

Financing Waste Management and Recycling Infrastructure to Prevent Ocean Plastic Pollution

A Survey of Innovative Financial Instruments

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Foreword

The plastics value chain is long and complex. There are companies that make plastic resin, businesses that convert those resins into various kinds of plastics, packaging makers, and companies that use and – ideally – reuse plastics to either make or wrap their products. Post-consumer, there are waste collectors (informal or organized), waste aggregators, waste processing facilities, and urban officials who oversee waste management. Finally, there are national level governments whose policy choices determine the framework in which all actors operate.

Each of these stakeholders has a role to play in building a truly circular economy for plastics, and to keep plastics out of our ocean. In some places, stakeholders are already making the necessary changes. In others, plastic market participants would like to move forward, but cannot do so without help. While there is no estimate of the global financing needed to transition to a circular plastic economy, even the partial figures we do know are staggering: Indonesia alone estimates it will require \$5.1 billion in capital investment between 2017-2025, as well as an annual operating budget of \$1.1 billion by 2025 to deliver on its commitments to reduce the amount of plastic entering the ocean from its shorelines and waterways by 70%.

While these numbers are sobering enough, that's not the only challenge. Each of the actors along the plastic value chain has very different financing needs. At one end, informal sector waste collectors desperately need micro-capital to purchase equipment that protects their health and safety and allows them to grow their income. At the other end, large companies need the ability to hedge against price volatility so that they can reliably source recycled plastic to meet growing public demand for recycled and recyclable products.

Fortunately, interest in the issue of ocean plastics has exploded globally. More and more resources are being devoted to keeping our ocean free of trash. Ocean Conservancy hopes this report will contribute to getting those resources to where they are needed. Building on our previous work to help establish the Circulate Capital Ocean Fund, the world's first catalytic capital fund devoted to keeping trash out of the ocean in South and Southeast Asia, we sought to identify capital market tools that could be brought to bear in the fight against ocean plastic pollution. Some already exist, but are either nascent or have not yet been applied in the plastics space. Some are drawn from other environmental sectors that have also grappled with financing challenges. Others are theoretical – for now.

It is our sincere hope that this work will spur efforts to apply new financial instruments to various aspects of the ocean plastics crisis. We need everyone, including the finance sector, on board.

Join us!

Chever Voltmer
Director, Plastics Initiative
Ocean Conservancy

Glossary

ADB	Asian Development Bank
AEPW	Alliance to End Plastic Waste
ASEAN	Association of Southeast Asian Nations
bbf	Barrel of crude oil
Bio-PET	Bio-based polyethylene terephthalate
BIS	Bank for International Settlements
bps	Basis points
CBI	Climate Bonds Initiative
CCM	Circular Credit Mechanism
CFTC	United States Commodity Futures Trading Commission
CME	Chicago Mercantile Exchange
DC Water	District of Columbia Water and Sewer Authority
DCA	Development Credit Authority (part of USDFC)
DFI	Development Finance Institution
DIB	Development Impact Bond
DRS	Deposit Return Scheme
EBRD	European Bank of Reconstruction and Development
EIB	Environmental Impact Bond
EPR	Extended producer responsibility
ESG	Environmental, Social, and Governance
ETF	Exchange-Traded Fund
EUR or €	Euro
FOB	Free on Board
GBP	Green Bond Principles
GDP	Gross Domestic Product
GIIN	Global Impact Investing Network
IAS	International Accounting Standard
ICMA	International Capital Market Association

Glossary

IDB	Inter-American Development Bank
IDR	Indonesian rupiah
IFC	International Finance Corporation
IFRS	International Financial Reporting Standards Foundation
INR	Indian rupees
IWC	Independent Waste Collector
JPY	Japanese yen
LMIC	Low- and Middle-Income Country
MDB	Multilateral Development Bank
MFI	Microfinance Institution
MLP	Multi-layered plastic
MRF	Material Recovery Facility
MSME	Micro-, Small and Medium Enterprises
MTN	Medium-Term Note
NPAP	National Plastic Action Partnership
NPO	Non-profit organization
OECD	Organization of Economic Cooperation and Development
PCM	Plastic credit mechanism
PCR	Post-consumer resin
PE/VC	Private Equity/Venture Capital
PPP	Public-Private Partnership
PRO	Producer Responsibility Organization
RBF	Results-based Financing
RLC	Reverse-Logistics Credit
rPET	Recycled polyethylene terephthalate
SDG	Sustainable Development Goal
SEC	United States Securities & Exchange Commission
SGX	Singapore Exchange

Glossary

Shariah	Islamic law
SIB	Social Impact Bond
SPV	Special Purpose Vehicle
SWF	Sovereign Wealth Fund
SWM	Solid waste management
THB	Thai baht
TLFF	Tropical Landscape Finance Facility
US	United States
USAID	United States Agency for International Development
USD or US\$	US dollars
USDFC	United States International Development Finance Corporation
WASH	Water, Sanitation and Hygiene

Executive Summary

In the three years since then-UN oceans chief Lisa Svensson declared plastic pollution “a planetary crisis” ahead of a UN environment summit in Nairobi, public awareness of its detrimental environmental, health and economic impacts has increased markedly.¹ Unfortunately, recent research suggests that without concerted action, the annual rate of plastic waste leaking into the ocean will nearly triple from 11 million metric tons in 2016 to 29 million metric tons in 2040.²

The COVID-19 pandemic has only exacerbated the problem. Low oil prices, spurred by a decline in economic activity globally, have made recycled plastics considerably more expensive than their virgin counterparts. The relative price advantage of new plastics in turn adversely affects incomes along the plastic recycling value chain, especially for the informal sector, as the recycling industry in some countries has effectively shut down.³

Meanwhile, the demand for single-use plastic items — from personal protective equipment (PPE) to food containers — has soared, with much of the resulting mismanaged waste ending up in waterways and, eventually, the ocean.⁴

While governments around the world have bolstered their economies with stimulus spending, the finances of low- and middle-income countries (LMICs) appear increasingly fragile, prompting expectations that tightening credit markets will require many to enact austerity measures in coming years.⁵

In several countries, this will inevitably exacerbate monetary deficits within the waste management and recycling sectors. At the municipal level, waste management suffers from chronic underinvestment in infrastructure and underfunding for collection services. Meanwhile, the various actors along the plastic recycling value chain — particularly its micro-, small- and medium enterprises (MSMEs) — lack access to funds that could spur business growth, and the tools they need to manage market volatility associated with the price of waste plastic.

The World Bank estimates that LMICs will need to spend between US\$637 billion (2% of their GDP) and US\$2.74 trillion (8% of GDP) each year on new infrastructure to meet Sustainable Development Goals (SDGs). Exactly how much each LMIC will need to spend depends on how efficiently it uses its funds, and the quality and quantity of service it pursues. In a 2019 paper, the World Bank estimates that if LMICs spent 4.5% of GDP, they would meet infrastructure-related SDGs and limit climate change to 2°C.⁶ (However, these calculations likely exclude accurate estimates of the investment required in waste management infrastructure).⁷

Financial instruments exist, or could be developed, to address the capital expenditure needs of waste management and recycling infrastructure in developing countries. But prospective investors require assurances that the operating cash flows will be sufficient to repay their initial investments

Executive Summary

plus an appropriate risk-adjusted return. In many cases, authorities will have to implement policies requiring certain stakeholders to pay for externalities that had previously gone ignored. National and municipal fiscal weaknesses – and growing environmental degradation – will leave them no choice.

These policy decisions will likely result in a form of extended producer responsibility (EPR). They may also require legislative or regulatory prescriptions that favor recycled post-consumer recycled plastic over new virgin plastic, by, for example, requiring minimum recycled content in plastic packaging.⁸ In November 2020, for example, the Maharashtra Pollution Control Board in India issued an amendment to the operating licenses for leading brand owners and plastic producers in the state, requiring the use of at least 20% recycled plastic in non-food/non-pharma packaging.⁹

Capital is beginning to flow to waste management and recycling entities in developing countries, particularly in the Indo-Pacific region. Certain private corporations, which are stakeholders in the plastic packaging space – notably, chemical companies and consumer product groups – have stood at the vanguard of those efforts. Yet the sums committed pale in comparison with their planned investments in new plastic production capacity. Investment in LMIC waste management and recycling systems occurs neither quickly enough, nor at sufficient scale. As recent research illustrates, in order to ensure a comprehensive circular economic approach to plastic pollution, it will be essential to mobilize private sector investment, especially by institutional investors.¹⁰

Thankfully, institutional investors across the world show clear indications of a growing and accelerating interest in environmental, social and governance (ESG)-focused investment vehicles and opportunities.¹¹ This survey therefore explores a series of innovative financial instruments – extant, nascent, and proposed – that can leverage this opportunity to attract increased investment in the waste management and recycling sectors. The range of financial instruments is broad. This reflects the disparate nature of the actors involved in developing countries' waste management systems, where infrastructure refers not just to fixed assets on municipal or corporate balance sheets, but also to human actors in the informal sector, who play an essential role in collecting waste plastic and other materials.

The financial instruments surveyed are divided into two categories: Those which raise capital and have the potential to address the need for financing, and those that can ameliorate volatility or market failure in pricing post-consumer plastics. While the former already exist – but are not yet widely applied in the waste management and recycling sectors – or remain in the early stages of their development, institutions have not yet devised the latter for post-consumer plastics in particular. The survey also summarizes certain EPR and other policy options with the potential to support financial instruments that might otherwise not be viable without the fund flows they bring.

Blended finance, which combines development funding and philanthropic contributions, also introduces underlying structural archetypes containing financial instruments that may – possibly in combination with one or more of the other financial instruments also reviewed – facilitate the requisite capital investments.

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While the growing green bond market and the investor interest driving it is encouraging, many of the actors in developing countries' plastic recycling value chains are not ready to establish the requisite issuance frameworks. So, in order to facilitate greater capital raising and the more widespread availability of financial and ESG impact data to encourage investment in waste management opportunities, the survey proposes the issuance of bonds or loan extensions according to a Circular Economy Plastic Reduction and Recycling Bond framework, a simplified standard that remains compatible with the prevailing Green Bond Principles (GBP).

The survey reinforces the conviction that in order to adapt, develop or realize creative financial instruments to increase investment in waste management and recycling companies and infrastructure, stakeholders “must go off the beaten path: mobilize all available sources, put the most diverse players in touch with one another, and use the financial system (its tools and institutions) as a catalyst.”¹² To do so, it will be necessary to:

- Break out of the topical silos that limit the application of lessons learned from analogous investment sectors.¹³ For example, the barriers to investing in water infrastructure and innovative financial instruments used to overcome them, offer several lessons that might be applied in the waste management and recycling space.¹⁴
- Incorporate thematic approaches to capital raising that attract a broader group of potential investors and may also contribute to the development of more comprehensive and sustainable municipal infrastructure.
- Challenge stakeholders — including, but not limited to, public sector development institutions — to adopt more flexible perspectives, or, in some cases, to reinvent themselves. In particular, these institutions could fund and support platforms that marry the top-down provision of de-risking and other financial tools that enhance bankability, to the bottom-up delivery of financial support, principally from public and philanthropic sources. Stakeholders could also welcome guidance from experienced waste management and recycling sector entrepreneurs and not technocrats to encourage risk taking and the creation of scalable and replicable business models.

