

# Santiago, Chile

City Waste Management Profile



**Published by:**

Resilient Cities Network (R-Cities)

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R-Cities is responsible for the content of this publication.

June 2024

# Contents

## 1. Introduction to Urban Ocean

OVERVIEW OF THE URBAN OCEAN CHALLENGE

PROGRAM OBJECTIVE

COHORT TWO CITIES

METHODOLOGY

## 2. About the City Waste Management Profile

## 3. Overview of Santiago and its Resilience Journey

THE CONNECTION OF THE SANTIAGO METROPOLITAN REGION WITH ITS RIVERS AND THE OCEAN

## 4. Legal, Policy and Governance

NATIONAL AND LOCAL REGULATIONS AND GUIDELINES

EXISTING WASTE MANAGEMENT PROJECTS

## 5. Waste Management in the Santiago Metropolitan Region

OVERVIEW OF THE WASTE MANAGEMENT SYSTEM

4	WASTE GENERATION AND CHARACTERIZATION	24
5	WASTE COLLECTION AND TRANSPORTATION	25
5	WASTE TREATMENT AND DISPOSAL	26
5	RECYCLING	31
5	GRASSROOTS RECYCLERS	32
7	ILLEGAL WASTE DISPOSAL	32

## 6. Key Findings and Opportunities 35

8	KEY SHOCKS AND STRESSES AFFECTING WASTE MANAGEMENT IN THE REGION	35
11	CHALLENGES AND OPPORTUNITIES FOR RESILIENT WASTE MANAGEMENT	35
14	KEY OPPORTUNITIES FOR THE GORE	42

## 7. Conclusion 44

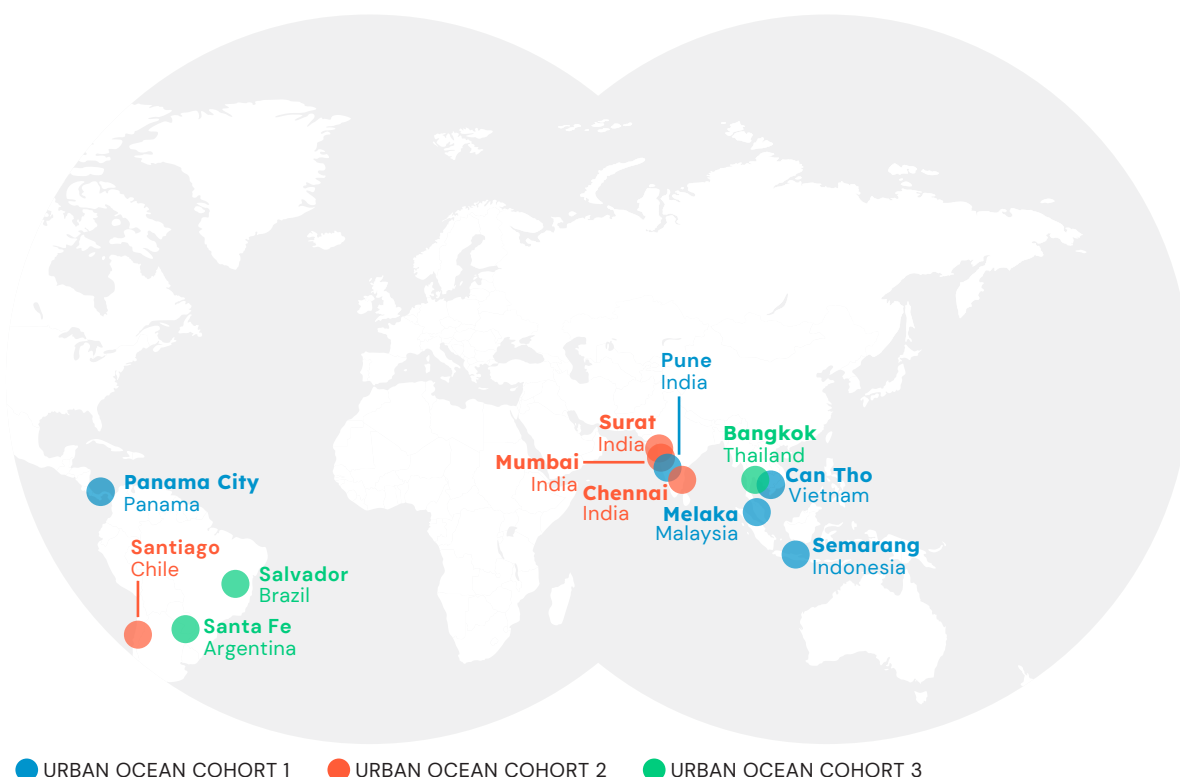
## 8. Glossary 47

## 9. References 49

# 1. Introduction to Urban Ocean

Urban Ocean is a capacity-building and accelerator program for cities that champions circular economy principles, builds awareness of ocean plastic pollution, and assesses waste management systems. The program leverages city leaders to bring new ideas, partners, and resources together and solve interrelated resilience challenges related to: waste management; plastic leakage; and protecting water bodies and the ocean. The program demonstrates how actions to improve waste management and recycling can provide resilient and sustainable solutions that reduce ocean plastic pollution while addressing key city priorities, such as improving public health, supporting economic development, and reducing greenhouse gas emissions. Furthermore, Urban Ocean provides cities with the opportunity to demonstrate thematic leadership and share knowledge and experience across the Resilient Cities Network (R-Cities) community and beyond. The program is jointly led by R-Cities, Ocean Conservancy (OC), and The Circulate Initiative (TCI).

**FIGURE 1**  
Urban Ocean cities map



## Overview of the Urban Ocean Challenge

Cities are home to over half of the global population and account for nearly three-quarters of global greenhouse gas (GHG) emissions (IPCC, 2021). No climate nor social target will be met without a deep transformation of urban centers towards a more inclusive, sustainable, and resilient path. Approaching urban waste management systems through a resilience lens reveals complex, interrelated ramifications for social, economic, and environmental indicators. In 2018, the International Labor Organization estimated that the waste management sector alone has the potential to create 45 million jobs globally by 2030 while reducing GHG emissions by 15 to 20%. Additionally, circular economies offer a USD 4.5 trillion economic opportunity by reducing waste, stimulating innovation, and creating employment by 2030 (WRI, 2021). Currently, plastic usage is growing and continues to be a threat to public and environmental health in the ocean and in cities. A huge opportunity exists for city governments to implement policies and projects that promote a more resilient and circular waste sector in their cities. Now is the time to set out on the path towards a more resilient urban–ocean relationship that highlights the importance of preventing marine plastic debris.

## Program Objective

The Urban Ocean program aims to collaborate with urban leaders to gather new ideas, partners, and resources to address interconnected challenges related to resilience in waste management, reduce plastic leakage and protect water bodies and the ocean. Urban Ocean provides a platform for ocean advocates and urban leaders to join forces in developing comprehensive solutions that meet the needs and priorities of governments, cities, communities, and other stakeholders to create real and lasting impacts.

## Cohort Two Cities

Urban Ocean works closely with cities to demonstrate tangible solutions and highlight progress in addressing waste management challenges. The first cohort of Urban Ocean cities included Pune (India), Can Tho (Vietnam), Panama City (Panama), Semarang (Indonesia) and Melaka (Malaysia).

The work further expanded to four additional cities in Cohort 2 – Chennai, Surat and Mumbai (all India) and Santiago (Chile) – to expand the geographic scope of the program, expand the waste management, circular economy and resilience ecosystem, increase collaboration with local governments and establish effective waste management systems that generate environmental, social and economic co-benefits to cities.

## Methodology

This report provides a summary of the information collected for the purpose of developing a resilience-oriented analysis of the urban waste management system in the Santiago Metropolitan Region. The profile was conducted in collaboration with the Santiago Metropolitan Regional Government (GORE), R-Cities, Ocean Conservancy, The Circulate Initiative (TCI), Kyklos Company, Acción Circular Company, and Do Smart Cities Company. The analysis involved desk research, a collaborative workshop with city stakeholders, and interviews. Table 1 presents the key stakeholders who were interviewed as part of the development of this profile.



**TABLE 1**  
Interviewed stakeholders



**Municipalities**

Emeres  
AMUCH  
DIGA La Pintana



**Pre-treatment of waste**

Veolia  
KDM  
Santa Marta Consortium  
Basic Recyclers  
VOLTA  
AMBIPAR



**Academia**

University of Georgia, U.S.A.  
Científicos de la basura de U. Católica del Norte  
PUC School of Government  
Biotechnology Core Carauma PUCV



**Other Public Sector Agencies**

SEREMI de Salud  
Environmental Department of RM's  
GORE  
Corporation for Production Development  
Sustainability and Climate Change Agency



**Waste Valuation**

Armony  
WTE Araucanía  
Recipet  
METALUM  
Recupac  
Revaloriza  
Greenrec



**Civil Society**

ReSimple  
Todos Reciclamos  
National Association of the Recycling Industry (ANIR)  
Chile Foundation  
Containers and Packages Center (CENEM)  
Association of Plastics Industry (ASIPLA)  
Construye 2025

## 2. About the City Waste Management Profile

As part of Urban Ocean, cities create a City Waste Management Profile, in which a city's waste management systems are presented, including technical and sustainability aspects, and formal and informal actors in the system. The City Waste Management Profile ("the Profile") examines major disturbances and stresses prevalent in the city that impact the city's waste management system. It brings together preexisting data and information collected in the initial phases of the program to allow the city to assess the risks and vulnerabilities of the system, as well as support project design.

The Profile seeks to provide insight for the city to better plan and identify appropriate solutions to increase the resilience of their waste management system, reduce plastic leakage into the environment, and improve the city's ability to respond to, adapt to or otherwise address current and future shocks and stresses. It summarizes the baseline assessment conducted in all cities in the Urban Ocean program and highlights the most relevant data and information to address urban resilience, ocean conservation, and plastic pollution.

The Profile encourages a more holistic approach to existing challenges and supports cities in the development of individual solutions suited to their specific history, economy, demographics and culture while being aligned with the city's unique institutional, environmental, and financial resources. An added benefit of being part of Urban Ocean is how cities can learn from each other by comparing common elements in their respective Profile.



# 3. Overview of Santiago and its Resilience Journey

Chile has undergone important social, demographic, and economic changes in the last 30 years. According to the World Bank, Chile has been one of the most successful countries in terms of economic growth and poverty reduction in recent decades in Latin America (World Bank, 2022).

For example, Chile's per capita GDP has increased by over 300% since 1990 (World Bank, 2023) and the proportion of inhabitants below the income poverty line decreased from 69% in 1990 to 8.6% in 2017 (MIDESO, 2020). These changes are particularly evident in the Santiago Metropolitan Region, which has become the main financial and commercial center of the country.

Despite these economic advances, the country faces important social and environmental challenges. On the social side, the level of economic inequality stands out: Just 1% of Chile's population controls 50% of the nation's wealth (World Inequality Report, 2022), and

Chile's 2020 Gini coefficient of 0.462 (ECLAC, 2021)<sup>1</sup> indicates greater income inequality than Bolivia, Argentina and Uruguay (ECLAC, 2021). Additionally, the country has experienced a demographic change due to high rates of international migration, with the Jesuit Migrant Service estimating that the migrant population has doubled since 2018, reaching just under 1.5 million people (JMS, 2021).

In environmental terms, Chile faces the consequences of its industrialized and constantly growing economy, resulting in an environment constantly under stress from industrial development (University of Georgia, 2023). The country also grapples with high rates of waste generation, as will be discussed further in this report. With a growing population, the city of Santiago and its accompanying metropolitan region has expanded its built footprint (Ministerio de la Vivienda y Urbanismo, 2020). To combat the growth of built-

up areas, the government has slowed deforestation to a fraction of its historic rates (Ministerio del Medio Ambiente, 2015). Moreover, Santiago depends on water flowing from the mountain ranges to supply its inhabitants with potable water, which places the region in a precarious situation with the landscape undergoing a process of desertification (GORE, 2022).

**This Profile analyzes the current situation of waste management in the Santiago Metropolitan Region,** one of the sixteen regions into which Chile is divided. The region encompasses the province of Santiago, the capital of the country and its main urban center. It is further divided into four provinces and two gubernations, which are then subdivided into 52 communes,<sup>2</sup> the sociodemographic details of which can be found in the annex to this report. The Santiago Metropolitan Region consists of at least 34 urban communes,<sup>3</sup> and 18 rural communes.

<sup>1</sup> The Gini coefficient is a measure used to understand and describe income inequality, ranging from 0 (perfect equality) to 1 (maximum inequality).

<sup>2</sup> In administrative terms, Chile is divided into 16 Regions. Recently, in 2017, Law No. 20.990 of 2017 amended the Political Constitution of the Republic, in order to establish the popular and democratic election of the Executive Body of the Regional Governments, which are exercised by the Regional Governor, who together with the Regional Council. Additionally, there are 56 provinces that are headed by a Provincial Presidential Delegate, who is appointed by the President of the Republic. At the local level, the country is distributed in 346 communes, which are headed by a Mayor and a Municipal Council whose members depend on the amount of people living in their territories. Both authorities are popularly elected by direct vote every four years.

<sup>3</sup> Defined as those communes with less than 2% of their population living in rural areas, according to INE data



The region is administered by the Santiago Metropolitan Regional Government (GORE), an autonomous body responsible for planning and preparing projects that promote the economic, social, and cultural development of the region (Constitutional Organic Law 19.175, 1993). Each commune, in turn, is administered by its respective municipality, whose purpose is to satisfy the needs of the local community and ensure their participation in the economic, social, and cultural progress of the communes, as outlined in Law 18.695 on municipal organization. For the purposes of this profile, the terms “commune” and “municipality” may be used interchangeably. Figure 2 presents the main indicators that characterize the region.

In March 2017, Santiago launched a Resilience Strategy, a process led by the Santiago Metropolitan Regional Government (GORE) and supported by the 100 Resilient Cities Program (100 RC). The city is currently a member of the Resilient Cities Network, a city-led network at the forefront of urban resilience worldwide.

For the implementation of the strategy, six key pillars were prioritized and divided into twenty-one objectives, as can be seen in Figure 3; this waste profile is part of the waste management objective of the environmental pillar.

Santiago joined the Urban Ocean program in 2022 with the aim of reducing the amount of plastic waste that ends up in the sea by being transported through urban waterways. Ocean Conservancy estimates that 80% of the plastics in the ocean originate on land (Urban Ocean Toolkit, 2020). Thus, one of the objectives of this report is to relate how waste management in the region impacts the waterways that pass through it.

In Table 2 it is possible to see the region’s journey towards resilient waste management, within the framework of the Urban Ocean program.

**FIGURE 2**

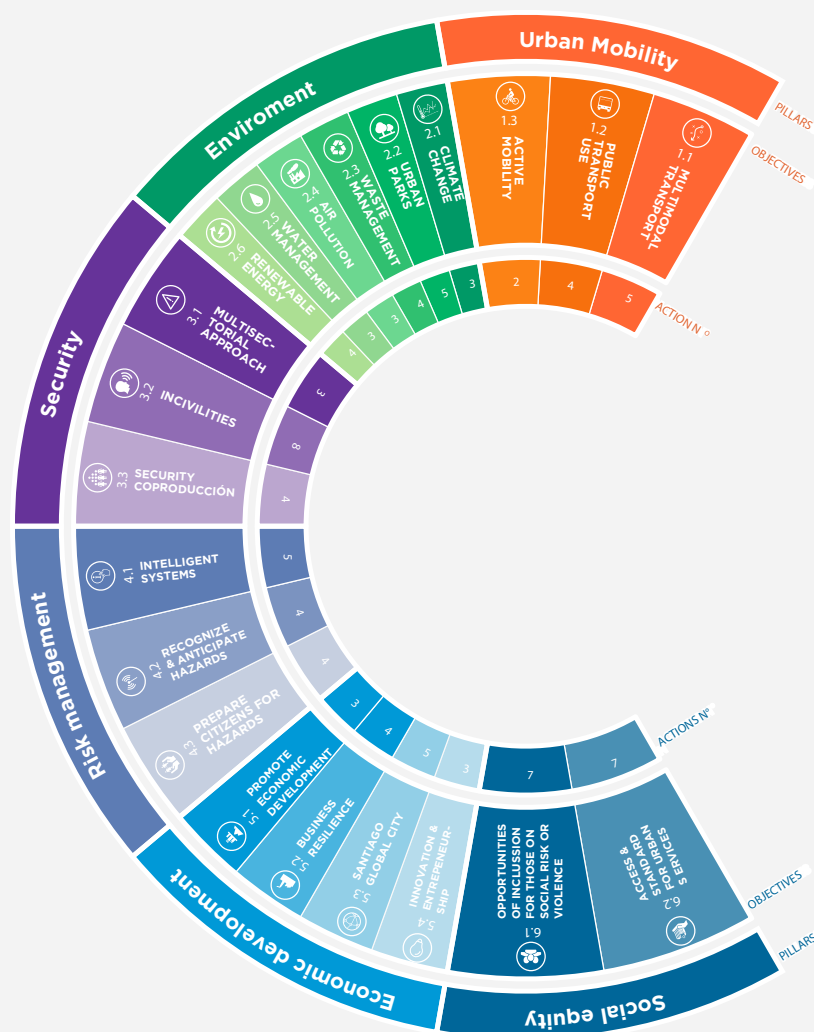
Socio-demographic indicators of the Santiago Metropolitan Region



<sup>4</sup> Defined as “precarious settlements of 8 or more households that inhabit land irregularly, lacking at least 1 of the 3 basic services (electricity, potable water, and sewage system), and whose dwellings form a defined socio-territorial unit.”

