

Opportunity Assessment

Inclusive Waste Management in Peru: *Enabling the Business of Recycling*

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By
Ciudad Saludable
and
Global Fairness Initiative



Center
for Inclusive
Growth



CIUDAD SALUDABLE



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EXECUTIVE SUMMARY AND OPPORTUNITY OVERVIEW

In 1992, more than 178 countries signed Agenda 21, the Rio Declaration on Environment and Development. Established at the United Nations Conference on Environment and Development (UNCED), Agenda 21 states that “the environmentally sound management of waste should go beyond the simple disposal or use by safe methods of waste produced and seek to solve the root cause of the problem trying to change unsustainable patterns of production and consumption.” To this end, one of the principles put forward in Agenda 12 was the adoption of the 3Rs – Reduce, Reuse, and Recycle. OECD countries in particular have since evolved the 3Rs into an economic model that envisions that the linear flow of materials (resources-product-waste) be transformed into a circular flow (resource-product-recycled resources) capable of generating both environmental and financial returns.

In the decade following the UNCED, the Latin American country that took some of the most progressive steps toward adopting the principals and practices espoused in the Rio Declaration was Peru. Peru’s promotion of the 3Rs and adoption of the framework of the circular economy across its national and local government systems has created a vibrant new economy around recyclable solid waste in the Andean nation of 32 million people. The recycling sector in Peru is relatively nascent and largely informal, but the growth and opportunity to be found in the sector is considerable, whether from an economic, societal or environmental perspective.

For the purposes of this report, the opportunity of most interest is the growth to be found in the economy and associated value chain of Integrated Solid Waste Management in Peru. To understand this economy requires an assessment of the laws and regulations that support and govern the sector, the actors involved and how value is added and extracted throughout the value chain. Additionally, we must look at the constraints each actor faces and the investment they require to maximize enterprise potential, all with the goal of unlocking the inherent economic value found in the sector.

With the support of the Mastercard Center for Inclusive Growth, this report seeks to do this by examining the legal framework that provides the foundation for progress and future growth, the key actors and their roles within the supply chain, and the best opportunities to invest in the growth and formalization of enterprises operating in the recycled waste sector in Peru. The conclusion of this report identifies significant opportunity to transform the waste management sector in Peru by engaging key actors who are well-positioned to strengthen the recycling and waste management sector as a whole while expanding new market and microenterprise opportunities.

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We are also grateful to our partners at Ciudad Saludable who assisted in the research, development, and execution of the overall report. In particular, we would like to thank Albina Ruiz Rios for her leadership, generosity and support, as well as Paloma Ruiz Rios and the Ciudad Saludable team in Peru for their research and fieldwork.

About the MasterCard Center for Inclusive Growth

The MasterCard Center for Inclusive Growth was created to foster collaborative relationships between academia, governments, nonprofits, the social design community, and the private sector. Through the advancement of research and strategic philanthropic investments, the Center will support and enable those historically excluded from financial services and serve as a catalyst for change. For more information, please visit www.mastercardcenter.org.

About Ciudad Saludable

Ciudad Saludable is a Peruvian NGO belonging to the Grupo Ciudad Saludable, which consists of three sister organizations: Ciudad Saludable, Peru Waste Innovation SAC, and Healthy Cities International Foundation. The Grupo Ciudad Saludable was founded to change the perception of the 109,000 impoverished and excluded recyclers in Peru and to economically empower these recyclers while developing solutions to the problem of inadequate solid waste management in Peru's cities and municipalities. For more information, visit www.ciudadsaludable.org.

About the Global Fairness Initiative

The Global Fairness Initiative (GFI) promotes a more equitable, sustainable approach to economic development for the world's poor by investing in workers, extending equal access to markets and driving balanced public policy to generate opportunity and end the cycle of poverty. Since 2002, GFI has partnered with hundreds of marginalized working communities in Latin America, Africa, and Asia to enhance economic opportunities and build sustainable livelihoods. For more information, please visit www.globalfairness.org.

ACRONYMS

DIGESA	Dirección General de Salud Ambiental e Inocuidad Alimentaria <i>(General Directorate of Environmental Health and Food Safety)</i>
D.L.	Decreto Legislativo <i>(Legislative Decree)</i>
D.S.	Decreto Supremo <i>(Supreme Decree)</i>
MINAM	Ministerio del Ambiente <i>(Ministry of the Environment)</i>
PGIRS	Plan de Gestión Integral de Residuos Sólidos <i>(Comprehensive Solid Waste Management Plan)</i>
PLANAA	Plan Nacional de Acción Ambiental <i>(National Environmental Action Plan)</i>
PSO/RS	Programa de separación en Origen y recolección selectiva <i>(Source separation and selective collection program)</i>
RENAREP	Red Nacional de Recicladores del Perú <i>(National Network of Recyclers of Peru)</i>
REP	Responsabilidad Extendida al productor <i>(Extended producer responsibility)</i>

REPORT OBJECTIVE AND METHODOLOGY

Over a four-month period, the Global Fairness Initiative (GFI) and Ciudad Saludable conducted an Opportunity Assessment of the Waste Management Sector in Peru. The primary goal of the study was to illuminate the structure, market conditions and key actors in Peru's recyclable solid waste management value chain. The secondary goal was to determine the feasibility of expanding the formal capacity and access to market for the micro and small firms operating in the sector. The report was designed to assess three core elements of the posited opportunity which are presented in the following three sections.

Section 1: Waste Management Value Chain and Market Assessment: The first section provides an overview of the waste management value chain in Peru, the regulatory framework in which it operates, and the market actors and opportunities found in the recyclable waste sector in particular. The market assessment is designed to both determine the viability of enterprise opportunities in the sector and to identify current operators in the value chain positioned to leverage these opportunities.

Section 2: Ciudad Saludable's Inclusive Recycling Model: The second section provides an analysis of the existing recycling centers model and operations. This section analyzes their capacity and constraints and assesses their opportunity for growth and value-added processes.

Section 3: Opportunity Landscape: The third section provides an overview of opportunities identified to engage the sector and encourage enterprise growth in the recycled waste value chain. Each opportunity may be considered independently, but there are links between each, and combined they represent a significant chance to transform waste management system in Peru to a truly integrated locally owned, market-oriented system.

This report relied on extensive research on solid waste management processes, in-depth interviews with key stakeholders directly and indirectly involved in the recycling value chain, and direct observations of recyclers and recycling centers in the cities of Lima, Ica, Chincha, El Carmen, Sunampe, Pueblo Nuevo, Iquitos, as well as in the districts of Villa El Salvador, San Juan de Miraflores, Villa Maria del Triunfo, and Miraflores.

LEGAL FRAMEWORK

Construct

Environmental law in Peru is uniquely structured within a Constitutional framework that codifies it as the law of the people and not merely a regulatory mandate. This has enabled environmental law to hold an elevated place in Peru where it is considered a fundamental part of the shared stewardship of a shared land. As a result, environmental law does not merely define general principles – it also specifies processes for the application of the law, including establishing regulatory processes, defining the stakeholders, structures, programs and management instruments to be used, and implementing a broad set of definitions and designations that guide the oversight and management of environmental initiatives.

Functionally, environmental management and stewardship, as decreed in the Constitution, is primarily the responsibility of the provincial and municipal government. A number of provinces and municipalities have in turn reinforced national law through their own state and local policies, which together have served to both prioritize environmental issues and to put leadership of environmental initiatives in local hands. In recent years, regulations have shifted environmental responsibility even further down by prescribing that citizens themselves adhere to and enforce environmental mandates, particularly related to management of the waste they produce. Specifically, the 2017 *Supreme Decree No. 014-2017-MINAM*, and the 2016 *D.L 1278: Law of Integral Management of Solid Waste* establish terms around the rights, obligations, attributions and responsibilities of society to ensure management of sanitary and environmentally sound waste. These statutes go as far as to establish the principles of a circular economy tied to waste valorization and put responsibility on the producer of the waste to protect the environment and be accountable for the public health principals laid out in the Constitution. This responsibility does not distinguish between individuals and businesses, though many of the provisions are more relevant to waste management by enterprises than by households.

Figure 1: Peru’s Constitutional Clauses on Environment

Article 2: Everyone has the right: (...) 22). To peace, to tranquility, to the enjoyment of free time and to rest, as well as to enjoy a balanced and adequate environment for the development of your life.

Article 66: Natural resources, renewable and non-renewable, are the Nation's heritage. The State is sovereign in its use.

Article 67: The State determines the national environmental policy. Promotes sustainable use of natural resources.

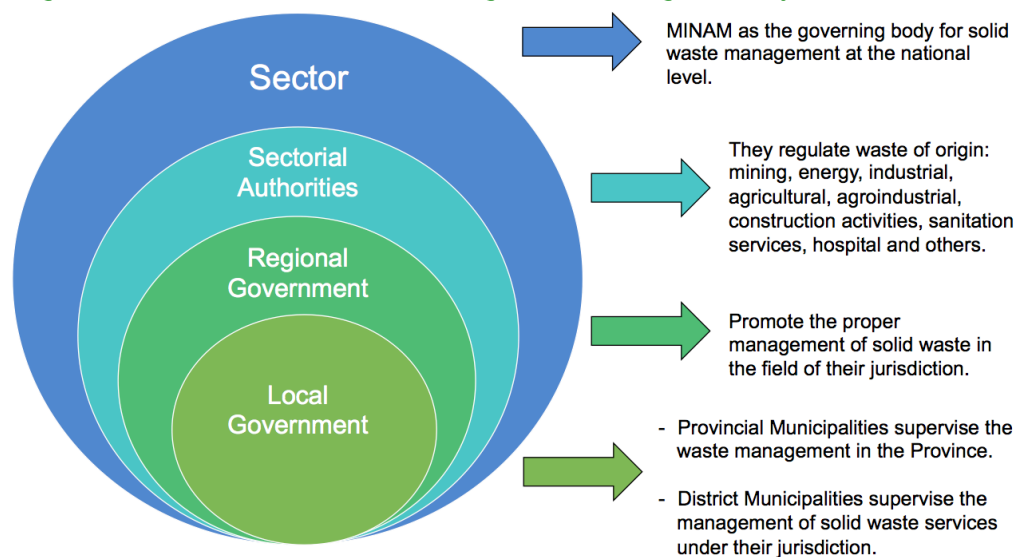
Article 195: Local governments promote development and the local economy, and the provision of public services of their responsibility, in harmony with national and regional development policies and plans.

Regulation

The regulatory structure governing waste management in Peru has four (4) basic levels of authority over the determination and application of the environmental laws. At the highest levels are the national government agencies, which determine the legal requirements for waste management within the various sectors in which solid waste is produced, such as mining, agroindustry, energy production, hospitals, sanitation, and others. These sectors each have a national authority that oversee compliance with the law by registered operators in the respective sectors. The key environmental authority in Peru, however, is held at the provincial and municipal levels, which are broadly empowered to develop policies, regulate practices, and institutionalize programs for solid waste management.

