VNG International

Solid Waste Management in Pereira, Colombia

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Summary

Pereira is a medium-sized and fast-growing city that faces many challenges associated with the comprehensive management of solid waste, which in turn impact the sustainable development of the municipality. Among these challenges are (i) increase the low recycling rates, (ii) bring informal recyclers into the formal economy and aid their transition to service providers for the Public Waste Service (SPA), (iii) integrate informal and unregulated recycling operations with the official recycling system, (iv) introduce the sorting of waste at source by service users, (v) begin differential management and treatment of organic waste, and (vi) find a new solution for the disposal of non-recyclable waste, given the short useful life of the current landfill site.

Developing solutions for these challenges requires an adequate understanding of the system and the waste management system and condition in the municipality. This report contributes by consolidating information from scattered secondary sources, as well as including primary information generated within the framework of the DEALS international cooperation programme, on the structure, governance and technical, social and financial indicators of Pereira's waste management system. The report pays special attention to recycling and the formalization of recyclers as this is the sector that DEALS seeks to impact.

In Pereira, the management of ordinary waste is carried out by companies contracted by the SPA and registered by the Public Household Services Superintendence (SSPD) under a free competition scheme. The service is provided in accordance with technical guidelines defined by the Ministry of Housing, City and Territory (MVCT). The system is financed by a monthly charge to service users calculated according to a tariff scheme regulated by the Commission for the Regulation of Drinking Water and Basic Sanitation (CRA). Management of special and hazardous waste is coordinated and financed by the private sector through an extended producer responsibility programs.

In 2021, the municipality generated an average of 500 tonnes of ordinary solid waste per day, of which approximately 10 tonnes/day (1.8%) were recycled. This figure falls a long way short of the estimated 50% recycling potential in the city (paper, cardboard, plastics, metal, glass). The organic material that makes up the largest individual fraction of the waste (33%) is all sent to landfill and there are currently no plans to treat it.

The collection rate for mixed ordinary waste - recyclable combined with organic and other non-recyclable material - hovers close to 100% in urban areas. Specific recycling collections only cover about 15% of the city. Recycling is carried out mainly by dedicated recyclers, around 300 in number, grouped in six organizations that are in the process of official registration as SPA companies. Other informal recyclers and warehouses buy and sell recycled materials that are not regulated or linked to the SPA. There is no information available on the amount of waste handled informally in this way. However, it is estimated that informal recyclers and warehouse staff may amount to about 500 people.

The cost of collecting and transporting a tonne of waste ranged between COP $99,000 and $112,000 in 2021, while the cost of its disposal in landfill varied between 28,000 and 36,000. There is no differential tariff structure for recycling, so the cost of recycling one tonne is estimated by adding the cost of collection and disposal in landfill. Recyclers are paid a recycling tariff via their recycling organization in the process of formalization.

In the period 2019-2021, the six organizations in the process of formalization made progress in meeting the requirements they must meet as SPA companies, and increased the amount of waste recycled. They all receive income from the SPA recycling tariff and from the sale of recycled material.

During 2018-2021, the Mayor's Office of Pereira, with the technical assistance of VNG International through the DEALS cooperation programme and in partnership with other public and private actors, has promoted the formalization and development of recyclers through two types of mechanisms: (i) public education campaigns on the separation of recyclable waste at source, the promotion of closer contact between recyclers and service users, and increasing the amount of recycled waste; and (ii) technical assistance at the administrative-business level and building the logistical capacity of recycling organizations.

These joint public-private initiatives, added to the increased income received by organizations and recyclers from tariffs, have improved recyclers' working and living conditions and increased the city's recycling rate from 0.3% in 2018 to 1.8% in 2021.

Recycling rates continue to be low and there is still a long way to go before recyclers are fully integrated into the formal economy. However, the experience of recent years shows that local government can make progress in addressing these and other challenges associated with sustainability through coordinated work with a range of public and private actors from different sectors, including government, academia, civil society, industry and development cooperation agencies, and at various levels i.e. local, regional, national and international.

Contents

1 Introduction

The predominant global culture is rapid disposal of the materials and products we consume. The growth of the population and large cities, the globalization of markets and the acceleration in per capita consumption due to economic growth complicates the logistics and resources necessary for adequate waste management. From another perspective, adequate collection, recycling and *aprovechamiento*[1], treatment (of organic material) and disposal of waste reduces environmental impact on the environment and health and minimizes the extraction of natural resources and social and environmental costs. However, there is no "one size fits all" solution and no solid waste management measures that are appropriate for every place.

1 Decree 2981 of 2013 issued by the Ministry of Housing, Cities and Territory (MVCT) defines "aprovechamiento" as the public waste service activity that comprises (i) the collection of recyclable waste sorted at source by service users, (ii) the selective transport to a sorting and recycling centre, and (iii) the sorting and weighing of waste. For the purposes of this document, the terms aprovechamiento and reciclaje are analogous.

Reducing waste generation through prevention, reduction, recycling and reuse is one of the Agenda 2030 Goals required to achieve a sustainable transition (Sustainable Development Goal, SDG, 12.5). Integrated waste management seeks to contribute to achieving and complying with other SDGs, such as guaranteeing a healthy life (SDG 3), ensuring universal access to basic services (SDG 11.1), reducing the per capita environmental impact of cities (SDG 11.6), promoting the efficient use of natural resources (SDG 12.2) and conservation of the oceans (SDG 14) (1).

The World Bank (2) emphasizes that solid waste management is usually ignored, especially in low-income countries[2], even though it is an essential element of sustainable, healthy and inclusive cities. High-income countries, which account for 16% of the world's population, produce more than 34% of the world's waste (3), but recover more than a third through recycling and composting. Low-income countries only recycle 4%. However, low-income countries often do not have statistics on recycling, as this is part of the informal economy.

Waste management is important because projections indicate that economic growth and a peak in urban expansion will increase global waste from 2,010 million tonnes in 2016 to 3,400 million tonnes in 2050 (2). The challenge of managing this volume in growth requires reliable information to ensure decisions are taken that reflect the reality in each country and that close the gap between developed and developing countries.

This report is a contribution to providing information with reference to the structure and data used in the World Bank report "What a Waste 2.0" (2). We present an overview of solid waste management in the municipality of Pereira, Colombia, using data from the period 2014-2021, describe the technical details of the system and provide a basis for land-use planning and decision-making that can promote sustainable development.

The report examines local data in relation to global indicators and describes waste material and

Image 1 **Plastic bottles for recycling.**
Source: DEALS Pereira photo archive, 2017 – 2022.

2 In 2020, the World Bank defined a low-income economy as one with per capita GDP at US$ 1,045 or less.

financial flows in waste management, as well as the relations between the formal and informal actors that play a role in governance of the system. Finally, we examine aspects of the recycling value chain and workforce.

We hope to reach a broad audience, including governments and civil servants at the local, regional and national levels, as well as the academic and scientific community and business sectors in general.

The Municipality of Pereira is located in the centre-west of the country. In 2018, its population was 467,269 (4) – 82.6% urban and 17.4% rural. The municipal area is 60,400 hectares – 3,148 urban and 57,252 rural. Pereira lies at an altitude of 1,411m above sea level and has an average temperature of 21°C (5).

Image 2 **Pereira.** Credits: Alexis Múnera.

2 Generation of waste in Pereira and the region

Figure 1 compares solid waste generation at the local, national and international levels. In 2019, the city of Pereira generated about 470 tonnes of ordinary solid waste[3] per day (5), with a recycling rate of 0.66%[4]. The municipality's recycling collection routes cover 15.8% of the city's neighbourhoods and this service is operated by recycler[5] organizations in the process of formalization[6] (5). Other informal recycling flows exist but no statistics are available.

The low recycling rates indicate that almost all waste is disposed of at the municipality's landfill site, which is projected to be full by 2028.

3 Ordinary solid waste is all non-hazardous waste, which by its nature, composition, size, volume or weight is collected, managed and disposed of by public waste service companies (21)

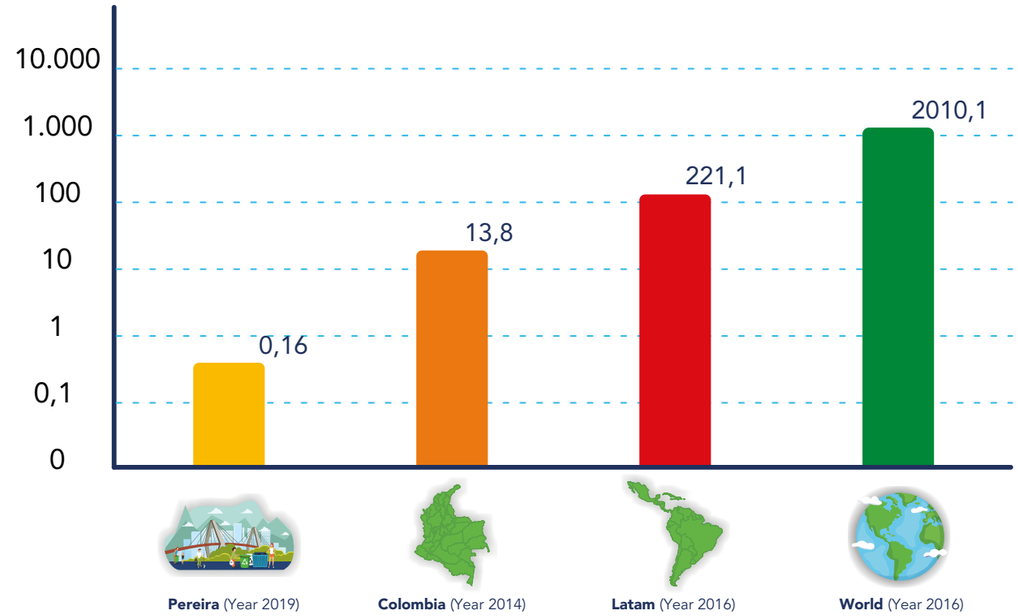
4 Formal recycling as part of the public waste service that deals exclusively with ordinary waste (excludes special waste).

5 Recyclers are persons who habitually recover, collect, transport and sort solid waste, such as raw materials, to recycle it for use in the productive economy, and who maintain themselves and their families from this activity (8).

6 In Colombia, the authorities are encouraging recyclers to enter the formal economy as members of organizations eligible for registration as public waste service recycling companies. Organizations have eight years in which to comply with the relevant conditions (see Appendix 1).

Figure 1 **Comparison of global, regional and local solid waste generation in millions of tonnes: Latin America, Colombia and Pereira. Logarithmic scale in (MTon/year)**

Source: World Bank, 2016; UN, 2018; National Sold Waste Policy, 2016; PGIRS Pereira monitoring, 2019.



In Colombia, information on waste management is scattered and covers different periods of time. Waste was estimated at 13.8 million tonnes in 2014 (6). In 2015, the average recycling rate was 17% (6). The disposal of solid waste in landfill was approximately 11.3 million tonnes in 2018 (7). The country's waste is expected to continue growing in line with the increase in population and per capita rates of materials consumption.

The World Bank (2) estimated that Colombia's annual generation of solid waste would be 13.4 million tonnes in 2018, 16.4 million tonnes in 2030, and 20 million tonnes by 2050.

The UN (3) said that Latin America and the Caribbean would generate 541,000 tonnes/day of urban waste in 2016, equivalent to 11% of the world's waste (Figure 1). Close to a third of this waste is inadequately disposed of in open dumps. It is estimated that 10% of waste is recovered and recycled. Colombia is responsible for generating 0.7% of the world's waste.

3 Structure and governance of the waste management system in Pereira

In Colombia, solid waste management and related activities[7] are mainly organized by the Public Waste Service (SPA), which deals with ordinary recyclable, non-recyclable and organic waste. The management and handling of hazardous and special waste, such as tyres, construction and demolition waste, high volume waste (e.g. furniture and mattresses), clinical waste and other waste subject to specific regimes, such as Electrical and Electronic Appliances Waste (RAEE) (Figure 2) is not covered by the public waste system.

Each municipality in Colombia is required to have an Integrated Solid Waste Management Plan (PGIRS). This is the most important long-term (12 years) municipal planning instrument for solid waste. These plans have a series of objectives, goals, programmes, projects, activities and resources that must be included in the Municipal Development Plan that each mayor prepares for a period of four years (8).

7 Public waste service and related activities: collection, transport, street and public spaces cleaning, transfer, treatment, disposal in landfill and washing of public areas.

Figure 2 Waste management in Colombia

Source: Compiled by authors.