In sum, in our “rapidly changing world, innovation [will be] a prerequisite.”¹⁵

Introduction

For many years, Ocean Conservancy has worked to understand the magnitude of the ocean plastics problem and to develop potential solutions, including:

- In 2015, *Stemming the Tide*, a white paper compiled with the McKinsey Center for Business and Environment,
 - identified the sources and means by which plastic debris leaks into the ocean;
 - articulated solutions to reduce leakage; and
 - specified the essential components of a concerted program for global action to address leakage – to include establishing the necessary conditions for private, public, and multilateral investment in waste management infrastructure.¹⁶
- In 2017, *The Next Wave* white paper demonstrated where in the plastic value chain the private sector could most effectively partner and invest in solutions to support waste management and resource efficiency goals.¹⁷
- In 2017-18, Ocean Conservancy contributed to the establishment of Circulate Capital and its launch in 2019 of the Circulate Capital Ocean Fund (CCOF), a US\$106 million investment vehicle providing capital to scale innovative companies and projects in South and Southeast Asia that divert waste from the environment and into the recycling value chain.¹⁸

The CCOF counts a number of the world's largest companies among its investors, and is one of a few examples of private-sector investment in this area. These financial commitments mirror similar efforts by development finance institutions (DFIs), aid agencies, philanthropic entities and the like. They also form an integral part of the increased investment inflows – albeit from a small base – circular economy investment vehicles have experienced more broadly in recent years.¹⁹

However, the simple fact is that they are neither appropriately large, nor sufficiently timely. To date, the largest corporate-backed effort, the Alliance to End Plastic Waste (AEPW), has committed US\$1.5 billion over five years towards preventing plastic leakage and recovering plastic waste. Yet this pales in comparison with the forecast US\$400 billion to be invested globally over the next five years in new virgin plastic capacity by the petrochemical industry, or the cumulative US\$203 billion in shale gas investment commitments made by the U.S. chemical industry since 2010.^{20 21} Indonesia alone, for example, estimates that in order to deliver on its commitment to reduce ocean plastic leakage by 70% from 2017 to 2025, it must attract capital investment totaling US\$5.1 billion, and in 2025 support an operational funding budget of US\$1.1 billion to run an effective waste-management and recycling system.²² Such needs contribute to the estimated US\$2.5 trillion annual shortfall in financing for developing countries if the SDGs are to be achieved by 2030.²³ These figures do not account for the massive uptick in plastic waste generation – and related waste management costs – resulting from the COVID-19 pandemic.

Mirroring Dual Deficits

The countries most impacted by plastic pollution have been unable to maintain a rate of investment in waste management systems commensurate with their economic development. The growth in income and consumption has overwhelmed waste management systems suffering from decades of chronic underinvestment.

This absence of monies within waste management systems manifests itself in mirroring dual deficits that affect participants throughout the plastic recycling value chain:

- **At the municipal level:**
 - A lack of capital, particularly from private sources, for investment in solid waste management (SWM) infrastructure; and
 - Debilitating shortfalls in operating funds for SWM systems.
- **At the level of actors along the waste management and recycling value chain:**
 - A significant financing gap, particularly for MSME entities; and
 - A dearth of financial tools with which to manage price volatility or market failures that occur in connection with recyclable materials.

While stakeholders recognize the paucity of investment in developing countries' waste management systems as an absence of financing, funding, or both, they often fail to distinguish adequately between these mirroring deficits and acknowledge that the potential solutions to those shortfalls differ. That division is crucial, however, with respect to determining where the requisite monies for infrastructure investment may be found.

Financing vs. Funding

The two critical and related questions in attracting investment to infrastructure are: "How will it be financed?" and "How will it be funded?"²⁴

Financing refers to the sources of upfront capital (capital expenditure) for building and commencing operation of the relevant infrastructure, while funding refers to the source of the cash flows necessary to continue operating that infrastructure (operating expenditure) service over time.²⁵

In developing countries, where national and local government budgets are often severely constrained, the former relies heavily on private sector participation through a variety of financial instruments, while the latter is generally the domain of public policy (i.e., political and regulatory decisions about how to price the relevant service).

The questions are related, because they speak to the feasibility of sourcing private sector monies. In the context of SWM infrastructure in developing countries, tools exist to address both financing and funding. They need to be managed in tandem, however, as policy decisions (e.g., implementing an EPR regime) could facilitate the application of specific financial instruments that might not otherwise be feasible.

Municipal Deficits

"Discussions of finance tend to be dominated by investment needs. But it is equally important to provide for recurring expenditure on administrative overheads, operations, maintenance, routine repairs and periodic

replacements,” noted the Camdessus report on financing water infrastructure.²⁶ This is especially true in the case of SWM, where operating expenditures “can easily account for 70% or more of total required [municipal] budgets.”²⁷

Ocean Conservancy research estimates a funding gap of US\$24-40 per ton across the plastic recycling value chains of China, Indonesia, the Philippines, Thailand and Vietnam, five of the countries most impacted by ocean plastic pollution.²⁸ Given the existing strains on municipal budgets in developing countries, such shortfalls are well beyond the fiscal capabilities of national or local governments.

The National Plastic Action Partnership for Indonesia, for example, estimates that between 2017 and 2040, the archipelagic nation will need US\$18.4 billion in capital investment to achieve appropriate levels of waste management, and that by 2040, an annual operational funding budget of US\$1.8 billion.²⁹ As the Macquarie Green Investment Group observes, “Indonesia’s

public sector will not be able to cover these costs alone; it will be imperative that Indonesia takes action to attract private actors to invest in its waste management sector.”³⁰ However, Indonesia’s existing waste collection system currently faces an annual operational shortfall of US\$1 billion.³¹

Absent efforts by national or local governments to address waste management budget deficits and make investment in waste management infrastructure viable, it will be impossible to attract the required capital from the private sector.

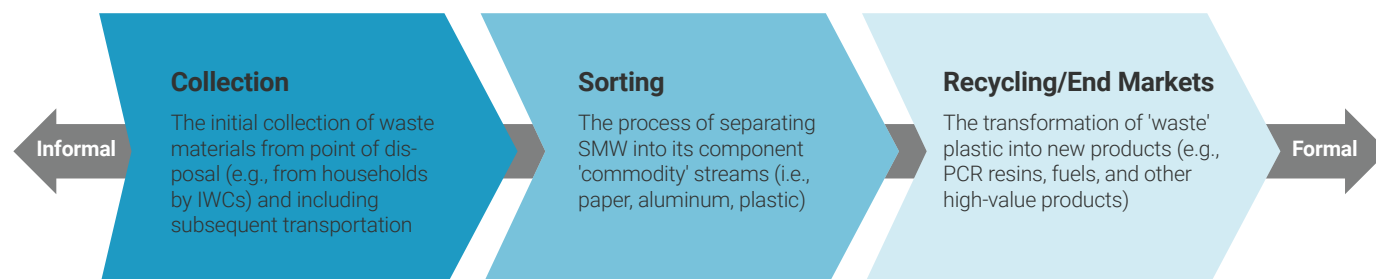
For example, decisions such as that taken by the Bangkok Metropolitan Authority and the City Council to put off a waste collection fee increase from THB20 to THB80 per household per month (versus an estimated cost of THB228) until at least October 2022 unfortunately reduce commercial financial institutions’ incentive to invest in these economies.³²

Plastic Recycling Value Chain Deficits

The financial constraints at the municipal level are mirrored by a paucity of investment capital all along the plastic recycling value chain in developing countries. Moreover, the absence of financial tools to manage volatility in recycled plastics prices, together with dramatic declines in prices for their virgin plastic competitors, has adversely impacted incomes and reduced the growth, efficiency and profitability of actors all along that value chain.³³

The diversity of actors along the plastic recycling value chain in developing countries is remarkable:

Figure 1: Plastic Recycling Value Chain



It ranges from self-employed waste pickers collecting and sorting plastic and other recycled materials to operators of junk shops aggregating those materials, before reaching recyclers who produce recycled plastic flakes and pellets. As plastic progresses along that value chain, the entities involved generally tend to shift from informal sector participants, who are most numerous in upstream collection and sorting segments, to formal sector actors, often in the guise of large domestic or multinational companies and project-specific special purpose vehicles (SPVs), who tend to dominate downstream processing activities and end markets.

Given the diversity of those actors, the size and structure of financing needs varies widely. As is true globally, the inability to access finance – the finance gap – is most acute among MSMEs in mid- to late-growth stages.

The International Finance Corporation (IFC) estimates that globally the:

- Formal MSME finance gap is US\$5.2 trillion, equivalent to 19% of developing countries' GDP, and
- Informal MSME finance gap is US\$2.9 trillion, equivalent to 10% of developing countries' GDP.³⁴

The Indo-Pacific region, with 60% of the global population, accounts for over half of the MSME financing gap. When Latin America is included, that lacuna increases to three-quarters.

Moreover, despite the importance of the informal sector in collecting plastic waste in many developing countries, governments at all levels often overlook it. As a result, recent national plastic leakage remediation plans do not include informal sectors in calculations of waste management investment requirements.³⁵

Financial Instruments Survey

Given the billions of dollars required for waste management and recycling infrastructure investment in developing countries, the private capital funds established to date with a focus on this sector or the circular economy more broadly are, at best, only a partial solution to the ocean plastics crisis.³⁶ In order to attract the levels of investment required, additional financing tools and techniques will be essential.

Recognizing the prevailing perception among private investors that the waste management sector in emerging markets is often not bankable — projects are insufficiently likely to generate an appropriate return to justify the risk taken — Ocean Conservancy's Trash Free Seas Alliance published the Plastics Policy Playbook in 2019.³⁷ The playbook provides a holistic framework of policy measures that may improve the economics of collection.

Building on that playbook, this survey reviews a series of innovative financial instruments — extant, in development, and proposed — to increase and accelerate investment to improve collection, recycling and other associated activities by actors along the plastic recycling value chain. Those investments, and the actions they support, in turn help reduce ocean plastic pollution. (Table 1)

The survey seeks to:

- Explore the application of existing financial instruments that have been used successfully in other sectors to the SWM and recycling sector, as well as demonstrating the lessons to be learned from their application
- Suggest the development of new financial instruments, particularly those that can address price volatility and/or market failure
- Explore the establishment of financing platforms that offer efficiencies in pooling resources for issuing financial instruments, especially those that encourage a holistic approach to cities as complex and inter-linked ecosystems
- Articulate changes to stakeholder behavior that encourage additional investment flows to waste management and recycling
- Contribute to the development of standards and recognized best practices by investors seeking to address the ocean plastic crisis

More broadly, this survey is intended to stimulate dialogue among stakeholders who have an interest in addressing the global plastic waste crisis.³⁸ At the current rate of private sector investment in waste management and recycling infrastructure and companies globally, the world's oceans will be the dumping ground for up to 29 million metric tons of plastic waste each year by 2040 — far in excess of the estimated 8 million metric tons that has dominated much of media coverage until recently, and the latest research estimates of 11 million metric tons.³⁹

Financial Instruments and Financial Mechanisms

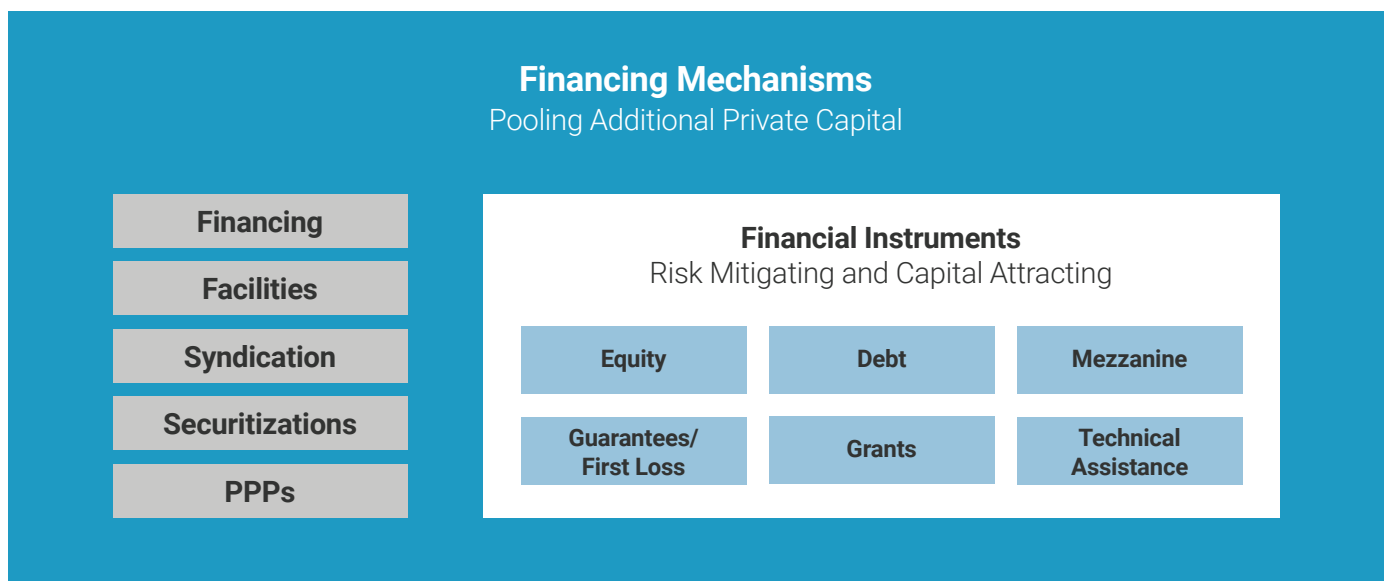
International Accounting Standard 32 defines a Financial Instrument as “a contract that gives rise to a financial asset of one entity and a financial liability or equity instrument of another entity.”⁴⁰ Thus it encompasses ordinary debt and equity instruments as well as more esoteric instruments like credit guarantees or futures contracts. Each of these financial instruments represents a commercial investment that is generally consolidated with other such investments through a financial mechanism. Those financial mechanisms include legal structures (e.g., funds or public-private partnerships) and/or a process of intermediation (e.g., syndication) that facilitates broader distribution of the financial instrument.⁴¹ (Figure 2).