The law that establishes this principle of decentralization is *Law No. 27783 [Law of Basis of Decentralization]*. This regulates the conformation of the regions and municipalities, sets the competencies of the three levels of government and determines the assets and resources of regional and local governments, and regulates government relations at different levels. For waste management and environmental stewardship it stipulates in Article 6 that municipalities shall have oversight over: a) territorial and environmental regulation; b) sustainable management of natural resources and improvement of environmental quality; and c) inter-institutional coordination and citizen participation at all levels of the National Environmental Management System. For the purposes of this report, the other law that uniquely enables citizen-led waste management at the local level is *Law No. 29419 [Law regulating the activity of waste pickers]*. It establishes a framework for recycling workers' activities that is oriented to the protection, training, and promotion of social and labor development, promoting their formalization, association, and contribution to the improvement of the ecologically efficient management of solid waste in the country.

Figure 2: Peru's Waste Management Regulatory Structure



Practice

Through the decentralized regulatory structure that Peru has established for environmental protection and waste management, municipal leaders and community-based organizations and enterprises have become uniquely reliant on each other to both oversee and benefit from the management of recyclable solid waste. Under the General Waste Law, municipalities are mandated to create action plans for the management of waste and encouraged to create partnerships with the private sector and civil society to implement these plans so that they are not reliant on public service provisions. As a result, a number of municipalities have initiated innovative collaborations with actors in the recycling value chain that had previously operated on the margins, but are now fully integrated into the public scheme. A salient example of this are the formal agreements that municipalities have entered into with largely informal associations of “waste pickers” (*recicladores*) to provide household recycled waste collection in neighborhoods throughout Lima. Empowered through the “Waste Pickers Law” (Law No. 29419) and incentivized by collaborative agreement with the municipality, informal waste collectors who had previously worked on open dumps have formed micro-enterprises made up of associations of waste pickers that now provide household and business waste collection services in dedicated sections of cities. These agreements offer the associations exclusive “at source” access to the recyclable waste products that are the foundation of their livelihood, thus lowering costs, competition, and health and safety issues associated with collecting at open dumps or on the street. Municipalities in turn promote the social value and legal requirement that households and businesses sort and recycle their waste, further improving the market that the associations operate in. Municipalities have broad latitude to enter into such agreements, which functionally may reduce market competition to the benefit of the enterprise with whom they are partnered, but which firmly fall within the legal framework that enables local waste management solutions.

There is a standing, non-binding 2017 goal of recycling 60% of recoverable waste and ensuring proper treatment and disposal of 70% of non-recoverable waste, but Peru is not currently close to achieving these numbers. The country has, however, established a progressive regulatory framework that empowers local leaders to solve local environmental and waste management challenges and creates a highly enabling environment for informal operators in the waste sector to become part of and benefit from the formal waste management system. To date, the vast majority of focus by national and local lawmakers has been on actors that produce waste (businesses and households) and those that collect waste, but the legal framework is also structured to facilitate stewardship for the large market actors in the value chain who trade in, transport, process, and transform waste. For all levels, the goals of regulation are clearly

aimed at enabling greater and more effective environmental stewardship and creating opportunity and benefit for good operators in the sector, as opposed to the more punitive approach taken by many countries of sanctioning the bad ones.

Current Landscape

Peru's government has set in place a series of policy levers and strategy tools aimed at strengthening the waste management sector while enabling development of key market players through public, private, and international investment. Government objectives, coupled with a growing demand for comprehensive waste management, are focused on handling the volume of waste in the country while promoting green growth.

Enabling an effective and sustainable integrated solid waste management is at the forefront of the Peruvian government's environmental sustainability, economic development, and macroeconomic growth initiatives. Peru has embraced green growth and undertaken commitments within the Paris Agreement and various government institutions, strategies, and plans. For example, the creation of the Ministry of the Environment (MINAM) in May 2008 marked a milestone in the development of a broad environmental institutional framework. MINAM is responsible for adapting the National Solid Waste policy and preparing and implementing comprehensive solid waste management plans (PIGARS), as well as the solid waste handling plans at the provincial and district levels (PMRS). In accordance with MINAM's goals, the Ministry has launched a series of programs and investment projects that tackle different aspects of comprehensive waste management, including Municipal Modernization Programs (PMMs), Segregation-at-Source Programs, and Formalization of Recyclers Programs. Additionally, MINAM leads information management and data collection through the solid waste management information system (SIGERSOL) and publishes regular reports and evaluations of environmental and waste management in Peru.

Peru's focus on environmental policies goes hand-in-hand with the development of strategy instruments to coordinate pro-competitiveness policies and efficient management in the public and private sectors around key areas, such as comprehensive waste management. MINAM leads the implementation of the National Plan of Environmental Action (PLANAA Peru: 2011-2021), a national environmental planning policy that set priority targets for 2021 around waste management and recycling. Following the development and publication of PLANAA, the government, in partnership with the United Nations and 800 stakeholders from the public, private and civil society sectors representing a total of 271 institutions in Peru, developed the Plan Nacional de Gestión Integral de Residuos Sólidos: 2016-2024 (PLANRES). PLANRES is a cross-sectoral and de-centralized framework that establishes guidelines in alignment with PLANAA, and by extension, the Sustainable Development Goals, and serves as the principle plan

for waste management. Its objectives focus on strengthening the capacity of the waste management value chain; promoting best practices around waste management technology; creating a legal framework on solid waste management and environmental sustainability for municipalities; strengthening SIGERSOL to collect local, regional, national data in a timely and effective manner; strengthening solid waste collection at the municipal level; coordinating investment in the national solid waste management system; and promoting private investment in the waste management system. It was designed to meet PLANAA's most ambitious goal: calling for 100% of municipal solid waste management, recycling, and proper disposal by 2021. As part of this initiative, Peru is actively seeking to create additional landfill capacity to meet basic disposal requirements and has set a goal of achieving 100% adequate treatment of waste via the 3R's (Reduce, Recycling, Reuse) and sanitary landfills by 2021. The government's goals for developing new sanitary landfills is intended to eliminate the practice of waste disposal in dumps with little active operation or environmental control. These ambitious goals reflect Peru's efforts to improve the management of municipal and non-municipal waste while strengthening the value chain.

SECTION 1: WASTE MANAGEMENT MARKET IN PERU

Over the last 15 years, Peru has experienced a period of incredible growth led by strong internal demand, inclusive poverty reduction policies, and deep macroeconomic reforms that liberalized trade and fiscal policies. At present, the Peruvian economy is the 7th largest in Latin America and has experienced sustained growth from 2003-2017, with an average growth rate of 5.9% and low inflation rates (averaging 2.9%). After a massive urbanization process over the last 60 years, Peru is a mostly urban country, with about 60% of the population living in urban areas. In addition, Peru has opened its economy to international trade, with raw materials forming the core of its exports.

This fast and widely shared growth has transformed Peru into an upper-middle income economy, with aspirations to become a high-income economy in the next 20 years. In parallel, this dynamic growth has been accompanied by increased production and consumption, and thus an increase in the generation of waste and recyclable materials. Over the last ten years, waste generation has grown by 40% per capita, reaching 0.78 kg per individual per day in 2009 and 0.83 kg per individual per day in 2014, and during this same period, investment from private, multilateral, and international funds to meet this demand through the construction of landfills, waste plants, and transfer stations totaled over S/. 2,000,000,000 (~\$615 million USD).

Figure 3: Municipal Waste Generated in Urban Zones, 2014

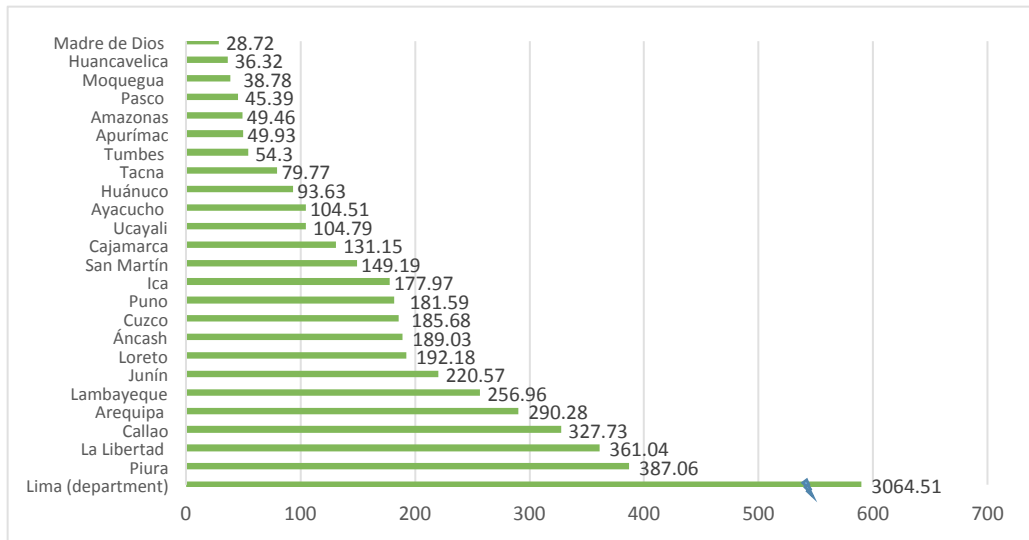
Solid Waste, Total	Solid Waste, Household	Solid Waste, Non-Household
.83kg/person/day	.56kg/person/day	.27kg/person/day
7,030,000 tons/year	4,740,000 tons/year	2,290,000 tons/year
100%	67%	33%

In Peru, approximately 7 million tons of waste is produced per year with over 70% collected from households, but only 48% of that material is properly disposed of in landfills; in many cases, waste is deposited in open-air dumps without prior treatment. Lima is the Peruvian city that generates the most household waste, with the amount doubling between 2000 and 2015 and increasing to represent over 30% of the national total in 2015. Estimations see household waste in the province of Lima growing to 16,000 tons per day by 2034 and growing across the country in parallel with expected per capita GDP growth.

The Ministry of the Environment’s (MINAM) official data on recycled goods estimates that only 0.41% - or 29,099 tons - of total waste per year in Peru is recycled. However,

that figure does not accurately represent the amount of recycling material available in Peru and unofficial data estimates that approximately 14% of total waste is recycled in a given year. This discrepancy suggests that a significant amount of recycled materials come from informal work that recovers material from dumps, public roads, and informal arrangements with companies. There are also major divergences among regions with respect to available infrastructure and the availability of trash collection services.

Figure 4: Waste Generation by Region, 2014



Of the 7 million tons of solid waste collected per year, approximately 5 million tons (74%) have the potential to be either recycled or composted. The largest categories of recyclable materials include plastic bags, paper, cardboard, and other more ridged forms of plastic.