<sup>5</sup> Sum of the 52 budgets for cleaning and beautification services of the municipalities of the region. Budget item 22-08

**FIGURE 3**  
Pillars of the resilience strategy for Santiago de Chile



Source: Human and Resilient Santiago, 2017

**TABLE 2**  
TIMELINE OF THE URBAN OCEAN PROGRAM FOR THE METROPOLITAN AREA OF SANTIAGO

<b>2016–2018</b>	Human and Resilient Santiago Strategy	Santiago identified waste management as one of the actions to be worked on.
<b>2020</b>	Launching of Urban Ocean Program (cohort 1)	Launch of the Urban Ocean Program in Can Tho (Vietnam), Panama City (Panama), Melaka (Malaysia), Pune (India), Semarang (Indonesia).
<b>2022–2023</b>	<b>Launch in Santiago (cohort 2)</b> <ul style="list-style-type: none"> <li>– Circularity Assessment Protocol (CAP)</li> <li>– City Waste Management</li> <li>– Opportunity Assessment Tool (OAT) with participatory workshops</li> <li>– Design of Proposals</li> </ul>	The city addressed the issue of household waste and how it filters into the environment and waterways of the region. It was also possible to identify the key challenges in which it is necessary to develop innovative and high-impact solutions and proposals on the road to resilience. Particularly concerning illegal dumping sites
<b>2023–ongoing</b>	Project Statement and Presentation	Creation of a compelling case for the project's importance, impact and sustainability. Presentation of projects to potential implementation and funding partners.

Source: Produced by Urban Ocean.

## The Connection of the Santiago Metropolitan Region with its Rivers and the Ocean

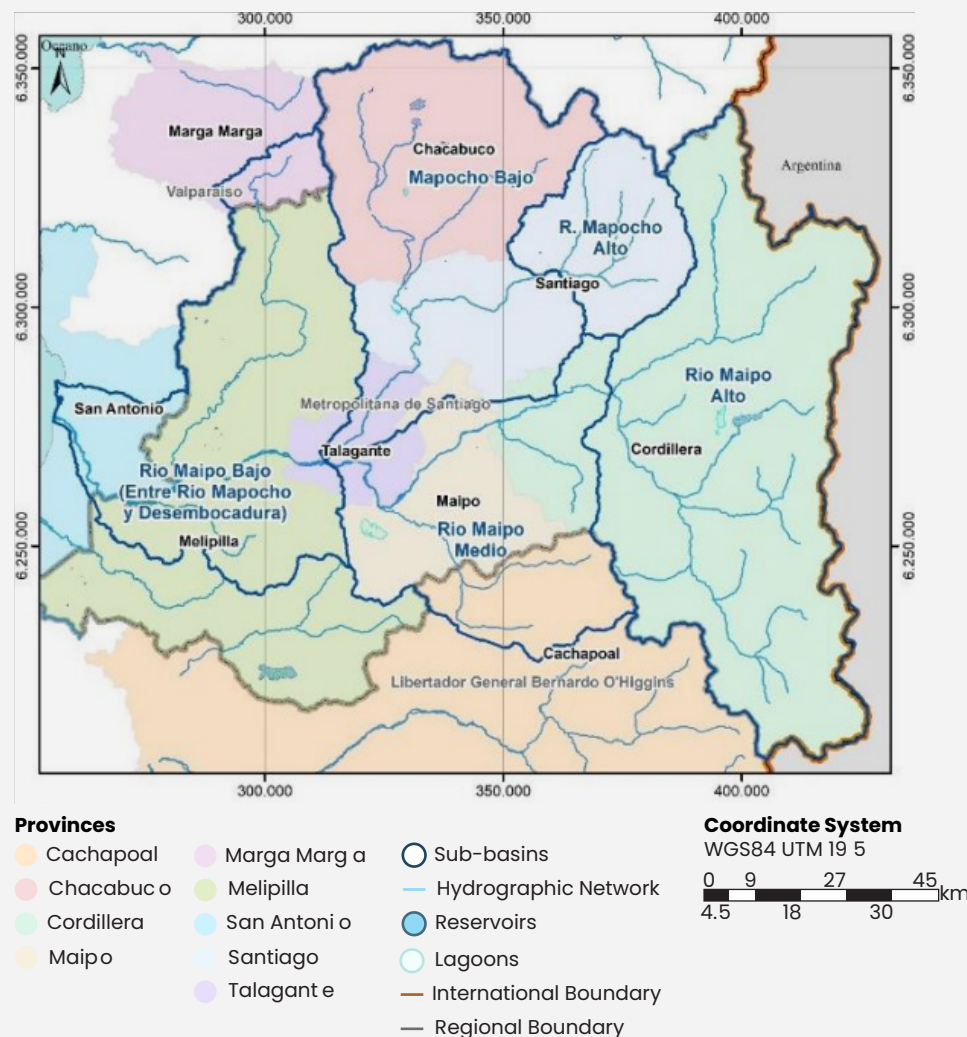
The Santiago Metropolitan Region has a significant connection to the Maipo River basin, which encompasses 90% of the region's surface area (DGA, 2014). The main tributary of the Maipo River is the Mapocho River, which flows through the city of Santiago from northeast to southwest, draining the northern portion of the main basin. Figure 4 provides an illustration of the Maipo river basin and its sub-basins, while Figure 5 depicts the Mapocho River within Santiago.

Stretching 250 km from the Andes Mountains to its mouth at the Pacific Ocean in the southern area of San Antonio, the Maipo River basin covers approximately 15,000 km<sup>2</sup>, with 13,000 km<sup>2</sup> falling within the Metropolitan Region (Maipo Adaptación, 2012–2016).

As for the Mapocho River, it spans about 110 km, and its basin encompasses a surface area of 4,500 km<sup>2</sup> (DGA, 2014). The river traverses sixteen communes that house 3,193,000 inhabitants, accounting for 38% of the region's total population (INE Projection, 2022).

The Maipo River basin plays a crucial role in the region due to its extensive use of water resources. The water demands of the basin encompasses power generation plants, including a planned run-of-river hydroelectric plant with a capacity of 2,400 GWh per year, 130,000 hectares of agricultural land, and an urban area accommodating over 6 million people who rely on water for their daily needs. In the upper zone of the Mapocho and Maipo river basins, 77% of the water used for human consumption in the city of Santiago is sourced directly from surface watercourses (Aguas Andinas, 2022).

**FIGURE 4**  
Maipo River basin in the Santiago Metropolitan Region



Source: Strategic Plan for Water Management in the Maipo Basin, DGA (2021).

**FIGURE 5**  
Mapocho Riverbed in Santiago



Source: Course of the Mapocho River in Santiago de Chile © Juan Villalobos, CC BY-SA 4.0

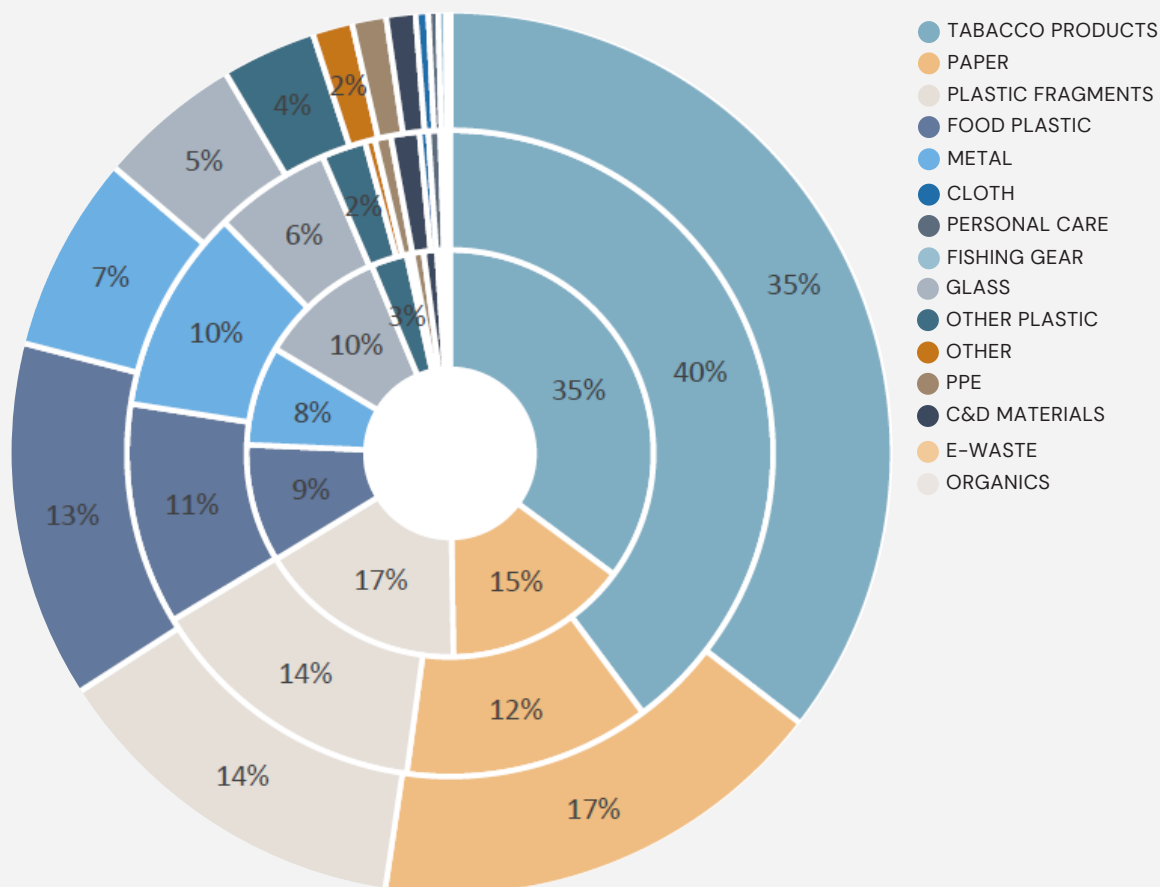


One of the primary concerns in the basin is the transportation of solid waste through the watercourses that pass through urban areas. In the case of Santiago, as mentioned earlier, the Mapocho River runs through a significant portion of the city before joining the flow of the Maipo River on its way to the sea. This convergence point poses a risk associated with urban pollution. According to the Circularity Assessment Protocol (CAP) developed by the University of Georgia, the estimated amount of loose garbage in the environment is 3.34 items per square meter. The largest category of waste items identified was cigarette butts (38% of waste items) followed by plastic waste (30%) (University of Georgia, 2023). Figure 6 presents the CAP findings.

Furthermore, in 2022, researchers from the Universidad de La Serena conducted a national sampling of garbage in the rivers of Chile. They estimated a density of 1.6 items per square meter on the banks of the watercourses, indicating some waste leakage from the city to the river. Additionally, the researchers identified numerous areas along the riverbanks where waste accumulates significantly. The authors estimate the presence of 50 garbage accumulation sites for every 10,000 m<sup>2</sup> of riverbank along the Maipo and Mapocho rivers.

**FIGURE 6**

Characterization of waste leakage according to the activity density in the city of Santiago



Source: Circularity Assessment Protocol of the University of Georgia



# 4. Legal, Policy and Governance

## National and Local Regulations and Guidelines

The management of household and industrial waste in Chile is governed by a series of regulations and decrees that work together to ensure proper waste management.

TABLE 3

Key national, regional and local regulations, policies and plans

NATIONAL	Chilean Constitution (article 19)	It declares the State's duty to safeguard the right to live in a pollution-free environment.
	Sanitary Code (first published in 1968)	This code establishes the regulatory framework for waste. It assigns the responsibility of overseeing the sanitary conditions of waste management to the National Health Service, while mandating municipalities to collect and dispose of household waste.
	2018–2030 National Waste Policy, aligning with Chile's commitments to the Organization for Economic Co-operation and Development (OECD)	This policy establishes guidelines for waste management and aims to increase recovery rates to over 30% of generated waste by 2030. It includes 60 specific actions, such as establishing waste executive secretariats at national and regional levels, developing instruments for waste management improvement, and creating a new institutional framework under the Ministry of the Environment dedicated to sustainable waste management (MMA 2018).
	National Organic Waste Strategy (ENRO) – Published in 2020	This strategy sets a recovery target of 66% for organic waste generated at the municipal level by 2040. It focuses on implementing waste separation models at the source, installing compost bins in households and educational institutions, and waste generation prevention. In June 2023, the Ministry of the Environment announced a bill for the recycling of organic waste to accelerate compliance with the ENRO goals. The proposed legislation aims to delegate the responsibility for organic waste management to municipalities in Chile (MMA message, 2023).

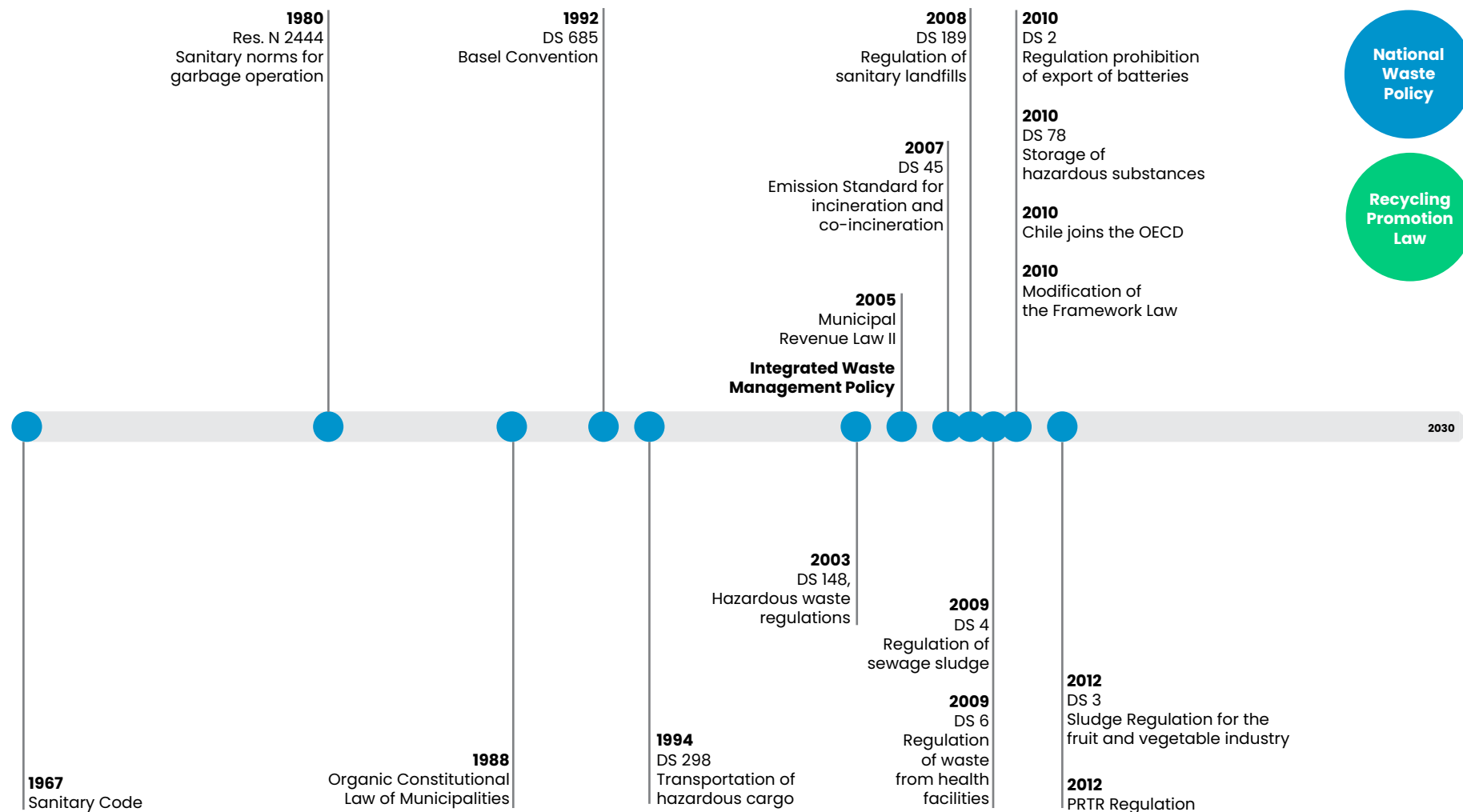
	Circular Economy Roadmap – Published in 2021	<p>The roadmap sets recovery goals of 40% by 2030 and 75% by 2040. It also includes targets related to the creation of 180,000 new green jobs, the recovery of 90% of illegal disposal sites, and a 60% increase in raw material productivity.</p> <p>In the year 2019, the Ministry of the Environment, in conjunction with the Ministry of Economy, the Production Development Corporation (CORFO), and the Sustainability and Climate Change Agency began developing the Roadmap. Today, the Circular Territory Program, driven by CORFO and the Ministry of the Environment, and implemented by SOFOFA Hub<sup>6</sup>, aims to, through collaborative and public-private partnership efforts, generate enabling conditions that contribute to an effective implementation of the Roadmap in Chile.</p>
	Roadmap for CDW Circular Economy in Construction – Published in 2020	This strategy was developed by the Ministries of Environment, Housing and Urban Development, and Public Works, along with CORFO and the Construye 2025 program. Its objectives include developing instruments for the proper management of construction and demolition waste (CDW) and promoting its valorization. Key goals include the installation of CDW valorization plants in the Santiago Metropolitan Region, enhancing the institutional framework in this area, and developing certification tools for sustainable construction and infrastructure.
	Framework Law for Waste Management, Extended Producer Responsibility, and Promotion of Recycling (Law No. 20.920)	It modifies the responsibility that previously fell on municipalities and makes producers responsible for organizing and funding the waste management of certain products.
REGIONAL	Regional Strengthening Law (Law 21.074 of 2018)	It empowers the regional government (GORE) to provide strategic guidelines on waste management within its jurisdiction. The Law also enables the regional government to determine the necessary conditions for the location of final disposal sites and of water treatment infrastructure. Furthermore, it grants regional governments the responsibility to finance feasibility studies aimed at defining the conditions for disposal locations of the different kinds of waste generated in the region. Finally, this law allows municipalities to enter into agreements, so that the regional government assumes the tasks related to the sanitation and beautification of the commune.
LOCAL	Organic Law of Municipalities (Law 18.695)	It establishes the municipality's responsibility for the sanitation and beautification of the commune, including the removal of household waste.