The financial instruments discussed in this survey have been identified through interviews with a broad range of stakeholders in the waste management and recycling industries, as well

as with financial intermediaries and investors globally. However, a financial instrument’s inclusion does not imply that a consensus, or even a majority, of stakeholders believes that it can be readily applied in all circumstances; or, in the case of financial instruments that do not yet exist (e.g., futures contracts on recycled plastics), that they can be developed quickly. Nevertheless, each represents a potential contribution in the service of facilitating private sector investment in developing countries’ waste management infrastructure.

While the financial instruments are generally discussed individually, the section on blended finance reviews the archetypal financial instruments used in this structuring approach collectively, as they are generally applied in a combination that facilitates the development of the specific investment opportunity and its de-risking in order to attract the requisite private sector monies. Furthermore, a number of those discussed individually can – and ought to – be utilized readily in blended finance structures. The survey’s focus is financial instruments

Figure 2: Financing Mechanisms and Financial Instruments



Source: Making Blended Finance Work, OECD (Author’s adaptation)

that can be utilized in an innovative manner to attract investment to the waste management and recycling sector in developing countries. However, existing financial instruments — debt, equity, and grants — could be used in a more innovative manner by incorporating more creative terms within the legal contracts which they represent. Table 1 illustrates examples of such creative financing terms, which could facilitate

greater access to capital by actors along the plastic recycling value chain, particularly among start-ups or other entities whose founders are keen to maintain ownership and control of their companies.⁴²

Table 1: Financing Concept and Creative Terms

Financial Concept	Creative Term
Revenue-based Finance	Debt repaid as a percentage of revenue with caps on the amount repaid or limit on repayment period
Cashflow-based Finance	Financing is repaid by reference to investee cashflows
Equity Redemptions	Allowing founders to repurchase equity at a predetermined price
Forgivable Loans	Debt that converts to a grant subject to pre-agreed conditions
Convertible Grant	Grant that converts into equity
Recoverable Grant	Grant that converts to debt

Stakeholder Flexibility and Reinvention

Achieving the SDGs by 2030 will require all stakeholders to exhibit greater flexibility and inventiveness in their approach — and, in the case of multilateral development banks (MDBs) and DFIs, possible reinvention of their roles. A corresponding evolution among waste management and recycling sector stakeholders is equally desirable in order to mobilize the capital necessary to tackle the mismanagement of waste plastic.

MDBs and DFIs, with their excellent credit ratings, will be central to such efforts. A former CFO of the World Bank calls for these institutions to play the role of “financial laboratories” by “exploring, testing, and reinventing” financial instruments

such as “guarantees, co-financing, loss-sharing mechanisms, and the like.”⁴³ Others call for a more wholesale reinvention to address the funding gap MSMEs face in developing countries. This will require development institutions “to accept higher risk, lower returns, and longer time horizons,” as well as “to consider innovative ways to take more risks and to explore innovative investor partnerships across the financing spectrum.”⁴⁴

And there are signs of increasing flexibility by these stakeholders: For Clean Cities Blue Ocean, the latest iteration of USAID’s program to tackle ocean plastic pollution, the agency expanded the universe of entities eligible for grant funding.⁴⁵ KfW, the German development bank, was an anchor investor in Althelia’s Sustainable Ocean Fund, contributing EUR25 million.⁴⁶ The Asian Development Bank (ADB) announced in late 2020

a Clean and Sustainable Ocean Partnership with the European Investment Bank in the Indo-Pacific region, including the development of technical assistance and advisory support to help entities get sustainable blue economy and clean oceans projects off the ground.⁴⁷ Corporate stakeholders have shown similar dexterity, contributing to the establishment of AEPW and financing the launch of Circulate Capital.

This top-down development and application of financial instruments must not take place in isolation, however. The perennial lament about the absence of bankable projects and companies is almost always accompanied by cries bemoaning

the paucity of a pipeline to create them. Innovative financial instruments can attend to the former, by de-risking transactions and enhancing the returns available to private sector and commercial investors. But generating attractive business models will require providing bottom-up financial support — likely from public development and philanthropic sources — to early and growth-stage entrepreneurs, encouraging risk-taking and testing business models that are scalable and replicable.⁴⁸ And management teams must also gain access to guidance from experienced waste management sector business people and technicians.

Table 2: Selected Financial Instruments and Their Implementation Status in Connection with Developing Countries' Waste Management and Recycling Infrastructure

Financial Instrument	Definition	Implementation Status
Financial Instruments for Capital Raising		
Microfinance	Provision of financial services, such as loans, savings, insurance and fund transfers to entrepreneurs, small businesses and individuals who lack access to traditional banking services	Extant, but not widespread
Green Bond	Fixed-term debt security whose proceeds are utilized in specific environmental or climate-related projects or activities	Extant, but not widespread
CEPPRe Bond	Fixed-term debt security issued pursuant to a simplified, GBP-analogous standard that ensures the regular disclosure of waste plastic management and/or recycling-related financial and ESG data	Proposed
Mezzanine Finance	Hybrid form of financing in which the relevant financial instrument may have characteristics of both debt and equity	Extant, but not widespread
Impact Bond	Generally, a multi-party financial agreement in which private investors provide pre-financing for public projects that seek predetermined and verifiable social, developmental or environmental outcomes. However, certain EIBs in the US have been issued in standard municipal bond form.	Nascent
Plastic Credit Mechanism	Market-based certificate evidencing the fulfillment of a specific service or process along the plastic recycling chain, generally (a) the post-consumer collection of waste plastic or (b) its processing into PCR	Nascent
Financial Instruments for Price Volatility		
Futures Contract on PCR	An exchange-traded legal agreement to buy or sell a specified quantity of a PCR for delivery in the future	Possible
Subsidized Insurance	Partially publicly funded insurance that compensates insured parties for declines in the market price of a specified plastic polymers below a pre-set level	Possible
Price Floors	A publicly funded price stabilization regime to which defined actors in the plastic recycling value chain receive a guaranteed price for waste plastic	Possible

Financial Instruments for Capital Raising

Microfinance and Related Instruments

Microfinance is the provision of financial services, such as loans, savings, insurance and fund transfers to entrepreneurs, micro- and small businesses, and individuals who lack access to traditional banking services. Microfinance Institutions (MFIs) have historically focused on rural communities and providing loans to the agricultural sector.

While there have been microcredit initiatives involving informal actors in the waste management sector, notably in Brazil and India, comprehensive data on those loans — such as loan amounts, length, repayment/default rates, the borrower's gender, and where in the value chain loans were extended — are not readily available.

Rang De, an MFI founded as a charitable trust in India, however, provides some insights: In its partnership with Hasiru Dala (Green Force), a membership-based waste picker organization in Bangalore, it extended 322 loans, totaling INR7.45 million (about US\$100,000), with delayed payments amounting to 3.2% of loans and outright defaults to less than 0.7%.⁴⁹ Additionally, Kabadiwalla Connect, an Indian company that develops decentralized waste management solutions and technology for developing country cities in collaboration with the informal sector, identifies loans for working capital purposes and/or to retrofit an aggregator's premises as a source of potential demand for microcredit in its hometown of Chennai.⁵⁰

In developing countries across the globe, the informal sector — individuals or enterprises engaged in recycling and waste management activities but not sponsored, financed, or recognized by the formal solid waste authorities, or who operate in violation of or competition with those authorities — contributes significantly to the collection of waste materials.

In Vietnam, for example, actors in the informal sector gather an estimated 83% of all plastic waste collected for recycling.⁵¹ But the informal sector goes largely unbanked, leaving its members unable to access finance that could allow them to collect additional waste materials and lead to increased incomes, while mitigating the hazards of their activities by enabling them to purchase carts or tricycles, as well as suitable protective clothing and equipment.

Access to Finance

At least 15 million people – an estimated 1% of the world’s urban population – depend upon waste collection for their livelihoods.⁵² These informal sector participants, as well as their families, could benefit materially from access to capital and other financial products through microfinance.

Globally, women make up a significant share of informal sector participants, sometimes comprising a majority in particular segments of the waste value chain.⁵³ Further, IFC estimates that of the MSMEs in developing countries that are fully or partially credit-constrained, women-owned business account for one-fifth of the total.⁵⁴ Offering microfinance services, therefore, has the potential to allow women to develop small businesses that promise more regular income streams and access to better equipment, making them safer and increasing their capacity to collect and better separate recyclable materials, including waste plastics.⁵⁵

In addition to extending microcredit (small loans), microfinance institutions (MFIs) often provide a broader range of products and services,

such as payment services, health insurance and educational savings. Independent waste collectors’ (IWCs) inclusion and empowerment needs to be an integral element in any holistic, near-term solution to the mismanagement of waste in developing countries.⁵⁶

The informal sector is not monolithic.⁵⁷ In a number of countries, the informal part of the plastic recycling value chain can range from individual waste collectors to more organized family- or clan-owned and operated recycling processors. This offers the potential for some granularity (in terms of tenor, amount, individual credit risk) within an MFI’s loan portfolio, albeit with exposure to the same industry.

How the informal sector organizes directly impacts its participants’ ability to generate income and their social status and working conditions. Generally, the less organized the informal sector is, the less capable its members are of extracting additional value from the waste materials they collect, and the more vulnerable they are to exploitation from intermediate actors along the plastic recycling value chain. (Figure 3)⁵⁸

Figure 3: Hierarchy of Informal Sector Recycling



Source: Habitat International

Conduit to Formalization

Access to financial products and services could act as an incentive for the informal sector to organize in order to extract greater value from its activities, through the increased bargaining power that collective representation affords. Indeed, such access may even facilitate a move towards greater formalization, and assist in overcoming the disincentive inherent in becoming visible to tax authorities. A waste picker cooperative, for example, is likely to be a more attractive borrower for an MFI than each of its members individually. And its legal organization means that it has the capacity to enter into waste collection contracts with municipalities, which are often disinclined to recognize the economic and environmental contributions of informal sector waste collection activities.

In Brazil, legislation recognizes waste picking as a profession and the Brazilian government has promoted the creation of cooperatives of waste pickers (known locally as *catadores*). There are around 1,100 waste picker cooperatives in Brazil. Their legal status has allowed them to enter into contracts, pursuant to which they fulfill the obligations of consumer product companies, under applicable solid waste legislation, to collect and dispose of their products' packaging waste. Further, it underpinned the development of reverse logistics credits (RLCs), financial instruments designed to remunerate cooperatives for the environmental service their collection activities represent, while evidencing the fulfillment of the consumer product companies' packaging recovery obligations.⁵⁹

Such an organic move towards formalization, through collective organization, may also prove more attractive and palatable to IWCs, who are often hostile to attempts to turn them into employees within material recovery facilities (MRFs) or other recycling entities.⁶⁰ Moreover, establishing an intermediary relationship between the MFI and each IWC could also act as a channel to provide other public services (e.g., conditional cash transfers for children's school fees or attendance) and as a means of collecting data to monitor the state of livelihoods generally within the informal sector.

In countries like Indonesia and Vietnam, where a majority of plastic waste leakage comes from areas that are semi-urban, rural or remote and that have limited (if any) collection coverage, offering finance options to entrepreneurial existing or new IWCs could contribute significantly to remediating leakage.⁶¹ Moreover, connecting those individuals directly to MRFs could also help drive the development of a more circular economy, while allowing IWCs to garner a larger proportion of the market price for their collected waste plastics by removing the need for intermediation by aggregators.⁶² More pressingly, such finance might also help alleviate some of the negative impacts of COVID-19 by providing individuals and families with new sources of income. (Case Study 1)

Case Study 1**Amartha**

Originally established in 2010, Amartha is an MFI in Indonesia, where more than 50 million micro- and small enterprises are unbanked, over half of which are women-owned. Utilizing a peer-to-peer lending platform model that it introduced in 2016, Amartha matches lenders to underserved micro-business owners requiring funds. Lenders on the platform are institutions and individuals, with urban millennials comprising over half of individual lenders both by value and number of loans. All of Amartha's borrowers are rural women micropreneurs, with loans ranging in size from IDR3-15 million (US\$200-1,000). Non-performing loans are less than 1%.