Solid waste group	Origin	Categories of waste	Material type	Waste manage system	Regulator
Ordinary	Residential	Organic	Organic matter e.g. food waste.	SPA	MVCT
	Commercial	Recyclable	Plastics - Cardboard Paper - Glass - Metal.	SPA EPR E&E	MVCT MADS
		Non-recyclable	Sanitary waste	SPA	MVCT
Special	Official	Bulky	Furniture - Mattresses Chairs - Messes.	SPA	MVCT
	Public spaces	Hazardous	RAEES - Luminarias	EPR	MADS
			Biological Waste	Private RESPEL	MADS Y MSPS
Construction and demolition wastes CDW	Industrial	CDW	Soil, Mulch Silt and Petrified Material.	Special Private Services	MADS

CONVENTIONS

E&E Containers and Packaging

MADS Ministry of Environment and Sustainable Development

MSPS Ministry of Health and Social Protection

MVCT Ministry of Housing, City and Territory

RAEE Waste Electrical and Electronic Equipment

CDW Construction And Demolition Waste

RESPEL Hazardous Waste/ Private

EPR Extended Producer Responsibility

SPA Public Waste Management Service

3.1 Integrated solid waste management plan

Pereira's PGIRS for 2015-2027 was prepared in 2015 and updated in 2016 (Figure 23). It has 14 programmes (Figure 3) that cover the main and associated public waste service activities (programmes 3, 4, 5, 6, 7, 8 and 10), the inclusion of recyclers (programme 9), and the management of some special waste flows (programmes 11 and 12) and rural waste (programme 13).

A Coordination Group is responsible for the preparation, adoption, modification, updating, implementation, supervision and monitoring of the plan. This body has representatives from local and regional public and private organizations (see list of members in Figure 6). This is an interdisciplinary decision-making body with technical, operational, social, environmental, legal, financial and administrative experience in solid waste management and the public waste service (8). The body also includes service user representatives (Vocales de Control) (9). Public waste service companies are represented in this group, but not organizations responsible for special and hazardous waste that operate under the Extended Producer Responsibility Programme (REP).

The PGIRS also has a Technical Working Group. This interdisciplinary team includes staff from the Mayor's Office with experience in planning, public services, the economy, finance and the environment. The group programmes, organizes and implements technical work for the PGIRS, helps to update the plan and calls on actors with relevant expertise to contribute their experience and knowledge (8).

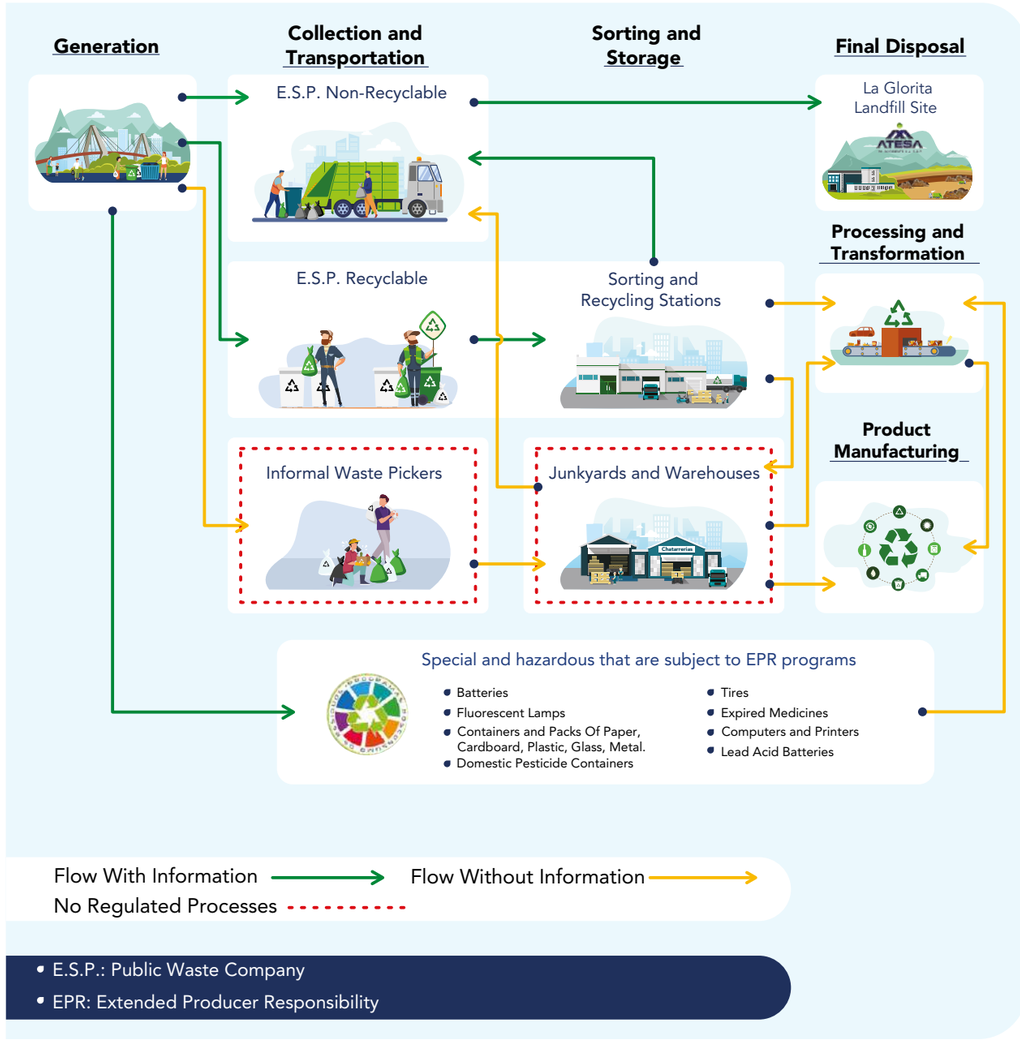
Figure 3 Integrated Solid Waste Management Plan programmes, Pereira.
Source: Integrated Solid Waste Management Plan, 2018

Image 3 Cleaning under a bridge Source: DEALS Pereira photo archive, 2017 – 2022.

3.2 The value chain

In accordance with the national structure, the management of ordinary solid waste (recyclable, organic, non-recyclable) in the urban area of the municipality of Pereira is mainly the responsibility of private public service companies (ESPs), including the recycling organizations in the process of formalization. Operating outside the SPA are (i) informal recycling by informal recyclers, junk yards and stores[8] and (ii) formal activities dealing with special and high-volume waste, which are covered by the Extended Producer Responsibility (REP) programmes (Figure 4).

Figure 4 Value chain and flows in solid waste management in Pereira.
Source: Compiled by authors.



8 Spaces for the purchase and sale of recyclable materials.

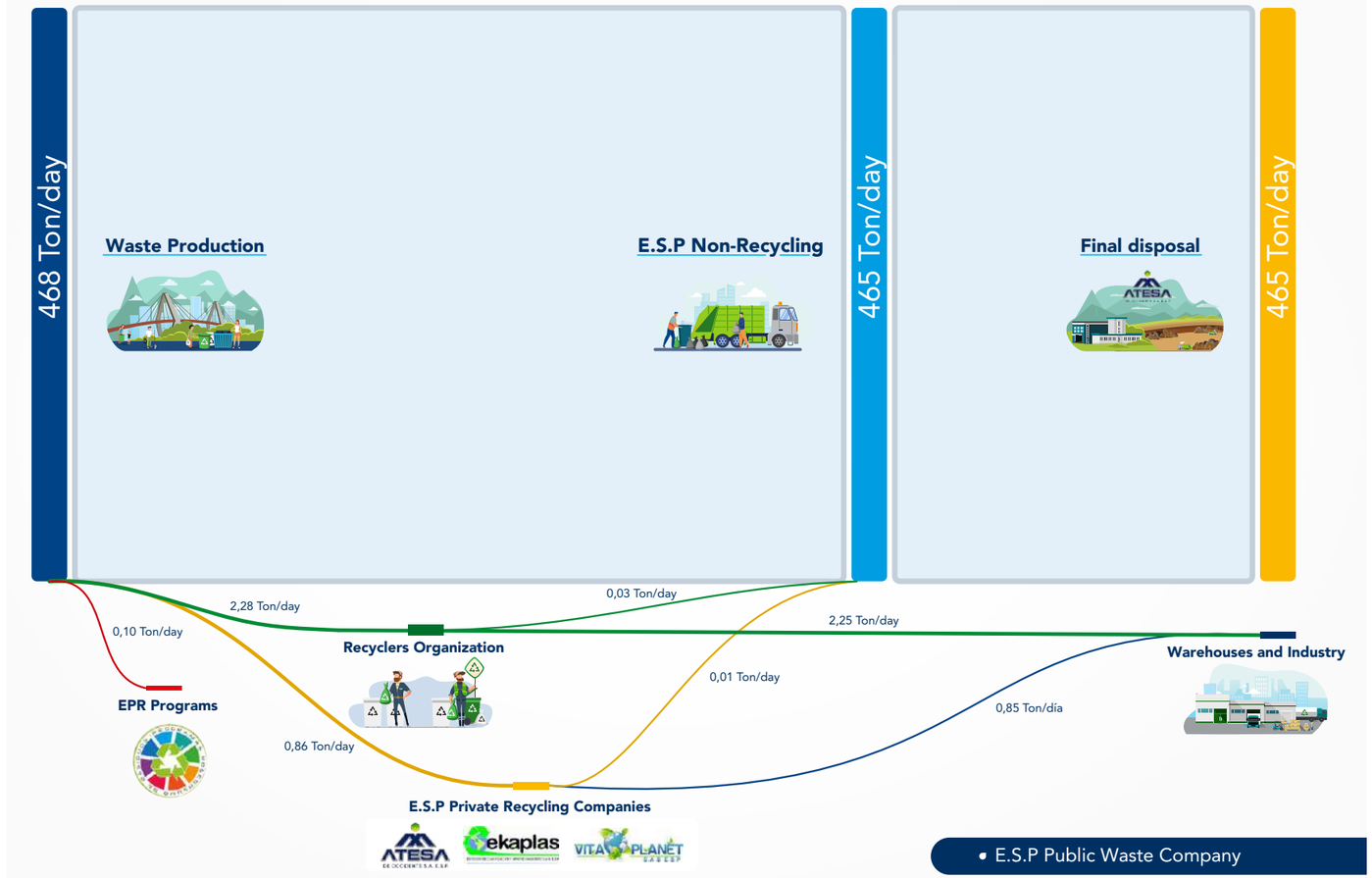
3.2.1 Flow of materials

Figure 4 shows the qualitative flow of waste materials between the different groups of actors involved in the management system. Activities include the generation, collection, transport, sorting, storage, disposal in landfill and processing of materials. Figure 4 also shows that quantitative data is not available for most of the waste flows, mainly those dealt with by informal and waste processing activities.

The available quantitative data on waste flows mainly comes from ESP reports to the SSPD's information system[9] (SUI) about the SPA. To a lesser degree, there are some reports produced by the municipal administration, for example, reports managed as part of REP programmes.

Figure 5 uses a Sankey diagram to show values of known waste flows in the municipality in 2019[10]. Total ordinary waste generated is 468 tonnes/day, of which 0.66% tonnes/day is recycled by recycling organizations and private ESPs, leaving 465 tonnes/day to go to landfill.

Figure 5 **Waste flows, Pereira, 2019.** Source: Compiled by authors



9 Single Information System (SUI) is the country's official household public services information system, which collects, stores, processes and publishes information reported by service providers and local authorities

10 No information is available on informal recycling flows or special programmes like RCD.

3.3 The actors

A range of actors participate in the physical handling and governance involved in solid waste management. The handling of waste is undertaken by local actors in accordance with formal and informal processes discussed in chapter 3.2. The governance of waste involves a wider range of actors that includes both public and private, local, regional and national actors with diverse regulatory, monitoring, coordination, supervision and technical support roles and responsibilities (Figure 6).

The main roles and areas of responsibility of national, local and regional actors are presented in Figure 7 and Figure 8 respectively. At the national level, public sector bodies regulate and monitor waste management, while in the case of Pereira, private institutions conduct activities to strengthen recycling organizations in the process of formalization and support local government with activities to promote waste recycling and management. The presence of national actors is limited in the municipality, except for ANDI.

With the exception of the Risaralda Provincial Government[11], regional actors participate in waste governance via representation of different sectors on the PGIRS Coordination Group, as described in section 3.1.

Figure 6 Map of actors involved in the governance of solid waste in Pereira, 2020 Source: Compiled by authors.

11 At the date of publication, the provincial government is not represented on the IAT committee shown in figure 8.

At the local level, three governmental institutions are involved in the governance of waste:

1. The Pereira Mayor's Office. The Mayor must ensure the provision of efficient public waste collection services to all citizens and chairs the PGIRS Coordination Group.
2. The Pereira Waste Company[12,13] has two main functions: (i) support the Mayor's Office in meeting targets and complying with the Municipal Development Plan with regard to waste, and (ii) audit the ESP ATESA de Occidente[14] regarding the collection and disposal of non-recyclable waste, associated SPA activities, and operations at the La Glorita landfill site.
3. The Municipal Council sets the subsidy and contribution rates corresponding to the waste tariffs. Section 3.4.1 provides more detail on this aspect.

Processing of materials in the municipality is low compared to the national picture. Some local actors process plastics, mainly crushing for use as plastic wood and other materials. Flows of processed materials and actors that take part in these activities are not directly associated with municipal planning programmes like the PGIRS.