<sup>6</sup> SOFOFA Hub is a business ecosystem that, with the support from the Inter-American Development Bank, has designed a model that creates a general framework for prioritizing projects in accordance with economic, environmental and social variables. Their role is to articulate different public and private stakeholders to address challenges related to circular economy and climate change.

Figure 7, developed by the Ministry of the Environment (or MMA, for its name in Spanish), shows the main instruments and regulations associated with waste management.

## FIGURE 7

### Key regulations on waste management in Chile



Source: Ministry of Environment Chile

## Extended Producer Responsibility Law

In 2016, the Framework Law for Waste Management, Extended Producer Responsibility, and Promotion of Recycling (Law 20.920), also known as the EPR Law, was enacted. Prior to the publication of this regulation, there were no instruments in Chilean legislation associated with recycling and waste valorization, making it highly significant in achieving the waste minimization objectives.

The EPR Law aims to “reduce the generation of waste and encourage its reuse, recycling, and other types of waste recovery, through the establishment of extended producer responsibility and other waste management instruments, in order to protect people’s health and the environment” (Law 20.920, 2016, p. 1).

Under this law, producers of specific priority products are held responsible for the “organization and financing of the management of waste derived from the commercialization of their products in the country” (MMA presentation on the EPR Law, 2020). The fundamental principles that underpin the law are that “the polluter pays” and that “the generator of waste is responsible for it”, as established in Article 2, paragraph a) of the standard.

The EPR Law defines six categories of items or “priority products” that producers must manage according to

these respective supreme decrees.<sup>7</sup> These priority products are: (1) lubricating oils; (2) electrical and electronic equipment; (3) car batteries; (4) containers and packaging; (5) tires; and (6) batteries. Currently, the supreme decrees for tires (DS 8, 2021) and containers and packaging (DS 12, 2021) have been published. For the purposes of this study, the relevant decree to consider is DS 12 on containers and packaging, due to the presence of these products in household or municipal solid waste. Table 4 shows the household collection goals for the different subcategories of containers and packaging material; it shows the percentage to be collected of the total placed on the market by type of material.

For this standard to function properly, producers will finance individual or collective Waste Management Systems (SIGs), which will ensure compliance with the obligations and goals related to the standard. These systems will tender the collection and recovery of packaging waste with duly authorized waste managers.

TABLE 4

Goals proposed in EPR Law for the management of containers and packaging materials

	SUBCATEGORY				
	Liquid cardboard	Metal	Paper and cardboard	Plastic	Glass
First year	5%	6%	5%	3%	11%
Second year	8%	9%	9%	6%	15%
Third year	11%	12%	14%	8%	19%
Fourth year	15%	15%	18%	11%	22%
Fifth year	19%	17%	23%	14%	26%
Sixth year	23%	21%	28%	17%	31%
Seventh year	27%	25%	34%	20%	37%
Eighth year	31%	29%	39%	23%	42%
Ninth year	36%	32%	45%	27%	47%
Tenth year	40%	36%	50%	30%	52%
Eleventh year	50%	45%	60%	37%	58%
From the twelfth year onwards	60%	55%	70%	45%	65%

Source: Decree 12 of the Ministry of the Environment, 2021

<sup>7</sup> In Chile, a supreme decree means an administrative act consisting of a written order issued by the President of the Republic or a minister, aimed at regulating matters not covered by legal provisions for the implementation of the law and the administration of the State..

On the other hand, municipalities can take on the role of waste managers by directly participating in the collection, sorting, storage of materials, or other activities related to legal operations. To this end, various Waste Management Systems (SIGs) can establish collaboration agreements with municipalities within the region. Similarly, as a regional authority, GORE can assist in coordinating with the municipalities and facilitate the exchange of knowledge and capacity building.

The implementation of this standard is expected to create fresh resources for municipal waste management, involve new stakeholders in the waste management process, promote the adoption of waste valorization methods for final disposal, and substantially enhance waste recovery rates nationwide.

## Governance Structure

### Levels of Governance

The following table summarizes the roles and responsibilities of the different actors involved in household waste management.

TABLE 5

Roles and responsibilities of the main waste management stakeholders.

LEVEL OF GOVERNANCE	STAKEHOLDER	ROLES AND RESPONSIBILITIES
National	Ministry of the Environment	<ul style="list-style-type: none"> <li>• Management of waste generation registration at national level.</li> <li>• Proposal of environmental policies and plans, including waste management strategies</li> <li>• Coordination of the generation of environmental standards.</li> <li>• Facilitation of environmental education and the active participation of citizens in waste management.</li> </ul>
	Ministry of Health	<ul style="list-style-type: none"> <li>• To exercise the stewardship of the health sector, including the generation and correct disposal of waste.</li> <li>• Oversee compliance of health regulations through the Regional Secretariats.</li> <li>• To formulate the country's health policies, including the operation of waste collection, transportation, and disposal.</li> </ul>
Regional	Environmental SEREMI <sup>8</sup>	<ul style="list-style-type: none"> <li>• Coordinate and implement strategies of the Ministry at a regional level.</li> <li>• Coordinate the activities of the Executive Secretary of Waste at a regional level.</li> </ul>
	Health SEREMI	<ul style="list-style-type: none"> <li>• Monitor the sanitary compliance of waste treatment and disposal sites.</li> <li>• Issue operating permits for waste collection, transportation, and treatment operations.</li> </ul>

<sup>8</sup> SEREMI: State entities with representatives of the different ministries in each of the Chilean regions.



Regional	GORE's Environmental Department	<ul style="list-style-type: none"> <li>• Manage the development of projects related to Environment and Sustainability.</li> <li>• Coordinate studies and actions aimed at circular economy and proper waste treatment together with relevant Public Services.</li> <li>• Develop, manage, and implement strategies and policies in environmental matters.</li> <li>• Develop the Climate Action Plan for the region and execute mitigation and adaptation actions to climate change.</li> </ul>
	Regional Roundtables	<ul style="list-style-type: none"> <li>• Coordination instrument between the GORE and public and private actors.</li> <li>• In 2016, a Regional Roundtable for Comprehensive Waste Management and Valorization Policy was established in the Metropolitan Region of Santiago.</li> <li>• In 2023, a Regional Roundtable for the fight against illegal landfills was established.</li> </ul>
Municipal	Directorate of Environment, Sanitation and Beautification	<ul style="list-style-type: none"> <li>• The municipality, through the Directorate of Environment, Sanitation and Beautification must ensure the cleanliness of the commune, including the collection and transportation of household waste.</li> <li>• It may operate the service or tender the collection and final disposal of its waste.</li> <li>• The municipalities set the rates for waste collection.</li> </ul>
Local	The community	<p>Users have specific responsibilities for the proper functioning of municipal waste management:</p> <ul style="list-style-type: none"> <li>• Waste separation at the source in municipalities that have selective collection, in order to achieve high recovery rates.</li> <li>• Correct and timely disposal of waste; use of the corresponding infrastructure.</li> <li>• Responsible use of existing infrastructure in the commune, from clean collection points<sup>9</sup> to dumpsters in public areas.</li> <li>• Stay informed about environmental initiatives that are developed in the community and disseminate such information.</li> <li>• Report bad practices of waste management in the community.</li> </ul>
	Private Sector	<p>Depending on the sector to which an organization belongs, different roles and responsibilities can be assumed:</p> <ul style="list-style-type: none"> <li>• Depending on the sector to which an organization belongs, different roles and responsibilities can be assumed:</li> <li>• The productive sector has the role of financing and coordinating management systems for the collection and treatment of priority products in accordance with the EPR Law's decrees.</li> </ul>

Local		<ul style="list-style-type: none"> <li>The companies involved in waste management must operate in accordance with the country's health and environmental regulations; in particular, they must have sectoral permits authorizing them to operate in the Santiago Metropolitan Region.</li> <li>Trade associations are responsible for coordinating efforts to improve waste management standards and practices in their sectors.</li> <li>At the same time, companies in all areas can subscribe to Clean Production Agreements and commit to meeting targets to reduce waste generation and increase recovery rates..</li> </ul>
	NGOs	<p>NGOs develop social functions that seek to bring about positive change at local, community, country or global level. They combat social problems in areas such as human rights, poverty, environmental and climate crises, in relation to the challenges of waste in the region, by seeking:</p> <ul style="list-style-type: none"> <li>To promote responsible consumption and sustainable waste disposal, seeking to minimize the amount of waste in landfills.</li> <li>To develop activities related to the cleaning up and/or caring for natural environments.</li> <li>To demand social and political changes that allow the development of resilient waste management systems.</li> </ul>

## Existing Waste Management Projects

Several public and private initiatives are currently underway in the region to enhance household waste management, driven by the implementation of the EPR Law, specifically the containers and packaging decree.

**Municipal Organic Waste Management:** Various public initiatives have emerged in the region to prevent a significant portion of the waste generated from ending up in landfills. This year, the Santiago Regional Government launched the program “Nos Compostamos Bien” (We Compost Well), which aims to distribute 7,000 worm and traditional compost bins to residents in the region, along with providing training and monitoring. This initiative aligns with the guidelines of the Regional Organic Waste Strategy. Figure 8 illustrates an example of the compost bins that will be distributed throughout the year.

In addition, developed by the Ministry of the Environment in collaboration with the Canadian government through the Organic Recycling program, the Circular Communes program advises municipalities and regional governments on designing organic waste recovery projects and provides technical knowledge to various stakeholders in the system (Office of Circular Economy of the MMA, 2022). Simultaneously, at the municipal level, several communes have implemented different models of organic waste management. The key local initiatives are as follows:

- Providencia, Las Condes, and Ñuñoa provide compost bins and vermi-composters (for worm-based composting) to residents upon request, and they also collect organic waste from drop-off points on a weekly basis.
- Santiago has established models for periodic collection of organic waste at specific locations within the commune through its “Composta tu Barrio” (Compost your Neighborhood) program.
- María Pinto is piloting the collection of organic waste from the homes of sixty families in the commune.

→ La Pintana operates a small-scale composting plant capable of processing up to three cubic meters of material per month.

In the Santiago Metropolitan Region, there are currently no medium- or large-scale composting projects in place that would allow for the management of organic waste on a massive scale across different municipalities.

**Municipal Recycling Programs:** Numerous municipalities in the Santiago Metropolitan Region have implemented selective waste collection systems, wherein recyclable materials like paper, cardboard, plastic, glass, and metal are separated from the rest of the waste. These materials are collected separately and transported to recycling plants for valorization. Table 6 showcases the primary successful examples in the region.

TABLE 6  
Key recycling programs per municipality

COMMUNE	TYPE OF MANAGEMENT
Las Condes	Door-to-door collection of containers and packaging. Green and clean collection points. Periodic bulk collection.
Providencia	Door-to-door collection of segregated containers and packaging. Green and clean collection points and Clean Mobile Points (CMPs). Periodic bulk collection.
Vitacura	Door-to-door collection of segregated containers and packaging. Green and clean collection points and CMPs.
Ñuñoa	Door-to-door waste collection, without any segregation. Georeferenced recycling centers platform.
La Granja	Collection center for pre-treatment, four green collection points and CMPs. Periodic removal of bulky waste.
Recoleta	Green and clean points. Places for collection of electrical and electronic waste. Door-to-door waste collection by basic recyclers.
MSUR <sup>9</sup> Communes	Twenty municipalities in the southern part of the region have door-to-door collection, along with management of clean collection points.
Alhué	This rural commune has door-to-door recycling service together with grassroots recyclers.
María Pinto	This rural commune has door-to-door recycling service as well as a collection and pre-treatment center.

<sup>9</sup> MSUR: Association of 20 municipalities with a focus on environmental and waste management. Website: [<https://asociacionmsur.cl/sobre-msur/>](<https://asociacionmsur.cl/sobre-msur/>). Member municipalities: Calera de Tango, Cerrillos, Curacaví, El Bosque, El Monte, La Cisterna, La Florida, La Granja, La Pintana, La Reina, Lo Espejo, Macul, Ñuñoa, Pedro Aguirre Cerda, Peñalolén, Pirque, Providencia, Recoleta, San Bernardo, San Joaquín, San José de Maipo, San Miguel, Santiago.

FIGURE 8  
Compost bin from the “We Compost Well” Program of MR’s GORE



Source: Regional Government of the Metropolitan Region (MR)

**Environmental Education Programs:** The Ministry of the Environment operates an Environmental Education and Citizen Participation Division with the aim of promoting sustainable behaviors among the population. This division is responsible for granting environmental certification to municipalities and educational institutions. Additionally, it provides environmental education resources through an accessible online platform and facilitates citizen participation processes.

Furthermore, the division is responsible for coordinating the management of the Environmental Protection Funds (FPA), which are allocated by the Ministry of the Environment to support citizen-led environmental initiatives.

The Regional Environmental Secretariat (SEREMI) in the Santiago Metropolitan Region faces the challenge of promoting these environmental education programs more extensively to create lasting impacts on the regional population and complement the ongoing enhancements in household waste management.

**Non-recoverable waste reduction programs:** The Ministry of the Environment has implemented initiatives to address the generation of non-recoverable waste that poses environmental hazards. These initiatives include the “Chao Bombillas” (Goodbye Straws) and “Chao Colillas” (Goodbye Cigarette Butts) campaigns, which aim to raise awareness and discourage the use of disposable drinking straws in places where drinks are consumed and prevent the disposal of cigarette

butts in public spaces or the environment. The “Chao Colillas” program led to the implementation of a law that restricts the consumption of tobacco in public places.

Another notable initiative is the “Chao Bolsas Plásticas” (Goodbye Plastic Bags) campaign, which sought to encourage political sectors to develop measures to combat the excessive use of single-use plastics. This campaign resulted in the enactment of a law in 2018 that prohibits the distribution of plastic bags in stores throughout the country. According to data collected by the University of Georgia through its Circularity Assessment Protocol (CAP), the field samples showed a low presence of plastic bags in the environment, which could indicate the success of the combination of the campaign and the policy ban.

**Contruye 2025:** The CORFO promotes the Construye 2025 Program, which aims to develop a sustainable and efficient construction sector. The program’s objective is to foster circular economy initiatives within the industry and advocate for sector-specific regulations to promote sustainable practices (Construye 2025, 2020). The program has developed a Circular Economy Roadmap mentioned elsewhere in this report, outlining specific actions to enhance environmental management in the construction sector. However, progress has been hindered by existing regulatory obstacles and the absence of a dedicated law to promote the valorization of CDW. Although the publication of the Chilean Law NCh 3562

in 2019, which establishes management plans for CDW, signifies some advancement the implementation of a regulatory framework emphasizing CDW valorization is still pending.

