (total) per emission source sector	Not applicable
	GHG emissions compensated (natural or technological sinks)	Not applicable
	Total costs	Not applicable

Action outline	Action name	**18. Mobilize and promote the engagement of the municipalities**
	Action type	VII. Mobilization of stakeholders and inhabitants
	Action description	- *Strengthen and promote the commitment of municipalities* - *Share and disseminate good municipal practices*
Reference to impact pathway	Impact pathway	Other (out of impact pathways on direct emissions)
	Systemic lever	12. Planning, governance and mobilization
	Outcome (according to module B-1.1)	Not applicable
Implementation	Responsible bodies/person for implementation	Grenoble Alpes Metropole
	Action scale & addressed entities	Grenoble Alpes Metropole, cities
	Involved stakeholders	Grenoble Alpes Metropole, cities, citizens
	Comments on implementation – consider mentioning resources, timelines, milestones	This action is detailed in the part 4.1 Module C-1 Governance Innovation Interventions
	Possible barriers and measures to address them	
	Exploratory levers	None
Impact & cost	Generated renewable energy (if applicable)	None
	Removed/substituted energy, volume, or fuel type	Not applicable
	GHG emissions reduction estimate (total) per emission source sector	Not applicable
	GHG emissions compensated (natural or technological sinks)	Not applicable
	Total costs	Not applicable

Action outline	Action name	**19. Mobilize citizens and economic actors**
	Action type	VII. Mobilization of stakeholders and inhabitants
	Action description	- *Promote citizen questioning and involvement* - *Develop a participatory budget* - *Invent sustainable consumption practices with inhabitants* - *Set up personalized advice to change travel modes* - *Raise awareness among children from an early age* - *Participate in the organization of the biennial of cities in transition* - *Propose programming on climate change in scientific and technical culture equipment* - *Bring together academics and researchers within a local expert group*
Reference to impact pathway	Impact pathway	Other (out of impact pathways on direct emissions)
	Systemic lever	12. Planning, governance and mobilization
	Outcome (according to module B-1.1)	Not applicable
Implementation	Responsible bodies/person for implementation	Grenoble Alpes Metropole, citizens, companies
	Action scale & addressed entities	Grenoble Alpes Metropole, cities, companies, citizens
	Involved stakeholders	Grenoble Alpes Metropole, cities, companies, citizens
	Comments on implementation – consider mentioning resources, timelines, milestones	This action is detailed in the part 4.2 Module C-2 Social Innovation Interventions and 4.1 Module C-1 Governance Innovation Interventions New actions initiated since 2020 : -Grenoble European Green Capital 2022 : further mobilize citizens and stakeholders - The Citizens' Convention for the Climate (CCC) and its aftermath (monitoring committee, citizen debates for the climate) - The Local Economic Pact - The Grenoble Alpes 2030 Economic Strategy - A transitions barometer in partnership with Grenoble Management School
	Possible barriers and measures to address them	
	Exploratory levers	None
Impact & cost	Generated renewable energy (if applicable)	None
	Removed/substituted energy, volume, or fuel type	Not applicable
	GHG emissions reduction estimate (total) per emission source sector	Not applicable
	GHG emissions compensated (natural or technological sinks)	Not applicable
	Total costs	Not applicable

Action outline	Action name	**20. The Exemplary Administration Plan (PAE)**
	Action type	VIII. An examplary Admnistration
	Action description	- *Launch an "exemplary administration" approach* - *Reduce the energy consumption of office and premises buildings, including the headquarter of the Grenoble Alpes Metropole* - *Produce renewable energy on metropolitan buildings* - *Continue to renew the metropole's vehicle fleet* - *Reduce and enhance energy consumption in water sanitation plant* - *Implement sobriety in water use*
Reference to impact pathway	Impact pathway	Other (out of impact pathways on direct emissions)
	Systemic lever	12. Planning, governance and mobilization
	Outcome (according to module B-1.1)	Not applicable
Implementation	Responsible bodies/person for implementation	Grenoble Alpes Metropole
	Action scale & addressed entities	Grenoble Alpes Metropole, employees
	Involved stakeholders	Grenoble Alpes Metropole, employees
	Comments on implementation – consider mentioning resources, timelines, milestones	Grenoble Alpes Metropole is committed to being an exemplary administration, implementing the orientations of the SECAP, both in its policies and in its daily operations. This plan particularly targets exemplary construction (renovation of the metropolitan headquarter), its vehicle fleet, sustainable purchasing and the implementation of awareness-raising and training actions for all civil servants and elected officials. More information on this subject is available in chapter 4.1 Module C-1 Governance Innovation Interventions. **New actions since 2020 :** The climate assessment of the local authority budget The greenhouse gas assessment for the local authority and its resulting action plan
	Possible barriers and measures to address them	➢ The difficulty of changing habits is an obstacle for certain civil servants. ➢ Adapted vehicle models with new engines (NGV, electric) are not always present on the market especially for heavy vehicles
	Exploratory levers	In the next climate plan, an issue is to reduce the carbon footprint, using carbon purchasing criteria, working in exemplary buildings (energy performance and sobriety in materials)
Impact & cost	Generated renewable energy (if applicable)	None
	Removed/substituted energy, volume, or fuel type	Not applicable
	GHG emissions reduction estimate (total) per emission source sector	Not applicable
	GHG emissions compensated (natural or technological sinks)	Not applicable
	Total costs	Not applicable

Action outline	Action name	**21. Better understand and anticipate the consequences of global warming on health and natural risks**
	Action type	IX. Adapt to climate change
	Action description	- *Deepen knowledge of the impacts of climate change on our health* - *Develop a strategy to make the environment a beneficial factor in health* - *Deepen and disseminate our knowledge of natural risks* - *Anticipate the risks linked to global warming* - *Strengthen our systems in the face of extreme weather events*
Reference to impact pathway	Impact pathway	**Impact pathway 6**: Promote carbon sequestration and nature-based solutions
	Systemic lever	6.Climate change adaptation)
	Outcome (according to module B-1.1)	Not applicable
Implementation	Responsible bodies/person for implementation	Grenoble Alpes Metropole, cities, universities and other public actors (example: town planning agency, regional health agency, regional health observatory)
	Action scale & addressed entities	City wide, all citizens
	Involved stakeholders	Metropole, municipalities, citizens, public actors
	Comments on implementation – consider mentioning resources, timelines, milestones	The Climate Plan initiated studies to better understand and anticipate the consequences of global warming on health, natural risks and resources : ➢ Health diagnosis carried out in 2021-2022 by the Regional Health Observatory ➢ Studies and work relating to knowledge of risks, prevention and reduction of vulnerability and the strengthening of crisis management It leads to a proactive approach to metropolitan resilience in the face of natural and technological risks (Risk and Resilience Strategy)
	Possible barriers and measures to address them	
	Exploratory levers	None
Impact & cost	Generated renewable energy (if applicable)	None
	Removed/substituted energy, volume, or fuel type	Not applicable
	GHG emissions reduction estimate (total) per emission source sector	Not applicable
	GHG emissions compensated (natural or technological sinks)	Not applicable
	Total costs	Not applicable

Action outline	Action name	**22. Plant trees, infiltrate rain water, investigate and reduce urban heat islands**
	Action type	IX. Adapt to climate change
	Action description	- *Deepen knowledge of the impacts of climate change on our health* - *Work on urban greening of towns and villages* - *Create wells and freshness paths*
Reference to impact pathway	Impact pathway	**Impact pathway 6**: Promote carbon sequestration and nature-based solutions
	Systemic lever	6.Climate change adaptation 8.Urbanism
	Outcome (according to module B-1.1)	Not applicable
Implementation	Responsible bodies/person for implementation	Grenoble Alpes Metropole, cities, companies, city developers
	Action scale & addressed entities	Grenoble Alpes Metropole, cities, neighborhood, companies, citizens
	Involved stakeholders	Grenoble Alpes Metropole, cities, companies, city developers
	Comments on implementation – consider mentioning resources, timelines, milestones	Grenoble Alpes Metropole leads an active policy on the urban greening, the renaturation of public spaces and increasing soil permeability thanks to its "Plan Canopée". It consists of planting more trees (+5,000 since 2019), legally protecting trees or allowing water to infiltrate more easily by currently waterproof surfaces (parking spaces, schoolyards, etc.). One main goal is to improve the living comfort of inhabitants and in particular the fight against urban heat islands.
	Possible barriers and measures to address them	➢ Urban space is constrained by the diversity of uses (vegetation, circulation of cars and bicycles, parking) ➢ The increase in green spaces implies increased maintenance and therefore a greater financial and human burden. ➢ Integrated rainwater management is seen as taking a risk compared to traditional "all pipes", particularly because of the difficulty of accepting water overflows. **Coming soon :** ➢ Updating of the "Biodiversity and Landscape" work in the town planning document "PLUi" , with numerous planting and depermeabilization projects ➢ Launch of a study on disconnecting rainwater from the water network
	Exploratory levers	None
Impact & cost	Generated renewable energy (if applicable)	None
	Removed/substituted energy, volume, or fuel type	Not applicable
	GHG emissions reduction estimate (total) per emission source sector	Not applicable
	GHG emissions compensated (natural or technological sinks)	Emissions offset by carbon storage in urban green elements: the 33,000 urban trees in the territory sequester between 1 and 2 ktCO2 annually
	Total costs	Not applicable

Action outline	Action name	**23. Limit soil destruction and preserve natural, agricultural and forest areas**
	Action type	X. Preserve resources and biodiversity in a context of climate change and sequester carbon
	Action description	- *Reduce mineralized lands* - *Deepen knowledge of the impact of climate change on our resources* - *Preserve agricultural areas in planning documents* - *Strengthen compensation measures for the construction on agricultural land* - *Vegetate our towns and villages* - *Preserve our water resources* - *Commit to a policy adapted to preserve biodiversity*
Reference to impact pathway	Impact pathway	**Impact pathway 6**: Promote carbon sequestration and nature-based solutions
	Systemic lever	7. Biodiversity and natural resources 8. Urbanism
	Outcome (according to module B-1.1)	Not applicable
Implementation	Responsible bodies/person for implementation	French Government, Grenoble Alpes Metropole, cities, city developers
	Action scale & addressed entities	Grenoble Alpes Metropole, cities, agricultural sphere
	Involved stakeholders	Grenoble Alpes Metropole, cities, farmers, foresters
	Comments on implementation – consider mentioning resources, timelines, milestones	The artificialization of land reinforces the threats on the ecosystems and resources. The Climate plan aims to limit the soil destruction, to preserve natural, agricultural and forest areas, to preserve aquatic environments and restore wetland, biodiversity as well as forests in their different functions, notably sequestration : ➢ More than 100 ha reverted to zones A (Agricultural) or N (Natural) have been approved in the town planning document "PLUi" ➢ Protection perimeters for peri-urban natural and agricultural areas have been created (12 000 hectares) ➢ GAM financially compensate the potential impacts on agricultural land ➢ Creation of the first observatory for monitoring the impact of climate change and anthropogenic pressure on environments « ORCHAMPS » **Coming soon** : Development of a new biodiversity preservation strategy
	Possible barriers and measures to address them	➢ The decree implementing "Net Zero artificialization" (French law on soil destruction) does not sufficiently take into account biodiversity in construction projects, which is contradictory with the naturalization of the city ➢ A lack of cross-referenced and identified data to assess the loss of agricultural land ➢ Land control is complex for the restoration of wetlands
	Exploratory levers	None
Impact & cost	Generated renewable energy (if applicable)	None

	Removed/substituted energy, volume, or fuel type	Not applicable
	GHG emissions reduction estimate (total) per emission source sector	Not applicable
	GHG emissions compensated (natural or technological sinks)	Not applicable
	Total costs	Not applicable

Action outline	Action name	**24. Carbon sequestration, wood supply, biodiversity, leisure : develop sustainable forests**
	Action type	X. Preserve resources and biodiversity in a context of climate change and enhance carbon sequestration
	Action description	- *Preserve the diversity of forest roles* - *Develop a quality local wood-log industry* - *Determine the carbon storage potential of the territory and develop an action plan* - *Develop a forest sector with neighboring territories* - *Develop a metropolitan wood recovery plan*
Reference to impact pathway	Impact pathway	**Impact pathway 6**: Promote carbon sequestration and nature-based solutions
	Systemic lever	7. Biodiversity and natural resources
	Outcome (according to module B-1.1)	Not applicable
Implementation	Responsible bodies/person for implementation	Inter-territory partners, Grenoble Alpes Metropole, cities, foresters, private owners
	Action scale & addressed entities	Inter-territory partners, Grenoble Alpes Metropole, cities, foresters, private owners
	Involved stakeholders	Inter-territory partners, Grenoble Alpes Metropole, cities, foresters, private owners
	Comments on implementation – consider mentioning resources, timelines, milestones	The Metropole contributes to sustainable forest management by: ➢ the development of a forest service plan ➢ development of a forest sector in cooperation with neighboring territories ➢ adherence to the PEFC label (sustainable management) ➢ awareness of risks in the forest (fire) **Coming soon :** Implement the forest sector framework deliberation adopted in 2023, to focus on the climate change adaptation
	Possible barriers and measures to address them	➢ A balance must be found between carbon sequestration and exploitation of the forest. ➢ The fragmentation of private forests is an obstacle to the structuring of a collective vision.
	Exploratory levers	None
Impact & cost	Generated renewable energy (if applicable)	None
	Removed/substituted energy, volume, or fuel type	Not applicable
	GHG emissions reduction estimate (total) per emission source sector	Not applicable
	GHG emissions compensated (natural or technological sinks)	Natural sink : 148 ktCO2 sequestered in forest soils and in wood products
	Total costs	Not applicable

Action outline	Action name	**25. Decarbonize the industrial sector**
	Action type	XI. Industry
	Action description	- *Valorize fatal heat from the industry* - *Mobilize industrial actors* - *Ecological industry project (Ecologie écologique)* - *Economic strategy 2030 (Stratégie économique 2030 Grenoble Alpes), available land etc* - *Support for the Axelera competitiveness cluster and SCIC Crisalid for innovation in carbon sequestration*
Reference to impact pathway	Impact pathway	**Impact pathway 4**: Decarbonizing Industry
	Systemic lever	9. Economy and Industry
	Outcome (according to module B-1.1)	Not applicable
Implementation	Responsible bodies/person for implementation	Industries, Grenoble Alpes Metropole
	Action scale & addressed entities	Local to international
	Involved stakeholders	Industries, Grenoble Alpes Metropole, national ministries
	Comments on implementation – consider mentioning resources, timelines, milestones	The industrial sector has contributed greatly to reducing the carbon emissions. Mobilisation of industrial actors can be further strengthened by identifying main emittors and developing collaborations. **Coming soon :** New industrial activities (Verkor, ALEDIA), innovations, CEC Alpes Convention of Climate, CSR, renovation of tertiary buildings
	Possible barriers and measures to address them	➢ Local levers have limited influence on this sector, changes in national and European laws are necessary
	Exploratory levers	Beyond metropolitan influence, new national goals on reducing carbon emissions from the industrial sector by 40 % in 2030, will contribute to this action.
Impact & cost	Generated renewable energy (if applicable)	None
	Removed/substituted energy, volume, or fuel type	Not applicable
	GHG emissions reduction estimate (total) per emission source sector	285
	GHG emissions compensated (natural or technological sinks)	Not applicable
	Total costs	Not applicable, the economic model does not calculate costs for this lever

3.2.1 Summary strategy for residual emissions

In order for Grenoble Alpes Metropole to become climate neutral, there is a need to phase-out fossil energy and to continuously seek new ways to bring down residual emissions close to zero. As the table 8: Emissions Gap shows, residual emissions that will not yet have been reduced to zero by 2030 will most importantly stem from the sectors of electricity, waste and industry. The electricity production in France is national and the Metropole has limited potential of energy production on its territory, so it has restricted possibility to influence this sector.

When it comes to the waste sector, much effort is being made at the moment and the metropole already has a very important programme of renewing the recycling and waste treatment plants up until 2030. Achieving a zero emission, and thus zero plastics is not possible within such a short amount of time.
Finally on the industrial sector, the emissions due to this sector are difficult to reduce in the timeframe available and largely dependent on national and European actions. The will is to continue to develop the industrial sector of the metropolitan territory, but also to reduce emissions by energy efficiency measures, decarbonisation of the energy used and its processes, as well as developing the exchange of industrial fatal heat/cold with the district heating system.

Several strategies are being used to offset residual emissions in the area, and new ones need to be explored. The territory's main carbon sinks are the forest, which covers some 30,000 ha, or 55% of its territory, and, to a lesser extent, agricultural soils and wetlands. The forest (its soil, living trees and dead trees) stores around 140 kteqCO2 annually according to an ENERDATA/Solagro assessment based on 2018 data, equivalent to 8% of the territory's emissions.

Nevertheless, the latest studies on the national forest sink show a shrinking capacity for carbon storage by forests after several consecutively warm years. The Grenoble region, where beech and spruce are very present locally, is therefore at risk of losing some of its sequestration capacity.

The challenge is to maintain the region's sequestration capacity, and to avoid damaging the absorption capacity of neighbouring areas, by helping to set up wood-energy supply chains that respect the availability of the resource. An inter-territorial forestry strategy to encourage local use of wood and develop carbon sequestration has been put in place for 2019. The Chartreuse forest and wood label, of which the Metropole is a partner, is also an asset for sustainable management of the resource, the environment and, of course, carbon sequestration (standing trees as well as construction wood). 24% of the forest area has also been awarded the PEFC label, guaranteeing sustainable management practices. The Regional Wetland Restoration Plan and the Agricultural Strategy also include actions to maintain and even strengthen carbon sequestration in wetlands and soils.

The metropolitan GHG Assessment estimated the carbon sequestration of metropolitan forests and natural lands at around 4,000 tCO2e/year. The study shows that trees along roads and isolated trees, spread across the whole territory, contribute around 60% to the carbon sequestration of the metropole's assets, while forest plots (almost 300 ha) account for the remaining 40%.

The Canopy Plan, launched in February 2022, aims to help the urban areas of the 49 communes of the territory to adapt to climate change, but also to green the metropole by increasing the number of trees and thus contribute to carbon sequestration. Almost 27% of the metropole's urban area is covered by canopy (in other words, the shade provided by the foliage of trees). The aim is to reach 30% canopy cover by 2030 and 40% by 2050, to enable trees to have a cooling effect on the city. What's more, today all parking lots must be at least 30% permeable.

At the same time, the Metropole is encouraging the use of timber in construction and in the making of the city, through the decarbonisation objectives for new buildings set out in the Land Use Regulation Plan, and through the projects developed through its implementation, for which the plan strives to ensure exemplarity.

The metropole also has a long-term vision of using carbon capture techniques to offset its emissions. The transition plan drawn up as part of the metropole's GHG assessment includes the objective of studying the possibility of setting up a carbon capture system at the incinerator outlet, as soon as the technologies are mature. A first step has been taken by guaranteeing the availability of land: a plot of land next to the existing waste incineration plant has been set aside for this purpose.

The district heating provide (Compagnie de Chauffage), which operates one of France's largest heating networks on behalf of Grenoble-Alpes Metropole, and CEA-Liten, Europe's leading research centre dedicated to energy transition, have also just renewed their partnership for a further 4 years. A key focus of the partnership is to further decarbonize heat production by studying carbon capture solutions and local recovery of the captured CO2 (P2X, Power to X).

However, in a financially constrained context, the cost/effectiveness of such investment in capturing residual emissions, if it were to be borne by the local authority, would have to be weighed against the cost/effectiveness of actions to be taken to reduce the region's carbon footprint.

Finally, at this stage, the metropole has not put in place a strategy for offsetting carbon emissions, the priority being to reduce emissions. However, a study will shortly be carried out into the possibilities of facilitating the financing of carbon sequestration or mitigation projects in the area through carbon offsetting schemes, via tool such as a carbon cooperatives.

In conclusion, Grenoble Alpes metropole has an active strategy to preserve and further develop natural carbon sinks and subsequent negative emissions within the territory.

3.3 Module B-3 Indicators for Monitoring, Evaluation and Learning

The Metropole, with the support of ALEC and ATMO (agreement with ATMO, contract with ALEC), carries out an annual GHG/Energy/Air assessment on a territorial scale as well as monitoring of observation indicators since 2005, all brought together in the Climate Observatory Letter.

The main annual figures of the Climate Observatory Letter are communicated on the website of the climate plan partners, and formalized in a "SECAP Observatory Letter ". In addition, the Magazine de la Metropole (https://www.lametro.fr/26-magazine-metropole.htm) presents news on the SECAP every 2 months, being particularly clear, exhaustive and educational in terms of elements on Climate/ Air/Energy issues. The Climate Plan Forum, organized once a year by the Metropole, allows for indicators to be presented to all partners, particularly the municipalities and debates and discussions to be held.

Finally, to learn and progress together with the SECAP partners, joint reflection is a priority. Some examples are the times for exchanges and feedback within the annual Forum, more regularly in dedicated working groups for municipalities (ALEC animation) and also for businesses (local economic pact).