Coordination of actions for the management of waste associated with the REP programmes involves the Metropolitan Environmental Committee for Hazardous Waste (CAMER), on which are represented the Pereira Waste Company, the Mayor's Office, Pereira Technological University, the Risaralda Autonomous Regional Corporation (CARDER), ANDI and national post-consumption reuse plans (7 plans)[15].

12 Decentralised municipal company.
13 This provided services to the SPA in Pereira until 2007 when the work was contracted to ATESA de Occidente until 2037.
14 Complete coverage of the public waste service in the urban area of the municipality, with 90.7% users.
15 Post consumption Reuse Plans: Pesticides, Expired Medicines, Batteries and Accumulators, Used Tyres, Lighting Appliances and Electrical and Electronic Appliances (RAEES), REP for containers and packaging.

Figure 7 **National actors participating in waste management governance in Pereira.** Source: Compiled by authors.

Figure 8 **Regional actors participating in waste management governance in Pereira.** Source: Compiled by authors.

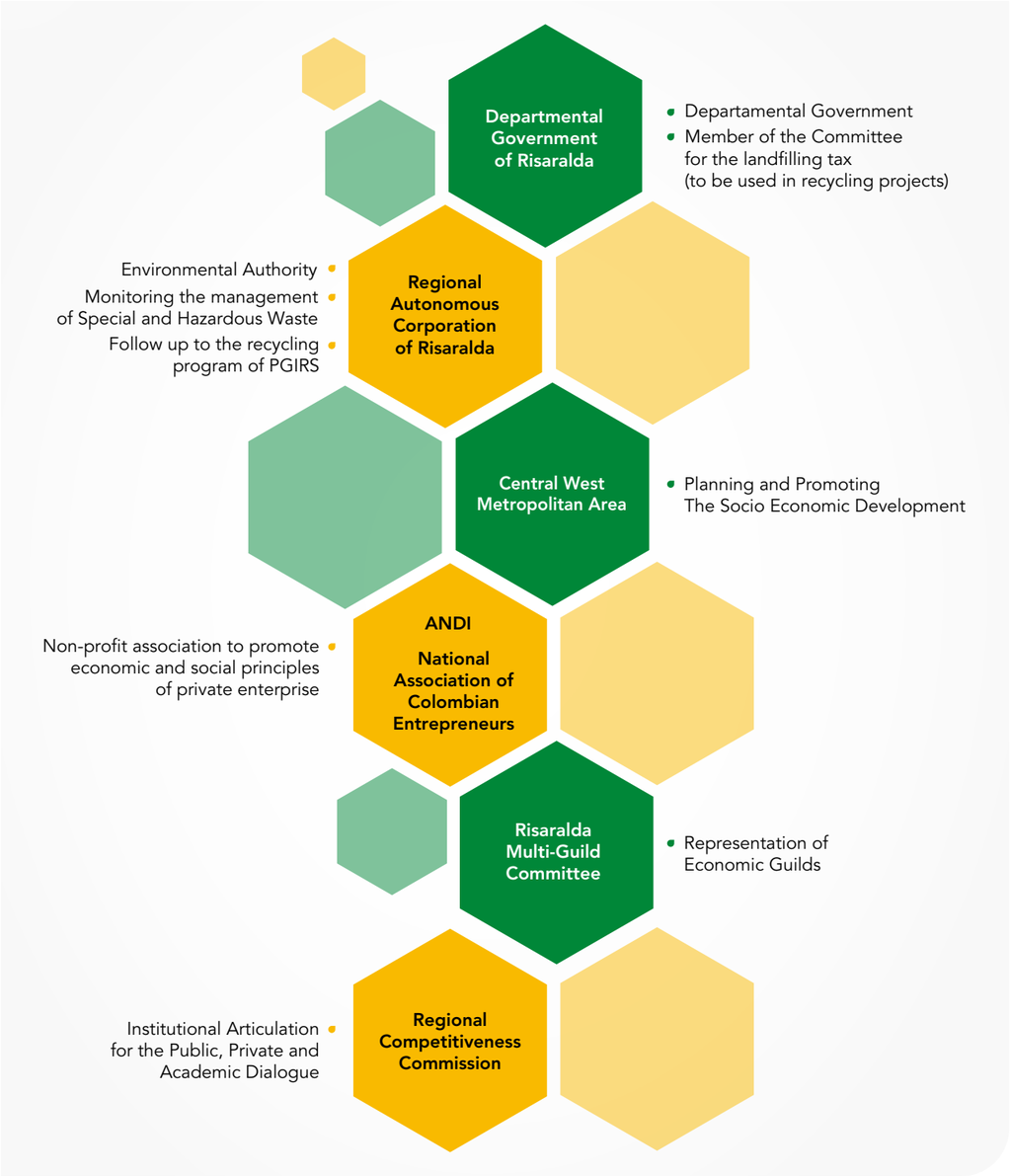


Image 4 **Collecting recyclable waste in rural Pereira.**
Source: DEALS Pereira photo archive, 2017 – 2022.

3.4 Financing waste management and street cleaning

Figure 9 shows the financial flows for the city's waste management (see Appendix 3 for a description of the flows shown in Figure 9). Waste management (materials – Figure 4 and Figure 5) is financed in various ways, using both regulated and unregulated mechanisms. In general, financial flows follow the flow of materials, whether (i) in the form of payments for waste management (e.g. bills sent to citizens for waste collection, and other SPA activities carried out by ESPs – Flow 1 in Figure 9), or (ii) the purchase of waste (e.g. sorting and recycling done by junk yards and informal recyclers – Flow 12 in Figure 9). This document focuses mainly on regulated flows.

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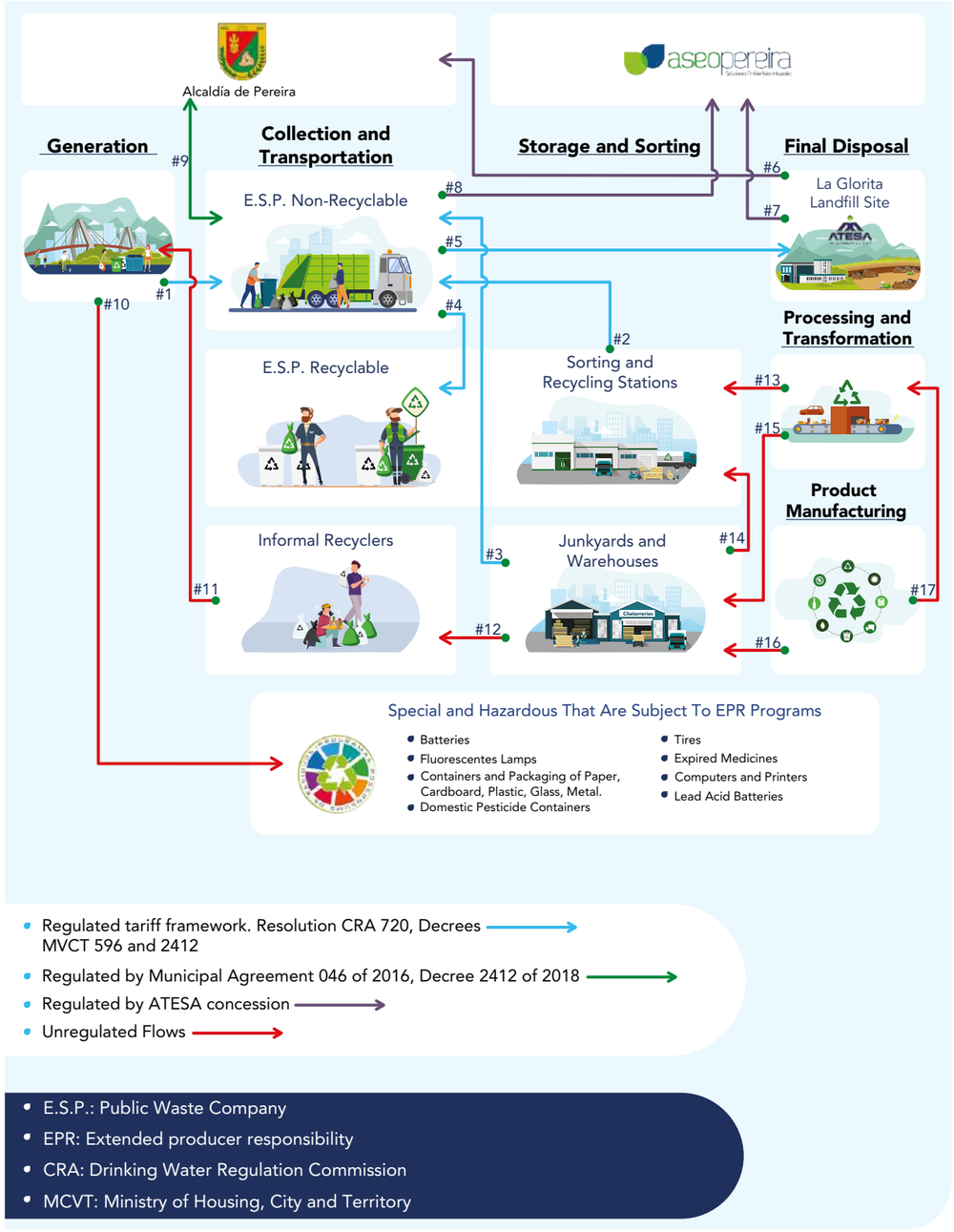
Figure 9 **Financial flows for integrated solid waste management in Pereira.**
Source: Compiled by authors.



Some financial flows between actors are not payments for services associated with the physical transfer of waste. These are (i) municipal administration subsidies for waste management (Flow 9 in Figure 9), or (ii) payments for outsourced services (Flows 6, 7 and 8 in Figure 9).

Flow 6 in Figure 9 corresponds to payments by the landfill operator to the municipal administration for use of the landfill by 26 other municipalities. Flows 7 and 8 in Figure 9 corresponds to payment for transfer of the SPA service from the Pereira Waste Company to ATESA de Occidente. The amount is in proportion to the amount raised by the waste tariff.

3.4.1 Tariffs

The full cost of managing ordinary waste within the framework of the SPA is charged to service users by the ESPs (Flows 1, 2 and 3 in Figure 9). Tariffs are regulated by the Drinking Water Regulatory Commission (CRA)[16] using a price

16 In municipalities with more than 5,000 urban service users, which includes Pereira, the price methodology is defined in CRA Resolution 720 of 2015

cap methodology that sets the maximum price that public service providers are allowed to charge for each SPA activity (Figure 10). In addition, tariffs can vary according to the socioeconomic position[17] of service users. There are six bands of residential users and three groups of users – industrial, official and commercial.

Bands 1 to 3 receive subsidies while those in bands 5 and 6 as well as industrial and commercial users make a financial contribution to the waste service. Band 4 and official users pay the real cost of the waste service, that is, they receive no subsidy nor do they pay a contribution[18].

National and/or municipal funds can be used to subsidize waste services to the poorest socioeconomic sectors if necessary. In 2019, Pereira paid COP 11,027,732,603 in the form of subsidies (5) (Flow 9 in Figure 9).

The tariff comprises fixed and variable costs (Figure 10). The fixed charge comprises operational costs[19] and all activities involved in cleaning urban public spaces. The costs are shared by all users. The variable cost is directly related to the quantity of ordinary waste generated by users and aims to finance waste collection, transport, transfer, recycling, processing, disposal in landfill and treatment of leachates[20] (10).

The pricing methodology does not have a differentiated cost structure for recycling, so the cost of recycling (item 7 - VBA in Figure 10) will be the same as for the collection, transport and disposal in landfill of non-recyclable or mixed waste that goes to landfill (items 4 and 5 in Figure 10).

The recycling tariff is collected by the ESPs that handle non-recyclable waste and passed on to the recyclers' organizations or to the private recycling ESPs (Flow 4 in Figure 9).

The work of the recyclers is remunerated via a recycling organization in the process of formalization. The amount is proportional to the number of tonnes recycled.

Recycling ESPs pay a tariff to the ESPs that are responsible for non-recyclable waste for handling waste rejected at the Sorting and Recycling Centres (ECAs) (Flow 2 in Figure 9).

17 The socioeconomic banding system classifies households on the basis of their ability to pay as indicated by the value of their homes, using the physical condition of the building as an indicator of the "financial capacity" of users (22)(23).

18 Subsidies and contributions are set by the municipal council. In the case of Pereira, this is in accordance with Municipal Agreement 46 of 2016: bands 1, 2 and 3 receive a 69.2%, 38.4% and 12.7% subsidy respectively; bands 5 and 6 and the commercial sector make contributions of 58.7%, 69.3%, 58.7% and 32% respectively.

19 The aim is to cover administrative activities costs such as invoicing and collection of tariffs (24).

20 Transfer and processing are not carried out in Pereira.

Figure 10 Tariff structure for public waste in Colombia.
Source: Adapted from CRA Resolution 720 of 2015.

