



CASE STUDY — Indonesia, Dominican Republic, Sri Lanka

Creating Economies of Scale for Plastics Recycling

Case in Brief

Alarming levels of plastic are produced every day, much of which makes its way into the environment and our ocean. Of the seven billion metric tons of plastic waste generated globally to date, less than 10 percent has been recycled.¹ For the world to succeed in stopping plastic waste from flowing into our oceans and damaging the environment, much higher volumes need to be collected and recycled at the source: on land. Waste aggregation—the ability to collect or “aggregate” post-consumer plastics or other recyclable material into large enough volumes to make recycling economically practical—is foundational to a circular economy. Clean Cities, Blue Ocean—the U.S. Agency for International Development’s (USAID) flagship program to address ocean plastic pollution under the [Save our Seas Initiative](#)—works in over 25 cities across ten countries to build the capacity of and partnerships between government, the private sector, and local organizations that enable the collection and processing of greater volumes of plastic.

At a Glance

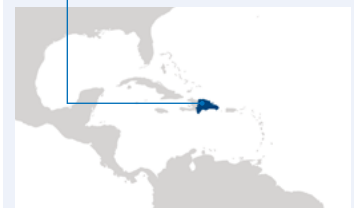
80% Plastic makes up 80% of the waste found in our oceans— from surface waters to deep-sea sediments.²

10% Less than 10% of all plastic ever manufactured has been recycled.³

Indonesia



Dominican Republic



Sri Lanka

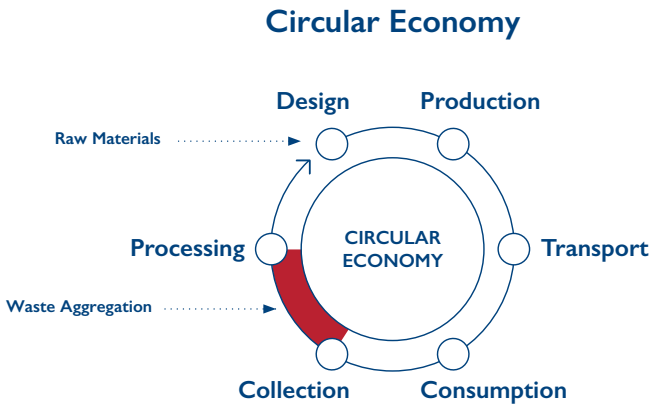


Cover Photo: Women sorting plastic waste at the PT. Prevented Ocean Plastic Indonesia aggregation facility in Semarang, Indonesia.
Photo: Giulia Soria/USAID Clean Cities, Blue Ocean

¹ UN Environment Programme, [Our Planet is Choking on Plastic](#).
² The International Union for Conservation of Nature (IUCN) (2021), [Issues Brief](#).
³ OECD (2022), [Global Plastics Outlook: Economic Drivers, Environmental Impacts and Policy Options](#), OECD Publishing, Paris, <https://doi.org/10.1787/de747aef-en>.

Background

Waste aggregation—collecting post-consumer plastic waste and other recyclable material in volumes large enough to make recycling economically and logistically practical—is necessary to support reliable supply chains that underpin the circular economy.



Dedicated waste aggregation facilities stimulate private investment by concentrating high-quality recyclable quantities. These facilities also support the people that collect the waste—typically informal waste collectors or sanitation workers—to be able to connect clean, uncontaminated plastic with local, regional, or global markets; optimize the value of plastics; and offer reliable prices.

Beyond country capitals, many cities and rural areas in low- to middle-income countries face considerable challenges aggregating sufficient quantities of plastic waste in their communities, most notably because of:

- **Limited collection mechanisms and incentives for households and businesses to separate and recycle waste.** Until waste systems are equipped with dedicated mechanisms to collect and keep recyclable waste separate from other household and business waste—and have the facilities to aggregate and process what is collected—there are limited incentives and options for residents to segregate and recycle their waste. Once developed, policy incentives are critical to support the system.
- **Limited access to facilities for waste management and recycling—and local recycling markets to offtake materials.** Many communities lack the facilities to manage and process collected waste for recycling, preventing them from being able to aggregate and make materials available to the recycling market. As a result, local recycling markets have not been established and plastic materials that are collected for recycling are often stockpiled or landfilled in cities that do not have purchasers and viable markets for recycled materials.