In order to reach would-be borrowers who do not have access to its app or website via smartphones or the internet, Amartha has 2,462 field officers deployed across three of Indonesia's more populous islands – Java, Sumatra and Sulawesi. As of the end of 2019, it had extended aggregated loans totaling IDR1.75 trillion (about US\$118 million) to 357,661 individual women borrowers, with an average loan size of IDR3.5 million (US\$235).

In the wake of significant job losses and increased poverty caused by COVID-19, Amartha is seeking to launch a Plastic Waste Womenpreneur program. Using a combination of private sector funding and grants, it aims to provide 5,000 women in rural areas with the tools to become independent entrepreneurs. In addition to extending an IDR4 million (US\$267) loan for working capital and capital expenditure purposes to each woman, it intends also to provide training on plastic waste collection and recycling and to link them to reputable recycling entities, who will benefit from more predictable supplies of less contaminated waste plastic.

Micro-equity

Microfinance has historically been concerned with the provision of capital through debt. As these loans are structured with a view to reducing the risk of potential default, they may discourage the creation of more risky enterprises with potentially higher returns. While such opportunities are more suited to equity, there have been very few efforts to implement micro-equity investments (with the exception of certain Islamic finance tools).

One of the hurdles to utilizing micro-equity is the informal or partial informality of the enterprises, which do not keep accounts, operate as cash businesses, and are generally owner-managed – all characteristics shared with IWCs. However, recent pilot projects in Sri Lanka have explored the potential for micro-equity investments, where returns have been tied to the revenue performance of the underlying enterprises.⁶³ The prevalence of informal enterprises in the waste management space make it well-suited to use equity contract structures similar to those in the pilot projects.

Blended Finance

In a 2002 EBRD economic research paper, Willem H. Buiter and Mark Schankerman mentioned blended finance in reference to the use of grants and other forms of subsidies by MDBs in the project finance space, though they did not define the term.⁶⁴ In the intervening years, variations in the definition of blended finance, while remaining grounded in its origins in the activities of MDBs and DFIs, increasingly reflect the more widespread use of and growing interest in the concept by other public, philanthropic or commercial actors; particularly in connection with its potential for bridging the estimated US\$2.5 trillion annual funding gap in achieving the SDGs by 2030.⁶⁵

These stakeholders share the objective of mobilizing additional capital from private and/or commercial actors that wouldn't otherwise invest in certain jurisdictions or sectors. (Box 1). Importantly, it is neither an asset class nor an investment strategy; rather, it is the use of one or more financial instruments in structuring an investment opportunity to distribute risk and attract additional capital. That additional capital can be pooled through a variety of financing

mechanisms, including funds, facilities, syndications, or others. (Figure 2 supra).

Blended finance is therefore a structural approach. It is meant to ameliorate high perceived and real risks associated with a prospective investment, to improve its adjusted risk return and make it investible – or bankable – for commercial capital.

Although blended finance has its origins in subsidies, neither the instruments used to mobilize additional capital, nor the structure as a whole, need necessarily involve a concessionary element that requires one or more investors being willing to accept a below market rate return on capital or no return at all. Nevertheless, there is a growing consensus that a blended finance transaction should involve the following three elements:

- Contribution towards the achievement of one or more SDGs;
- An anticipated positive economic return, assessed in its totality; and
- Public and/or philanthropic participation that de-risks the transaction, which attracts the requisite private capital

Box 1

What is Blended Finance?

The *strategic use* of development finance for the mobilization of *additional finance* towards *sustainable development* in developing countries.

OECD⁶⁶

The use of *catalytic capital* from public or philanthropic sources to *increase* private sector investment in *sustainable development*.

Convergence⁶⁷

[T]he *targeted* use of concessional funding in *high-impact* projects in which *actual or perceived risks are too high* for commercial finance alone.

IDB Invest⁶⁸

Structural Archetypes

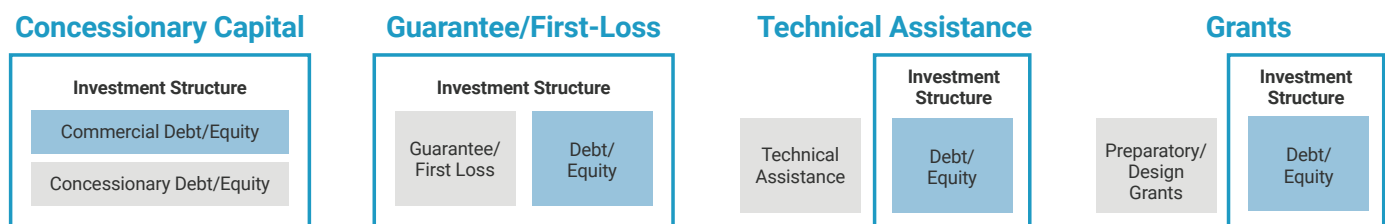
There are four general structural archetypes in blended finance. (Figure 4). :

1. Concessionary Finance: The provision of below-market-rate financing by public, philanthropic or purpose-driven investors, to
 - a) reduce the overall cost of capital within the investment structure and thereby enhance returns to other capital providers, or
 - b) provide an additional layer of protection to senior ranking capital providers (e.g., through the application of junior equity or subordinated debt)⁶⁹
2. The provision of credit enhancement instruments, including
 - a) Guarantee: an irrevocable promise by a third party to reimburse investors in case of an obligor's technical default up to a certain amount (generally, 30-50% of the total obligation on a pari passu basis)
 - b) First-Loss: any instrument designed to protect investors from the loss of capital exposed first in case of erratic cash flows and/or capital loss. It can take a variety of forms, including cash, equity, debt, derivatives, and guarantees
3. Technical Assistance: The grant-funded transfer of skills and knowledge, and/or provision of services, knowledge or technology, for developmental purposes prior to and/or during the term of the investment structure in order to strengthen its commercial viability and sustainability, often with a view to achieving a defined developmental/SDG impact. Such assistance is most often provided by MDBs and DFIs.
4. Grants: The provision of funds in the legal form of grants for the establishment of specific financing platforms and/or the preparation and design of investment vehicles and structures. Although often non-repayable, grants can be structured so that they become repayable or are converted into part of the investment structure (e.g., as equity or debt) upon the achievement of certain financial and/or broader metrics.

Relevant actors may apply one or more of these archetypes (and the relevant the financial instrument(s) associated with it) at one of two levels:

- At project or company level to mitigate risk (or possibly for a series of projects via a single entity (e.g., a guarantee of a bank's portfolio of loans to a specific sector)); or
- At the funding mechanism/portfolio level in order to attract private capital to pooled structures, like funds or facilities.⁷⁰

Figure 4: Blended Finance Structural Archetypes



Source: Convergence; Author's compilation

Application to Waste Management Infrastructure in Developing Countries

While blended finance may be a growing practice among stakeholders focused on the SDGs, funds and other financial actors have applied it only very recently in connection with investments in developing countries' waste management and recycling infrastructure.

Indeed, its application to the waste management sector via the financing mechanism of an investment fund began in 2014, when a US\$100,000 grant from the WalMart Foundation helped establish what would become the Closed Loop Partnership.

The Closed Loop Infrastructure Fund (originally, the Closed Loop Fund), funded primarily by U.S.

chemical and consumer product companies, is a blended finance mechanism that provides zero interest loans to municipalities and below-market-rate loans to private companies. In the process, the fund aims to attract a multiple – about three times – of capital from the private sector for investment in waste management and recycling in North America.⁷¹

Leveraging that experience, one of its co-founders subsequently established the Circulate Capital Ocean Fund, a new investment management entity and the first fund focused on investing in waste management and recycling infrastructure in developing countries. This fund invests in companies or projects that divert waste from the environment into the recycling value chain in South and Southeast Asian countries. The fund incorporates a variety of blended finance archetypes. (Case Study 2).

Case Study 2

Circulate Capital Ocean Fund

Circulate Capital is a Singapore-based, impact-focused investment manager founded in 2018. It evolved out of the Closed Loop Ocean initiative, a project that explored the potential for creating a financing mechanism that might encourage the flow of institutional capital to investment in waste management and recycling infrastructure in the Indo-Pacific region, thereby preventing ocean plastic leakage. Its inaugural fund, the Circulate Capital Ocean Fund (CCOF) had its first close in late 2019 at US\$106 million.

CCOF, reflecting the diversity of investment opportunities along the Indo-Pacific plastic recycling value chain, is a blended finance vehicle that incorporates two associated archetypes:

- At the portfolio level, the Development Credit Authority (DCA) provides a 50% guarantee in certain target countries, up to an aggregate loan portfolio value of US\$35 million, to de-risk private co-investors in those loans.
- At the individual transaction level, CCOF offers concessionary capital by investing in financial instruments ranging from ordinary equity to plain vanilla debt. It is therefore able to take junior or subordinate positions, as well as flexible mezzanine debt interests, that can increase the potential returns to co-investors.

CCOF made its inaugural investments in Q1 2020 in India and Indonesia.

Recognizing, however, that there are multiple factors retarding the development of efficient waste management and recycling supply chains in Asia, Circulate Capital also supported the creation of The Circulate Initiative (TCI). An NPO, TCI is dedicated to ending ocean plastic by incubating, measuring and amplifying new circular economy waste management and recycling solutions. To do so, TCI uses incubation activities to offer technical assistance; establishes metrics to measure the impact of investments into waste management, recycling projects, and infrastructure; and more.

Given its nascent application in waste management and recycling in developing countries, there appears to be broad application for blended finance and the financial instruments underpinning it.

However, although investment in developing countries' waste management infrastructure requires billions of dollars, institutional investors are constrained by the need to invest capital efficiently, considering the costs inherent in conducting due diligence on any specific investment.

For example, Temasek, the Singapore SWF, generally seeks to make individual investments of at least US\$30 million. Such minimum investment amounts militate for investment in the downstream segments of the plastic recycling value chain by institutional investors where projects are more likely to be of sufficient size, or at the level of a fund or facility, where transaction costs are spread across the portfolio of investments made by the vehicle. (Although blended finance instruments can, of course, be applied by a fund or facility at the level of an individual project or company). Research suggests the median size for a blended finance project or transaction across all SDGs is US\$60 million, and the fact that half of all blended finance transactions have been in pooled vehicles (i.e. funds or facilities) reinforces the need for standardized access to institutional monies.⁷²

Pooling

Such constraints notwithstanding, around the globe SWM services are most often the preserve of a municipal or city authority, where the requisite investment in related infrastructure – bins, trucks, transfer stations – totals several million dollars. Further, private investment in that infrastructure is likely best effected within a specific watershed,⁷³ which will often comprise one or more municipalities of a size that may support institutional interest in a blended finance investment, in order to encourage the development of a holistic and self-sustaining waste management system in that locale.⁷⁴

While the poor fiscal position of many municipalities in developing countries often makes them uncreditworthy to international commercial investors, a combination of blended finance and a credible source of operating funding (ring-fenced and/or overseen by a third party) could unlock additional capital. As the creation of pooled water bonds in Tamil Nadu by USAID illustrates, the aggregation of smaller transactions, combined with appropriate credit enhancement, can craft a transaction that offers an appropriate size and risk-adjusted return to investors, while facilitating collective access to private capital that would not be possible for an individual municipality. (Case Study 3).

Case Study 3

Tamil Nadu Water and Sanitation Pooled Bond Issuance⁷⁵

In 1996, the Government of Tamil Nadu (GoTN) created the Tamil Nadu Urban Development Fund (TNUDF), a PPP structured as a trust fund to facilitate access to long-term financing by local bodies for infrastructure without state guarantees. The Tamil Nadu Urban Infrastructure Financial Services, Ltd. (TNUIFSL), an asset management company majority owned by private sector interests, managed the fund. It could finance capital expenditures including water, sanitation and hygiene (WASH) and SWM projects.

Initially, the TNUDF focused on large municipal corporations with readier access to capital markets, but later created a financing mechanism for the smaller Urban Local Bodies (ULBs) that experienced most of the shortfall in urban infrastructure finance and were least able to afford the bond issuance and credit rating fees required for accessing the capital markets.