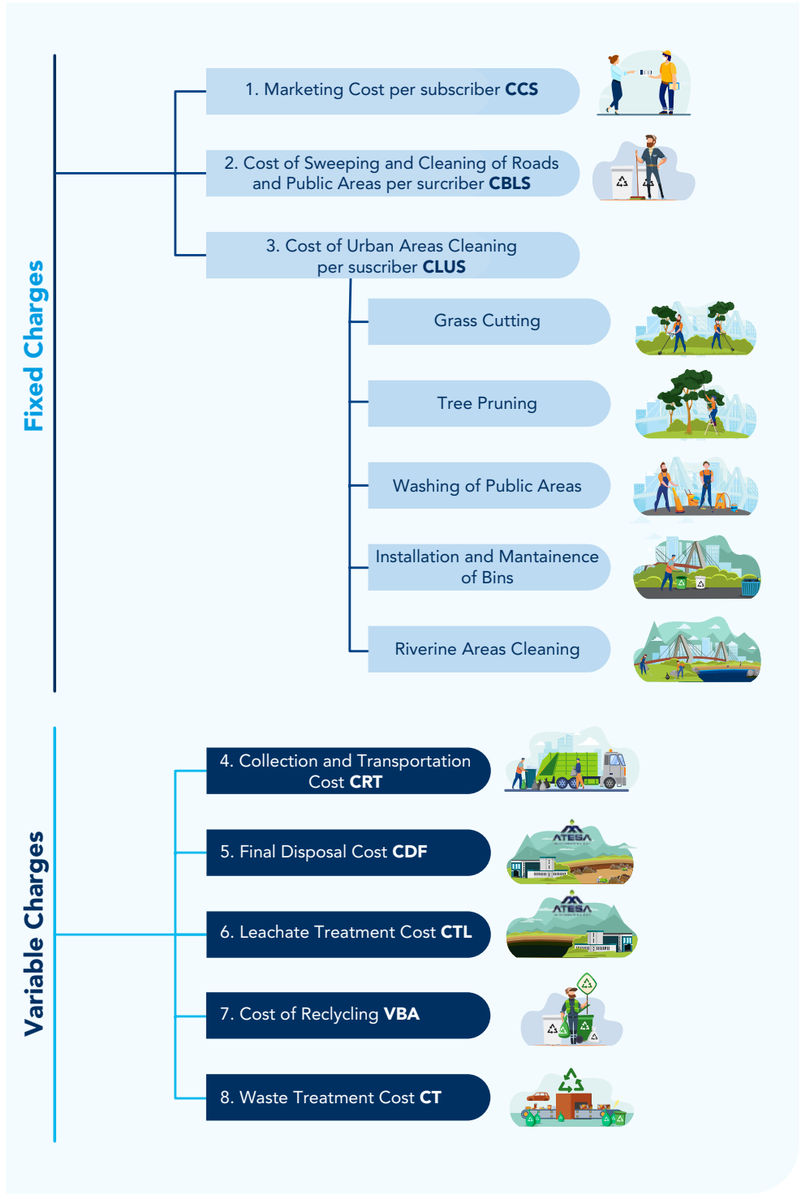


Image 5 Recyclers in Pereira.
Source: DEALS Pereira photo archive, 2017 – 2022.

In addition, in 2018, a charge called the Solid Waste Recycling and Treatment Incentive (IAT) began to be made for waste services. This surcharge is paid by all public waste service users in proportion to the tonnes of solid waste sent to landfill (11). These resources are allocated to projects that promote the recycling and treatment of waste and reduce the amount of waste sent to landfill. The use of IAT resources for funding projects in Pereira had not yet started by the end of 2021.

3.4.2 Average cost of collection, disposal in landfill and recycling

In accordance with the tariff capped pricing methodology, the cost of waste service activities can vary between ESPs handling non-recyclable waste, but cannot exceed the price cap. Figure 11 presents the maximum and minimum costs invoiced in Pereira for the collection, transport and disposal in landfill of one tonne of solid waste in the period 2018-2021.

Figure 11 **Maximum and minimum cost of the collection, transport and disposal in landfill per tonne of solid waste in Pereira, 2018-2021 (COP).**
Source: Compiled by authors using data provided by SUI.

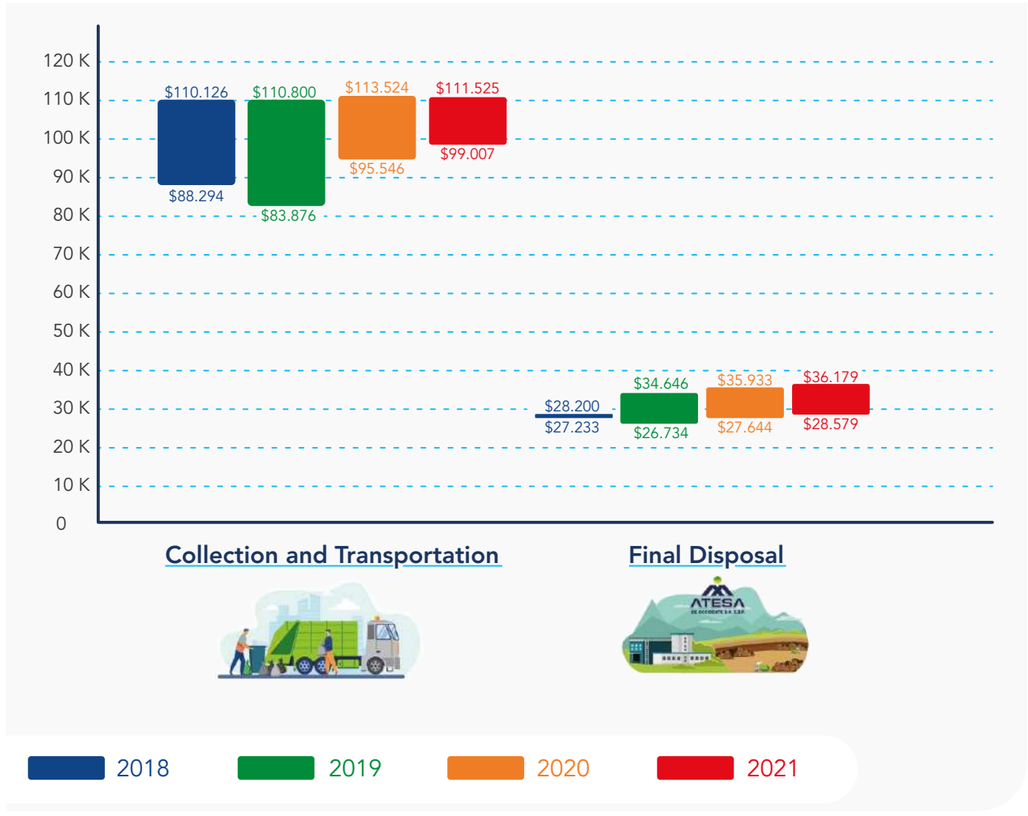


Image 6 **Street cleaning, part of the public waste service.**
Source: DEALS Pereira photo archive, 2017 – 2022.

3.4.3 Financing the Extended Producer Responsibility programmes

The costs of managing special waste as part of the REP programmes is covered by industry, but ultimately transferred to users via the initial product purchase value, that is, users pay in advance for the waste management. This system was devised as an alternative for effective management of REP waste (Flow 10 in Figure 9).

3.4.4 Unregulated financial flows

Data on informal recycling is not available, but ordinary and special recyclable waste is sold by users (Flow 11 in Figure 9) and informal recyclers (Flow 12 in Figure 9) via junk yards and stores. There is no financial information available about the final part of the recycling chain, which is a market for materials that is not regulated by the country's commercial rules.

3.5 Conflicts of interest

National law requires the municipality of Pereira to invite tenders from private companies and recycling organizations in the process of formalization for the provision of all public waste services. It assumes that public waste services may overlap, which may result in the replacement of recyclers.

There us unequal access to information and financial resources between recycling organizations and private ESPs dealing with non-recyclables. ESPs dealing with recyclables and non-recyclables are required to form a committee to reconcile accounts in order to ensure the transfer of funds for recycling that are invoiced for by ESPs dealing with non-recyclables on behalf of recycling organizations (Flow 4 in Figure 9). There are problems with the transfer of these funds and this interferes with the process of formalization of recycling organizations (see Appendix 1), hinders progress in implementation of their corporate development plans as well as their administrative and operational expenditure.

Colombia's tariff methodology does not take into account the specific costs of collection, transport (non-crushed), sorting, weighing and storage of recyclable waste; a process that would make it possible to measure the cost of waste. In general, the current tariff structure gives prevalence to the disposal in landfill of waste rather than recycling, which generates an imbalance between the ESPs responsible for non-recyclable waste and those dealing with recyclable waste.

At the municipal level, Pereira faces the challenge of finding solutions for the disposal in landfill of waste, given that the "La Glorita" landfill site will be full by 2028. This site belongs to Pereira municipality but serves the region, receiving waste from 26 other municipalities in the departments of Risaralda (13), Norte del Valle (10) and Caldas (3), (5).

Image 7 Three-wheeled vehicles for the collection of recyclable waste, Punto Verde (recycling organization).
Source: DEALS Pereira photo archive, 2017 – 2022.

4 Waste indicators

4.1 Technical indicators: generation, disposal in landfill and recycling

In 2019, it was estimated that daily generation of solid waste per capita was 0.99 kg; an increase of approximately 2% compared with 2018 when it was 0.97 kg.

Figure 12 shows the generation, disposal in landfill and recycling of municipal solid waste in the period 2018-2021. Approximately 455 tonnes/day of waste were generated in 2018 compared to 495 tonnes/day in 2021 (5), an increase of 8.7%.

Figure 12 also shows an increase in recycling rates, which increased by about 600% in the last four years, from 0.28% in 2018 to 1.8% in 2021.

Figure 12 Generation, disposal in landfill and recycling of solid waste in Pereira.
Source: Compiled by authors using data provided by SUI.

Daily Tonnes

	Waste Production	Final Disposal	Recycling
2018	454,1	452,8	1,3
2019	468,3	465,2	3,1
2020	501,3	495,2	6,1
2021	502,8	493,7	9,1

Percentage

	Waste Production	Final Disposal	Recycling
2018	100%	99,7%	0,3%
2019	100%	99,3%	0,7%
2020	100%	98,8%	1,2%
2021	100%	98,2%	1,8%

This does not include August recycling from one of the recyclers' organizations because validation by the Public Utilities Superintendency is still pending.

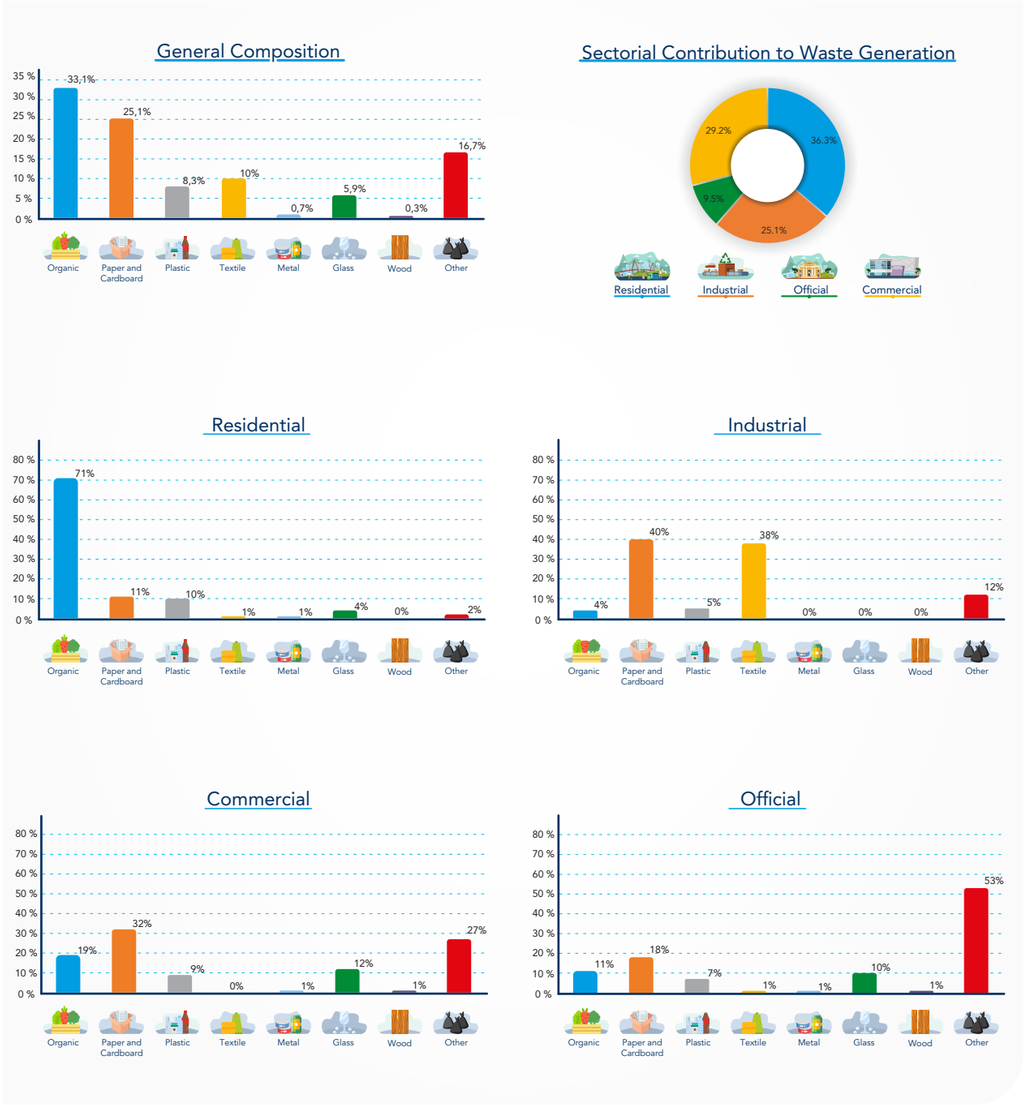
Image 8 Sorting waste, FUNDAMBIENTA (recycling organization).
Source: DEALS Pereira photo archive, 2017 – 2022.