“These areas [outside of the country’s capital of Jakarta] have traditionally lacked any kind of formal waste management infrastructure, so to introduce these new [plastic aggregation] centers is a privilege... as someone from here, it means a lot to be part of the solution and provide income opportunities for Indonesian workers and their communities.”

– Daniel Lawrence Angelo Law

Director of Prevented Ocean Plastic Southeast Asia

- **Insufficient investment in local recycling businesses, including the informal sector.** In many countries, the private sector does not consider plastic recycling to be a lucrative business and offers little or no investment in it, resulting in a lack of growth. While the informal waste sector is predominantly responsible for collecting recyclables, there is little support to establish systems to efficiently receive and integrate these materials into the recycling chain.
- **Uncertainty of consistent high-quality plastic materials or “feedstocks” to process.** Growing markets and recycling facilities require consistent feedstocks and secondary processors and manufacturers that are able to purchase and use these recycled materials. Before plastic waste is sold to offtake partners for further processing, it needs to be cleaned and often sorted by plastic type to retain its value.

To stem the tide of ocean plastic pollution, local governments need to prioritize investment in sufficient collection and aggregation infrastructure and businesses to increase the volume and quality of plastic material required to advance circular economies, but also to support the people responsible for collecting the waste.



Women sorting plastic at the PT Prevented Ocean Plastic Indonesia aggregation facility in Semarang. Photo: Giulia Sorial/USAID Clean Cities, Blue Ocean

Our Approach

USAID employs a local systems approach to advance circular economies. Together with its partners, Clean Cities, Blue Ocean promotes waste aggregation to create economies of scale needed to advance local circular economies and build comprehensive solid waste management and recycling systems.

USAID’s Local Systems Approach to Building Circular Economies

USAID’s approach stresses the importance of “3R” (reduce, reuse, recycle) practices to address plastic pollution. Recycling, however, requires efficient systems to be able to collect, aggregate, and sort solid waste in large enough volumes to make recycling an economically viable and attractive option.

As waste management is typically the responsibility of local governments, **USAID works through local systems, bringing together stakeholders from government, the private sector, the informal sector (waste collectors), and civil society to create a comprehensive systems approach to waste management**—to prioritize and implement plastic waste aggregation and recycling centers as integral components of strong, sustainable solid waste management systems and circular economies.

USAID in Action: Investing in Recycling Infrastructure

Clean Cities, Blue Ocean is partnering with [Prevented Ocean Plastic Southeast Asia](#) (POPSEA), a plastic recycling company providing traceable plastic to global buyers; POPSEA's local subsidiary, PT. Prevented Ocean Plastic Indonesia (POPI); and [Circulate Capital](#), a leading circular economy investment management firm, to expand recycling infrastructure in Indonesia through new aggregation and collection centers in Semarang and Makassar cities that optimize the volume and value of plastic waste. The partnership blends public and private financing with the strength of USAID's technical expertise to advance local, well-positioned recycling companies that reduce the plastic entering our ocean.

The partnership initially focused on the city of Semarang—one of the largest cities on the island of Java—to support the expansion of POPI's aggregation facility to become a regional hub to export high-quality plastic to the global recycling market. With USAID support, the aggregation center is now fully equipped to shred (or densify) plastic materials to be processed and recycled in volumes large enough to establish a strong local recycling market, improve logistic efficiencies, and reach international buyers. The aggregation center now has a much higher capacity and is capable of processing 500 metric tons of recycled plastic per month—the equivalent of over 54 million plastic bottles.

A focus of the work is building inclusivity, better livelihoods, and safer working conditions throughout the waste value chain—to ensure informal waste collectors, especially women, can participate and are recognized in the local waste system. The center works directly with informal waste collectors to bring materials to the aggregation and collection facilities, which offer them training on how to clean and sort plastics to optimize their value; establishes price standards; and provides safe working conditions where collectors can sort the waste. The efforts enable the informal sector to provide higher quality, clean materials so that they can earn higher wages.

