Planning Climate Action in Cities and Regions

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Towards Carbon Neutral and Resilient Territories in the face of Climate Change

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Preface

It is with great enthusiasm and commitment to Chile's climate action challenges that we share this guide with you. This guide was designed to contribute to identifying concrete and practical measures and actions towards a more resilient and carbon-neutral future for our regions and communities.

Climate change is a systemic reality proven by the scientific community. It impacts the daily life of people and the functioning of our society at all levels. Its effects are evident in all latitudes of the world and particularly in Chile, given its high vulnerability to certain climate threats. Sustained increases in the average annual temperature in the country, as projected by climate scientists, threaten our people and land, as well as economic sectors such as fishing, aquaculture, forestry, agriculture, and livestock, and will reduce the availability of and access to water resources.

Chile's Climate Change Framework Law provides us with a solid approach to address this challenge, establishing climate change management instruments that are fundamental for effective implementation of subnational climate action plans. This guide has been developed in line with these instruments and seeks to contribute to their design, providing a practical and applied perspective.

Climate action requires ambition, urgency, and the coordinated participation of all actors in society. Regional and municipal governments are key actors in ensuring that the country's commitments to carbon neutrality and resilience are integrated and that action is undertaken throughout the country. Local leaders are already facing the effects of climate change in their territories, and reacting quickly with forward-thinking actions that address near- and long-term climate impacts will strengthen their resiliency and ability to adapt to future realities. This guide considers the analysis of climate risks faced by Chile, including heat waves, droughts, forest fires, and inland and coastal floods. It also considers the key sectors that contribute to climate change, including energy, buildings, transportation, forest and nature degradation, agri-food systems, and waste.

The document is structured in six chapters, highlighting 22 key transformations to increase climate resiliency and reduce emissions production that can be implemented at the subnational level. The guide proposes key tools to ensure better standards of success for climate action, suggests high-impact enablers to implement climate actions that consider the competencies and administrative instruments of regional and municipal governments, and outlines a clear, quick pathway for planning and implementing climate action. Each chapter provides examples and experiences from municipalities or regions and identifies the main barriers and facilitators associated with taking action.

The preparation of this guide was possible thanks to the active participation of key national, regional, and local stakeholders from government and civil society, who shared their experiences and lessons learned during the workshops and meetings. Their experiences are reflected throughout the document, grounding the guide in the context and reality of local governments.

"Regional and municipal governments are key actors in ensuring that the country's commitments to carbon neutrality and resilience are integrated and that action is undertaken throughout the country." We hope that this guide will complement other frameworks that have been developed to support subnational climate action and serve as a compass for regional and municipal governments, providing them with concrete, highimpact initiatives to act quickly on climate mitigation and adaptation. We recognize that each territory has its particularities, capacities, and resources, so users of this tool are encouraged to adapt the suggested transformations and actions according to their specific context.

This guide is not intended to be definitive, but, rather, a starting point to advance climate empowerment and the recognition of the projects the territories need. I invite you to take ownership of the contents of this guide so that climate action in our regions and communities is ambitious and effective, and the design and implementation of subnational climate management instruments contribute to the legacy of resilience, prosperity, and climate justice.

Maisa Rojas Corradi

Minister of the Environment



Prologue

There is no need to reiterate the urgent need for climate action. Heat waves and forest fires in summer are followed by floods in winter. The priority is to adapt, but adaptation will not be possible if the problem continues to worsen. This is why international leaders have committed to halting climate change to 1.5°C above pre-industrial levels, as proposed by science. To achieve this goal, all countries of the world must drastically reduce their greenhouse gas emissions to achieve global carbon neutrality.

Chile's Climate Change Framework Law enacted in 2022 is one of the best in the world because it recognizes these facts. It sets the goal for Chile to be a climate-resilient country with net-zero emissions by 2050 and establishes a realistic and substantial method to achieve this. It gives a clear mandate to sectoral ministries, municipalities, and regional governments to develop and publish climate action plans aligned with these goals.

Disasters affect territories, ratifying the key role of local administrations. Not only are they at the forefront of urban planning and rural development, which must be compatible with a net-zero emissions economy, but they must also attend to the emergencies and basic needs of people affected by a climate event.

With this guide, the Inter-American Development Bank hopes to support regional governors and mayors in effectively complying with the law, acting on behalf of the people who live in their territories, and, at the same time, taking care of the planet. It aims to start by precisely defining the problem these plans must address — on the one hand, building resilience to climate risks such as heat waves, droughts, forest fires, and floods, and on the other, reducing greenhouse gas emissions from transportation, electricity generation, energy use in buildings, deforestation and the destruction of other ecosystems, food production, and waste management. This guide proposes concrete solutions, including 22 practical and achievable transformations, listing and describing actions that regional and municipal governments can take, such as building bike lanes or using regional land-use plans to prohibit development in at-risk areas. It also identifies barriers that prevent governments from taking climate action and provides facilitators or avenues to address them, including possible funding sources.

This guide would not have been possible without the commitment of the Chilean municipal, regional, and national government actors that make up the Community and Regional Climate Finance Action Group (GAFICCOR). The best thanks to them will be to see this guide used to design ambitious, pragmatic, and beneficial plans for all people living in Chile. We have no doubt the actions taken by local governments in Chile will inspire climate action in the rest of Latin America, the Caribbean, and the world.

"Disasters affect territories, ratifying the key role of local administrations. Not only are they at the forefront of urban planning and rural development, which must be compatible with a net-zero emissions economy, but they must also attend to the emergencies and basic needs of people affected by a climate event."

María Florencia Attademo-Hirt

General Manager, Southern Cone Countries Department, and IDB Group Representative in Chile

Juan Pablo Bonilla

Manager, Climate Change and Sustainable Development Sector



Executive Summary

Climate change affects the environment, our daily lives, and the functioning of society. Its dangerous and widespread impacts are evident in all regions of the world. Chile is highly vulnerable to climate change because it threatens our ecosystems and biodiversity, as well as economic sectors such as agriculture, livestock, and fisheries. Other resources necessary to sustain the population, such as water, are also threatened. In the last 30 years, water resources have decreased 20% in the south and 50% in the north and central areas of the country (Ministry of the Environment, 2021).

Faced with this urgency, Chile submitted its Long-Term Climate Strategy to the United Nations Framework Convention on Climate Change at COP 26 in 2021. In addition, in June 2022, the State adopted the Climate Change Framework Law, the first law in the Americas that establishes the goal of achieving carbon neutrality and resiliency by 2050, at the latest.

The law strengthens the legal and institutional bases for implementing climate change mitigation and adaptation goals. In addition, the law is linked to the Nationally Determined Contribution (NDC) targets, which represent the commitments the country made in 2016, when it ratified the Paris Agreement to limit the increase in global average temperature to between 1.5°C and 2°C.

To ensure climate action implementation at all levels of government, the law established that the country's 16 regional governments and 345 municipalities must develop climate action plans, encouraging coordination between the different levels of government to comply with Chile's climate commitments.

Within this framework, this guide seeks to enhance the capacities of mayors, governors, and their teams to plan and implement climate actions in their jurisdictions, leading their communities towards sustainable, resilient, and low-carbon development.

The guide identifies 22 solutions to build resiliency and accelerate carbon neutrality in the country, which we call "transformations" (see tables ES1 and ES2). Additionally, the guide proposes more than 100 actions that regional or municipal governments can implement to support these transformations, for example, identifying protection zones for green areas in land-use plans or building a network of urban bicycle lanes.

Like a compass, the guide provides regional and municipal governments with direction to move quickly and achieve high-impact climate action.



Figure RE 1: Example of one of the 22 transformations illustrated in this guide. Source: Prepared by the authors

Table ES 1:

Transformations to increase climate resilience.



Table ES 2: Transformations to move towards carbon neutrality.



Method

The transformations and actions suggested in the guide were developed based on the analysis of different national and international documents on climate action and the key components for its successful implementation, prioritizing those that are most relevant at the municipal and regional levels. In order for the analysis to be based on the reality of regional and municipal governments in Chile, four workshops were held in March and April 2023 with representatives from the municipal, regional, and national levels, members of civil society, and other actors. These workshops made it possible to identify the actions presented in this guide. Of the workshops, one was national and three others covered macro-areas of the country (north, central, and south).

To analyze climate action during the workshops, a conceptual framework composed of five elements was constructed:



Climate transformation:

The necessary, broad, and far-reaching changes required to achieve carbon neutrality and climate resilience in the country.



Climate action:

Policies, measures, or programs available to regional and municipal governments to support the achievement of transformations.



Barriers:

Obstacles or opposition to implementing a climate action.



Facilitators:

Tools and resources that help regional governments and municipalities carry out climate actions.

Relevant background:

Experiences and case studies of climate actions that have already been implemented.



Workshop participants shared their experiences and knowledge regarding these elements. Broad and diverse participation highlighted the variability in the characteristics of regional governments and municipalities, such as the differences between rural and urban communities, or those in the north and south. The workshops also identified the different barriers and facilitators governments encounter when making decisions and implementing climate actions. The "Background" section of each transformation showcases lessons learned and experiences that local governments contributed during the workshops. The variability identified is associated with the diverse characteristics of their territories, such as the disparate capacities, competencies and resources that regional governments and, above all, municipal administrations have.

Structure of the Guide

The guide is divided into six chapters.

Chapter 1 presents the transformations needed to increase resilience to heat waves, droughts, forest fires, and inland and coastal floods. Each transformation provides examples of possible supportive climate actions, experiences implemented by communities or regions, and the main barriers and facilitators to implementing action. The list provided in this guide is not exhaustive, but contains the elements identified as most relevant at the local level, and over which municipalities or regions have jurisdiction to make changes.

Chapter 2 presents the transformations to accelerate carbon neutrality; these consider the main greenhouse gas emitting sectors related to regional and local governments: energy, buildings, transportation, forests and nature, agri-food, and waste. Each transformation is presented in the same format as the transformations in Chapter 1.

Chapter 3 presents the keys to successful climate action implementation, identifying the main barriers it encounters and the most relevant facilitators to accelerate it. Key principles and cross-cutting actions that should be developed to strengthen the capacities of regional and local governments are presented as well.

Chapter 4 presents the high-impact enablers for implementing climate actions in regional and municipal governments. These include public financing, administrative instruments, and the main legal competencies of regional and municipal governments to implement climate transformations.

Chapter 5 presents the roadmap for quick, highimpact climate action and provides examples for how to structure action.

Finally, **Chapter 6** presents a summary of recommendations for successful climate action, considering the urgency of the climate crisis. This is based on the principle that while it is important to carry out regional and municipal plans based on detailed local analyses to achieve carbon neutrality and resilience in the coming decades, we have to start implementing change today. Cle Transformations to increase climate resilience

Transformations to accelerate
carbon neutrality

Keys to successful climate action: Cross-cutting actions, facilitators and barriers

High-impact enablers

C5: A Pathway to Quick, Effective Climate Action

> Recommendations for successful climate action

Suggestions for using the Guide

The guide can be used in different ways, depending on the reader's needs and the specific realities of each regional or municipal government. The following is a suggested use.

The regional or municipal government conducts a diagnosis of its climate risks and emitting sectors. If there is no previous diagnosis, it is recommended to carry out a rapid diagnosis, relying on the following sources:

- For climate risks, consult the Climate Risk Atlas (Arclim) developed by the Ministry of the Environment, which has relative risk indicators for each municipality: https://arclim.mma.gob.cl/
- For emitting sectors, consult the National Greenhouse Gas Inventory System, which has information on emissions at the regional level: <u>https://snichile.mma.gob.cl</u>
- In addition, the United Nations Development Program and the Ministry of Environment published the document <u>"How to Prepare</u> <u>a Community Climate Change Action Plan?</u> <u>A Step-by-Step Guide" (UNDP, 2023).</u> This guide suggests drafting a municipal climate change action plan using 11 steps and 36 activities. Additionally, the guide includes a technical synthesis on the main aspects of climate change, a description of the regulatory framework for municipalities on climate change, options for financial instruments to support the

implementation of community climate change action plans, and, finally, some examples of climate actions.

 For background information on mitigation or adaptation in Chile, two good summaries can be found in the National Communication to the United Nations Framework Convention on Climate Change and in the Biennial Update Report to the United Nations Framework Convention on Climate Change. Their latest versions to date can be found below: <u>https://unfccc.int/sites/default/files/</u> <u>resource/4NC_Chile_Spanish.pdf</u>

https://unfccc.int/sites/default/files/resource/ Informe_5IBA_2022_Final.pdf



Go to chapters 1 and 2:

- Identify the priority "climate risks" and "greenhouse gas emitting sectors" for your territory based on your diagnosis.
- Choose the transformations in each section most appropriate for your territory.

- Choose climate actions for the chosen transformations.
 - » Analyze the list of possible barriers and facilitators and take them into account in your actions.
 - » Review the background information and evaluate if any of it may be useful to you.



- Identify cross-cutting actions, facilitators, and barriers that are relevant to your actions.
- Analyze the principles for successful implementation and assess whether there are any possible gaps in your approach.



5

6

Go to Chapter 4:

- Identify funding sources for your climate actions.
- Identify administrative instruments to leverage financing.
- Review your government's legal competencies. Consider them in developing your approach.

Go to Chapter 5:

- Review the steps for planning and implementing climate action.
- See examples of how to structure actions.
 - After reading the guide, and with the climate actions chosen, move on to the **implementation of the climate action.**



Key recommendations for successful climate action

To summarize the guide and achieve effective climate action, the main recommendations for regional and municipal governments are as follows:

- 1. Have ambition and take immediate action.
- 2. Have "climate champions" in leadership positions.
- 3. Align with national carbon neutrality and resilience goals.
- Create an inspiring vision of the future, showing an ambitious but feasible path to implementing climate action commitments that includes economic and social benefits for citizens and businesses operating in the region or municipality.
- **5.** Involve everyone in the challenge, including all municipal departments, citizens, private sectors, and civil society, and collaborate with the national government, other municipalities, and regional governments.
- **6.** Institutionalize climate action, creating a team that takes responsibility for managing and supporting the progress of actions across the board.
- **7.** Communicate, communicate the vision of the future, continuously showing the progress and benefits generated by climate action.
- 8. Identify barriers and opposition to change and take action to overcome them.
- **9.** Be citizen-centric. Design climate actions by analyzing the accessibility and usability of solutions from the perspective of citizens (e.g. considering gendered approaches and impacts on historically marginalized populations, such as Indigenous peoples or inhabitants of informal settlements).
- **10.** Be proactive in taking advantage of opportunities that currently exist, such as climate financing, citizen interest, partnerships with the private sector or civil society, etc.

- 11. Review the list of transformations in this guide and select those that are most relevant to your local context, based on the territory and within the scope of the organization's management and competencies. Draw inspiration from the actions in this guide to advance a set of initiatives that address these transformations in a comprehensive manner.
- **12.** Start with projects that are easy to design, achieve, and have high impact in the short-term. Projects that are highly visible and have broad relevance are advantageous.
- 13. Do not get discouraged if the first climate action you undertake is not as successful as you imagined. Keep an open mind to learning and feedback this builds momentum and advances the transformation.

We are in a climate crisis, and while it is important to carry out 'regional and municipal climate action plans' (PACCC) based on detailed local analyses to achieve the necessary transformations, it is possible to start climate action in a decisive way today, as many municipalities and regional governments are already doing. We hope that this guide will help municipalities and regions accelerate action to face climate change.

It is possible to start climate action in a decisive way today, as many municipalities and regional governments are already doing.



Chapter 1

Chapter 1:

Transformations to increase

climate resilience

Climate resilience is the capacity to anticipate, absorb, adapt to, or recover from the adverse effects of climate change. The transformations and actions identified in this section provide solutions to increase the climate resilience of the country's regions and municipalities, focusing on how governments can collaborate to implement measures to adapt to environmental threats.

The actions included in this chapter aim to proactively manage identified climate risks, preventing stressful and vulnerable conditions. They also seek to minimize the impacts of environmental and extreme weather events and prepare communities for the inevitable consequences of a changing climate.

Box 1.1:

Climate risks in Chile: Current impacts and future prospects.

Heat waves	Up to 3.5 °C	Increase in average annual temperatures in Chile by the end of the century (The World Bank Group, 2021).
Droughts	15%	Average increase in the frequency of droughts at mid-century (Ministry of the Environment, 2022a).
Forest fires	4,000 to 8,000	Number of annual fires each year since 1985 (National Forestry Corporation, 2021).
Inland and coastal flooding	5,53 %	Percentage of the Chilean population living in areas exposed to sea level rise and storm surges in 2022 (Ministry of the Environment, 2022c).

Box 1.2: Transformations to increase climate resilience.







Risk 1:

Heat waves

Chile is experiencing an increase in heat waves nationwide. The Climate Risk Atlas (Arclim) tool, developed by the Ministry of the Environment, projects that in the coming years, 103 municipalities will have 20 or more days per year with temperatures above 30°C. In municipalities such as Quilicura, Graneros, and María Elena, more than 60 days per year above 30°C are projected, and other municipalities that traditionally have not been as affected by heat waves, in the southern zone of Chile, will begin to have more days above 30°C as well (Ministry of the Environment, 2022a).

To respond to this challenge, there are two high-impact transformations to achieve. The first is to prepare for heat waves by incorporating more green areas, reflective surfaces, or early warning systems. The second is to ensure that buildings, such as houses, apartments, or offices, are adequately air conditioned and thermally insulated.

In the coming years, 103 municipalities will have 20 or more days per year with temperatures above 30°C.

Image 3: People refreshing themselves at a water fountain in Paseo Bulnes, in the commune of Santiago. @vicho. Stock.adobe.com



Risk 1: Heat waves

Transformation:

Buildings have clean and efficient air conditioning systems.

Transforming urban infrastructure to make cities more resilient to heat waves is a major challenge today. Planting trees in urban areas or growing flora with low water demand and replacing concrete with natural areas, particularly on streets and sidewalks, can significantly reduce air and surface temperatures. The creation of large green spaces, such as parks, can have a similar effect, also generating air currents in cities due to the temperature differential they generate. However, the challenge is significant: Governments have to be willing to provide or protect large tracts of land and finance the costs of building and maintaining them.