In August 2002, TNUDF established a Special Purpose Vehicle – the Water and Sanitation Pooled Fund (WSPF) – in the form of a trust to be managed by TNUIFSL, and to act as a credit pooling facility. As its first bond issuance, WSPF refinanced outstanding loans made to 12 ULBs for water and sanitation projects and one ULB for underground drainage. These 13 ULBs ranged in declining size from a municipality, through six municipal councils down to six town panchayats.

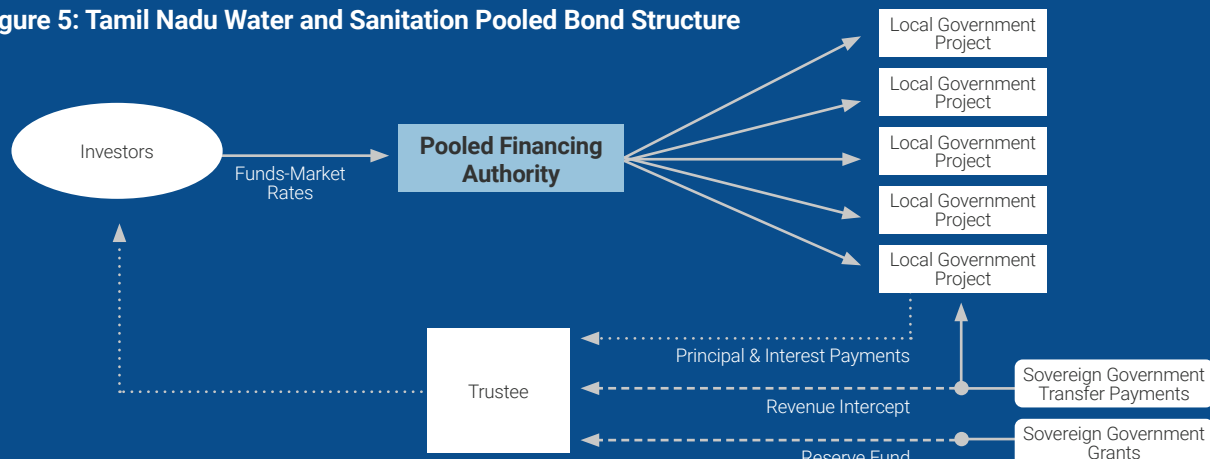
The December 2002 pooled bond issuance was denominated in Indian rupees, totaling INR304 billion (US\$6.5 million), with a 15-year tenor and an annual coupon of 9.20%. Subscribers included local banks (INR302.5 million) and the Provident Fund Trust (INR1.6 million). It was rated AA by local credit rating agencies.

In order to strengthen the bond’s structure and appeal to investors, it had three levels of credit enhancement:

1. Non-lien escrow on the bank accounts of participating ULBs, where their property tax and other revenues were deposited, from which WSPF could withdraw funds if project revenue payments were insufficient;
2. Debt Service Reserve Fund (DSRF) with INR69 million deposited by GoTN, the equivalent of about one year’s debt service; and
3. Partial credit guarantee provided by DCA, covering 50% of the principal, that would replenish the DSRF as needed. If the guarantee became exhausted, GoTN ordered the DSRF to be replenished by deducting any relevant ULB’s share of the revenue transfer administered by the State Finance Commission.

This was the first successful bond issuance using a pooled financing structure for financing WASH projects to be offered outside the U.S.

Figure 5: Tamil Nadu Water and Sanitation Pooled Bond Structure



Source: World Bank

Bankability and Pipeline Development

A further frequently encountered constraint to investment in emerging market infrastructure is the need to develop the underlying project or business to a point where it is investible – both in terms of legal form and anticipated risk-adjusted returns. In other words, it must be bankable and, in developing countries where municipalities are regularly not only underfunded, but also have limited human capital, the need for methods to spur that development is great.

The Tropical Landscape Finance Facility and its associated inaugural bond issuance provides one potential model for developing both a platform to raise waste management and recycling dedicated finance, and a supporting preparatory capacity, each of which draws upon blended finance techniques. (Case Study 4).

Case Study 4

TLFF and its Inaugural Sustainability Bond Issuance⁷⁶

TLFF is a financing platform founded by a multi-stakeholder partnership between the UN Environment Programme (UNEP), The World Agroforestry Centre (ICRAF), BNP Paribas, and ADM Capital. Its aim is to finance projects and companies in Indonesia focused on green growth and sustainable rural livelihoods. Initially launched in 2016, it completed its inaugural transaction – issuing a US\$95 million sustainability bond to finance sustainable natural rubber production across heavily degraded concession areas in Indonesia – in February 2018.⁷⁷ Both the financing platform and the inaugural issuance illustrate the ability to combine a variety of blended finance archetypes and associated financial instruments in an innovative manner in support of specific SDGs.

TLFF Structure

TLFF comprises two core elements:

- A grant fund supported by philanthropic and developmental monies, this provides technical assistance and co-funds early-stage development costs to projects and companies that support them from a nascent “construction phase” through to a “harvest phase.” At that point, they can raise supporting capital through the lending platform.
- A lending platform through which long-term loans issued by TLFF will be securitized and sold to institutional investors via an MTN program. DFIs and bilateral development agencies supply credit enhancement, to the benefit of the program.



Figure 6:
TLFF Structure
Source: TLFF

Case Study 4 (cont.)

The Jakarta-based TLFF Secretariat, which is supported by UNEP and ICRAF, provides administrative assistance to the lending platform, grant fund and other related entities.

Following its initial launch, to establish the credibility and track record to support the portfolio approach that TLFF embodies, it embarked on building a pipeline of transactions, culminating in the initial bond issuance.

TLFF I Pte. Ltd Issuance

In February 2018, through a US\$95 million transaction arranged by BNP Paribas, TLFF I Pte. Ltd (a Singapore SPV) issued Asia's first corporate sustainability bond. The multi-tranche structure comprised US\$30m in Class A notes with a 15-year term, and US\$65 million in four tiers of Class B notes with tenors of 5, 7 and 15 years. The bond proceeds were on-lent to PT Royal Lestari Utama (RLU), a joint venture between Groupe Michelin and PT Barito Pacific, the bulk of which will be used to plant rubber trees across degraded concession areas in the Jambi and East Kalimantan Provinces of Indonesia.

The issuance was verified to align with the ICMA Sustainability Bond Guidelines by a second-party opinion provider. Among the sustainable impacts anticipated are the conservation of 27,000 hectares within RLU's concessions and the protection of wildlife, and the creation of 16,000 fair-wage jobs.

In addition to receiving developmental and philanthropic monies that supported the early-stage structuring activities — including a grant from Convergence in November 2016 to help design and structure the initial deal pipeline — the transaction benefited from other blended finance instruments:

- Credit enhancement in the form of guarantee on US\$70 million of the proceeds, with US\$3.5 million of first losses to be absorbed by RLU, and 50% of the remaining US\$66.5 million (up to US\$33.25 million) covered by a DCA guarantee, in case of default; and
- Funding of a baseline carbon assessment by USAID's Green Invest Asia program, against which emissions reduction impacts can be measured.

Given the significant risks (both reputational and financial) involved in the underlying transaction, participants note the critical role the DCA credit played in unlocking investor participation from, among others, an Asian pension fund, an impact investment fund, and clients of BNP Paribas' private wealth division. After the initial issuance, in March 2019, the &Green Fund, an impact fund focused on financing inclusive, sustainable and deforestation-free commodity production, subscribed to an additional US\$23.75 million in 15-year notes. Interested parties note, however, that neither in the case of the initial issuance, nor in the follow-up loan, did the sustainable nature of the investment warrant any reduction in the coupon that investors required.

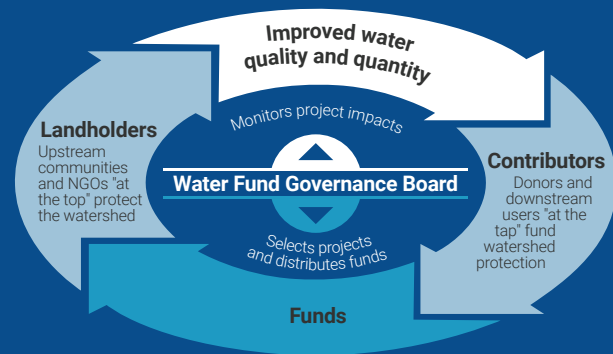
Governance

Any organization that receives public, philanthropic and/or development monies in order to cultivate bankable pipeline must adhere to rigorous governance and transparency standards. The development of water funds in Latin America is instructive on this issue. (Case Study 5). FEMSA Foundation, which has been closely involved in standardizing the creation of these structures and is exploring their potential application to waste management, notes the importance of separating administration of the fund from control over the release of monies invested to achieve overall goals.⁷⁸ In Monterrey, Mexico, for example, the water fund's administration is undertaken by a local NPO, which can make recommendations to the trustees, who oversee the fund. The administrating entity, whose operating costs are met through philanthropic grants, cannot direct capital expenditure by the fund; rather, it can make recommendations to the trustees, who are similarly constrained by their ability to approve or turn down, but not direct, application of the fund's corpus.

Case Study 5

Water Funds⁷⁹

Originally piloted by The Nature Conservancy and Inter-American Development Bank in 2000 as a water conservation mechanism, water funds have evolved into organizations that design and enhance financial and governance mechanisms that combine public, private and civil society stakeholders in pursuit of the common goal of water security through nature-based solutions and sustainable watershed management. There are 25 such organizations worldwide and another 14 in development.⁸⁰



As a dedicated implementation mechanism focused on governance, facilitating investment, and source water protection, water funds provide continuity in approach and a framework for collective action by stakeholders. They share four common characteristics:

- Science/data-based implementation plans
- Multi-stakeholder approach
- Funding mechanism, and
- Implementation capacity

Box 2

Wastesheds

In a developed economy like the U.S., a wasteshed often refers to a geographic area that shares a common solid waste management and recycling system by using the same infrastructure, including landfills and recycling facilities.

In developing countries, however, while that definition may be appropriate when evaluating potential investment in a municipal, or a series of combined municipalities', waste management context, it may not be sufficiently broad when considering investment in individual entities operating along the plastic recycling value chain.

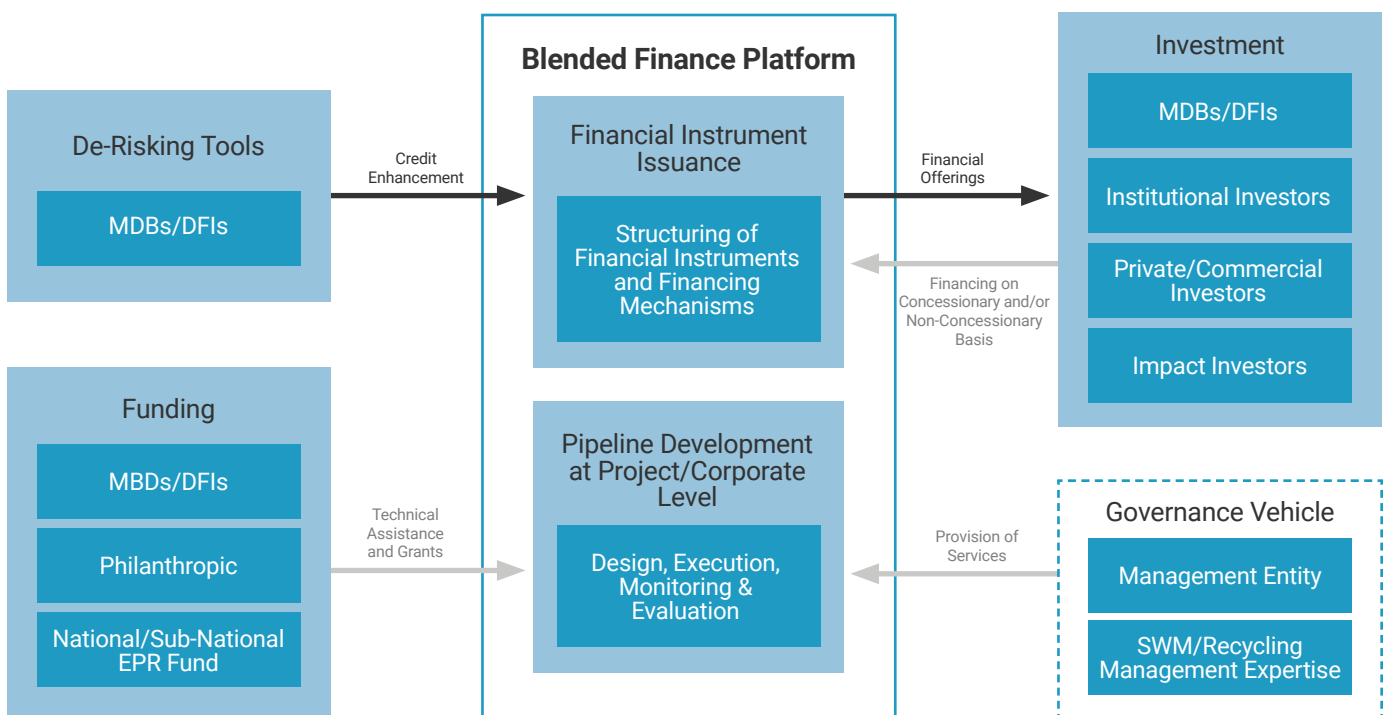
In that instance, a wasteshed may be more appropriately conceived of as the geographic area within which it is economically viable to collect and transport any individual waste plastic polymer type to a central location for recycling.