POPI's second USAID-supported facility—in Makassar—is also now fully operational and capable of processing 400 metric tons of recycled plastic per month. The organization plans to develop 25 similar aggregation facilities in underserved areas across Indonesia to create more consistent and valuable markets for plastics.



PT. Prevented Plastic Ocean Indonesia's aggregation facility engages members of the informal sector as part of their supplier network, with trainings to empower and increase the skills of women collectors. Photo: Giulia Serial USAID Clean Cities, Blue Ocean



A woman sorts waste at the PT. Milion Limbah Ambon recycling center.
Photo: Giulia Sorial/USAID Clean Cities, Blue Ocean

USAID in Action: Improving Logistics to Promote Recycling

Clean Cities, Blue Ocean is partnering with Milion Limbah Indonesia, an end-to-end plastic recycling business in eastern Indonesia with a focus on low-value plastics collection and recycling. The partnership seeks to improve logistics and build efficiencies in the recycling system by bringing recycling facilities closer to the source of the aggregated waste.

In the City of Ambon, Clean Cities, Blue Ocean's local grantee, PT. Milion Limbah Ambon—a subsidiary of Milion Limbah Indonesia—supported the city to develop its first recycling center in the village of Hutumuri, with several collection centers strategically located in the city center. Milion Limbah partnered with the local government, which provided the land for the facility, and in return established the facilities which manage a significant amount of the city's recyclable waste, provide green jobs for the community, and improve conditions for the city's waste and recycling workers. This hub and spoke network contributes to the surrounding region's circular economy, not only providing collection, sorting, and recycling, but also raising awareness of the circular economy for Ambon's citizens.

With support from Clean Cities, Blue Ocean, PT. Milion Limbah Ambon is also implementing new recycling processes to improve the quality and value of the plastic collected. For example, the recycling center now uses a pelletizing process that—once the plastics are cleaned and shredded—melts the plastic flakes into granules, while removing excess dirt and contamination. This increases the value of the finished materials by as much as 30 percent and, by compressing the material, reduces the cost of transporting the finished products to the end user. These cost savings can be significant, particularly for operators in small or island-based cities (such as those on Indonesia's more than 18,000 islands) that must ship pellets to buyers in larger markets.

USAID in Action: Securing Feedstocks for Expanding Recycling Systems

Clean Cities, Blue Ocean is supporting local actors in Samaná Province in the Dominican Republic, a popular tourist destination located nearly three hours from the capital, Santo Domingo, to build integrated, sustainable recycling systems, backed by informal waste collectors and entrepreneurs.

To increase plastic recovery and recycling rates, USAID and its partner, Sostenibilidad 3Rs, initiated plastic bottle collection points where the community, a network of hotels, and local schools bring their plastic waste for recycling—and, in parallel, supported local recycling businesses, such as Reciclajes Bahía (Recycling Bay), to expand their operations to collect the plastic waste. With program support, Reciclajes Bahía, which was started by an informal waste worker, registered as a recycling business and entered into an agreement with Cilpen Global—the country’s first and largest material recovery facility in the Dominican Republic—and now sells plastics as well as other recyclables at a set, market rate. USAID provided Reciclajes Bahía with critical equipment—including a new collection truck and generator to power its off-grid facility—to enable the business to continue expanding its collection business to serve major waste hotspots, such as Samaná airport. Through this business, plastic waste from Samaná Province is returning to the country’s circular economy for the first time.

USAID in Action: Securing Investment in Aggregation and Recycling Infrastructure through Extended Producer Responsibility Legislation

In Sri Lanka, USAID supported the development and piloting of the country’s first voluntary Extended Producer Responsibility system, which has stimulated investment in local aggregation and processing facilities to collect and recover recyclables.

In Sri Lanka, Clean Cities, Blue Ocean partnered with the Ceylon Chamber of Commerce to pilot a voluntary EPR scheme in preparation for an envisioned mandatory nationwide collection and reporting system. The EPR system—which requires companies that produce and sell plastic products or use plastic packaging to become responsible for funding and managing the collection, recycling, and safe disposal of the plastic waste—has secured nearly \$300,000 to date in private sector investment to develop twelve material recovery facilities that will support the additional demand for material processing created by the EPR system.