**Clean Production Agreements (CPA):** CPAs are agreements between business sectors and public agencies focused on environmental issues, with the objective of implementing production models with low environmental impact. These agreements are coordinated by the Sustainability and Climate Change Agency (ASCC),<sup>10</sup> a state agency sponsored by CORFO. The appendices provide details on the CPAs present in the Santiago Metropolitan Region.

According to information provided by ASCC, as of 2020 there are 65 CPAs in place, which have successfully prevented the generation of 16,000 cubic meters of waste and facilitated the recovery of 1,800 tons of materials (ASCC, 2020).

In the Santiago Metropolitan Region, around two thousand companies are part of the existing CPAs. Of these, 40% belong to the agricultural sector, followed by 15% involved in the management of waste from priority products and other industrial waste. Additionally, 12% of the entities have agreements related to handicrafts and free trade fairs, while 10% are engaged in the industrial sector. There are also other entities participating in CPAs from the mining, construction, transportation, and other sectors.

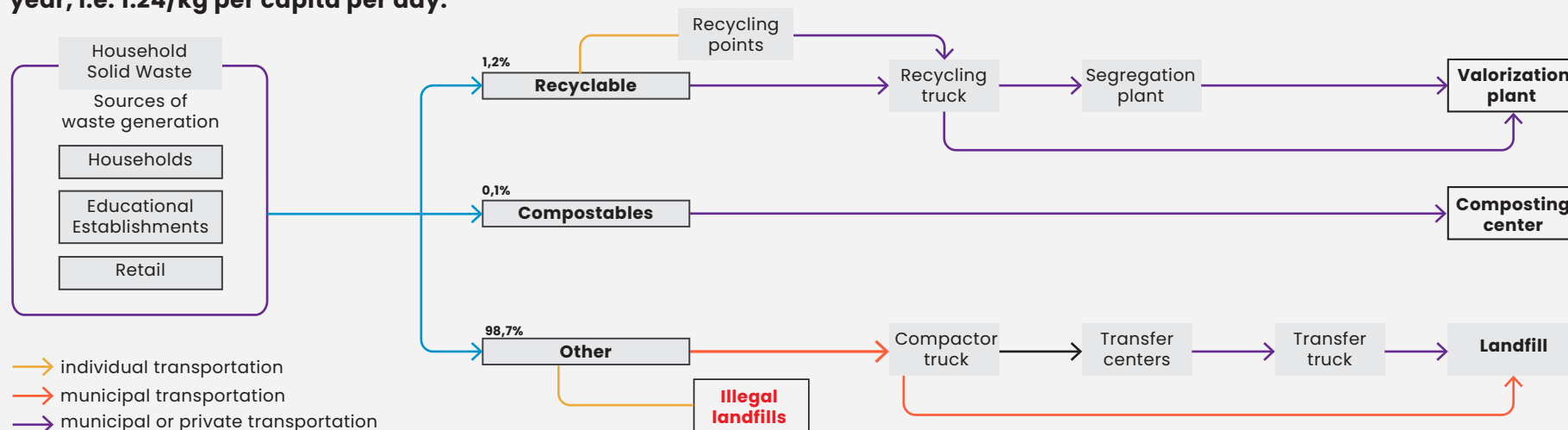
<sup>10</sup> ASCC: The CORFO committee seeks to include the dimensions of climate change and sustainability in the private sector.

# 5. Waste Management in the Santiago Metropolitan Region

FIGURE 9

Solid Waste Municipal Waste Management Model

Currently, the total volume of solid household waste collected in the Santiago metropolitan region is around 3,000,000 tons per year, i.e. 1.24/kg per capita per day.



Source: Produced by Urban Ocean



## Overview of the Waste Management System

Household solid waste management in the Santiago Metropolitan Region is the responsibility of the municipalities. Therefore, each municipality has its own waste management activities. Figure 9 provides an overview of the most common waste management activities in the region. Municipal Solid Waste (MSW) refers to waste generated in homes and establishments, including commercial premises, food outlets, hotels, educational establishments, and prisons, as defined by Supreme Decree 189 of the Ministry of Health.

In 2021, the total budget allocated for waste management in the region amounted to CLP 230 million. Revenues from sanitation fees are generated through property taxes and direct collection from households and businesses, and they are paid on a quarterly basis. Municipalities set the tariff annually based on the actual cost of their household sanitation services. However, a significant portion of the population is exempt from paying sanitation fees because if a home's value is appraised at less than USD 18,000 the owners are exempt (Library of the National Congress, 2019). In 2021, this exemption resulted in a deficit of USD 135 million (SINIM, 2021).

In 2021, approximately 3.8 million tons of MSW were generated in the Santiago Metropolitan Region, equivalent to a daily per capita generation of 1.25 kilograms (SINADER 2021). The National Waste

Declaration System, SINADER, is a web platform that enables waste generators, recipients, and managers to declare their non-hazardous waste annually or monthly. About 99% of the MSW declared in Santiago is transported to landfills by municipal collection trucks. In addition to sanitary landfills and controlled landfills, the region has two transfer stations located in the communes of Quilicura and San Bernardo, which improve the efficiency of MSW transport to its final destination.

Within the region, at least 20 communes report having at least one pilot program for the segregated collection of recyclable waste, and more than 35 communes have waste reception infrastructure, such as green points and clean points. Municipal or tendered (contracted) trucks collect the waste, which is then sent to recovery plants based on the type of material. However, in 2021, the recyclable portion accounted for only 1.2% of the total declared waste.

Organic waste management models in the municipalities of the region are limited and mostly in the pilot stage, as mentioned in the previous chapter. The lack of larger-scale initiatives in the region can be attributed to various factors, primarily regulatory obstacles associated with establishing an organic waste treatment site in any of the municipalities in the Santiago Metropolitan Region. These challenges will be discussed in more detail in the chapter on Challenges and Opportunities for Resilient Waste Management

when addressing the specific challenges that need to be addressed for resilient waste management.

Lastly, very few municipalities have organic waste collection programs due to the barriers involved in establishing new composting plants. As a result, only 0.1% of the MSW declared in 2021 was organic waste.

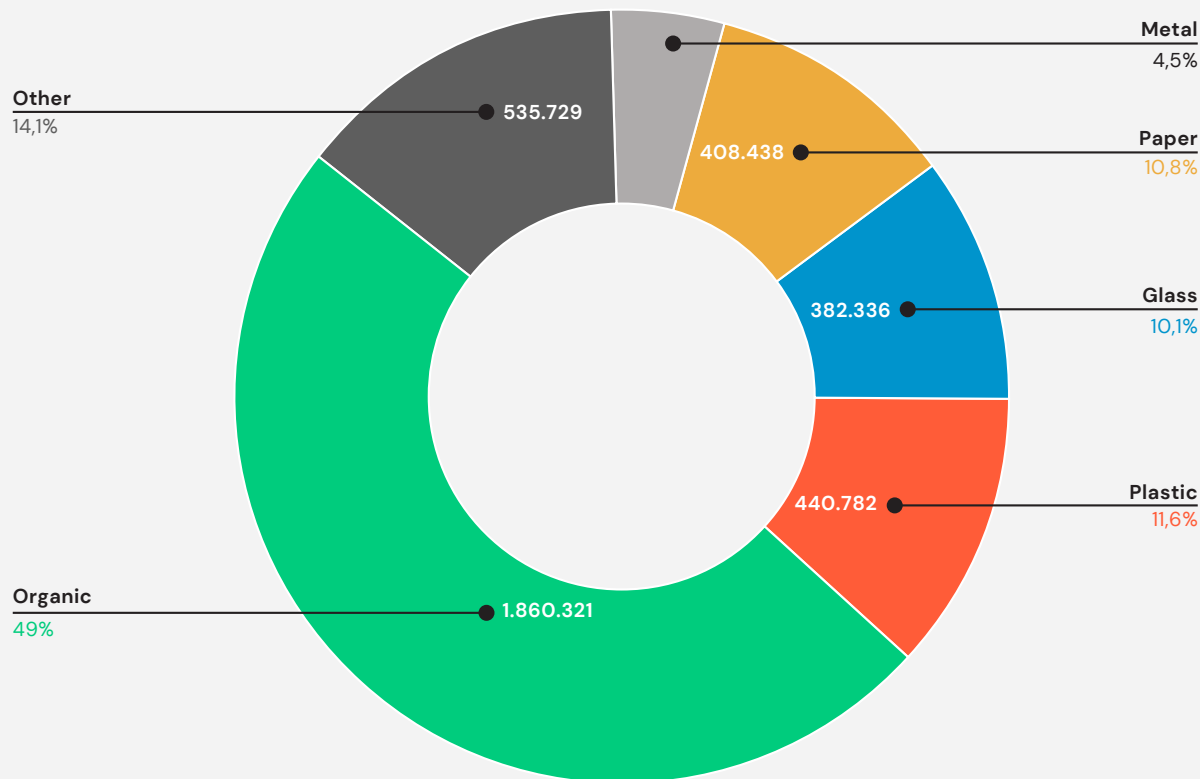
## Waste Generation and Characterization

In 2021, the Santa Marta Landfill, which receives MSW from 15 municipalities, conducted a study to estimate the composition of household waste deposited at its facilities. Figure 10 illustrates the results of this study, which align with the characterization proposed in the National Organic Waste Strategy.

The share of organic waste constituted 49%, amounting to 1.8 million tons per year, making it the largest category of waste from households in the region. This situation is consistent with other regions across the country. In contrast, the share of recyclable waste accounts for 37% of the total generated, equivalent to 1.4 million tons per year. Finally, the remaining waste, which includes materials that cannot be recovered through conventional composting, reuse, or recycling methods,<sup>11</sup> represents 14% of the total waste generated, equivalent to 500,000 tons.

<sup>11</sup> <https://www.paiscircular.cl/economia-circular/que-es-la-fraccion-resto/>

**FIGURE 10**  
Total Household Solid Waste Generation in the Metropolitan Region



Source: Produced by Urban Ocean using data from SINADER and Santa Marta Consortium.

## Waste Collection and Transportation

The collection and transportation of MSW is the responsibility of the 52 municipalities in the Region, as outlined in Law 18.695 of 2006, which defines the Organic Constitutional Law of Municipalities. This law designates the sanitation and ornamentation of the commune, including waste collection, transportation, and disposal, as private functions of the municipalities. It allows municipalities to contract third parties, through public bidding, to provide these services to the community.

The cost of waste collection and transportation services varies among municipalities due to factors such as population size, density, and proximity to the final disposal site. In the Santiago Metropolitan Region, this cost accounts for approximately 67% of the total expenditure on waste management, with variations ranging from 40% to 90% across the 52 communes in the region (SUBDERE, 2018).

There are significant budget disparities for waste management in the region, resulting in deficient waste collection services in informal areas and economically disadvantaged neighborhoods due to inadequate infrastructure and limited resources. Lower-income communes often face challenges such as the use of old trucks and a shortage of personnel. These issues can lead to garbage accumulation and public health concerns. In 2021, the region had over 1,300 micro-landfills, with Puente Alto, a peripheral commune,

having 170 of them. Puente Alto had a per capita budget of USD 16 in 2021.

The Ministry of the Environment and the Environmental Superintendence are responsible for regulating the waste collection and transportation services and establishing standards and regulations to ensure safe and efficient operations. Waste collection trucks must obtain a sanitary authorization, granted by the Health SEREMI, certifying compliance with the sanitary standards required for transporting solid household waste. This authorization is mandatory for all waste transportation companies.

## Waste Treatment and Disposal

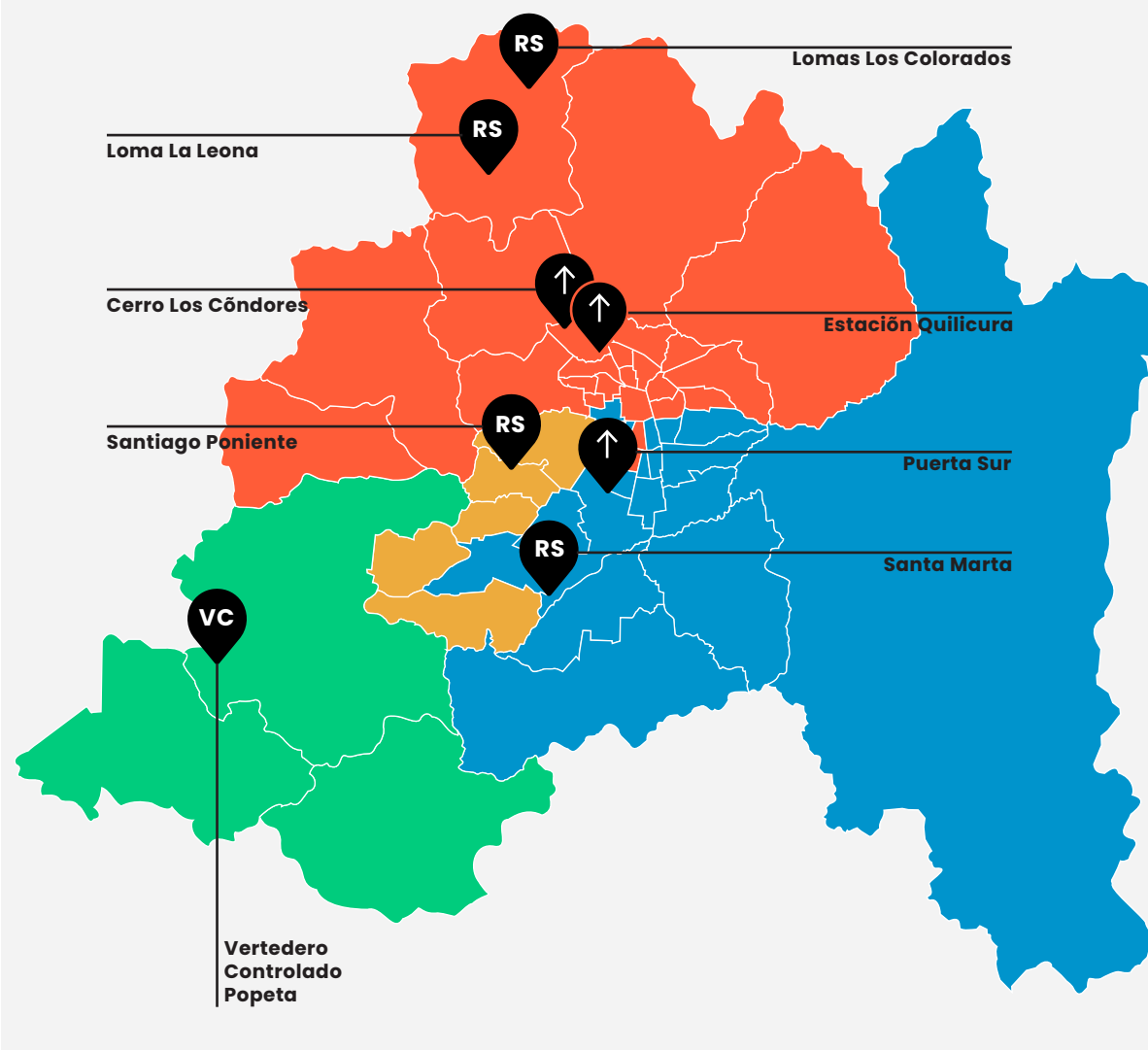
According to Decree 316 of the Undersecretary of Regional and Administrative Development (SUBDERE),<sup>12</sup> collection bids for waste must include the disposal site, which should possess the necessary environmental and sanitary authorizations to operate effectively.

In the Santiago Metropolitan Region, waste is transported to five final disposal sites, as reported by SINADER in 2021:

→ Lomas Los Colorados Sanitary Landfill (KDM)

<sup>12</sup> State entity under the Ministry of the Interior, responsible for leading and promoting sub-national government's strengthening and the country's decentralization process.

**FIGURE 11**  
Location of landfills and transfer stations in the Santiago Metropolitan Region



→ Santa Marta Sanitary Landfill (Santa Marta Consortium)

→ Santiago Poniente Sanitary Landfill (Veolia)

→ Cerro La Leona Sanitary Landfill (GERSA)

→ Popeta Spillway (Melipilla Municipality)

Additionally, there are three transfer stations that receive waste for subsequent transport to the respective landfills:

→ Puerta Sur Transfer Station (Santa Marta Consortium)

→ Cerro Los Cóndores Station (GERSA)

→ Quilicura Transfer Station (KDM)<sup>13</sup>

The locations of these sites is shown in Figure 11, while Figure 12 provides information on the quantities of the household waste (RSM) and household-related waste (Asim)<sup>14</sup> disposed of at these sites.