4.1.1 Composition of ordinary waste by sector

Two studies (2) have analyzed the composition of the municipality's waste. The most important and recent for the urban area dates from 2014 and calculated a per capita waste generation of 0.88 kg/day (12). Figure 13 shows the amount of waste by sector (household, commercial, industrial and official). Composition of waste by type was as follows: organic (33.1%), paper and cardboard (25%), plastics (8.3%) and glass (5.9%) (12).

Figure 13 Composition of solid waste, Pereira, 2014.

Source: Caracterización de residuos sólidos del municipio, 2014.



In 2014, the sector generating the most waste was the household sector (36.3%). In this sector, 71% of waste was organic[21] (12). In contrast, the proportion of organic waste generated by the other sectors was less than 20%.

Commerce was the second-highest generator of waste. In this sector, 93% of waste was generated from large shopping centres. The official sector was the sector that generated the least waste.

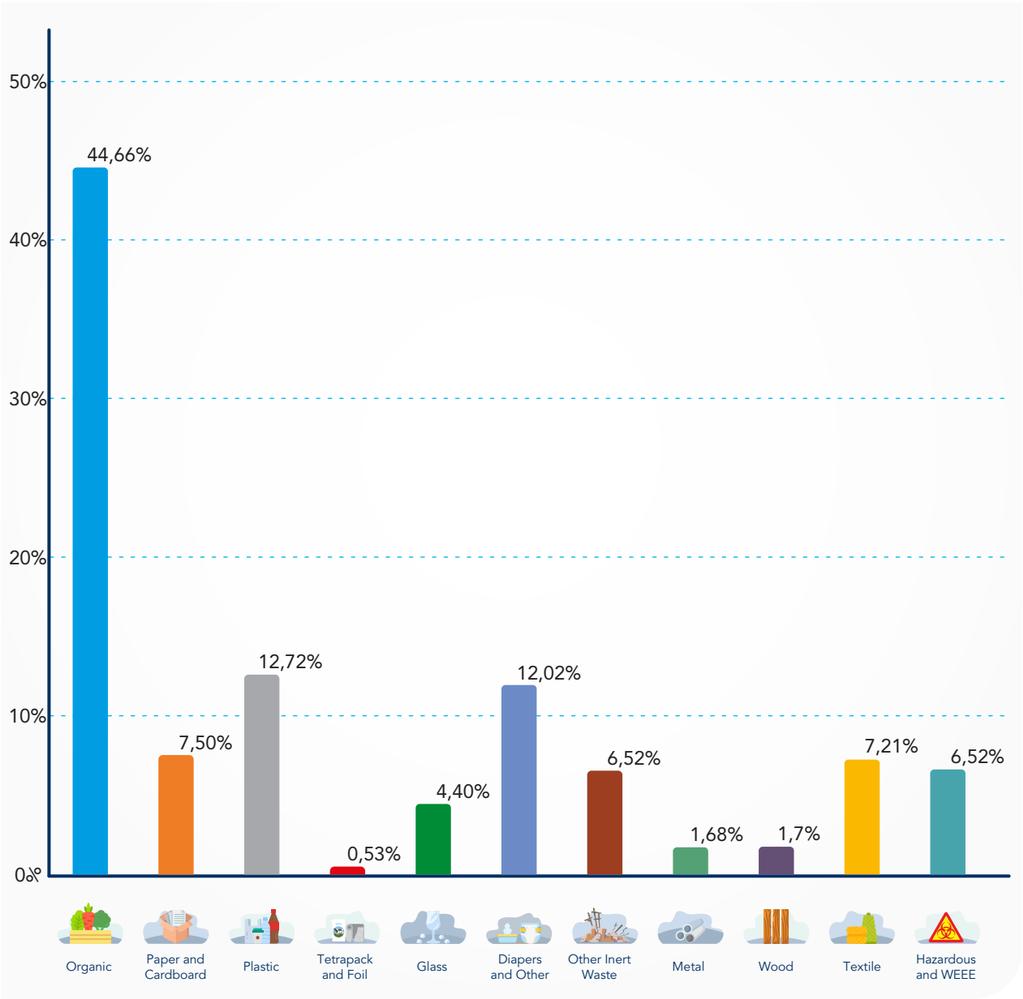
Image 9 Sorting waste at a Sorting and Recycling Centre.

Source: DEALS Pereira photo archive, 2017 – 2022

21 Organic Waste Management. Pereira does not collect organic waste separately. It is sent to landfill without any kind of processing.

The second study, conducted in 2020, looked at waste generated in the municipality's rural areas (Figure 14). The data showed that the largest percentage of waste by type was organic (44.6%), followed by plastics (12%) and paper (8%). The average per capita waste generated by the rural sector was estimated at 0.33 kg/day.

Figure 14 **Composition of solid waste in rural Pereira, 2020.**
Source: CEMPRE 2020.



4.1.2 Collection coverage and service user numbers

In December 2020, Pereira had four handling non-recyclables, three private companies handling recyclables and six recycling organizations in the process of formalization (Figure 16). The latter category employed about 300 people in 2020 (13). Chapter 6 provides more information on recyclers.

With regard to non-recyclable ordinary mixed waste, the municipality had 181,100 SPA service users in 2019 and 100% coverage of the urban area (5), a 20.6% increase compared to 2014. The service provider with the largest number of users is ATESA de Occidente (Figure 15).

With regard to recycling, the city has 75 recyclable waste collection routes, which cover 15.86% of users (5), which means that 153,00 SPA users do not have a recyclable waste collection.

The sectoral and income-band distribution of users in 2014 (Figure 17), the last year for which information is available, shows that households were the largest number of users (89.1%).

Figure 15 Service users by non-recyclable waste company, 2019.
Source: Monitoring of PGIRS 2019.

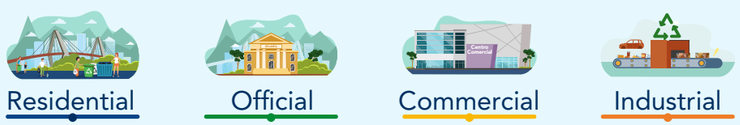
Waste Company	Users' percentage
ATESA DE OCCIDENTE S.A. E.S.P.	90,73%
Aseo Plus	7,86%
E.S.P. TRIBUNALES CORCEGA	1,23%
AcuAseo	0,18%

Figure 16 Recyclable waste companies' market share, 2019.
Source: Monitoring of PGIRS 2019.

	Waste Company	Number of Users	Users' Percentage	Recycling Percentage
Recyclers' Organisations in Formalization	Red Recicladores	7.069	27,7	25,72
	Infinity Recycle	2.800	9,7	12,43
	Fimaus	1.031	3,5	7,51
		2.781	9,6	20,55
		507	1,7	4,01
Private Waste Companies	ATESA DE OCCIDENTE S.A. E.S.P.	13.601	47,3	10,62
	Vita Planet S.A.S. E.S.P.	41	0,1	18,17
	ekaplas	Witouth Reporting		18,17
Total		28.730	100%	100%

Figure 17 **Distribution of public waste service users by sector and income band, 2014.** Source: Monitoring of PGIRS 2019.

Social Estrata / Sector		Number of Users'	Users' Percentage
ESTRATOS	1	20.982	14,6%
	2	40.912	28,5%
	3	24.040	16,8%
	4	20.186	14,1%
	5	13.032	9,1%
	6	8.583	6,0%
Official		962	0,7%
Commercial		14.001	9,8%
Industrial		787	0,4%



4.3.1 Recycling

There was a tendency for an increase in the volume of waste recycled in the period 2018-2021 (Figure 12). The volume of waste recycled in the city increased from 1.3 tonnes to 9.1 tonnes per day in this period.

In this same period, the recycling organizations REDCICLADORES and FUNDAMBIENTA achieved a higher recycling rate than all the other ESPs (Figure 18), although reports provided by the organizations are asymmetrical and figures vary from month to month. Figure 18 also shows that EMAUS[22] submitted reports until December 2019; during 2020, it submitted joint reports with Infinity Recicle.

ESPs use nine sorting and recycling centres (ECAs) to process recyclable waste, all registered at the Household Public Service Superintendence (SSPD). Six ECAs are located in Pereira – five owned by recycling organizations and one by a private ESP. The three other ECAs are in the neighbouring municipality of Dosquebradas – one owned by a recycling and two by private ESPs. The municipality has identified 106 recycling stores in the city: 84 small ones (< 150 m2), 17 medium-sized (150-999 m2) and five large (> 1000 m2) (14). Most of these are outside the SPA and are operated by junk yards or storekeepers in the informal sector.

22 In 2021, EMAUS cancelled its registration with the Service Providers Registry (RUPS) and, in 2022, began providing recycling services under the name of Alianza Aprovechamiento Inclusivo Centro Occidente.

Image 10 Sorting recyclable waste at a Sorting and Recycling Centre.

Source: DEALS Pereira photo archive, 2017 – 2022.

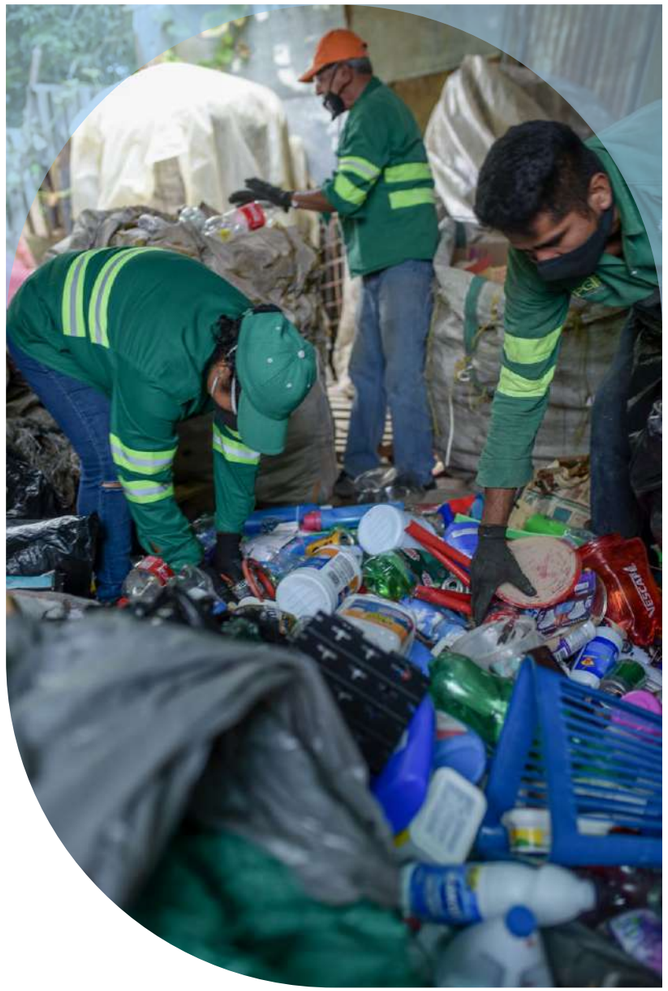
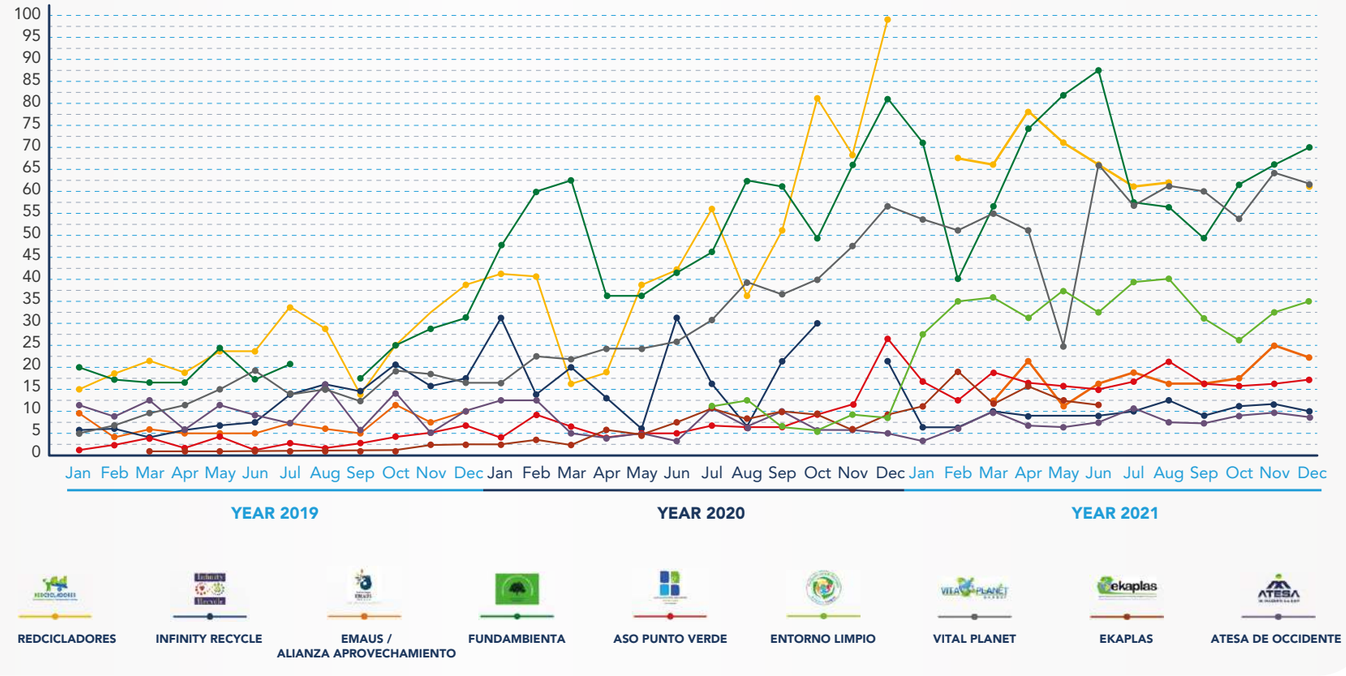