Figure 5: Potential Recycled Material of Municipal Waste Collected

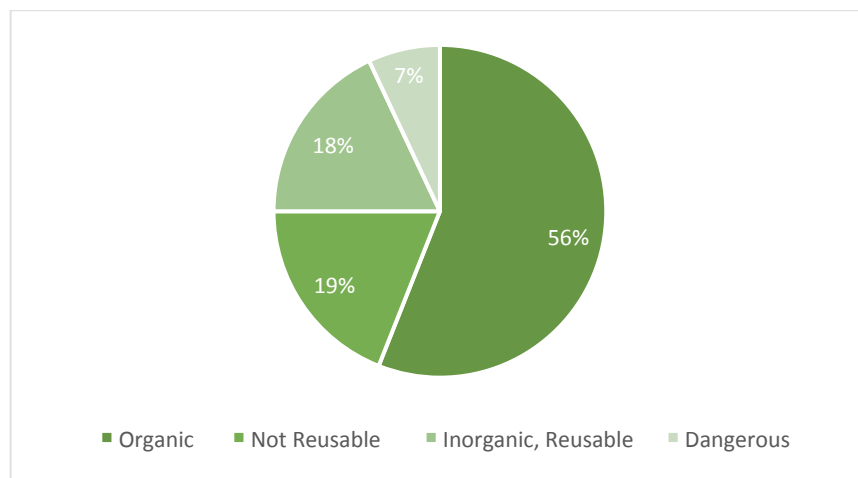


Figure 6: Municipal Waste Generation by Type

Components	Composition
Organic Material	53.16%
Foliage/Wood	2.87%
Paper	3.86%
Cardboard	3.74%
Glass	2.79%
PET Plastic	2.39%
Hard Plastic	2.88%
Bags	4.03%
Tetra Pak	0.51%
Styrofoam	0.98%
Metal	2.34%
Fabrics/Textiles	1.47%
Rubber/Leather	1.12%
Batteries	0.30%
Medical Waste	0.40%
Sanitary Waste	6.53%
Inert Waste	8.15%
Other	2.49%
Total	100.00%

In Peru, there are 30 dumps across 43 cities and 11 sanitary dumps that receive 38% of the generated waste from urban zones. However, the proper management of waste within these landfills is insufficient and waste is piling up, untreated, unhealthy, and forgotten. These unmanaged, open landfills create broad environmental hazards and contribute to nearly 6% of Peru’s greenhouse gas emissions. They are also the cause of serious health and environmental hazards in surrounding communities, as highlighted by the flooding in northern Peru in 2017, which carried away solid waste, demolishing houses, contaminating streams and drinking water, and ultimately polluting the sea. With only 14% of Peru’s annual waste being turned into recycled materials, but the potential for as much as 74% being recycled or composted, the opportunity for robust expansion of Peru’s recycling sector is significant.

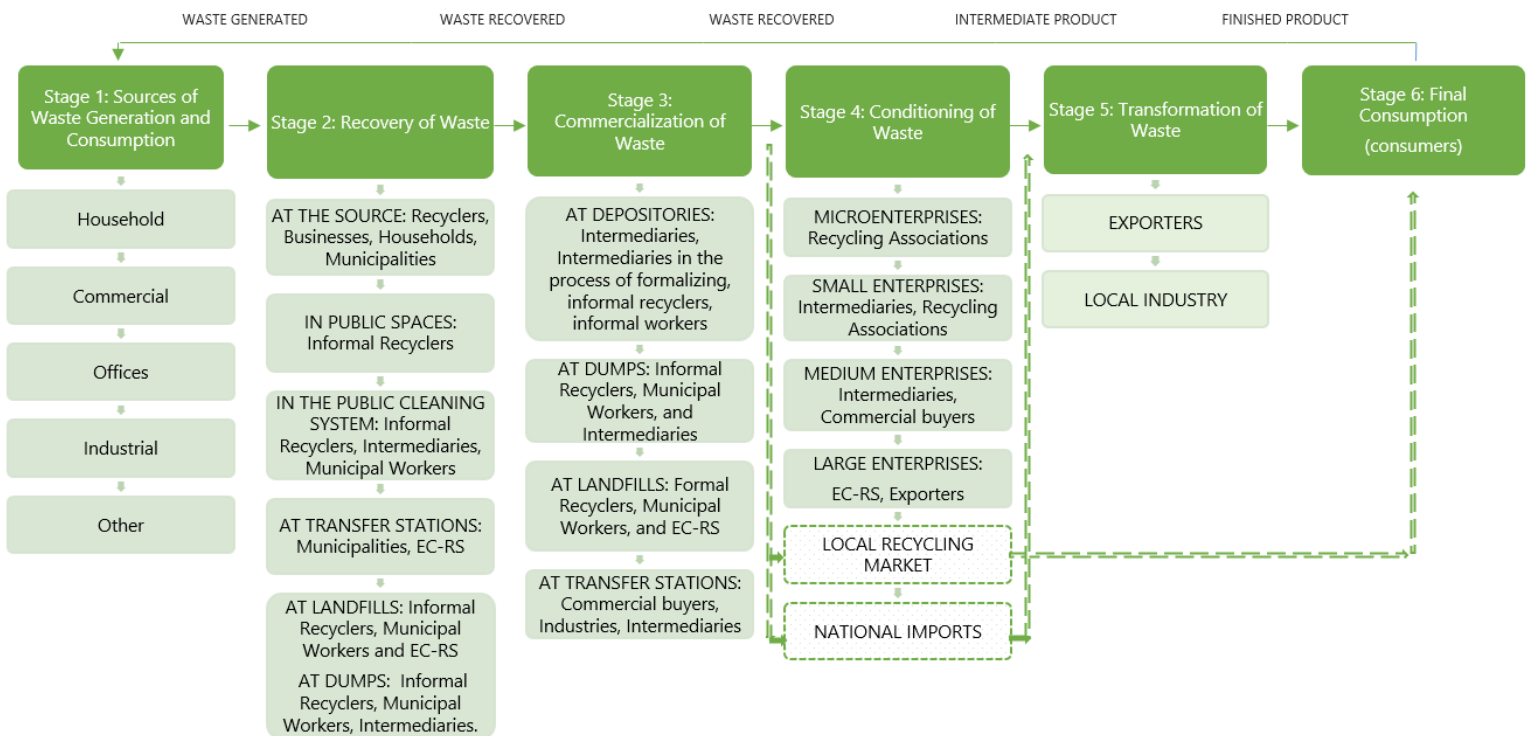
Peru’s commitment to strengthening the waste management sector and value chain to enable green growth, economic development, and market competition and activity is highlighted across the various policies, planning documents, and strategy tools the government has developed. Enabling further formalization and professionalization of the sector are understood as critical to meeting Peru’s economic and green growth

goals, as well as increasing market demand for these services. This enabling regulatory and political environment furthers the breadth of the recycling market and the opportunities for engagement, which are explored below.

RECYCLING VALUE CHAIN

Peru’s recycling value chain is comprised of six stages – 1) Generation, 2) Recovery, 3) Commercialization, 4) Conditioning, 5) Transformation, and 6) Final Consumption. An overview of this process has been summarized in the following flow chart.

Figure 7: Flow Chart of Recycling Value Chain



Stage 1 (Generation) refers to the amount of waste generated by a particular group such as households, commercial businesses, offices, industries, or other actors. Through the analysis of per capita generation and the composition of solid waste, we can estimate the re-usable quantity, classifying it as recyclable and compostable, as well as the potential for effective segregation, essential indicators for the design of a program of segregation at the source and selective collection.

Stage 2 (Recovery) refers to the method in which the waste is collected and, where possible, segregated. For example, for households, recovery is at the source through garbage collection routes typically managed by municipalities or individual recyclers and recycler associations. The act of segregation is separating out material such as packing or food that can be reused, recycled, or consumed as swine feed and which typically

have a commercial value. This is carried out formally through segregation programs at the source and selective collection, i.e. pre-sorted at homes, businesses, and industries or informally on public roads through public cleaning services, transfer points, dumps or landfills by recyclers or public cleaning workers.

Stage 3 (Commercialization) includes the act of buying and selling reusable solid waste. This is typically carried out in either informal warehouses, formal collection centers, or final sites such as dumps and landfills. The warehouses and collection centers can range from small, family-run centers to large, professional centers.

Stage 4 (Conditioning) refers to the processing of recycled materials. This stage includes activities such as storage, cleaning, crushing or grinding, compacting, and packaging. This stage does not include treatment of any recycled materials. These processes are carried out by a range of actors from micro-enterprises to large export companies. Each actor responds to the demand of local reuse markets, large industries such as bottling companies, and exporting companies.

Stage 5 (Transformation) refers to the act of transforming the recycled materials, either through physical or chemical reprocessing, from solid waste into intermediate or final products that can be used by various buyers. Buyers can purchase raw material or recycled products for local or export markets.

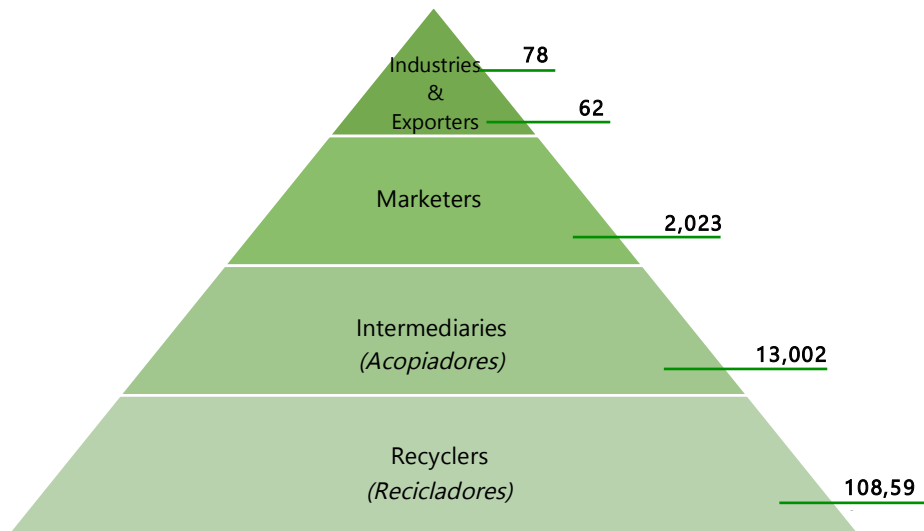
Stage 6 (Final Consumption) is the last stage of the value chain in which the recycled products are consumed or converted again into waste which would then return to the start of the recycling chain.

Across each of these stages and levels is a wide variety of movement and variation. For example, a large office building or shopping mall may have its waste collected by a municipal garbage collector or an association of informal workers. Small enterprises that store solid waste, as described in Stage 4, may sell to a local market or regional buyer. Therefore, it is important to understand that within each stage of the value chain there is tremendous variability and complexity in the movement of materials which, in turn, affects the variability of the prices.

KEY ACTORS FOR ENGAGEMENT

Within the recycling value chain, there are four key segments of actors – Recyclers, Intermediaries, Marketers, and Industries/Exporters – which can be summarized in the following Recycling Actors Pyramid.