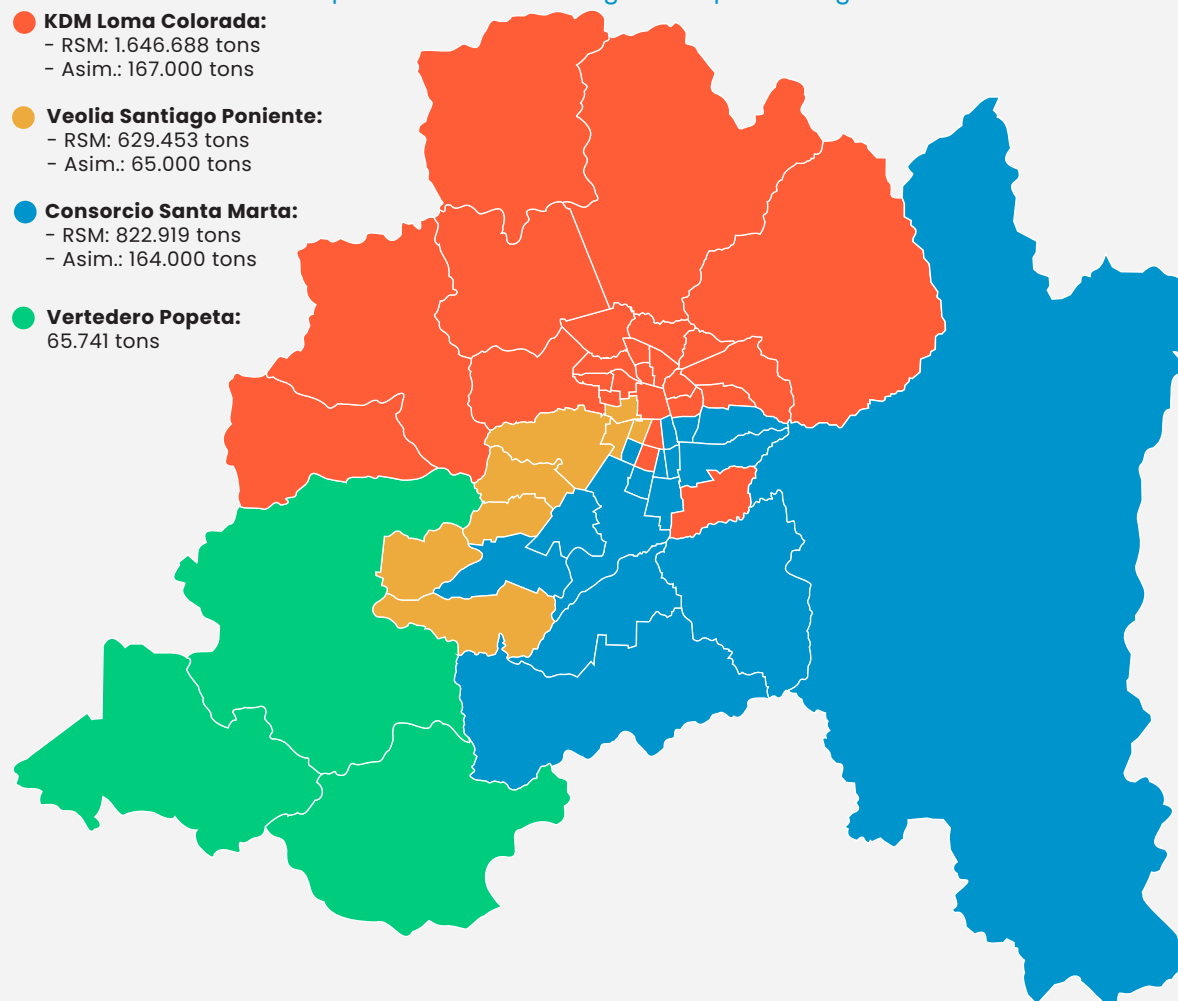
It's important to note that the Cerro La Leona landfill and its corresponding Cerro Los Cóndores transfer station currently do not have a disposal contract with the municipalities in the Santiago Metropolitan Region, and therefore, they do not receive household waste from the region.

<sup>13</sup> Waste disposed at the Lomas Los Colorados landfill first goes through the company's own transfer station in Quilicura (<https://www.kdm.cl/tratamiento/servicios.html>), except for waste from the municipality of Tiltil, where the landfill is located (interview with company executives). KDM does not charge the municipality of Tiltil for disposal services.

<sup>14</sup> These are solid waste materials that, due to their non-hazardous characteristics, can be disposed of in facilities designated for the final disposal of household solid waste.

**FIGURE 12**

Household solid waste disposed of at the Santiago Metropolitan Region's landfills



Source: Produced by Urban Ocean with data from SINADER, 2021

In order to increase pre-treatment capacity, there are 7 key projects under development in the region shown on Table 7. These initiatives seek to participate in the upcoming tenders for the reception of containers and packaging from the EPR waste management systems.

**TABLE 7**

Main Waste Pre-Treatment Projects in the Santiago Metropolitan Region.

PROJECT	HOLDER	PROJECT STATUS IN JUNE 2023	TYPE OF MANAGEMENT	CAPACITY
La Pintana Recycling Plant	Santa Rosa Spa	In the qualification process	Valuation of household waste at La Pintana	4,000 tons/month
Eco Campus Plant	REMBRE	Approved, waiting for the Environmental Court's resolution	Separation and pre-treatment of household waste and tires	2,000 tons/month of containers and packaging 1,500 tons/month of used tires
INSER Waste Separation Plant	Santa Marta Consortium	Approved, construction has not yet started	Separation and pre-treatment of household and industrial waste	30,000 tons/month
Vespucio 0800 Plant	VOLTA	Approved, due to start operation in 2023	Separation and pre-treatment of household waste	6,700 tons/month
GIRI Center	AMBIPAR	Approved, due to start operations in 2023	Separation and pre-treatment of household and industrial waste	5,000 tons/month
Zyklus Plant	KDM Group	Approved, in operation	Waste separation and collection	Stage 1: 15,000 tons/month Stage 2: 30,000 tons/month

Source: Produced by Urban Ocean with data from the Environmental Impact Assessment System

Additionally, two plants have been established in the region for the recovery and valorization of CDW. The first is Greenrec, which has been carrying out a pilot project for waste separation and classification from construction sites since 2023. This project is currently in the testing phase. The second plant is operated by Rio Claro, which produces aggregates from scrap metal and construction waste.

It is important to note that the pre-treatment capacity relies on three assumptions that require further discussion: (1) the ability to collect and transport recyclable waste to the pre-treatment plants; (2) well-segregated material with high recovery rates received at the plants; and (3) the exclusive use of pre-treatment capacity for managing household waste.

Presently, there is inadequate capacity to recover pre-treated recyclable waste in order to achieve the Circular Economy Roadmap's objectives. Data provided by the

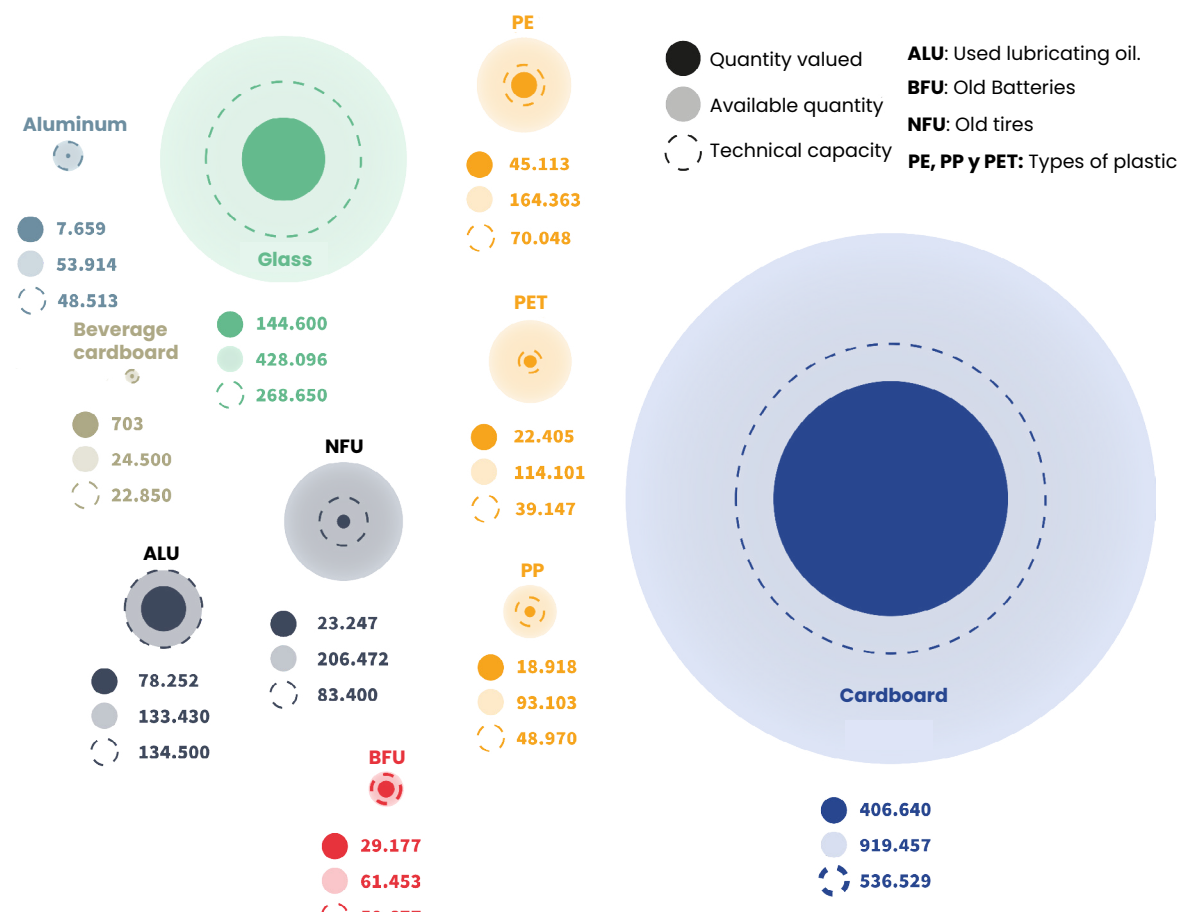


National Association of the Recycling Industry (ANIR) indicates a deficit in the recovery capacity of various packaging materials, as depicted in Figure 13 (ANIR, 2022). The figures represent annual tonnages.

It is important to note that the installed capacity does not reflect the actual amount of material recovered during the study year. Additionally, this study addresses the total capacity of the recycling industry, including the management of industrial waste. Therefore, it should be considered that a significant portion of the currently utilized capacity pertains to these materials rather than household waste.

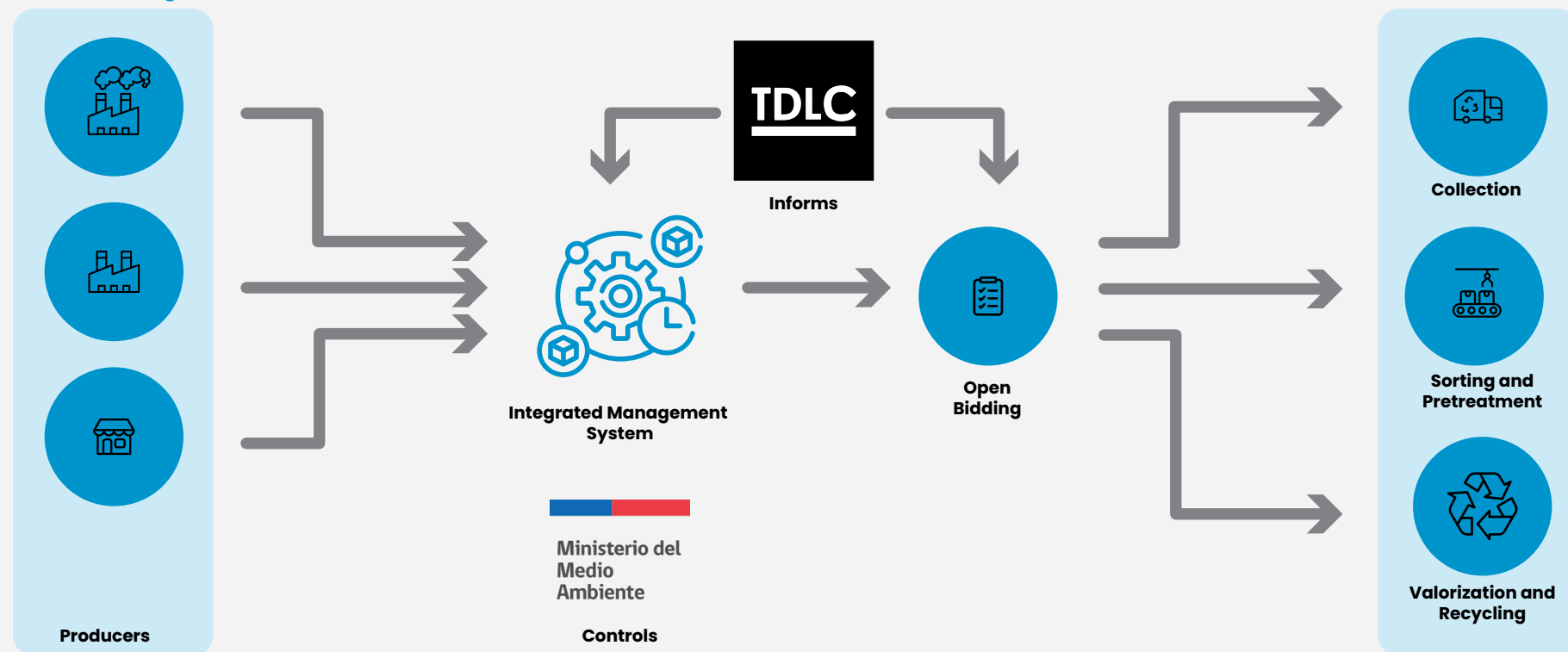
Finally, as part of the implementation of the EPR policy discussed earlier, producers bear the responsibility of financing the management and recovery of certain priority products, such as bottles and packaging materials, through the Waste Management Systems (SIGs). Producers of household waste must be part of a SIG and pay a corresponding amount based on their production or import of these priority products, as depicted in Figure 14. This process is facilitated by managers who are selected through open tenders conducted by the SIGs. By adopting this approach, municipalities can enhance their recycling rates without needing to allocate additional resources, as the system is financed by the producers.

**FIGURE 13**  
Managed material and installed capacity for containers and packaging material in Chile



Source: ANIR, 2022

FIGURE 14  
EPR Law Management Model



Source: The Competition Center, Adolfo Ibáñez University (2021)

## Recycling

In the Santiago Metropolitan Region about 44,000 tons of recovered waste were declared in 2021, corresponding to 1.2% of the total waste generated. Table 8 shares more detail on these figures.

- Organic waste: only 2,910 tons were reported, or 0.2% of the compostable potential.
- Recyclable waste: 41,340 tons were reported, corresponding to 3% of the recyclable potential. The most recovered household waste material is glass, accounting for 6.4% of the collectable potential. It is followed by paper and cardboard with 2.9%, plastic with 0.9% and metals with 0.5%.

The main stakeholders in the market per material are:

1. Glass: Cristalerías de Chile SA and Cristalerías Toro SPA mainly recover glass in the region through campaigns arranged in various locations, managed by themselves.
2. Paper and Cardboard: Recicladados Industriales SA, Recupac SA, and Sociedad Recuperadora de Papel SA (SOREPA) are the largest recyclers, receiving the material from both smaller collectors and grassroots recyclers (defined in the next section). Sometimes, they also have infrastructure located in commercial areas.
3. Plastic: Recipet, RinoPlast, and UltraPac are the largest managers of plastic waste. They grind it and

then manufacture clamshells<sup>15</sup> with recycled material through affiliate companies. There is currently no market for recycled plastic bottles in the country. These companies also generally source their supplies from the grassroots recyclers. Household plastic waste is also managed but in smaller quantities due to the lack of a culture of recycling and the high levels of inhibiting cross-contamination. The main recyclers in the area are Greenplast, Inproplas, and Cambiaso.

4. Metals: There is currently no metal recycling industry in the country, so these materials are exported for recovery. The main exporters are Metales y Aluminios S.A. (METALUM), Recuperadora de Excedentes Industriales Norte Verde, and Ecosur, among others.
5. Sorting: KDM currently manages segregated house-to-house collection in four municipalities at its sorting plant. Once the material has been separated, it is sent to the corresponding recovery plants.