Figure 18 Recycling reports to SUI by recycling organizations (tonnes / month), 2019-2021.

Source: Adapted using data provided by SUI, 2021.



4.1.4 Composition of recycled waste

We do not have figures for the composition of waste recycled as part of the SPA. However, we have figures for 2019 for the composition at each of the ECAs run by recycling organizations in the process of formalization (Figure 19) (15). There is no equivalent data available at the ECAs run by the private ESPs.

Image 11 **Recycler working for REDCICLADORES. Sorting waste in the street.**
Source: DEALS Pereira photo archive, 2017 – 2022.

Figure 19 shows that the most commonly recycled materials are cardboard, followed by plastics. Variations in the composition of recycled waste between organizations may be linked to the source of the waste (household, commercial, official and industrial), the number of collection routes in each sector and the operational capacity of the organizations.

Figure 19 **Composition of recycled waste at the ECAs owned by recycling organizations, 2019.** Source: Informe Convenio 5059 CEMPRE – Pereira, 2019 (17).

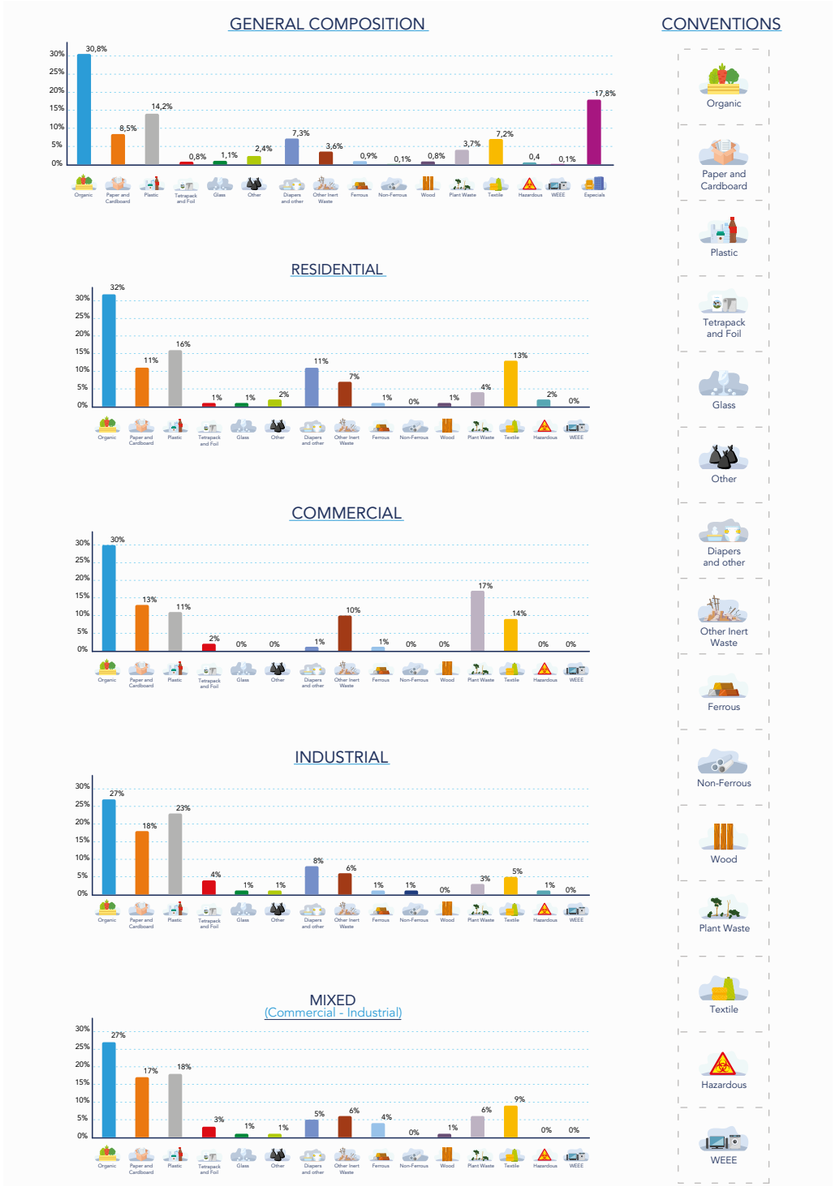
Image 12 **Crushing cardboard.** Source: DEALS Pereira photo archive, 2017 – 2022.

4.1.5 Landfill

In 2019, Pereira sent about 170,000[23] tonnes of waste to the La Glorita landfill site, an increase of 3.07% compared to 2018 (5). Organic waste was the largest component (30.8%), followed by special waste[24] (17.8%), plastics (14.2%), paper and carboard (8.5%) (Figure 20) (16).

23 This represents 53.8% of the waste sent to this landfill site by the region.
24 Special Waste is non-ordinary waste and may be high-volume e.g. mattresses and furniture.

Figure 20 **Composition of solid waste sent to landfill by Pereira in 2019.**
Source: Adapted from Caracterización de Residuos en Relleno Sanitario La Glorita, 2019.



La Glorita is the only landfill site available to the municipality for the disposal of ordinary waste. The site is projected to be full by 2028 and no alternative site has yet been identified.

Image 13 **Operations at La Glorita landfill, Pereira.**
Source: Pereira Waste Company, 2019.

4.2 Socioeconomic indicators

In 2018, the municipality's population was 467,269, of which 385,838 (82.6%) lived in the urban area and 81,431 (17.4%) in the rural area (17). The male population was 47.1%, so there were 89.1 men to every 100 women. The population was expected to rise to 480,803 in 2021, with a slight increase in the urban percentage of the population (84.1%) (4).

Image 14 **Operations at La Glorita landfill, Pereira, 2019.**
Source: DEALS Pereira photo archive, 2017 – 2022.

The GINI coefficient of income inequality for Colombia was 0.51 in 2018, one of the highest in the region. In the same year, Pereira was one of the country's cities with a lower GINI (0.416 (18). The illiteracy rate in Pereira's urban area was 5.4%, close to the national average of 5.24% in 2017.

The National Statistics Department (DANE) estimated that 99.4% of homes in Colombia in municipal capitals had access to water in 2018 (18). There is no data available for Pereira.

The extreme poverty threshold in Colombia in 2018 was COP 117,605 per month and the national poverty threshold in the same year was COP 257,433. The percentage of the population with per capita incomes between $0 and $117,605 was 7.2% and the percentage with per capita income between $0 and $257,433 was 27% (17).

5 Land use and waste management planning

Pereira has three planning and land use instruments relevant to waste management:

1. The Integrated Solid Waste Management Plan (PGIRS), which covers the period 2015-2027, and which was described in Chapter 2;
2. The Land Use Plan (POT), updated in 2016 and covering the period 2016 – 2027;
3. The Municipal Development Plan (PMD) produced by the mayor for a four-year period. The current plan covers the period 2020-2023.

The PMD must include PGIRS programmes and projects in order to guarantee the allocation of resources required for implementation. The current plan has the following objectives::

- Ensure the provision of a quality public waste service and maintain service coverage;
- Promote sorting of waste at source and increase the recycling rate;
- Recover critical points ;
- Implement a minimum waste programme for the vulnerable population (bands 1 and 2);
- Monitor and update the PGIRS;
- Take action to develop the circular economy model.

The municipality's current POT approaches solid waste management as a public service (SPA), which applies exclusively to ordinary waste, whether recyclable or not. It does not cover any other type of waste, such as special, construction and demolition, hazardous, biosolid or all waste water and leachate treatment plants.

In 2020, the VNG International DEALS cooperation programme funded an assessment of the POT's waste component. The assessment concluded that it still needs infrastructure, buildings and furniture for recycling, treatment, co-processing and reuse of ordinary, special and hazardous waste. The assessment stated that "*The POT lacks maps and geographical information about the infrastructure required for integrated solid waste management, and about potential sites for installations in accordance with land use legislation, such as operational centres, storage and locker rooms, ECAs, treatment plants, transfer centres, areas that are difficult to manage, disposal in landfill sites, sites for the management of hazardous waste and sites for recycling solid household waste.*"

With regard to land use planning, the municipality has yet to deal with the management of risk and climate change associated with waste management. The current approach to risk management is limited to contingency plans for the provision of public waste services.

A new challenge that the municipality must deal with is consideration of the soil requirements for the management of biosolids generated by the Waste Water Treatment Plant (PTAR) that is under construction in the city and which is due to begin operating in the first half of 2026.

6 Formalization of recyclers and the promotion of recycling

In 2016, Ministry of Housing, City and Territory Decree 596 introduced regulations for the recycling of solid waste in Colombia as part of the Public Waste Service (SPA). This decree also devised a transitional regime for the formalization of the employment status of the country's recyclers. It seeks to recognize and dignify the work done by recyclers operating in the informal economy, promote their participation in creating public waste service companies and pay them via the waste service tariff.

During this transitional regime, these recycling organizations will have a period of eight years[25] to comply with all the administrative, commercial, financial and technical obligations incumbent on any public waste service provider (see Appendix 1).

Municipal administrations must include in their PGIRS a "Recyclers Inclusion" programme that includes affirmative action[26] to build the technical, operational, administrative, commercial and financial capacities necessary to promote their formalization (8).

Image 15 **Tying and stacking cardboard.**
Source: DEALS Pereira photo archive, 2017 – 2022.

25 Initially, Decree 569 of 2016, established a period of five years for formalization (5). Decree 1345 of 2021 extended this period to eight years.

26 Affirmative action includes all measures or policies designed to help certain people or groups, with the aim of eliminating or reducing the social, cultural or economic inequalities that affect them or to help the members of an under-represented group, usually a group that has been discriminated against, to gain greater representation, with the aim of achieving greater substantive equality.

6.1 The DEALS programme: international cooperation to aid recyclers

As part of this process of formalization, VNG International's DEALS[27] programme "Governance of Green and Inclusive Growth in Cities", has been cooperating with Pereira's Mayor's Office in the period 2018-2022, to help achieve innovative governance and management of solid waste, paying special attention to the formalization and strengthening of the city's recycling organizations, which collect, sort and recycle solid waste.

The DEALS programme, which aims to promote multi-stakeholder, multi-level cooperation, has helped Pereira's Mayor's Office to identify allies, connect stakeholders and produce and disseminate information that promote integrated and inclusive waste management in the city, via the following measures:

1. Technical assistance through the consolidation of the public-private partnership between CEMPRE[28] Colombia and Pereira's Mayor's Office between 2019 and 2021. This has involved developing recycling organizations in the process of formalization and organizing public education campaigns.

   Development included the provision of personal protective equipment, office equipment (computers, printers, projectors), equipment for the sorting and recycling centres (e.g. weighing and signage) and human-powered vehicles (three-wheeled vehicles and carts). At the administrative level, the programme built the technical, administrative and financial capacities of the organizations in accordance with their corporate development plans and service provision programmes.

27 The DEALS programme seeks to improve the performance of local governments in cities undergoing rapid growth and in transition towards inclusive and sustainable development. DEALS promotes new forms of cooperation between government, companies, social organizations and academic and funding institutions.