In complement to the already existing monitoring and learning system, additional indicators will be followed for the Climate City Contract, provided in Table 15. The indicators are taken from the NetZeroCities economic model which enabled to draw Grenoble Alpes Metropole's decarbonisation trajectory. The target values at 2025 and 2027 have been calculated based on the hypothesis of a linear progression from the 2019 baseline, to reach the chosen target at 2030.

In this first iteration of the Climate City Contract we only provide the target values for the obligatory indicators.

Table 15. Indicators for monitoring

Sector	Indicator No.	Indicator name		Target values		
				2025	2027	2030
			Baseline 2019 (ktoneCO2)	ktoneCO2	ktoneCO2	ktoneCO2
Stationary energy	1	GHG emission from stationary energy	467	213	128	3
	2	Energy use by fuel/energy type within city boundary				
Transport	3	GHG emission from transport	433	281	230	156
	4	Fuel consumption for in-boundary transportation per fuel type				
Waste	5	GHG emission from waste	92	64	54	41

	6	Mass of waste processed per end-of-life treatement type within city boundary				
	7	Mass of waste processed per end-of-life treatement type outside city boundary				
Industry	8	GHG emission from IPPU	700	545	493	416
	9	Emission generation potential per unit of input/output for industrial processes within the city boundary				
	10	Emissions from non-energy product use				
Agriculture, forestry, land use	11	GHG emission from AFOLU	10	10	10	10
	12	Net annual rate of change in carbon stocks per hectare of land				
	13	Local RES energy production				
	14	Energy Autonomy				
Energy	15	GHG emission from grid supplied energy	150	115	103	86
	16	Grid specific emission factor				
	17	Transmission and distribution loss factor for grid supplied energy				
Sequestration	18	Amount of permanent sequestration of GHG within city boundary	-			
Negative emissions	19	Negative emissions through natural sinks	123,7 ktCO2e/year			
		TOTAL (without sequestration)	1852	1231	1020	712

Table 16 : Indicator Metadata	
1	
Indicator Name	GHG emission from stationary energy (residential + tertiary buildings)
Indicator Unit	t CO2 equivalent
Definition	Green house gas emissions (mainly CO2 emissions) from the operations of buildings.
Calculation	Base emission information can be derived through "Amount of fuel consumption per fuel type x GHG emission per fuel type". Calculation methodology has been described in detail in GHG Protocol for Cities (GPC) pages 60 – 73.
Indicator Context	
Does the indicator measure direct impacts (reduction in greenhouse gas emissions?)	Yes
If yes, which emission source sectors does it measure?	Stationary Energy
Does the indicator measure indirect impacts (i.e., co- benefits)?	No
If yes, which co-benefit does it measure?	
Is the indicator useful for monitoring the output/impact of action(s)?	Yes
If yes, which action and impact pathway is it relevant for?	Systemic priority 1 : Renovate residential and commercial buildings to reduce the need of heating and improve territorial resilience Systemic priority 2 : Decarbonize heating, relying primarily on extended 100% carbon-free urban heating networks and renewable resources
Is the indicator captured by the existing CDP/ SCIS/ Covenant of Mayors platforms?	No
Data requirements	
Expected data source	ATMO
Is the data source local or regional/national?	Regional and local
Expected availability	Yes
Suggested collection interval	Yearly
References	
Deliverables describing the indicator	Letter of territorial GES and Air Quality observatory
Other indicator systems using this indicator	territorial GES and Air Quality observatory

2	
Indicator Name	Energy use by fuel/energy type within city boundary
Indicator Unit	MWh/year
Definition	Real consumption data for each fuel type disaggregated by sub-sector.
Calculation	Calculation formulae for stationary energy from GHG Protocol for Cities (GPC) pages 60 – 73.
Indicator Context	
Does the indicator measure direct impacts (reduction in greenhouse gas emissions?)	Yes

If yes, which emission source sectors does it measure?	Stationary Energy
Does the indicator measure indirect impacts (i.e., co- benefits)?	No
If yes, which co-benefit does it measure?	
Is the indicator useful for monitoring the output/impact of action(s)?	Yes
If yes, which action and impact pathway is it relevant for?	Systemic priority 1 : Renovate residential and commercial buildings to reduce the need of heating and improve territorial resilience Systemic priority 2 : Decarbonize heating, relying primarily on extended 100% carbon-free urban heating networks and renewable resources
Is the indicator captured by the existing CDP/ SCIS/ Covenant of Mayors platforms?	No
Data requirements	
Expected data source	ATMO
Is the data source local or regional/national?	local
Expected availability	Available, to be calculated
Suggested collection interval	Yearly
References	
Deliverables describing the indicator	Letter of territorial GES and Air Quality observatory
Other indicator systems using this indicator	territorial GES and Air Quality observatory

3	
Indicator Name	GHG emission from transport
Indicator Unit	MWh/year
Definition	Real consumption data for each fuel type disaggregated by sub-sector.
Calculation	Calculation formulae for stationary energy from GHG Protocol for Cities (GPC) pages 60 – 73.
Indicator Context	
Does the indicator measure direct impacts (reduction in greenhouse gas emissions?)	Yes
If yes, which emission source sectors does it measure?	Transport and Mobility
Does the indicator measure indirect impacts (i.e., co- benefits)?	No
If yes, which co-benefit does it measure?	
Is the indicator useful for monitoring the output/impact of action(s)?	Yes
If yes, which action and impact pathway is it relevant for?	Systemic priority 3 : Develop carbon-free mobility
Is the indicator captured by the existing CDP/ SCIS/ Covenant of Mayors platforms?	Yes
Data requirements	
Expected data source	ATMO
Is the data source local or regional/national?	local

Expected availability	Yes
Suggested collection interval	Yearly
References	
Deliverables describing the indicator	Letter of territorial GES and Air Quality observatory
Other indicator systems using this indicator	territorial GES and Air Quality observatory

4	
Indicator Name	Fuel consumption for in-boundary transportation per fuel type
Indicator Unit	MJ/kg/kWh
Definition	Emissions per fuel type emerging from the operations of vehicles.
Calculation	Calculation formulae for Transport indicators from GHG Protocol for Cities (GPC) pages 75 to 87.
Indicator Context	
Does the indicator measure direct impacts (reduction in greenhouse gas emissions?)	Yes
If yes, which emission source sectors does it measure?	Transport and Mobility
Does the indicator measure indirect impacts (i.e., co- benefits)?	No
If yes, which co-benefit does it measure?	
Is the indicator useful for monitoring the output/impact of action(s)?	Yes
If yes, which action and impact pathway is it relevant for?	Systemic priority 3 : Develop carbon-free mobility
Is the indicator captured by the existing CDP/ SCIS/ Covenant of Mayors platforms?	Yes/No
Data requirements	
Expected data source	ATMO
Is the data source local or regional/national?	Local, regional, national (combination of data from different sources)
Expected availability	Yes
Suggested collection interval	Yearly
References	
Deliverables describing the indicator	Letter of territorial GES and Air Quality observatory
Other indicator systems using this indicator	territorial GES and Air Quality observatory

5	
Indicator Name	GHG emission from waste
Indicator Unit	t CO2 equivalent
Definition	Green house gas emissions from waste treatment, waste incineration and landfills
Calculation	Quantity of waste per End-of-life (EoL) treatment type x emission factors per EoL treatment. Detailed methods for different waste types are defined under GPC, pages 89 - 107
Indicator Context	
Does the indicator measure direct impacts (reduction in greenhouse gas emissions?)	Yes

If yes, which emission source sectors does it measure?	Waste and Water
Does the indicator measure indirect impacts (i.e., co- benefits)?	No
If yes, which co-benefit does it measure?	
Is the indicator useful for monitoring the output/impact of action(s)?	Yes
If yes, which action and impact pathway is it relevant for?	Systemic priority 4 : Develop waste management facilities and collection and circular economy
Is the indicator captured by the existing CDP/ SCIS/ Covenant of Mayors platforms?	Yes
Data requirements	
Expected data source	ATMO
Is the data source local or regional/national?	Local
Expected availability	Yes on scope 1, no data on scope 3
Suggested collection interval	Yearly
References	
Deliverables describing the indicator	Letter of territorial GES and Air Quality observatory
Other indicator systems using this indicator	territorial GES and Air Quality observatory

6	
Indicator Name	Mass of waste processed per end-of-life treatement type within city boundary
Indicator Unit	t CO2 equivalent
Definition	Depending on end-of-life treatment options available in the city boundary, the city can report mass of waste sent towards each treatement type.
Calculation	Detailed calculation and scoping methodology described in GPC, pages 89 - 107
Indicator Context	
Does the indicator measure direct impacts (reduction in greenhouse gas emissions?)	Yes
If yes, which emission source sectors does it measure?	Waste and Water
Does the indicator measure indirect impacts (i.e., co- benefits)?	No
If yes, which co-benefit does it measure?	
Is the indicator useful for monitoring the output/impact of action(s)?	Yes
If yes, which action and impact pathway is it relevant for?	Systemic priority 4 : Develop waste management facilities and collection and circular economy
Is the indicator captured by the existing CDP/ SCIS/ Covenant of Mayors platforms?	Not known
Data requirements	
Expected data source	Waste department
Is the data source local or regional/national?	Local
Expected availability	Yes
Suggested collection interval	Yearly
References	

Deliverables describing the indicator	Yearly report from waste department
Other indicator systems using this indicator	-

7	
Indicator Name	Mass of waste processed per end-of-life treatement type outside city boundary
Indicator Unit	t CO2 equivalent
Definition	If waste types or end-of-life treatements are unknown for exported waste, a singular "mixed waste exported" weight can be reported. If waste types and treatement types are known, then all data can be reported.
Calculation	Detailed calculation and scoping methodology described in GPC, pages 89 - 107
Indicator Context	
Does the indicator measure direct impacts (reduction in greenhouse gas emissions?)	Yes
If yes, which emission source sectors does it measure?	Waste and Water
Does the indicator measure indirect impacts (i.e., co- benefits)?	No
If yes, which co-benefit does it measure?	
Is the indicator useful for monitoring the output/impact of action(s)?	Yes
If yes, which action and impact pathway is it relevant for?	Systemic priority 4 : Develop waste management facilities and collection and circular economy
Is the indicator captured by the existing CDP/ SCIS/ Covenant of Mayors platforms?	Not known
Data requirements	
Expected data source	No data
Is the data source local or regional/national?	Not calculated
Expected availability	Not planned
Suggested collection interval	
References	
Deliverables describing the indicator	
Other indicator systems using this indicator	-

8	
Indicator Name	GHG emission from IPPU
Indicator Unit	t CO2 equivalent
Definition	Greenhouse gas emissions from industrial processes and product use within city boundary.
Calculation	GHG emission calculation methodology for the IPPU sector is described in detail in the 2014 IPCC Mitigation of Climate Change, chapter 10, page 746. City-level calculation and scoping methodology described in GPC, pages 109 onward.
Indicator Context	
Does the indicator measure direct impacts (reduction in greenhouse gas emissions?)	Yes

If yes, which emission source sectors does it measure?	Industrial Processes and Product Use (IPPU)
Does the indicator measure indirect impacts (i.e., co- benefits)?	No
If yes, which co-benefit does it measure?	
Is the indicator useful for monitoring the output/impact of action(s)?	Yes
If yes, which action and impact pathway is it relevant for?	Systemic priority 5 : Decarbonize the industry
Is the indicator captured by the existing CDP/ SCIS/ Covenant of Mayors platforms?	Not known
Data requirements	
Expected data source	ATMO
Is the data source local or regional/national?	Local, regional, national (combination of data from different sources)
Expected availability	Yes
Suggested collection interval	Yearly
References	
Deliverables describing the indicator	Letter of territorial GES and Air Quality observatory
Other indicator systems using this indicator	territorial GES and Air Quality observatory

9	
Indicator Name	Emission generation potential per unit of input/output for industrial processes within the city boundary
Indicator Unit	CO2 equivalent per kg of production
Definition	The carbon intensity of products produced in the city. These are defined using the GHG emissions from industrial processes, which may include the production and use of mineral products (e.g. cement, lime, glass), chemicals (inorganic and organic) and metals.
Calculation	Detailed calculation and scoping methodology described in GPC, page 109 onward. Emission factors per material can be found in 2006 IPCC Guidelines for National Greenhouse Gas Inventories, volume 3.
Indicator Context	
Does the indicator measure direct impacts (reduction in greenhouse gas emissions?)	Yes
If yes, which emission source sectors does it measure?	Industrial Processes and Product Use (IPPU)
Does the indicator measure indirect impacts (i.e., co- benefits)?	No
If yes, which co-benefit does it measure?	
Is the indicator useful for monitoring the output/impact of action(s)?	Yes
If yes, which action and impact pathway is it relevant for?	Systemic priority 5 : Decarbonize the industry
Is the indicator captured by the existing CDP/ SCIS/ Covenant of Mayors platforms?	no
Data requirements	
Expected data source	No data

Is the data source local or regional/national?	Not calculated
Expected availability	-
Suggested collection interval	No data
References	
Deliverables describing the indicator	
Other indicator systems using this indicator	

10	
Indicator Name	Emissions from non-energy product use
Indicator Unit	T CO2 equivalent
Definition	Greenhouse gas emissions from industrial product use, which may include: the use of lubricants and paraffin waxes in non-energy products, FC gases used in electronic production and Fluorinate gases used as substitutes for Ozone depleting substances.
Calculation	Detailed calculation methodology described in GPC, Equation 9.5. Adapted from 2006 IPCC Guidelines for National Greenhouse Gas Inventories, chapter 3.' Emission factors can be found in the IPCC Emissions Factor Database (EFDB).
Indicator Context	
Does the indicator measure direct impacts (reduction in greenhouse gas emissions?)	Yes
If yes, which emission source sectors does it measure?	Industrial Processes and Product Use (IPPU)
Does the indicator measure indirect impacts (i.e., co- benefits)?	No
If yes, which co-benefit does it measure?	
Is the indicator useful for monitoring the output/impact of action(s)?	Yes
If yes, which action and impact pathway is it relevant for?	Systemic priority 5 : Decarbonize the industry
Is the indicator captured by the existing CDP/ SCIS/ Covenant of Mayors platforms?	no
Data requirements	
Expected data source	**ATMO**
Is the data source local or regional/national?	Local
Expected availability	Fall
Suggested collection interval	Yearly
References	
Deliverables describing the indicator	Letter of territorial GES and Air Quality observatory
Other indicator systems using this indicator	territorial GES and Air Quality observatory

11	
Indicator Name	GHG emission from AFOLU
Indicator Unit	t CO2 equivalent
Definition	IPCC guidelines divides AFOLU emission activities into three categories: Livestock, Land, Aggregate sources and non-CO2 emissions sources on land. The cumulative of

	these emissions forms the sectoral emissions. It requires identifying which categories of the AFOLU sector are relevant for reporting purposes.
Calculation	Detailed calculation and scoping methodology described in GPC pages 121- 137
Indicator Context	
Does the indicator measure direct impacts (reduction in greenhouse gas emissions?)	Yes
If yes, which emission source sectors does it measure?	Agriculture, Foresty and other Land Use (AFOLU)
Does the indicator measure indirect impacts (i.e., co- benefits)?	No
If yes, which co-benefit does it measure?	
Is the indicator useful for monitoring the output/impact of action(s)?	Yes
If yes, which action and impact pathway is it relevant for?	Systemic priority 5 : Promote carbon sequestration and nature-based solutions
Is the indicator captured by the existing CDP/ SCIS/ Covenant of Mayors platforms?	No
Data requirements	
Expected data source	**ATMO**
Is the data source local or regional/national?	Local, regional
Expected availability	Yes
Suggested collection interval	Yearly
References	
Deliverables describing the indicator	Letter of territorial GES and Air Quality observatory
Other indicator systems using this indicator	territorial GES and Air Quality observatory

12	
Indicator Name	Net annual rate of change in carbon stocks per hectare of land
Indicator Unit	t CO2/ha
Definition	IPCC divides land-use into six categories: forest land; cropland; grassland; wetlands; settlements; and other. Further refinements for each land use category may be based on national or local definitions. Using national definitions for land use categories will promote consistency with the national GHG inventory, while local definitions may be more relevant to specific policies and measures being taken at the local level.
Calculation	Detailed calculation and scoping methodology described in GPC pages 121-137; Estimating carbon stock changes can also be derived from 2006 IPCC guidance, vol 4 chapter 2, the GPC Supplemental Guidance for Forest and Trees and the 2019 IPCC revision, section 4.
Indicator Context	
Does the indicator measure direct impacts (reduction in greenhouse gas emissions?)	Yes
If yes, which emission source sectors does it measure?	Agriculture, Foresty and other Land Use (AFOLU)

Does the indicator measure indirect impacts (i.e., co- benefits)?	No
If yes, which co-benefit does it measure?	
Is the indicator useful for monitoring the output/impact of action(s)?	Yes
If yes, which action and impact pathway is it relevant for?	Systemic priority 6 : Promote carbon sequestration and nature-based solutions
Is the indicator captured by the existing CDP/ SCIS/ Covenant of Mayors platforms?	No
Data requirements	
Expected data source	ALDO
Is the data source local or regional/national?	Local
Expected availability	Yes, data to be calculated
Suggested collection interval	Yearly
References	
Deliverables describing the indicator	Letter of territorial GES and Air Quality observatory
Other indicator systems using this indicator	Artificialisation departement

13	
Indicator Name	Local RES energy production
Indicator Unit	MWh
Definition	Annual local renewable energy production. It can be inferred that this indicator will prove useful for tracking the impact of the installation and operation of renewable energy projects over time. It will allow for the analysis of the before and after situation, as following the installation and operation of renewable energy projects (or as the difference between the annual renewable energy generation related to the project compared to the BAU case). It is possible to divide the annual total energy consumption compared to a previous baseline or inventory, and then multiply by it by 100 to express the difference/result as a percentage.
Calculation	Annual local renewable energy production is calculated by acquiring the total renewable energy generation within the city in a given year.
Indicator Context	
Does the indicator measure direct impacts (reduction in greenhouse gas emissions?)	Yes
If yes, which emission source sectors does it measure?	Energy Generation
Does the indicator measure indirect impacts (i.e., co- benefits)?	No
If yes, which co-benefit does it measure?	
Is the indicator useful for monitoring the output/impact of action(s)?	No
If yes, which action and impact pathway is it relevant for?	