In addition to private sector-led developments, Clean Cities, Blue Ocean supported partner Municipal Councils to open and operationalize new material recovery facilities. In early 2024, with USAID’s support, the Kaduwela Municipal Council opened the first of four planned plastic recycling centers



USAID provided critical equipment to local recycling company Reciclajes Bahía (Recycling Bay), which has entered into an agreement with Cilpen Global, the country’s first recycling facility. Photo: Melinda Donnelly/ USAID Clean Cities, Blue Ocean



that will sort, clean, bale, and crush large quantities of plastic for commercial recycling. Clean Cities, Blue Ocean provided essential machinery and equipment to the recycling center; including a crusher and baler machine, scales, trolleys, sorting tables, e-bikes with trailers, and jumbo collection bags. Facility workers also received safety equipment such as first aid kits, personal protective equipment, and fire extinguishers. Informal waste collectors that will support the centers also received handcarts and backpacks to collect materials, new uniforms, and personal protective equipment kits with training. USAID also supported the development of an Informal Waste Collectors' Association, enabling informal collectors to register with the municipality.

Impacts

Effective waste aggregation is critical to the long-term success of solid waste management systems. Through Clean Cities, Blue Ocean, USAID is helping to build circular economies and supporting local governments to sustainably improve the environment and economy.

USAID's local efforts to advance the 3Rs and circular economies is strengthening the aggregation and recycling capacity of solid waste management systems. These efforts have resulted in numerous related benefits:

- **Diverting recyclable materials out of the waste stream—and out of the ocean.**

Improved aggregation and recycling capacities have contributed to materials management and recovery—diverting plastic from entering the environment and back into the circular economy. On average, POPI's aggregation facility processes over 250 metric tons of plastic waste

Clean Cities, Blue Ocean partnered with Lumala Bikes to design e-bikes to support informal waste collectors to more efficiently collect recyclables. Photo: USAID Clean Cities, Blue Ocean

per month. Milion Limbah Ambon, meanwhile, processes over 90 metric tons of plastic waste each month on average—66 percent of which is low-value or “soft” plastics, including plastic bags—which is contributing to the City of Ambon’s target to reduce landfilled waste by 30 percent.

- **Increasing local government understanding of circular economies.**

Developing recycling capacity increases local governments’ understanding that managing plastic waste and building circular economies is much more than service delivery. The local government becomes aware of the improvements needed in the local systems—from collection to processing—to meet market specifications and create a robust recycling market. And they see the opportunity for achieving this in partnership with the private sector.

- **Improving the livelihoods of informal waste workers.**

USAID’s Clean Cities, Blue Ocean invested in local aggregation and recycling facilities, but also in the people that collect the waste. By facilitating agreements for recyclable materials to be purchased at an equitable price, the increase in value is passed on to the informal waste workers, many of whom are women. For example, POPI’s aggregation facility in Semarang is providing new income for both employees and local waste collectors sourcing materials. To complement this work, other Clean Cities, Blue Ocean local grantees—through the [Women in Waste’s Economic Empowerment](#) activity—are also training informal collectors at local waste banks across Semarang to properly sort plastic for ease of processing, and are promoting the aggregation facility as the primary offtake partner in the city. In total, Clean Cities, Blue Ocean has supported over 1,600 informal waste collectors to increase their technical skills, agency and confidence, and opportunities to earn higher wages.

- **Reducing greenhouse gas (GHG) emissions.**

Waste aggregation not only diverts recyclable materials out of the waste stream, thus prolonging landfill capacity, it also lowers GHG emissions by reducing the need for new plastic manufacturing and ensuring existing plastic is recycled responsibly. In its first year, POPI’s Semarang aggregation facility reduced the equivalent of 3,709 metric tons of CO₂e, or the equivalent of over 417,000 gallons of gasoline consumed. In its first six months, Milion Limbah Indonesia reduced the equivalent of 763 metric tons of CO₂e.