28 CEMPRE: Company Recycling Agreement, non-profit making association to promote the generation and transfer of knowledge and the circular economy in the public and private sectors.

2. Provision of advice and support for the development of the public education campaign "Intelligent Citizens Sort at Source", implemented by the municipality in alliance with CEMPRE. The campaign encourages citizens to sort waste at source into recyclable and non-recyclable waste and hand over the recyclable waste to recycling organizations, raising the profile and improving the status of recyclers.

   The public education campaign involved theatre, radio spots, advertising on the integrated transport system, with maps of the recycling routes and a webpage on the PGIRS website[29]. A "where to recycle" app[30] shows the location of ECAs and sites for returning unwanted special waste.

3. Technical assistance for "Ecobarrios" recycling contest led by the Empresa de Aseo de Pereira, which aims to increase recycling rates and coverage of residential users by recycler organizations, as well as increase the loyalty of users to recycler organizations.

All these efforts have improved recyclers' working conditions, increased the quantities of waste recycled (Figure 18) and increased the municipality's recycling rate (Figure 12).

DEALS has also provided technical assistance to the Mayor's Office to update the solid waste component of the Land Management Plan (POT), develop the methodology for implementation of the minimum vital cleaning program of the Municipal Development Plan (PMD), and prepare the municipality for implementation of the Recycling and Treatment Incentive (IAT).

The impact that these last activities may have on the rates of inclusion and formalization of recyclers, as well as on the recycling rates of the city, will be observed in the medium and long term, mainly as reflected in the IAT.

Image 16 **"The City of the 3 Rs", by Paso de Pereira theatre company.**
Source: DEALS Pereira photo archive, 2017 – 2022.

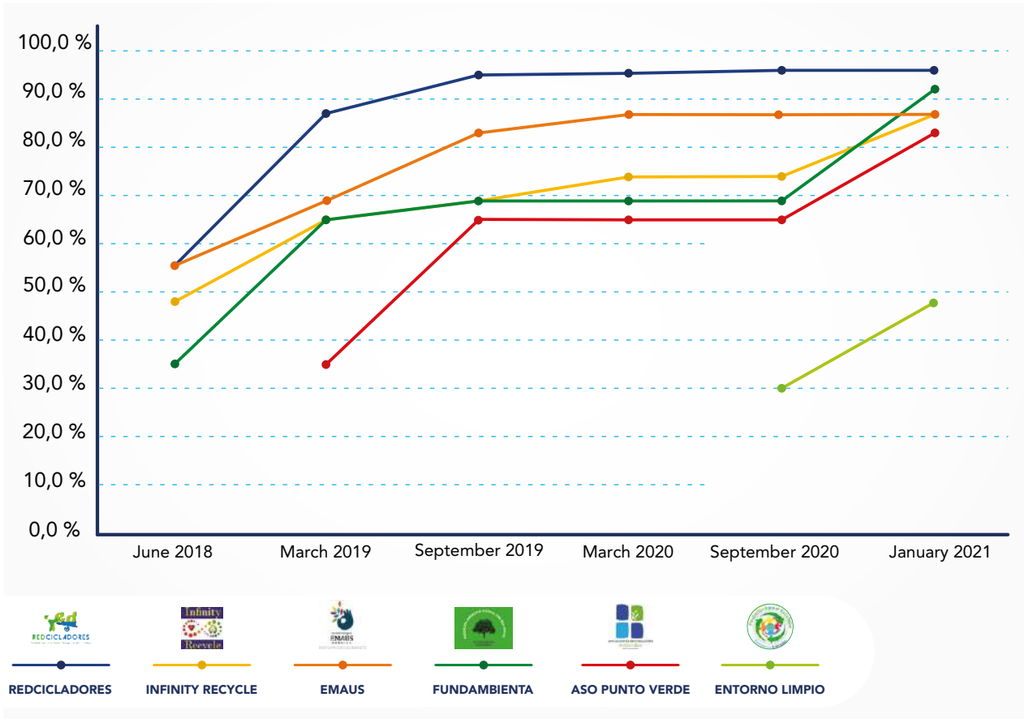
29 www.pgirspereira.com
30 www.dondereciclo.com

6.2 Progress in the formalization of waste picker organizations

As of December 2020, the six recycling organizations in the formalization process showed different degrees of progress[31]. Figure 21 presents their progress in meeting the formalization requirements between June 2018 and January 2021.

Despite the evident progress in meeting the formalization requirements and building capacity, recyclers' organizations still need strengthening in certain areas: (i) technical – for the efficient provision of the public recycling service, clearly reflected in the lack of adequate and sufficient infrastructure, equipment and vehicles; (ii) financial – to achieve adequate cash flow and economies of scale; (iii) administrative – to eliminate asymmetries in the account reconciliation processes; and (iv) social – to improve the quality of life of recyclers - education, access to health services and decent, adequate housing.

Figure 21 Progress in the formalization of recycling organizations in Pereira.
Source: Monitoring of Formalization. VNG, 2020.



31 The method used to calculate progress is described in Appendix I.

6.3 The recycling workforce

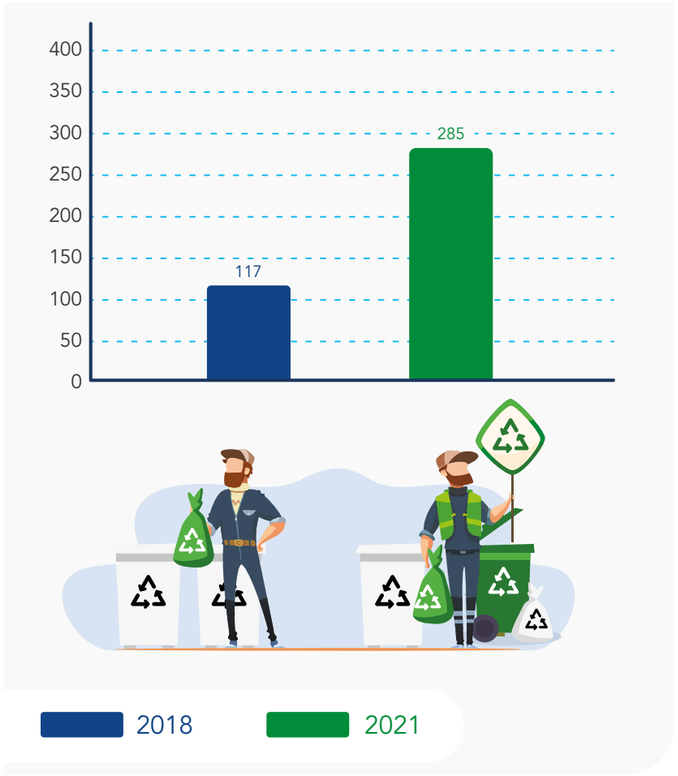
The municipalities of Colombia are required to conduct and update a census of their recycler population, as well as to identify and register it (8). Demographic, economic and social data are obtained from the census that allows the local government to develop adequate affirmative actions.

Pereira carried out a census update in 2018, which registered 1,333 people. Of these, 117 (Figure 22) were registered as recyclers working for organizations in the process of formalization, 519 belonged to informal recycling organizations such as stores and junkyards, and 697 were connected in some way to the recycling chain.

At the end of 2020, the municipality of Pereira, with the cooperation of the DEALS Program, produced a profile of the recycling population[32] working for the six recycling organizations in the process of formalization. A total of 297 people were registered as recyclers; of these, 285 (Figure 22) people met the criteria set out in Colombian regulations for classification as a professional recycler. The 2020 study found that that 73% of the recyclers were men and 27% were women.

In the first half of 2021, the National Administrative Department of Statistics (DANE) and the Secretary of Social Development of the Pereira Mayor's Office carried out a census of the city's homeless population. This exercise identified 98 people who stated that they carry out activities related to the collection, sorting and sale of recyclable waste in a completely informal manner.

Figure 22 Number of recyclers in the process of formalization.
Source: Compiled by authors.



In addition, in 2020 and 2021, the DEALS Program helped with the registration of recyclers and the administrative and technical staff of the municipality's organizations; a total of 460 people were registered.

32 The study looked at six recycling organizations, one private recycling ESP and recyclers working on sorting at a commercial centre.

7 Conclusions and Recommendations

- The total volume of waste generated by Pereira and the per capita amount have been gradually increasing in recent years. Economic growth has been accompanied by an increase in the consumption and disposal of materials. As of 2021, approximately 500 tonnes of waste were generated daily in the city; and although there is no specific monitoring, it is considered that waste collection covers 100% of the population.

- In 2019, it was estimated that daily generation of waste in the urban area was 0.99 kg/person/day, while for the rural area the figure was 0.33 kg/person/day. Waste comprises 33% organic material and 50% recyclable material. Households are responsible for 36.3% of waste. Most waste is generated at places of work, study or recreation.

- The municipality's recycling rate has increased gradually in recent years, from 0.3% in 2018 to 1.8% in 2021. Despite this increase, recycling is still low when compared to the potential or the amount of ordinary waste recycled – 50%. This means that almost all of the city's waste goes to landfill and is therefore lost. In other words, a linear consumption and disposal model predominates over a circular one.

- Recycling in the city is carried out primarily by recyclers' organizations that are in the process of formalization as public service companies. These organizations employed about 300 recyclers in 2021. There is also informal recycling in the city, but there are no statistics regarding this activity.

- In Pereira, there are six organizations in the process of formalization. This process began in Colombia in 2016 when the Ministry of Housing, City and Territory issued Decree 596, which established the requirements and a five-year (now eight years) transitional period for organizations to become public waste service companies. Formalization means that recyclers are paid - via the waste service tariff - for the collection and sorting of recyclable waste. This payment is in addition to the recyclers' income from the sale of recyclable material.

- The physical management of ordinary solid waste in Colombia is carried out by the public waste service, which is highly regulated, both with regard to its activities and in the charges made for financing the system. Waste service users pay a monthly fee that is set according to the average number of tonnes generated. By 2021, the cost of collecting and transporting a tonne of waste was around COP 100,000. The cost of disposal in landfill of one tonne averaged COP 32,000. The cost of recycling one tonne of waste is calculated by adding the two previous values, as there is no separate calculation for this activity. This means that recycling must compete, in terms of cost-efficiency, with sending waste to landfill.

- Invoicing and collection of the waste service tariff is carried out by the companies that collect and take the waste to landfill. These companies must transfer the funds gained from recycling to the recycler organizations. This transfer has been subjected to delays and underpayments. This has hindered the recycling organizations' attempts to meet the requirements for formalization and development of recyclers.

- Since 2018, the Solid Waste Recycling and Treatment Incentive (IAT) tariff began to be charged. This surcharge is paid by all public waste service users and allocated to projects that promote the recycling and treatment and recycling of solid waste by recycling ESPs, including recycling organizations. The use of IAT resources for funding projects in Pereira had not yet started by the end of 2021.

- The local government, in association with national actors, such as CEMPRE, and international actors, such as VNG International, through its DEALS cooperation programme, has developed the administrative and technical capacities of recycling organizations during the 2019-2021 period. However, there is still a need to improve infrastructure, vehicles and equipment for the efficient and competitive provision of the recycling service, as well as the working conditions, income and quality of life of the recycling population.

- The governance of waste in Colombia is led by the local government. It must guarantee the provision of an efficient public waste service and municipalities are required to have an Integrated Solid Waste Management Plan (PGIRS) to ensure long-term planning and the coordination of the roles played by the different actors involved. The Pereira plan was formulated for the 2015-2027 period and is currently being updated. A Coordination Group made up of local and regional and public and private actors, including public waste service companies and recycling organizations in the process of formalization supervises the formulation, adoption, modification, updating, implementation, monitoring and follow-up of the plan.

- Other management and development instruments that have an impact on waste management are the Municipal Development Plan (PMD) and the Land-Use Plan (POT). The PMD is formulated by each mayor for a period of four years and must include the PGIRS goals and objectives. The current PMD seeks to increase the volume of recycling in the city, as well as the development of circular economy strategies.

- The POT highlighted shortcomings in certain aspects needed for integrated waste management. Specifically, the plan lacks cartographic representation and information about the existing infrastructure or possible implementation of infrastructure for waste management such as operational centres, storage and locker rooms, recycling and sorting centres, treatment plants, transfer centres, areas that are difficult to manage, disposal in landfill sites, sites for the management of hazardous waste and sites for recycling construction and demolition waste.

- In summary, the municipality faces challenges related to: (i) increase the low recycling rates, (ii) bring informal recyclers into the formal economy and aid their transition to service providers for the Public Waste Service (SPA), (iii) integrate informal and unregulated recycling operations with the official recycling system, (iv) introduce the sorting of waste at source by service users, (v) begin differential management and treatment of organic waste, and (vi) find a new solution for the disposal of non-recyclable waste, given the short useful life of the current landfill site.