Is the indicator captured by the existing CDP/ SCIS/ Covenant of Mayors platforms?	Yes
Data requirements	
Expected data source	ALEC
Is the data source local or regional/national?	Local
Expected availability	Yes
Suggested collection interval	Yearly
References	
Deliverables describing the indicator	Letter of territorial GES and Air Quality observatory
Other indicator systems using this indicator	territorial GES and Air Quality observatory

14	
Indicator Name	Energy Autonomy
Indicator Unit	%
Definition	The indicator highlights whether the local available energy is sufficient to meet the local energy demand and in turn, whether the city is energy autonomous or not.
Calculation	Local available energy/ total consumption x 100/1
Indicator Context	
Does the indicator measure direct impacts (reduction in greenhouse gas emissions?)	Yes
If yes, which emission source sectors does it measure?	Energy Generation
Does the indicator measure indirect impacts (i.e., co- benefits)?	No
If yes, which co-benefit does it measure?	
Is the indicator useful for monitoring the output/impact of action(s)?	No
If yes, which action and impact pathway is it relevant for?	
Is the indicator captured by the existing CDP/ SCIS/ Covenant of Mayors platforms?	No
Data requirements	
Expected data source	ALEC
Is the data source local or regional/national?	Local
Expected availability	Yes
Suggested collection interval	Yearly
References	
Deliverables describing the indicator	Letter of territorial GES and Air Quality observatory
Other indicator systems using this indicator	territorial GES and Air Quality observatory

15	
Indicator Name	GHG emission from grid supplied energy
Indicator Unit	t CO2 equivalent

Definition	GHG emissions occurring as a consequence of the use of grid-supplied electricity, heat, steam and/or cooling within the city boundary
Calculation	Detailed calculation and scoping methodology described in GPC pages 56 – 75.
Indicator Context	
Does the indicator measure direct impacts (reduction in greenhouse gas emissions?)	Yes
If yes, which emission source sectors does it measure?	Grid-supplied energy (electricity, heat, steam or cooling)
Does the indicator measure indirect impacts (i.e., co- benefits)?	No
If yes, which co-benefit does it measure?	
Is the indicator useful for monitoring the output/impact of action(s)?	Yes
If yes, which action and impact pathway is it relevant for?	Systemic priority 2 : Decarbonize heating, relying primarily on extended 100% carbon-free urban heating networks and renewable resources
Is the indicator captured by the existing CDP/ SCIS/ Covenant of Mayors platforms?	No
Data requirements	
Expected data source	ATMO
Is the data source local or regional/national?	Local
Expected availability	Yes, to be calculated
Suggested collection interval	Yearly
References	
Deliverables describing the indicator	Letter of territorial GES and Air Quality observatory
Other indicator systems using this indicator	territorial GES and Air Quality observatory

16	
Indicator Name	Grid specific emission factor
Indicator Unit	tCO2 eq/MWh
Definition	Mass GHG emissions per unit of grid-supplied energy
Calculation	Detailed calculation and scoping methodology described in GPC pages 56 – 75.
Indicator Context	
Does the indicator measure direct impacts (reduction in greenhouse gas emissions?)	Yes
If yes, which emission source sectors does it measure?	Grid-supplied energy (electricity, heat, steam or cooling)
Does the indicator measure indirect impacts (i.e., co- benefits)?	No
If yes, which co-benefit does it measure?	
Is the indicator useful for monitoring the output/impact of action(s)?	Yes
If yes, which action and impact pathway is it relevant for?	Systemic priority 2 : Decarbonize heating, relying primarily on extended 100% carbon-free urban heating networks and renewable resources
Is the indicator captured by the existing CDP/ SCIS/ Covenant of Mayors platforms?	Yes
Data requirements	

Expected data source	RTE
Is the data source local or regional/national?	national
Expected availability	Yes, to be calculated from emission factors of the networks
Suggested collection interval	Yearly
References	
Deliverables describing the indicator	Annual report of RTE
Other indicator systems using this indicator	-

17	
Indicator Name	Transmission and distribution loss factor for grid supplied energy
Indicator Unit	%
Definition	Average loss rate of the grid and amount of energy transmitted. These include losses from generation (upstream activities and combustion) of electricity, steam, heating, and cooling that is consumed (i.e., lost) in a Transmission and Distribution (T&D) system reported by end user. Localised Grid Loss Factors are usually provided by local utility or government publications.
Calculation	Transmission & Distribution Losses (%) = (Energy Input at Power Plants (kWh) – Billed Energy to Consumer (kWh)) / Energy Input (kWh) x 100 Detailed scoping methodology described in GPC standard 56-75 for various sectors and more specific calculations in the GPC scope 3 guidance, incl. pages 44-45. Transmission and distribution losses vary by location, see The World Bank's World Development Indicators (WDI) for an indication of national transmission and distribution losses as a percent of output, see: http://data.worldbank.org/indicator/EG.ELC.LOSS.ZS
Indicator Context	
Does the indicator measure direct impacts (reduction in greenhouse gas emissions?)	Yes
If yes, which emission source sectors does it measure?	Grid-supplied energy (electricity, heat, steam or cooling)
Does the indicator measure indirect impacts (i.e., co- benefits)?	No
If yes, which co-benefit does it measure?	
Is the indicator useful for monitoring the output/impact of action(s)?	No
If yes, which action and impact pathway is it relevant for?	
Is the indicator captured by the existing CDP/ SCIS/ Covenant of Mayors platforms?	No
Data requirements	
Expected data source	National grid companies
Is the data source local or regional/national?	national
Expected availability	Yes, but need to make the link with the companies
Suggested collection interval	Yearly
References	

Deliverables describing the indicator	So far, none
Other indicator systems using this indicator	unknown

18	
Indicator Name	Amount of permanent sequestration of GHG within city boundary
Indicator Unit	t CO2 equivalent
Definition	This indicator supports the reporting of carbon sequestration through "Technological sinks", such as Biomass for Energy with Carbon Capture and Storage (BECCS) and Direct Air Carbon Dioxide Capture and Storage (DACCS) technologies. This indicator can only be reported for Carbon Capture Project (CCP) applications which result in permanent sequestration of the CO2 (i.e., injected into geological structures)
Calculation	Direct reporting from Carbon Credit Projects (CCP) basedn on C40 guidance: C40 and NYC Mayor's Office of Sustainability, Defining Carbon Neutrality for Cities and Managing Residual Emissions. Cities' perspective, C40, 2019.
Indicator Context	
Does the indicator measure direct impacts (reduction in greenhouse gas emissions?)	Yes
If yes, which emission source sectors does it measure?	Carbon Removal and Residual Emissions
Does the indicator measure indirect impacts (i.e., co- benefits)?	No
If yes, which co-benefit does it measure?	
Is the indicator useful for monitoring the output/impact of action(s)?	Yes
If yes, which action and impact pathway is it relevant for?	Systemic priority 6 : Promote carbon sequestration and nature-based solutions
Is the indicator captured by the existing CDP/ SCIS/ Covenant of Mayors platforms?	Yes
Data requirements	
Expected data source	Economic development department
Is the data source local or regional/national?	There is no permanent sequestration of metropolitan territory
Expected availability	Depending on whether this activity starts
Suggested collection interval	Yearly
References	
Deliverables describing the indicator	-
Other indicator systems using this indicator	-

19	
Indicator Name	Negative emissions through natural sinks
Indicator Unit	t CO2 equivalent

Definition	"Natural sinks" refer to the planting of trees or other conversion of land use. Cities are allowed to account for negative emissions through the enlargement or enhancement of natural sinks within the territory to address residual emissions (accounting for all changes in the carbon stock). Carbon sinks should be accounted for as part of the 'AFOLU' sector of the GHG inventory and can be independently monitored as a progress indicator to show negative emissions.
Calculation	Refer to AFOLU indicators section
Indicator Context	
Does the indicator measure direct impacts (reduction in greenhouse gas emissions?)	Yes
If yes, which emission source sectors does it measure?	Carbon Removal and Residual Emissions
Does the indicator measure indirect impacts (i.e., co- benefits)?	No
If yes, which co-benefit does it measure?	
Is the indicator useful for monitoring the output/impact of action(s)?	Yes
If yes, which action and impact pathway is it relevant for?	Systemic priority 6 : Promote carbon sequestration and nature-based solutions
Is the indicator captured by the existing CDP/ SCIS/ Covenant of Mayors platforms?	No
Data requirements	
Expected data source	ALDO, ADEME
Is the data source local or regional/national?	Local, regional
Expected availability	Yes
Suggested collection interval	Yearly
References	
Deliverables describing the indicator	Letter of territorial GES and Air Quality observatory
Other indicator systems using this indicator	territorial GES and Air Quality observatory

4 Part C – Enabling Climate Neutrality by 2030

Part C "Enabling Climate Neutrality by 2030" aims to outline any enabling interventions, i.e., regarding organizational setting or collaborative governance models or related to social innovations – designed to support the climate action portfolios (Module B-2).

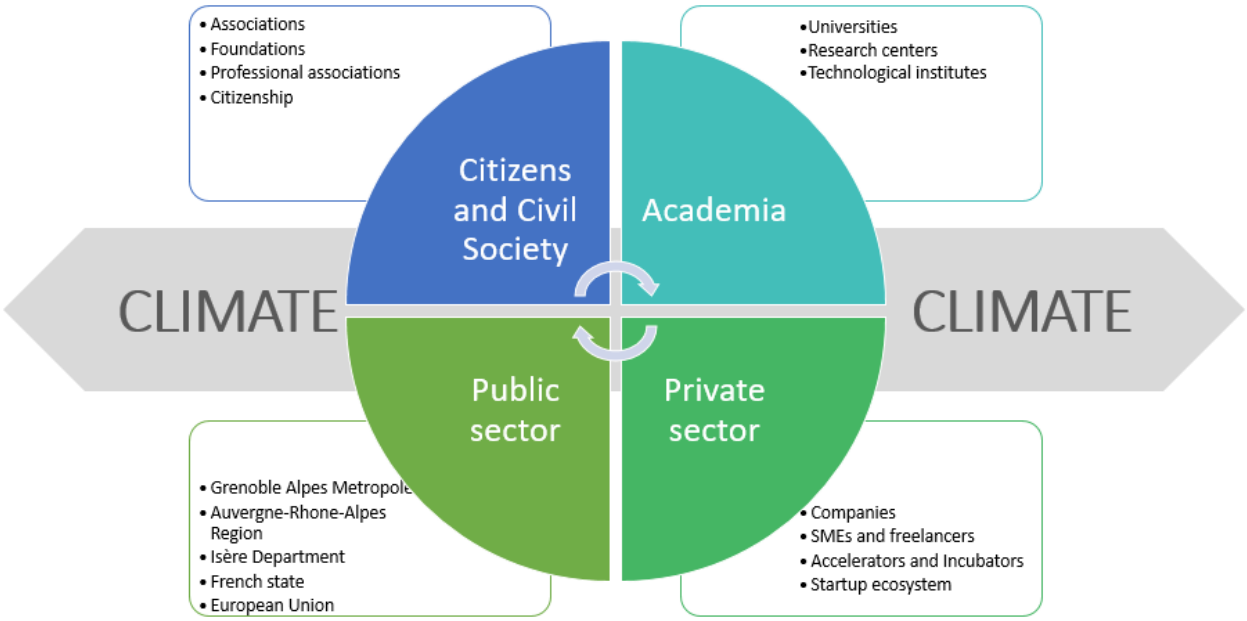
4.1 Module C-1 Governance Innovation Interventions

Overall, metropole has a governance framework based on a multi-stakeholder structure with climate action as the main objective. Four groups can be considered as the main actors in this system that contribute to the advancement of the climate action and climate neutrality:

- Public sector
- Private sector
- Academia
- Citizens and civil society

Figure 11 below, shows the key stakeholders in each group of actors of the system.

Figure 11: Multi-stakeholder governance framework



Grenoble Alpes Metropole has multiple working methods to integrate each actor in the fight against climate change. This chapter will explain the main governance model and the main processes for mobilizing actors to facilitate joint climate action.

A notable event, to be highlighted above all, was the nomination of Grenoble as European Green Capital in 2022 (the evaluation is to be found in annex 15). This label is given by the European Commission to highlight the exemplary nature of a city in terms of ecological transition, encourage

new sustainable practices and create a network of innovative cities facing the ecological emergency. This title rewarded the climate action undertaken in the territory and the year was seized as an opportunity to accelerate the mobilization of all the actors and inhabitants of the territory. Grenoble is the second French city to obtain the title, after Nantes in 2013. Co-piloted with the city of Grenoble, the Department and the State within the framework of a Public interest group (GIP), it enabled the setting up of 750 events by public and private actors in the territory, the labelling of 350 stakeholder challenges, the dissemination of public awareness documents, the posting online of resources for action etc. The momentum that has been underway has continued since then within the framework of the climate plan partnership and the network dynamics in place. To find out more, visit the website for this label: https://greengrenoble2022.eu/

4.1.1 Internal governance of Grenoble Alpes Metropole

Committed for over 20 years to the fight against climate change, the community has had to change its organization several times in order to improve its efficiency in carrying Climate-Air-Energy issues within its organization chart. This was the case in particular in 2015, on the occasion of the change of status to become a metropole and with the creation of an Energy Transition Department in addition to the Environmental Department.

In 2022, it strengthened the place taken by Climate-Air-Energy issues within its organization chart, in accordance with the new political roadmap which designates climate as a priority of the mandate, by creating the Climate, Transitions and Contractualisation Department, directly attached to the General Director of Services, with a mission of steering, monitoring and cross-functional animation of the implementation of the Climate Air Energy Plan within the community, and of mobilizing financing for the transitions. The climate service is responsible for leading a cross-functional project team, which meets every two months to take stock of the progress of the action plan.

The objectives and actions planned in the SECAP are set out in the thematic master plans and strategic planning documents developed upstream or as a variation of the SECAP (Energy Master Plan, Waste Master Plan, Mobility Plan, Land Use Regulation Plan, Local Housing Plan, agriculture and forestry strategies, Exemplary Administration Plan, the Socially and Environmentally Responsible Purchasing Promotion Plan, Canopy Plan, Bicycle Plan, 2030 Economic Strategy, Circular Economy Strategy, etc.). They are distributed between operational departments in the SECAP Monitoring Table and integrated into the administration's "tree of objectives", which serves as a support for the annual management dialogue by each department. This management dialogue makes it possible to assess the achievement of objectives and verify whether human, financial and organizational resources are in line with these objectives, to allow for possible adjustments. The climate department also organizes SECAP project reviews once or twice a year by theme in the presence of the General Director of Services and Deputy General Directors concerned, making it possible to identify the obstacles encountered and levers to remedy them. Finally, the work undertaken on the climate assessment of the metropole's budget ("Climat Budget", see Investment Plan) now makes it possible to involve the various departments each year in the assessment of the consideration of Climate-Air-Energy issues in the various public policies of the Metropole.

Thus, beyond the SECAP project team, the entire general management college and the management committee are now mobilized in the implementation of the community's air-energy-climate policy and a majority of the community's agents carry out missions related to it. This collective mobilization was reinforced within the framework of the European Green Capital dynamic in 2022 and the metropolitan

Citizens' Convention for the Climate in 2022 and 2023 (participation in sessions and analysis of proposals).

The human resources mobilized for the implementation of the SECAP have been adapted and strengthened according to the needs identified, by reassigning missions and creating positions. Among these developments, we can mention the creation and strengthening of the Climate Transitions and Contractualisation Department (15 full-time employees, including 5 new positions), the strengthening of the Energy Transition Department now also in charge of the Air Quality policy (16 employees), the creation of a department in charge of steering the Bicycle Plan and the Canopy Plan, the mobilization of an urban planner on the bio-climatization of the PLUi and the mapping of urban heat islands; the creation of 3 new positions, within the attractiveness and economy pole (dedicated to the mobilization of economic actors, the animation of the Circular Economy Network and the animation of an Industrial Ecology Approach on the southern industrial park); the establishment of an energy mission within the Real Estate and Work Environment Department reinforced by 2 agents for the monitoring and optimization of consumption; the mobilization of an Employer Mobility Plan referent, the recruitment of 2 persons for the Inter-Territorial Food Project and collective catering mission managers, a Social Support Fund for Transitions mission manager, a citizen convention mission manager for the climate, and 1 agent reoriented towards expertise in supporting behavior change, 1 apprentice for the climate assessment of the budget, a mobility and rail mission manager with the DGS.

This inventory carried out at the beginning of 2024 makes it possible to identify a minimum of 40 positions directly assigned to the implementation of the SECAP, not including the agents of the waste department, those in charge of trees, risks, teams of project management of buildings and public spaces for the implementation of building renovation projects, cycle paths and infiltration/greening of public spaces, the transport operator SMMAG or the agents partially assigned to this or the time spent by the Deputy General Directors and other mobilized directors.

Finally, concerning innovation and citizen participation, the "Direction of Strategy, Innovation and Citizen Relations" was created to bring together several cross-functional functions of resources for services and expertise in metropolitan public action. The functions respond to three issues and identify three audiences:

1. Support services in the development of qualitative and efficient public action, innovative and more transparent, adapted to changes in society, the institution and the territory, in line with needs and uses.
2. Support elected officials and general management in terms of strategic decisions, in particular through support in terms of knowledge and understanding of territorial and institutional mechanisms.
3. Contribute to metropolitan construction in conjunction with local stakeholders – municipalities, civil society, universities, etc. – with whom it notably leads dialogue and exchange forums.

An exemplary metropole

Grenoble-Alpes Metropole has set itself the goal of becoming an exemplary administration in terms of climate and environmental impact. Numerous actions have been undertaken in this direction in recent years as part of its successive Climate Plans and the Territoires en Transitions (ex Cit'ergie) label. In order to structure and strengthen the momentum underway, Grenoble-Alpes Metropole initiated the development of an exemplary administration plan (PAE) in 2020.

This plan, built with all the services concerned, aims to capitalize on the work carried out, integrate the actions undertaken and supplement them as much as necessary in order to develop guidelines and a first concrete and prioritized action plan over 3 years. This plan includes a steering, monitoring and evaluation system. It defines the resources needed to run it. An assessment of the first PAE action plan was carried out at the end of 2023. In 2024, PAE 2 will be launched, which will offer an action plan co-constructed with the services and updated over the period 2024-2026.

Highlighted during the citizens' consultation, the exemplary nature of the Grenoble metropolitan area is an important dimension in the perspective of engaging the population and all stakeholders in the environmental transition.

Aligning the management of metropolitan assets (real estate, public lighting, water networks, etc.) with the objectives of the SECAP is essential. It will reduce the energy footprint of the Metropole, while improving the quality of work of the agents. With this in mind, the Metropole wishes to continue developing its strategy for rehabilitating and monitoring the consumption of its buildings and facilities, and in particular the renovation of the metropolitan headquarter Forum.

Grenoble-Alpes Metropole is responsible for all wastewater collection and treatment in its territory, from the user connection point to discharge into the Isère after treatment at the Aquapole treatment plant. Its mission is to build, renovate, maintain and operate all the sanitation networks and facilities used to transport wastewater, as well as the treatment plants. Today, the Metropole wants to reduce the energy consumption required for this wastewater treatment, while enhancing the energy potential that their treatment brings to light.

The Metropole also wishes to preserve the diversity, quality and quantity of water resources for its entire territory, particularly for mountain areas supplied by hillside springs. In this context, and through its PLUi, the Metropole ensures that land use and occupation are regulated in order to protect all drinking water supply catchments.

Implement energy accounting and GHG emissions from public buildings

Grenoble Alpes Metropole manages a building and facilities portfolio of approximately 500,000m2. Energy monitoring and control actions rely mainly on the Metropole's internal resources, via an "Energy" mission, made up of 3 people (reinforcement of 2 people at the end of 2022). Attached to the Buildings Department, this mission focuses on monitoring and optimizing consumption.

All buildings are subject to complete energy and technical monitoring via the Deepki software, extended to all buildings in the Metropole in 2023. In addition, the Metropole carries out numerous energy audits of the main buildings at stake.

A Real Estate and Energy Master Plan (SDIE), linked to the Exemplary Administration Plan, is underway to establish a work program, strengthen the energy efficiency of its assets and reflect on uses. The objectives selected are those of the tertiary decree (reference year chosen for Grenoble Alpes Metropole, 2019): -40% energy savings by 2030, -50% by 2040 and -60% by 2050.

According to the results of the Metropolitan GHG Assessment Report, "BEGES Patrimoine et Compétences", energy consumption in buildings does not represent the main challenge for the Metropole to reduce its GHG emissions. On the one hand, the energy consumed in buildings is largely decarbonized (district heating and electricity, no more fuel heating). On the other hand, fixed assets is responsible for the majority of the carbon emitted. However, the Metropole is carrying out an

ambitious building retrofitting program and a sobriety roadmap, implemented in 2022/2023 and renewed in 2023/24, as well as a strategy to optimize surfaces through the renovation/extension project of the Metropolitan headquarter Forum, expected to get the PassivHaus label.

Develop a building strategy including a renovation program

The Grenoble Metropole is in the process of formalizing its Real Estate Energy Master Plan, which will be finalized in 2024. Since the expansion of its territory in 2014 to 49 municipalities and the becoming a metropole in 2015, the number of inter-municipal agents has increased from 800 to 2,000, including more than 1,100 administrative staff, and the Metropole has welcomed into its portfolio new sites resulting from transfers of skills from municipalities or the department, with heterogeneous levels of energy performance.

In order to rationalize its assets, the Metropole chose to eco-renovate and expand its historic headquarter Forum – a “thermal strainer” from the 80s that no longer had the latest safety standards – rather than rebuilding a building from A to Z, in order to eventually accommodate 1,100 agents (today distributed in 9 different buildings) in a PassivHaus building (-80% energy consumption and GHG emissions expected). The headquarters construction project required freeing up the entire Forum site. Relocations were therefore necessary to transfer the agents to temporary sites, favoring the second life of unoccupied tertiary buildings in the city center, the future of which the Metropole is already studying. The two main structuring projects are led by the Metropole in terms of optimizing the uses of buildings and rationalizing it.

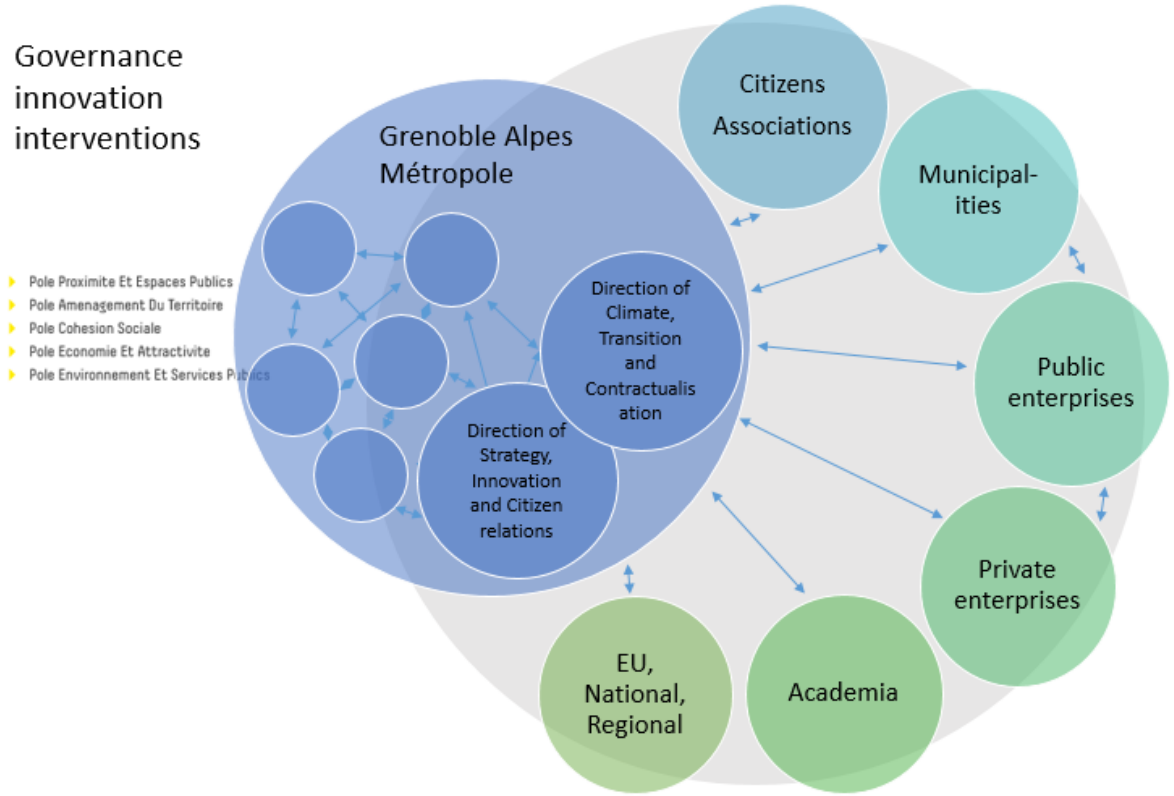
In parallel, the metropole has already started or planned renovation work on other buildings and facilities: renovation of the ice rink in 2020 (-36% energy consumption), renovation of the artisanal zone of Peupliers, renovation of the Ecole Supérieure d'Art et de Design, renovation of Alpes Congrès, etc. Finally, a flagship action of the Exemplary Administration Plan is the ongoing development of the “Sustainable Construction Guide”, an internal guide for taking into account climate and energy issues in the construction of metropolitan buildings.