An example of these types of actions can be seen in the Metropolitan Region's plan to build new urban parks, adding seven new parks to Santiago's parks network. Another example is the Municipality of Coronel, which has developed urban tree planting programs and is utilizing native trees and shrubs.

Barriers:

- Soils have been impoverished, for example, by installing concrete or asphalt on top of them.
- Limited urban space.
- Lack of funding to promote nature-based solutions.
- Neighborhoods with informal housing in high-risk or potential green spaces.

Secilitators:

- Community support for maintenance and care of trees and infrastructure.
- Guidelines for arborization and urban space transformations.
- Community teams trained in the proper maintenance of parks and gardens.
- Law No. 20.958. System of Contributions to Public Space.

Background (examples in Chile):

Regional Government of the Metropolitan Region:

- Construction plan for new urban parks (seven new parks).
- Urban tree plan to provide shade (planting 200,000 trees).

Municipality of Coronel, Region of Biobío

• Urban tree planting program where 1,000 native trees and bushes were planted on three hectares of land.





Risk 1: Heat waves

Transformation:

Buildings have clean and efficient air conditioning systems.

Heat waves will become more frequent and intense as global temperatures continue to rise. Regional and municipal governments can prepare their communities for heat waves by promoting passive and active air conditioning in buildings and public spaces. For active air conditioning, encouraging the use of heat pumps and recommending appliances that use refrigerants with less global warming potential, such as hydrofluoroolefins (HFOs), keeps citizens cool and comfortable while reducing impacts on the environment.

For those who cannot afford to pay for airconditioning or modify their homes, governments can provide "cooling centers" (air-conditioned public buildings such as schools or libraries) where people can find respite, or governments can simply add more shade and water features to parks and streets for public access. Furthermore, subsidies can support families in acquiring air-conditioning devices. For example, the Biobío Regional Government implemented a program to replace polluting heaters, such as wood stoves, in exchange for air-conditioning systems that provide heating and cooling. Not only are these air conditioners cleaner and more efficient, but they also improve indoor air quality. An example of a park that helps keep the community cool during hot days is Santiago's Metropolitan Park. It includes shaded paths, water fountains, gardens, and a zoo. It also has a sustainable development plan and a water consumption reduction plan.

Barriers:

- Lack of a regulatory plan in municipalities that would allow for adequate planning of green spaces.
- Neighborhoods with informal housing.
- Inconsistent community organizations for care and maintenance.
- Neighbors are reluctant to change plants because they are not as green as grass.
- Real estate projects with little environmental awareness.
- Vandalism and theft of trees and plants.

Secilitators:

- Improved thermal conditioning standards in existing homes and buildings due to Atmospheric Decontamination Plans (PDA).
- Existing home retrofitting industry in the region or commune.

- Community environmental committees that support climate actions.
- Green infrastructure and tree planting plans by other levels of government.
- Private sector interest in the subject.

Background (examples in Chile):

Biobío Regional Government:

- Program for the replacement of polluting heaters in 2022, in exchange for air-conditioning systems, which can also be used in summer and winter.
 Provides for 800 families in 11 municipalities of Gran Concepción.
- The program had a total cost of \$5.18 billion pesos, co-financed by the regional government (CLP \$4 billion) and the Ministry of the Environment (CLP \$1.18 billion).

Santiago Metropolitan Park:

- There are public swimming pools and water play areas for refreshment.
- It has shaded paths with trees.







Risk 2:

Droughts

Since 1961, annual precipitation in Chile has decreased by 7% per decade; some areas have even experienced a decrease of up to 14% per decade (Ministry of Environment, 2022c). These reductions are expected to continue as climate change progresses. Drought has serious economic, environmental, and social consequences, and citizens across the country could be subject to measures such as water rationing and emergency potable water supply distributions.

Between 1965 and 2019, Chile suffered four major droughts that had ecological and human impacts. From various analyses, it is estimated that the losses from each occurrence exceeded US\$1 billion, on average (Ministry of Environment, 2022c). The most recent began in 2010 and has been described as the worst drought in the last thousand years. In 2020, the national average rainfall deficit was 20% to 45%, depending on location. These dry years have had direct consequences on water security, with increasing conflict over accessibility, supply, and, ultimately, means of survival. In this context, the following two transformations seek to enable communities to adapt to this new reality, which will be key to an equitable and healthy future. Economic losses from a major drought exceed US\$1 billion.

Image 5: Families collecting water. @Mark. Stock.adobe.com

Risk 2: Droughts

Transformation: Production systems (agriculture, mining, industry) reduce water use.

Agriculture (73%), mining (4%), and industry (11%) consume more than 80% of the country's water and should help combat droughts by reducing their consumption and recycling water. Regional and local governments can encourage industries to reuse water, establish recovery systems, and provide technical support, equipment, and infrastructure for rainwater harvesting. They can also implement measures that encourage reduced freshwater use for cooling and establish measures to control the use of water from wells and canals.

The municipality of Navidad, in the O'Higgins Region, developed a pilot rainwater harvesting and management project to reduce desertification and drought (Food and Agriculture Organization of the United Nations, 2010). The municipality partnered with the local community group, Junta de Vecinos La Aguada, to use rainwater for vegetable cultivation and livestock production. The project received technical assistance from the Agricultural Research Institute (INIA) and the Local Development Program and funding from the Global Environment Facility through its small grants programs (UNDP, 2015).

Barriers:

- The cost of acquiring water rights is very high for municipalities.
- Lack of willingness of the private sector to implement initiatives.
- Insufficient regulations on water reuse.
- Municipalities lack strong construction management and permit oversight teams.
- Secilitators:
- Resources such as mulch, nutshells, etc. that help prevent soil evaporation are inexpensive and accessible.
- Alliances with the private sector to improve water management.
- Regional governments prioritize projects associated with water efficiency in areas of scarcity.
- Regional land management plans linked to water conservation.

Background (examples in Chile):

Municipality of Navidad:

- Rainwater harvesting and management to reduce desertification and drought.
- Municipality works with local farmers to use rainwater for vegetable and livestock production.

Atacama Regional Government:

 The regional government, in partnership with the National Irrigation Commission, has a \$6 billion programming agreement aimed at improving water management. The government called for a competition for projects related to remote data collection and water management, automation of existing civil works, installation of volumetric valves and remote sensors in authorized wells, etc.





Risk 2: Droughts

Transformation:

Urban water systems are efficient and reuse greywater.

Regional and local governments can transform urban water systems by supporting efficiency gains and recycling greywater. For example, in new buildings, adopting higher water efficiency standards and incentivizing the installation of greywater systems can reduce overall consumption. In existing buildings, offering low-cost solutions, such as low-flow faucets and showerheads, can have a major impact. Other alternatives, such as promoting rainwater harvesting and growing native plant species for landscaping, also reduce water use. In public parks, smart irrigation and greywater use can reduce costs and water waste in government operations.

An example is the Kaukari Urban Park in Copiapó, which is filled with native plant species and uses greywater irrigation systems to maintain them. Additionally, the local government organizes tours and environmental education programs in the park to raise awareness about what the public can do to take action against climate change.

Barriers:

- Public health regulations could limit the use of greywater.
- Lack of resources to control for water misuse at home (swimming pools, car washes, etc.).
- Neighborhoods with informal housing.
- Opposition from residents to reduce water consumption.
- Secilitators:
 - Environmental education programs in schools.
 - Definition of water consumption levels through local ordinances.
 - Alliances with the private sector to improve water management.

Background (examples in Chile):

Copiapó, Kaukari Urban Park:

- Reuse of water for irrigation.
- Native plant species with low water consumption.
- Community environmental education programs.

Regional Government of Coquimbo:

• Financed the implementation of 14 greywater reuse systems in rural schools.






Risk 3:

Forest fires

With increasing temperatures and drier conditions, forest fires become more frequent and difficult to manage. Since 1985, there have been between 4,000 and 8,000 forest fires each year, mainly affecting the southern and central areas of the country (Corporación Nacional Forestal, 2021). In 2017, forest fires were more destructive than ever before, devastating 570,000 hectares (Ministry of Environment, 2021).

Reducing and controlling forest fires is critical for Chile to reach its carbon neutrality goals, as fires are major GHG emitters and degrade carbon sinks. The issue has become a serious priority for the national government, which committed US\$152 million in 2021 and 2022 and leveraged additional private investment to support both fire control and sustainable reforestation of 24,100 hectares (Ministry of Environment, 2021).

Forest fires also affect the tourism industry, which is the economic base of 200 municipalities throughout the country. In many places, but especially in the south of the country, the beauty of the forests drives tourism (Ministry of the Environment, 2021). For this reason, forest fires are the greatest threat to this industry, as they reduce biodiversity and native forests, destroying not only the ecosystem but also, potentially, the livelihoods of these communities. Considering all these factors, regional and municipal governments must reduce wildfire risks and prepare their communities to respond quickly when wildfires start. This chapter proposes two transformations to increase resilience to this risk.

> Image 7: Forest fires in Chile in 2017.Andrés Pérez Cuenca

Forest fires are the greatest threat to tourism, as they reduce biodiversity and native forests, also the source of livelihoods for communities.



Risk 3: Forest fires

Transformation:

Land-use planning and management reduce wildfire risk.

Urban planning and zoning are excellent tools for preventing and reducing damage from fires. Restricting development in high-risk areas and developing fire breaks can save lives and reduce physical and financial damage. Forest management is also crucial to prevent and stop fires. It is essential to delegate responsibilities and fund activities adequately. Moreover, regional and municipal governments can develop tools to encourage landowners to remove fire accelerants, such as dead and dry vegetation, and restrict the use of fire for agricultural land management and forest clearing. These actions will help reduce the risk of fire spread.

An illustrative example comes from the Association of Araucanía Municipalities, which partnered with the regional offices of Conaf (National Forest Corporation) and the National Emergency Office (now the National Disaster Prevention and Response Service), the Chilean Association of Municipalities (ACHM), and other municipalities in the area to develop a model called the "Municipal ordinance for the prevention and management of local forest fires risks". This ordinance, based on laws No. 19,300 and No. 18,695, is an instrument that can be inserted into municipal regulatory frameworks to mitigate the occurrence and impact of forest fires (Chilean Association of Municipalities, 2022).

Barriers:

- Lack of private sector support for preventive measures.
- Lack of municipal competencies and powers against private companies.
- Urbanization and fragmentation of ecosystems in rural areas.
- Informal housing in high-risk areas.

Facilitators:

- Training for inhabitants living near high-risk areas.
- Trained personnel to act as monitors within their community to continue educating.
- Political will.

Background (examples in Chile):

Araucanía Association of Municipalities:

• Developed a model "Municipal ordinance for the prevention and management of local forest fires risks" to help mitigate wildfires.

Biobío Regional Government:

• In 2023, invested 5 billion pesos in a program that develops management measures to prevent forest fires.





Risk 3: Forest fires

Transformation:

Early warning and monitoring systems combat and reduce damage caused by wildfires.

After a fire has started, time is of the essence. Investing in personnel and training will prepare communities to suppress fires. Developing fire response and evacuation plans that clearly define responsibilities and outlines how to act in stressful situations can help emergency management procedures run more effectively. Public campaigns explaining the plan will create community awareness of actions to take, and funding for warning systems will set actions in motion. The alliance with national institutions such as the National Disaster Prevention and Response Service (SENAPRED) will be key to provide a coordinated and timely response.

One example of a municipality that has taken action is Calbuco, in the Los Lagos Region. The municipality is using drones to support early detection of fires to speed up response times.

Barriers:

- Lack of funding to create warning systems in the municipalities.
- Community lacks interest.
- Private sector is unwilling to support.
- Firefighting budget is limited.
- Training is expensive.
- Delay in information flows.
- Secilitators:
- Existing digital mapping and data collection.
- Declared natural reserve areas.
- Disaster risk management plans.
- Financing from the National Regional Development Fund (FNDR).

Background (examples in Chile):

Calbuco:

• Use of drones for fire detection allows firefighters to react quickly, controlling the fire before it spreads.

Maule Regional Government:

• Financed \$928 million in equipment for firefighters (e.g. flexible 40,000 liter tanks).







Risk 4:

Inland and coastal flooding

In terms of climate risks, floods are the second largest threat to Chile, especially in the southern regions, as well as in Arica, Parinacota, and Atacama (Ministry of Environment, 2021). During the last hundred years, almost a thousand people have died in floods, mudslides, and storms in Chile (The World Bank Group, 2021). In addition to threatening lives and human settlements, these hazards also threaten the functioning of hydraulic and coastal, road, or other critical infrastructure (Ministry of Public Works and Ministry of Environment, 2017).

In coastal areas, 972,623 people, or 5.53% of the population, live in areas exposed to sea level rise and storm surges. Given that the flood level is expected to increase by about 0.3 meters between 2026 and 2045, the following 12 municipalities have been identified as high-risk and are expected to sustain the most damage from these threats based on people, property, and infrastructure: Antofagasta, Coquimbo, Viña del Mar, Valparaíso, Pichilemu, Talcahuano, Coronel, Arauco, Puerto Saavedra, Valdivia, Rapa Nui and the Juan Fernández archipelago (Ministry of the Environment, 2019). Studies on urban flooding have projected up to 75% increases in daily rainfall, leading to a greater extent of flooding due to insufficient water collection and drainage and greater vulnerability of existing infrastructure.¹ To mitigate flood risks, municipalities will need to revise zoning, build or retrofit infrastructure to be resilient, and restore natural drainage and ecosystems, as well as plan and prepare for the storms ahead.

¹Another effect of global change in both temperature and humidity conditions is the increased risk of invasive species (e.g. mosquitoes).

Image 9: Floods of June 2023 in the Rivera de Ñuble sector. Andrés Pérez Cuenca



Risk 4: Inland and coastal flooding

Transformation:

Cities have infrastructure to withstand floods and storms.

To lessen the impacts of floods and extreme storms, natural and urban infrastructure must be able to withstand and respond resiliently to these events. Protecting and restoring wetlands and shorelines, while improving soil quality and vegetation will strengthen ecosystem response, preventing erosion and providing better drainage. Improving building standards and preventing development in flood zones will keep families and businesses safe and reduce physical and financial damages.

A successful case of implementation of these actions occurred in the Municipality of Pichilemu in the O'Higgins Region, where the local government modified the Communal Regulatory Plan to reduce construction in at-risk areas, and prioritized the recovery of ecosystems along the coastline.

Barriers:

- Urbanization without land-use planning and the existing informal settlements.
- Lack of hydraulic works developed by the Ministry of Public Works.
- High cost for the design and implementation of hydraulic works.
- Citizens lack knowledge on the impacts of climate change.
- Limited advice and technical capacity.

Facilitators:

- Citizen activism in defense of wetlands.
- Updating community regulatory plans.
- Projects in protected areas are a part of the Environmental Impact Assessment System (SEIA).
- Urban Wetlands Act, new urban wetlands decree.
- Modifications to territorial planning instruments for coastal areas.

Background (examples in Chile):

Pichilemu:

- Modifications were made to its communal regulatory plan to reduce construction in at-risk areas.
- Ecosystem recovery zones were identified along the coastline.

Quebrada de Macul:

- Construction exclusion zone was created around the creek and its channel.
- Seven settling pools were built at the beginning of the creek and are maintained and monitored during periods of heavy rainfall.





Source: Prepared by the authors

Risk 4: Inland and coastal flooding

Transformation:

Extreme weather events are anticipated and have rapid response and recovery.

Anticipating and responding to an extreme weather event reduces damage and tragedies. Assessing the risks and vulnerability of a community is a great first step in understanding its key weaknesses. Establishing a plan to respond and evacuate will help mitigate these risks and vulnerabilities. The success of the plan will lie in educating citizens about their risks and responsibilities. Investing in systems to warn citizens when an extreme weather event is approaching will improve community response.

Some government agencies already have this work underway. In Biobío, the regional directorate of the National Service for Disaster Prevention and Attention carries out early warning and preparation for extreme weather events. The service collaborates with other government agencies to remove debris, make retention ponds, and deploy emergency services equipment (Concepción Newspaper, 2023).

Barriers:

- Reactive organizational culture.
- Soil erosion and degradation.
- Lack of qualified personnel on teams.
- Deteriorating coastline due to private sector (construction, vehicle entry, dune extraction).
- Lack of commitment from the authorities.
- Lack of resources to invest in prevention.
- Facilitators:
 - Existing management plans for wetlands.
 - Remote sensing and real-time information of tidal events.
 - Interdisciplinary coordination between municipalities.
 - Existing emergency plans of the National Disaster Prevention and Response Service.
 - Use of drones by municipal teams.

Background (examples in Chile):

Biobío Regional Directorate of the National Disaster Prevention and Response Service:

- Implements preventive actions such as debris removal, hillside planting, and retention ponds.
- Collaborates with other governments to prepare emergency services.

Antofagasta Regional Government:

• Developing a system to respond to rains caused by the "altiplánico winter", which also includes mitigation tactics.



Climate Action Manager:



Source: Prepared by the authors



Chapter 2:

Transformations

to accelerate

carbon neutrality

The transformations and actions identified in this section provide solutions to reduce the amount of greenhouse gasses that are released into the atmosphere and increase carbon capture capacity. As a part of the Climate Change Framework Law, Chile committed to be carbon neutral by 2050 by implementing the Long-Term Climate Strategy and other climate action tools. Municipal and regional governments will play a key role in achieving this ambitious goal through the development and implementation of their climate action plans.

This section focuses on how regional and municipal governments can have a greater impact on the mitigation of greenhouse gasses generated by the sectors that produce the most emissions. Table 2.1: Percentage of absolute greenhouse gas emissions for the entire country by sector, 2020



*Forests and nature

(emissions associated with the forestry sector are not considered since their net value is negative)

Source: Prepared by the authors, based on data from the National Greenhouse Gas Inventory, INGEI (Ministry of the Environment, 2022).

Table 2.2: Transformations to accelerate carbon neutrality



Source: Prepared by the authors





Sector 1:

Energy industry

The energy industry, which includes electricity and heat production, oil refining, and solid fuel manufacturing, represented 28.2% of the country's total greenhouse gas emissions in 2020 (37.4% of the energy sector's emissions)¹, or 29,842 kt Co2 eq (Ministry of the Environment, 2022c).