In Indonesia, for example, market participants describe the island of Java as comprising two principal wastesheds for post-consumer PET bottles: One centered on the area around the capital Jakarta in the west; and another centered on Surabaya in the east. Waste PET bottles within these areas will generally flow to recycling facilities located adjacent to each of these cities, while such materials sourced from more centrally located cities, such as Semarang, which is 445 kms from Jakarta and 350 kms from Surabaya, flow to both locations. Moreover, post-consumer PET bottles may on occasion also flow from Surabaya to Jakarta, and vice-versa.

Blended Finance Model Template for Waste Management and Recycling

Drawing upon the case studies, as well as analogous frameworks suggested elsewhere, provides the essence of a basic blended finance model template for facilitating investment in developing countries' waste management and recycling infrastructure. (Figure 7). Clearly, the level at which potential stakeholders institute the model template – city/municipality, regional or national, or even inter-country – will be subject to a variety of factors specific to a particular country or countries.⁸¹ Nevertheless, the fact that waste collection, aggregation and recycling occurs most often at the local level necessitates administrative implementation at the level of a specific watershed – which is generally comprised of one or more cities/municipalities – even if the relevant investment financing is pooled at a higher regional or national level.

Figure 7: Operating and Investment Model Template



Source: Author

FEMSA Foundation, with the experience of implementing multiple water fund models, highlights several elements important to success:

- Science and data-driven feasibility and design studies prior to implementation
- A holistic approach that combines both policy and financing/capital raising elements
- Strong governance setup
- Recruitment of key human capital, including
 - a local champion, generally a well-respected member of the private sector, who can ensure buy in from stakeholders, and
 - a competent director, who can drive daily activities and also navigate any changes in local and/or national political administrations

In addition, including an MDB or DFI that is willing to take a more flexible approach to the use of its technical assistance/grant and investment capabilities can be vital. And IDB, which was integral to the development of the water fund concept, has a reputation for being one of the more entrepreneurial of its development institution brethren.

In the final analysis, however, blended finance is not a universal panacea to resolve all financing challenges: its adoption as a structuring approach is likely to succeed only where the requisite commitment of capital resources match the ability to scale the underlying business model(s).



Mezzanine Finance

Mezzanine finance has been pithily described as all forms of financing in between ordinary equity and senior debt.⁸² It follows, therefore, that if a company or project is dissolved, investors in mezzanine financial instruments rank below senior debt holders, but above ordinary shareholders (who bear the greatest risk in financial structures). (Figure 8)

Defined more comprehensively, mezzanine

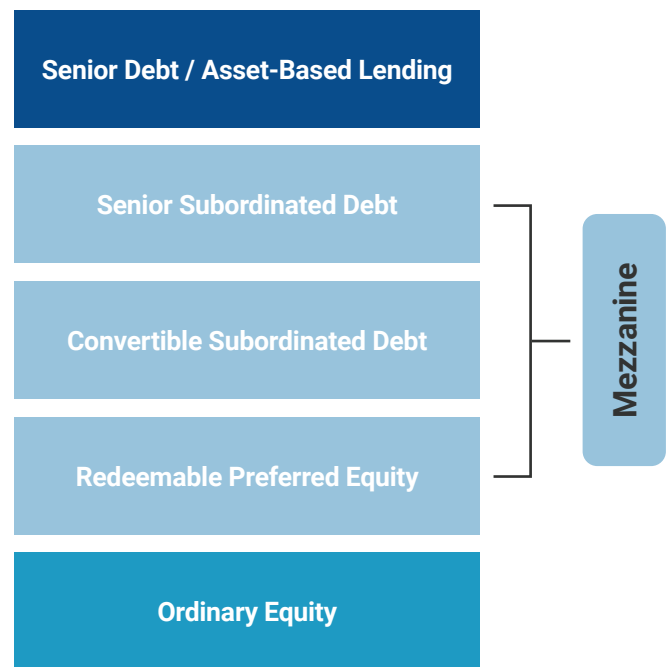


Figure 8: Mezzanine Financing in an Indicative Financing Structure

finance refers to a hybrid form of financing in which the relevant instrument may have characteristics of both debt and equity. Convertible debt generally carries a specified interest rate, as senior debt similarly does but, unlike normal debt instruments, lenders are entitled under pre-defined circumstances to change convertible debt into ordinary equity. Thus, it has the potential to benefit from any accrual of value stemming from a company or project's ordinary equity during the bond's tenor. Other forms of mezzanine finance include senior subordinated debt, debt with attached warrants (the right to purchase equity at a pre-agreed price) and various forms of preferred, redeemable and/or convertible equity. As a consequence of its hybrid nature, mezzanine finance is often referred to as quasi-equity or quasi-debt, depending on the specific instrument's underlying legal form.

While remarkably diverse in terms of the legal rights attached to each form, all forms of mezzanine finance share one critical characteristic: flexibility. That malleability makes it a powerful financing tool, especially as it offers a company's owners a way of accessing capital that does not dilute (or not unduly dilute) their ownership interest. It may also incorporate terms that anticipate unpredictable business environments during the instrument's term (e.g.,

addressing cashflow disruptions by capitalizing interest payments). That versatility can also help attract other forms of financing by lowering the overall cost of capital and improving equity returns.

Unfortunately, while mezzanine financing is readily available in OECD countries, it is often very scarce in emerging market countries. The limitations of the domestic legal system may preclude the use of mezzanine financial instruments in some countries.⁸³

Nevertheless, the scarcity of such finance is an argument for its increased use, especially in the plastic recycling value chain in emerging markets. As the range of financial instruments which the Circulate Capital Ocean Fund can deploy illustrates, the flexibility of mezzanine financial instruments is well suited to the diversity of actors engaged in SWM and recycling, and their varied financing requirements. (Case Study 2). In particular, its versatility as a gap filler between senior debt/asset-based lending and ordinary equity is well suited to early-stage investments that offer opportunity for accelerated growth, but where company owners also wish to preserve their controlling equity interest.

Case Study 6

Blue like an Orange Sustainable Capital – Latin America Fund I⁸⁴

In June 2020, Blue like an Orange Sustainable Capital announced the closing of its inaugural fund, the Latin America Fund I, with just over US\$200 million in commitments from institutional investors and family offices. The fund focuses principally on providing mezzanine debt capital to companies in Latin America and the Caribbean, whose businesses contribute to the achievement of the SDGs. The fund's core investment themes are access to finance, infrastructure and technology-enabled services, agriculture, and social infrastructure (e.g., healthcare and education).

In 2018, Blue like an Orange entered into a novel co-financing agreement with the Inter-American Development Bank's private sector lending arm, IDB Invest. Pursuant to that agreement, the entities work jointly to originate, structure and execute transactions.

From Blue like an Orange's perspective, the arrangement offers "a more cost-effective due diligence process on potential investments, . . . preferred access to deal flow, [the ability to] assess development impact using high, market leading standards, and . . . better access to data on social and financial performance."⁸⁵ Meanwhile, IDB Invest is able to mobilize additional capital to further its parent MDB's aim of bringing about US\$1 billion in additional financing to Latin America and the Caribbean over the next few years, on an approximate ratio of US\$10 in private capital coinvested alongside every US\$1 from the IDB⁸⁶.

That symbiosis is present in the co-financings that Blue like an Orange and IDB Invest have brought about. In January 2019, for example, the two entities announced an eight-year subordinated loan of US\$20 million to Banco de la Producción, S.A. (Produbanco), an Ecuadorian bank, to increase its SME financing and green lending. That loan took IDB's usual A/B lending structure: IDB Invest (as the A lender) committed US\$2 million and Blue like an Orange's Latin America Fund (as the B lender) contributed US\$18 million, reflecting a 1:9 public-to-private capital mobilization ratio.⁸⁷ That loan comprised one element of a larger lending package from IDB Invest, which also included a five-year, senior unsecured loan of US\$30 million, as well technical assistance in the form of diagnostic, training and promotion tools to improve and promote Produbanco's green lending products.⁸⁸

Critically, although Blue like an Orange uses mezzanine debt as a blended finance instrument, that capital is not offered on a concessionary basis. Indeed, the firm espouses its belief in "a no trade-off principle between market level rates of financial returns and sustainable development outcomes aligned with the SDGs."⁸⁹

The launch of Blue like an Orange's Sustainable Capital Latin America Fund demonstrates that mezzanine financing is a tangible opportunity for collaboration between MDBs and DFIs and the providers of private capital. (Case Study 6). Such collaborations offer the prospect of heightening the role these entities play, while accelerating mobilization of the trillions of dollars required for infrastructure investment generally — and in waste management and recycling infrastructure, in particular — in developing economies.

Debt Markets

According to BIS, USD-denominated credit extended to non-bank borrowers outside the U.S. amounted to US\$12.6 trillion at the end of 2019, an annual increase of 6% and a near doubling on the total for 2010.⁹⁰ That amount is split roughly half in the form of bank loans and half in traded debt securities, although most of the growth in recent years has been through increased bond issuance.

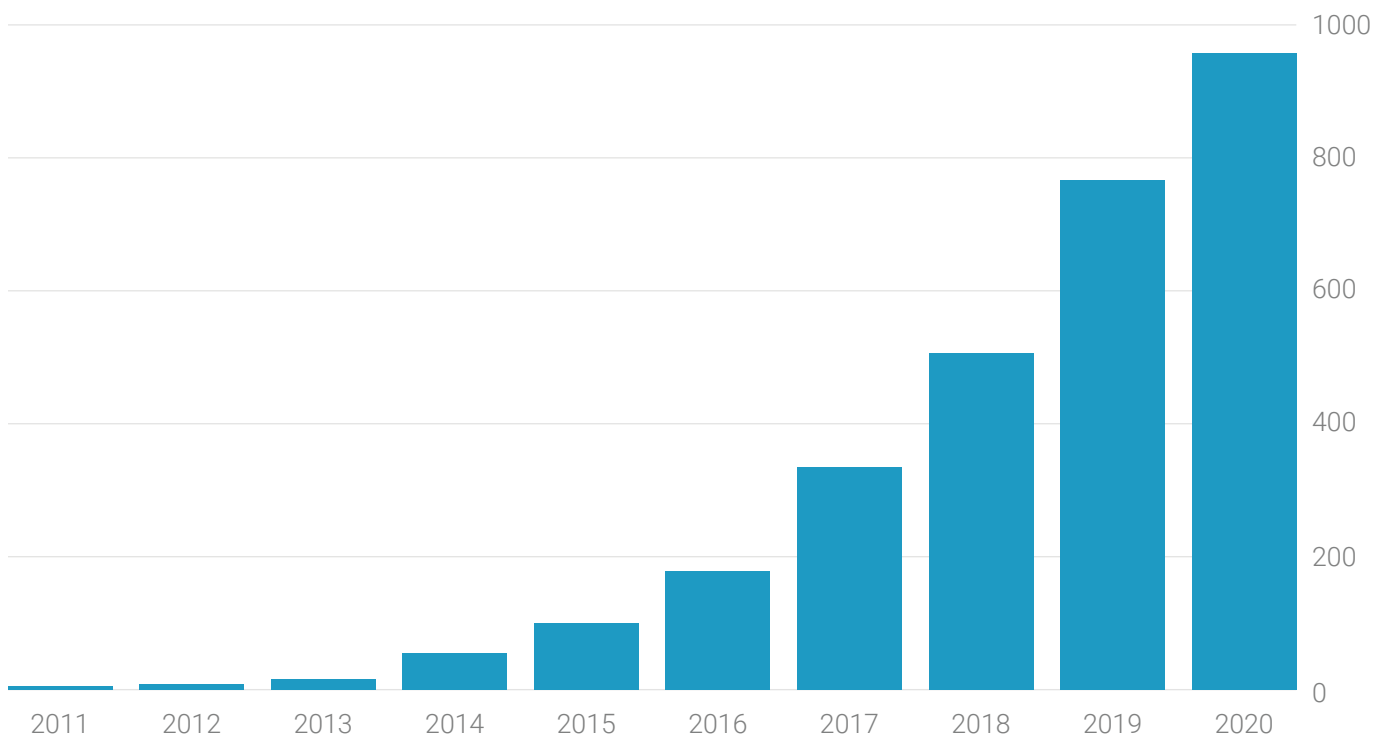
Green Bonds

Against that background, the significant growth in issuance of green bonds – fixed-term debt securities whose proceeds are utilized in specific environmental or climate-related projects or activities – reflects the escalation of climate change as a topic of concern among institutional investors globally.⁹¹