TABLE 8

Characterization of household solid waste and its recovery

MATERIAL	CHARACTERIZATION (RSM, 2021)	POTENTIAL (TON, 2021)	RECOVERED (TON, 2021)	RECOVERY RATE
Organic	49%	1,860,321	2,910	0.2%
Plastic	12%	440,782	4,132	0.9%
Paper and cardboard	11%	408,438	11,836	2.9%
Glass	10%	382,336	24,533	6.4%
Metal	4%	170,163	843	0.5%
Other	14%	535,729	-	-
<b>TOTAL</b>	<b>100%</b>	<b>3,797,770</b>	<b>44,253</b>	<b>1.2%</b>

Source: Produced by Urban Ocean with data from SINADER.

<sup>15</sup> A single-piece container with two halves joined by a hinge that allows the structure to close when united.

## Grassroots Recyclers

It is estimated that there are approximately 60,000 individuals working as grassroots recyclers nationwide, with the majority operating within the informal sector. However, as of May 2023, only 1,844 of them were registered in the National Registry of Grassroots Recyclers, and out of these, 499 were in the Santiago Metropolitan Region (Circula el plástico, 2023).

The income of grassroots recyclers varies and is often unstable, ranging from 50% to 300% of the legal minimum income.<sup>16</sup> Their earnings depend on several factors, including the fluctuation of material prices in the recycling market, the quality of the collected material, transportation methods, availability of collection space, and equipment, among others (MMA, 2016).

According to Law 20.920, grassroots recyclers are defined as people “who, through the use of artisanal and semi-industrial techniques, are directly and regularly involved in the selective collection of household or similar waste and the management of facilities for the reception and storage of such waste, including its classification and pretreatment.” This law recognizes grassroots recyclers as key actors in the system and imposes requirements to formalize and professionalize their work, with the aim of promoting a more equitable and resilient waste management system.

The requirements for grassroots recyclers to become

waste managers under Law 20.920 are as follows:

1. Obtain certification within the framework of the National System of Certification of Labor Competencies established in Law 20.267 (Art. 32).
2. Be registered in the Pollutant Release and Transfer Register (PRTR) (Art. 37).
3. Declare waste in the PRTR and comply with current regulations (Art. 6).

## Illegal Waste Disposal

As of 2021, there were at least 54 illegal dumping sites and over 1,300 micro-landfills in the metropolitan region, as detailed in Figures 15 and 16 (information obtained from Ossio and Faúndez, 2021 and data from SEREMI de Salud, 2022). Illegal dumping sites are those with an area of more than one hectare, whereas the micro-landfills are those of less than one hectare.

The illegal dumping sites can be categorized based on their location within the region:

→ **Urban illegal dumping sites:** These sites are situated within the urban area and are typically found in uninhabited and/or abandoned areas. They have a significant impact on the quality of life for nearby residents, as they contribute to the spread of diseases and unpleasant odors. These sites are also associated with crime and safety risks, which results in economic losses due to the

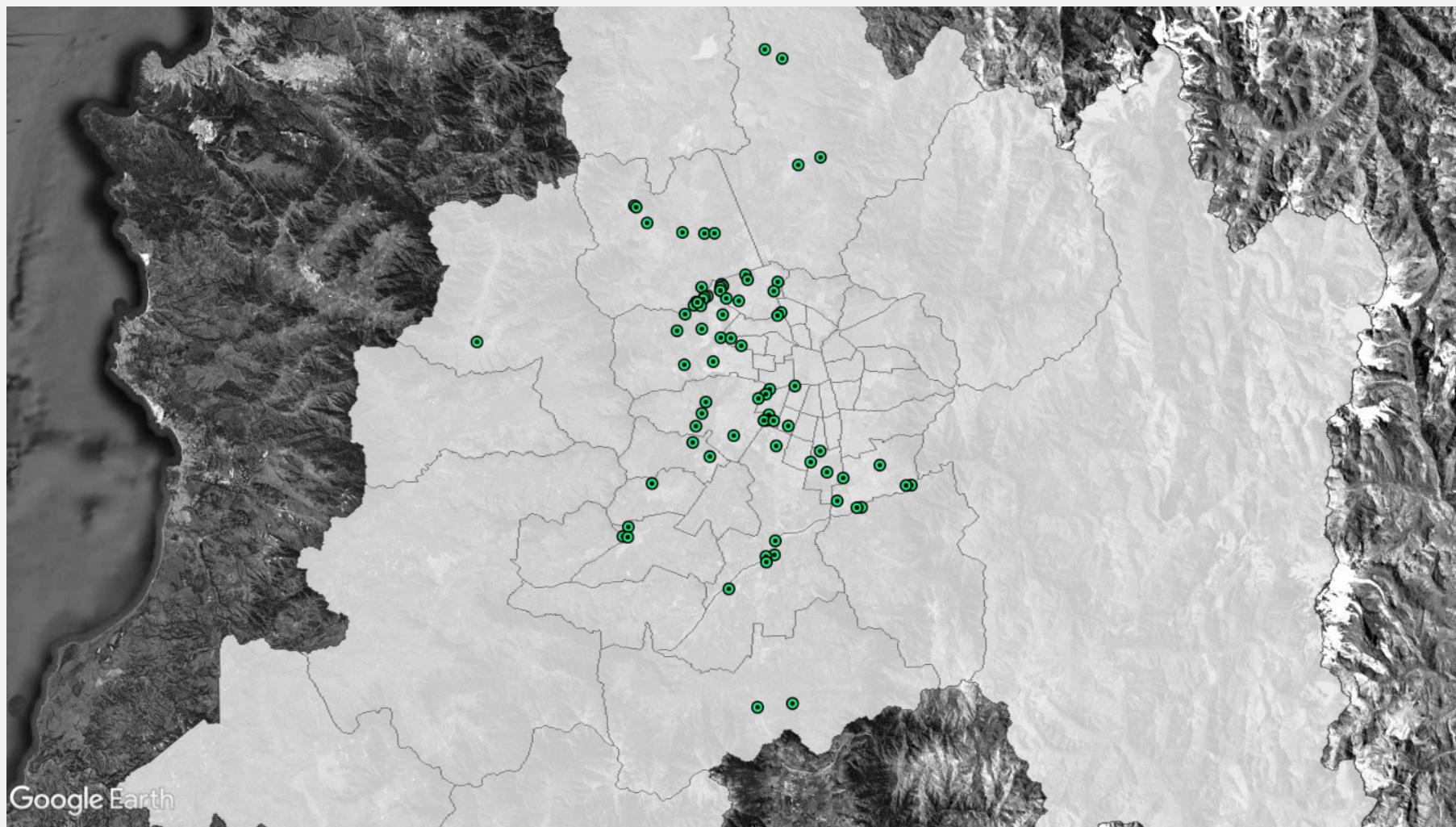
negative impact on property values. Studies have demonstrated that individuals living near illegal dumping sites face an increased risk of developing respiratory diseases and lung cancer due to the inhalation of harmful gases, particularly affecting children (Mataloni et al., 2016).

→ **Peri-urban illegal dumping sites:** These sites are located beyond the urban radius and are often found along the banks of watercourses and rivers. They pose a greater ecological impact compared to urban illegal dumping sites and present a high risk of contaminating watercourses, groundwater, and the ocean.

Regarding their composition, Ossio and Faúndez highlight a strong correlation between the presence of construction and demolition waste and the existence of these illegal dumping sites. Although the problem of illegal dumping sites is complex and multifaceted (Ossio et al., 2020), effective management of construction and demolition waste and bulky waste presents an opportunity to prevent the emergence of these sites.

<sup>16</sup> The minimum monthly income as of May, 2023 was around USD 550: <https://www.dt.gob.cl/portal/1628/w3-article-60141.html>

**FIGURE 15**  
Location of illegal dumping sites in the Santiago Metropolitan Region

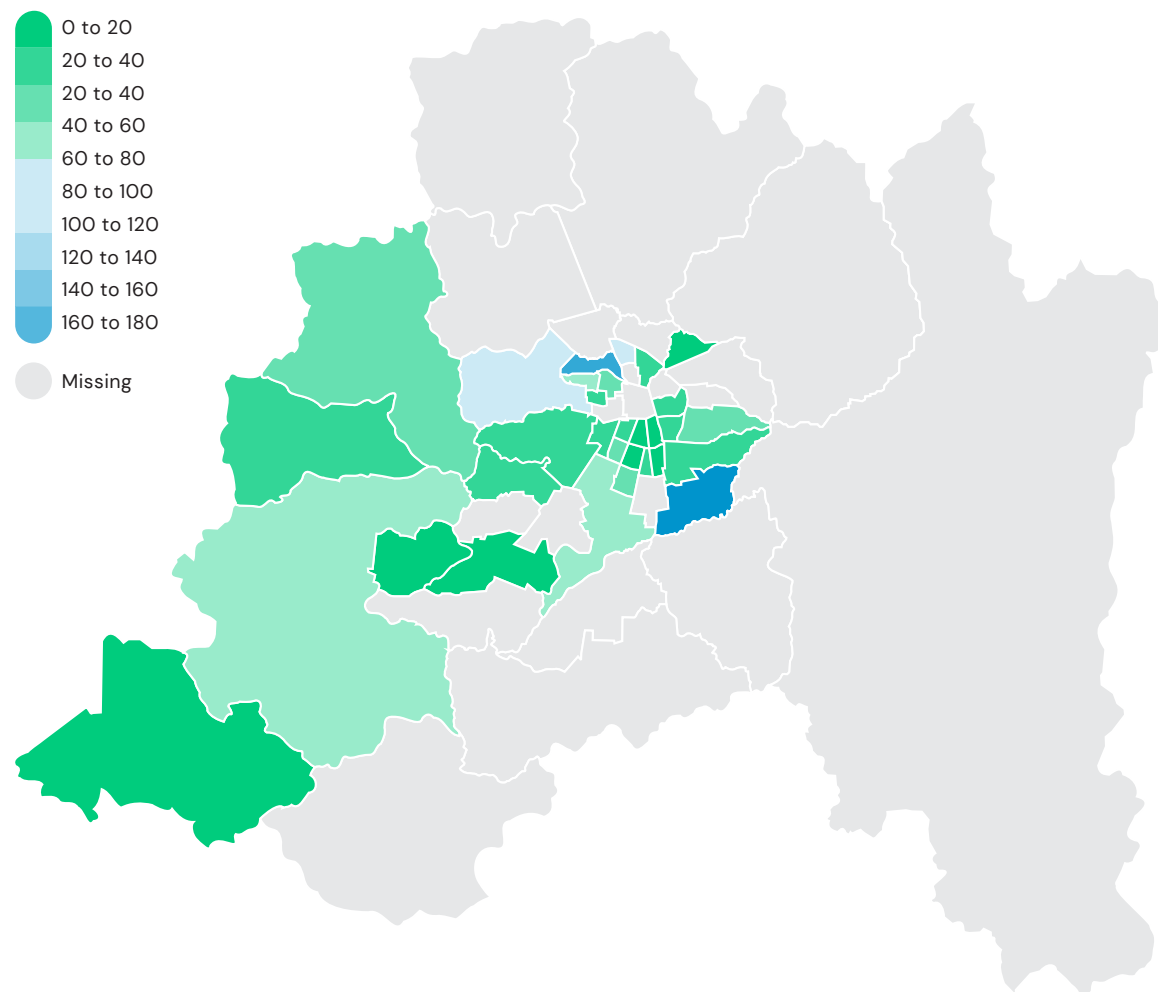


Source: Produced by Urban Ocean with data from SEREMI and Google.



**FIGURE 16**

Location of micro-landfills in the Santiago Metropolitan Region



Source: Produced by Urban Ocean with data from municipality surveys and Ossio & Faúndez, 2021.

Figures 15 and 16 depict the distribution of illegal dumping sites and micro-landfills in the Santiago Metropolitan Region, respectively. Illegal dumping sites are primarily concentrated in the western part of the urban area, with Lampa and Pudahuel being the main locations, each with eight illegal dumping sites. The total estimated number of illegal dumping sites in the region is 54, but this number is subject to change due to their spontaneous emergence.

In the region, there are approximately 1,300 to 1,400 micro-landfills, dispersed throughout the urban zone and the western periphery. The municipalities most affected by these sites include Puente Alto with 170, Renca with 147, and Conchalí and Pudahuel with approximately 100 micro-landfills.

Communes located in the central and eastern parts of the Santiago Metropolitan Region's urban area exhibit a lower prevalence of both illegal dumping sites and micro-landfills. These communes generally have lower population density and less construction activities. Additionally, some of these communes are considered high-income areas, which provides them with more resources for effective waste management. While there is still limited information on the sources of illegal dumping sites, a correlation can be observed between urban sprawl and the occurrence of illegal dumping, requiring further analysis.



# 6. Key Findings and Opportunities

## Key Shocks and Stresses Affecting Waste Management in the Region

According to the Santiago Resilience Strategy (2017), a resilient city is prepared both “to cope with the acute shocks that threaten it and to address the chronic stresses that weaken its systems on a daily or cyclical basis.” Acute shocks are the sudden events that can affect a city, while chronic stresses are those constant circumstances that undermine urban systems.

## Challenges and Opportunities for Resilient Waste Management

Achieving sustainable waste management is an important part of the city’s resilience strategy, because approaching this challenge from a resilience perspective makes it possible to prevent harmful impacts on the city and to strengthen its response to crises.

### The Impact of Shocks and Stresses in the Waste Management System

The Santiago Metropolitan Region, like many other parts of the world, is highly susceptible to the effects of climate change, including escalating heatwaves and heavy rainfall. As the primary emitting region in Chile, the Santiago Metropolitan Region is responsible for 20% of

FIGURE 17

Main shocks and stresses linked to waste management in the Santiago Metropolitan Region

### SHOCKS



Fires that are caused by the accumulation of waste in illegal disposal sites. This is further exacerbated by increasing heatwaves.



Alluvium associated with the accumulation of garbage in watercourses and channels



Earthquakes – it impacts construction material regulations in the city.



Heavy rain and flooding partially due to micro-landfills and illegal dumping sites that can impact transportation (influenced by La Niña and El Niño)

### SHOCKS



Inequality in the resources available to the municipalities for waste management; increased production of single-use items and lack of circular solutions



Air pollution – generation of greenhouse gases associated with the accumulation of waste in landfills



Environmental impact on soil, watercourses, and water bodies



Sense of insecurity in areas near illegal dumping sites



Low income and lack of security for grassroots recyclers



Spread of infectious diseases associated with poor waste disposal



Urban sprawl and real estate market dynamics that impact housing price and construction material use and disposal



Insecure Municipal Finance

the country's total greenhouse gas (GHG) emissions. Between 1990 and 2016, regional GHG emissions increased by 141.6%, reaching 22.3 MtCO<sub>2</sub>eq. From 2013 to 2016 alone, emissions rose by 16.4%, compared to the national increase of 7.1%. In 2016, the transportation sector's fuel consumption accounted for 41.2% of the main emission sources, while waste treatment contributed 5.5% (Chile MMA, 2019). An effective and sustainable waste management system encompasses efficient waste collection and transport routes, proper disposal, and waste recovery. Air pollution resulting from inadequate waste management directly impacts public health, leading to respiratory diseases and other related issues.

Rising temperatures also affect the waste management system and pose risks to the population. Heat accelerates the decomposition of organic waste, resulting in increased production of percolated liquids, gases, and foul odors. It also leads to the proliferation of flies and insects. Improper waste disposal combined with heatwaves can contribute to the spread of diseases. Additionally, the Santiago Metropolitan Region has experienced landfill fires due to heatwaves. In 2016, a fire broke out at the Santa Marta landfill in the municipality of Talagante, significantly impacting air quality in the region.

Furthermore, the increasing temperatures, coupled with La Niña and El Niño phenomena in Chile, have led

to extended and intensified rainy periods in Santiago. Since June 1982, when an intense storm caused the unexpected swelling of the Mapocho River, resulting in flooded streets and rivers overflowing their banks, the population of the Santiago Metropolitan Region has increasingly experienced the adverse effects of heavy rainfall. In June 2023, a similar episode caused injuries, damage to assets, and the closure of a major road for hours. Inadequate waste management practices and waste leakage into the river were closely linked to this flooding event. According to a local newspaper, emergency cleanup operations removed at least 250 tons of garbage from the Mapocho River due to the rainfall (La Tercera, 2023).

Lastly, it is important to acknowledge the implications of the region's susceptibility to earthquakes on the waste management system. Chilean construction regulations are stringent and include seismic design requirements for buildings, limiting the opportunities for reusing or recovering construction waste materials for similar purposes.