Non-conventional renewable energies (NCRE), such as solar, wind, small hydroelectric (power plants up to 20 MW), and geothermal, have strongly increased their share of electricity production, accounting for 42.7% of the total energy grid installed in 2022 (Chilean Association of Renewable Energies and Storage, 2023).² Rooftop solar is making exciting advances — in March 2023, installations reached a capacity of 175 MW in the country (Chilean Association of Renewable Energies and Storage, 2023). Although progress is being made, Chile still has a long way to go to reach its 2050 goal of producing 90% of its energy with renewables (Ministry of Energy, 2019). This is what the transformation of this sector is all about. Image 12: Wind turbines of the Talinay Wind Farm, in the Coquimbo Region. @Abriendomundo. Stock.adobe.com



By March 2023, rooftop solar installations reached a capacity of 175 MW in Chile.



¹The energy sector, which includes the country's energy consumption, accounts for 75.5% of GHG emissions by 2020.

 $^{^2\,{\}rm The}$ percentage considers the National Electric System, Aysén, Magallanes, and Easter Island.

Sector 1: Energy industry

Transformation: Energy is produced without fossil fuels.

One of the transformations expected in the future is that energy production will not use fossil fuels and, therefore, will be carbon-free. Local and regional governments can collaborate in several ways, including encouraging the deployment of self-generated energy technologies in their communities. This can be done by implementing renewable energy (solar and wind) with storage in public buildings (e.g. schools) or by helping homeowners to install rooftop solar.

Regional and municipal governments can also promote measures such as co-financing and incentives to help advance this transformation. In addition to providing incentives and financing, governments can use campaigns to build awareness and interest in these technologies through local campaigns and can train technicians to support the transition while adding green jobs.

Some regional governments are already taking action. For example, the O'Higgins and Antofagasta regional governments have begun to provide resources for at-risk households to install home solar systems.

Barriers:

- Lack of interest and commitment from the private sector.
- Lack of suppliers for storage systems.
- Difficult to install rooftop solar on old buildings with unstable roofs.

Facilitators:

- Law No. 20,571 of 2012, which regulates the utility payments for customers producing their own energy (netbilling).
- Regional government financing for renewable energy projects.
- Citizen pressure to adopt non-conventional renewable energies for energy production.

- The Municipality of La Florida installed solar courts that produce energy for Fundación Raimapu and Villa Las Araucarias.
- The Municipality of Yungay installed solar lights and solar panels in municipal schools.







Sector 2:

Buildings (residential, commercial, institutional)

Greenhouse gas emissions generated in the buildings sector are attributed to the burning of fossil fuels in residential, commercial, and institutional buildings. This sector represented 6.2% of the country's total emissions in 2020, or 6,588.8 kt Co2 eq (Ministry of the Environment, 2022c).

Between 2010 and 2020, emissions from the sector increased 14.6%, despite the efforts to add new buildings regulations and replace heaters. This increase was driven mostly by the residential sector, where emissions increased 18.4% in that same period (Ministry of the Environment, 2022c).

To respond to this dilemma, two transformations are proposed. The first recommends passive design to increase energy efficiency, while the second pushes to stop the use of fossil fuels inside buildings.

Emissions from the residential sector increased 18.4% *between 2010 and 2020.*

Image 14: Informal settlements in Valparaíso. @Pav-Pro Photography. Stock.adobe.com



Sector 2: Buildings (residential, commercial, institutional)

Transformation:

Buildings are passive, energy efficient, and use highly efficient appliances.

Transforming the built environment by improving its energy efficiency, both for thermal comfort and other uses such as cooking and water heating, is key to reducing greenhouse gas emissions. Passive design and improved efficiency can reduce energy use and demand. Incentives and standards for replacing old appliances with energy-efficient, electric ones will also reduce consumption in both residential and commercial buildings.

Cities such as Arica and Copiapó are constructing their public offices to meet high thermal and energy standards and produce on-site solar energy. Another noteworthy program is the refrigerator replacement initiative adopted by the Metropolitan Region.

Barriers:

- High cost of materials, equipment, and technologies.
- Difficult to retrofit informal housing.
- Low budget for social housing projects.
- Construction industry unfamiliar with passive design solutions.

- The market does not have sufficient availability of equipment and materials.
- Difficult to retrofit old buildings.
- Opposition to changing building design and using new equipment.
- Facilitators
 - Training for officials of the Municipal Works Directorates.
 - Improved coordination between regional government and municipalities.
 - New thermal standards.
 - Standardized construction solutions.
 - Areas with atmospheric prevention and decontamination plans already incorporating more demanding thermal insulation regulations.

- Background (examples in Chile):
- Construction of green public offices in Arica, Copiapó, and El Bosque.
- Installation of windows with reflective coating (that generate a mirror effect where radiation bounces off) at the public library in Yungay.
- Installation of cogeneration plants (simultaneously producing electricity and heat) in public hospitals. For example, at the Coyhaique Hospital.
- Refrigerator replacement program. People obtained a 40% discount on the purchase of a (more efficient) refrigerator by turning in their old one. Developed in 2022 in the Metropolitan Region by the Ministries of Energy and Environment together with Fundación Chile.





Source: Prepared by the authors

Sector 2: Buildings (residential, commercial, institutional)

Transformation:

Buildings do not consume fossil fuels.

Currently, firewood is used to heat homes in the south, and gas is used for cooking and water heating throughout the country, which makes electrifying all the buildings in Chile a substantial challenge. Actions that incentivize solar water heating systems or promote heat pumps will help change these buildings' current energy sources and accelerate the transition toward clean buildings. Making changes in public buildings will also be key to ensuring successful transformation of the built environment. Simple actions like replacing gas boilers and old appliances in public buildings will have big impacts and show government leadership.

Some municipalities, supported by central government funds, have already made major changes, including installing heat pumps (instead of gas boilers) to regulate swimming pool temperatures in Santiago and Providencia. The Chillán Regional Government collaborated with the Ministry of the Environment to promote a program that replaces outdated heaters, and other regional governments are bringing this partnership to their territories as well.

Barriers:

- Cost of electrical systems.
- Utility costs (e.g. electricity rate increases in the winter).
- Limited access to electricity in rural areas.
- Heating, cooking, and domestic water heating systems are unavailable on the market.
- Legal limitations to prohibiting the types of energy used in buildings.
- Cultural resistance to fuel switching.
- Fear of high dependence on electricity.

Facilitators:

- Cost savings in gas network installation and maintenance costs.
- Web tool (www.climatizatuhogar.cl) that allows users to evaluate and choose different options of air-conditioning equipment and thermal insulation for their homes.

- Public financing tools to support regional and local governments and the direct beneficiaries.
- Citizen support with coordinated community and regional working groups.

- Installation of electric heat pumps instead of gas boilers to heat swimming pools at O'Higgins Park in Santiago and at Providencia Sports Center.
- Heater replacement program in Chillán, Viejo, Ñuble Regions.
- Installed solar panels for heating and electricity in Putre, Arica, and Parinacota Region in government-owned infrastructure.



Climate Action Manager:





Sector 3:

Transportation

Fuel combustion in transportation activities including air, transit, personal-use vehicles, rail, shipping, and other modes are the driver of emissions in the sector. Military transport as well as international maritime and air transit are excluded in the country's accounting. This sector represented 24.8% of the country's total greenhouse gas emissions in 2020, equivalent to 26,114 kt CO2 eq (Ministry of the Environment, 2022c).

Despite regulation improvements and investments to reduce emissions in public transit, emissions in the transportation sector increased 182% between 1990 and 2020 due to increases in the number of personaluse vehicles and the length of average trip distances attributed to urban sprawl (Ministry of the Environment, 2022c). The emissions increase would have been even higher, but due to mobility restrictions caused by the Covid-19 pandemic, emissions dropped 11% between 2019 and 2020 (29,218 kt CO2 eq), cushioning the growth (Ministry of Environment, 2022c).

Four transformations are proposed to respond to increasing emissions in transport. The first relates to public transport and proposes increasing its share of trips and utilizing electric public transit vehicles. The second transformation focuses on increasing active transit modes, such as bicycles and walking. The third refers to the electrification of private vehicles, and the fourth suggests reducing transportation demand in general.

The increase in the private vehicle fleet and average trip distances due to urban sprawl have caused the transportation sector to increase its emissions by 182% between 1990 and 2020.

Image 16: Electric public transport buses in the city of Santiago. @Drag Asaftei. Stock.adobe.com

Sector 3: Transportation

Transformation:

Public transportation uses electric vehicles and increases its share of total trips.

Public transit must electrify and increase ridership to reduce greenhouse gas emissions in the sector. Supporting the purchase of electric transit vehicles (e.g. buses and taxis) through financial incentives is the first step in this transition. To ensure these new electric transit vehicles can meet the public demands, cities must extend the electric charging network. Additional improvements to public transit infrastructure will help increase ridership, especially actions like developing exclusive rapid bus lanes, which enhance travel times and frequencies. Similarly, developing transportation hubs that connect different transit modes (e.g. Park n' Ride, bike shares at transit stops, etc.) strengthens the network as a whole and encourages the public to take advantage of various types of transit.

Transitioning transit to electric vehicles is already taking place across the country. In O'Higgins and the Metropolitan regions, governments have replaced their bus fleets with electric ones. The Energy Sustainability Agency developed the My Electric Taxi program, which supports the purchase of electric taxis.

Barriers:

- Coordination between regional government agencies is weak and lacks a comprehensive approach.
- Higher upfront cost for electric vehicles.
- Inadequate charging infrastructure for public transit.
- Government opposition to procure public transit services in regions.
- Lack of infrastructure exclusive to public transit.

Facilitators:

- Access to financing or loans to reduce the initial investment in electric vehicles.
- Electric vehicles are widely available on the market.
- Accessible information on public transit hours of operation, arrivals, trip lengths, etc.
- Integrated payment systems for different transit modes.

- Subsidies for senior and youth fares.
- Possible to convert existing vehicles to electricity, subject to approval of regulations.

- Using the Special Public Transportation Bus Renewal Program hosted by the Ministry of Transportation and Telecommunications, O'Higgins Regional Government replaced 10 buses with electric ones.
- Replacement of 50 electric cabs in the Metropolitan Region supported by the My Electric Taxi program (Energy Sustainability Agency).
- 2,000 electric buses were added to the Metropolitan Region's mobility network.
- Electroterminal El Conquistador in Maipú, Metropolitan Region, supports 215 buses.
- The first electro-terminal in Antofagasta is expected to open in 2023 and will power 40 electric buses.

Public transportation uses electric vehicles and increases its share of total trips.





Sector 3: Transportation

Transformation:

Active transportation, such as bicycling and walking, increases its share of total trips.

How residents choose to get around depends on their preferences, resources, and constraints. Active transit modes (mainly walking and cycling) are sustainable, low-carbon, and traffic-free, plus they provide other benefits to personal and community health. To encourage people to use active transit more, it is essential to improve infrastructure by creating protected bicycle lanes and improving sidewalks, as well as broadening access to bicycles, both to purchase and rent.

Governments are already improving biking infrastructure and access across the country. Punta Arenas has constructed 60 kilometers of bicycle lanes and Iquique has developed bike lanes along its waterfront. Santiago has increased access to bikes with a bike rental service, and it turned Bandera Street downtown into a pedestrian walkway.

Barriers:

- Long, bureaucratic permitting processes to construct.
- Lack of planning instruments that encourage the interconnection between bicycle lanes and sidewalks in different communities.
- Culture that does not prioritize pedestrians.
- Lack of knowledge for designing bicycle and pedestrian infrastructure.
- Some businesses and neighbors are against bicycle lanes, as they do not want reduced parking or traffic lanes.
- Vandalization of infrastructure.

Facilitators:

- Private sector participation; for example, companies that manage urban bicycles.
- Existing lighting in bicycle lanes.
- Maximum urban speeds of 50 km per hour.

- Growing interest in bicycles as a transit mode.
- Successful pro-pedestrian and pro-bicycle designs in Chilean cities.

- Construction of bicycle lanes and jogging paths in lquique's waterfront.
- Public bicycle rental service in Santiago.
- Constructed 60 km of bicycle lanes in Punta Arenas.
- Transformation of Bandera Street in downtown Santiago into a pedestrian walkway.





Source: Prepared by the authors



renovation plan, improving safety

conditions and universal accessibility (e.g.

wider sidewalks, pedestrian crosswalks).

Implement low-speed zones. Reduce the maximum traffic speed to 30 kilometers per hour to improve safety and promote walking and cycling. A low-cost solution.



Sector 3: Transportation

Transformation:

Privately owned vehicles are electrified.

While other transportation transformations aim to increase public transit ridership or active transit mode share, many trips will continue to be made by privately owned vehicles. As such, this transformation focuses on electrifying all privately owned vehicles in the country to reduce the GHG emissions in the transportation sector. Municipalities and regional governments can lead by example and start electrifying their own fleets. Governments will also need to support the expansion of charging infrastructure to encourage the uptake in electric vehicles. Governments can install charging points in public spaces, incentivize businesses to install chargers, and update building codes to require charging infrastructure in new residential or commercial buildings.

Electric vehicles are gaining traction, and different levels of government are supporting their success. Municipalities such as Coquimbo have installed charging stations in their towns, and recently, the national government reduced taxes and vehicle registration costs for electric vehicles.

Barriers:

- Upfront costs for electric vehicles are higher than those of gas- or diesel-powered vehicles.
- Inadequate charging infrastructure.
- Lack of knowledge about the potential cost savings in fuel and maintenance provided by electric vehicles.
- Market is exclusively offering only high-end electric vehicle models.
- Legal limitations to the conversion of existing vehicles to electric.

Facilitators:

- Private sector interested in financing charging stations.
- Existing applications and platforms provide information on charging stations.
- Lower green tax new vehicle charge.
- Fuel and maintenance cost savings.
- Tax rebates and exemption from vehicle registration fees for electric vehicles.

- The municipality of Coquimbo installed charging stations.
- The municipalities of Renca and Peñalolén have replaced part of their fleet with electric vehicles.





Sector 3: Transportation

Transformation: Transportation demand is reduced.

The previous transformations reduce GHG emissions in the transportation sector by transitioning away from the use of fossil fuels and shifting towards more sustainable transportation options like electric vehicles and active transit. In addition to switching vehicle types and modes, regional and municipal governments can implement different measures to manage the demand for transportation, reducing the need for travel through urban and economic coordination. Governments can encourage remote working in their offices and in the private sector. Similarly, digitalization of different government processes and services can reduce travel and act as a model, encouraging businesses to follow suit. Land management plans are key to preventing unsustainable urban sprawl and building up density in areas with different land uses (residential, services, employment) and easy access to transit.

Concepción, Valparaíso, and Santiago are integrating transit-oriented development into their planning practices and are increasing density around train stations and subway stops. The National Government encourages remote work in some government agencies.

Barriers:

- El estado actual de la infraestructura, con ciudades muy extendidas.
- El aumento en la extensión de las ciudades y la aparición de suburbios y parcelas de agrado.
- La débil gobernanza regional en las áreas metropolitanas (gobiernos regionales, ministerios de Vivienda, Obras Públicas y Transportes) impide gestionar el desarrollo urbano de manera integral.
- La resistencia a aceptar el teletrabajo como opción permanente.

Facilitators:

- Capacidad técnica para analizar los flujos de transporte.
- El proceso de regionalización, que empieza a generar mayores atribuciones a gobiernos regionales.
- La apertura a opciones de teletrabajo, gracias a la pandemia del covid-19.

- Caso de densificación urbana en Concepción y Valparaíso alrededor de estaciones ferroviarias.
- Normativa para regular el teletrabajo en el Estado de Chile (Ministerio del Trabajo).
- Caso de densificación en torno a las estaciones de metro en Santiago.






Sector 4:

Forests and nature

Forests, and nature in general, can be important for carbon sequestration if adequately protected. In the National Greenhouse Gas Inventory, this sector is called Land Use, Land Use Change and Forestry (LULUCF) and includes emissions generated and removed from forestry activities and land- use change. It is the only sector that has net CO2 value in Chile. In 2020, for example, the difference between emissions generated and emissions removed was -49,727 kt CO2 eq, which represented a -32% reduction of the country's total balance (Ministry of Environment, 2022c).

However, the sector's emission removals fell by 24% between 1990 and 2022, from -65,811 kt CO2 eq to its current -49,727 kt CO2 eq. This is largely due to forest fires in recent years and a decrease in forested land.

In order to increase carbon sequestration and reduce emissions, two transformations are proposed for this sector. The first is associated with the restoration and conservation of forests and ecosystems with high carbon stock. The second transformation is associated with implementing nature-based solutions.

> Image 18: Fray Jorge National Park, Coquimbo Region.@Kseniya Ragozina. Stock.adobe.com



Carbon sequestration has fallen by 24% between 1990 and 2020.



Sector 4: Forests and nature

Transformation:

Forests, natural systems, and other ecosystems with high carbon stock are restored and conserved.

The restoration and conservation of forests, natural systems, and other ecosystems with high carbon stock are key for the sector to maintain its status as a CO2 sink and partially balance the country's overall footprint. Municipalities and regional governments have several opportunities for action, from the protection of these lands through their territorial planning and management, to the financing and implementation of restoration and conservation.

Municipal and regional governments (in collaboration with national institutions) have already carried out some of these actions: In the Los Rios Region, they have a pilot restoration and governance program for their river basin. In Araucania, there is the Large-Scale Native Forest Restoration Program. In the Pampa del Tamarugal, they have native trees for restoration efforts.

Barriers:

- Current regulations place too much responsibility on the private sector. There are too many costs and disincentives for proper management.
- Lack of understanding of the problem within municipal and regional governments.
- Limited water availability.

- Lack of information regarding the location and categorization of forests, natural systems, and other ecosystems with high carbon stock.
- The Native Forest Law (Law No. 20,283) is inefficient in promoting forest conservation and restoration.

Facilitators:

- Capacity to protect some of these areas through the different land management plans.
- Recent modification of the Water Code emphasizes the protection of ecosystems.
- Agreements with the National Forestry Corporation.
- Draft on standardized guidelines for the cultivation, restoration, and maintenance of these areas.
- Existing regional and municipal coordination (e.g. territorial climate action roundtables and regional climate change committees).
- The Native Forest Law (Law No. 20,283) includes wetland conservation in its scope.