Issuance of green bonds was initially slow and, even by 2013 when the first corporate green bond was issued, it was viewed as a niche sector with cumulative issuance totaling a mere US\$9 billion. Since then, however, a “green bond boom” spurred rapid growth, and issuance in the first eight months of 2020 alone totaled US\$157 billion, despite COVID-19.^{92 93}

Figure 9: Green Bond Issuance 2011-2020

Cumulative global issuance of green bonds (US\$bn)



Source: Climate Bonds Initiative
© FT

Box 3**What is a green bond?**

A green bond is a tradeable debt instrument issued by an entity that commits to using the proceeds of the bond offering for environmental projects or activities. Such activities can include climate change mitigation, conservation of natural resources and/or biodiversity, and pollution prevention and control. There are also other categories of bonds that similarly target ESG goals. These include social bonds, where the proceeds are directed towards projects with an anticipated positive social benefit, and sustainability bonds, where the proceeds are used to further both green and social objectives.

Who issues green bonds?

The European Investment Bank issued the first green bond in 2007. Since then, other MDBs as well as national governments, sub-national governments (cities, states and provinces) and agencies, and corporates have issued green bonds. In addition to the major traded currencies (USD, EUR and JPY), these bonds may also be denominated in local currencies.

Who determines whether a bond is green?

Perhaps unsurprisingly, given the relatively recent rise of the green bond market, there is neither a uniform definition of a green bond, nor a global set of principles governing their issuance. Instead, the market has developed over time from one where issuers self-labeled their bonds as green (and had enough creditability with investors to do so), to one where an issuer voluntarily complies with standards set by third parties, particularly those related to transparency and the eligibility of the projects towards which funds raised will be applied. Of these, the two most prominent frameworks are:

- Green Bond Principles⁹⁴

A consortium of investment banks developed the Green Bond Principles (GBP) in 2014 as voluntary best practices guidelines for transparency, disclosure and reporting to promote integrity in the green bond market. International Capital Market Association (ICMA) now oversees ongoing management and annual updating of the GBP.

The GBP comprise four core tenets:

- Use of proceeds for green purposes;
- Selection and evaluation of green projects;
- Management of proceeds; and
- Annual reporting on use of proceeds.

While they do contain a broad, indicative list of project categories that may contribute to environmental objectives, the GBP do not contain a comprehensive definition of what is to be considered green, leaving that to the relevant issuer and the implicit concurrence of potential investors. Neither do the GBP explicitly capture projects with a climate mitigation and/or climate adaptation focus, even though they may meet the GBP's criteria. The second prominent framework — Climate Bonds Standard and Certification Scheme — aims to address that gap.

Box 3 (cont.)

- Climate Bonds Standard and Certification Scheme

The Climate Bonds Initiative (CBI), an international, investor-focused NPO, developed the Climate Bonds Standard and Certification Scheme as a Fairtrade-like labeling scheme for bonds that aim to address climate change. CBI's Climate Bonds Taxonomy contains the definition of the relevant activities that such bonds may fund, and the Climate Bonds Standard sets specific criteria to assess bonds labeled as green in terms of their alignment with the Paris Agreement goals. A third-party verifier certifies the prospective issuer, after which the Climate Bonds Standards Board gives final approval. There is also an annual reporting requirement throughout the life of the bond.

In addition to these frameworks, there are a number of national (e.g., Japan, China and UK) and regional (e.g., ASEAN) entities that developed their own green bond taxonomies. Most notably, in the absence of a uniform green bond standard within its jurisdiction, the EU established a Technical Expert Group on Sustainable Finance to explore the development of such a standard in mid-2018. This culminated in its release of the Usability Guide for the EU Green Bond Standard. The document, which seeks to build on market best practices like the GBP, defines a green bond as one “issued by a European or international issuer” that meets three requirements: (i) the issuer's Green Bond Framework is in alignment with the European Green Bond Standard (EU GBS); (ii) the proceeds will finance or re-finance Green Projects (as defined by the EU GBS); and (iii) the bond's alignment with the EU GBS is confirmed by an approved verifier.

Given the Brussels Effect – the EU's power to promulgate regulations that shape the global business environment – and the fact that it builds upon existing market best practices, the EU GBS may become the de facto global standard for determining if a bond qualifies as green.⁹⁵

As institutional investors increasingly adopt ESG screens as an essential element of their investment appraisal process, there should be increased opportunity for a variety of entities to issue green bonds (or blue bonds), where the proceeds are used for projects or activities that seek to remediate ocean plastic leakage. Recent issuance in the global debt capital markets addressing plastic recycling and reducing plastic waste supports that conclusion.

- In October 2019, PepsiCo issued a US\$1 billion 30-year green bond for eligible projects to support its selected SDGs.⁹⁶ (Case Study 7).
- In July 2020, Henkel AG & Co. KGaA (Henkel) privately placed a US\$70 million 5-year, self-described “plastic waste reduction bond” with two Japanese life insurance companies, Dai-ichi Life and Dai-ichi Frontier Life. The bond proceeds help finance key projects and activities that support Henkel's packaging targets for 2025.⁹⁷
- In August 2020, Coca-Cola FEMSA, S.A.B. de C.V. (Coca-Cola FEMSA) issued US\$705 million 12-year notes, the proceeds of which will fund projects that reduce its environmental footprint and conserve natural resources. This represented the largest ever such issuance by a Latin American company.⁹⁸

Case Study 7

PepsiCo Green Bond

In October 2019, in a deal that “piqued an investor base increasingly engaged in [ESG] issues,” PepsiCo debuted its first green bond.⁹⁹ PepsiCo issued the US\$1 billion issuance, which matures in 2049 and carries an annual coupon of 2.875%, under the PepsiCo Green Bond Framework. The company developed the framework to issue green bonds that finance or refinance, in whole or in part, “eligible green projects” (as defined in the prospectus filed with the SEC) it undertakes during a period ranging from three years prior to any relevant issuance through to the maturity of such notes.¹⁰⁰ Eligible green projects comprise three categories: sustainable plastics and packaging; decarbonizing its supply chain; and water sustainability. Collectively, these categories address SDGs 6, 7, 9, 11, 12 and 15.

In 2017 and 2018, PepsiCo announced a number of sustainability targets. By 2025, the company aims to achieve fully recyclable, compostable or biodegradable packaging; a 35% reduction of virgin plastics across its beverage brands; and recycled plastic used in 25% of its packaging.

The type of investments that fall within PepsiCo’s sustainable plastics and packaging category under its green bond framework reflect these commitments.

This is defined as including:

- Purchases, directly or via its intermediary suppliers, of
 - rPET for use in product packaging;
 - Bio-PET for use in product packaging;
 - Compostable, biodegradable and/or recyclable material for use in product packaging; and

- Investments in projects for sustainable product packaging such as Bio-PET bottles and compostable and biodegradable snacks flex films.

PepsiCo sought a second party opinion from Sustainalytics, a leading global provider of ESG research and rating, to support its stake as an issuer of green bonds. In that opinion, Sustainalytics expressed its confidence that PepsiCo is well positioned to issue green bonds, and that the PepsiCo Green Bond Framework is robust, transparent, and aligns with ICMA’s GBP.

The opinion also noted that PepsiCo intends to publish an annual report on its website, until full allocation of the relevant bond proceeds. Management’s assertion of the amount of net proceeds allocated to eligible green projects, and an examination report from an independent accountant on that assertion will also accompany the report. Sustainalytics’ opinion considered this in line with market best practice.

This did not insulate PepsiCo from criticism, however. ESG analysts noted that the documentation supporting the issuance was vague, suggesting it would benefit from greater specificity as to how the funds will be allocated among the three project categories as well as on the metrics to be applied in determining impact.¹⁰¹

Such criticism notwithstanding, interest in the issuance attracted an order book totaling US\$3.65bn, before a tightening in the pricing from 110 bps over the equivalent U.S. Treasuries to 92 bps reduced it to US\$2 billion, or twice final the deal size.

Neither the PepsiCo nor the Henkel bond indicates that the proceeds raised will go towards specific targets for avoiding the mismanagement of plastic waste (either generally or with respect to any particular polymer) resulting from their packaging. In contrast, the Coca-Cola FEMSA bond and its associated framework includes Pollution and Prevention Control (the GBP category of eligible green projects including waste prevention, reduction, and recycling) among its list of eligible projects, and notes that (a) the tons of waste recycled / properly disposed of in its operations, and (b) the percentage of post-consumer primary packages (e.g., PET and/or glass bottles) collected as a result of waste management initiatives, rank among the expected impact metrics that it will report on annually.¹⁰²

Disappointingly, however, none of these issuers made a commitment to releasing information comprehensively — ascribing definitive proceed amounts to individual projects and those project’s individual contribution to measurable metrics concerning post-consumer plastic waste management and/or recycling — that allows an existing or prospective investor to determine the specific impact on plastic waste mismanagement attributable to each USD invested. To be clear, each issuer is under no legal obligation to do so, but the availability of that data could support the case for investing in waste management and recycling infrastructure and companies in order to remediate ocean plastic leakage.

Waste Reduction Bonds

In February 2020, UBS published a research piece entitled, “The Future of Waste.”¹⁰³ It noted that plastic packaging loses 95% of its material value — US\$80-\$120 billion annually — after just one use, and that plastics account for 12% of the world’s solid waste. Thus, it lamented the fact

that a mere 4% of proceeds used from the US\$700 billion green bond market, which focuses more on energy efficiency and green buildings, actively address waste. Further, although the GBP includes waste prevention, reduction and recycling within its Pollution Prevention and Control eligible green project category, UBS found that only three out of 213 issuances referred to waste-related projects as the exclusive use of proceeds.

As an alternative for raising dedicated financing, UBS posited the development of waste reduction bonds (WaRe Bonds). “Like green bonds, [WaRe Bonds] would be standard bonds that appeal both to mainstream traditional investors and to the growing cohort of sustainable investors.”¹⁰⁴ But, rather than complying with the more onerous requirements of the GBP, WaRe Bonds would rely on a simplified standard.

Under this standard, bond proceeds would finance new, or refinance existing, eligible waste reduction projects that address three broad areas: energy, packaging, and food. To ensure adequate transparency for investors, an issuer would be required to disclose the intended use of proceeds when the bond is issued, and commit to annual reporting on the eligible projects financed and their respective waste reduction outcome. Henkel pursued a somewhat analogous format in issuing its plastic waste reduction bonds.

Similarly, in December 2019, after two years of development, CBI launched the Waste Management Criteria for use in certifications under its Climate Bonds Standard. However, the relative complexity of its certification process (e.g., identifying assets that meet the relevant sector criteria), the associated costs of issuance pursuant to its standard, and the perceived financial and operational burdens (pre- and post-issuance), will likely preclude many of the companies in the plastic recycling value chain in developing economies from using the criteria.

Circular Economy Plastic Reduction and Recycling Bonds

In proposing WaRe bonds, UBS noted that many smaller companies regard the financial costs and operational demands of establishing a green bond framework as overly burdensome. And it's notable that the offerings of green bonds described above came from multinational companies with solid credit ratings, and with issuance amounts in the hundreds of millions (or billion) of U.S. dollars that assure an active secondary trading market.

In contrast, many of the entities operating along the plastic recycling value chain in developing countries are unrated companies with modest capital requirements that are not candidates to issue green bonds. Even where larger corporations are present, they often choose to finance plastics-related waste management and recycling ventures by utilizing their own balance sheets, rather than seeking external funding (e.g., Suez's construction in 2019-20 of a 30,000 ton per annum LDPE/LLDPE recycling plant in Thailand's Bang Phli District near Bangkok). This results in a paucity of waste plastic management and recycling investment performance data, both from a financial and an ESG perspective, that can showcase the returns available in the sector and attract much-needed institutional investment.