4.1.2 External partnership governance

As stated by the SECAP, achieving its objectives will require ownership by all and unprecedented collective mobilization in its implementation. This is why the metropole is constantly working to include a wide range of external actors in order to accelerate climate action. Involving the entire innovation ecosystem of the metropole and even the territory means first involving citizens and civil society. The actions involving citizens are numerous and are described in more detail in the following chapter, "4.2 Social Innovation Interventions".

In addition to citizens, the Metropole works with a multitude of governance tools to create a partnership ecosystem for carbon neutrality. Figure 12 below shows the main levels of governance. A description of each level and its tools can be found in this chapter.

Figure 12: Partnership ecosystem



The municipalities

As part of its SECAP, the metropole works with "charters" to involve stakeholders (municipalities and external partners). While the Metropole has significant levers for action in the exercise of its powers, achieving these territorial objectives requires strong mobilization of citizens and all public, private and associative stakeholders. As such, the municipalities are essential partners of the SECAP, not only through the actions they are likely to undertake in the implementation of their powers on their assets (built, land, vehicle fleet, etc.), but also through the role of relay and information that they can play, as a local actor, with citizens and businesses in their municipality.

In this perspective, with the SECAP adopted in 2020, a new framework for the commitment of municipalities for the period 2020-2026 was developed in close consultation with them, called the "**Municipalities Commitment Charter**". 31 municipalities representing 94% of the territory's inhabitants are today signatories to the charter (each individual charter and action plan can be found here https://planclimat.grenoblealpesmetropole.fr/295-les-communes.htm). Each signatory is invited to develop a specific action plan, at the municipal level, with the individual and collective support of ALEC (technical and financial support through the provision of guides, facilitation of thematic workshops allowing stakeholders to improve their skills, with a dedicated website: Partners of the Climate Plan). To develop the charters, the municipalities choose the actions to be implemented within their scope (basic, regulatory, voluntary actions). https://planclimat.grenoblealpesmetropole.fr/37-charte-d-engagement.htm

Significant work was carried out in 2023 to cross-reference the actions of the municipality commitment charters with the citizens' proposals following the Citizens' Convention for the Climate. The actions of the charters responding to a proposal from the citizens were identified using a pictogram.

24 municipalities representing 66% of the territory's public lighting posts, are also committed through a charter for reducing public lighting consumption and light pollution, including 15 municipalities that benefit from the metropolitan public lighting service (€1.8 million of work financed since 2019). A Transition Assistance Fund for municipalities has been set up to finance their projects contributing to the implementation of the Climate Plan. The first 18 projects were supported in 2023 for an amount of €1.4 million.

The **Climate Plan Forum,** an event organized annually by Grenoble Alpes Metropole, brings together between 100 and 200 participants (municipalities, businesses, chambers of commerce, partners, the State, associations, etc., with the exception of the general public). The objective is to report on the achievement of the climate plan objectives and to share metropolitan actions taken in favour of transitions. Also, it is the moment to highlight municipal and territorial initiatives, and to be inspirated by current debate issues and how everyone is tackling them (e.g.: energy sobriety in 2022, how to involve all stakeholders in transitions through awareness-raising in 2023, etc.).

Public companies

The Metropole benefits from tools for the implementation of some of its public policies by different types of structures such as the SMMAG for mobility, the ALEC for the energy transition, the Eaux de Grenoble Alpes for the supply of drinking water or the Compagnie de Chauffage for district heating networks and renewable energies. Many of these structure are also shared with the neighbouring territories to share the benefits. For carbon neutrality, the most important public companies are:

SMMAG, Joint Urban Mobility Authority of the Grenoble area (SMMAG), brings together the mobility organizing authorities of the Grenoble metropolitan area, and the two neighboring territories Grésivaudan community of communes and Pays Voironnais urban community. Its mission is to organize mobility to serve the territories.

M'Tag (local public company) : On July 2, 2021, elected officials of the Grenoble metropolitan area unanimously adopted the transformation of this mixed economy company into a local public company, a 100% public structure, of which the SMMAG and the Grenoble metropolitan area are currently the only shareholders. The structure has three purposes: the operation, management and development of mobility and public transport services; provide advice, information and communication on mobility; and manage parking in park&rides.

The Heating Company (Companie de Chauffage or CCHIAG, mixed economy company): The Metropole is the majority shareholder of this mixed economy company which operates in the energy sector and carries out numerous investments, especially the district heating networks and renewable energy production projects.

Local Energy and Climate Agency (ALEC, local public company), created under associative status in 1998 at the initiative of Grenoble Alpes Metropole, ALEC has been a Local Public Company since 2020. ALEC implements the climate and energy transition policies of its shareholder communities: Grenoble Alpes Metropole (majority shareholder), the Department of Isère, 45 municipalities, the SMMAG and

an inter-municipal union (SIVOM du Néron). It is the main operator of the metropolitan Public Service for Energy Efficiency (SPEE). More broadly, it supports the public policies of local authorities in terms of energy and climate through information (informs, raises awareness and advises citizens on energy savings), support (for citizens in the energy renovation of their homes, for local authorities and businesses in the energy performance of their buildings, for local authorities in the definition and implementation of air-energy climate plans) and through training and equipping local stakeholders.

Waters of Grenoble Alpes (Eaux de Grenoble Alpe, local public company) provides all the drinking water services from wells to users' taps, as well as public sanitation services. The 3 main shareholders of SPL EDGA are Grenoble Alpes Metropole (67%), the City of Grenoble (20%), and the Le Grésivaudan Community of Communes (12%).

Private companies

The mobilization of economic actors has been in existence for a long time and has accelerated since 2020 with the establishment of dynamics at several scales. The main public-private collaborations are described in the following chapter.

The Local Economic Pact

The Local Economic Pact is a united and committed approach in favour of ecological, energy, digital and societal transitions, essential to the economic resilience and attractiveness of the Grenoble Alpes territory. Launched in 2021, this pact now brings together 32 of the largest public and private employers in the territory (34 planned for the end of 2024), which represents 54,000 jobs, or nearly a fifth of the jobs in the Greater Grenoble territory. Supported by the three communities (Grenoble-Alpes Metropole, Pays Voironnais and Grésivaudan), this partnership allows for local, concrete and united cooperation that is carried out through 25 collective actions and more than 280 individual actions. The Pact's partners are thus mobilizing through: local and responsible purchasing (on food, the circular economy, B2B events), the production and consumption of energy and resources (the planting of trees on car parks, work on energy efficiency and water), employee training (distribution of Climate frescoes or Carbon Conversations), changing practices (optimizing and reducing vehicle fleets, encouraging soft mobility), local partnerships (universities, research, peer-to-peer), the attractiveness of professions and the region. The list of partners of the pact and their individual roadmaps can be found annex 10 and 11.

Grenoble Alpes 2030 Economic Strategy

An economic development strategy can only be defined collectively, with all the stakeholders concerned. This is why Grenoble Alpes Metropole called upon the diversity of economic stakeholders in the region to define this Grenoble Alpes 2030 Economic Strategy: companies, associations, consular and socio-professional organizations, support structures, local elected officials: more than 150 participants (half of which were companies) mobilized to take part in the workshops that took place from March to May 2022. To ensure a diversity of profiles and points of view, criteria such as size, sector of activity and location were taken into account to constitute this panel, and 40% of the participating companies were drawn at random. The workshops allowed the drafting of an initial document which was subject to a collaborative review by volunteer participants using the so-called surveying methodology. This first version was completed with proposals from discussions with members of the Citizens' Convention for the Climate led by Grenoble Alpes Metropole. Out of 80

actions, it is estimated that three quarters have a positive ecological impact while the remaining quarter has a neutral impact. Each year, the Strategy is evaluated and amended during the Metropolitan Economic Dialogues with the entire economic sector.

The Convention of Entreprises for the Climate

Grenoble-Alpes Metropole has been supporting the CEC Alpes (Convention des Entreprises pour le Climat Alpes) since 2023, the second edition of which was launched in March 2024. The CEC Alpes is the local version of the CEC which took place in 2022 on a national scale. The CEC is a voluntary scheme aimed at business leaders (all sizes and all sectors) wishing to question the economic model of their structures in order to move from an extractive economy to a regenerative economy. Each leader of participating enterprises chooses a collaborator with whom they engage in a cycle of working sessions allowing them to raise awareness and consciousness, then the definition of a roadmap for each structure. This approach has already brought together 76 companies in 2023 (half of which are from the Metropole and 2/3 from the greater Grenoble region) and nearly 60 in 2024 (a third of which are from the Metropole and half from Greater Grenoble).

The Metropole called for this scheme (by welcoming its launch and granting it a subsidy of €30,000), an important element in encouraging companies to question and change their economic models, as well as for the influence of the Grenoble region on environmental issues.

Partner Commitment Charter

In line with the partner commitment charter of the previous climate plan and in complementarity with the municipality commitment charter, a new charter of commitment intended for the socio-economic actors of the territory is currently being finalized.

https://planclimat.grenoblealpesmetropole.fr/25-des-acteurs-engages.htm

Metropolitan experimentation strategy

In 2022, a metropolitan experimental strategy was launched with the following objectives: encourage the contribution of innovative solutions by a diversity of actors to public service issues, promote the emergence, maturation, validation and marketing of disruptive innovations, give project leaders the opportunity for a “proof of concept” and to promote experimentation in public service in order to improve its quality.

The first year, a call for experimentation was launched to stimulate innovation within the framework of the European Green Capital. This targeted traditional VSEs/SMEs, social and solidarity economy structures as well as project leaders from technology transfer wishing to test an innovative project at the product prototype stage (i.e. from a Technology readiness level (TRL) or technological maturity level equal to 7) or service. Thus, 10 projects were selected after the feasibility phase. 3 projects were able to be tested.

In 2023, a partnership with Air Liquide and the Solar Impulse Foundation was concluded to organize the Climate and Solutions Day, the objective of which was to accelerate transitions and provide concrete solutions to environmental issues. This day brought together public and private donors looking for solutions to the climate emergency and start-ups and SMEs providing solutions. The latter were found among the solutions labelled by the Foundation as well as locally. This event welcomed 130 participants and more than 175 BtoB meetings were organized. The metropolitan financial participation amounted to €20,500.

Support for social and solidarity economy stakeholders

For several years, the Grenoble metropolitan area has recognized companies and organizations in the social and solidarity economy as a model of sustainable economic and social development. Grenoble Alpes Metropole relies on an ecosystem of more than 200 actors and has defined 4 strategic objectives to develop this economy. The Metropole thus affirms its desire to combine economic efficiency and social and environmental resilience by:

- Support for the creation and development of ESS projects through the establishment and management of a dedicated business support program, based on a network of expert actors.
- Access to real estate as a lever to promote the development of the ESS and economic diversity.
- Financing the emergence and development of social innovation projects with high environmental and social added value, carried out by associations and cooperatives.
- The promotion of the ESS through territorial animation targeted at: Economic cooperation between stakeholders: for example, the establishment of ESS Meetings within the framework of the Local Economic Pact and the organization of ESS events such as the social and solidarity employment day.
- For the year 2023, the Metropole has thus mobilized €506,300 under the ESS support plan.

Circular economy development strategy

At the end of 2022, Grenoble Alpes Metropole adopted a strategy for developing the circular economy (Stratégie de développement de l'économie circulaire) among economic stakeholders in its territory for the period 2023-2026. 290 companies were mobilized to build this strategy based on their needs. The aim of this strategy is to support economic stakeholders in reducing their ecological impact through the rational use of resources and limited production of waste, while strengthening their positive economic impacts. 6 key actions implemented in 2023 form the basis of this strategy:

- The creation of Pôle R, a totem third place of 8,000 m² of buildings dedicated to circular economy activities.
- The launch of Circul'Alpes, the network of circular economy companies on December 1, 2023, to raise awareness among companies about the circular economy, facilitate cooperation and enable the creation of new activities.
- Support for the creation of circular economy activities, through the partnership with the Ronalpia business incubator, with 10 project leaders made aware of the circular economy, and the "waste reduction and circular economy" call for projects , with 13 projects supported for an amount of €100,000.
- Communication on the "Ecological transition of companies" service offer with the publication of the "Companies in transition" guide.
- Incentive through the exemplary nature of the Metropole in public purchases, in particular the reuse of materials from the Metropole headquarters reconstruction project.
- The Interreg alpine Space ECOLE project (more information below)

Industrial ecology project on the southern industrial park and the Metropole

At the heart of the leading chemical production region in France and the second in Europe, the region has 15,000 jobs in the chemical and clean-tech sectors. From the development of basic products to the

production of fine chemicals, all of the sector's activities are represented through two platforms considered exemplary in terms of industrial ecology. A region committed to environmental issues, Grenoble Alpes Metropole also relies on the presence of actors specializing in clean-tech (air and water quality, energy efficiency of buildings, environmental engineering, etc.)

The European Interreg ECOLE programme aims to accelerate the transition towards more circular and efficient industrial parks in the Alpine region. To participate in this project, the Metropole has selected the Southern Industrial Parc, called HYtech Valley (which extends over the municipalities of Jarrie, Champ-sur-Drac, Pont-de-Claix, Champagnier, Vizille), which simultaneously presents significant energy and decarbonization challenges, a strong partnership dynamic between companies on the one hand (grouped in the association of industrialists of South Grenoblois), and Grenoble Alpes Metropole on the other hand. To arrive at an integrated industrial park model, applying the principles of the circular economy and industrial and territorial ecology, the Metropole works with companies in the area and beyond to identify the challenges on incoming and outgoing material flows as well as the needs for mutualisation in the area.

Support for very small, small and medium-sized businesses

Measures have also been put in place to support small and medium-sized businesses in energy renovation (MurMur TPE/PME, aid for investment work by businesses), energy savings and the decarbonisation of their logistics. Some examples are free energy diagnostics and direct investment aid (energy renovation of buildings, less energy-consuming equipment), personalised consultancy services to decarbonise vehicle fleets, events on vehicle fleets with companies in the Local Economic Pact and aid for the acquisition of less polluting vehicles (Air Vehicle Fund). In addition, the Metropole also supports businesses in transitions (training restaurateurs to learn non-meat cooking, “Clé Verte” label, “Maitre Restaurateur” label and the promotion of local products from the “Nos produits Is Here” brand.

Academia, research and innovation institutions

Science plays an important role in objectifying, monitoring and evaluating public policies, particularly in the context of climate policies where the path to transition is fraught with uncertainty. Grenoble has a long tradition of cooperation between university and research, public authorities and local businesses (particularly in innovation logics). This research is developing in various fields ranging from energy sciences with the CEA (Commissariat à l'Énergie atomique), digital or earth sciences, as well as geography or political sciences.

This favorable environment, marked by the entry of the University of Grenoble-Alpes into the top 100 of the Shanghai ranking in 2020, has developed numerous bridges with local policies. The most obvious expression is the establishment of the **scientific council** created during the Green Capital year 2022. Composed of around thirty local researchers in a multidisciplinary approach, it is part of the long term objective of supporting the 2020-2030 climate plan.

Grenoble-Alpes Metropole also contributes to various research projects in the region (QAMECS Mobil'air, Predict'air Chair) as well as to university chairs ("territories in transition" with Grenoble-école de management, "energy insecurity" HOPE with Institut Polytechnique de Grenoble and "Public innovation" on issues of behavioral change with ENA). Behavioral change is a fundamental aspect of the path towards carbon neutrality and the stakeholders of the territory have an essential role to play. Since several years, the metropole has been experimenting, together with researchers in cognitive sciences, on the subject of behavioral change. For example, the waste management policies (recycling,

reduction of waste and sorting of food waste) have been elaborated based on a behavioral approach designed together with the citizens. Also, considering mobility with the implementation of the Low Emission Zone, alternatives to car use were subject to behavioral analyses.

This favourable environment also allows the implementation of action research or the association with important research programs such as the national POPSU2 program which analyzes and re-examines the local development model and its impacts on the territory. The metropole also welcomes many interns and apprentices from local universities.

Finally, the issue of citizen science is at the heart of our considerations with the recent creation of a public establishment for cultural cooperation (from an association that developed a Center for Scientific, Technical and Industrial Culture (CCSTI): Fab Lab, exhibitions, workshops, etc.). This recognition should help to strengthen cooperation with the creation in 2023 of the "Cosmocité" science center focused on earth sciences.

Regional, national and European Union level

The Metropole' involvement in the transition is based on numerous collaborations at regional, national and European levels, but also in partnership with neighboring territories.

The Metropole has focused on continuous partnerships with neighbouring territories (SMMAG, SCOT, Positive Energy Territory project, Interterritorial Agricultural Project, structuring projects for shared waste treatment across southern Isère, partnership with CAPV and CC Grésivaudan on the Prime Air Bois, etc.). This is a way to sustain the partnership dynamics initiated in the territory during previous climate plans (Climate Plan Forum, partners' website and dedicated newsletter) and to strengthen the mobilization of municipalities, economic players, cultural, research and education players and the mobilization of citizens, through awareness-raising and citizen participation actions.

At the regional level, two major programs were able to support the Metropole: the Metropolitan component of the State-Region plan contract and the FEDER 2014-2020 program. Many actions were financed within this framework, whether for the metropole or partners (municipalities and social landlords on retrofitting of buildings for example). The Metropole also signed an air quality agreement (CQA) with ADEME and the Region, in addition to the Breathable Metropole agreement signed with the State in 2017. It should be noted, however, that these partnerships are currently weakened by a withdrawal of the region.

At the national level, the metropole has been heavily involved in the Future Investment Program (PIA). Similarly, framework agreements have been signed with ADEME (the French National Agency for the Environment and Energy) and the Caisse des Dépôts et Consignations (the public bank) in order to provide structured support for our local policies. For example, the recent signing of a territorial objective contract with ADEME, based on progress in relation to the EEA benchmark.

Grenoble-Alpes Metropole is a member of European and national associations, places of exchange and qualification on climate issues:

- At the European level, it is an active member of Eurocities and participates in the “environment” forum, where it hosted the annual meeting on the theme of changing behaviors in April 2022. It participates in the activities of EnergyCities. Finally, the title “European Green Capital 2022” provided access to the eponymous network,

- At the national level, the metropole participates in the activities of the AMORCE network, France Urbaine and the association of communities of France (ADCF).

The Metropole is also a signatory to conventions such as the Covenant of Mayors and the Milan Pact, which are places for networking and exchange.

As part of the Cities Mission and the Call for expression of interest “100 Climate Neutral and Smart Cities”, a network has been set up of French cities, metropoles and municipalities that are part of the Mission. This group, called the Miroir Group, is led by the Ministry of Ecological Transition and the Ministry of Higher Education, Research and Innovation of the French state. The Miroir Group aims to ensure coordination between cities within the framework of the EoI and to facilitate sharing on trajectories towards carbon neutrality and French specificities in terms of regulations, financing, etc. Participation in this group also allows the metropole to share its experiences and best practices beyond metropolitan borders.

Three major objectives that the European Union and Grenoble Alpes Metropole share are to accelerate the movement towards carbon neutrality, to work towards a more egalitarian society and to strengthen the autonomy of the territory and its economic vitality. To deploy these policies, Europe carries out its own projects, and also relies on territories such as those of the Grenoble Alpes Metropole, by supporting the actions of local institutions to create a common dynamic.