Figure 8: Pyramid of Key Actors in Recycling Value Chain Pyramid



Recyclers

Often referred to as waste pickers or *recicladores*, the 108,594 recyclers at the base of the Recycling Actors Pyramid are the first link in the recycling value chain, recovering waste from generating sources such as open dumps, streets, residences, businesses, and other public spaces. Of the approximate 109,000 recyclers, only 13,000 (or 12%) are formal workers, either organized into recycler associations or micro-enterprises. These workers are represented by 311 waste picker organizations, of which 291 are recycler associations and 20 are Micro and Small Enterprises (MYPES). These associations and micro-enterprises operate in municipalities across the country with the largest concentration (78 organizations) in the provinces of Metropolitan Lima and Callao. In addition to these formal organizations, recyclers are also represented at the national level through trade associations such as the National Network of Recyclers of Peru (RENAREP).

However, the majority of recyclers are informal workers. Informal recyclers are drawn from poor and vulnerable sectors of society; the low barriers to entry coupled with a ready income drives impoverished workers to waste picking. Waste, and particularly recyclable materials, are relatively easy to access and have both value and an accessible

market to sell to. Waste pickers, and particularly those operating on open dumps and on the streets, work in hazardous conditions and lack access to public services, healthcare, protective gear and the proper tools that might otherwise improve productivity. Due to an absence of economies of scale, informal waste pickers have weak bargaining power in the recycling value chain. With poor opportunities and insufficient earnings, informal pickers are unrecognized and unprotected actors in the waste management system – despite their clear, critical role in the market.

Opportunity Highlight - The best opportunity for engagement with recyclers is to help them organize into formal recycling associations (“Associations”) that can compete for selective collection routes with municipalities and businesses, provide greater social protections including access to healthcare and social security programs, access to training programs, and eventually establish their own collection facilities.

Intermediaries

The second category of actors is the most dynamic economic group in the recycling chain, commonly known as Intermediaries (*Acopiadores*). Intermediaries represent a large variation of actors, including small and medium sized businesses or waste picker associations operating formally or informally that purchases and sells recyclable solid waste and/or provides home and selective waste collection services. Many Intermediaries operate small enterprises ranging from 50 square meters to 2,200 square meters in residential or commercial areas that are typically located close to dumps and landfills. They have little specialization and are usually limited to the purchase and sale of recycled materials – Stage 3 (Commercialization) and some elements of Stage 4 (Conditioning) including storage. Where some Intermediaries have received technical assistance or financial support, they have expanded into Stage 4 (Conditioning) such as cleaning or pressing or materials and Stage 5 (Transformation) such as the chopping of PET materials. Intermediaries typically have between 2 and 10 people working for them and require minimal capital investment and operate with between S/. 2,000 soles and S/. 10,000 soles (~\$610 USD to \$3,100 USD) per month. There are approximately 13,000 Intermediaries across Peru with over 8,000 operating in urban areas. A typical urban intermediary can sell between 1 to 15 tons per month.

Opportunity Highlight – Intermediaries act as the primary bridge between collection (Stage 2) and the rest of the value chain, although some Waste Picker Associations sell directly to Marketers or Exporting and Manufacturing companies. Most are small enterprises that operate informally and would benefit from formalization support as well as technical assistance to increase the volume of goods processed and their ability to capture more of the value chain.

Marketers

The Marketers are the third rung in the recycling pyramid. They are medium to large enterprises and typically operate in metropolitan trade zones and industrial zones. Marketers can be involved in Stage 3 (Commercialization), Stage 4 (Conditioning), Stage 5 (Transformation) and, occasionally, Stage 6 (Final Consumption) of the recycling value chain. Many Marketers have three locations – one location to purchase and sell recyclable waste to retailers in the surrounding areas, another location to classify, carry, and label goods, and a final location where they carry out the conditioning process, i.e. pressing chopping, packaging, and shipping. Most Marketers specialize in at least two types of waste such as A) paper or cardboard, B) PET and plastics, or C) scrap and metals to protect themselves against price instability and market volatility. Marketers typically process over 15 tons of recycled materials per month and operate with a working capital greater than S/. 30,000 soles (~\$9,200) per month. In addition to large footprints, their primary assets are in equipment for the conditioning of waste such as electronic scales; paper press machines; metal, PET and plastic choppers; and vehicles for transporting materials. Given their size and asset portfolio, they can access financial services relatively easily as well as regional market technologies. Their access to the export market is conditional on whether they have secured an EC-RS license – an authorization of commercialization of solid waste - issued by the Health Sector or MINAM. Of the 2,023 Marketers estimated nationally, only 555 have EC-RS registration, but EC-RS registration is growing dramatically. Across a sample of 19 selected provinces, EC-RS registration almost tripled between 2008 and 2009 alone.

Opportunity Highlight – The majority of value in the recycling value chain is added during the Conditioning Stage (#4). As a result, Marketers are well positioned to take advantage of additional support and investment to scale their operations. Marketers that store large volumes of raw or semi-processed recycled materials fare better because they can wait longer periods of time for a more favorable price point. Given their size and asset portfolio, many Marketers have decent access to capital, although not always at the most favorable rates. Technical assistance and support to improve business practices, increase efficiencies, and strengthen operations would benefit this group.

Exporters and Industrial Companies

At the top of the pyramid are two types of actors – Exporters and Industrial Companies. These companies reuse or transform recyclable waste into final products for consumption. The group is the smallest within the value chain, although it captures a decent portion of the value added. They are characterized by a high level of specialization, technological development, organization, and financial capacity. There are 78 national industries and 62 export companies. National industries include recycling

industries of plastic, paper, cardboard, scrap, metals and glass, as well as bottling companies that promote the use of returnable glass containers, gas companies that promote the returnable use of gas cylinders, and other industries that promote the consumption of spare parts that have been manufactured with minimal packaging. For most recyclable materials, there are a small number of large companies that dominate the market. For glass, the primary company is Owen Illinois, a multi-national corporation that is the largest buyer of recycled glass fiber for the manufacturing of bottles; they typically demand approximately 30 tons of glass per month for their processing. For PET plastic, a major company is San Miguel Industries which specializes in PET processing; San Miguel Industries requires approximately 3,000 tons of PET per month. The primary paper industries include Kimberly Clarke (Lima) that serves a national market, Productos Tissue del Perú S.A – PROTISA (Elite Brand), Papelera del Sur, and PROVESUR. Papelera del Sur can require as much as 70 tons of cardboard or paper per month, whereas PROVESUR typically requires between 15 and 20 tons per month. The primary scrap companies are Aceros Arequipa Corporation in the south and SIDER Peru in Chimbote in the north. Aceros Arequipa typically requires between 15 and 20 tons of metal scrap per month.

Opportunity Highlight – Industries and Exporters are large national and multi-national companies (MNCs) most of which are in good financial standing. The best opportunity for engagement with this group of stakeholders would be to work closely with them to negotiate more favorable purchasing agreements for Collectors and/or Marketers.

OPPORTUNITY ANALYSIS

Over the past decade, Peru has become a regional leader in championing and instituting a range of strong environmental policies, including a commitment to achieve 100% adequate treatment of waste through the 3R's (Reduce, Recycling, Reuse) model and sanitary landfills by 2021. The promotion of a circular economy is starting to take hold, although there remains significant room for growth. For example, a decade ago, 80% of the recycled material in Peru was exported and only 20% was consumed by domestic markets. Today, the opposite is true, with only 20% of recycled goods being exported. With the recent passage of Decree D.L. 1278 – The Law of Integral Management of Solid Waste - which mandates municipalities create comprehensive waste management plans that prioritize waste prevention and reduction and encourages partnerships with the private sector, the current legal framework is one of the most progressive in Latin America. In addition, outdated regulations have been replaced by more environmentally friendly policies that incentivize the use of recycled materials. For example, until as recently as 2016 there was a prohibition against the use of recycled resin in bottle

production due to a misperception of recycled plastic as “dirty.” As a result, bottle manufacturers had to import virgin resin for their production processes. However, once this prohibition was removed, several manufacturing companies began integrating recycled resin into their manufacturing processes, reducing costs and increasing demand for recycled materials from domestic suppliers. After D.S. 038-14 was passed, San Miguel Industries, the largest buyer of PET in Peru, invested in the required technology and increased demand from 10 tons of PET per month to 3,000 tons per month. In a similar vein, exporters have changed their business operations from exporting bulk bottles to transforming materials in-country into products such as flakes or scraps, allowing them to capture more value from the value chain and sell at higher prices. The relatively quick change in business operations as legal constraints were removed suggests that there is a strong interest and demand for recycled goods domestically.

In Peru, the three major tradable recycled materials are Paper, Plastics, and Metal. In 2016, Peru had a positive trade balance in terms of volume of paper (i.e. more paper exported than imported), although the total value of paper traded was negative, indicating that import prices were higher than export prices. For plastics, both volume and value of plastics had a negative trade balance, indicating that Peru’s internal supply is still not meeting domestic demand. For metal, the trade balance was also negative for both volume and value of traded goods.

Figure 9: Exports and Imports of Peruvian Recyclable Material, 2016

2016 Exports			
	Volume (Tons)	Price (USD/Kg)	Value (Thousands USD)
Paper	63,983,583	0.18	11,461,424
Plastic	26,225,681	0.58	15,280,865
Metal	104,779,064	0.54	56,421,065

2016 Imports			
	Volume (Tons)	Price (USD/Kg)	Value (Thousands USD)
Paper	63,065,683	0.20	12,527,310
Plastic	27,232,954	0.62	16,911,027
Metal	108,485,247	0.58	62,379,692

Peru is actively trying to reduce the volume of imported recycled materials to strengthen domestic markets. While Peru has the potential to supply the current

demand for imported materials, it does not currently have the capacity to do so because much of the recyclable waste is left unrecovered in poorly managed landfills or rural dumps that are inaccessible to urban markets both due to high transportation costs and lack of proper cleaning, processing, or transformation.

However, several of the challenges preventing scaling of collection capacity are being addressed through international investments. With the Government of Peru's strong commitment to environmentally friendly policies and legal frameworks, international partners have been eager to invest in building Peru's capacity to capitalize on this momentum. Partnerships with Japan's International Cooperation Agency (JICA) and the Inter-American Development Bank (IDB) have focused on building more efficient and hygienic waste management sites, introducing environmentally conscious technology, and strengthening local capacity and management structures. In addition, the Government of Peru is in discussions with the United Nations Development Programme (UNDP) to implement a Nationally Appropriate Mitigation Action (NAMA)¹ on Peru's waste management sector. The proposed NAMA is designed to complement and accelerate the existing modernization policy for solid waste management in Peru by creating incentives that increase the economic value of waste that currently goes to landfills and dumps.

With the combination of a strong government commitment to recycling, significant international investments in much needed infrastructure improvements and capacity building, and unmet demand for recycled materials, Peru's recycling industry is perfectly positioned for a dramatic expansion. Each of the actors within the recycling value chain are likely to benefit from this expansion; however, the Recyclers and Intermediaries are the best positioned for dramatic growth.