• Existing NGOs, private sector actors, communities, and others protecting and restoring natural areas.

- Lauca Biosphere Reserve was developed on private land.
- Araucanía undertaking forest planting with the Plan Siembra por Chile (Large Scale Native Forest Restoration Program as a part of the National Forestry Agency).
- Los Ríos Region is restoring watersheds by planting native species.
- Parinacota Regional Government working on Sustainable Land Management Planning.
- Pampa del Tamarugal is using native trees to reforest (project of the Regional Government of Tarapacá and the National Forestry Agency).





Sector 4: Forests and nature

Transformation:

Nature-based solutions to capture carbon are implemented in cities.

Implementing nature-based solutions is within governments' legal and financial capacities, making it a key transformation to increase carbon sequestration in urban areas. Regional and municipal governments can carry out different types of actions to advance nature-based solutions, starting with evaluating the natural ecosystems within their jurisdiction. This will be the basis for understanding what types of native plant species to grow in urban areas, along sidewalks, or in parks. Municipalities can also encourage new developments to build green infrastructure through urban planning plans and ordinances.

Many municipalities are finding nature-based solutions for their communities: In Quillota, the City undertook a tree census; Cerros de Renca Park increased tree planting through massive campaigns; and in El Bosque, the Salvador Allende School installed green roofs.

Barriers:

- High maintenance costs for the first years of restoration and cultivation.
- Lack of knowledge and experts to support municipalities.

- Limited water availability threatens the sustainability of the project in the future.
- Lack of infrastructure for modernized irrigation.
- Civil society is disengaged in nature-based solutions.
- Climate problems in some areas (e.g. in Magallanes, the wind blows down urban trees).
- Facilitators:
 - Abundant information on ecosystems.
 - Private financing to protect ecosystems.
 - Previous experiences of water efficiency in urban tree-planting projects.
 - Existing collaboration with the community in some areas.
 - Municipalities have legal and financial powers to manage urban trees.
 - Financial resources from private offset projects to conserve nature-based solutions.

- Tree planting through large-scale campaigns in Cerros de Renca Park.
- La Ligua and Zapallar manage urban wetlands.
- In María Pinto, a municipal park is using the Miyawaki method (ecological restoration system where four native trees are grown per square meter, along with shrubs and herbs).
- In Talca, a wetlands protection network was formed.
- San Fabián de Alico in the Ñuble Region changed and added vegetation in the community.
- In El Bosque, the Salvador Allende School has green roofs.







Sector 5:

Agri-food

Image 20: Food production and food sovereignty. @Yerko. Stock.adobe.com

Within the agri-food sector,¹ agricultural and livestock emissions can be attributed to emitters like methane production from livestock and fertilizers in agricultural soils. According to the National Greenhouse Gas Inventory, agriculture and livestock accounted for 7% of the country's total greenhouse gas emissions in 2020, equivalent to 11,238 kt CO2 eq (Ministry of the Environment, 2022c).

Sectoral emissions decreased 6.4% between 1990 and 2020, with the greatest reduction, 3.6%, occurring between 2018 and 2020 (Ministry of the Environment, 2022c). The reduction is largely due to decreasing cattle and sheep populations as the national production has lost its competitive edge over foreign markets.

In order to continue this downward trend, two transformations are proposed. The first looks to transform agricultural practices to reduce emissions, and the second aims to increase low-carbon diets.



¹Fishing and aquaculture activities are not included in this sector, since the regional governments and municipalities do not have major powers over them. However, on their own initiative, these governments could request the MMA to declare marine protected areas in their surrounding sectors.

Sector 5: Agri-food

Transformation:

Agriculture is modernized, reducing its methane and nitrous oxide emissions.

In order to reduce greenhouse gas emissions from the agricultural sector, it is necessary to modify production practices to reduce livestock methane emissions and nitrous oxide emissions produced by fertilizers. Municipal and regional governments can support transformation through educational campaigns and by training farmers in new practices, utilizing guides and demonstration workshops in agricultural communities. Supporting or developing urban organic gardens provides a space to test sustainable farming techniques and produce food locally. Municipalities and regional governments can encourage local farmers to produce organic and sustainable products by providing them opportunities to sell their products in local markets.

Some regional governments, like Los Ríos, have published guides to support farmers, and "eco markets" have sprung up in Puerto Varas, Linares, and Calama. The Farmers' Markets Network complements these efforts by helping small farmers sell their products directly.

Barriers:

- Municipalities and regional governments have limited power in the agricultural sector.
- Culture of burning organic waste by communities that engage in intensive agriculture.
- Lack of resources to monitor and control agricultural burning.
- Lack of resources and knowledge to train small farmers in new practices.

Facilitators:

- Existing guides for implementing change.
- Existing financial resources from regional governments, such as the Competitive Innovation Fund (FIC) and the Agricultural Innovation Fund (FIA).

- Puerto Varas, Linares, and Calama host the solidarity eco markets program, a food bank that provides healthy food to vulnerable people.
- The Agricultural Development Institute's Farmers' Market Network supports farmers in selling directly to their neighbors.



Climate Action Manager:



Sector 5: Agri-food

Transformation:

Population adopts healthy diets with a low-carbon footprint.

Transitioning to healthy diets with a low-carbon footprint is key to lowering emissions from the agrifood sector. These healthy diets will be primarily focused on increasing plant-based food (e.g. fruits, vegetables, nuts, and legumes). To support this transformation, municipalities and regional governments, in coordination with the health authority, can develop educational programs to demonstrate healthy food preparation, aligned with Law No. 20.606. Governments can also establish food procurement standards in their facilities, prioritizing purchasing food with a low-carbon footprint. Creating alliances with the private sector will help build up the local plant-based food market, hosting farmer's markets can bring in direct sales, and developing programs to connect local food producers with restaurants and other industries supports wholesale purchases.

Governments are supporting these efforts around Chile. In Punta Arenas, small agricultural producers sell their products in school gymnasiums. La Araucanía Regional Government is reviving traditional plant-based foods with the support of the Agricultural Innovation Fund.

Barriers:

- Cultural resistance to reduce meat consumption.
- Few markets with local suppliers.

Second Facilitators:

- Alliances with health organizations and institutions.
- Youth are receptive to dietary changes.
- Culinary identity of the country is linked to healthy eating.
- Existing agro-ecological cooperatives.

- Reviving traditional foods, like beans grown by Mapuche communities in La Araucanía (led by Fondo de Innovación Agraria).
- Small agricultural producers sell their local products in school gymnasiums in Punta Arenas.





Source: Prepared by the authors



Sector 6:

Waste

Image 22: Biodigester converting swine manure into gas to generate electricity. @Marco Paulo Bahia. Stock.adobe.com

Greenhouse gas emissions from the waste sector are linked to the management, processing, treatment, and discharge of solid waste and wastewater. This sector emits 7,660 kt CO2 eq, which represents 7.3% of the country's emissions (Ministry of the Environment, 2022c).

Between 1990 and 2020, waste sector emissions surged, increasing a staggering 383% (Ministry of the Environment, 2022c). The primary reasons for this increase can be attributed to the rising population, higher per capita generation of both liquid and solid waste, and increases in waste treatment systems.

To reverse this trend, the country must achieve three transformations: reduce the amount of waste generated, implement waste collection systems that separate out recyclable and organic materials from garbage, and implement systems that commodify organic and inorganic waste.



Sector 6: Waste

Transformation: The amount of waste generated is minimized.

At a time when the consumption of goods and services continues to rise sharply, reducing the amount of waste generated seems like a long way off. Nevertheless, municipalities and regional governments have the potential to make significant change in their communities. Governments can use campaigns to educate the public on waste and its impact on climate change, then encourage businesses and institutions to make commitments to zero-waste goals — providing programmatic support to these organizations will only make them stronger.

New initiatives are in the works, including clean production agreements that support partnerships with the private sector to promote the circular economy and local research projects to develop sustainable packaging for seafood products.

Barriers:

- Lack of awareness and knowledge in the community.
- Underdeveloped market for repairing furniture and electrical appliances, etc.
- High product repair costs.
- New laws regulating the reduction of waste such as plastic are not enforced.
- Planned obsolescence promoting new products and upgrades.

Facilitators:

- Human resources and political powers within municipalities.
- Funding for environmental education programs, for example, the Environmental Protection Fund (FPA) from the Ministry of the Environment.
- Support from leadership.

- Existing programs in the Technical Cooperation Service (Sercotec) for Commercial Districts and other programs.
- Technical assistance can be funded through other municipal programs, such as the Neighborhood Improvement Program.
- Community engagement.

- The clean production agreement to promote the circular economy, which works with several companies towards circularity.
- The MásMar Program is a public-private partnership in the Coquimbo Region that is working on sustainable packaging for seafood products.





Sector 6: Waste

Transformation: Waste types are collected separately.

To mitigate greenhouse gas emissions in the waste sector, there must be widespread adoption of separated waste collection systems, in which organic material (e.g. food scraps) and recyclable materials (e.g. glass and paper) are separated from landfill waste. Municipalities can establish ordinances to regulate waste separation. Differentiated waste collection containers to sort recycling and organic materials promote waste separation at businesses and homes. Governments should also have a fleet for collecting recyclables and drop-off points for depositing sorted waste.

Cities like La Pintana, Villa O'Higgins, and the Aysén Region are already promoting waste separation for recycling and organic waste.

Barriers:

- Low participation in recycling programs and lack of knowledge in waste segregation.
- Informal dumps and landfills.
- Subdivisions and informal housing in rural areas.
- Insufficient municipal land zoned for waste management to implement large scale composting.

- High waste transportation costs in isolated communities.
- Sanitary requirements that are complex to comply with.
- Lack of training on REP Law.
- Lack of landfills or disposal sites for sorted waste.
- Facilitators:
 - Financing from regional governments and the Subsecretaría de Desarrollo Regional (Undersecretary of Regional Development).
 - Citizen support for waste separation.
 - Existing trucks are suitable for separated waste collection.
 - Existing private separated waste collection programs in the municipality.
 - Citizens who have equipment for source separation management.

- Chiguayante, in the Biobío Region, worked with grassroots recyclers and recycled PET 1 plastic, paper, and cans.
- La Pintana developed a project to promote the separation of vegetable waste at home and treat it through composting and vermiculture.
- Villa O'Higgins implemented an organics separation system that brought sorted waste to composting facilities.
- The Municipality of Vitacura has a pilot program for home collection of organic waste.





Source: Prepared by the authors

Sector 6: Waste

Transformation: Waste is commodified.

In addition to the previous transformation, another challenge lies in effectively utilizing and commodifying the separated waste. This could look like repairing and reselling recycled products, converting organic waste into compost for agriculture, or selling biogas on the energy market. Municipal and regional governments can undertake various initiatives, such as establishing pre-treatment facilities for recyclable materials, installing municipal composting bins, or setting up anaerobic digesters to produce biogas. To ensure the success of these initiatives, governments will also need to support the market for recycled materials, compost, and biogas.

Some regional and municipal governments are taking steps in this regard. Lo Barnechea has a composting program for its street markets, and in La Pintana, they have developed a municipal composting project. There are also various anaerobic biodigestion initiatives, such as the Ecoprial biogas plant in Osorno, which receives waste from the dairy, meat, fishing, and sanitary industries.

Barriers:

- Difficulties in managing sectoral permits (e.g. Health, National Property).
- Underdeveloped market for recycled products.

- Insufficient waste drop-off locations.
- High waste transportation costs for rural communities.
- Lack of technical capacity to implement biodigesters at the municipal level.
- Lack of knowledge and awareness around the benefits of a circular economy.
- Public resistance to processing facilities.
- Opposition from grassroots recyclers.
- Reluctance to install biodigesters from private companies due to uncertainty of constant supply from municipalities.

Facilitators:

- Possibility for public–private partnerships, for example, by creating agreements with large waste-generating companies.
- Municipalities have legal powers to implement change.
- Integration of existing recyclers.
- Advanced technological development in the country with respect to these solutions.
- Partnerships with NGOs that are working on waste reuse programs with communities.

- Calama is running a pilot project for composting and vermiculture.
- La Pintana has a community composting program.
- Talca has a municipal composting plant.
- Lo Barnechea is running a pilot project for composting waste from the street markets.
- In Hualaihué, in the Los Lagos Region, a community scrap metal recycling campaign collected 30 tons of scrap metal, which was then reused.
- Osorno is operating the Ecoprial biogas plant.
- Lanco, in the Los Ríos Region, installed biodigesters to extract biogas for local businesses to use.





Source: Prepared by the authors



Chapter 3:

Keys to successful climate action: Cross-cutting actions, facilitators and barriers

This chapter focuses on what the key actions, opportunities, and challenges are to successfully execute long-term community transformations. The "cross-cutting actions" are recommended initiatives within the government's powers that can be taken when implementing any of the transformations. The "facilitators and barriers" section describes exactly that: the barriers and facilitators that governments may face when trying to implement climate actions. The "principles for implementing climate action" are guidelines for successful climate action by municipalities and regional governments, which are inspired by best practices from other subnational climate action.



3.1. Cross-cutting actions

How governments choose to frame transformations depends on the local context, but there are cross-cutting initiatives that can be applied to any and all climate actions. These should be considered by governments when they are developing their strategies because they provide the basis for a just and ambitious transformation.

Analyze data from the local context

To know what transformations to prioritize and what actions to take, municipal and regional governments must first understand their most worrisome climate risks and biggest opportunities to mitigate greenhouse gasses. Governments must conduct an initial diagnosis of their community, collecting and evaluating data. The analysis will depend on personnel and financial resources — some administrations may conduct their own risk analysis assessments and emissions inventories, while others will need to use information developed by other sources. Regardless of the capacity of the subnational government, the goal is to understand the risks and mitigation opportunities, and then take swift action to make the necessary transformations.

It is important to take into consideration territorial planning instruments and regional development strategies, which provide diverse contextual information, as they assist in identifying and diagnosing risks while also highlighting potential synergies that can be leveraged.

This information gathering also helps to analyze any equity gaps in the community, such as gender inequality or marginalized Indigenous peoples. This makes it possible to adapt climate action to incorporate gender, social, and intercultural perspectives and to be effective in reducing inequality and creating a fairer, healthier, and more sustainable society.

Analyzing local data and context makes it possible to adapt climate actions to incorporate gender, social, and intercultural considerations and to effectively reduce inequality, creating a fairer, healthier, and more sustainable society.

Tools for risk and emissions analysis

The national government has developed a series of tools to help regional and municipal governments understand the climate risks facing their communities and diagnose which sectors continue to emit the most greenhouse gasses at the local level.

For climate risks consult the Climate Risk Atlas (Arclim).

For greenhouse gas emissions, consult the <u>National Greenhouse Gas Inventory</u> System (SNI Chile).

For other consolidated information on climate change in Chile, see the Fourth National Communication to the United Nations Framework Convention on Climate Change, 2021, and the Fifth Biennial Update Report to the United Nations Framework Convention on Climate Change, 2022.

Improve land-use management

Many municipal planning decisions made today will still have environmental impacts a hundred years from now. In the case of infrastructure investments and land-use planning instruments, the environmental consequences can continue for decades. This leads to a lock-in situation, i.e. where past decisions limit choices and increase the costs of future decisions. In the context of climate action, this makes longer-term decisions also among the most urgent to ensure that communities adapt to the climate risks at hand and reduce their greenhouse gas emissions.

Land-use planning is a fundamental tool for municipal governments to accelerate these transformations and can help address more than one risk or sector in a comprehensive and integrated approach. Municipalities and regional governments should focus on developing compact, transit-oriented, mixed-use cities, with regulations that address their risks (e.g. floods, forest fires), protect and expand green spaces, prioritize energy demand reduction, and enhance nature-based solutions.

Regional governments and municipalities should collaborate in the early management of informal settlements. This implies generating adequate affordable housing solutions for families and preventing at-risk areas from becoming informal settlements. For the latter, the creation of parks in these areas is one of the various actions that can be found in the IDB report, "Ecological Design: Strategies for the Vulnerable City. Urban green infrastructure and public space in Latin America and the Caribbean" (Vera et al., 2022).

Climate actions can be incorporated directly into a Regional Land Use Plan (PROT) or a Communal Regulatory Plan (PRC), which dictate regional and communal land-use planning respectively. These plans can support sustainable development through guidelines and zoning. Complementarily, the Strategic Environmental Assessment (SEA) ensures environmental considerations are integrated into the design of landuse and zoning plans or policies (Ministry of the Environment et al., 2018).

Open Urban Planning Toolbox

The IDB's Housing and Urban Development Division, realizing that many places in Latin America and the Caribbean lacked data for urban planning, developed the <u>Open Urban Planning Toolbox</u>, a set of open source resources to support every step of the urban planning process, from design to project implementation and evaluation. The tools include:

- Property detector
- Urban growth forecast
- OSM data extraction
- OpenMapKit
- Estimated housing deficit
- Georeferenced Program Evaluation (GPE)
- UrbanPy

In addition, the IDB provides the <u>URSA</u> tool, which is a support system for urban planning.

Lead by example and strengthen governance

If municipal and regional governments want to be champions of climate action, they must make the changes they are asking the community to undertake. Retrofitting government buildings, electrifying their vehicle fleet, and improving waste management are all part of leading by example. Community and business leaders must see that their municipal and regional governments take these commitments seriously and integrate these values into their operations. For example, when the community has questions about how to renovate a building to eliminate the use of fossil fuels, a public building should be the model to follow.

Internally, regional and municipal governments can strengthen the implementation of their climate action by creating a centralized climate action department or an intersectoral committee to lead this work and assume responsibility. The law gives municipalities and regional governments the power to hire staff to assume these positions, and funds should be dedicated to implement actions and programs. Without government examples, actions are unlikely to be adopted more broadly by the public.

Municipal and regional governments can lead by example by retrofitting public buildings, electrifying their vehicle fleets or improving waste management.

Punta Arenas: Change of lighting fixtures to LEDs

By 2023, the city of <u>Punta Arenas</u> will replace 30% of its lighting fixtures with LED devices. The project will increase safety by adding more lighting and reduce the energy consumption of this service by 40%. Switching to LED lighting is a great way for local governments to show how they are making the same changes they are requesting from the community and businesses. Learn more about <u>Municipal Streetlight Luminaire Replacement</u>.