The Biomax wood-fired heating plant, urban development of the GrandAlpe sector, the MurMur system and the Via du Tram cycle path are metropolitan projects that would have seen the light of day anyway, but European funds have given them a boost. In other cases, it is Europe that implements its own policies in the metropolitan area for example with the Foodtrails project. Winner of this European call for projects, Grenoble Alpes Metropole received €740,000 to improve the quality of meals and reduce waste in school canteens, and to strengthen the food autonomy of the area. This dynamic is expanding to responsible consumption at the start of 2024, with in particular a project called Solstice aimed at structuring a sector around second-hand textiles, in order to promote their collection and reuse, which received support of €700,000.

Partnerships to develop

The governance of the climate plan is being strengthened with the integration of neighboring inter-municipalities and a closer association of economic actors (already engaged in a local economic pact initiated in response to the pandemic), and civil society (college composed of associations) and a strengthening of internal management. The ambition is to position the climate plan on a large scale and to even better involve economic actors and civil society. The objective is to find forms and a broader dynamic in a perspective of shared interests and responsibilities. These developments can be adapted to the Climate City Contract in a logic of continuous improvement.

To do this, it is planned that a partnership monitoring committee be set up, made up of 4 colleges:

- College of associated public partners: State, ADEME, Region, Department, SMMAG, EPSCoT, neighboring territories, etc.
- College of Municipalities
- College of Economic Actors: professional branch unions, consular chambers, etc.
- College of Civil Society, the exact composition of which remains to be finalized

Strengthening exchanges with economic stakeholders, particularly large industrialists, deserves special attention. The instability of the territory's industrial sector is not conducive to encouraging stakeholders to make long-term investments and plans for the climate. This aspect could be worked on with other French and European cities as well as the NetZeroCities consortium as part of the Cities Mission.

Table 17. Relations between governance innovations, systems, and impact pathways

Intervention name	Description	Systemic barriers / opportunities addressed	Leadership and stakeholders involved	Enabling impact	Co-benefits
Observatory letter (Lettre de l'observatoire)	Annual report of the monitoring of the emissions on the metropolitan territory in terms of energy consumption, production of renewable energy, GHG emissions, and air pollutants.	Monitoring intervention that facilitates the evaluation of the main barriers and opportunities	Service Climat Metropole and ALEC for producing the observatory. Various stakeholders to use the results	Learning and capabilities	Better understanding of GHG emissions and air pollution and therefore an incentive to act.
Exemplary Administration Plan (Plan Administration Exemplaire)	Guidelines and action plan to become an exemplary administration in terms of climate and environmental impact. The objective is to have a "common culture" on the subject of transition.	Interventions in various domains related to public buildings, mobility and emissions related to the services provided by the metropole (water, waste, etc.).	Metropole, employees of the Metropole, citizens	Technical, policy, learning and capabilities, behavior change	Better understanding of carbon emissions related to metropolitan activities and so an incentive for the employees to act in their daily tasks. Indefinitely also a source of inspiration for civil society.
Climate Plan Partners Website (Site web Partenaires du plan climat)	Website grouping information about the SECAP, Letter from the observatory, actions and ways of contributing	Mobilizing external partners to embrace the objectives of the Climate Plan	Public and private companies, municipalities, other actors	Technical, policy/ regulatory, democracy/ participatory, fiscal/ financial; learning and capabilities,	Better understanding of GHG emissions and air pollution and therefore an incentive to act.

	for various types of stakeholders			behavior change	
Municipalities Commitment Charter (Charte d'engagement des communes)	Engagement of municipalities in the metropole on the actions proposed by the climate plan	Distributing responsibility for climate action to actors of the territory	Municipalities, Metropolitan Climate Service	Technical, policy/regulatory, democracy/participatory, fiscal/financial, learning and capabilities, behavior change)	Indirect actions on subjects such as biodiversity, adaptation, resilience…
Partner Commitment Charter (Charte d'engagements partenariale)	Engagement of external partners of the climate plan	Mobilizing external partners to embrace the objectives of the Climate Plan	Public and private companies, Metropole	Technical, financial, learning and capabilities, behavior change	
Climate Forum (Forum Climat)	Local annual forum on climate with presentation of indicators, evolution of actions, discussions and workshops open for all stakeholders and particularly the municipalities.	Mobilizing external partners and municipalities to embrace the objectives of the Climate Plan	Metropole, various actors, municipalities, citizens	policy/regulatory, learning and capabilities	
Climate, Transition and Contractualisation Department (Direction du Climat, Transition et Contractualisation)	Internal direction at the metropole responsible for climate issues and funding. Due to its importance, the direction is transversal and placed beneath the general direction.		Employees of the metropole	Technical, policy/regulatory, democracy/participatory, financial; learning and capabilities, behavior change	
Interservice circle (Cercle interservice)	Transversal collaboration meetings internally in the metropolitan organization	Help to collaborate on various climate actions, monitoring, feedback, information, learnings.	Different services of the metropole		

"Portrait of territory" Donut (« Portrait de territoire » Donut)	Observation method that aims to illustrate the state of the territory with regard to planetary and social limits through a presentation of several indicators			Learning and capabilities	Questions the impact of activities and projects on dimensions less identified than climate change (decline of biodiversity, changes in land use etc.) and link them to social issues.
Scientific Council of the Climate Plan (Conseil scientifique du plan climat)	Multidisciplinary scientific council with the role of objectively follow and evaluate the public politics on subjects related to climate.	External observation and transparency	Researchers, metropole	Technical, policy, democracy/participatory, learning and capabilities, behavior change	Increased collaboration between researchers and metropole
The Local Economic Pact (Le Pacte Économique Local)	This pact brings together the largest public and private employers in the region, within which collective actions have been initiated, on sustainable food, local purchasing and climate awareness tools.	Mobilize private and public sector	Led by three public entities; Grenoble Alpes Metropole, le Pays voironnais and Grésivaudan) and the 31 largest private and public employers	Ecological, energy, digital and societal transition	A solidarity and committed approach in favor of ecological, energy, digital and societal transitions, essential to the economic resilience and attractiveness of the region.
Economic Strategy Grenoble-Alpes 2030 (Strategie-Economique-Grenoble-Alpes-2030)	Strategy of 80 actions to combine economy and ecology.	Mobilize private and public sector and raise awareness of ecological issues	Private companies, metropole	Technical, policy/ regulatory, democracy/ participatory, fiscal/financial, learning and capabilities, behavior change	Economic attraction
Convention of Entreprises for the Climate - Alps (Convention des entreprises pour le climat - Alpes)	The CEC is a voluntary organization for business leaders (all sizes and all sectors) wishing	Mobilizing private sector, industrial sector	Private companies, CEC association, the Metropole supports the action	Infrastructural, participatory, learning and capabilities, behavior change	Economic attraction, resilient companies

	to question the economic model of their structures to move from an extractive economy to a regenerative economy.				
Metropolitan experimentation strategy (Stratégie d'expérimentation métropolitaine)	Partnership between Air Liquide and the Solar Impulse Foundation set up for the organization of the Climate and Solutions Day, the objective of which was to accelerate transitions and to provide concrete solutions to environmental issues.	Mobilizing private sector, industrial sector	Private enterprises, B2B, financial participation from the Metropole	Infrastructural, technical, participatory, financial, learning and capabilities, behavior change	Economic attraction, resilient companies
Circular Economy Business Network (Réseau des entreprises de l'économie circulaire)	This network designed by and for local companies aims to raise awareness, develop inter-company exchanges and facilitate cooperation to bring about new projects.	Accelerate reuse, recycling etc and mobilizing private companies	Private companies, metropole	Technical, participatory, financial; learning and capabilities, behavior change	Less resources used, changed consumer behavior, innovation
Sustainable Construction Guide (Guide de la construction durable)	Guide to sustainable construction and planning produced by the building project management services. For internal and external implementation and shared with other development	Transitioning the construction sector	For all internal and external partners of the construction and planning sector	Technical, learning and capabilities, behavior change	

	stakeholders in the region.				
1st Forum for Careers in Ecological Transition (1er Forum des métiers de la transition écologique)	Event in June 2022 to support the emergence of new professions and the evolution of many traditional professions. 6 key sectors of activity / 1,200 visitors / 1 job dating / 10 conferences.	Transitioning the construction sector	Businesses, metropole, professionals, students, young graduates, parents, people retraining, job seekers…	Technical, learning and capabilities, behavior change	Economic attraction of the region, increased employment, economic boost for companies
Businesses and Transitions Guide 2024 (Guide Entreprises et transitions 2024)	Guide to facilitate the action of local businesses in favor of transition (proposals for technical and financial tools and systems to better understand climate issues).	Transitioning the economic sector, mobilizing private sector	Companies, metropole	Technical, participatory, financial, learning and capabilities, behavior change	Economic attractiveness, awareness…
French Mirror Group (Groupe Miroir français)	Working group composed of the different cities committed to the project “100 climate neutral and smart cities”, with the goal to coordinate, facilitate and spread knowledge between the French cities.	Enabling contact with other French cities and the state in order to raise regulatory questions, financing issues that need to be dealt with on a national/EU level.	9 French cities/metropoles etc, Ministries, researchers, NetZeroCities	Policy/regulatory, financial, learning and capabilities	Increased collaboration between cities, researchers, networking opportunities
Food Trails	Foster the development of a local food sector with an environmental friendly agriculture and part of a short supply chain in an inclusive approach.		EU (Horizon 2020 project) Metropole, school canteens employees, school children, elderly	Infrastructural, participatory, learning and capabilities, behavior change	Better food quality, citizens' awareness on food issues

eCharge4Drivers	Development of urban charging network for electric mobility	Facilitating the shift towards decarbonized mobility. Addressing the issue of irregular energy load and reverse flow systems like Vehicle to Grid.	EU (Horizon 2020 project) Metropole, because users	Infrastructural , behavior change	Less air pollution, efficient electricity grid
ECOLE	Cooperation project of the "Alpine Space Program" on the theme of industrial ecology and circularity. It allows the Metropole to build an industrial ecology strategy linked to locally established industries and to apply it in an industrial zone (southern industrial park)	Mobilizing industrial sector	INTERREG Europe, metropole, other alpine cities, companies specially in the "South industrial park"	Infrastructural , participatory, learning and capabilities	Circularity economy, resource efficiency, networking
CityZen	European project related to urban farming as a successful driving force for economic and social transformation by introducing the concept to policy makers.		INTERREG Europe (R&D FP7), other alpine cities , Metropole	Technical, policies, learning and capabilities	Green innovation, resource efficiency, food security, waste management, community development and adaptation to climate change.
LOS_DAMA!	Project that aims to valorize and the potential of peri-urban green infrastructure for sustainable development, by improving	Develop methods and actions to better take account of the interface between urbanization	INTERREG Alpine space, Metropole, other alpine cities	Technical, learning and capabilities	More liveable and green cities, understandin g of ecological, economic and social values

	governance and planning in this domain.	and natural areas in peri-urban spaces.			and ecosystem services.
Climaborough	Horizon Europe Project on the subject of new forms of urban planning (design, livability, participation…) to create a sustainable and climate resilient city. The urban renewal project GrandAlp will act as a demonstrator area for Climaborough.	Developing and testing innovative solutions, tools and methods on themes such as urban heat islands, daytime thermal comfort, CO2 sequestration , geographical data, public procurement processes .	Metropole, companies, startups, development actors (general contractors, constructors, architects); elected representatives; citizens	Technical capabilities, democracy, participatory, learning and capabilities, raising awareness, behavior change	Citizen engagement , attractive and resilient neighborhoods, improved summer comfort, better health for inhabitants…

4.2 Module C-2 Social Innovation Interventions

The territory of Grenoble is marked by its democratic vitality, its solidarity mechanisms and its citizen participation. On the theme of climate, the fourth axis of the SECAP sets the tone; "Let's mobilize collectively for the climate". Many actions are underway and have been put in place to mobilize citizens and this chapter will describe some key actions. A sub-chapter will be dedicated specifically to the Citizens' Convention for the Climate, a flagship process for the Metropole in terms of social innovation. This process addressed a multitude of barriers identified in chapter 2.3 Systemic Barriers and Opportunities, especially actions related to citizens' involvement, behavioural change, and specifically vulnerable groups. It was the opportunity to not only reach the citizens already engaged and informed about climate change but also groups that are usually harder to involve.

In complement to the above, the Metropole works with a multitude of innovative social interventions; both deliberative, informative, awareness-raising, participatory budgets, participatory urban planning, co-creation and educational interventions.

2.2.1 The French context and the specificities of the Metropole

To fully understand the metropole' social innovation interventions for the climate, it is necessary to add some details on the French context and the citizen-state relationship specific to France. The country is characterized by a centralized and strong state, which has many advantages for organizing the country. However, citizens do not have a mandatory role to play and in this sense a citizen can choose to participate or not in public life.

When it comes to tackling a major problem like climate change, this system is reaching its limits. Not only are all citizens concerned, but they must play an active role in changing their habits and lifestyles, without waiting for the government to "fix the problem". It is therefore a question of moving towards greater awareness, action, innovation and inclusion of citizens.

In 2005, Grenoble-Alpes Metropole was the first urban area in France to adopt a Climate Plan, a decision that demonstrated its awareness of climate risk and its pioneering desire to act. At the time, the Climate Plan was not an obligation for metropolitan areas, but it subsequently became mandatory by law for any inter-municipal area with its own tax system (EPCI) with more than 20,000 inhabitants. Similarly, in 2015, the metropole decided to vote on a framework deliberation for participatory policy to demonstrate its ambition for participatory democracy, in order to involve citizens in public decision-making. This document, now called the "Governance and Citizenship Pact", has become a legal obligation since 2019. The metropole has chosen to go further than the law by involving not only citizen participation but also the participation of all stakeholders and partners of the metropole in its Governance and Citizenship Pact.

2.2.2 The participatory policy of the Metropole

Citizen participation is essential on everyday issues but also on metropolitan projects and policies. This dialogue with citizens is a democratic issue, a tool for social cohesion and allows for the improvement of public policies. To give itself a framework and clear objectives, the Metropole has equipped itself with a Metropolitan Governance and Citizenship Pact and a participatory platform.

The Metropole has developed the Metropolitan Governance and Citizenship Pact with randomly selected citizens. This document, signed by 28 municipalities, recalls five commitments:

1. Citizen dialogue is part of deliberative dialogue
2. The Metropole guarantees the involvement of all audiences in participatory processes
3. The Metropole organizes the reasoned return on the contributions of citizen participation
4. A variety of spaces and complementary approaches to participation are put in place
5. Cooperation between the Metropole and the municipalities makes it possible to strengthen resources and improve citizen dialogue

The Participatory Platform allows citizens to give their opinion on current projects. It includes:

- Presentation of participatory bodies (development council, public services consultative commission, user committees) and their news
- Current consultations (presentation of projects, agenda of public meetings, reports, etc.), with the possibility of contributing directly online
- Calls for projects from the Metropole

The Metropole has set up several participatory bodies to allow citizens to give their opinion on current projects:

1. Composed of 66 members involved in the territory in an associative, professional, cultural, militant or intellectual capacity, the **Development Council (C2D)** is commissioned each year by the Metropole on a subject, or can take on a theme himself. He writes reports and recommendations concerning elected officials.
2. The **Local Public Services Advisory Commission (CCSPL)** provides advice to improve the quality of delegated metropolitan public services, such as MC2, Alpexpo and Pompes funèbres intercommunales. It is made up of 40 members, metropolitan elected officials, inhabitants and representatives of associations.
3. In order to involve users in improving the quality of public services, the Metropole has set up four **User Committees** , each on a theme (waste, energy, etc.)
4. The **Drinking Water and Sanitation Operating Council** , composed of 16 members appointed by the Metropolitan Council, meets 6 to 7 times a year. It gives its opinion on draft budgets, accounts and the appointment of the director of the authorities.
5. The **City's Political Citizen Councils** are set up in priority neighborhoods. Made up of volunteer inhabitants, randomly selected inhabitants and local stakeholders, they are a source of proposals and initiatives for their neighborhoods.

2.2.3 The Citizens' Convention for the Climate

Faced with the scale of the changes in lifestyles, production and consumption to be made, and based on the observation that these changes cannot be made without the support of citizens, the Metropolitan Council decided in 2021 to set up a Citizens' Convention for the Climate. 150 inhabitants were drawn at random to, as part of the objectives of responding to the challenges of the SECAP, develop proposals guiding our territory towards carbon neutrality. In 2022, they met 5 times under the leadership of an operational committee and guarantors, to reflect independently and present their proposals to metropolitan elected officials. These proposals were presented to the Metropolitan Council and some were submitted to a citizen vote.

After 5 weekends of work, the convention members presented their proposals at an extraordinary metropolitan council on October 14, 2022. The Metropolitan Council decided on the follow-up to the 219 proposals made, at a 2nd extraordinary council on April 28, 2023.

The implementation of these measures translates into budgetary terms in 2024, since 54 million euros of the metropolitan budget are dedicated to programs resulting from the Convention.

The process of the citizens' convention for the climate does not end with the proposals for actions, but continues with follow-ups at several levels.

Commitments of the Metropole

At the end of its work, in October 2022, the Convention presented to the Metropole a set of 219 proposals deemed "priority". To these actions, it was necessary to add 20 additional proposals considered "non-priority", for a total of 239 proposals. 7 other points, which were reported as "levers for action" by citizens in their final report, but were not accompanied by proposals, were added, for a total of 246 points to be analysed.

A significant amount of analysis was then carried out by the metropolitan services to assess the ability of the Metropole to take up the proposals: the actions falling within the Metropole's remit, those not falling within its remit and those concerning other institutional actors were first identified. It was then necessary to distinguish between the actions already undertaken and those that deserved to be strengthened, then the types of possible responses (financial or non-financial support, awareness-raising or communication actions, intervention in direct project management, etc.) and the technical and legal feasibility issues.

All this allowed the community to group together proposals which concerned the same subject or overlapped, all in constant dialogue with the citizens who were members of the convention, particularly regarding proposals for which difficulties of understanding had been noted.

On Friday, April 28, 2023, during a dedicated Metropolitan Council**,** the community voted on all the proposals made, which confirm the trajectory taken by the Metropole. The work of citizens therefore supports the work already undertaken and enriches public policies for the years to come, by focusing on areas that require acceleration or greater scaling. The members of the citizens' convention, like the citizens of the sobriety workshops before them, note that the Metropole is already carrying out numerous actions to contribute to the mitigation and adaptation to climate change, but that these actions are not sufficiently known. Thus, of the 239 proposals examined (219 priority + 20 non-priority voted at more than 50%) and 7 levers proposed by the convention without specifying the actions:

- 56 actions were identified as being outside the metropolitan area of competence and will therefore be transmitted to the competent institutions; 190 were therefore within the area of competence of the Metropole.
- 144 actions, or 76% of these proposals, were identified as in progress, sometimes simply initiated or programmed, sometimes well-sized. More precisely, 88 actions, or 46% of the total, are indicated as needing to be strengthened. It is then appropriate to question the means of going further and/or removing the obstacles encountered.
- 5 actions were indicated as “not to be retained” because they were not relevant with regard to the actions already undertaken elsewhere or the political or technical orientations chosen.

- 34 actions are "to be studied" because as stated in the convention, they cannot be applied directly and deserve further study on feasibility and/or relevance.
- 7 actions were identified as “to be started immediately”.

A selection of the commitments made by the Metropole on the proposals of the Convention, among several are barriers identified in the “Module A-3 Systemic Barriers and Opportunities to 2030 Climate Neutrality” are presented below:

- Working on the development of a replanting scheme in the Metropole
- Continue to develop the Land Use Regulation Plan to translate the carbon trajectories and “Net zero land take” Law(ZAN) into the local urban planning document
- Create a peripheral Chronovélo route linking the closest towns (start of construction in 2024)
- Continue work with municipalities on identifying shopping streets that could give rise to a “preference” for active modes
- Strengthening citizen investment in the development of renewable energies (2023)
- Launch a study on “returnable containers” from 2023
- Strengthen current actions in terms of vegetation and artificialization of soils
- Develop an ecotourism offer linked to the Smmag offer (in progress)
- Strengthen awareness and training of inhabitants on climate issues from 2023
- Developing and strengthening citizen participation, from 2023 (2023)

The rest of the actors

The Metropole committed at the April 2023 council to transmit proposals that do not fall under metropolitan jurisdiction, but from other stakeholders in the territory and other public institutions, in particular:

The State: which plays a major role in climate action at the national and international levels. It sets national climate and environmental objectives and has key levers to accelerate collective awareness of the climate and ecological emergency and the scale of the changes to be made, to mobilize all stakeholders and support changes in lifestyle and consumption. As a legislator, financier, public policy maker, as well as through the exemplary nature of both elected officials and administrations, it is competent or concerned by more than 80 proposals from the metropolitan citizens' convention for the climate.

The Auvergne Rhône Alpes Region: which has an important role to play in this mobilization through the implementation of its skills, particularly in terms of economic development and innovation (notably through the SRDEII), professional training, regional planning and the environment (notably through the development of the SRADDET), as a transport organizing authority, manager of high schools and owner of numerous buildings and cultural facilities. It is also expected, like all public administrations, to set an example through its practices. Finally, it can concretely act to accelerate and intensify transitions, as a financier and manager of European funds.