### **Insecure Municipal Finance**

The distribution of resources for waste management among municipalities in the region is highly uneven. Figure 18 presents the per capita expenditure on sanitation services, encompassing the collection and disposal of household solid waste, based on data obtained from the National Municipal Information

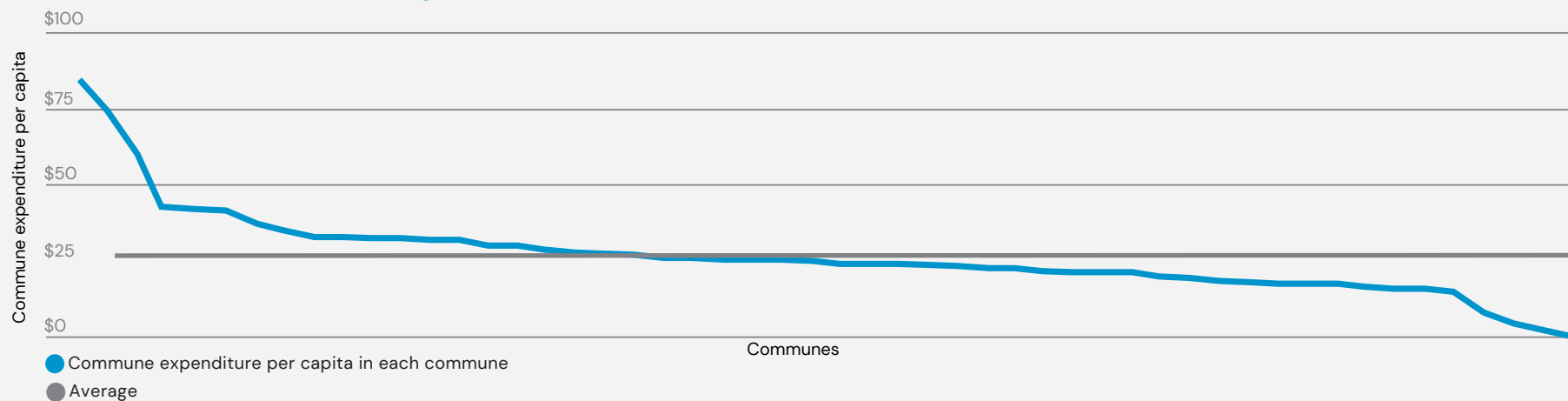
System (SINIM, 2021).<sup>17</sup> The figure highlights significant variations in per capita budgets across different communes. Three communes spend more than the regional average of USD 27; namely Vitacura (USD 84.7 per inhabitant), Lo Barnechea (USD 74.4 per inhabitant), and Las Condes (USD 60.4 per inhabitant). These three communes are among the six with the highest income populations in the Santiago Metropolitan Region, as indicated by the Social Priority Index of the Social Development report (2022).

Conversely, the four communes with the lowest sanitation expenditure per inhabitant, reflecting limited budget allocation for waste management services, are characterized by medium-to-high levels of rurality according to the criteria of the Communal Profiles Report of the Chilean Integrated Territorial Information System (2022). These communes are San Pedro (USD 8.1 per inhabitant), El Monte (USD 5.5 per inhabitant), Alhué (USD 2.5 per inhabitant), and Tiltil (USD 0.2 per inhabitant).

<sup>17</sup> State system under the auspices of the Undersecretariat of Regional and Administrative Development, which, among other functions, gathers budgetary information from the municipalities and presents different management indicators of the communes.

**FIGURE 18**

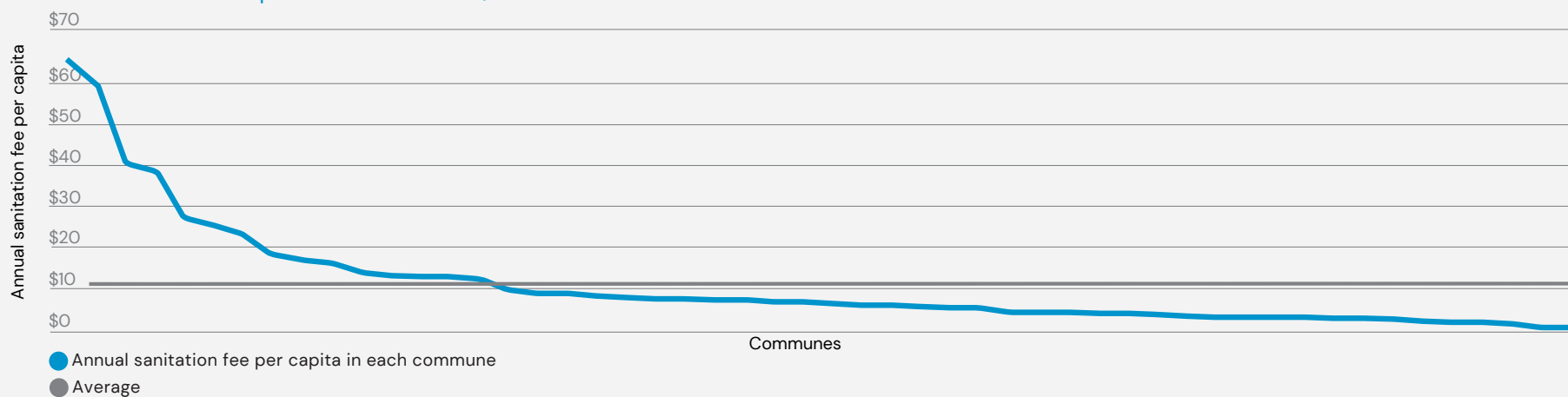
Per capita expenditure on waste management



Source: Produced by Urban Ocean with SINIM data, 2021.

**FIGURE 19**

Sanitation fees revenue per user. Data in USD/user



Source: Produced by Urban Ocean with SINIM data, 2021.

This variability in resource allocation is influenced by various factors, one of which is the exemption from paying sanitation fees. Figure 19 presents the indicator of annual payment of sanitation fees per person in each commune of the region, providing an estimate of the annual amount paid by an inhabitant in each commune. Once again, significant variability is evident between communes, suggesting that certain municipalities, particularly those with higher rates of poverty and/or informal housing, receive fewer resources for their sanitation management from residents.

Among the municipalities, there are four outliers on the left side of the curve that stand apart from the range of the rest. These municipalities are Vitacura, Providencia, Las Condes, and Lo Barnechea. Interestingly, it can be observed that three out of the four municipalities with the highest revenues from sanitation fees align with those having the highest waste management budgets. This correlation highlights how these municipalities with higher-income populations contribute more to the funding of sanitation services. It is worth emphasizing that the average revenues from sanitation fees amount to approximately USD 11 per inhabitant, which falls below the minimum rates estimated by municipalities in the region. These rates range from USD 17 to USD 66 per inhabitant, as indicated by a sample study conducted in seven municipalities of the region: Peñalolén (2022), San Miguel (2021), Ñuñoa (2020), Providencia (2023), Renca (2017), Lo Barnechea (2021), and Vitacura (2020). These values have been normalized based on population and adjusted to 2023 prices.

However, it should be noted that a higher expenditure alone does not guarantee more efficient waste management or better recycling rates. Various factors can influence indicators like expenditure per inhabitant or per ton; these factors include the distance to disposal sites, conditions of collection contracts, market concentration in waste management, the number of users benefiting from a contract, and other relevant factors (Soukopová et al., 2022; Russo & Vittorio, 2019). Nevertheless, efficient management of available resources can help equalize the conditions among municipalities, enabling them to implement waste minimization and recovery programs, as well as invest in infrastructure for these purposes.

### **Waste Disposal and Treatment Capabilities**

As mentioned earlier, the Santiago Metropolitan Region has four authorized landfills for the final disposal of waste. However, one of these landfills, Cerro La Leona of GERSA, does not accept household waste from the municipalities in the region. In addition to these, there is a controlled landfill owned by the municipality of Melipilla, which receives waste from three municipalities in the capital. This landfill is still in operation despite reaching the end of its useful life and lacking the necessary sanitary safeguards of a modern landfill; however, there are currently no alternative disposal services to rural communities in the southwestern area.

The Environment SEREMI of the Santiago Metropolitan Region has provided information on the estimated

useful lifespans of these landfills (SEREMI, 2017).

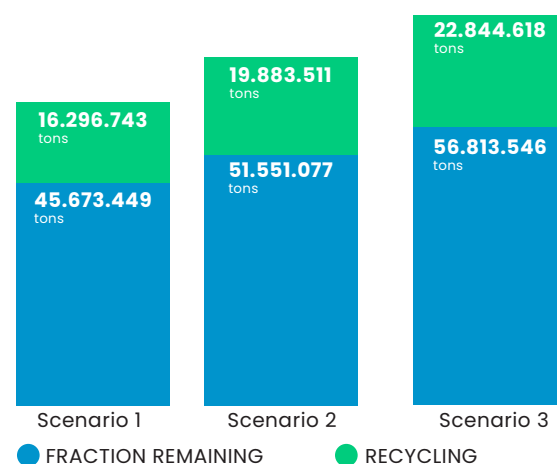
As shown in Table 9, the Lomas Coloradas and Santiago Poniente landfills are the only sites in the Santiago Metropolitan Region with sufficient capacity to receive municipal waste in the medium and long term. To prevent a potential sanitary emergency, it is expected that the Sanitary Authority will postpone the closure of the other mentioned sites. However, developing a new sanitary landfill project is complex due to regulatory obstacles and the lack of suitable sites, taking into account the Santiago Metropolitan Regulatory Plan (PRMS).

In terms of the long-term capacity for waste reception and disposal, it is projected that by 2040, the Santiago Metropolitan Region will have accumulated between 45 and 56 million tons of residual waste (Thiele, 2020), as depicted in Figure 20. Considering the current disposal capacities, this would place significant strain on the existing facilities. For instance, by 2020, the Loma Los Colorados landfill had already received 43 million tons of waste (Thiele, 2020).

**TABLE 9**  
Useful lifespans of landfills in the Santiago Metropolitan Region

LANDFILL	YEAR OF CLOSURE (END OF SANITARY AUTHORIZATION)
Lomas Coloradas (KDM)	2046
Santa Marta (Santa Marta Consortium)	2028
Santiago Poniente (Veolia) <sup>18</sup>	2034
Cerro La Leona (GERSA) <sup>19</sup>	2050
Popeta Landfill (Municipality of Melipilla)	Closed

**FIGURE 20**  
Total waste accumulation to 2040 under three generation scenarios



Source: Generation Projection, Marc Thiele, 2021

### Waste Generation and Recovery Rates

The per capita generation of household waste in the Santiago Metropolitan Region is 1.25 kg per inhabitant per day, or 454 kg per inhabitant per year. This places the region below the main OECD economies in terms of waste generation, but with significantly lower recovery rates (SENSONEO, 2019).

Therefore, in line with the goals outlined in the Circular Economy Roadmap, the strategy for tackling this challenge must consider multiple factors that need to be addressed simultaneously. The three factors considered in this section are: (1) environmental education; (2) infrastructure and technology; and (3) organic waste recovery.

One of the primary challenges to increasing recovery rates in the region is the need to improve **environmental education at all levels**. Environmental education serves as a crucial pillar in achieving the desired outcomes in waste management. A population with limited environmental knowledge lacks the fundamental understanding necessary to adopt effective measures for reducing waste generation. Conversely, well-informed individuals are more likely to demand change from both their peers and authorities. In 2022, academics Federico Antico and María Julia Wiener highlighted the importance

of environmental education, stating that addressing environmental challenges “requires educating citizens to support and demand the implementation of associated laws, change consumption habits, and contribute to the proposed circular economy framework.” (Antico & Wiener, 2022)<sup>20</sup>

According to the Third National Environmental Survey conducted by the consulting firm In-Data in 2020, 56.5% of respondents admitted to not separating their waste for recycling. This figure increases to 58% in central Chile, where the Santiago Metropolitan Region is located (In-Data, 2020). The same survey asked those who answered negatively about the main reasons for not separating their waste. Figure 21 shows the results.

Thus, it is evident that 47.8% of the responses are related to civic education of the population, including factors such as a lack of habit, comfort, and indifference towards recycling. Additionally, 5.2% of the responses are linked to environmental education, emphasizing a lack of information and awareness (In-Data, 2020).

<sup>18</sup> Year-end information obtained from the 2021 Environmental Audit Report of the Chilean Superintendency of the Environment.

<sup>19</sup> Does not accept municipal household waste from the Santiago Metropolitan Region.

<sup>20</sup> Interview for the Diario Sostenible newspaper. [www.diariosostenible.cl/noticia/columna-de-opinion/2022/05/desafios-para-la-industria-del-reciclaje-en-chile](http://www.diariosostenible.cl/noticia/columna-de-opinion/2022/05/desafios-para-la-industria-del-reciclaje-en-chile)

FIGURE 21

Environmental behavior survey

### Why don't you usually separate your waste for recycling?

Please select the main reason

Lack of habit

36,9%

No place to recycle or drop off waste

36,4%

Convenience

10,4%

Lack of time

8,3%

Lack of information

3,3%

It is not worth it because it all comes together later

1,9%

No things to recycle

1,3%

Other

1%

I don't care about recycling

0,5%

Source: In-Data, 2020

Furthermore, respondents were asked for their opinion on the most effective measures to address environmental issues. Figure 22 displays the results, indicating that the respondents believe that the primary measure to be implemented is promoting behavior change among users through punitive measures and financial incentives.

Another important aspect to address is the need to **improve infrastructure, waste collection, and recovery technologies**. Figure 21 highlights that 36% of the respondents mentioned the lack of recycling facilities as one of the main obstacles they face when separating and recycling their waste (In-Data, 2020). This suggests that bringing recycling facilities closer to the population can have a significant impact.

Similarly, a public opinion study conducted by the consulting firm GfK Chile for the Circula el Plástico program of Fundación Chile emphasizes the need to "expand existing infrastructure and make waste management easier for people" in order to motivate those who do not currently separate and recycle their waste (GfK, 2022). The study revealed several obstacles related to infrastructure, as reported by the respondents: 32% mentioned a lack of transportation options for their waste, 41% mentioned a lack of collection services at their homes, 43% stated that they lacked space at home to separate recyclable waste, and 62% indicated a lack of recycling points

near their residences.

In addition to improving infrastructure availability, academic Nicolás Valenzuela highlights that selective collection of recyclable waste, involving differentiated collection from households, enhances recycling outcomes at the community level. This approach is implemented in nations that have achieved significant success in household waste recovery (Valenzuela, 2022).<sup>21</sup>

Another crucial aspect is the promotion of **organic waste recovery**. As mentioned before, approximately 50% of household waste generated in the Santiago Metropolitan Region consists of organic waste, but only around 0.2% of it is currently composted annually (SINADER 2021 and municipal surveys in the Santiago Metropolitan Region). This composting rate is insignificant compared to the total amount generated and disposed of in landfills.

The national government is working to develop a system for organic waste recovery: an organic waste bill is under discussion,<sup>22</sup> and the National Organic Waste Strategy proposes to require an environmental assessment for incorporating organic waste management, and the implementation of "pay-as-you-throw" systems, where a reduction in the sanitation fee is offered if the total waste generated is decreased, among other mechanisms.

<sup>21</sup> <https://www.paiscircular.cl/economia-circular/que-factores-influyen-para-que-la-recoleccion-y-el-reciclaje-de-los-residuos-solidos-domiciliarios-sea-mas-eficiente/>

<sup>22</sup> Press site of the Ministry of the Environment: [mma.gob.cl/dia-del-medioambiente-ministerio-anuncia-proyecto-de-ley-para-reciclar-residuos-organicos/](http://mma.gob.cl/dia-del-medioambiente-ministerio-anuncia-proyecto-de-ley-para-reciclar-residuos-organicos/)



## Regulations and Compliance

Considerable progress has been made in terms of environmental regulations and waste management, including the implementation of laws such as the EPR Law, the Single-Use Plastics Law, and the Pollutant Release and Transfer Registry. However, there are still challenges in legislative and policy areas.

According to the 2020 Regulatory Quality Report of Strategic Sectors by the National Productivity Commission, Chile has the highest regulatory procedure complexity among OECD countries, leading to inefficient regulation characterized by an excess of laws, duplicated permits and standards, and various loopholes that result in different interpretations. This complexity is evident in waste management, as seen in the previous section, where multiple permits are required for different aspects of waste management, leading to complexities and delays in obtaining authorizations. The report identifies 400 different permits involving 53 entities, and waste storage permits vary by region.

In a similar vein, the Ministry of the Environment administers a Pollutant Release and Transfer Register (PRTR) under Article 70 of Law 19.300 of 2013. The PRTR system registers and systematizes the generation and destination of pollutant sources. Municipal and industrial waste generators are required to register the amounts of waste generated and their destinations annually in the SINADER system. However, the system's validation logic poses challenges, as it relies on manual

reconciliation without documented verification of declarations, as highlighted by Kyklos (2021).

Moreover, in the 2021 municipal waste declarations database (SINADER, 2021), ten out of the 52 communes in the Santiago Metropolitan Region, representing 19% of the total, did not declare their waste, resulting in estimates of waste generation and compromising proper traceability of materials. Similarly, in the construction and demolition industry, although the Ministry of the Environment estimated the generation of CDW at 3 million tons in 2020, only 1.3 million tons were declared in 2021, corresponding to 43% of the estimated total (MMA, State of the Environment, 2020).