Figure 23: Replacement of luminaires with LED fixtures. @ Tricky Shark . Stock.adobe.com

C. Collaborate

Adaptation and mitigation actions do not fit neatly into the traditional government organizational charts. Developing and implementing climate action requires the involvement of multiple official departments with staff, who are empowered to coordinate, working across administrative boundaries. When staff from different departments and levels of government do not collaborate, the goal of a comprehensive approach to climate action in all public works is lost.

Collaboration with other government levels and jurisdictions is very effective in achieving large-scale actions and transformations. Governments can leverage their collective power to have a greater impact in negotiating or accessing funding. Moreover, other governments can offer information, resources, and best practices from their experiences. For example, networks of regional governments or municipalities, such as the Red Chilena de Municipios ante el Cambio Climático (RedMuniCC) or the Global Covenant of Mayors for Climate and Energy (GCoM), facilitate opportunities for peer-to-peer learning and provide access to tools and resources. Governments that are required to commit to climate action as a part of their participation in the network are encouraged to be more ambitious and are recognized for their achievements.

Collaboration with private sector partners can also have great benefits for governments and help accelerate the transition to a resilient, carbon-neutral future. Private sector partners can work together with governments on individual projects, such as public–private partnerships, as well as on a broader scale, such as breaking down policy barriers to advance market transformation.



Collaboration with private sector partners can have great benefits for governments and help accelerate the transition to a resilient, carbon-neutral future.

Agorechi: Association of Regional Governors of Chile

Agorechi is an association of governors who come together to strengthen regional governments and encourage dialogue between these governments on issues that affect them. It also promotes collaboration with municipal governments, and it developed an agreement with the Sustainability and Climate Change Agency to support regional governments in their climate action efforts.

Engage the community

For climate transformations to be successful, the community must be involved in developing and implementing the actions that will build up resiliency and accelerate carbon neutrality in their neighborhoods. The national government committed to public participation, access to information, and environmental justice as a signatory to the <u>Escazú Agreement</u>, and municipal and regional governments should be at the forefront of fulfilling this commitment.

To understand what community climate priorities are and what citizen support exists, municipalities and regional governments can hire individuals and teams to build up relationships and provide opportunities for community members to share their voices. Engaging citizens, businesses, and investors will help governments understand the challenges of and opportunities for action. Participatory processes bring together a wide variety of perspectives and experiences, which helps ensure that actions are relevant to the challenge and the local community while also meeting a variety of objectives. Tools such as the Municipal Environmental Certification System (MECS) can help governments collaborate with different stakeholders, such as private sector partners and community members, to co-create a sustainable environmental management model. Developing the model together with the private sector ensures that the government is creating a policy environment in which the private sector can take climate action and thrive.

Effective implementation of climate action reflects local circumstances, and the community holds the key to unlocking this door. An early engagement process that includes a gender perspective, different social groups, and Indigenous peoples is a crucial element in successful climate action. Moreover, with this background and citizen support, the national government or others interested in leading climate action will be more inclined to assist with financial and programmatic resources. Locally, inclusive community engagement empowers citizens, fosters cross-sectoral collaboration, raises awareness, and builds capacity.

Inclusive Community Engagement Playbook

C40 Cities Climate Leadership Group developed a playbook detailing how cities can develop comprehensive and effective engagement strategies for climate action. The playbook recommends including community engagement in four stages:



Learn more about how to develop an engagement strategy for your projects.

Promote environmental education

Climate literacy for government leaders and staff, as well as for community stakeholders, empowers people to take action in their own lives, spreads knowledge to others, and builds up capacity for the community to participate in actions on a larger scale. Climate adaptation and mitigation actions may be new concepts for both government officials and residents and will require continuous reinforcement.

Regional and municipal government leaders and staff who advocate, design, implement, and monitor climate action will need direct on-the-job training and will need to build the capacity of the organization as a whole to integrate climate action across departments and within government operations. In communities, environmental education can be implemented through school programs, community gardens, or outreach campaigns. Educational programs can be low-cost and effective; there are likely to be many opportunities to collaborate with local partners who have aligned goals. For example, students who need to raise money for field trips could do so by collecting recyclables, and a school program could be developed to educate students about the values of reuse, reduce, and recycle.

Educational programs can be low-cost and effective; there are likely to be many opportunities to collaborate with local partners who have aligned goals.

Environmental Certification for Educational Establishments: Sncae

The National System of Environmental Certification for Educational Establishments supports schools and organizations in the development of comprehensive environmental education, from early childhood through secondary education. Certification and training opportunities promote:



Read more about how your community can get involved.

Support training programs

To help develop the labor market to support these transformations, governments can create and invest in training programs that make good "green" job opportunities more accessible to local workers. Training programs can be created with high schools, technical schools, technical training centers, universities, or in conjunction with programs in community centers.

Governments can focus training programs on the needs of their communities. For example, if the government needs more support to fight forest fires, it can work with firefighters to develop a training program for volunteer firefighters. In addition, creating programs with an equity perspective gives marginalized groups, such as women, Indigenous peoples, and low-income people, access to new opportunities with good labor standards and living wages.



Action for Climate Empowerment (ACE)

The ACE approach was developed by the United Nations Framework Convention on Climate Change and promotes six elements to solve complex climate challenges.

- Education
- Training
- Public awareness
- Public access to information
- Citizen participation
- International cooperation

Chile incorporated the ACE approach in its first Strategy for Capacity Building and Climate Empowerment in Chile, as well as in the Climate Change Framework Law and Long-Term Strategy.

The training aims to develop practical skills, foster a better understanding, and build capacity to address climate change and its impacts. Subnational governments have opportunities to connect their citizens to new programs that combat climate change and promote equity, such as Energy + Women, which trains women to work in renewable energy jobs.

Figure 24: Training for "green" job opportunities. @ NVB Stocker. Stock.adobe.com

3.2. Facilitators and Barriers

As governments begin to plan and develop their actions, they will encounter both facilitators that advance their success and barriers they must overcome. Facilitators are factors and conditions that can support or promote the government's efforts to bring about change. Barriers, on the other hand, are challenges or constraints that can slow or stop progress on implementing climate action. Each concept is described as a potential barrier and puts forward ideas for overcoming it and turning it into an facilitator.

Technical competencies of professionals

For each transformation, more people will be needed to do the work, representing a significant opportunity to generate good local jobs, from increasing energy efficiency through building retrofits, to planting trees to support reforestation, to installing solar panels, and more. The current labor market may not have all the workers needed or qualified in these areas to meet these needs, which could hinder rapid, broad-reaching implementation of climate action.

As mentioned above, governments can build labor market capacity by developing training programs to support the growth of workers' job skills. Partnerships with educational institutions, the private sector, and other governments will be key to long-term progress.

Processing time

Climate actions involve changing the way things are done, and this can be a challenge for project design, approval, and financing processes. Current government systems are not prepared to manage these types of initiatives since they differ from normal projects, which can slow or halt implementation. Moreover, the governance of these initiatives is complex — as many actors are involved in moving a project forward, siloed or uncoordinated systems will delay progress. The repercussions to timing and feasibility of initiatives can be detrimental to project implementation.

These barriers can be mitigated by coordinating early on with the different agencies that will participate in the design, evaluation, and financing process, which will help prioritize these types of initiatives as well as standardize and simplify evaluation processes. Additionally, collaboration across departments raises awareness among key stakeholders about possible business models for these initiatives and their socioeconomic co-benefits.

Available technologies

For some subnational governments, the technologies or solutions needed may not be widely available or affordable, especially in rural areas that are more isolated and where the private sector is underdeveloped. These communities can collaborate with other local governments to create demand for products, conduct market consultations prior to bidding processes, and foster new relationships with private sector suppliers and universities. In addition, national and regional governments can support municipalities by updating procurement practices that support these new solutions, which, in turn, will increase demand and establish a basis for new technologies in the communities. The national government is already trying to expand access to sustainable and low-carbon technological solutions with the launch of the Development and Technology Transfer Strategy for Climate Change 2021, which is advancing technology in key sectors and priority areas.



Developed private sector

An underdeveloped market can create a number of challenges, from manufacturer resistance to lack of demand. Without private sector support, governments can feel trapped in the status quo. This is one of the many reasons why private sector involvement is essential to the successful implementation of climate action. Understanding the needs and barriers faced by private actors will help governments support market transformation and open up new areas of economic activity.

Incubators and pilot programs can provide a benchmark for the broader market, as well as technical support to build local human capital for these solutions. Collaboration on innovative financial mechanisms can expand green economic development strategies. Regional entrepreneurship funds can strengthen key markets for climate action (e.g. leveraging the home thermal retrofit industry), especially when accompanied by programs that generate demand for the solutions (e.g. home thermal retrofit subsidy program). Furthermore, public– private partnerships can be a mutually beneficial option.

Corfo: Innovation Challenge - Valparaiso Water Efficiency

The Production Development Corporation (Corfo) organizes different competitions that aim to motivate the private sector to develop climate change solutions.

For example, the "Innovation Challenge - Valparaíso Water Efficiency", launched in 2023, co-finances the development of innovative and sustainable products and services that are proposed by the private sector as a part of the competition.

This challenge encourages research centers, companies, and entrepreneurs to increase water efficiency and address the water challenges in the agri-food sector in the Valparaíso Region.



Citizen support

Citizen support is critical to the success of any government action, and public opinion can vary greatly depending on who is involved and how they experience the city. Overcoming the status quo is a challenge for all stakeholders, and citizens are no exception, so identifying cultural barriers to climate solutions in the local context is critical. When citizens are against initiatives, they can stop a project altogether. That is why community engagement is a vital part of developing and implementing climate action. Public engagement processes must compile broad visions, ensuring the participation of diverse groups and the inclusion of community interests; considering people's differences in terms of gender, age, income, and ethnicity; and involving marginalized groups, who often bear the brunt of climate change impacts, to ensure there are equal opportunities to contribute and make fair decisions. Public participation helps governments gain support for their proposed climate actions, which often bring co-benefits to communities, and presenting these benefits to the community can help bring them on board. This, along with listening to their experiences and realities, can illuminate the challenges of and opportunities

> for implementation and can empower various stakeholders. Citizen support can drive transformations as citizens put pressure on the national government to prioritize and support implementation at the local level.



Political will

Changes in government, political differences between different agencies, increased economic and social urgencies, or simple disinterest can result in a lack of political will to implement climate action. Without key leaders in municipalities and regional governments championing this work, transformations stall and put communities at risk of experiencing greater climate impacts as emissions continue to rise. Without internal leadership within subnational governments and collaboration with other public agencies, officials may be left with few options for financing and implementing action. The Climate Change Framework Law requires municipalities to develop climate action plans, and failure to meet deadlines will result in sanctions from the national government. Nationally, there is a lot of momentum for achieving climate action goals, and technological, financial, regulatory, and public recognition systems have been established to support local leaders. It is just a matter of political leaders knowing how to take advantage of the moment.

External financing

Access to external capital and financing mechanisms is a critical facilitator — or potentially a detrimental barrier — to the actions recommended in this guide, given that many of the solutions require greater upfront costs. Regional and municipal governments have an important role to play in creating or expanding financing options and improving access to those funds for public, private, and civil society initiatives. While budget constraints differ between subnational governments, funding sources, including regional, national, private, and international funds, are available for climate actions. For example, the private sector could play a significant role in providing funding through environmental offsets or corporate social responsibility.

Governments will need to be innovative in leveraging the resources available to them and develop business models that build on operational savings as a result of climate actions. Public–private partnerships, green bonds, and other financing strategies will attract private capital, along with their expertise. Implementing and sustaining climate actions will require continuous long-term financing.



Regulatory

Considering regulations, there are some important restrictions:

- a. Adapting public policy instruments to address the changes needed in the community is difficult due to bureaucratic obstacles and approval processes. For example, approving new and modified territorial planning instruments (IPT), especially at the municipal level, is a lengthy, bureaucratic process. Communal regulatory plans take an average of seven years to be approved (Chilean Chamber of Construction, 2016).
- b. Coordination between the different regulatory instruments utilized at each level of government (national, regional, municipal) is inadequate. To address this issue, relevant regulatory tools should be identified, consolidated, and applied to the community's context, and should involve all relevant stakeholders.

It is important that regional governments and municipalities are aware of their regulatory limitations and their competencies, and that they use them strategically. Climate action can be very effective if initiatives with clear competencies are pursued initially, allowing for quick wins.

Currently, there is a lot of momentum and support for climate action and implementation. Political leaders can seize the moment and bring big impacts to their communities.

3.3. Principles for implementing of climate action

There are now hundreds of local governments around the world committed to climate action and achieving resilient, carbon-neutral communities. Their accumulated experience provides valuable insights into the guiding principles for successful climate action. Integrating these principles into action implementation will help ensure lasting and meaningful results that maximize benefits for all members of the community.



Leadership

Leadership is critical to successful climate action. Mayors, governors, councils, staff, and citizens are at the forefront of mobilizing governmental powers to address climate change. While other responsibilities, such as spatial planning, are a regular part of local government management, adaptation and mitigation strategies are an emerging issue, and their success requires leadership within the corporation. Climate action planning and implementation require changes to established frameworks and practices, and these are more likely to succeed when supported by leadership from elected and senior officials in subnational governments. Taking action on climate change requires a "champion," ideally at the executive level (e.g. mayor or governor), as many decisions require council approval. Developing and implementing the vision demands leadership, which requires experience, timing, and will.



Alignment and integration

Climate actions are most likely to succeed when they align with community goals, aspirations, and policies for public health, fiscal efficiency, self-sufficiency, economic prosperity, inclusion, full employment, planning, and development.

Achieving these transformations requires integrating adaptation and mitigation actions into all aspects of government planning, policies, and infrastructure investments. Combined with alignment, integration is a powerful approach to promote a resilient and carbon-neutral future. Coordination across departments and agencies, as well as between other levels of government, including municipal, regional, and national, is also an important strategy, particularly for those that are significantly interconnected and interdependent.



Leverage and opportunities

The key to regional and municipal governments' success in reducing greenhouse gasses and building resilience lies in their ability to leverage the control and influence they have over the decisions, investments, and behaviors in the community that determine emissions levels and infrastructure use. The government's role varies according to particular circumstances and opportunities. Exerting effective influence requires understanding what needs to happen to achieve a resilient and carbon-neutral outcome, who the key actors are to achieve each outcome, and how subnational governments can use their powers, financial resources, and influence to accelerate the desired transformation.

Seizing opportunities can play a key role in developing the momentum to achieve these transformations. Such opportunities may be direct, such as financial support available from the national government, or indirect, such as a proposal to partner with a local nonprofit organization on healthy eating habits in schools. Seizing the opportunity requires understanding the various ways in which government can influence mitigation and adaptation strategies so that opportunities to advance resilience and carbon neutrality goals are recognized as they arise.

Inclusiveness and equity

These transformations will require partnerships between government and other organizations (e.g. other levels of government, private sector, civil society organizations, and academia), as well as between internal subnational government departments and divisions. To develop and implement actions, the municipality and the regional government should involve multiple government departments, stakeholders and affected parties, and diverse communities, with special attention to marginalized groups. In addition, the government should ensure that actions equitably address the risks of climate change, sharing the costs and benefits of implementation across the community.

Considerations include, for example, having a gender focus and taking historically neglected populations, such as Indigenous peoples, into account early in the process. In addition, it is recommended to consider the impact of climate change on access to services, household income, economic opportunities, investment in infrastructure, etc. In this way, involving at-risk communities in the design of climate action will support successful implementation and mitigate potential negative impacts.



Innovation

Climate action is an evolving field and innovation is urgently needed to implement our visions of resilient, carbon-neutral communities. Innovation requires a willingness to take risks, fail, and learn. Governments must foster innovation by providing educational opportunities for their staff and community and by creating partnerships with innovators in their communities, especially in academia and the private sector. Being open to exploring new ideas and willing to pilot initiatives will accelerate transformation.



Transparency

Transparency is key to ensuring that governments are accountable for the climate actions implemented. Transparency includes an open decision-making process and the setting of targets for actions that can be independently measured, reported, verified, and evaluated. The use of transparent models and assumptions instills confidence in the rationale for actions and policy changes. Ensuring that processes and documentation are accessible to all enhances credibility in processes and builds community support for actions.



Innovation requires a willingness to take risks, fail and learn. Being open to exploring new ideas and willing to pilot nitiatives will accelerate transformation.

Chapter 4

Chapter 4:

High-impact enablers

This section presents three enabling elements to carry out climate actions in regional and municipal governments. The first refers to public and private financing spaces, the second involves administrative instruments to leverage actions, and the third is a summary of the main regional- and municipal-level competencies around climate transformations.



4.1. Funding opportunities

This section provides specific guidance on how to finance each climate transformation. Table 4.1 shows the possible sources of funding for climate transformations, with the understanding that funds are fungible between sources. The resources can be used in two dimensions: 1) in a preventive **manner**, anticipating known physical conditions or increasing resilience, and 2) in a reactive manner, in the event that the municipality or region is affected by a climate impact. The use of each serves to implement climate action.

For additional resources, the guide, "How to Develop a Community Climate Action Plan? A Step-by-Step Guide" (UNDP, 2023) has general recommendations for generic financing options to implement local climate action plans.