The Department of Isère: these include proposals that challenge the Department in terms of aid for agriculture and forest management, actions in colleges, health and social action, actions within the framework of its policy in favor of the mountains, and as owner of the Grenoble Alpes Isère airport.

The Municipalities: Through their skills and their proximity to the inhabitants and stakeholders of the territory, the municipalities have a major role to play in this mobilization for the transitions. This is why Grenoble-Alpes Metropole has invited them, since the first climate plan in 2005, to act as partners of the Climate Plan. When the new Metropolitan Air Energy Climate Plan was adopted in 2020, a charter of commitment was drawn up and proposed to the municipalities in this regard. Beyond the mechanisms already in place, the citizens' convention for the climate constitutes a real opportunity for everyone to accelerate and intensify the transitions.

The SMMAG: Considering that the organization of mobility must be dealt with at the level of the living area and therefore on a scale broader than administrative borders, the Department of Isère, the urban community of Pays Voironnais, the community of communes of Grésivaudan and the Metropole created in 2020 the mixed union of mobility of the Grenoble area (SMMAG). In the theme 3 mobility, 31 actions or three quarters of the proposals of the convention fall under the SMMAG or concern it, as the organizing authority of mobility in the territory.

Territorial tools: In implementing its policies, the Metropole does not act alone: various territorial tools falling within all the themes contribute to the achievement of public action (Park GAM, Eaux de Grenoble Alpes, PFI, ALEC, SAGES, Inovaction ... CODASE or Hexagone.)

The Metropole, depending on its status within each of these organizations, will support as much as possible so that these structures take on the recommendations of the citizens' convention.

Citizens’ debates for the climate

Many of the topics arising from the proposals of the Citizens' Convention for the Climate raise important questions of individual and social acceptability/desirability and require structural transformations, both of our systems (production, consumption, services) and of our individual behaviours.

Grenoble Alpes Metropole therefore wishes to organize "citizens’ debates for the climate " . They will make it possible to broaden the circle of those who are increasing their collective skills around climate issues and who are engaging in dialogue with the community in order to continuously adjust metropolitan policies from design to evaluation.

The "citizen debates for climate" will have the mission of disseminating scientific knowledge and experiential knowledge, animating controversies, disseminating solutions to accelerate the implementation of the convention's proposals. They will be "addressed" to targets with which it is necessary to debate today (the stakeholders of each subject, professionals in the sector, the main beneficiaries, the "prescribers" of practices, etc.) and will be sized according to the stage of maturity of the subject (awareness, one-off support for an initial transition to action, strengthening one-off practices, maintaining and securing good practices, etc.).

The topics will be directly linked to policies and projects already worked on by Grenoble Alpes Metropole (PLUI, ZAN, planning, mobility, housing, food) in order to guarantee the metropole's capacity to follow up on these contributions.

Monitoring of commitments and the monitoring committee

The Citizens' Convention for the Climate has therefore entered, after this Council, into its second phase of effective implementation of the selected proposals. The quality of this second phase guarantees the robustness of the citizen dialogue beyond the Convention "event", and the contribution of the approach to achieving the carbon neutrality objective. This implementation must be the subject of visible monitoring for the entire metropolitan population. The deliberation on the follow-up to the Convention therefore specifies the manner in which the approach of the Metropolitan Citizens' Convention for the Climate will be followed up at the end of the Council of April 28 in accordance with the principles of metropolitan citizenship set out in the governance and citizenship pact of Grenoble Alpes Metropole, deliberated on November 20, 2020. The Citizens' Convention approach contributes to the 5 principles:

- Citizen dialogue is part of deliberative dialogue
- The Metropole guarantees the involvement of all audiences in participatory processes
- The Metropole organizes the reasoned return on the contributions of citizen participation
- A variety of spaces and complementary approaches to participation are put in place
- Cooperation between the Metropole and the municipalities makes it possible to strengthen resources and improve citizen dialogue.

This request is explicitly formulated by the citizens of the Convention in their introduction: " *We hope that the collective dynamic initiated during the Citizens' Convention for the Climate will continue. We ask to be associated, in one form or another, with the monitoring and implementation of the proposals.* "

To this end, the Metropole has undertaken to set up a **monitoring committee** responsible for monitoring the implementation of the proposals of the Citizens' Convention for the Climate based on the deliberations adopted during the dedicated Metropolitan Council of April 28, 2023. The monitoring committee functions as an observatory of commitments and has three objectives: **to ensure** the implementation of the Convention's proposals, **to disseminate, to promote** the work of the Convention on the territory and in dialogue with partners and **contribute** to the continuation of citizen dialogue on the subjects arising from this work.

In order to ensure its diversity and to reflect the collective dynamics engaged around climate issues, the monitoring committee is composed of:
- members of the Citizens' Convention for the Climate among those who volunteered to be members of the monitoring committee; appointed by election without a candidate; - members of the operational committee which supervised and organized the Convention, composed mainly of academics
- elected officials appointed in such a way as to respect the diversity and representativeness of political groups among metropolitan councilors, - representatives of other participation bodies associated with metropolitan participatory democracy

Other social innovation projects following the citizens' convention for the climate:

Transition Months

Following the needs expressed by inhabitants who are members of the Citizens' Convention for the Climate, the Metropole wanted to offer a regular thematic event program, similar to what was proposed during the Green Capital year, to:

- Raising awareness of the behavioral changes required by the climate crisis
- Bringing practical solutions to combat and adapt to this crisis
- Promote the Metropole's systems and assistance in this area

Climate change is mainly due to greenhouse gases, emitted in roughly equal parts by four sources: 25% transport (cars, trucks, etc.), 25% energy (mainly heating), 25% food, 25% consumption of goods and services (textiles, furniture, hi-fi, household appliances, etc.). The Metropole therefore offers one month per theme, as well as an additional month devoted to the necessary adaptation, all staged according to a positive communication axis and based on "the best" (quality).

- MARCH: Energy Month for "Better Heating"
  Topics: Promotion of energy savings, thermal renovation (MurMur), renewable energies (solar, Prime air bois, etc.), heat networks
- MAY: Mobility Month for "Better Movement", in conjunction with SMMAG
  Topics: Promotion of alternatives to the car, walking, cycling, parking, cycle paths, assistance with purchasing bicycles and renewing fleets, charging stations, etc.
- JUNE: Freshness Month for "Better Adaptation"
  Promotion of water savings, green, natural and fresh spaces, the Canopy Plan, renovation, awareness of biodiversity
- OCTOBER: Food Month for "Eating Better"
  Topics: Promotion of agriculture, local producers and their products (including the IsHere product label brand), markets, short supply chains, etc.
- NOVEMBER: Responsible Consumption Month (name pending stabilization) for "Consuming Better and Less" Promotion of repair, reuse (Pôle R), recycling, sorting, second-hand (unwrapping, etc.), homemade, DIY, etc.

The territory is already rich in many resources and active public, associative or economic structures, which are already mobilizing on comparable events: Month of the Night, Month of the Food Transition, 10 Days of Culture… The organizational principle chosen for the thematic Months is the same: rely on what already exists (events already scheduled, or created for the occasion) for the first programs, gradually rallying other actors over the years. The Metropole hopes to mobilize all of its partners (municipalities, satellites, service providers, associations, etc.) to offer various adapted times: workshops, conferences, games, thematic markets, guided tours, screenings, debates, concerts, demonstrations, shows, etc.

Behavior change roadmap

Following the citizens' convention for the climate, the metropole has committed to building a roadmap to accelerate awareness, training and support for behavior change. The development of this roadmap is underway (2024-2026), it is co-piloted by the Climate, Transition and Contractualization Department, the Strategy Innovation Citizen Relations Department and the Communication Department. Other stakeholders involved; relay actors and resources of the territory, experts.

2.2.4 Mobilization for behavior change and sobriety

As identified in Module A-3, mobilization for behavior change is a major lever for accelerating towards carbon neutrality. The metropole has implemented numerous actions to encourage citizens to change their behavior so that they adopt more sustainable lifestyles and participate more actively in achieving climate change mitigation and greenhouse gas emission reduction objectives. Since 2020, work has been undertaken within the Metropole with experts in behavior change support and via service design studies to improve the effectiveness of high-stakes technical and financial support systems (wood air bonus, ZFE, MurMur single-family home), Other tools, such as the "transition barometer" set up in 2022 in partnership with Grenoble Ecole de Management, or evaluation systems, are being used to better target and evaluate the action taken.

Achieving carbon neutrality targets requires a profound shift towards more sustainable lifestyles and consumption patterns. Some flagship projects on the theme of changing behaviors and practices are presented below.

Carbon Conversations
These constitute an approach to sustainably support people towards a more carbon-efficient lifestyle by combining technical-practical expertise and advanced psychological know-how applied to the climate. The training of territorial facilitators aims to create active communities to support the Energy-Climate transitions of the territory and thus accelerate the massification effect, encouraging participants to also become actors.

At the end of a cycle of 6x2 thematic hours over 4 months, in a so-called "head, heart, body" approach, the people who participate are supported to change their behavior in their daily lives. Initiated by Grenoble Alpes Metropole in 2022 on the occasion of Grenoble Green Capital, and supported by ADEME, this dynamic of deploying carbon conversations relied on voluntary actors in the territory within companies, communities, health actors or associations, each committing to deploying carbon conversations with their networks, particularly professional ones. Thanks to the establishment of calls for expressions of interest, 3 promotions of 10 facilitators (5 pairs) were trained in 2022, and a 4th was trained in 2023. At this stage, more than 230 participants have already taken part in the cycles.

Invent our low-carbon lives

In the same way as the Carbon Conversations, the Metropole supports, with the support of ADEME, the training of local stakeholders in the animation of the game "Inventons Nos Vies Bas Carbone". Chosen on the basis of a call for expressions of interest, the selected structures undertake to lead at least 3 workshops with their employees free of charge.

Sobriety workshops

Moderation is included in all metropolitan planning documents such as the Climate Air Energy Plan , the Energy Master Plan , the Waste Master Plan and the PLUI . However, achieving these objectives requires collective actions, carried out by companies, public actors but also by individual actions. This is why supporting the change of practices constitutes an immense challenge to which public action must provide its support. The proposed avenues of work were to rely on a citizen's opinion to feed the reflection of the next executive and develop a metropolitan action plan in terms of moderation. Thus,

the metropole proposed to the members of the bodies to integrate this approach which took place from June to November 2020, and to work on this problem in order to answer the question: " *Under what conditions could we, metropolitan citizens, change our practices towards greater environmental moderation?"* The aim was to arrive at proposals for action formulated by the participants, which were presented to the new elected officials of the Metropole.

Metroenergies web platform

Service offered to inhabitants allowing them to view and monitor their energy and water consumption, see where their energy consumption is in relation to similar households, benefit from the regular sending (monthly or quarterly) of a consumption report, and access educational content with advice on how to reduce their consumption.

Citizen Energy (Énerg'Y Citoyennes)

Association of general interest with the aim of promoting the reduction of energy consumption and the use of renewable energies in the territory. It raises awareness, supports and advises inhabitants/local stakeholders towards energy sobriety (behavioral changes), energy efficiency (buildings, means of transport, etc.), the fight against energy insecurity, energy production. Grenoble Alpes Metropole participated in the founding of Énerg'Y Citoyennes and continues to support the association. The collective is made up of two structures, supported by volunteers: Association, which develops mobilization actions to control energy consumption and fight against energy insecurity, in partnership with local stakeholders and the simplified joint stock company, Energ'Y Citoyennes SAS , which produces photovoltaic electricity and wood heat thanks to the savings of the territory.

Transition Guide

Publication of a transition guide in progress 2024.

Internal to the metropole:

The **Climate Fresco** and the serious game **Inventons Nos Vies Bas Carbone** were included in the internal training program, and deployed to agents, but also to elected officials. By the end of the year, approximately 1,200 agents and 12 elected officials had participated in a climate fresco since 2021.

2.2.5 Mobilization within the framework of the European Green Capital 2022

The title of "**European Green Capital** " in 2022 has helped to strengthen collective mobilization and trigger a new territorial dynamic around climate issues. In addition to the actions already mentioned on the theme of behaviour change (Carbon Conversations, sobriety workshops, transition guide, etc.), here are some key actions.

- The circular economy at Cadran Solaire, an urban transformation project organized with citizens: recovery of plants, reuse of interior and exterior materials of buildings, creation of a “bâtitèque” open to inhabitants which collected 320 t. of materials and saved 373 t. of carbon equivalent.

- The European Green Capital 2022 challenges are an opportunity to accelerate the mobilization of local stakeholders and inhabitants through challenges launched to local stakeholders and inhabitants on 12 themes (climate, energy, mobility, waste, food, etc.).

- " **The transition barometer** " (2022): it aims to "take the pulse" of the territory to better act with inhabitants, particularly for environmental policies. This approach took shape in 2022 with the launch of the "ecological practices" survey. After this first survey conducted at the beginning of the Green Capital year, a second survey is planned for spring 2023, one year later. The objective? To evaluate the impact of Green Capital on practices, one year later.

2.2.6 Environmental education

Since 2012, Grenoble-Alpes Metropole, with its partner associations, has offered a range of activities, visits and environmental education outings for nursery and primary schools in the area, on themes falling within its remit (climate, air, energy, waste, agriculture/food, nature: forests and natural spaces). These actions, free for the beneficiaries, reach around 10,000 students and 130 schools in metropole each year, in more than 1,000 sessions. The National Education system is a partner of this system and ensures that the content is consistent with school curriculum.

2.2.7 Specific measures for vulnerable citizens

Grenoble-Alpes is pursuing an active policy of social and urban cohesion in socially deprived neighborhoods where ecological issues have their place, whether in the context of solidarity grocery stores, raising awareness among children or urban redevelopment of neighborhoods with the emblematic project of renovating the Villeneuve neighborhood (20,000 inhabitants), the first popular eco-neighborhood in France.

Some examples of social mitigation measures:

- in terms of mobility, solidarity pricing for public transport (very reduced rates for young people and low-income populations) and the mobility/employment platform to promote the mobility of people looking for work;

- in terms of energy, aid to individuals for energy renovation (MurMur system) and for the renewal of wood heating systems (air/wood bonus) are modulated according to household income with large bonuses for low-income households; Coverage of work (all aid) between 65 and 75% for very low-income households, between 50% and 60% for low-income households and between 20% and 25% for those outside the ceilings.

- social pricing of water as part of a national experiment with two components: free consumption diagnostics and financial aid for the poorest households.

FAST, Social Support Fund for Ecological Transition)

In line with Grenoble-Alpes Metropole's commitment to excluding no one from the ecological transition, a "FAST" fund (Social Support Fund for the Ecological Transition) was set up in 2022. €3 million is planned in investment to support ecological and climate transition projects aimed at the most vulnerable groups, supported by solidarity association structures and social landlords across all 49 metropolitan municipalities.

The implementation of FAST required the Social Development Directorate to work with a range of services and partners. The political will is to make this fund the social pillar of the climate air energy plan. It requires cross-functional work to understand, on the one hand, the changes underway on different subjects (transport, mobility, waste, insulation, etc.) and, on the other hand, to grasp the

social needs that this will generate. This is why the Projects and Territories unit of the Social Development Directorate works in conjunction with other services/directorates.

5 Outlook and next steps

This document is the first version of the Climate City Contract for the Grenoble Alpes metropole, presenting the local authority's vision with all the partners involved in implementing its climate plan (municipalities, public establishments, companies, associations and citizens).

In the context of an existing SECAP and a partnership with stakeholders already well underway around this territorial action plan and its thematic variations (energy master plan, waste prevention plan, Grenoble Alpes economic strategy, urban logistics roadmap, etc.), and just a few months before the launch of consultations on the revision of the climate plan, the Climate City Contract was not the subject of a specific partnership mobilization, but it does consolidate the territorial vision shared by the territory's stakeholders to act towards carbon neutrality.

This territorial engagement has been renewed and strengthened on an iterative basis since the first climate plan was adopted in 2005: consultation of all stakeholders to draw up the SECAP, stakeholders have been mobilized through updated partnership charters, and plans and schemes have been drawn up on a thematic basis, again in consultation with all stakeholders.

The Climate City Contract is a new step in this process. It has enabled us to take a more exploratory approach to the obstacles and levers for acceleration, and to examine the investment aspect in greater depth, based on the NetZeroCities economic model, shared with several European cities. It will be used as input for discussions on the revision of the SECAP, and will be updated iteratively once the SECAP adopted in 2026. The SECAP remains the regulatory framework for the metropole.

Priorities to be developed in the next Climate City Contract

- The next Climate City Contract will be more closely co-constructed with private-sector actors already involved in the Local Economic Pact and the Grenoble Alpes 2030 Economic Strategy, and signatories to the SECAP Partner Commitment Charter. The aim will be to detail the carbon impact of the industrial sector and work more closely with this sector. Also, the decarbonisation of the construction and planning sector and the agriculture/food sector will be further explored and detailed.

- At action plan level, in the next iteration of the Climate City Contract, it is proposed that actions will be more detailed, with estimates of CO2 reduction and cost per action.

- Develop interaction and connection with the national level through the Miroir group with the opportunity to share barriers and levers as well as issues related to regulatory frameworks and policies that influence territorial emissions and carbon footprint.

- Strengthen investment planning and financial capabilities by deepening the metropole's understanding of investment flows and the different assets and potentials of stakeholders to finance the climate transition. Further explore the economic model and its analytical

possibilities. Explore options for coordinating the public and private financing needed to fill the gaps in climate policy and accelerate the transition.

- Continue strengthening the metropole's overall internal learning process. Particularly in the area of investment and climate finance, there is potential to raise capacity levels.

- Finally, Grenoble Alpes Metropole has a long history of stakeholder engagement, but a stronger fusion of the SECAP engagement process (Charter of Communes, Partnership Charter) and the Climate City Contract engagement process needs to be developed.

NET ZERO CITIES

EU MISSION PLATFORM | CLIMATE NEUTRAL AND SMART CITIES

Climate City Contract

2030 Climate Neutrality Commitments

For Grenoble Alpes Metropole

Version 1.1

GRENOBLE ALPES MÉTROPOLE

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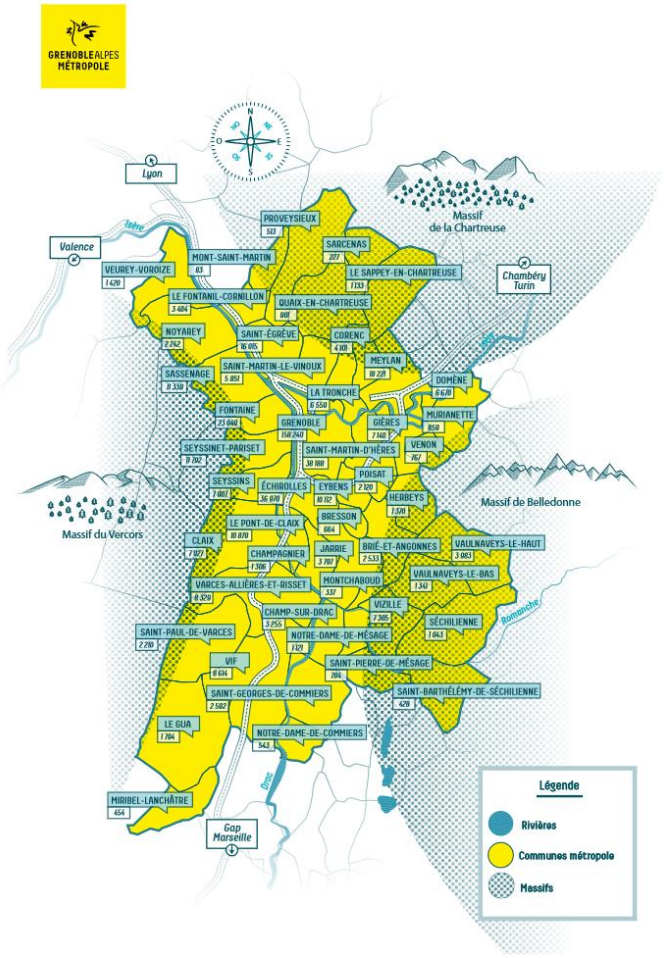
1 Introduction

Developed around the city of Grenoble, between valley and mountain, in the heart of the Alpes, the Grenoble-Alpes Metropole brings together 450,000 inhabitants in 49 municipalities. Its varied territory, both urban and rural, makes up its richness and unique character. The mountain ranges of Belledonne, Chartreuse and Vercors border its contours and forge its alpine identity.



Globally, it is a young and dynamic territory, driven by the influence of the university, and research and innovation centers. It is home to both historic industrial activities (chemical platform, cement, glass, etc.) and large digital companies.

The Grenoble-Alpes Metropole has long been committed to climate action. In 2005, it was the first French urban area to adopt a Climate Plan. Since 2008, the Metropole has been a signatory of the Covenant of Mayors for Climate and Energy. Since then, it has undertaken numerous actions in this area, such as the establishment of a platform to support the energy renovation of buildings called " MurMur " since 2008 (first in France too), the continuous deployment of its tramway network since the first line in 1987, the development of infrastructure and services for cycling, and the establishment of a biogas production process by methanization of sludge from the Aquapole wastewater treatment plant since 2016.