FIGURE 22

Survey of environmental opinions

**In your opinion, which of the following measures are most effective in addressing environmental problems?**

In order of preference: First preference

E. Educate people to change their habits (waste separation, transportation habits, energy, consumption, etc.).

37%

A. Establish fines for people who do not take sustainable actions that pollute the environment.

21%

B. Promote an environmental crime law focused on prevention to prevent environmental damage from occurring.

19%

D. Invest in research and development to find technological solutions.

10%

C. Introduce or increase financial incentives to companies and individuals that take measures to protect the environment.

10%

F. Incentivize community actions in the territory to address different environmental problems.

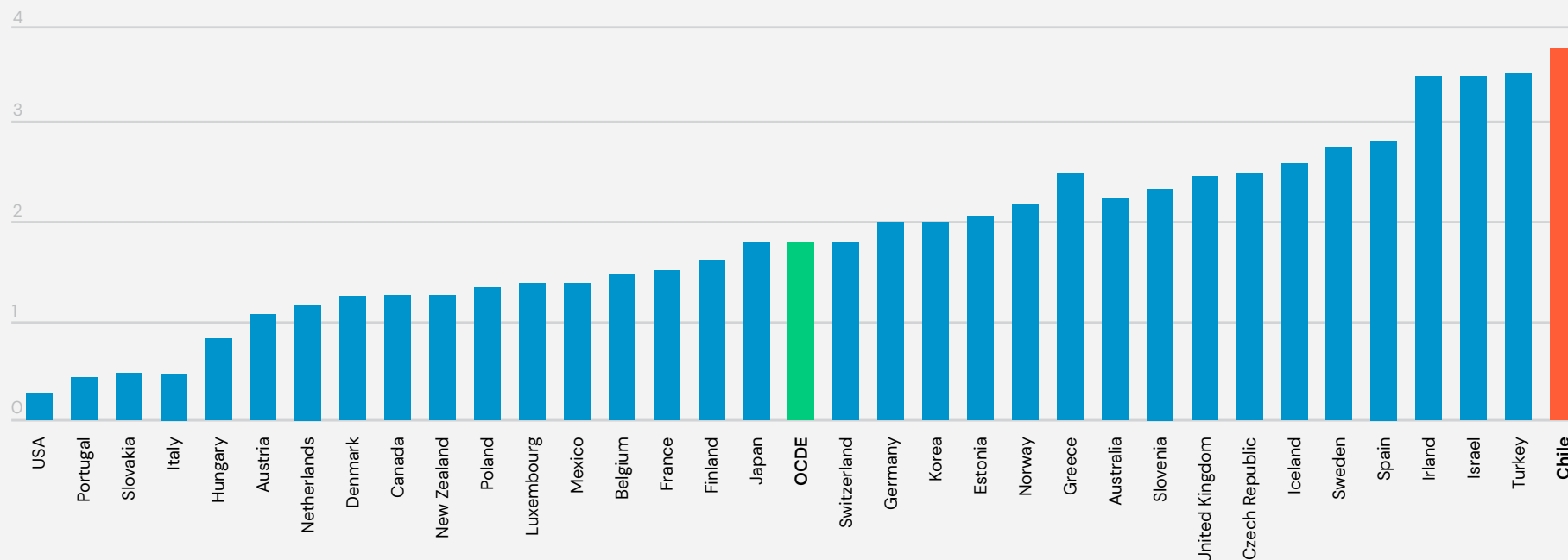
3%

Source: In-Data, 2020

FIGURE 23

Indicator of the complexity of regulatory procedures

Complexity of Regulatory Procedures  
(Index from 0–6, higher is worse)



Source: OECD, via the National Productivity Commission

## Key Opportunities for the GORE

➔ **Closing Gaps in Sanitary and Environmental Authorizations:** According to a report by Kyklos (2021) on legal gaps, certain permits are not explicitly required but are still demanded by supervisory authorities, leading to a cumbersome permitting process. For example, while the transportation of recyclables does not require sanitary authorization, the sanitary authority often requires permits for the collection and transportation of non-hazardous industrial waste, complicating the recovery of household waste. A similar situation arises with Green Collection Points and Clean Collection Points,<sup>23</sup> where the requirement for sanitary authorization depends

<sup>23</sup> For the purposes of this profile, a green collection point is a smaller facility with public access containers, without pre-treatment. A clean collection point is a larger facility, with public access, the capacity to pre-treat some waste and, in some cases, to carry out environmental education. Information obtained from Kyklos Legal Gap Report, 2021.

on inspection criteria set by the Health SEREMI. The Santiago Regional Government can address these permit obstacles through the Waste Board, which involves the participation of the Secretariats of Environment and Health responsible for providing the necessary authorizations.

→ **Differentiation Between Organic Waste Management and Common Household Waste:**

The legal system does not distinguish between the management of these two waste types, even though organic waste requires the implementation of composting plants. As a result, the establishment of regional organic waste treatment plants is subject to environmental and sanitary authorizations similar to those required for sanitary landfills. This lack of differentiation discourages the installation of organic waste treatment sites since their effective management incurs higher costs compared to sanitary landfills, without corresponding financial benefits for project implementation. In this regard, the Santiago Regional Government can collaborate with the SEREMIs of Environment, Health, and Housing and Urban Development to standardize requirements and identify suitable sites for organic waste treatment, utilizing the regional government's authority in establishing waste disposal sites.

→ **Reducing Gaps in Construction and Demolition Waste (CDW) Regulation:** CDW is addressed in

this report due to its impact on micro-landfills and illegal dumping sites. However, specific regulations for CDW are lacking compared to household and hazardous waste, resulting in complexities and difficulties in managing CDW. The regulatory framework for CDW is fragmented, with thirteen legal instruments involved, hindering understanding among stakeholders and regulatory bodies. This complexity also facilitates non-compliance with regulations by certain actors in the system. Unlike priority products covered by the EPR Law, there is no Circular Economy Framework Law or other instruments promoting sustainable and resilient management of CDW. The regional government has an opportunity to implement sustainable CDW management pilots in collaboration with the construction sector, aligning with the 2025 Construction Roadmap's initiatives for sustainable construction, particularly by supporting the implementation of management plans in publicly financed construction projects.

→ To address these regulatory complexities, GORE can raise these issues in the **Santiago Metropolitan Region Waste Roundtable** and provide support to municipalities in terms of regulatory and sector-specific systems training. Additionally, GORE can assist municipalities and management systems in developing information campaigns to raise awareness among the population about the scope

of the EPR Law and its implications for the region's citizens. Surveys conducted in 2022 indicate that between 76% and 80% of Chileans have insufficient or no knowledge of the EPR Law, making it crucial to inform the population about its significance.

→ **Reclaiming Public Spaces:** There is an opportunity to reduce the number of areas that become dumping sites by reclaiming and rehabilitating these spaces to prevent their deterioration. Ossi and Faúndez (2021) report that 74.3% of illegal dumping sites and micro-landfills in the Province of Santiago are located on sites classified as National Public Use Assets, presenting the potential for transformation and utilization by state entities for the benefit of the region's residents. One of the focuses of this program and of GORE's regional strategy is to reduce the amount of waste that escapes from the management system, i.e. that is not recovered or disposed of correctly and ends up in the environment, affecting natural sites, watercourses, and bodies of water. This group of waste includes waste scattered throughout the city and along the banks of watercourses, but also includes inadequate disposal sites, such as illegal dumping sites and micro-landfills.

# 7. Conclusion

This section provides three fact sheets that summarize the waste management challenges from a resilience perspective. These fact sheets aim to consolidate the waste profile while addressing the primary issues associated with waste management in the Santiago Metropolitan Region.

**Fact Sheet 1** focuses on the challenges related to existing waste logistics and disposal capacities, as well as the regulatory barriers that restrict the expansion of treatment capabilities and hinder the integration of new technologies into the discourse.

**Fact Sheet 2** addresses the presence of micro and illegal landfills in the region and emphasizes the importance of addressing them in the short and medium term due to their significant impact.

**Fact Sheet 3** highlights a cross-cutting issue that underlies all the challenges faced: environmental education and the shared responsibility of the region's citizens. It emphasizes the vital role of community participation in ensuring the successful implementation of any initiatives.

## FACT SHEET 1: WASTE COLLECTION AND TREATMENT CAPACITY

DESCRIPTION	Four million tons of household waste are generated per year, with high costs for municipalities and low recovery rates (1–2%).
IMPACTS	<ul style="list-style-type: none"> <li>• The public sector incurs significant expenses related to waste management, which can strain resources.</li> <li>• Tensions due to municipal resource disparities.</li> <li>• Untapped opportunities for grassroots recyclers and waste recovery actors.</li> <li>• Opportunity cost of recovering recyclable materials.</li> <li>• Waste leakage, including improper disposal and littering, can exacerbate flooding occurrences.</li> </ul>
CHALLENGES	<ul style="list-style-type: none"> <li>• Pre-treatment projects could receive up to 35% of the recyclable potential in the region.</li> <li>• Municipal resources for waste collection are very unequal. Funding disparities exist for selective collection projects.</li> <li>• Sectoral permits for new treatment and/or recovery projects hinder progress towards resilient systems.</li> </ul>

<b>OPPORTUNITIES</b>	<ul style="list-style-type: none"> <li>• Continue to implement and support initiatives that disincentivize single-use and incentivize reuse wherever possible</li> <li>• Move towards integrated household waste management by increasing reception capacity and implementing selective collection throughout the region.</li> <li>• Reduction in variable landfill disposal costs.</li> <li>• Decompression of the sanitary system to extend useful life of landfills.</li> <li>• Boost the recovery market and demand for recycled material. Creation of green jobs and contribution to the local economy.</li> <li>• Opportunity for grassroots recyclers to participate in the system.</li> </ul>
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## FACT SHEET 2: ILLEGAL WASTE DISPOSAL

<b>DESCRIPTION</b>	There are 1,300 micro-landfills and at least 54 illegal dumping sites in Santiago, where CDW, bulky waste and other household waste accumulates.
<b>IMPACTS</b>	<ul style="list-style-type: none"> <li>• Damage to the environment and harm to waterways.</li> <li>• Economic and quality of life damage to neighboring communities.</li> <li>• Health risks to the public. Fire hazard, among other dangers.</li> </ul>
<b>CHALLENGES</b>	<ul style="list-style-type: none"> <li>• It is estimated that 70% of illegal dumping site waste is CDW. There are limited initiatives for the recovery of bulky and construction waste, and there are no incentives for its valorization.</li> <li>• There are insufficient resources for the control of illegal disposal together with a very lax regulatory framework.</li> </ul>
<b>OPPORTUNITIES</b>	<ul style="list-style-type: none"> <li>• Decrease in the quantity of illegal disposal sites in the region, improving the neighboring communities' quality of life.</li> <li>• Avoidance of municipal costs for cleanup operations.</li> <li>• Decrease in the effect of pollutants in the region's waterways.</li> <li>• Evident improvement in the quality of life of the neighboring communities that have been impacted by illegal sites.</li> <li>• Potential transformation of affected sites into green areas for public use.</li> </ul>

### FACT SHEET 3: GREEN CITIZEN: ENVIRONMENTAL EDUCATION CHALLENGES

<b>DESCRIPTION</b>	In order to implement a resilient structure for household waste management, it is necessary to have committed and participative citizens. Therefore it is necessary to develop environmental education programs.
<b>CHALLENGES</b>	<ul style="list-style-type: none"> <li>• There is still a lack of development of methodologies to include the environment in the educational curriculum (MMA Environmental Education, 2018).</li> <li>• Although there is some interest in environmental knowledge, there is no proactive culture of citizen participation.</li> <li>• Developing environmental education campaigns and programs that effectively cover a significant portion of the population is costly and highly complex.</li> <li>• There are few concrete incentives to foster environmental motivation; changing citizen habits is complex.</li> </ul>
<b>OPPORTUNITIES</b>	<ul style="list-style-type: none"> <li>• To train environmentally conscious citizens to become part of the waste valorization chain in the region.</li> <li>• Citizens capable of demanding environmental conditions from the authorities and the private sector.</li> <li>• Better waste recovery rates due to correct separation at source and good use of infrastructure.</li> <li>• Increase number of citizen and community initiatives to care for the environment.</li> <li>• Less aversion to changes in waste management systems.</li> </ul>



## 8. Glossary

**ANIR:** National Association of the Recycling Industry. Main trade association of companies related to the treatment and recovery of waste in Chile. Composed of 61 companies.

**ASCC:** Sustainability and Climate Change Agency. CORFO Committee that seeks to include the dimension of climate change and sustainability in the private sector.

**BCN:** Library of the National Congress of Chile. Legislative library of the Chilean Congress, where the country's regulations and different documents are compiled to assist legislators and their teams' work.

**CAP:** Circularity Assessment Protocol. Assessment protocol developed by the University of Georgia to identify and analyze waste streams, particularly plastics.

**CDW:** Construction and Demolition Waste

**COEVA:** Environmental Assessment Commission. Regional body made up of several SEREMI, SEA management and the regional delegate, which represents the Chilean government. It is in charge of approving or rejecting environmental qualification resolutions for projects with potential impact on the environment.

**Construye 2025:** A program promoted by CORFO that seeks to transform the construction sector in terms of productivity and sustainability to achieve national development goals with a positive impact on the social, economic and environmental sectors. <https://construye2025.cl/nosotros/>

**CORFO:** Production Development Corporation. State agency under the Ministry of Economy, Development and Tourism, whose objective is to promote entrepreneurship, innovation and competitiveness in Chile.

**CPA:** Clean Production Agreement. Agreements coordinated by the ASCC, between business sectors and public agencies related to environmental issues.

**DGA:** General Directorate of Water. Agency of the Ministry of Public Works, in charge of analyzing, verifying and distributing water information in Chile.

**DS:** Supreme Decree. Legal mandate, issued by the President of the Republic, through one of their Ministries of State.

**ECLAC:** Economic Commission for Latin America and the Caribbean

**ENRO:** National Organic Waste Strategy Chile 2040

**EPR Law:** Law 20.920, Framework for Waste Management, Extended Producer Responsibility and Promotion of Recycling Containers and packaging. These correspond to one of the priority products defined by Law 20.920 on Extended Producer Responsibility (EPR Law).

**FNDR:** National Regional Development Fund. Financial instrument for public investment of regional management, administered by the regional governments.

**FPA:** Environmental Protection Fund. Competitive fund of the Ministry of the Environment to finance environmental protection projects or activities.

**GDP:** Gross Domestic Product

**GHG:** Greenhouse Gases

**GORE:** Santiago Metropolitan Regional Government

**Green Collection Point:** Facility for the reception of smaller recyclable materials, with public access containers, without pre-treatment

**INE:** National Institute of Statistics. Agency in charge of producing Chile's official statistics and conducting censuses in the country.

**MIDESO:** Ministry of Social Development and Family

**MINVU:** Ministry of Housing and Urbanism of the Government of Chile

**MMA:** Ministry of the Environment of Chile

**MSUR:** Municipal Association of 20 communes of the Metropolitan Region, with focus on environmental and waste management

**MSW:** Municipal Solid Waste. Waste that originates in homes and establishments such as commercial establishments, food stores, hotels, educational establishments and prisons. In addition, waste that despite not belonging to the establishments mentioned above, due to its characteristics can be disposed of in sites destined for Solid Household Waste is considered as Waste Assimilable to Household Waste.

**OECD:** Organization for Economic Cooperation and Development. International cooperation organization, composed of thirty-eight member countries, including Chile.

**Clean Collection Point:** Larger facility with capacity to pre-treat waste and, in some cases, to carry out environmental education.

**PRTR:** Pollutant Release and Transfer Register. Database of the Ministry of the Environment, which compiles information on emissions, waste and transfer of pollutants potentially harmful to health and the environment.

**SEREMI:** Regional Ministerial Secretariat. Regional government agency that represents the respective ministry in each of the country's regions.

**SIG:** Integrated Management System of the EPR Law. Private, non-profit entity in charge of ensuring that the goals established by the EPR Law are met.

**SINADER:** National Waste Declaration System. Platform of the Ministry of the Environment for waste generators, recipients and managers to declare their management of non-hazardous waste on an annual or monthly basis, in accordance with the obligations established in the Pollutant Release and Transfer Register (PRTR) regulations.

**SINIM:** National Municipal Information System. A state system under the auspices of the Undersecretariat of Regional and Administrative Development, which, among other functions, gathers budgetary information of the municipalities and presents different management indicators of the communes.

**SUBDERE:** Undersecretary of Regional and Administrative Development. Agency under the Ministry of the Interior and Public Security, in charge of the development of the country's territories.

**Superintendency of the Environment:** Autonomous agency of the State of Chile, which coordinates the monitoring and oversight of the various instruments of an environmental nature

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