Primed for Growth – Recyclers and Intermediaries

Approximately 90% of the supply chain is represented by Recyclers and Intermediaries. Despite the significant volume processed by these actors, the overwhelming majority of both Recyclers and Intermediaries in Peru operate informally and at a relatively small scale. This has limited their ability to take advantage of the growth of the recycling sector, including selling larger quantities to buyers and capturing additional parts of the value chain. Because of the potential for growth, both are well positioned to be formalized and capacitated through the right combination of investment, technical assistance, and market facilitation to help them overcome the constraints that have limited their size and revenues.

¹ A NAMA is a set of policies and actions aimed at reducing greenhouse gas emissions which is enabled by technology, financing, and capacity-building.

For Recyclers, the primary opportunity is to support their formalization into Waste Picker Associations, which can operate as micro-enterprises. Waste Picker Associations that have access to collection facilities – either through partnerships with existing facilities or by leasing properties themselves – can run their operations as small Intermediaries and therefore would be well-positioned to take advantage of the same opportunities as Intermediaries, as outlined below.

The roughly 13,000 Intermediaries occupy a key space for enterprise opportunity due to their processing volume and their ability to link between Recyclers and Marketers or Exporters. With technical assistance around formalizing their operations, support to create bank accounts, and/or small loans to help them purchase processing equipment, vehicles, or lease larger spaces, Intermediaries could not only increase the volume of raw materials purchased and sold, but also engage in more value-added activities such as cleaning or pressing. For example, if an Intermediary was able to purchase a plastic bottle pressing machine for their facility, they could increase the volume of materials stored as well as sell the plastic at a higher price point to large buyers who only purchase plastic pre-pressed.

Another opportunity for growth for Intermediaries would be improved buyer relationships, especially with the large Industries and Exporters that transform (Stage #5) plastic, paper, cardboard, and metal into products for final consumption (Stage #6). The primary barriers for Intermediaries to engage in these sought after relationships have been insufficient volumes to meet demand, inadequate sorting processes resulting in deliveries of mixed goods (i.e. white paper and cardboard combined rather than separated), inability to deliver products in line with transportation requirements, and a lack of bank accounts or integration into a formal financial system. Based on our assessment, we believe there are a number of ways in which to address these constraints. These include increasing Intermediaries' storage and processing capacities, aggregating their supply with other Intermediaries in order to meet the higher buyer thresholds, and supporting efforts in formalizing operations such as creating bank accounts, registering vehicles, and using electronic payment processes for streamlined invoicing. If Intermediaries were able to access these larger buyers, we believe that they could increase their monthly income by as much as 50% to 60%.

There is great potential for expansion and market disruption, but given the varied capacities and levels of formalization that exist amongst Waste Picker Associations and Intermediaries, investment should be coupled with technical assistance both at the enterprise level and at the local and regional levels. For example, support in advocating for separation at source policies, arrangements with municipalities for collection routes, and increasing awareness of the importance of recycling are all necessary investments

that support the industry, and eventually the profitability, of these actors in this segment of the supply chain.

Model for Success

For more than a decade, Ciudad Saludable has worked to establish a new model for empowering highly successful social enterprises in Peru's recycling sector. Beginning at the bottom of the value chain, Ciudad Saludable has organized informal waste pickers into collectively managed recycling associations that generate employment and income for thousands of recyclers. At the top of the value chain, they have helped improve linkages between buyers and suppliers and promoted the social value and impact of recycling operators. Finally, at the heart of the value chain, they have launched a dynamic set of successful enterprises known as *Centros de Acopio de Residuos Reciclables* (CARRs) that offer a unique model for enabling actors that purchase and sell recyclable materials to maximize the regulatory, market, and technical opportunities and benefits of Peru's new recycling economy.

SECTION 2: INCLUSIVE RECYCLING MODELS

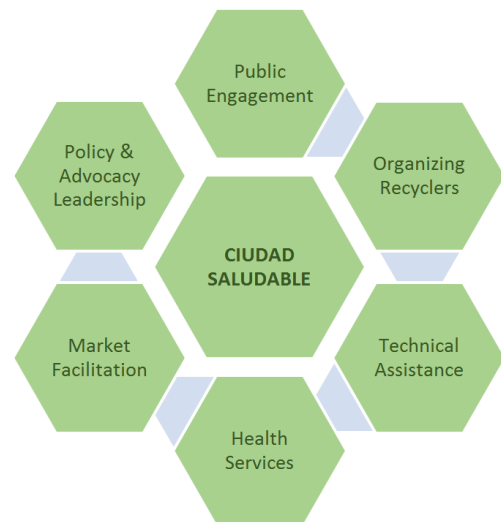
CIUDAD SALUDABLE

Ciudad Saludable is a Peruvian non-governmental organization (NGO) founded in 2002 with a mission to build healthy and inclusive cities. To achieve this, the organization proposes a model of environmental citizenship and sustainable management for the mitigation and adaptation to climate change from the inclusive recycling value chain. Their work is broken into three major programmatic areas: 1) inclusive recycling, 2) environmental education and communication, and 3) integral management of solid waste.

CS was founded by the Peruvian environmental leader Albina Ruiz, who was inspired to work with waste pickers originally to address the social and economic deprivations of this community of more than 100,000 highly vulnerable people in Peru. Albina conceived of an organization that enabled workers at the bottom level of the waste management value chain so they could secure greater access to and income from higher, more complex levels. In addition, she saw the opportunity to empower these waste pickers to become stewards of a burgeoning environmental movement by playing a central role as recyclers (*recicladores*) in a locally led recycled waste management system. By linking the marginalized people who handle waste with a national environmental movement in search of solutions to waste management, CS created a highly innovative model that has become internationally recognized and replicated throughout the region.

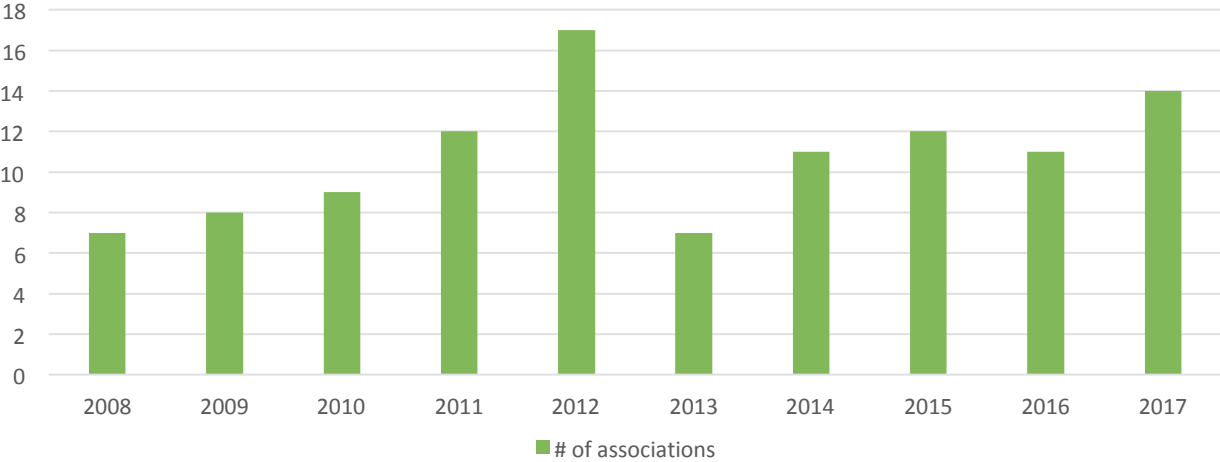
CS began its work to help address the systemic poverty, and by extension terrible living and health conditions, faced by Peru's waste pickers who survive on the collection and sale of recyclable waste found in open dumps and streets throughout the country. CS has organized thousands of Recyclers into informal and formal Associations of up to 50 members who work collectively to manage waste and strengthen their bargaining power as organized cooperatives. CS regularly relies on Association members who previously worked on dumps to help provide validation and build trust as they organize in new locations where local recyclers are not familiar with them and are often reticent. CS has a well-established set of tools and curricula to deploy in helping facilitate the transition of recyclers to associations and on to sustainable waste management enterprises. Over

Figure 10: Ciudad Saludable Framework



time, these Associations develop into more formal micro-enterprises, supplanting Intermediaries (*acopiadores*) and selling directly to higher level Marketers and Industries and Exporters at a better price and volume.

Figure 11: Association Growth per Year

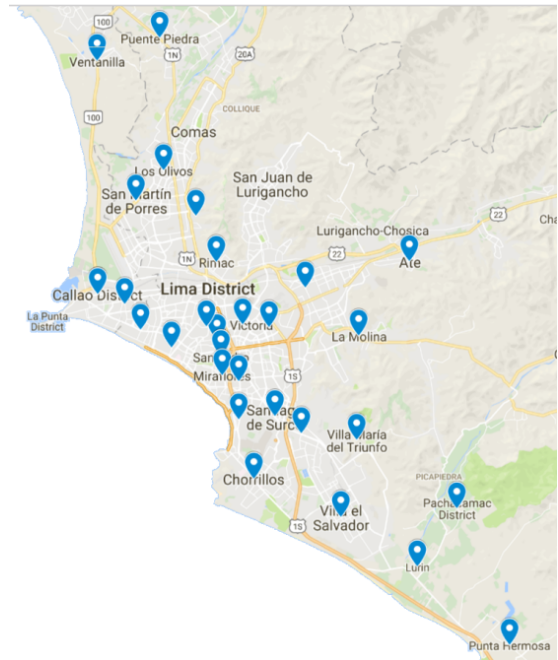


CS innovated a new business model for these Associations through the negotiation of a legal framework that allowed recyclers to be integrated into the municipal waste management systems mandated by the national “waste picker” law. The new law enabled the waste picker Associations to service household and business selective waste collection needs in sections of the municipalities where the associations operate. This gives them exclusive and reliable access to recycled waste and a legitimacy afforded by the agreement with the municipality (for example, formalized Associations wear the municipal logo on their protective uniforms). In addition, municipalities work with Associations to secure low cost leases for space where the associations sort and store the collected recycled waste. Securing these spaces is the foundational step towards the recycler owned and operated *Centro de Acopio de Residuos Reciclables* (CARRs). In addition to enabling the enterprise success of recyclers, CS facilitates the provision of health services, labor protections, and social benefits afforded by right under the “waste-picker” law. To date, CS has organized over 11,500 recyclers into Associations that serve the recycled waste collection needs of thousands of individuals and households across Peru. Through these associations and the municipalities with whom they partner, CS has elevated the importance of recycling and the recycled waste value chain for millions of Peruvians.

Figure 12: Ciudad Saludable in Peru



Figure 13: CARRs Operating in Lima



To further enable the market for these recyclers and to advance the environmental movement that they support, CS also leads education, advocacy and public awareness programs in partnership with government, the private sector, and other stakeholders throughout Peru. These awareness campaigns help strengthen the waste management systems by changing behaviors around sustainability and trash; as more residents and businesses are targeted and learn about segregation programs and inclusive recycling, they are more likely to participate in recycling programs and, therefore, provide a steady supply of materials for waste pickers and CARRs.