From 2015 and on, Grenoble Alpes Metropole used the opportunity of its new status as a Metropole (and additional responsibilities transferred on this occasion from the municipalities in key missions - energy distribution, urban planning, public spaces and roads, economic development,…) to strengthen its climate action. Major actions undertaken since then are the development and decarbonisation of its district heating network, integration of climate issues into the economic development strategy and the Land Use Regulation Plan, agricultural and food policy,...

In the successive Climate Plans since 2005, the Metropole's climate objectives have been strengthened. The ambition to significantly accelerate the energy and ecological transition is expressed today in all of our public policies through master plans and strategic plans for 2030 (energy, waste, mobility, water and sanitation, housing, urban planning, agriculture and food policy etc.), articulated within a 2020-2030 Climate Air Energy Plan (SECAP, annex 4), acting as cornerstone of the metropolitan vision. This SECAP sets ambitious objectives and an action plan to reduce the territory's

direct and indirect emissions through the consolidation of actions (energy renovation, decarbonisation of energy and transport, waste reduction and treatment, etc.) to achieve the objective of reducing gross emissions by half between 2005 and 2030, corresponding to the -55 % in comparison to 1990 "Fit for 55" objective, and beyond that, to move towards carbon neutrality.

Since we must act now, the Metropole has made the climate emergency the priority of the ongoing mandate and the Multi-Year Investment Plan 2021-2026 (annex 21) and the forecasted amount of investments for the climate compared to the previous mandate has been doubled.

But carbon neutrality is an unprecedented collective challenge, which will only be possible if there are significant changes in our lifestyles and consumption patterns. It requires the mobilization of each stakeholder, public institutions, economic sectors (companies, social and solidarity economy actors, farmers, etc.), and citizens, on an individual and collective scale.

This is why the SECAP calls for an unprecedented mobilization of all actors and citizens of the territory. Like previous climate plans, all stakeholders are proposed to sign up to a Charter of Commitment. A specific charter for the municipalities has been created (annex 7), and to date has been signed by 34 out of 49 local municipalities (representing 94 % of the population). The other socio-economic actors were successively invited to commit to the Green Capital Partnership initiative in 2022, to the Convention of Enterprises for the Climate (70 local businesses took part and built individual roadmap towards carbon neutrality, annex 9) and to sign the new Partner Commitment Charter (annex 8), committing economic actors to the SECAP.

To take one step further and involve the citizens profoundly, in a bottom-up approach, in 2022 the Metropole organized a Citizens' Convention for the Climate (annex 14), by inviting 100 randomly chosen citizens to work on proposals to achieve carbon neutrality. Since then, all the proposals have been adopted by the metropolitan council and are under implementation and a process for the long term engagement of the citizens is outlined.

To push the reflections further, with the aim of identifying the necessary ruptures to carbon neutrality in 2050, the Metropole has undertaken a Carbon Neutrality Study (annex 12), based on the national transition agency ADEME’s four scenarios.

Thanks to the cross-cutting and pioneering nature of its actions in favor of the ecological transition, its territory was designated European Green Capital in 2022 (annex 15). In the autumn of 2024, the Metropole was labeled the gold level of the European Energy Award, with a score of 87.1 %, it is the highest rated French Metropole to date.

But the mid-term review of the SECAP (annex 5) in 2023 clearly shows that, despite the ambition of the projects and actions undertaken, they do not always lead to the expected changes in behavior and reductions in emissions. There are many obstacles to overcome; lack of an economic models or investment capacity of public and private actors, unwillingness to change behavior and practices, non-availability of skilled labor, multiplicity of decision-making scales etc. Feedback from experience and the Carbon Neutrality Study highlight the fact that many of these obstacles cannot only be overcome by the mobilization of the local authority or region alone.

Joining the mission today represents a new step for Grenoble Alpes Metropole in the fight against climate change, to be part of an ambitious collective drive at national and European level, which is the only way to achieve carbon neutrality. The visual below shows the key steps of the past, present and future engagement and action for the climate.

2 Commitment to climate neutrality

Grenoble-Alpes Metropole has long been committed to the fight against climate change, with France's first Climate Plan in 2005. **The area's climate objectives have been strengthened in successive Climate Plans, co-constructed with local stakeholders and citizens, and each time, supported by the stakeholders by the signature of successive commitment charters.**

The determination of Grenoble-Alpes Metropole to fight global warming is today clearly expressed in the last Metropolitan Climate Air Energy Plan (SECAP) 2020-2030 adopted on February 7, 2020. **This roadmap for climate action sets out a regulatory commitment to move towards carbon neutrality and reach a first intermediate milestone of reducing greenhouse gases by 50% by 2030 compared to 2005, corresponding to the -55 % in comparison to 1990 "Fit for 55" objective.**
The SECAP sets ambitious goals to reduce the territory's direct and indirect emissions, reduce the energy consumption by 40% and reach 30% renewable and recovered energy in its energy consumption, improve air quality, adapt the territory to climate change and preserve natural spaces and resources. It has become the cornerstone of the metropolitan vision and is declined today in the all of our public policies (energy renovation, decarbonisation of energy and transport, waste reduction and treatment, urban planning, agricultural and food policy, etc.).

But carbon neutrality is an unprecedented collective challenge, which will only be possible if there are significant changes in our lifestyles and consumption patterns. It requires the mobilization of each stakeholder, public institutions, economic sectors (companies, social and solidarity economy actors, farmers, etc.), and citizens, on an individual and collective scale.

Such a rupture will only be possible if collective choices are shared and carried by the greatest number, without exclusion, starting from the perception of each person, their means and capacities for development: it is a question of building a collective vision, a real vision involving institutions, economic sectors, and citizens.

The Citizens' Convention for the Climate, the Carbon Neutrality Study and the Mid-term Review of the Climate Plan, carried out by the local authority in 2022 and 2023, have highlighted the obstacles encountered and levers for accelerating towards carbon neutrality. They show that it will require support for developments and impulses on the regulatory, economic or fiscal, cultural and organizational levels, carried out in a coherent manner, at all scales. Though the local authority and stakeholders must continue and strengthen their action, they will not be able to achieve this ambition without the strong impetus that is essential at national and European level.

By joining the Cities Mission and the European dynamic of 100 climate-neutral and smart cities, as deliberated by the Metropolitan Council on February 9, 2024, and by the President signing this Climate City Contract, **Grenoble Alpes Metropole reiterates its commitment to:**

- **Act with all the levers at its disposal and mobilize all the stakeholders to drastically reduce greenhouse gas emissions by 2030 and accelerate the systemic transformation of its territory towards carbon neutrality;**

- **Contribute to exploring all pathways of acceleration towards carbon neutrality by 2030;**

- **Actively collaborate with other French and European cities and communities, as well as the structures and representatives of the State and the European Union, in order to identify the regulatory, financial, legal, behavioral and operational obstacles and levers to achieve carbon neutrality;**
- **Continue and develop the dynamics of innovation and cooperation, already carried out through numerous national and European projects and networks, in all sectors at stake (energy, mobility, waste, decarbonisation of industry, food, circular economy, behavioral change, etc.).**

To this end, by building the Climate City Contact, Grenoble Alpes Metropole has drawn up an ambitious action and investment plan to explore ways of accelerating the achievement of carbon neutrality by 2030. Those plans are based on the SECAP 2020-2030, updated and improved by new actions undertaken since 2020 or planned following the Citizens' Climate Convention, new national targets in the draft SNBC 3, as well as the lessons learned from the recent SECAP mid-term review and Carbon Neutrality Study.

The Climate City Contract thus presents an ambitious trajectory for reducing the territory's GHG emissions by 81 % compared to 2005 (scopes 1 and 2, within the Metropole's administrative boundary, but excluding large industry), based on the 6 impact pathways below (described in detail in Chapter 3):

- Impact pathway 1: Decarbonize heating, relying primarily on 100% decarbonized and extended urban heating networks
- Impact pathway 2: Renovate residential and commercial buildings to reduce heating needs and increase the resilience of the territory
- Impact pathway 3: Accelerate the transition towards low-carbon mobility
- Impact pathway 4: Decarbonizing Industry
- Impact pathway 5: Strengthen waste management, reduce the quantities of waste produced and develop the circular economy
- Impact pathway 6: Promote carbon sequestration and nature-based solutions

This ambition implies continuing and strengthening the action undertaken by the local authority and its partners, but **it cannot be achieved without convergent mobilization of all decision-making levels and national and European policies, to overcome the regulatory, organizational and financial obstacles identified today.** In particular, the exploratory action levers considered for the decarbonisation of heating and the electrification of vehicles cannot be achieved without major changes at the regulatory and economic levels (energy prices, business models, etc.), which depend on the national or European level. Successful thermal renovation of buildings, the deployment of public transport and cycle paths requires the mobilisation of significant financial resources not available locally, and the systemic transformation of our territories presupposes a rapid transformation of jobs and skills for massive renovation of buildings, a rapid and radical cultural change in the way the city is built etc.

To achieve this objective, the Metropole will strive to:

- Use all the levers within its responsibilities or concerning its buildings and facilities

- Mobilize local stakeholders in the construction and implementation of an ambitious new roadmap, as part of the SECAP review currently being launched, aimed at implementing all possible actions at local level to accelerate the achievement of carbon neutrality
- Work, with stakeholders, cities, national and European authorities to collectively identify the obstacles, the means of overcoming them and the levers that cannot be activated at local level alone
- Continue and develop the dynamics of innovation and cooperation and experimentation, in all sectors at stake

In addition to the Climate City Contract's objective of reducing territorial emissions, which, according to the Carbon Neutrality Study, only represent 30 % of the carbon footprint (GHG emitted per inhabitant in 2019), **the Metropole has the objective of reducing the total carbon footprint**.

For the implementation of its climate actions, the **Metropole aims to find the conditions for a just transition**. To this end, we have set up social pricing mechanisms, investment support mechanisms for the most vulnerable citizens and small businesses, and since 2022 a Social Support Fund for Transition, and will continue to put emphasis on a just transition for all.

Finally, **the Metropole pays particular attention to prioritizing action levers that provide positive co-benefits** in terms of health, quality of life, resources and biodiversity preservation, local jobs as well as reducing the carbon footprint of the territory. Furthermore, also those that present the least risks for their implementation (availability of materials, strong dependence on the evolution of national or European policies or the price of energy, etc.). The development of cycling in the urban and suburban area, carpooling or reducing the space for cars in the city to allow planting and permeable soils have thus been identified as no-regret action levers with strong co-benefits.

3 Strategic priorities

Strategic priorities for climate action and regulatory objectives are set in the SECAP adopted in 2020, which will be revised and adopted in 2026. **By building this Climate City Contact and using the Net Zero cities economic model, we have drawn up an ambitious trajectory to challenge our present ambitions, prepare this new SECAP and explore ways of accelerating the achievement of carbon neutrality by 2030.**

The action plan and investment plan are both based on the SECAP 2020-2030, updated and improved by new actions undertaken since 2020 or planned following the Citizens' Climate Convention, new national targets in the draft SNBC 3, as well as the lessons learned from the recent SECAP mid-term review and the carbon neutrality scenario study.

In the Climate City Contract, 6 impact pathways have been identified to accelerate towards carbon neutrality. These impact pathways will be explored in greater depth with the metropolitan services and local stakeholders as part of the iterative process of the Climate City Contract and the revision of the SECAP.

- **Impact pathway 1: Decarbonize heating, relying primarily on 100% decarbonized and extended urban heating networks**

The dense urban area is served by the second largest urban heating network in France, currently mainly supplied by heat from the waste incinerator, waste heat from the chemical platform and wood energy. During the 2022-2023 heating season, this urban heating network was supplied by 82% renewable and recovered energy, compared to 44% in 2005. It serves 100 000 housing equivalents (50 % of real housing) and several large tertiary complexes (University Hospital Center and more recently the university), and 7% of the territory's energy need and 16 % of the heating need. **Grenoble Alpes Metropole is committed to continue the decarbonisation of this urban heating network to become coal free in 2027 and a 100% renewable and recovered energy heating network in 2030.** To achieve this objective, it is carrying out two flagship projects to transform the Villeneuve and Poterne coal power plants into wood and wood-waste power plants.

It will also be necessary to accelerate the densification and extension of the main district heating network, in parallel with a gradual withdrawal of the local gas network, to develop secondary district heating networks in peripheral areas (three new projects have been validated and interconnections studied) and support the renewable energy heat production projects by local stakeholders (Heat Fund). The Energy Master Plan currently being revised will build a trajectory for decarbonizing heating and develop a strategy for the district heating networks, adapted to the different sectors and typologies of buildings, and being economically sustainable. Another challenge is to support the deployment of heat pumps to avoid the induced risks of worsening urban heat islands, noise pollution, and impact on historical neighborhoods.

At the same time, although its territory has limited development potential, the Metropole is deploys energy production on its buildings and support the deployment of renewable electricity and biogas production projects to contribute to the national effort (cogeneration, photovoltaic solar on roofs and car parks, biogas production on the purification plant since 2016 and soon to come on the composting plant, etc.).

To achieve climate neutrality, the action plan aims to decarbonize the heating sector 100%. This implies that heating would be provided by district heating networks that are entirely decarbonized or by converting all individual heating to heat pumps, wood-fired heating or geothermal heating. Despite the incentives and technical support that have been in place for several years, this transformation has encountered many obstacles and cannot be achieved without a strengthening of the regulatory framework and/or a change in the associated business models, which are heavily dependent on the price of fossil fuels.

➔ **Impact pathway 2: Renovate residential and commercial buildings to reduce heating needs and increase the resilience of the territory**

The Metropole guides and financially supports the renovation of social housing and private apartment buildings since 2010 through the MurMur platform. Nearly 9 000 social housing units and more than 10 000 collective housing units have been supported. The support has been adjusted and expanded to include individual housing and VSEs/SMEs and the platform is now provided by a recognized Public Energy Efficiency Service. **Carbon neutrality requires at least doubling the renovation rate of housing, particularly private housing, by prioritizing the least energy efficient buildings**. The territory will have to meet three challenges to achieve this:

- Removing the obstacle of decision-making to renovate in co-owned apartment buildings (80% of the housing) by simplifying the processes (support by the Metropole for the management of the State aid system (ANAH) to strengthen the links with its own renovation platform MurMur, support from an expert in behavior change)
- Facilitate access to loans and experiment with a third-party investment system
- Increase the number of qualified professionals working with building retrofitting, which is currently insufficient to meet the demand: a partnership is being set up with the building and public works sector to act quickly on this issue (the Metropole is developing a proposition based on this subject for the ongoing Mission Call Enabling City Transformation)

The renovation of the most energy consuming social housing classes (energy performance certificate E, F and G) is already planned.

A **significant effort must be made on the renovation of public and private tertiary sectors**. The scaling up of the renovation of the public tertiary sector is hitting the limits of their investment capacity and that of the private tertiary sector is struggling in the absence of a fruitful economic model (no impact on the rental price or small reduction in energy costs). The needs and levers of action will be specified with the stakeholders as part of the revision of the SECAP. The Metropole is continuing its commitment to renovating its own buildings and facilities: the ongoing rehabilitation of the Metropole headquarter, the Forum, aiming for the label PassivHaus (€108 million) is a demonstrator to inspire major tertiary building owners. To go further, the Metropole will adopt an ambitious Real Estate Energy Master Plan in 2025.

To support this development, the Land Use Regulation Plan includes energy performance and decarbonisation obligations for new buildings, ahead of national regulations (RE2020), solar panel installation on car parks and roofs and permeable soil measures. It includes, as part of its amendment no. 3, a "bioclimatic OAP", which aims to integrate new provisions in favor of adaptation to climate change and its mitigation. The new Local Housing Plan 2025-2030, known as "transition plan" currently being finalized, addresses the challenges of retrofitting and new methods of housing production, more focused on densifying the existing city, not only renovating existing buildings. The challenge is to mobilize all the actors of the construction sector, create a dynamic of shared transition and to build new economic models associated to this.

➔ **Impact pathway 3: Accelerate the transition towards low-carbon mobility**

Mobility is an important systemic factor in reducing greenhouse gas emissions, but also air pollutants, which are a real challenge in Grenoble. Transport represents 23% of the territory's emissions. For many years, the Metropole has been encouraging the reduction of private car use in favor of public transport, active mobility and shared cars through numerous projects (development of a tram network since 1987, cycle paths and bicycle rental services, speed limit of 30 km/h in urban centers, self-service bicycles and scooters, reserved carpooling lanes, carpooling services, deployment of park and ride facilities, etc.). Despite its actions, the reduction in kilometers traveled by car between 2005 and 2020 remains low and the drop in emissions in this sector is mainly driven by the improvement of the efficiency of the engines.

Given the size and diversity of the territory, both urban and rural, geographically in the valley or in the mountains, mobility solutions must be adapted accordingly and strategies adjusted to the different typologies of users. In the dense urban area, the priority is to reduce car use over short distances in favor of active mobility (walking, cycling, etc.) and public transport, and to reduce the space for cars, allowing planting of trees and rainwater to infiltrate. With one of the most developed cycle networks in France, **the use of bicycles has accelerated significantly in recent years, driven by the COVID crisis, the deployment of a new generation of two-way cycle paths on dedicated sites (cycle highways) and the arrival of the electric bicycle**. Cycling still has very high development potential today, and presents significant co-benefits. Through its Bicycle Plan, the Metropole aims to deploy a large structuring network of these "chrono vélos", including bridges and tunnels, within the city center and towards the suburbs and small towns around. These infrastructures have already shown a very positive impact on the use of bicycles, co-benefits (health, air quality, energy vulnerability, etc.) and mark a profound change in public space. However, they are proven costly and without direct financial return. Thus, their full deployment will only be possible with the mobilization of substantial external financing.

For longer distance journeys in suburban and rural areas, from or to the urban area, the development of e-cycling and carpooling remains a solution without remorse, but with a limited impact on the challenges of decarbonisation. Since mid-2023 a Low Emission Zone has been established in 13 municipalities of the urban area. The goal is to progressively ban the most polluting vehicles, with a stated target of phasing out diesel in 2030. The electrification of vehicles undertaken at European and national level also constitutes an essential lever for accelerating the decarbonisation of the transport sector. Charging infrastructure for electric vehicles is being developed, based on a hypothesis of 25 to 35% electric vehicles by 2030. These measures are accompanied by the reinforcement of park&ride options and carpooling, fluidity measures for express buses on motorway as well as the improvement of the public transport from main towns towards the urban area.

In the medium term perspective, the reliability and modernization of the interurban rail transport network towards the city and airport of Lyon and Chambéry **to create a real express network for commuters**, is a long awaited project by all stakeholders with a key role for the decarbonisation of transport in the region. These investments with high capital mobilization (1 billion euros), dependent on the State (SNCF) and the Region and should gradually take shape between 2030 and 2040.
Finally, on the subject of logistics and freight transport, the Low Emission Zone for heavy and light trucks has been in place since 2019 and the Sustainable Urban Logistics Roadmap outlines a trajectory for decarbonizing freight transport. Although, still today the decarbonisation is delayed due to the lack of suitable electric vehicles and affordable prices.

A key issue for the territory remains strengthening the transport operator (SMMAG) which manages a dense and efficient urban transport network, but whose economic model has been seriously weakened since COVID. The operator faces a challenge as major investments for the renewal of its infrastructure, fleet and electrification are coming up. In the absence of new resources, its ability to finance the decarbonization of buses, express buses and multimodal interchange hub projects, tramway

extension, etc. and to continue the current level of mobility services (shared bicycle, public transport, carpooling service, bicycle rental and lockers, etc.) will depend on the financial support of the Metropole and the mobilization of external financing.

In order to reach climate neutrality and a decarbonized transport sector, a major shift in mobility patterns would be necessary with increased modal shares of walking, cycling and medium and long distance public transport as well as a completely electrified (or decarbonized) vehicle fleet, which require substantial investment and depend heavily on the regulatory and economic framework defined at national and European level.

➔ **Impact pathway 4: Decarbonizing Industry**

The Grenoble-Alpes territory includes a multitude of industrial activity; several large scale companies subject to the European Emissions Trading System (including a chemical platform and a cement plant), new transition industries (new generation batteries and LEDs), small industries and research and innovation centers in the fields of health, energy and microelectronics. As the Metropole has little leverage to directly influence the decision makers of the large scale industries, we have excluded them from the scope of the carbon neutrality trajectory, but we have chosen to include this sector which represents 40% of the territory's emissions, in our action plan and revised SECAP. The aim of this is to continue to stimulate the economic ecosystem (already started with the European Green Capital 2022, the Local Economic Pact, the Grenoble Alpes 2030 Economic Strategy, the Convention of Enterprises for the Climate) in a dynamic of transition and ambitious decarbonization of the territory, while contributing to the relocation of industries in a logic of carbon footprint reduction. To be effective, it will need to rely on an incentive regulatory and economic framework at national and European level and on partnerships with other public stakeholders of the territory.

Because industrial strategies are not locally driven, this pathway need a strong commitment of European institutions with a view on territorial impacts and strategies. The support of circular industry is among other a big challenge for the future decarbonisation of this sector.