Table 4.1: Potential funding sources for climate action

Risks	Transformations	Possible sources of preventive or advance financing	Applicability
Heat waves	 Urban infrastructure is prepared for heat waves. The buildings have clean and efficient air- conditioning systems. 	Extraordinary fiscal contribution from the central government.	Municipal and regional
		Programs from the Undersecretariat of Regional Development with the Ministries of Health, Interior and Defense in coordination with the National Forestry Corporation. Regional government programs based on the nature and occurrence with contingent financing.	Municipal
		Budgeted resources for the maintenance of public spaces.	Municipal and regional
		Compensation associated with public space for infrastructure development (such as parks and public spaces, for related works) (Law No. 20,958).	Municipal
Risks	Transformations	Possible sources of preventive or advance financing	Applicability
Droughts	 Production systems (agriculture, mining, industry) reduce water use. 	Programs from the Undersecretary of Regional Development, specifically with the General Water Directorate of the Ministry of Public Works.	Municipal
:O: A A A A A A A A A A A A A	• Urban water systems are efficient and reuse gray water.	Regional government programs mainly for infrastructure works, which must also be coordinated among municipalities.	
		Extraordinary fiscal contribution when there is greater severity in a specific year, with the possibility to include in multi-year budgets.	Municipal and regional
Risks	Transformations	Possible sources of preventive or advance financing	Applicability
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Forest fires	 Land-use planning and management reduce the risk of forest fires. Early warning and monitoring systems combat and reduce the damage caused by forest fires. 	Programs of the Undersecretariat for Regional Development with the Ministries of Defense, Interior and other sectoral ministries, and of regional governments in coordination with institutions such as the National Forestry Corporation, which can assist in fire control.	Municipal and regional

Risks	Transformations	Possible sources of preventive or advance financing	Applicability
Inland and coastal flooding	• Cities have infrastructure to withstand floods and storms.	Extraordinary fiscal contribution for unforeseen events, containment of damages to infrastructure and others.	Regional
	 Extreme weather events are anticipated and have a rapid response and recovery. 	Programs from the Undersecretariat of Regional Development and regional governments in coordination with the Ministry of Public Works for infrastructure, for example, in coastal areas.	Municipal and regional

Sector	Transformations	Possible sources of preventive or advance financing	Applicability
Energy	• Energy is produced without fossil fuels.	Programs from the Undersecretariat of Regional Development and regional governments in coordination with the Ministry of Energy, with allocation of specific programs.	Municipal and regional
		Transfer of monetary resources for capital cost requirements from sectoral ministries.	Regional
		Budgeted resources for maintenance of public spaces (e.g. for solar lights).	Municipal and regional
Sector	Transformations	Possible sources of preventive or advance financing	Applicability
Buildings	 Buildings are passive, energy efficient and use highly efficient appliances 	Land taxes.	Municipal
	The buildings do not consume	Budgeted resources, considering planning over longer periods.	Municipal and regional
	fossil fuels.	Budgeted resources budgeted for the maintenance of public spaces.	Municipal and regional

Sector	Transformations	Possible sources of preventive or advance financing	Applicability
Transportation	Public transport uses electric vehicles and increases its share of total trips	Traffic permits and traffic fines correspond to income from the same sector and may be a first source of financing.	Municipal
	 Active transportation, such as biking and walking, increases its share of total trips. 	Programs from the Undersecretariat for Regional Development, particularly with the Ministry of Transportation and Telecommunications and regional governments (e.g. to channel resources for major or minor urban public transportation).	Municipal and regional
	 Privately owned vehicles are electrified. 		
	• The demand for transportation is reduced.		

Sector	Transformations	Possible sources of preventive or advance financing	Applicability
Forests and nature	• Forests, natural systems, and other ecosystems with high carbon stock are restored and conserved.	Programs from the Undersecretariat of Regional Development and regional governments in coordination with the Ministry of Agriculture, Agricultural Development Institute, the Ministry of Economy, Undersecretariat of Fisheries, and the National Forestry Corporation.	Municipal and regional
	 Nature-based solutions are implemented in cities to capture carbon. 	Another important interaction is with the Ministry of National Assets. The declaration of protected zones could mean resources for physical assets.	Municipal and regional
		Biodiversity offsets regulated by the Environmental Assessment System.	Municipal and regional
		Offsets for greenhouse gas emissions associated with nature-based solutions:	Municipal and regional
		 As of January 1, 2023, the registry of emissions and offset projects established in Article 8 of Law No. 20,780 will be implemented. 	
		 In parallel, Title III, Article 15 of the Climate Change Framework Law (Law No. 21,455) establishes the registration and certification of emission reduction projects. 	

Sector	Transformations	Possible sources of preventive or advance financing	Applicability
Agri-food	 Agriculture is modernized, reducing its methane and nitrous oxide emissions. The population adopts healthy diets with a low-carbon footprint. 	Programs from the Undersecretariat for Regional Development and regional governments (e.g. with the Ministries of Agriculture and National Assets, or innovation programs such as those financed by Corfo and the Ministry of Economy).	Municipal and regional
Sector	Transformations	Possible sources of preventive or advance financing	Applicability
Sector Waste	Transformations • The amount of waste generated is minimized. • Waste types are collected separately.	Possible sources of preventive or advance financing Programs from the Undersecretariat of Regional Development and regional governments for major works and resources, such as new investments in waste management infrastructure.	Applicability Municipal and regional

Source: Prepared by the authors

Other sources of private financing

Private investment, whether domestic or international, is another relevant source of climate action financing.¹ For example, the market responded to regulation around electricity generation and mobilized more than US\$8 billion between 2015 and 2021 to install renewable energy sources (BloombergNEF, 2023). Another example is how the central government utilized sovereign bonds between 2019 and 2022 to attract private financing for the purchase of electric buses (Sebastien Boitreaud et al., 2021).

The State promotes action by offering incentives such as tax benefits, direct transfers, or subsidies. Similarly, the State encourages behavior change from private actors by establishing norms and regulations, which set standards for economic activities. Relationships can be built by regional governments, municipal governments, and initiatives such as the Community and Regional Climate Finance and Action Group (GAFiCCoR). Below are some sources of private funding for climate action at the regional and municipal levels.

Table 4.2: Other private funding sources for climate action

Instrument	Explanation	Applicability
Public–private partnerships and private investment	The public–private partnership and, in particular, private initiative mechanisms, have allowed the State to optimize its investments and enhance regional development by incorporating infrastructure requirements while also boosting the country's productive development. The private sector provides the economic resources, experience, and technological innovation, and the State provides the associative schemes, instruments that facilitate financing, and the legal framework that has made it possible to sustain a long-term alliance.	To the central government in coordination with regional governments and municipalities.
	In accordance with the Concessions Law and its current regulations, amended by D. S. MOP No. 206 of October 7, 2021, and published in the Official Gazette on February 8, 2022, any natural or legal person may apply to the Ministry as a private initiative for the execution of public works through the concession system.	
	Municipalities can grant private parties public use of municipal and national assets, including their subsoil (Law No. 18,695).	Municipal
Environmental donations	Law No. 21,440 creates a donation system with tax benefits to support non-profit entities. To this end, it incorporates Title VIII bis in Decree Law 3,063, which establishes rules on municipal revenues. The benefits are applicable to donations in the form of money or tangible or intangible goods (the latter only when they are subject to registration or registration by law) to nonprofit entities that are previously registered in the donations portal. These donations include the character or environmental issues.	Municipal

Source: Prepared by the authors

¹ See Cities Climate Finances Leadership Alliance 2021 report: https://citiesclimatefinance.org/publications/2021-state-ofcities-climate-finance/

4.2. Administrative instruments for financing

Line 1: Agreements

1.1. Programming agreements (financing from regional governments to municipalities):

Regional governments may enter into public investment programming agreements with one or more municipalities for the execution of projects with communal or intercommunal impact. They may be annual or multi-year, and compliance with agreements is mandatory (Law No. 21,074, art. 8 bis). The agreements offer an effective opportunity to achieve mutual climate actions between the parties. The agreements may include other public or private entities and must be sanctioned by resolution of the respective regional government (Law No. 21.074 art. 8° ter). To achieve this, the administrations only need to create an allocation within the corresponding item for the transfer of resources to other public entities.

1.2. Programming agreements based on provisions of the Budget Law (financing of public services from the central government to regional governments and municipalities): In the budgets of ministries and public services (defined by law), there are allocations (related to current or capital transfers) that are linked to the execution of local and regional governments. These could be connected to one or more of the climate transformations listed in this guide (Annex 1).

It is an opportunity to respond to the challenges at the municipal and regional levels, collaborating with ministries and public services in the development of programming agreements. These will allow the effective, efficient, and economical use of public spending, which will have an impact on people and will contribute to solving climate change challenges. The instruments have certain complexities related to their temporality (budget cycles, internal planning of financing agencies) and the interests of decision makers (sectoral, political, territorial interests). These complexities must be managed to increase the probability of success, both in obtaining financing and in project implementation.

Line 2: Direct agreements

2.1. Direct agreements (central government public services to municipalities):

Municipalities have the power to sign agreements based on coordinated action with the corresponding public services in their territories (Law No. 18,695, art. 10°). These are an opportunity to achieve a coordinated action between the municipality and the public services as long as there is a coincidence in the territorial interest, the powers of the corresponding ministry, and the availability of financing. Current or capital transfers can be fundamental for the development of these agreements and the achievement of shared objectives.

Line 3: Concessions

3.1. Concessions (municipalities to the private

sector): As a legal tool to develop different types of projects, local governments can concession municipal and national assets, including their subsoil, for public use. Examples of such actions include parking lots, urban forestation, or renovation of lighting fixtures (Law No. 18,695). Concessionaires may charge third parties for these works, as in other concessions.

However, municipalities are limited in the subsidies they may grant for these matters. These may only go to public or private non-profit entities that collaborate directly in the fulfillment of their functions (Law No. 18,695, Article 5, letter g.). In addition, these contributions may not exceed 7% of the total municipal budget.

Line 4: Partnerships

4.1. Associations of municipalities: The law allows groups of municipalities to develop associations that solve common problems and make better use of available resources. It also allows these organizations to become a legal entity under private law, and thus, be subject to financing (Law No. 20,527). The financing must come from the municipalities themselves and be approved by the respective municipal councils, although they may receive subsidies from national public entities, competitive funds, or other contributions of a similar nature (Law No. 18.695, Article 145).

These associations must be registered with the Undersecretariat of Regional Development and have the authority to execute the provisions of the financing agreements and provide themselves with the necessary administrative equipment for the corresponding execution.

The law also establishes that the purpose of the associations may be to carry out, among other things, programs related to the protection of the environment (Law No. 18,695, Article 137, letter d.).

<u>Annex 1</u> presents a list of the available budget allocations from the 2023 Budget Law that can potentially be used for climate change purposes and their execution by regional or municipal governments.

4.2.1. Steps to mobilize administrative tools

Steps to develop a programming agreement or a direct agreement	 Step 1: Evaluate the environmental needs of the community (e.g. green areas, bicycle lanes, separated waste collection systems, etc.) aligned with majority citizen priorities. Step 2: Develop a corresponding project. Step 3: Meet with the relevant authority (e.g. Undersecretary of Housing and Urban Development, Regional Government, etc.) to present the case. Step 4: Adjust the project. Step 5: Sign the agreement.
Steps to obtain a municipal concession	 Step 1: Evaluate the environmental needs of the community (e.g. green areas, bicycle lanes, separated waste collection systems, etc.) aligned with majority citizen priorities. Step 2: Develop a corresponding project. Step 3: Call for public proposals to develop the concession. Step 4: Evaluate the bids and award project. Step 5: Grant execution and tax inspection.
Steps to form an association of municipalities	 Step 1: Evaluate the environmental needs of the community (e.g. green areas, bicycle lanes, separated waste collection systems, etc.) aligned with majority citizen priorities. Step 2: Gather with mayors who are facing similar problems. Step 3: Create the association and register it with the Undersecretariat of Regional and Administrative Development. Step 4: Approach regional governments where the association has a presence or central public services to present the project and the need for funding. Step 5: Sign an agreement with the regional government or the corresponding public service.

4.3. Legal analysis

This section analyzes the main legal powers that municipalities and regional governments have to take climate action aligned with the suggested transformations.

For a more general review of the regulatory framework when preparing regional and municipal climate action plans, see the guide, "How to Develop a Community Climate Action Plan? A Step-by-Step Guide" (UNDP, 2023).

4.3.1. Municipal legal powers for climate action

The following are the **Municipal legal competencies to increase** climate resilience:



Heat waves

Urban infrastructure is prepared for heat waves. Each municipality can establish modifications to its territorial planning instruments or ordinances to implement these measures (articles 2.1.17 and 2.1.18, General Ordinance of Urbanism and Construction, OGUC). The corresponding instrument can be changed in a general way, or they can be established at the municipal ordinance level for certain buildings. Territorial planning can be established at different scales, either by means of the Communal Regulatory Plan (PRC) or by means of sectional plans at neighborhood scale. The buildings have clean and efficient air-conditioning systems. Although the municipality does not have direct authority in this area, it can adopt measures aimed at this transformation as part of its general authority:

- 1. The municipalities, within the scope of their territory, may develop, directly or with other bodies of the State Administration, functions related to public health and environmental protection (Art. 4 letter b, Law No. 18.695).
- 2. Governments have residual control and collaboration functions. Without discounting the functions and attributions of other public bodies, the municipalities may collaborate in supervision and compliance management with the legal and regulatory dispositions corresponding to the protection of the environment within the community limits (Art. 5, Law No. 18,695).
- **3.** The entity in charge of the environment, cleanliness, and ornamentation at the municipal level may propose and execute measures to materialize actions and programs related to the environment (Art. 25 letter d., Law No. 18,695).



Production systems (agriculture, mining, industry) reduce water use.

Although the municipality does not have direct competencies in this matter, it can adopt measures aimed at this objective, under the following terms, due to its general competencies:

1. Within the scope of their territory, municipalities may develop, directly or with other bodies of the State Administration, functions related to public health and environmental protection (art. 4 letter b, Law No. 18.695).

- 2. Governments have residual control and collaboration functions. Without discounting the functions and attributions of other public bodies, the municipalities may collaborate in supervision and compliance management with the legal and regulatory dispositions corresponding to the protection of the environment within the community limits (art. 5, Law No. 18,695).
- **3.** The entity in charge of the environment, cleanliness, and ornamentation at the municipal level may propose and execute measures to materialize actions and programs related to the environment (art. 25 letter d., Law No. 18,695).

Urban water systems are efficient and reuse greywater. Each

municipality can request to incorporate measures for new projects regarding technologies for greywater management. They can propose, within the scope of their competencies, the development of feasibility studies for greywater collection and disposal systems. In particular, they may promote systems for collection, treatment, and reuse of greywater in public services, educational institutions, housing projects, and urban, rural, and suburban bus terminals (arts. 6 and following, Law No. 21,075 regulating the collection, reuse, and disposal of greywater). Broad competencies are established according to the text of this law.



Land-use planning and management reduce the risk of forest fires. Around this transformation, the municipality has coordination duties with other agencies to implement four measures.

- 1. Verification of existing management plans (Law No. 20,283, on native forest recovery and forestry promotion).
- 2. Administration and management of green areas (Law No. 18.695, art. 25 letter C.), assigning the entity in charge of the environment, cleanliness, and ornamentation of the municipality with the duty of constructing, conserving, and administrating the public green areas of the community.
- Disaster risk management in the community, including actions related to mitigation and preparation for these events, as well as actions related to emergency response and recovery (Law No. 18,695, art. 4 letter i). For this purpose, municipalities must have a disaster risk management unit (Law No. 18.695, art. 26 bis).
- Finally, there are fire prevention measures in coordination with the National Forestry Corporation and the Ministry of the Interior (Decree No. 733 of 1982, Ministry of the Interior).

Early warning and control systems combat and reduce damage caused

by forest fires. The municipalities have coordination obligations with the National Forestry Corporation and the interior government (Decree No. 733 of 1982, Ministry of the Interior). In particular, these obligations involve disaster risk management in the community, which includes as in the previous section, the phases of mitigation and preparation for these events, actions related to response and recovery, and the obligation to have a disaster risk management unit. It should

be noted that, although fire fighting is the responsibility of the National Forestry Corporation, the law establishes the necessary coordination between the different levels of government in the community.



Inland and coastal flooding

Cities have infrastructure to withstand floods and storms. Each municipality can establish modifications to its sectoral planning instruments or ordinances to implement these measures (Arts. 2.1.17 and 2.1.18 OGUC). In addition, the corresponding territorial planning instrument can be changed in a general way or established at the municipal ordinance level for certain buildings. Territorial planning can be established at different scales, either by means of the communal regulatory plan or by means of sectional plans at the neighborhood scale.

Extreme weather events are anticipated and have a rapid response and

recovery. Municipalities are responsible for disaster risk management in the community, which includes actions related to mitigation and preparedness, as well as actions related to the response and recovery phases in the event of emergencies (Law No. 18,695, art. 4 letter i.). For this purpose, municipalities must have a disaster risk management unit (Law No. 18.695, art. 26 bis).

The following are the **Municipal legal competencies to accelerate** carbon neutrality:



Energy sector

Energy is produced without fossil fuels. Municipalities have two powers in this matter. The first refers to coordination tasks and having a person in charge of overseeing these matters (Law No. 21, 305, on Energy Efficiency, art. 5). The second is related to ensuring compliance with certain standards. Thus, dwellings, public buildings, commercial buildings, and office buildings must have an energy assessment to obtain the final or definitive approval by the respective Municipal Works Directorate. For this purpose, the Director of Public Works must state in the building permit that the project is subject to this obligation (Law No. 21,305, on Energy Efficiency, art. 3).



Buildings sector

Buildings are passive, energy efficient, and use highly efficient

appliances. Although municipalities do not have direct competencies in this area, there are steps the government can take to encourage implementation as mentioned in the previous point, including coordinating tasks and having a person in charge of overseeing building compliance with certain standards.

Buildings do not consume fossil fuels. Regarding this transformation, the municipalities must ensure proper energy use in accordance with the provisions of Art. 5 of Law No. 21,305. This is without damaging the residual competencies already indicated in the energy sector transformation.



Transportation sector

Public transportation uses electric vehicles and increases its share of total trips. The municipality must coordinate with the appropriate bodies to implement measures corresponding to public transport and transit (Law No. 18.695, art. 3 letter d). In addition, each municipality, through the powers granted in the OGUC (arts. 2.3.1 and following), may also establish measures through its territorial planning instruments. These may include, for example, the regulation of urbanization standards and contributions to public space, urban road layouts, parking lots, etc.

Active transportation, such as cycling and walking, increases its share

of total trips. The municipality must coordinate with the appropriate bodies to implement measures corresponding to public transport and transit (Law No. 18.695, art. 3 letter d.). In addition, through the powers granted in the OGUC (arts. 2.3.1 and following), each municipality can establish urban- and road-planning measures through its IPT, including the regulation of urbanization standards and contributions to public space, urban road layouts, parking, access, etc.

Privately owned vehicles are electrified. Although municipalities do not have direct powers in this area, they can adopt measures aimed at this transformation for various reasons:

1. Within the scope of their territory, municipalities may develop, directly or with other bodies of the State Administration, functions related to public health and environmental protection (Law No. 18.695, art. 4 letter b.).