CS is a highly dynamic organization that operates on multiple levels, but the key components of their work include public engagement, organizing recyclers, technical assistance, health services, market facilitation, and policy and advocacy leadership. Each component is weighted and applied differently across each of their programmatic areas, but are equal pillars in an integrated organizational model that engages all actors in waste management and environmental stewardship in Peru.

Since its founding in 2001, Ciudad Saludable has sensitized 9 million people in Latin America to the issues inherent in solid waste management through education and communications campaigns, trained 6,000 informal recyclers, formalized 11,500 recyclers in formal selective collection routes benefiting 5.6 million Peruvians, and

worked with more than 200 municipalities to improve solid waste management. With a desire for holistic engagement, a wide-reaching ability for community and government engagement, and technical expertise in solid waste management, Ciudad Saludable has created an innovative social enterprise model that addresses many of the challenges facing key actors in the recycling supply chain. Over the last ten years, Ciudad Saludable has established a uniquely successful model to empower highly successful social enterprises in the recycling sector.

CENTROS DE ACOPIO DE RESIDUOS RECICLABLES (CARRs)

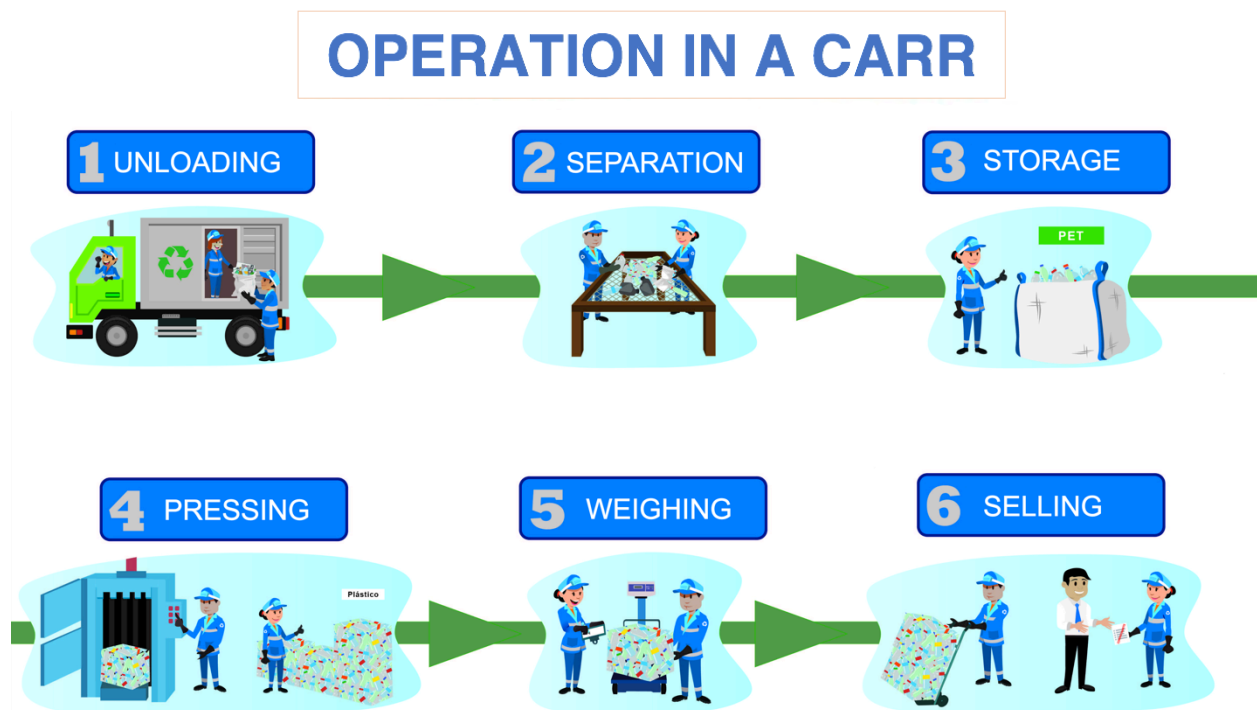
Ciudad Saludable's *Centros de Acopio de Residuos Reciclables* (CARRs) are social enterprises that facilitate partnerships between Recycling Associations and municipal governments. In this approach, municipalities and waste pickers formally organize into Associations (Waste Picker Associations) and establish contracts or cooperation agreements for performing collection services and/or recycling. Once established as Associations and operating as CARRs, these Centers function as legally recognized microenterprises with significant opportunity for valorization. Through their recycling activities, they advance a culture of inclusive recycling by delivering comprehensive services that contribute to the incomes of waste pickers, deliver vital environmental services, provide materials for local industries, and generate sustainable livelihoods for low-income citizens. The CARRs also have the advantage of working with all actors in the supply chain – CARRs buy and store materials on behalf of recyclers, sell processed or unprocessed materials to Marketers, and engage directly with large industries such as San Miguel Industrias, S.A. and single-product Exporters and processors such as Siderperu, a Peruvian steel and iron company, for scrap metal and other products. CARRs broaden their sources of income by working with private and public sector partners and lower the overall costs of recycling for municipalities, as well as contribute to national competitiveness and environmental sustainability. Therefore, CARRs offer a hybrid model combining traditional roles previously carried out by multiple actors into one efficient and sustainable entity.

The first CARR was established in 2011 and at present there are 35 CARRs operating across Peru. On average, a High Capacity CARR services 14,300 households, institutions, and companies and is actively engaged in Stages #2 (Recovery), #3 (Commercialization), and #4 (Conditioning). They collect and store an average of 850 tons per year, or 71 tons per month, and partner with between 1 to 10 Waste Picker Associations, thus providing reliable income to as many as 200 waste-workers.

OPPORTUNITY TO SCALE CARRs

CARRs operate at varying levels of low and high capacity based on capacity for efficiencies in inventory management, processing, and sales. Each CARR follows a six-stage process in processing, storing, and selling the materials. Waste Picker Association members serve in a variety of different roles at the CARRs, including in the CARR's administrative offices handling sales, inventory, and relationships with private sector buyers and government actors, while others work exclusively on activities related to selective collection and processing, including as collection vehicle drivers, sorters, and processors. CARRs also provide Waste Picker Association members with technical trainings and have conference rooms used for meetings by Association management with buyers, locker rooms with showers for workers, and lunch spaces.

Figure 14: CARR Operations



“Low Capacity” CARRs operate with limited capacity for collection, small areas for material collection, storage, and segregation, and significantly fewer association-affiliated waste pickers. These CARRs have between 5 and 10 employees and are defined as enterprises earning up to \$50,000 per year. These Centers often require upgraded equipment and enhanced infrastructure to grow their capacity and meet the needs of customers with greater efficiency and scale.

Figure 15: Photos of Low Capacity CARRs



As shown above, low capacity CARRs lack storage units, advanced technology, and infrastructure to engage in higher volume collection and processing. For example, these Centers may require inventory management shifts from unorganized and unsorted recyclable waste to bagged and separated collection areas that improve productivity and efficiency, or upgraded equipment and enhanced infrastructure to grow their capacity and meet the needs of customers with greater efficiency and scale. In addition, low capacity CARRs work to design, expand, and implement residential and business routes for selective collection of recyclable waste.

“High Capacity” CARRs operate with 10 to 100 employees, function more efficiently and utilize more modern technology, including defined areas of segregation and upgraded technologies to enhance collection and processing. High Capacity CARRs earn between \$50,000 and \$150,000 per year. These CARRs have invested in infrastructure upgrades, including adding or enhancing bathrooms, buying more collection vehicles, and investing in additional chippers, pressers, and segregation tables. In addition, High Capacity CARRs have successfully designed and implemented broader routes for selective collection of recyclable waste, working directly with the municipal governments to establish proper documentation and certification.

Figure 16: Photos of High Capacity CARRs



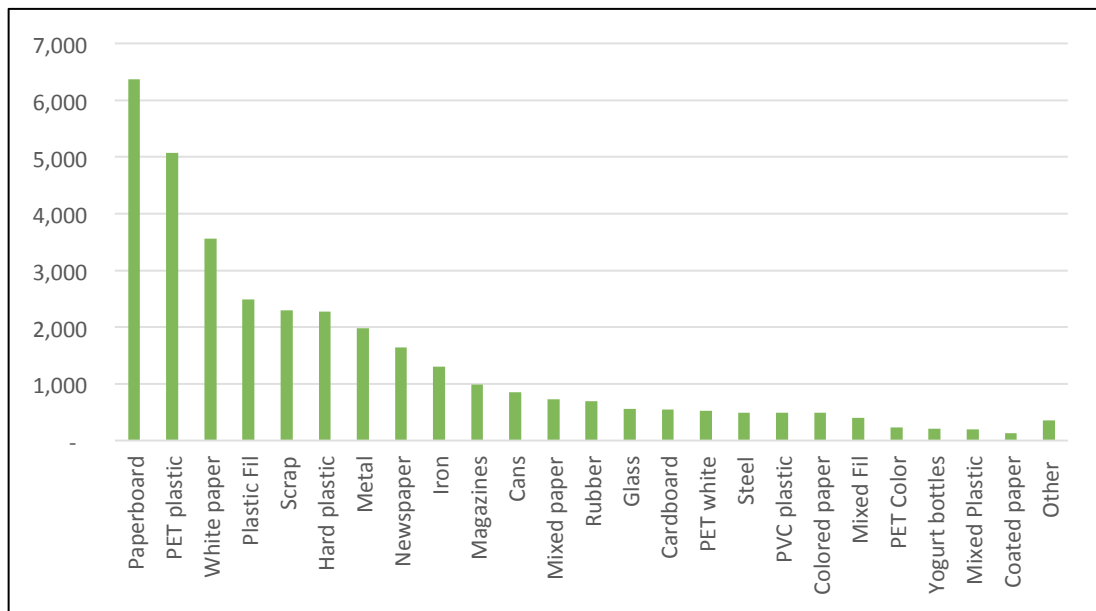
At this point in the process, many of these enterprises are operating at a high enough capacity that they are operating as Marketers and have partnerships with large firms, such as bottling companies like San Miguel Industrias, the top bottling company in Latin America. These CARRs have agreements with local governments for official routes and services, thereby gaining access to long-term supplies of recyclable materials in residential and business neighborhoods. These partnerships guarantee a steady supply of recyclable materials and many firms have committed to continuing to work with Ciudad Saludable associations and increase their supply to the CARRs. As seen in the photos above, these CARRs have access to technology and infrastructure that ease the burdens around collection, storage, and processing, but still have room for growth through increased investment. Ultimately, CARRs at “high capacity” have the opportunity to take greater ownership of the market and optimize their services.