- **Unlocking private sector investment.**

Establishing increased capacity to aggregate and process high quality volumes of plastic waste can attract additional investments from the private sector and development organizations. In Indonesia, for example, Le Minerale mineral water, invested over \$150,000 in POPI’s operations through the donation of ten trucks to boost collection efficiency. For Milion Limbah, USAID’s support has increased its visibility and credentials amongst investors, resulting in a \$500,000 investment in parent company,

By the Numbers

PT. Prevented Ocean Plastic Indonesia’s aggregation center in Semarang, on average, processes over

250 metric tons

of plastic every month—the equivalent of nearly **27 million plastic water bottles.**

Milion Limbah Ambon recovered and recycled over

746 metric tons

of plastic—the equivalent of roughly **80.5 million plastic water bottles**—from May to December 2023.

Milion Limbah and POPI’s new facilities have created over

220 local jobs,

providing community members avenues for training and higher wages.

PT Milion Limbah Indonesia (in consortium with Rekosistem and SweepSmart) by WWF Norway's Plastic Smart Cities Project to establish similar operations in Bekasi, West Java—part of the Greater Jakarta metropolitan area. In Sri Lanka, private sector companies have invested nearly \$300,000 to date to develop twelve material recovery facilities that will support the additional demand for material processing generated by the country's EPR pilot.

Key Recommendations

Key takeaways from USAID and its partners' work on aggregating plastic waste revolve around the importance of better structured recycling markets to support aggregation centers; strong local government leadership and private sector investment in the system; the inclusion of informal waste collectors and their welfare; and strengthening communities' and businesses' ability and incentive to recycle plastic.

- **Mitigate market fluctuations through pre-negotiated agreements.**
In order for aggregation centers to succeed, they require a robust plastics market that can consistently support them. Recycling systems need both the capacity to collect, clean, and sort plastic waste and the ability to regularly offload that recycled waste to appropriate markets. An important consideration is the fluctuation in the price of plastics, since that can greatly impact the shift in supplier dynamics and business costs. One of the first steps in establishing or improving an aggregation center should be securing both feedstock and offtake agreements, which ensures adequate volumes coming into the center from suppliers and guarantees offtake from buyers at sustainable, pre-negotiated rates.
- **Foster local leadership.**
The buy-in, leadership, and engagement of local governments is essential to building effective and sustainable recycling systems. Local governments need to commit to increasing their own revenues (through taxes or fees) to support the systems' operations and maintenance and look for synergies to decrease expenditures, including through collaborations with neighboring jurisdictions. Private sector investment through Extended Producer Responsibility schemes or other waste-related investments, like Prevented Ocean Plastic Southeast Asia, can support the system costs.
- **Prioritize informal waste collectors.**
Inclusivity, better livelihoods, and safer working conditions for informal waste collectors, especially women are essential. Communities rely on informal waste collectors—who are often overlooked and undervalued—to fill the important municipal service of collecting, sorting, and recycling waste. Connecting informal workers to the aggregation and collection facilities and establishing price and safety standards promotes better working conditions and better practices—and results in a more effective and efficient recycling system.



Clean Cities, Blue Ocean's support to Extended Producer Responsibility legislation in Sri Lanka has catalyzed private sector investments in new collection and aggregation facilities.
Photo: Giulia Sorial/USAID Clean Cities, Blue Ocean



- **Strengthen communities' and businesses' ability and incentive to recycle plastic.**

In many communities, there is a lack of awareness of the essential role household waste segregation in maintaining the quality of recyclables, as well as a lack of incentive to keep waste and recyclables separate. Locally appropriate social and behavioral change approaches can increase awareness of—and community participation in—circular economy practices.

Related Tools and Resources

Virtual Training

[Unlocking the Power of Material Recovery Facilities to Build Sustainable Circular Economies](#)

Other Resources

[Celebrating our First Year in Partnership With USAID](#)
(Prevented Ocean Plastic Southeast Asia)

[The Building Blocks of a Circular Economy: USAID's Local Systems Approach to Reducing Ocean Plastic Pollution](#)

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Above Photo: Launch of the PT.Milion Limbah Ambon-sponsored recycling center, the first in the City of Ambon.
Photo: USAID Clean Cities, Blue Ocean