- 2. Governments have residual control and collaboration functions. Without discounting the functions and attributions of other public bodies, the municipalities may collaborate in supervision and compliance management with the legal and regulatory dispositions corresponding to the protection of the environment within the community limits (Law No. 18,695, art. 5).
- **3.** The municipality is responsible for coordination tasks and must have a person in charge of these matters (Law No. 21.305. on Energy Efficiency, art. 5).

The demand for transportation is reduced. The municipality must coordinate with the appropriate bodies to implement measures corresponding to public transport and transit. In addition, through the powers granted in the OGUC (art. 2.3.1 and following), each municipality can establish urban-, territorial-, and road-planning measures through its IPT (Law No. 18.695, art. 3 letter d.).



Forest and nature sector

Forests, natural systems, and other ecosystems with high carbon stock are restored and conserved. Municipalities have two spheres of competencies with respect to these transformations:

- 1. It must recognize those areas of environmental importance in their respective territorial planning instruments and adopt the corresponding measures for their due protection for those that have already been declared (art. 2.1.31 OGUC). The instrument must expressly indicate which land, due to its special nature and location, cannot be built on, including buildings or historic preservation zones. In these cases, the existing buildings may not be demolished or refurbished without prior authorization from the corresponding Regional Housing and Urban Planning Secretariat. Additionally, existing urban wetlands in each territorial level should be recognized as a protected area with natural value. This is for the purpose of establishing the conditions under which permits must be granted for urbanization or construction to be developed (art. 60 LGUC). In particular, the municipality is responsible for: (i) recognizing the protected areas as resources with natural and cultural heritage value; (ii) recognizing or modifying non-buildable zones in order to comply with the legal regulations that establish them; and (iii) modifying the routes of intercommunal roads, provided that a favorable report has been issued by the respective Regional Ministerial Secretariat of Housing and Urban Development (art. 2.1.9 bis OGUC).
- 2. The entity in charge of the environment, cleanliness, and ornamentation is responsible for: (i) proposing and executing measures to materialize actions and programs related to the environment, (ii) applying the environmental regulations to be executed in the community that fall within its competencies, and (iii) preparing the draft environmental ordinance for its approval (Law No. 18,695, art. 25).

Nature-based solutions to capture carbon are implemented in cities.

The municipality has two areas of competencies:

- 1. It must recognize those areas of environmental importance in its territorial planning instruments and adopt the corresponding measures for their due protection (art. 2.1.3.1 OGUC).
- 2. In addition, the environment, cleanliness, and ornamentation entity is responsible for proposing and executing measures related to the environment, enforcing the environmental regulations that fall within its competencies, and preparing the draft environmental ordinance for its approval (Law No. 18,695, art. 25).



Agri-food sector

Agriculture is modernized, reducing its methane and nitrous oxide emissions. Although the municipality has no direct responsibility in this area, it can adopt measures to achieve this objective:

- 1. Municipalities may develop, directly or with other State Administration bodies, functions related to public health and environmental protection (Law No. 18.695, art. 4 letter b.).
- 2. Governments have residual control and collaboration functions. Without discounting the functions and attributions of other public bodies, the municipalities may collaborate in supervision and compliance management with the legal and regulatory dispositions corresponding to the protection of the environment within the community limits (Law No. 18,695, art. 5).

The population adopts healthy diets with a low-carbon footprint. The municipality has the duty to create policies that improve the quality of life of all its citizens:

- 1. Municipalities may develop, directly or with other State Administration bodies, functions related to public health and environmental protection (Law No. 18.695, art. 4 letter b.).
- 2. There are health policies at the national level that delegate coordination powers (art. 27, Decree 136 of 2004, regulations of the Ministry of Health) and the responsibility to monitor and promote public health policies.



Waste sector

The amount of waste generated is minimized. The municipality must coordinate environmental education processes to reduce the amount of waste generated at the community level. Law No. 19,300, on General Bases of the Environment, recognizes "A permanent interdisciplinary process aimed at training citizens to recognize values, clarify concepts, and develop the skills and attitudes necessary for harmonious coexistence between human beings, their culture, and their surrounding biophysical environment".

Waste types are collected separately. The Organic Law of Municipalities establishes, as a private function of the municipalities, the cleanliness and adornment of the community (Law 18,695, art.3 letter f.) and assigns to the environment, cleanliness, and adornment entity the responsibility of ensuring the cleanliness of the community's public roads, parks, squares, gardens, and, in general, its existing public-use national assets. This entity is also responsible for the community's garbage removal service. It may establish a separated waste collection service by virtue of this power.

Also included are the provisions of Law No. 20.920 (Waste Management Framework Law, Extended Producer Responsibility and Promotion of Recycling, or REP Law), which designates the municipalities as managers of collecting, transporting, and treating waste. This can be done with intermediaries, including promoting adequate waste management in their territories and installing green points that can serve neighbors, functioning as a public good. The REP Law is the legal framework for waste and the promotion of recycling.

Waste is commodified. Law No. 20,920 designates municipalities as managers of collecting, transporting, and treating waste. This can be done with intermediaries, including promoting adequate waste management in their territories and installing green points that can serve neighbors, functioning as a public good. The REP Law is the legal framework for waste and the promotion of recycling.

4.3.2. Legal powers of regional governments for climate action

Regional governments mainly have competencies related to the coordination and implementation of public policies, and the financing of projects with regional or local impact, including (Law 19.175, as amended by Law No. 21.074):

- i. designing, preparing, approving, and implementing the region's development policies, plans, programs, and projects within the scope of its competencies;
- **ii.** carrying out studies, analyses, and proposals related to regional development;
- **iii.** guiding the region's territorial development in coordination with its public services and municipalities;
- iv. preparing and approving its draft budget in accordance with the guidelines issued for the formulation of the draft Public Sector Budget Law;
- v. administering funds and programs for regional application; and
- vi. deciding the specific project location of sectoral resource allocation investment programs, contemplated annually in the National Budget Law according to art. 16 of DFL No. 1, of 2005 Law No. 19,175, LOC on Regional Government and Regional Administration.

Therefore, a large part of its interventions fall within these residual competencies.

The following are the **legal competencies of regional governments to increase climate resilience:**



Heat waves

Urban infrastructure is prepared for heat waves. Regarding this transformation, regional governments may establish modifications to the Intercommunal Regulatory Plan (PRI) or the Metropolitan Regulatory Plan (PRM) (arts. 2.1.17 and 2.1.18 OGUC). The regulation expressly instructs them to prepare and approve the regional land-use plan, consistent with the regional development strategy, the national land-use policy, the long-term climate strategy, and the regional climate change action plan. Along with a favorable report from the ministers that make up the Interministerial Commission of City, Housing and Territory (art. 17 letter a. DFL N° 1, of 2005, Law N° 19.175).

The buildings have clean and efficient air-conditioning systems. Regional governments do not have specific powers in this area, although they have

general powers in relation to guiding the territorial development of the region in coordination with the public services and municipalities located in it (art. 16 letter c. DFL No. 1 of 2005, Law No. 19,175).



Production systems (agriculture, mining, industry) reduce water use.

The regional governments do not have specific competencies in this area, although they do have general competencies in relation to guiding the territorial development of the region in coordination with the public services and municipalities located in it (art. 16 letter c. DFL No. 1, of 2005, Law No. 19,175). **Urban water systems are efficient and reuse greywater.** Under Article 6 and following Law No. 21,075, which regulates the collection, reuse, and disposal of greywater, the regional government is given certain powers to coordinate and supervise these matters.



Forest fires

Land-use planning and management reduce the risk of forest fires. The regional government has two competencies in this area. The first is the capacity to adopt the necessary measures to face emergency or catastrophe situations in accordance with the law and develop prevention and protection programs for disaster situations without discounting the competencies of national authorities (art. 16 letter j. DFL N° 1 of 2005, Law N° 19,175). The second refers to the obligation to coordinate measures in case of forest fires (art. 2 Decree No. 733 of 1982, Ministry of the Interior).

Early warning and monitoring systems combat and reduce the damage caused by forest fires. There are coordination obligations with the National Forestry Corporation and the national government established in Decree No. 733 of 1982, Ministry of the Interior. In addition to adopting the necessary measures to face emergency or catastrophe situations in accordance with the law, governments should develop prevention and protection programs for disaster situations without discounting the powers of the national authorities (art. 16 letter j. DFL No. 1, 2005 Law No. 19,175). Although firefighting is the responsibility of Conaf, the law establishes the necessary coordination between the different levels of government within the territory.



Inland and coastal flooding

Cities have infrastructure to withstand floods and storms. Regional governments may establish modifications to intercommunal or metropolitan regulatory plans, as appropriate (articles 2.1.17 and 2.1.18 OGUC). Likewise, they must expressly prepare and approve the regional land-use plan, consistent with the regional development strategy; the national land-use policy; the long-term climate strategy; and the regional climate change action plan after a favorable report from the ministers that make up the Interministerial Commission of City, Housing and Territory (Article 17 letter a. DFL No. 1 of 2005, Law No. 19,175).

Extreme weather events are anticipated and have a rapid response and

recovery. The regional government has the capacity to adopt the necessary measures to face emergency or catastrophe situations in accordance with the law and to develop prevention and protection programs for disaster situations without discounting the powers of the national authorities (art. 16 letter j. DFL No. 1 of 2005, Law No. 19,175).

The following are the legal competencies of regional governments to accelerate carbon neutrality:



Energy sector

Energy is produced without fossil fuels. The regional government must ensure the proper use of energy in the properties they occupy or manage in any capacity (Law No. 21,305, art. 5). It may also develop initiatives for the financing of projects that promote such orientations, since it is responsible for deciding the specific project location of sectoral resource allocation investment programs, as well as the investment of the resources of the National Fund for Regional Development (art. 16 of DFL N° 1 of 2005, Law N° 19,175).



Buildings sector

Buildings are passive, energy efficient, and use highly efficient appliances. The regional government must ensure the proper use of energy in the properties they occupy or manage in any capacity (Law No. 21,305, art. 5).

Buildings do not consume fossil fuels. The regional government must ensure the proper use of energy in accordance with Article 5, Law No. 21,305.



Transportation sector

Public transportation uses electric vehicles and increases its share of total trips. The regional government has the task of coordinating transportation at the regional level and must also approve the transportation master plan when metropolitan areas are established (arts. 17 letter e. and 104d of DFL No. 1 of 2005, Law No. 19,175).

Active transportation, such as cycling and walking, increases its share of total trips. The regional government has the task of coordinating transportation at the regional level and must approve the transportation master plan when metropolitan areas are established (arts. 17 letter e. and 104 quinquies of DFL No. 1 of 2005, Law No. 19,175).

Privately owned vehicles are electrified. The regional government does not have express powers in this area, but it can develop initiatives for financing projects that promote such orientations since it is responsible for deciding the specific project location of sectoral resource allocation investment programs, as well as the investment and distribution of the resources attributed to the region from the National Regional Development Fund (art. 16 of DFL No. 1, of 2005, Law No. 19,175).

The demand for transportation is reduced. The regional government has the task of coordinating transportation at the regional level and must approve the transportation master plan when metropolitan areas are established (arts. 17 letter e. and 104 quinquies of DFL No. 1 of 2005, Law No. 19,175).



Forest and nature sector

Forests, natural systems, and other ecosystems with high carbon stock are restored and conserved. The regional government must recognize those areas of environmental importance in their respective territorial planning instruments and adopt the corresponding measures for the protection of those that have already been declared (art. 2.1.31 OGUC). Likewise, it must expressly prepare and approve the regional land-use plan in coherence with the regional development strategy, the national land-use policy, the long-term climate strategy, and the regional climate change action plan after a favorable report from the ministers that make up the Interministerial Commission of City, Housing and Territory (art. 17a. DFL N° 1, of 2005, Law N° 19,175).

Nature-based solutions to capture carbon are implemented in cities.

The regional government must recognize those areas of environmental importance in their respective territorial planning instruments and adopt the corresponding measures for the protection of those that have already been declared (Art. 2.1.31 OGUC). Likewise, the regional government must expressly prepare and approve the regional land-use plan in coherence with the regional development strategy, the national land-use policy, the long-term climate strategy, and the regional climate change action plan after a favorable report from the ministers that make up the Interministerial Commission of City, Housing and Territory (Art. 17 letter a. DFL N° 1, of 2005, Law N° 19,175).



Agri-food sector

Agriculture is modernized, reducing its methane and nitrous oxide emissions. Although the regional government does not have direct powers in this area, it does have powers in relation to the design of public policies and projects at the regional level, as well as powers of coordination with regional bodies and local governments (art. 16 DFL No. 1 of 2005, Law No. 19,175).

The population adopts healthy diets with a low-carbon footprint. Although the Regional Government does not have direct powers in this area, it does have powers in relation to the design of public policies and projects at the regional level, as well as powers of coordination with regional bodies and local governments (art. 16 DFL No. 1 of 2005, Law No. 19,175).



Waste Sector

The amount of waste generated is minimized. Although the regional government does not have direct powers in this area, it does have powers in relation to the design of public policies and projects at the regional level, as well as powers of coordination with regional agencies and local governments (art. 16 DFL No. 1 of 2005, Law No. 19,175).

Waste types are collected separately. In the event that a metropolitan area is decreed, the regional government may assume all or part of the tasks of collection, transportation and final disposal of household solid waste from one or more municipalities in the metropolitan area (Law No. 18,695).

Waste is commodified. Law No. 20,920, the legal framework for waste and recycling promotion, gives the regional government coordination and oversight powers in accordance with Law No. 19,175 at the regional level.



Chapter 5

Chapter 5:

A Pathway to Quick, Effective Climate Action

This chapter presents a decision tree for using this guide and structuring climate action at regional and municipal levels. Additionally, it provides two examples to demonstrate how to structure quick, effective climate action.

5.1. Simple steps to planning and implementing action

In response to the need for urgent climate action, the following outline of simple steps for regional governments and municipalities showcases how to structure climate actions to produce big impacts and rapid results.



Figure 5.1: A pathway to quick, effective change



5.2. Examples of how to structure climate action

Following the path above, the examples below show how regional and municipal governments can structure climate actions for quick and effective implementation.

Box 5.1: Example of how to structure a climate action to improve resiliency (Administrator: Municipality)

	Description and examples
Identify a climate risk that affects/will affect your community.	Heat waves
Choose the transformation you want to achieve.	Urban infrastructure is prepared for heat waves.
Define actions you want to undertake	1. Urban tree planting along sidewalks with native plant species.
	2. Cultivate flora with low water demand in public areas.
	3. Encourage the development of green spaces outside of private buildings through requirements in the communal regulatory plan.
Define your goals (appropriate to the reality of the municipality)	1. Plant 5,000 trees per year over the next four years.
	2. Cultivate low water demand flora in public areas — one hectare per year.
	3. All new construction will have to have 20% of the total area of the original land set aside for vegetation.
Analyze barriers and facilitators in your community	Barriers
	• The soil has been degraded and many surfaces have concrete or asphalt.
	Lack of municipal funding for cultivation and maintenance.
	Facilitators
	Community is demanding solutions.
	• There is a real estate boom.
	City has a good relationship with the construction sector.
	Law No. 20,958 System of Contributions to Public Space.
	Identify a climate risk that affects/will affect your community. Choose the transformation you want to achieve. Define actions you want to undertake Define your goals (appropriate to the reality of the municipality) Analyze barriers and facilitators in your community

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Steps		Description and examples
5.	Search for communities with similar experiences (national, international)	The Municipality of Coronel developed an urban tree planting program where 1,000 native trees and shrubs were planted on three hectares of land.
6.	Identify if the municipality has legal powers	The municipality can modify its territorial planning instruments or ordinances to implement these actions (arts. 2.1.17 and 2.1.18 OGUC). The corresponding instrument can be changed in a general way or established at the level of a municipal ordinance for certain buildings. Territorial planning can be established at different levels, either by means of the communal regulatory plan or by means of sectional plans at the neighborhood scale.
7.	Identify funding sources	Regional government investment programs.National Forestry Corporation programs.
8.	Identify possible administrative instruments to leverage	 Programming agreements with the regional government. Direct agreement with the National Forestry Corporation. Changes in the communal regulatory plan.
9.	Define the team responsible for implementation	Head of the Planning Secretariat (Secpla) will be responsible for implementation.

Source: Prepared by the authors

Box 5.2: Example of how to structure a climate action to accelerate carbon neutrality (Administrator: Regional government)

Steps		Description and examples
1.	Identify the targeted emission sector in your territory	Waste
2.	Choose the transformation you want to achieve	Waste is commodified.
3.1.	Define actions you want to undertake	 Finance the installation of anaerobic biodigesters for organic waste. Finance systems for capturing and using biogas in landfills and dumps.
		3. Finance or develop community or municipal composting plants to generate fertilizer from organic waste.

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Steps		Description and examples
3.2.	Define goals (appropriate to the reality of the regional government)	1. Finance two biodigesters per year for the next four years.
		2. Finance one landfill or landfill capture system per year.
		3. Finance two community or municipal composting plants per year for the next four years.
4.	Analyze barriers and facilitators in your	Barriers
	territory	Difficulties obtaining permits.
		Opposition from the public.
		Facilitators
		Technology available on the market.
		Possibilities for public-private partnerships.
5.	Search for communities with similar experiences (national, international)	Community composting program in La Pintana.
		Biodigesters extract biogas and are used by local businesses in Lanco.
		Slurry biodigester project in Osorno.
6.	ldentify if the regional government has legal powers	Law No. 20,920, the legal framework for waste and recycling, gives the regional government the power to coordinate and oversee waste management, in accordance with Law No. 19,175 at the regional level.
7.	Identify funding sources	Tax contribution
8.	Identify possible administrative instruments to leverage	Programming agreements (financing of public services from the central government to the regional government)
9.	Define the team responsible for implementation	Head of the Department of Environment, Diversity and Climate Action.

Source: Prepared by the authors



Chapter 6:

Recommendations for successful

climate action

The climate crisis we are facing requires decisive action by all actors in society; therefore, the role of subnational governments is of particular importance given their proximity to the issues on the ground and their ability to move guickly, effectively, and with a comprehensive perspective.