➔ **Impact pathway 5: Strengthen waste management, reduce the quantities of waste produced and develop the circular economy**

The extraction of materials, the production of raw materials, the manufacturing and transport of the objects and foods we consume, as well as the collection and incineration of waste, consumes energy and emits greenhouse gases. To reduce this, an ambitious waste prevention and collection policy has been deployed within the metropolitan area and the surrounding cities/villages as part of the 2020-2030 Waste Master Plan. This plan aims to reduce the quantity of waste generated annually by 20%, to improve sorting, and to reduce by 50 % the weight of the residual incinerated waste.

Since three years, the collection of food waste has become generalized, with a solution offered to all inhabitants of the territory. Existing metropolitan equipment and devices for waste treatment and collection have also improved, with the **increase in the capacity of the sorting center, the modernization of the biowaste composting unit and the installation of a new methanization unit, and the launch of the reconstruction of the Athanor incineration and energy recovery plant** (completion planned 2028). Beyond waste management, a more global reflection on "throw less, consume better" is being strengthened, in particular thanks to the third Local Program for the Prevention of Household Waste and the Circular Economy Development Strategy launched in 2022. This strategy is based in particular on the “Pôle R” inaugurated in December 2023, a totem place of the circular economy, open to all economic actors in the reuse sector, which helps to consolidate their

place within the local economy, and to offer citizens an incentive tool for more sustainable consumption.

Lastly, particular attention will be paid to the ongoing work to develop carbon capture solutions at the national and European level, an exploratory project has been identified with the aim to capture carbon at the outlet of the waste incinerator.

➔ **Impact pathway 6: Promote carbon sequestration and nature-based solutions**

In order to develop carbon sequestration and nature-based solutions, there are many levers for action: increasing the capacity of natural carbon sinks (forests, grasslands, etc.), limiting soil destruction by construction, contributing to ongoing innovations to capture CO2 to produce energy or materials and improving public and private forest management.

In the Grenoble Alpes Metropole area, the main carbon sinks are composed of the forest, which covers approximately 30,000 hectares, or 55% of its territory, and, to a lesser extent, agricultural soils and wetlands. The forest (its soil, living trees and dead trees) stores approximately 140 kteqCO2 annually according to an ENERDATA/ Solagro assessment based on 2018 data, or the equivalent of 8% of the territory's emissions. However, the latest studies on the national forest sinks show a reducing carbon storage capacity of the forest, after several consecutive warm years. **The Grenoble Alpes Metropole area, where beech and spruce are common trees, therefore risks losing part of its sequestration capacity**. Faced with this challenge, the Metropole is taking action, in particular through its 2030 Forest Strategy, its Agricultural Strategy and the Wetland Restoration Plan to consolidate these carbon sinks. To date, 24% of the territorial forest area is PEFC certified (sustainable management label).

Between 2005 and 2017, an average of 47 hectares of agricultural or natural land were urbanized each year. The new French law “Net zero land take” provides a legal framework for the objectives of limiting soil destruction. This helps to strengthen the biodiversity of the territory, combat urban heat islands and improve the health and well-being of the inhabitants. This work is reflected in the Metropolitan Land Use Regulation Plan (PLUI) where more than 100 hectares have been approved to be changed to agricultural land or natural zones. 12,600 hectares of agricultural and natural areas are protected, or in the process of being protected.
In parallel, the Canopy Plan, launched in February 2022, aims to enable the urban area to adapt to climate change by preserving and developing vegetation and permeable areas, to guarantee the health and quality of life of the citizens. Today, the urban area of the Metropole is covered by nearly 27% canopy (in other words, the shade provided by tree foliage). The objective is to reach 30% canopy in 2030 and 40% in 2050 to allow for the trees to have a cooling effect on the city.
Lastly, discussions are underway to explore the possibility of elaborating carbon capture projects in the area, particularly on the waste incinerator.

In connection to these 6 impact pathways, a significant number of projects, both ongoing and planned, directly or indirectly address the reduction of emissions and carbon neutrality. The complete list will be found in the Action Plan.

Finally, since territorial emissions only represent 30% of the carbon footprint, the Metropole is also taking proactive actions to reduce indirect emissions. In particular, it is acting to support the territory's food transition towards less carbon-intensive consumption patterns, through the interterritorial food project (in connection with the Foodtrail project), and to reduce the carbon and environmental impact of its purchases through the responsible purchasing scheme adopted in 2022 (annex 20). The future SECAP will pay particular attention to this issue.

4 Process and principles

This chapter explains the key principles of the Climate City Contract process, the current iterative process of climate action described through the NetZeroCities Transition map and finally the new step of this process with the development of the Climate City Contract and the Cities Mission.

The Climate City Contract Process

The Climate City Contract process is for the Metropole an acceleration and experimentation tool towards carbon neutrality in 2030. It permits us to draw a more ambitious carbon emission trajectory which will be put to test by the territory's stakeholders within the framework of the ongoing regulatory SECAP revision.

To explore the ruptures needed to reach climate neutrality by 2030, the Metropole has been using the economic model developed by NetZeroCities. In addition to the levers of the SECAP, we have developed an exploratory scenario with higher ambitions, taking into account objectives revised since the adoption of the PCAEM in 2020, recent national objectives but also new local exploratory actions. This exploratory scenario developed, that the Climate City Contract Action Plan is based on, leads to a total emission reduction of 81% between 2005 and 2030, excluding large industry.

The action and investment plans described in this Climate City Contract are based on the 2020-2030 SECAP, updated and complemented by new actions, the sectoral plans and strategies accepted since 2020 (Bicycle Plan, Grenoble Alpes 2030 Economic Strategy, Forest Strategy, Circular Economy Strategy, etc.), programmed following the Citizens' Convention, lessons learned from the recent mid-term review of the SECAP and the recent Carbon Neutrality Study, the Multi-Year Investment Program as well as the exploratory scenario of the economic model.

The Climate City Contract Action Plan will allow us to test new actions and ways of working towards climate neutrality. Already, some first steps have been taken in this direction such as developing a reflection on carbon capture connected to the waste incinerator Athanor and exploring actions such as carbon compensation. Also, in terms of work processes, the economic model with its possibilities to model cost efficiency has already permitted new levels of financial analysis. By doing iterative modelling of levers related to the district heating system, current policies are being questioned and public resources optimized. A next step to accelerate the transition of the work force and local economy, is our participation in the Enabling City Transformation Call, with the joint projet JET-Cities – Jobs for Ecological Transition, together with 4 other French cities.

In parallel, the Metropole has started the work on the revision of its SECAP, scheduled for approval by 2026. This revision of the SECAP will be developed in collaboration with local stakeholders, and is closely connected to the ongoing revision of the Energy Master Plan and the Mobility Plan. We will therefore use the Climate City Contract as an acceleration tool that nurtures the revision of the SECAP and later on the Multi-Year Investment Program for the climate investment planning. The cost efficiency analysis of the economic model have raised the internal competences on investment planning and is already being integrated into the revision process of the SECAP.

On the territory of the Metropole, several large industrial companies are subject to the EU Emissions Trading System. These industries are major emitters whose emission reductions since 1990 has significantly contributed to the total reduction of emissions of the territory. But their evolution will

depend on the economic context, the reindustrialization policy of France and the EU and the decarbonisation actions of the concerned industries. As the Metropole has no direct influence on industrial emissions and does not exclude to welcome new industries, we have chosen to exclude large industries from our carbon neutrality trajectory, but include the industrial sector in the action plan to highlight the challenge of reducing these emissions and to further develop collaborations with its stakeholders for developing circularity in industry.

The Carbon Neutrality Study also highlighted the limits of the Metropole's action. The trajectories for achieving carbon neutrality are highly dependent on decisions and regulations taken regional, national and European scales, and on budgetary capacities. This is particularly the case for the electricity energy mix (that is already highly decarbonized in France), that of gas, the dynamics of decarbonisation of the industrial sector and the evolution of the vehicle fleet. The ambition carried locally cannot succeed without convergent mobilization of all decision-making levels, European and National policies, to overcome the regulatory, organizational and financial obstacles identified today. For the Metropole, engaging in the Cities Mission, is the opportunity to participate in surmounting these barriers.

NetZeroCities Transition map
Inspired by the "Transition Map" proposed by NetZeroCities, the following text explains the iterative process of climate action of the Metropole. A more detailed explanation can be found in the Action Plan.

A long-standing commitment to climate action with a strong ambition
Since its first climate plan in 2005, Grenoble-Alpes Metropole has shown its awareness of climate risk and its pioneering desire to act. We have built a strong mandate for action, reaffirming the ambition by signing the Covenant of Mayors' in 2008 and 2021, by strengthening the climate objectives in its successive climate plans and by establishing the climate emergency as a priority for the metropolitan council in 2020. Finally, by committing to the Cities Mission, the Metropole confirms its engagement

to accelerate further, beyond the local level by scaling up, learning from others and reaching out to the national and European level.

Successive climate plans co-constructed based on local analysis, assessment and experimentation
The SECAP defines the territory's strategy and roadmap for ecological and energy transition for a period of 6 years. It sets regulatory targets for adapting to climate change and reducing greenhouse gas emissions and atmospheric pollutants across the metropolitan area. Today's climate objectives and action plan are set in SECAP adopted in 2020, which will be reviewed in 2026.

To build a strong mandate, each iteration of the climate plan was co-constructed with local stakeholders and citizens. The climate plan is built on the basis of local analysis with input from all the studies, assessments and experiments carried out since the last climate plan, as well as new national and European regulations and policies. Each iteration is enriched by feedback from other regions and networks of actors in which the Metropole is involved.

In 2023, to push the reflections further, with the aim of identifying the necessary ruptures to carbon neutrality in 2050, the Metropole has undertaken a Carbon Neutrality Study, based on the national transition agency ADEME's four scenarios.

Increasingly widespread mobilization of local actors
Because carbon neutrality is an unprecedented collective challenge, each iteration of Climate Plans has proposed a framework for partnership engagement, open to voluntary stakeholders in the region (municipalities, businesses, etc.), individually committed, by signing a charter to act and implement actions to combat global warming, and meeting each year to share their progress within the Climate Plan Forum.

Collective mobilization constitutes one of the five axes of the current SECAP. In 2020, as a continuation of the SECAP, in close collaboration with the municipalities, a new commitment framework was developed called the Municipality Commitment Charter. The charter includes an action plan developed and approved by each municipality, supported by the metropole, and acting as a local municipal climate plan (the plans can be downloaded at https://planclimat.grenoblealpesmetropole.fr/295-les-communes.htm). 34 municipalities (out of 49) representing 94% of the population of the Metropole has already approved a charter. In each of their charters, the municipalities establish not only the actions that they are likely to undertake in the implementation of their competences (buildings, real estate, vehicle fleet, etc.), but also the "relay role" that they can have, as a local actor, with the inhabitants and businesses of their community, in a "bottom-up" spirit. The mobilization of the region's economic actors has also been strengthened in recent years through; the Local Economic Pact which brings together the region's 31 main employers; the co-construction of the Economic Strategy Grenoble Alpes 2030 and the Circular Economy Strategy; the coordination of an Industrial Ecology Project on the southern industrial platform; the support for the deployment of the Convention of Enterprises for the Climate and through the signature of the new charter committing stakeholders to the 2020-2030 SECAP.

Because getting people involved is all about setting an example, an Exemplary Administration Plan has been implemented to raise awareness and train all staff of the Metropole and adopt best practices in all areas of the local authority's activities (administration, purchasing, mobility, building management, etc.). The first Exemplary Administration Plan has recently been evaluated to build a second action plan.

Citizen participation and co-creation
The SECAP also establishes a principle of consultation and association of citizens during the preparation of all plans and projects relating to the implementation of the climate plan, such as the recent establishment of the low emission zone.

A flagship project to mention on this theme is the "Citizens' Convention for the Climate" which brought together 100 citizens in 2022, drawn at random from the entire metropolitan population, tasked with making proposals to reduce greenhouse gas emissions by 2030 and to move towards carbon neutrality by 2050. Accompanied by experts and scientists, they worked under the watchful eye of guarantors ensuring the independence of their work.

The Grenoble Alpes Metropole is the first French urban area to set up a Citizens' Convention for the Climate of such scope and ambition. The convention lasted several months, with a firm commitment on the follow-up of the formulated proposals, in complete transparency and with the final goal that all the proposals were presented to the Metropolitan Council. Some may be integrated into the SECAP at the occasion of its next revision. The proposals that concern other stakeholders will also be transmitted to the relevant municipalities, private or public actors of the territory and the complex proposals or those that give rise to significant debate within the Metropolitan Council, will be the subject of a citizen consultation. We wish to encourage other cities and Metropoles to undertake similar participatory approaches and to share our best practices on a European scale.

Implementation of the climate plan
Over time, as the attention to climate issues has increased, the Metropole and its SECAP have also evolved. The ambition to significantly accelerate the energy and ecological transition is expressed today in all of our public policies through master plans and strategic plans for 2030 (energy, waste, mobility, water and sanitation, housing, urban planning, agricultural and food policy, etc.), articulated within a 2020-2030 Climate Air Energy Plan (SECAP), acting as a cornerstone of the metropolitan vision. These plans and strategies now define the actions to implement on all sectors that contribute to GHG emissions.

A shared monitoring and learning system
Each year, the "Climate Observatory Letter" monitors the evolution of emissions and assesses trends and shares it with politicians and actors of the territory at the climate plan partnership forum. This iterative process is marked by the spirit of collaboration and co-creation between the metropolitan area, ATMO (the Auvergne-Rhône-Alpes air quality observatory) and ALEC (Public Company who assists the Metropole in leading the partnership approach). The observatory letter is also published on the climate plan partners' website to inform stakeholders and citizens.

To go further, the climate action is now based on the latest scientific knowledge, thanks to the establishment in 2022 of the Green Capital and Climate Plan Scientific Council, which is consulted on the development and monitoring of the climate plan. A department is also responsible for evaluating public policies and assesses every year several transition policies. More recently, the climate budget project has made it possible to classify all the metropolitan authority's expenditures with a favorable or unfavorable impact on the climate.

The Grenoble-Alpes Metropole GHG Assessment (annex 13) has made it possible to draw up an action plan to reduce direct and indirect emissions directly linked to the metropolitan authority's activities, buildings and facilities.

Finally, the mid-term review of the climate plan made highlighted the achievements and obstacles encountered or levers to reach further.

Make it the new normal and supporting behavioral change
Behavioral change is a fundamental aspect of the path towards carbon neutrality and the stakeholders of the territory have an essential role to play. Since several years, the Metropole has been experimenting, based on cognitive sciences, on the subject of behavioral change. For example, the waste management policies (recycling, reduction of waste and sorting of food waste) have been elaborated based on a behavioral approach designed together with the citizens. Also, considering mobility with the implementation of the Low Emission Zone, alternatives to car use were subject to behavioral analyses to designate a scheme to help the citizens concerned to change their mobility habits.
The implementation of climate actions have evolved over time, the projects that were innovative in the early 2000s are now integrated into the Metropole's everyday operations.

Summary of the principles for the upcoming work process As part of the Cities Mission, we have identified the following principles for the upcoming work process:

- **Each 6 years, develop a strong mandate for action through a regulatory climate action plan** (SECAP), learning from the experience and evaluation of previous action plans and based on last national and European objectives
- Act through all our policies and setting an example
- Building on **the partnership dynamics of the territory**, consolidated during the European Green Capital year and through the Local Economic Pact and thematic plans to accelerate mobilization and bring on board all public and private stakeholders, with the objective of carbon neutrality.
- **Continue citizen involvement** following the Citizens' Convention with monitoring committees, voluntary consultations (as in 2023 for the establishment of the Low Emission Zone), and the launching of citizen debates for the climate
- In accordance with the proposals of the Citizens' Convention for the Climate and our commitment; **accelerate awareness-raising, training and support for changes in the behavior** of all citizens of all ages through the "Awareness and behavior change roadmap" and to continue the close collaboration with researchers who are experts in behavioral change.
- Continue to estimate the financial needs of the transitions for the territory, and **seek to mobilize new sources and tools of financing or economic models**, to keep up with the high stakes in order to accelerate the implementation of actions.
- **Promote innovation, experimentation and collaboration** within the framework of national and European projects (existing projects: H2020 Foodtrails & eCharge4Drivers, MountAdapt, IURC, H-Europe Climaborough, INTERREG ECOLE, EIB ELENA, Solar Impulse Foundation Partnership, SPADES, SOLSTICE, JET-CITIES etc.)
- **Monitor and evaluate the actions implemented and their results**
- Continue to work in an iterative, continuous improvement process, to **identify the obstacles to decarbonisation and the levers for change**, in increasingly close collaboration with other local authorities involved in transitions, and regional, national and European actors.
- **Each 2-3 years, c**apitalize on the lessons learned and test exploratory levers to challenge further SECAP and neutrality carbon trajectory

The Climate City Contract: a new step of the process

This document is the first version of the Climate City Contract for the Grenoble Alpes metropolitan area. It presents the vision that the local authority is carrying out in close collaboration with all the partners of the territory.

The SECAP mid-term review, the carbon neutrality study and the Metropole's GHG Assessment has provided input for the Climate City Contract, particularly in terms of identifying local obstacles and levers to carbon neutrality, action scenarios and the cost of implementation.

In turn, the drafting of the Climate City Contract made it possible to capitalize on the lessons learned from this work, test exploratory levers and draw an ambitious neutrality carbon trajectory to challenge our present ambition. These reflections will nourish the recently started revision of the SECAP, with the involvement of local stakeholders and adoption planned in 2026.

Following adoption of the new SECAP, a new iteration of the Climate City Contract will be drafted, to integrate new objectives and actions to accelerate towards carbon neutrality, in an iterative, systemic transformation and citizen-inclusive approach. The exploratory work will continue, in close collaboration with the other cities and partners of NetZeroCities, in a logic of continuous improvement. The Partner Commitment Charter of the next SECAP will include the partners' commitment to the 2nd Climate City Contract.

The SECAP, revised every 6 years, will remain the regulatory and main plan to move towards carbon neutrality but the Climate City Contract may be revised more often to include exploratory work and experimentation, in order to challenge the acceleration of carbon neutrality in addition to the defined regulatory framework of French climate plans, within the collaborative framework of the 100 climate neutral and smart cities.

5 Signatories

The current document represents the first draft of the Climate City Contract, establishing an alliance between Grenoble-Alpes Metropole and its stakeholders in this voluntary, collective and ambitious initiative.

This Climate City Contract was built in the context of an existing SECAP and a partner engagement process connected to the SECAP, which is already well established with the municipalities and socio-economic stakeholders. Also, since this contract was established just a few months before the launch of the revision of the climate plan, this first version of the Climate City Contract has not been the subject of a specific partnership mobilization. The present commitment process is described in chapter 4. To assure the commitment of the stakeholders, for the next iteration of the Climate City Contract the commitment process of the next SECAP will be merged with the objectives of the Climate City Contract.

Although the President of the Metropole is the only signatory of this first version, the Metropole consolidates in this Climate City Contract the shared vision of the committed stakeholders of the territory to move towards carbon neutrality.

6 Annexes

As the annexes to this Climate City Contract are numerous, a document has been added that explain the role and content of the different annexes. The document can be found in annex 25.

Climate City Contract documents:
Annex 1 Climate City Contract Action Plan
Annex 2 Climate City Contract Investment Plan
Annex 3 Climate City Contract Metropolitan Council Deliberation

SECAP and climate observatory:
Annex 4 SECAP 2020-2030
Annex 5 SECAP mid-term review
Annex 6 Observatory Letter 2023

Commitment of external partners:
Annex 7 Municipality Commitment Charter Catalogue of actions (each individual charter can be downloaded at: https://planclimat.grenoblealpesmetropole.fr/295-les-communes.htm)
Annex 8 Partner Commitment Charter
Annex 9 List of committed companies in the Convention of Enterprises for the Climate

Engagement of external partners:
Annex 10 Local Economic Pact – enterprise action plans
Annex 11 List of companies engaged in the Local Economic Pact

Prospective studies and assessments:
Annex 12 Carbon Neutrality Study
Annex 13 Grenoble-Alpes Metropole GHG Assessment

Reports on social innovation actions:
Annex 14 Citizens' Convention for the Climate report
Annex 15 Green Capital Report 2022

Principal master plans and strategies:
Annex 16 Grenoble Alpes Economic Strategy 2030
Annex 17 Energy Master Plan
Annex 18 SUMP (Mobility Plan 2019-2030)
Annex 19 Waste Master Plan
Annex 20 SPASER Roadmap for responsible public procurement

Financial documents:
Annex 21 Multi-year investment plan 2021-2026
Annex 22 Administrative account report (CA) 2023

Economic model:
Annex 23 Economic model results

Complementary GHG data:
Annex 24 Baseline 2005 GHG data

Annex 25 Navigation document to the Annexes of the Climate City Contract

7 Contract with signature

We, the undersigned, commit to the common ambition and commitments, as formulated in the Climate City Contract of Grenoble-Alpes Metropole.

Date of signature	Name	Signature
13 septembre 2024	Le Président Christophe FERRARI	

President of Grenoble-Alpes Metropole

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