Opportunity Spotlight – For both low and high capacity CARRs, there is a need for stronger infrastructure, access to upgraded and new technologies, access to capital, and improved buyer relationships. There are unique opportunities for both low and high capacity CARRs to capture a larger share of the market and become more competitive in Stage 3 (Commercialization), Stage 4 (Conditioning), and Stage 5 (Transformation) in the value chain.

As part of this assessment, we surveyed 4 Waste Picker Associations and 21 CARRs about their existing operations, challenges, and opportunities for expansion. The majority of those surveyed were Low Capacity CARRs with an average operating and

storage space of approximately 70 square meters, processed approximately 1.2 tons of recycled material per month, and employed 10 people. The primary materials collected and stored are Paperboard, PET Plastics, White Paper, Plastic Fil, and Scrap. Of the 16 CARRs surveyed, they collectively process approximately 34,900 kilograms per day. Based on a financial analysis of their operations, their annual income ranges between \$35,000 and \$150,000 per year. The Associations and CARRs surveyed highlighted the challenges often associated with Intermediaries.

Figure 17: Materials Processed Per Day of Surveyed CARRs, Kilograms



Most CARRs surveyed operate within the Commercialization Stage (#3) of the supply chain, limiting their operations to the purchase, storage, and sale of recycled materials. While some CARRs do some types of conditioning such as cleaning or pressing (Stage #4) and others take part in the Transformation Stage (#5) such as chopping of PET materials, the majority remain engaged in Commercialization Stage (#3) of the supply chain.

A common reason for their lack of engagement in Stage #4 and Stage #5 is due to their small size and limited financial and business capacity. For example, many CARRs operate with very minimal working capital. With such low working capital balances, it is clear that they have little ability to plan for unexpected expenditures, save for future growth including moving to large locations or purchasing equipment, or even sufficiently manage daily operations. With a slightly higher working capital balance, they would have the flexibility to ride out market price fluctuations by choosing to store their recyclable material for longer periods of time rather than having to sell them

immediately in order to keep operations moving. Furthermore, many have limited avenues in which to address this constraint, as most have not accessed formal credit mechanisms. The reasons cited for not pursuing bank loans were a lack of familiarity with the banking system and how to engage in it, limited use of bank accounts, and for those that do not own their properties, a lack of collateral to secure financing. Of those surveyed, only 7 CARRs – all in Lima – have accessed a bank account.

With limited financial flexibility, these entities are stuck in their current state of operations – unable to store more material, even if they could collect it, unable to process material because they do not have the financing to purchase the needed equipment, and unable to secure higher price points for their materials because they cannot generate the volume needed to partner with the larger Marketers and Industries or Exporters. That being said, it is clear that they have the potential to address all of these constraints and are primed to do so with the right package of investment, technical assistance, and market access. For example, based on our analysis, a typical press has a production capacity of 768 bales per month, which would generate an output of approximately 50 tons per month of PET – significantly expanding these Associations and CARRs current production capacity. With the pre-pressed materials, they could now sell the PET at 1.70 soles/kilo compared to 1.04 soles/kilo of the unpressed plastic. The cost of energy, labor, and machine depreciation would be approximately 0.30 soles/kilo resulting in an additional gain of 0.40 soles/kilo. An average CARR stores approximately 47,000 kilos of PET per month, resulting in an increase in monthly income of as much as 19,000 soles (\$5,800). Another example is the conditioning of hard plastic by washing and drying it. Unprocessed hard plastic sells for approximately 1.26 soles/kilo whereas once it has been washed and dried, it can be sold for around 2.60 soles/kilo, more than doubling the price. Additional conditioning processes include chopping, grinding, and packing recyclable material all of which can result in larger portions of the value chain being captured by CARRs.

Figure 18: Constraints to and Opportunities for CARR Growth

Goals	Practical Challenges	Solutions
Increase Supply of Collected Material	Inadequate Facility Space	<ul style="list-style-type: none"> - Larger spaces - More efficient layouts, - Dedicated spaces for processing stages such as storage areas, unloading areas, and separation workspaces, - Improved working conditions including bathrooms and locker rooms
	Insufficient Storage Infrastructure	<ul style="list-style-type: none"> - Stacking and modular containers - Scaffolding and ladders - More efficient layouts - Equipment to condense size of materials (i.e. pressing, grinding, compacting, etc.)
Increase Processing Volume	Insufficient Technologies	<ul style="list-style-type: none"> - Vehicles (i.e. trucks, scooters, and <i>motofurgones</i>) for expanded collection capacity - Processing equipment (i.e. pressers, washers, shredders, compactors, segregation tables, carts, and scales) - Office equipment (i.e. desks, computers, printers, smart phones, Internet access) - Digital Financial and Payment Systems - Bank Accounts - Computers for Electronic Records
		Inadequate Safety Equipment
Increase Processing Capacity	Weak or Insufficient Technical Capacity	<ul style="list-style-type: none"> - Technical training and assistance on new technologies, business management, government engagement, marketing and buyer relationships, and safety procedures for complex materials
		Insufficient Working Capital
Strengthen Relationships with Buyers	Insufficient Volumes and Quality for Large Buyers	<ul style="list-style-type: none"> - Pool collected materials with other CARRs to increase volumes - Vehicles for expanded collection capacity - Large physical spaces - Efficient use of existing spaces - Technical trainings on processing including proper sorting techniques and equipment operation - Vehicle licensing and registration (for transport to buyers)

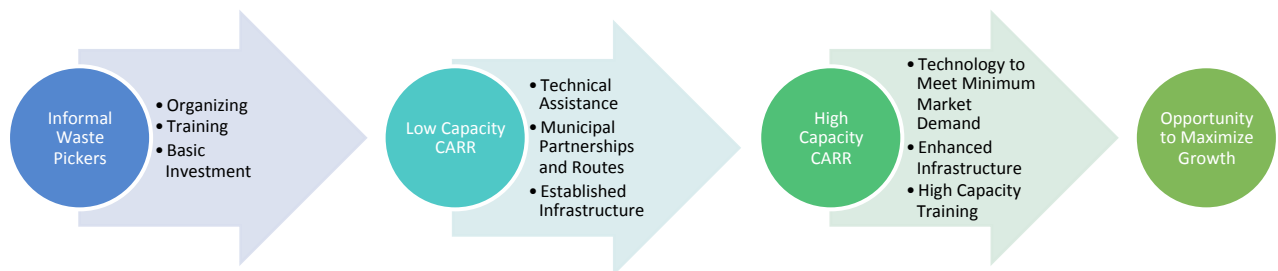
More broadly speaking, Associations and Low Capacity CARRs are unable to capture a larger share of the value chain and position themselves for growth. The various stages of professionalism influence their sustainability and dependency as legitimate actors in the value chain as purchasers seeking to work with formal, professionalized enterprises with a high capacity to meet demand and increase the value of the recyclable product. As supply continues to increase and the demand for recycling and recyclable materials grows, CARRs face the opportunity to meet the discrepancy between collected recyclable materials and the market head on. Many CARRs rent machinery and equipment for sorting and processing recyclable materials for several years, an expensive and labor-intensive process. Investments in basic technologies to maintain activity and in new equipment that handles more diverse materials, such as conveyor belts, hydraulic presses, and automatic compactors, broadens the economic activity and sustainability of the CARR. Formalizing their operations by creating bank accounts, digitizing financial records, and creating electronic invoicing system strengthens their management practices, increases efficiencies, and positions them to access financing and larger buyers who operate exclusively with online payment systems. CARRs operating at a higher capacity also have room for growth and improvements through linkages to larger buyers, expanded collection routes and processing capacities, and improved business management practices. The opportunity to meet market demand is within reach.

Opportunity Spotlight – Both Low and High Capacity CARRs serve a critical role in formalizing and professionalizing both the Recycler and Intermediary segment of the recycling value chain. With the right combination of targeted investment, technical assistance, and market facilitation, Low Capacity CARRs have the potential to scale up to High Capacity CARRs, thus capturing larger portions of the value chain. High Capacity CARRs have an opportunity to expand their reach, partner with larger and more professional buyers, and continue to grow the profitability of their enterprises.

OPPORTUNITY TO CREATE CARRS

In addition to enabling the growth of existing CARRs, there is an opportunity to invest in and develop new Collection Centers. The development of new CARRs shifts the formalization of the waste management system one step closer to meeting and strengthening market demand, finishing the circular economy, and strengthening the waste management sector as a whole. Associations entering the market seek to professionalize and diversify activity at the base of the Pyramid, and require robust infrastructure, equipment and technology, and training and leadership to achieve economic activity and develop into sustainable microenterprises.

Figure 19: CARR Lifecycle



The shift from informal recycling to becoming part of the formalized, collector tier begins with the recruitment and organization of at least five informal waste pickers working at dumps and in public spaces, into Waste Picker Associations with formal leadership structures, management processes, and government recognition. Informal recyclers are drawn from poor and vulnerable sectors of society seeking the relatively easy, albeit hazardous, access to waste and the immediate value associated with its sale. With poor opportunities and insufficient earnings, informal pickers are unrecognized and unprotected actors in the waste management system – despite playing an obvious, critical role in the market.

During the formalization process, Associations are trained to meet the requirements established by Law 29419 as well as municipal and district requirements. In addition, the formalization process addresses personal, familial, health and other challenges workers face, as well as the governance and organizational capacity necessary to run a successful recycling microenterprise and link with secondary value chain actors, including sourcing agents, recycling companies, and exporting firms.

Once formalized and licensed by the government, each Recycling Association is linked to a Collection Center, or CARR, that handles collection management, storage, and

separation of products. The lifecycle of onboarding new CARRs begins with the transition of informal waste pickers into organized associations that grow into financially sustainable businesses and moves through a certification process regulated by the municipal government. On average, it takes 2 months and a minimum working capital of \$400 USD to formalize and certify a Waste Picker Association.

One of the main benefits of becoming a formally registered Association is the possibility of entering into agreements or contracts for recycling programs and routes that include participating households or businesses that implement separation at source waste disposal. The breakdown of goods in households, commercial offices, factories, and public waste bins, raises the productivity and incomes of waste pickers. This linkage not only expands the window of business opportunities and social inclusion for the recyclers, but also adds value to recovered waste and strengthens the recycling and waste market. Furthermore, after the formalization and licensing process, Centers gain access to funds from Peru's *Fondo de Garantía Empresarial* (Entrepreneurial Fund, or FOGEM) and the ability to participate in the export market.

As a critical economic group in the recycling chain, waste pickers' activity has substantial economic impact that is currently being lost. Incorporating informal waste pickers into the waste management and recycling system enables the expansion of Peru's recycling sector and presents the opportunity for Peru to overcome the discrepancy between formal collection and informal activity, as well as empower marginalized workers. In partnership with governments, the municipality provides the regulatory and legal framework for operation while waste pickers provide labor. Strengthening and formalizing the capacity to link to private and public sources is intricately linked to long-term sustainability of these enterprises; through partnerships with local governments and firms, the CARRs are recognized as formal entities operating in the waste management sector and have agreements with local governments for official routes and services, therefore gaining access to long-term supplies of recyclable materials in residential and business neighborhoods. In addition, by formalizing and organizing into associations or cooperatives, waste pickers secure economic enfranchisement, social benefits, and gain more equitable participation in the market.