As indicated in Chapter 3, for regional and municipal climate change plans to be effective, it is essential that they be based not only on priority actions for the specific territory, but also on cross-cutting actions: improving landuse management, strengthening climate change governance, collaborating with other actors, engaging the community, carrying out continuous environmental education, and training teams.

It is also important to always consider the facilitators and barriers the government will face in implementing climate transformation. These tend to vary according to the type of transformation, but the main elements that facilitate or impede the successful implementation of climate action are the technical skills of the teams, the available clean technologies, the development of the market in the area, the time required to complete permitting and approval procedures, citizen support, access to external financing, and regulatory limitations. In addition, the following principles are key to implementing successful climate action:







Innovation



Transparency

Along with the above points, it is necessary to be clear about the "high-impact enablers" that help regional governments and municipalities in their climate action. Among these enablers, which are presented in Chapter 4, are the financing avenues that can be accessed, the administrative instruments that can leverage actions, and the legal powers municipal and regional governments have to take climate action.

In this regard, Chapter 5 of the guide provides a proposed "pathway to guick, effective climate action". A decision tree provides guidance on how to use this guide and the steps to follow to develop efficient climate change plans. Two practical examples for how to structure climate actions provide a model for how municipal and regional governments can approach this work. The first describes how a municipality can increase resiliency by adapting to heat waves, and the second describes how a regional government can accelerate carbon neutrality by implementing climate action to transform the waste sector.

In summary, to achieve effective climate action, the main recommendations for regional and municipal governments are:

- 1. Have ambition and take immediate action.
- 2. Have "climate champions" in leadership positions.
- 3. Align with national carbon neutrality and resilience goals.
- **4.** Create an inspiring vision of the future, showing an ambitious but feasible path to implementing climate action commitments that includes economic and social benefits for citizens and businesses operating in the region or municipality.
- **5.** Involve everyone in the challenge. This includes all municipal departments, citizens, private sector, and civil society and involves collaborating with the national government, other municipalities, and regional governments.
- **6.** Institutionalize climate action, creating a team that takes responsibility for managing and supporting the progress of actions across the board.
- **7.** Communicate, communicate, and communicate the vision of the future, continuously showing the progress and benefits generated by climate action.
- 8. Identify barriers and opposition to change and take action to overcome them.
- **9.** Be citizen-centric. Design climate actions by analyzing the accessibility and usability of solutions from the perspective of citizens (e.g. considering gendered approaches and impacts on historically marginalized populations, such as Indigenous peoples or inhabitants of informal settlements).
- **10.** Be proactive in taking advantage of opportunities that currently exist, such as climate financing, citizen interest, partnerships with the private sector or civil society, etc.

- 11. Review the list of transformations in this guide and select those that are most relevant to your local context based on the territory and within the scope of the organization's management and competencies. Draw inspiration from the actions in this guide to advance a set of initiatives that address these transformations in a comprehensive manner.
- **12.** Start with projects that are easy to design and achieve and that have high impact in the short-term. Projects that are highly visible and have broad relevance are advantageous.
- **13.** Finally, do not get discouraged if the first climate action you undertake is not as successful as you imagined. Keep an open mind to learning and feedback as this builds momentum and advances the transformation.

In short, we are in a climate crisis and although it is important to carry out regional and municipal climate action plans based on detailed local analyses, to achieve the necessary transformations, it is possible to start climate action in a decisive way today, as many municipalities and regional governments are doing.

We hope that the guide will be useful for your community and region in facing climate change.

The climate crisis we are facing calls for decisive action by subnational governments given their deep understanding of the local context and their ability to move quickly and effectively on climate action implementation.



Glossary of Terms

The definitions associated with the main concepts of the guide are presented below. The concepts on which each of the transformations are based are presented first.

Table G 1: Concepts and definitions associated with municipal and regional climate action

Concepts and definitions associated with municipal and regional climate action

Climate transformation: Necessary, broad, and far-reaching changes in the fundamental attributes of natural and human systems to achieve carbon neutrality and climate resilience (IPCC, 2022).

Regional and municipal climate action: Policies, measures or programs undertaken by a public actor or institution (e.g. regional government or municipality), with a view to catalyzing a climate transformation, either by mitigating greenhouse gas emissions or increasing the climate resilience of systems (Global Gender and Climate Change Alliance (GGCA), 2023).

Barriers: Obstacles or resistance to implementing a climate action.

Facilitators: Tools and resources that help regional governments and municipalities carry out climate actions.

Source: based on various IPCC sources and others.

The main concepts and definitions associated with climate change and on which this guide is based are presented in the table below.

Table G 2: Climate change concepts and definitions

Climate change concepts and definitions

Adaptation: In human systems, it is the process of adjusting to the current or expected climate and its effects in order to moderate harm or take advantage of beneficial opportunities. In natural systems, it is the process of adjustment to the current climate and its effects; human intervention can facilitate adjustment to the expected climate and its effects (IPCC, 2022).

Adaptation to climate change: Actions, measures or processes to adjust to the current or projected climate or its effects on human or natural systems in order to moderate or avoid damage, reduce vulnerability, increase resilience, or take advantage of beneficial opportunities (Ministry of Environment, 2022b).

Global warming: Denotes the observed or projected gradual increase in global surface temperature as a consequence of radiative forcing from anthropogenic emissions (IPCC, 2014).

Climate change: A change in climate attributed directly or indirectly to human activity that alters the composition of the global atmosphere and that is, in addition to natural climate variability, observed over comparable time periods (Ministry of the Environment, 2022b).

Carbon neutrality or zero net CO2 emissions: Zero net carbon dioxide (CO2) emissions are achieved when anthropogenic (resulting from human activity) CO2 emissions are balanced at the global, country or regional level by anthropogenic CO2 removals over a specified period (IPCC, 2022).

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Climate change concepts and definitions

Capacity building: The practice of enhancing the strengths, attributes, and resources available to an individual, community, society, or organization to respond to change (IPCC, 2022).

Climate finance: Financial resources dedicated to addressing climate change by all public and private actors, from global to local scales, including international financial flows to developing countries to help them address climate change. Climate finance aims to reduce net greenhouse gas emissions, enhance adaptation, and increase resilience to the impacts of current and projected climate change. Finance can come from public and private sources, channeled through various intermediaries, and is delivered through a variety of instruments, including grants, concessional and non-concessional debt, and domestic budget reallocations (IPCC, 2022).

Greenhouse gas: Gaseous component of the atmosphere, natural or anthropogenic, that absorbs and emits radiation at certain wavelengths of the terrestrial radiation spectrum, emitted by the Earth's surface, by the atmosphere itself, or by clouds, considered by the Convention and by the Kigali Amendment or those that replace them (Ministry of the Environment, 2022b).

Mitigation (of climate change): Actions, measures, or processes aimed at reducing emissions of greenhouse gasses and other climate forcers; restricting the use of such gasses as refrigerants, insulators, or in industrial processes, among others; or increasingly avoiding deterioration or improving the state of the sinks of such gasses in order to limit the adverse effects of climate change (Ministry of the Environment, 2022b).

Neutrality of greenhouse gas emissions: State of equilibrium between anthropogenic greenhouse gas emissions and removals in a specific period, considering that emissions are equal to or less than removals (Ministry of the Environment, 2022b).

Climate resilience: Capacity of a system or its components to anticipate, absorb, adapt to, or recover from the adverse effects of climate change, maintaining its essential function, while retaining the capacity to adapt, learn, and transform (Ministry of the Environment, 2022b).

Climate change concepts and definitions

Climate-change-related risks: Those potentially adverse consequences for human or ecological systems, recognizing the diversity of values and objectives associated with such systems. In the context of climate change, risks may arise from the potential impacts of climate change, as well as from human responses to climate change (Ministry of Environment, 2022b).

Nature-based solutions: Actions to protect, sustainably manage, and restore ecosystems, natural or modified, that address societal challenges such as climate change, food and water security, or disaster risk in an effective and adaptive manner while providing benefits for sustainable development and biodiversity (Ministry of Environment, 2022b).

Vulnerability to climate change: Propensity or predisposition to be negatively affected by the adverse effects of climate change. Vulnerability comprises a variety of concepts, including sensitivity or susceptibility to damage, and the lack of response and adaptation capacity of ecosystems, communities, territories, or sectors (Ministry of the Environment, 2022b).

Source: based on various sources from the Ministry of Environment and IPCC.

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Acronyms

ACERA	Chilean Association of Renewable Energies and Storage
ACHM	Chilean Association of Municipalities
BBNN	Bienes Nacionales
CESFAM	Family Health Centers
CONAF	Corporación Nacional Forestal
CORFO	Corporación de Fomento de la Producción
GHG	Greenhouse Gas
GORE	Regional Government
NCRE	Non-Conventional Renewable Energies
FAO	Food and Agriculture Organization
FNDR	Fondo Nacional de Desarrollo Regional (National Regional Development Fund)
INDAP	Instituto de Desarrollo Agropecuario
INGEI	National Greenhouse Gas Inventory
INIA	Instituto de Investigaciones Agropecuarias
IPT	Territorial Planning Instrument
LGUC	Ley General de Urbanismo y Construcciones (General Law of Urbanism and Construction)
MINVU	Ministry of Housing and Urban Development
MMA	Ministry of Environment

MOP	Ministry of Public Works
MTT	Ministry of Transportation and Telecommunications
OGUC	Ordenanza General de Urbanismo y Construcciones (General Ordinance of Urbanism and Construction)
ONEMI	Oficina Nacional de Emergencias del Ministerio del Interior (National Emergency Office of the Ministry of the Interior)
PACCC	Community Action Plans on Climate Change
PARCC	Regional Climate Change Action Plans
PRC	Plan Regulador Comunal
REP	Extended Producers Responsibility
SECPLA	Planning Secretariat
SEN	National Electric System
SENAPRED	Servicio Nacional de Prevención y Atención de Desastres (National Service for Disaster Prevention and Attention)
SUBDERE	Undersecretariat of Regional and Administrative Development
SUBPESCA	Undersecretariat of Fisheries and Aquaculture
LULUCF	Land Use, Land Use Change and Forestry

Annex 1

List of possible funding sources through an agreement from the central government to regional governments or municipalities.

This is a list of central government transfers within the 2023 National Budget that are applicable to regional or municipal governments. It is important to bear in mind that the effective applicability of the funding sources will depend on the adequate correspondence between the nature of the climate change initiative proposed by the regional or municipal government and the requirements of the regulations and laws of the portfolio to which the resources are allocated, as well as the restrictions of each transfer and its respective comments.

All appropriations funded by permanent law, either in whole or in part, have an asterisk next to the corresponding appropriation type "(*)".

Central Government:

Current Transfers: Approximately MM\$150,000 maximum.

Ministry of Economy, Development and Tourism

Corporación de Fomento de la Producción:

→ Sustainable Productive Development (Program 07): allocation 418 Complementary allocation resources: US\$1,065 million

Ministry of Finance

Secretariat and General Administration:

→ Secretary of State Modernization (Program 08): allocation 252 To executing entities: US\$3,003 million

Ministry of Public Works

General Directorate of Public Works:

→ Infrastructure for good living (Program 14): allocation 001 To other executors. MM\$1,307 MILLION

Ministry of Agriculture

Agricultural Development Institute

- → Instituto de Desarrollo Agropecuario (Program 01):¹
 - allocation 407 Productive and Entrepreneurial Capacity Building Services MM\$1,846
 - allocation 415 Advisory Services to Technical MM\$9,870
 - 416 allocation 416 Local Action Development Program MM\$22,311
 - 418 allocation 418 Indigenous Territorial Development Program MM\$22,950
 - allocation 420 Productive Alliances MM\$2,746
 - allocation 421 Marketing advisory services MM\$1,214
 - allocation 422 (*) Advisor for Sustainable Production of Traditional Crops MM\$1,050
 - allocation 423 (*) Transition to Sustainable Agriculture Program MM\$1,515

Ministry of Labor and Social Security

Undersecretary of Labor:

→ Proempleo (program 03): allocation 264 (*) Community Investment Program: MM\$14,103

National Training and Employment Service:

→ National Training and Employment Service: allocation 257 Scholarship Program: MM\$2,656 (page 618)

¹ In this case, although the transfer is included in suballocation 01 To the Private Sector, all these suballocations have a gloss that allows the transfer to municipalities.

Ministry of Labor and Social Security

Undersecretary of Public Health:

→ Undersecretary of Public Health (program 01): allocation 299 Special Programs, Primary Health Care: MM\$3,573

Ministry of Mining

Secretariat and General Administration:

→ Promotion of Small and Medium Mining (program 02): allocation 485 Small Artisanal Mining Training and Technology Transfer Program: MM\$1,637

Ministry of Transportation and Telecommunications

Secretariat and General Administration of Transportation:

- → Mobility Network (Program 03): Allocation 001 Extraordinary Program 2023. MM\$21,260
- → National Public Transportation Subsidy (Program 06): Allocation 511 Regional Transportation Subsidy. MM\$18,076

Ministry of Social Development and Family

Undersecretary of Social Services:

- → Undersecretary of Social Services (Program 01):
 - allocation 315 (*) Elige Vivir Sano (Choose to Live Healthy) MM\$1,411
 - allocation 409 Indigenous Affairs Program MM\$1,088

Ministry of Energy

Undersecretary of Energy:

- → Support for the Development of Non-Conventional Renewable Energies (Program 03): Allocation 003 Support for the Development of Non-Conventional Renewable Energies MM\$2,049
- → Rural and Social Energization Program (Program 04): allocation 004 Implementation of Rural and Social Energization Program MM\$2,049
- → Energy Efficiency Action Plan (program 05): allocation 006 Implementation of Energy Efficiency Action Plan MM\$245
- → Just Energy Transition (program 06):
 - allocation 007 Program to promote green hydrogen in Chile MM\$3,787
 - appropriation 008 Just Energy Transition MM\$4,082

Ministry of the Environment

Undersecretary of the Environment:

→ Undersecretariat of the Environment (Program 01):

- allocation 001 Environmental Protection Fund \$605 million
- allocation 004 Municipal Environmental Certification MM\$133
- · 009 Air Quality Forecasting Model MM\$135
- allocation 011 Sustainable Heating MM\$3,110
- allocation 017 Recycling Fund MM\$225
- → Adaptation and Mitigation for Climate Change (Program 02)
 - allocation 023 Climate Change and Nationally Determined Contributions (NDCs) MM\$1,240

Capital Transfers: MM\$786,000 maximum.

Ministry of the Interior

Undersecretary of Regional Development:

- → local development program (program 03): allocation 006 Municipalities (Neighborhood Improvement Program): MM\$56,612
- → Transfers to Regional Governments (program 05): allocation 432 Regional Contingency Support Fund: ThCh\$36,987 million

Ministry of Public Works

General Directorate of Public Works:

- → Rural Sanitation Services Sub-Directorate (Program 12): allocation 202 Application of Laws No. 20,998 and 21,435 (rural drinking water issues). MM\$17,878
- → Infrastructure for good living (Program 14): allocation 001 To other executors. MM\$0.01
- → Infrastructure Fund for Development (program 15): allocation 001 To other executors. MM\$492,216

Dirección General de Aguas (Programa 01):

→ General Water Directorate (Program 01): allocation 202 Application of Laws N° 20.998 and 21.435 (matters related to watershed management). MM\$531.5 MILLION

Ministry of Agriculture

Agricultural Development Institute:

- → Instituto de Desarrollo Agropecuario (Program 01)²
 - allocation 001 Irrigation. MM\$32,498
 - allocation 002 Investment Development Program. MM\$.3055

² In this case, although the transfer is included in suballocation 01 To the Private Sector, all these suballocations have a gloss that allows the transfer to municipalities.

- allocation 006 Local Action Development Program MM\$20,810
- allocation 007 Indigenous Territorial Development Program MM\$22,405
- allocation 009 Productive Partnerships MM\$1,482
- allocation 012 Investments for Marketing MM\$200
- allocation 013 Investments in Technical Advisory Services MM\$7,637
- allocation 014 Investment in Sustainable Production of Traditional Crops MM\$8,358
- 015 allocation 015 Sustainable Agriculture Transition Program MM\$452

Ministry of Housing and Urban Development

Undersecretary of Housing and Urban Development:

- → Shantytowns (Program 02): allocation 003 Municipalities for the Shantytowns Program. MM\$43,900
- → Neighborhood Recovery (Program 04):
 - assignment 002 Municipalities for the Neighborhood Recovery Program MM\$29,265
 - 106 Allocation 106 Municipalities for Small Localities MM\$12,490

Ministry of Energy

Undersecretary of Energy:

- → Just Energy Transition (program 06):
 - allocation 007 Program to Promote Green Hydrogen in Chile MM\$0,01


The impacts of climate change are already being felt by our communities. Rising temperatures and extreme weather events not only affect the environment, they also affect our daily lives and how society functions. These impacts are evident in all regions of the world, and Chile, in particular, is highly vulnerable.

Faced with this urgency, in June 2022 Chile adopted the Climate Change Framework Law, which established goals for achieving carbon neutrality and resiliency by 2050 at the latest. In addition, it compels municipalities and regional governments to prepare climate change action plans.

In this context, this guide seeks to empower regional and municipal leaders to act decisively in the fight against climate change, promote coordination across different levels of government, and identify the transformations needed for a carbon neutral and resilient future and the climate actions required to implement these changes, overcome barriers, and inspire communities. This document was developed based on workshops with key stakeholders at the national, regional, and municipal levels, in addition to a literature review and context analysis of the experiences in the region.

The guide identifies the transformations required to increase resiliency and proposes actions to address climate challenges, such as heat waves, droughts, forest fires, and inland and coastal flooding, that threaten our communities. It also proposes transformations and actions to reduce greenhouse gas emissions from the energy, buildings, transportation, forest and nature, food and agriculture, and waste sectors. Examples of climate actions suggested in this guide include planting native tree species in urban areas, reusing greywater, installing low-emission air conditioners for cooling and heating, developing exclusive bus lanes, restoring forests and wetlands, and establishing recycling collection centers. To support this climate action, the guide also identifies the keys to successful implementation, proposing a roadmap and providing a set of cross-cutting tools, such as possible financing options, administrative instruments, and an analysis of the legal competencies of municipal and regional governments. Finally, recommendations to promote climate actions are provided, which can be incorporated into municipal and regional climate change action plans.