Appendix 1: Calculation of progress in the formalization of recycling organizations

$$Progress = \frac{Compliance\ with\ requirements}{Total\ requirements}$$

$$Expected\ progress = \frac{Expected\ requirements\ according\ to\ start\ of\ RUPS\ year}{Total\ requirements}$$

Table 1. Stages in the formalization of recycling organizations

Require-ment #	Stage	Time since RUPS	Requirement
1			RUPS
2	1	Month 0	Date of RUPS Registration
3			Date of RUPS Update
4			Define service provided
5			Registration of tonnes transported
6			Registration of tonnes – service provision area
7	2	Month 1	Registration of tonnes recycled
8			Registration of invoice for sale of recycling materials
9			Registration of sorting and recycling centres (ECAs)
10			Registration of vehicles for transport of materials
11	3	Month 2	Uniform conditions of the public cleaning service (CCU)
12			Service portfolio
13	4	Year 1	Corporate Development Plan
14			User database
15			Web page
16			Registration of calibration of scales
17	5	Year 2	Operational control supervisors and systems
18			Service provision programme
19			Personnel by employment category
20	6	Year 3	Collection microroutes
21			Labour competence certificate
22	7	Year 4	Registration of requests, complaints and appeals (PQR)
23			Emergency and contingency plans
24			Financial information
25	8	Year 5	Map of service provision area using MAGNA-SIRGAS reference system

Source: Decree 596, 2016 (19).

Appendix 2. Summary of Colombian and Pereira solid waste management policies

There are two starting places for discussing Integrated Solid Waste Management in Colombia. First, the Political Constitution of 1991, which provides the environmental vision for the management of waste flows. Second, the national public waste service outlined in Law 142 of 1994. The latter defines the policy, regulates the markets and carries out supervision and monitoring, but the municipalities are responsible for ensuring provision of the service. This makes it a different model from other countries.

The regulations regarding the provision of the public waste service in Colombia are the responsibility of the legislative power and the government is in charge of regulating the laws. Likewise, the national government, through the National Planning Department and the National Council for Economic and Social Policy (CONPES hereinafter) is responsible for formulating public policies in this area (20).

Financial regulation is carried out by special administrative units attached to the ministries[33] of their branch, and they are in charge of issuing financial regulations for each residential public service. The Public Household Services Superintendence is in charge of the inspection, supervision and monitoring of the ESPs (20).

- The National Planning Department (DNP) is the Technical Secretariat of the National Council for Economic and Social Policy (CONPES). This is the highest national planning authority and acts as an advisory body to the government in all aspects of the country's economic and social development. It coordinates and guides the government agencies in charge of economic and social management, through the study and approval of documents on the development of general policies that are presented in session.

- In 2016, the national government formulated a national policy for the integrated management of solid waste through CONPES 3874 (Figure 23). This, complementing and connecting with other policies such as production and sustainable consumption, seeks through integrated solid waste management to contribute to the transition from a linear economic model to a circular one. Among the goals of this policy is to have consolidated, sustainable and inclusive solid waste recycling systems in at least the thirteen main cities of the country, aiming at an increase in sorting at source and a recycling rate of 30% by 2030 (6).

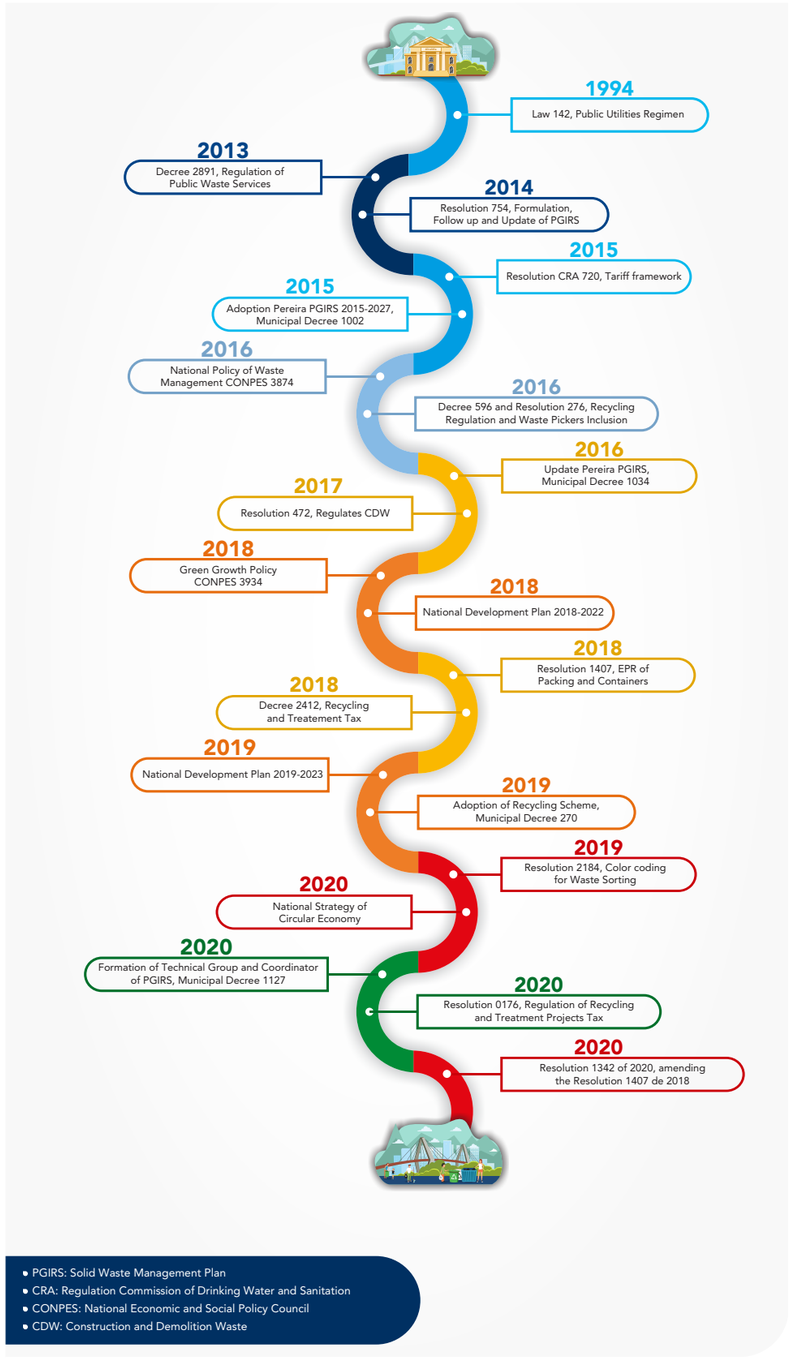
- Waste policy has been developed (see Figure 22) through instruments such as (i) Decree 596 of 2016 (19) on the recycling activity of the public waste service and the transition period for the formalization of recyclers; (ii) the National Circular Economy Strategy (iii) Decree 2412 of 2018 regarding the incentive for recycling and treatment of solid waste; and (iv) regulation of the Extended Producer Responsibility, in 8 flows:
  - Expired medicines (Res. 0371 of 2009)
  - Used fluorescent light bulbs (Res. 1511 of 2010)
  - Used lead acid batteries (Res. 361 of 2011)
  - Domestic pesticide containers (Res. 1675 of 2013)
  - Used batteries (Res 2246 of 2017)
  - Used tyres (Res. 1326 of 2017)
  - Electronic and Electrical Equipment waste (Res. 284 of 2018)
  - Regulation of containers and packaging (Resolution 1407 of 2018 amended by Resolution 1342 of 2020)[34]

33 There is a duality of responsibilities between two ministries regarding the management and governance of solid waste, the Ministry of Environment and Sustainable Development and the Ministry of Housing, City and Territory. The former is responsible for defining the National Environmental Policy and promoting the recovery, conservation, protection, organization, management, use and recycling of renewable natural resources, in order to ensure sustainable development and guarantee the right of all citizens to enjoy and inherit a healthy environment. The second aims to formulate, adopt, direct, coordinate and execute public policy, plans and projects in terms of territorial and urban development, likewise, to regulate the activities of provision of the service of cleaning, recycling, disposal in landfill in landfill and the methodology for the formulation, implementation, evaluation, monitoring, control and updating of the Integrated Solid Waste Management Plans (PGIRS). DECREE 3571 of 2011.

34 The resolution regulates the environmental management of paper, cardboard, plastic, glass and metal containers and packaging waste (cite: resolution 1342, 2020)

In 2019, Resolution 2184 of 2019 regulated the colours to be used to facilitate sorting of waste at source into three categories: organic (green), recyclable (white) and non-recyclable (black).

Figure 23 **Public policies for solid waste management and governance in Colombia and Pereira.** Source: Compiled by authors



- PGIRS: Solid Waste Management Plan
- CRA: Regulation Commission of Drinking Water and Sanitation
- CONPES: National Economic and Social Policy Council
- CDW: Construction and Demolition Waste

Appendix 3. Definition of financial flows

Flow 1 SPA rate that is paid by users to non-recycling ESPs.

Flow 2 SPA rate paid by the ECAs to the non-recycling ESPs for management of rejected waste.

Flow 3 SPA rate paid by junkyards and stores to non-recycling ESPs as commercial users.

Flow 4 transfer of resources by non-recycling ESPs to recycling ESPs, with reference to the Basic Recycling Value.

Flow 5 payment made by the non-recycling ESPs to the landfill operator for the disposal of solid waste in landfill.

Flow 6 transfer of resources by the landfill operator to the Pereira Mayor's Office for landfill regionalization.

Flow 7-8 value transferred (12.1% - 2022) by the concessionaire ATESA to the Empresa de Aseo de Pereira for service contract.

Flow 9 corresponds to the balance of subsidies and contributions, which are payments made in two ways, from the Mayor's Office to the ESP and/or from the ESP to the Mayor's Office.

Flow 10 payments made by citizens for post-consumer REP procedures.

Flow 11 payment made by informal recyclers to users of the public waste service for the purchase of recyclable material.

Flow 12 payment made by junkyards and stores to informal recyclers for the purchase of recyclable materials.

Flow 13 payment made by the processing industry to the ECAs for the purchase of recyclable materials.

Flow 14 payments made by junkyards to recycling ESPs for the purchase of materials. This occurs when recycling organizations do not have the capacity to sell to the industry.

Flow 15 payment made by the industry to junkyards and stores for the purchase of materials.

Flow 16 payment made by manufacturing industry to junkyards and stores for the purchase of recyclable materials.

Flow 17 payment made by manufacturing industry to the materials processing industry.

Acronyms

ANDI	Asociación Nacional de Empresarios de Colombia /National Business Association of Colombia
ANLA	Autoridad Nacional de Licencias Ambientales / National Authority for Environmental Licenses
CAMER	Comité Ambiental Metropolitano de Residuos Peligrosos / Metropolitan Hazardous Waste Environmental Committee
CARDER	Corporación Autónoma Regional del Risaralda / Risaralda Autonomous Regional Corporation
CBLS	Costo de Barrido y Limpieza de Vías y Áreas Publicas / Cost of Cleaning Streets and Public Places
CCS	Costo de Comercialización por Suscriptor / Operational Cost per Service User
CDS	Costo de Disposición Final / Cost of Disposal in Landfill
CEMPRE	Compromiso Empresarial para el Reciclaje / Company Recycling Agreement
CLUS	Costo de Limpieza Urbana por Suscriptor / Cost of Urban Cleaning per Service User
CONPES	Consejo Nacional de Política Económica y Social / National Economic and Social Policy Council
CRA	Comisión de Regulación de Agua Potable y Saneamiento Básico / Commission for the Regulation of Drinking Water and Basic Sanitation
CRT	Costo de Recolección y Transporte / Cost of Collection and Transport
CT	Costos de Tratamiento / Cost of Treatment
CTL	Costos de Tratamiento de Lixiviados / Cost of Leachate Treatment
ECA	Estación de Clasificación y Aprovechamiento / Sorting and Recycling Centre
ESP	Empresa de Servicios Públicos / Public Services Company
E&E	Envases y Empaques / Containers and Packaging
IAT	Incentivo al Reciclaje y Tratamiento de residuos sólidos / Solid Waste Recycling and Treatment Incentive
MADS	Ministerio de Ambiente y Desarrollo Sostenible / Ministry of Environment and Sustainable Development
MSPS	Ministerio de Salud y Protección Social / Ministry of Health and Social Welfare
MVCT	Ministerio de Vivienda Ciudad y Territorio / Ministry of Housing, Cities and Territory
PGIRS	Plan de Gestión Integral de Residuos Sólidos / Municipal Solid Waste Management Plan
PMD	Plan Municipal de Desarrollo / Municipal Development Plan
POT	Plan de Ordenamiento Territorial / Land Use Management Plan
RCD	Residuos de Construcción y Demolición / Construction and Demolition Waste
REP	Responsabilidad Extendida del Productor / Extended Producer Responsibility
RESPEL	Residuo Peligroso / Hazardous Waste
RSU	Residuos Sólidos Urbanos / Urban Solid Waste
SPA	Servicio Público de Aseo / Public Waste Service
SSPD	Superintendencia de Servicios Públicos Domiciliarios / Public Household Services Superintendence
SUI	Sistema Único de Información de la SSPD / SSPD Information System
VBA	Valor Base de Aprovechamiento / Basic Recycling Value

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