Similar to "low capacity" CARRs, these Associations require an infusion of both working capital and technical assistance to strengthen the culture of recycling, while enhancing the capabilities of their members by providing them with the technical knowledge and access to succeed. For an Association to grow into a sustainable Intermediary-level microenterprise that handles high-level and high-volume collection, storage, processing, and/or transformation, workers must have the technical expertise on health and sanitation, inclusive recycling, and business management practices. In addition to

technical skills, workers require personal protection equipment to not only protect the recyclers from the innate hazards of their work, but also help add credibility and legitimacy through the uniformity and professionalism of the equipment. Other activities, such as creating linkages with local governments to help recyclers access existing public health services and government programs such as Seguro Integral de Salud (SIS), Peru's public health system, and Pensión 65, the state-run pension program, empower the recyclers with the necessary resources and skills to work with dignity and embeds their work in a formal, organized labor sector with public and private support.

Opportunity Spotlight – Given the untapped supply of recyclable materials, the creation of new CARRs enables inclusive economic growth for informal waste pickers and transitions them into formal Associations operating high functioning social enterprises. With its grassroots nature, minimal investment requirements, and established model, the creation of new CARRs is an extremely viable opportunity to expand the number of profitable, small and medium enterprises in the recycling sector.

SECTION 3: OPPORTUNITY LANDSCAPE

In recent years, authorities at the local and national levels within various countries across Latin America have experienced growing concerns over how they can undertake integrated waste management with a focus on sustainability and social and economic inclusion.

The growing commitment to green city management in Latin America is driven by policy priorities related to the social, health, and environmental impacts of high urbanization rates and renewed social responsibility practices. Over the last ten years, in efforts to keep pace with rapid expansion, cities across the region have moved to strengthen waste management to optimize growth patterns. Despite this, recycling is still limited, with less than 3% of solid waste generated in Latin America separated at the source and recycled. Recycling activities performed by informal waste pickers – the majority of whom are poor and socially marginalized – are responsible for up to 90% of the recyclable waste recovered from the waste stream.

Informal recycling has become an employment opportunity for thousands of people operating at varying tiers of the recycling actors pyramid. Despite their importance in the value chain, they face numerous obstacles to growth and professionalization. Across the region, common challenges for Recyclers range from dangerous working conditions and lack of access to social and health services, inadequate access to financial services, as well as legitimacy, and inconsistent volume collection – and thus, earnings. These constraints carry over to other tiers of actors, including Intermediaries, who are similarly hampered from growth due to informal operations, inconsistent supplies, and a lack of investment.

In response to these challenges and building upon a regional commitment to social and economic development and environmental sustainability, countries such as Peru, Colombia, and Brazil have developed inclusive policies and legal frameworks to drive the implementation of integrated and inclusive sustainable waste management systems. These frameworks aim to not only recognize the entire recycling value chain and waste management sector, but also empower key stakeholders including recyclers, municipalities, and firms to create efficient, responsible recycling systems.

OPPORTUNITIES OVERVIEW

For the purposes of this report, GFI and Ciudad Saludable assessed the multiple programs, priorities, and market machinations associated with the formalization process and the micro and small recycling enterprises within the recycling value chain. The goal

of this assessment process was to identify opportunities to significantly expand market and enterprise growth in the recycled waste value chain. From this assessment, three areas of opportunity were identified to engage the sector and launch, formalize, and further capacitate key market actors and enterprises. Each opportunity may be considered independently, but there are links between each, and combined they represent a significant chance to transform waste management system in Peru to a truly integrated locally owned, market-oriented system.

Opportunity 1: Formalize Recyclers

Given that the majority of Peru's more than 109,000 recyclers are informal workers, there is a clear opportunity to expand engagement with these actors to integrate them into the formal waste management framework. Recyclers are already entrenched in the recycling value chain of Peru, providing a key first link in the chain of recycled waste moving from dumps to Intermediaries, Marketers, and Industries and Exporters. In some municipalities, Recyclers represent one of the only providers of recycled waste collection, but they still operate at the margins and in deplorable conditions despite this key role.

For Recyclers, the primary opportunity is to support their formalization into Waste Picker Associations, which can operate as micro-enterprises. The formalization process recruits informal waste pickers and addresses personal, familial, health and other challenges workers face, as well as the governance and organizational capacity necessary to run a successful micro-recycling enterprise. These Associations are linked with secondary value chain actors, including sourcing agents, recycling companies, and exporting firms. As formal workers, they are able to access healthcare and social security as well as participate in vaccination programs run by government agencies.

There is also a unique opportunity to strengthen financial inclusion of Associations and their Members, the majority of whom are unbanked and rely on cash transactions. Overcoming this challenge early, coupled with financial literacy training, can lead to improved management of personal finances including increases in savings and planning for future expenses for Members as well as improved financial management, capital accumulation, and expanded investments for the enterprises.

Opportunity 2) Invest in Recycling Enterprises (CARRs)

Over time, the formalized Waste Picker Associations develop into higher function enterprises called Centros de Acopio de Residuos Reciclables (CARRs). These Centers function as legally recognized micro-enterprises with significant opportunity for valorization. Section Two of this report provided a detailed overview on the CARR model, but in summary, CARRs are innovative social enterprises that advance a culture

of inclusive recycling by delivering comprehensive services that contribute to the incomes of waste pickers, deliver vital environmental services, provide materials for local industries, and generate sustainable livelihoods for low-income citizens. CARRs are able to go beyond the storage of collected materials and take part in various stages or processing such as pressing, washing, chopping, thus capturing larger portions of the value chain and selling to Marketers, Industries, and Exporters at higher prices and larger volumes.

Given the innovative and inclusive model of CARRs, there is significant opportunity to expand the CARR model. Ciudad Saludable has launched approximately 35 CARRs over the past ten years with each social enterprise able to service as many 14,300 households, collect as much as 70 tons per month, and provide incomes to as many as 200 waste pickers. While each enterprise can operate with a significant footprint, there is room to grow the existing capacity of the CARRs. For example, investments around organizing waste pickers and expanding collection routes of Associations will increase the supply of collected materials while also establishing a reliable income for waste-pickers. Investments and technical assistance to improve the capacity and efficiency in the collection, treatment, and business management of the CARRs will help increase processing volume, reduce costs, and increase sale prices. In addition, stronger financial inclusion of CARRs coupled with improved financial management practices and technologies can help improve efficiencies, financial planning, and access to financial services. Finally, strengthening the link to private and public sources is intricately linked to long-term sustainability of the CARRs. Partnerships with municipalities create reliable sources of supply while providing value services to the community and an income for the waste-pickers. Direct linkages and strong buyer relationships with Marketers, Industries, and Exporters provide diverse sources of income for the enterprises as well as opportunities for collaboration such as buyer investment in appropriate technologies so the CARRs are better positioned to meet their needs.

In addition to investments in the existing CARRs, there is significant room for expansion of the CARR model. The majority of CARRs operate in and around the suburbs of Lima, however, the model is not restricted to those geographic areas and could easily be applied across Peru as well as the region more broadly.

Opportunity 3) – Engaging Intermediaries

Approximately 90% of the supply chain is represented by Recyclers and Intermediaries. Despite the significant volume processed by these actors, the overwhelming majority of both Recyclers and Intermediaries in Peru operate informally and at a relatively small scale. This has limited their ability to take advantage of the growth of the recycling

sector, including selling larger quantities to buyers and capturing additional parts of the value chain.

There are over 13,000 Intermediaries, the majority of which are informal enterprises that trade in the market of recycled waste and operate in municipalities throughout Peru. They tend to operate on the fringes of the value chain and are often considered predatory in their treatment of waste pickers and furtive in the operation of their businesses, but they are also entrenched in the recycling sector. Intermediaries can be found in nearly every municipality in Peru and most have been working in the recyclable waste sector for multiple generations. Most are microenterprises that store and trade materials that have been collected by waste pickers or dropped at their facilities by households or businesses. They tend to work on a cash basis and on a slim margin, and many supplement their income from their recycling enterprises with other work. These enterprises have similarities to low-capacity CARRs in terms of their facilities, their operations, and the markets they engage. However, they lack the advantages CARRs have secured through partnerships with municipalities and the market facilitation led by CS.

By targeting locations that are not currently served by CS associations, and where municipal buy-in is high, there is an opportunity to capacitate Intermediaries and integrate them into a tailored municipal waste management scheme highlighted in the CARR model. Leveraging market opportunities to organize Intermediaries has already proven effective in at least a handful of efforts CS has led. In one highly successful example, CS organized a set of Intermediaries working in scrap metal to collectively sell to Siderperu, a subsidiary of the Brazilian transnational steel company Gerdau. Each of the independent scrap collectors were required to organize into registered micro and small enterprises (MYPE) to facilitate the agreement, which in turn required them to comply with labor provisions and occupational health and safety requirements. Using this model, CS successfully organized 36 independent MYPEs capable of operating with some of the advantages CS has enabled for CARRs.

In summary, because of the potential for growth, all three groups of actors identified – Recyclers, CARRs, and Intermediaries – are well positioned to be formalized and capacitated through the right combination of investment, technical assistance, and market facilitation to help them overcome the constraints that have limited their size and growth potential. Empowering these tiers of actors in the value chain is critical to supporting inclusion, improving working conditions and decent work, and strengthening the sector overall.

CONCLUSION

In its 15 years of work, Ciudad Saludable has demonstrated an unprecedented capacity to generate progress with diverse stakeholders, ranging from informal waste pickers, to government and the market actors at all levels of the recycled waste value chain. Their model and innovative interventions have proven highly adaptable to local conditions and context, but securely integrated into the larger market and regulatory framework in which they operate. As a result, they have earned international recognition for their work and are highly regarded for their leadership and guidance within Peru and throughout Latin America.

In Peru, their advocacy, education programs and public engagement have reached an estimated 9.5 million Peruvians directly or indirectly. Through the regulatory reforms they helped write and pass, they have established a model for locally-led solid waste collection and environmental stewardship that impacts the country as a whole. Through this model, they have organized over 11,500 recyclers into independent associations and enterprises and have launched 35 profit-making, collectively owned microenterprises servicing hundreds of thousands of households and businesses in Peru. These impeccable credentials and proven experience have positioned CS to launch a new phase of work aimed at transforming the value chain for recyclable waste in Peru.

Only 14% percent of waste is recycled in Peru and merely a small percentage of recyclable waste is collected from households and business annually, yet the domestic market for recyclable waste grows each year. These conditions point to an opportunity to expand the CS model and engage informal market actors including waste pickers and Intermediaries who are positioned to operate within the municipal waste collection framework CS has created. By building on CS's successful model of inclusive recycling, formalizing micro enterprises, and expanding market access, there is a meaningful opportunity to transform the waste management sector in Peru.

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