Recognizing that this information gap is a barrier to investment, The Circulate Initiative, an NPO, is developing guidelines designed to accelerate the ability of prospective investors in plastic waste solutions to measure and determine the impact of their investments.¹⁰⁵ These guidelines will incorporate metrics related to preventing plastic leakage, climate mitigation and contributions to the circular economy.

These guidelines and the ESG metrics they contain (or similar frameworks) could be used

as the basis for developing Circular Economy Plastic Reduction and Recycling (CEPRRe) Bonds (and loans). As with UBS's WaRe Bonds, CEPRRe Bonds would not require the issuer to put in place a green bond framework. Instead, in connection with the financing of a new or existing plastic waste reduction and/or recycling eligible project, it would publicly state at issuance (or upon first drawing on a loan) the use of proceeds and ESG metrics by which it intends to assess impact.

Further, it would commit to annual public disclosure of the sums invested to date in that project and the progress towards plastic waste reduction and/or recycling by reference to its chosen ESG metrics. While issuers (or borrowers) would not have to hire an independent entity to verify these metrics, its auditors would assess and certify the underlying documentary basis for its representations. This should facilitate smaller capital raising (by way of bonds or loans) without imposing overly onerous costs or compliance burdens on the issuer or borrower.

In July 2020, Duy Tan Plastics Corporation (Duy Tan) entered into a green loan with HSBC for an undisclosed amount in connection with the construction of a US\$60 million bottle-to-bottle plastic (rPET) recycling facility in Vietnam.¹⁰⁶ The loan accords with the international Green Loan Principles jointly issued by the Loan Market Association and the Asia-Pacific Loan Market Association.¹⁰⁷ (These are based upon and essentially replicate the core components of the GBP). And while these contain a reporting requirement, there is no indication of what specific information Duy Tan will be required to report to HSBC, nor any commitment to making any green related information available to the investment community generally.

Had the loan been extended according to the conceptual CEPRRe framework, investors would likely have been able to review annual metrics concerning the amount of rPET diverted from the environment and recycled; GHG emissions avoided by eliminating virgin plastic to produce new bottles; and, possibly, incremental gains in the livelihoods of those IWCs who collect the waste plastic bottles supplying Duy Tan’s new facility.

In addition to providing an on-ramp to raising green financing, the CEPRRe Bond framework could become the de facto standard for plastic reduction and/or recycling bonds (and loans) and the recognized reporting standard for green bonds incorporating those objectives within the GBP’s Pollution Prevention and Control category. It would also avoid allegations of greenwashing¹⁰⁸ – or, where the SDGs are concerned, rainbow washing (from the 17 colors of the SDG logo).¹⁰⁹

Other ESG-focused Bonds

The universe of ESG-focused bonds (and loans) continues to grow. Sustainability-Linked Bonds, for example, have been added to Social and Sustainability Bonds and companion blue bonds have joined green bonds. ICMA issued

voluntary guidelines or principles for some, but not all, of these categories.¹¹⁰ Where they have, however, the barriers to accessing debt capital for smaller waste management and recycling entities will be the same as for green bonds.

Blue bonds do not yet have voluntary issuance guidelines or principles, nor do they have a clear definition. But it is generally understood that they’re issued with the specific objective of financing “the implementation of [SDGs] related to life under water as well as the transition towards a sustainable blue economy with a strengthened blue natural capital at its core.”¹¹¹ Thus, they are analogous to green bonds, and – in the context of remediating ocean plastic leakage – may share common or identical objectives, particularly reducing ocean plastic leakage.¹¹² (See Ocean/Blue Finance).



Results-Based Financing

There is no commonly agreed upon definition of results-based financing (RBF). Nevertheless, the defining characteristic of RBF instruments is that they are structured to ensure that any payment for the provision of a service or infrastructure is conditioned upon the achievement of pre-agreed and verifiable results.

The Global Partnership for Results-Based Approaches, which was established within the World Bank in 2003, identifies eight RBF approaches.¹¹³ Several of these relate to the use of RBF in the context of monies flowing from a government, MDB or aid agency. Output-based aid, for example, refers to the use of publicly- or aid-funded subsidies to pay a service provider – complementing or replacing a user contribution – to provide access to infrastructure and social services (e.g., water, sanitation, education, and health care) for the poor. However, unlike other forms of RBF, the private sector provides the requisite up-front financing for an impact bond.

Impact Bonds

Because they are not tradeable financial instruments that represent a debt, impact bonds are not actually bonds. Nor are they loans. In fact, they are not financial instruments at all. Rather, they are a multi-party financial agreement – generally structured as a PPP – in which private investors provide pre-financing for public projects that seek predetermined and verifiable social, developmental or environmental outcomes. Hence, they are often described as pay-for-success or performance-based contracts. If the project achieves the agreed upon impact outcome(s), the funder will repay the investors their initial capital, plus a return (i.e., interest); if not, the interest payment and possibly all or part of the capital will be lost to the investors.

Like true bonds, whose proceeds are directed towards ESG goals, impact bonds come in a variety of forms. The two most prominent are social impact bonds (SIB) and development impact bonds (DIB), which differ in terms of who pays for a successful outcome: governments in the case of a SIB; a donor entity (e.g., an aid agency or philanthropy) in the case of a DIB.

In contrast, the environmental impact bonds issued by a limited number of U.S. municipal authorities, have taken the form of standard municipal bonds. (An exception to the rule that impact bonds are not bonds). Nevertheless, the return on EIBs, as with SIBs and DIBs, is tied to the verified achievement of pre-agreed outcomes.¹¹⁴

As of July 2020, 194 impact bonds have been contracted in 33 countries, representing up-front capital of US\$421 million.¹¹⁵ The vast majority of these were contracted in developed countries, particularly the U.S. and UK. In low- and middle-income countries, 11 DIBs and six SIBs, totaling US\$48 million have been contracted – mostly in India (three impact bonds), and predominantly focused on health and employment outcomes (five impact bonds each).¹¹⁶

To date, there have been no impact bonds contracted in the SWM and recycling space in developing economies. Only one loan in a developed economy incorporated RBF-like terms, and the attainment of the relevant metrics was mixed.¹¹⁷

Nevertheless, the World Bank has consistently supported applying RBF in the waste management sector.¹¹⁸ It believes that such financing may be tailored to several objectives that can help stakeholders to:

- Increase fee collection
- Promote source separation, waste reduction, and recycling
- Strengthen waste collection and transportation
- Design efficient infrastructure projects, and
- Defray risk for investors and increase investments¹¹⁹

Yet, the World Bank also recognizes that RBF is likely to be more effective when combined with other prescriptions such as infrastructure investment, policy reform and technical assistance.¹²⁰ Further, it notes that in certain circumstances the provision of up-front financial assistance to service providers with limited access to credit could actually facilitate RBF projects.¹²¹ Combining monetary sources opens the possibility to use privately financed impact bonds with other forms of publicly and/or aid-funded RBF for common waste management and/or recycling related impact objectives. This could help address the absence of scale and replicability that has often characterized impact bond structures.¹²²

Case Study 8

DC Water Environmental Impact Bond

In late 2016, as part of a legally mandated green infrastructure strategy, DC Water issued the U.S.'s first EIB, which was privately-placed with Goldman Sachs and the Calvert Foundation. The proceeds were allocated to the construction of green infrastructure on public properties that absorbs and slows stormwater surges during heavy rainfall, reducing the incidence and volume of combined sewer overflows that pollute waterways around the city.

Structured as a 30-year tax-exempt municipal bond, the EIB totaled US\$25 million with an initial coupon of 3.43% for the first five years. It also has a mandatory tender date on April 1, 2021, when a variable payment will be due contingent on the environmental intervention's level of success or failure.

Specifically, if the new infrastructure reduces stormwater runoff by more than 41.3% against the pre-established baseline, DC Water will make a one-time US\$3.3 million outcome payment to the investors. Conversely, if runoff reduction is less than 18.6% of the baseline, the investors will make a one-time risk sharing payment to DC Water of US\$3.3 million. If runoff reduction is between 18.6% and 41.3%, no payment is due other than

the principal and applicable accrued interest. Both the baseline and the performance metrics are independently verified. The level of performance will be assessed in early 2021.

In using this innovative financing tool, DC Water isolated the performance risk of its investment in green infrastructure and shared it with the investors. Further, if the investment proves successful, its cost of capital will also be reduced by virtue of the one-time risk sharing payment it will receive. In developing countries, where municipal authorities' scope for investing in SWM infrastructure is often constrained, the ability to isolate the performance risk inherent in such investment could be a particularly powerful tool, especially if used in combination with other innovative tools, like credit enhancement.

The performance-based financing of the EIB is replicable in the U.S.: in January 2019, Atlanta's Department of Watershed Management issued a publicly offered US\$14 million EIB to finance six green infrastructure projects for stormwater management; and the City of Baltimore is reportedly considering a US\$6.2 million EIB issuance.¹²³

Facilitating Factors

Recent research by the Brookings Institution identified seven drivers, or facilitating factors, that enable countries to effect multiple impact bonds:

- Qualified service providers
- Willingness of governments to engage
- Strong intermediaries
- Technical assistance for project development
- Standardization of procedures
- Existing experience with PPPs
- Technology for data collection, analysis, and action¹²⁴

While one or more of these drivers is often absent in developing countries, the nature of the plastic waste crisis is such that it could be a catalyst for developing those capabilities within a specific country or region. The following factors, in particular, support that potential:

- The imperative to engage multiple stakeholders in a holistic approach to financing and funding waste management and recycling
- The significant sums required for investment in waste management and recycling infrastructure could attract broader interest from private investors for impact bonds that are well constructed and have a sufficiently large ticket size
- Plastic waste leakage generally occurs across multiple municipalities (each of which is responsible for waste management within its jurisdiction) within a specific watershed, providing the opportunity to
 - Add municipalities incrementally as participants in impact bond structures (possibly through pooling vehicles)
 - Build the critical mass of service providers and intermediaries with repeat impact bond offerings
 - Provide a conduit for investment by government-funded outcomes funds focused on waste management and recycling and/or other hygiene matters
 - Distribute certain fixed development costs across multiple offerings, and
 - Address the issue of plastic leakage in a staggered but comprehensive way within a specific watershed, or watershed-by-watershed

Access to credible data is a consistent issue in developing countries, but the greater prevalence of cost-efficient IT solutions (e.g., satellite imaging) seems poised to diminish this barrier to accurately measuring the impact of plastic reduction interventions, and offer greater transparency on the scope and sources of leakage.

Prospective investors can some assurance that financial return is achievable in research that indicates that in all but two of 50 impact bonds completed, the projects funded by the bonds achieved their outcomes and repaid investors.¹²⁶ As additional performance data becomes available from earlier-established vehicles dedicated to investing in the emerging market waste and recycling sector (e.g., Circulate Capital Ocean Fund) and in related ocean health-focused projects (e.g., Althelia's Sustainable Ocean Fund), that trend may continue to bear out.

Case Study 9

Border Impact Bond Proposal¹²⁵

Plastic leakage is not merely a domestic issue, it is transnational. And that is well exemplified by the heavy contamination of Tijuana River Watershed, which initially runs through the Mexican state of Tijuana and then the state of California in the U.S. Each year, Californian municipal authorities incur remedial costs in the region of US\$1.8 million to excavate, sort and dispose of contaminants, particularly plastics, from upstream sources in Mexico.

4 Walls International, a U.S. NPO, is driving efforts to create a border impact bond (BIB) that leverages the pay-for-success PPP model used by municipalities elsewhere in the U.S. Under the proposed BIB (which is still in development), private investors will supply up-front monies for upstream interventions to reduce sediment and solid waste downstream in an area that forms a state park. Payments to BIB investors would be tied to the success or failure of independently measured reductions in downstream contaminants and concomitant reductions in the cost of remediation activities to Californian authorities.

Plastic Credit Mechanisms

Plastic credit mechanisms (PCMs) are market-based certificates that evidence the fulfillment of a specific service or process along the plastic recycling value chain. PCMs generally take one of two forms (although some schemes conflate the two):

- Collection credits, evidencing the post-consumer collection of waste plastic; or
- Processing credits, evidencing the processing of waste plastic into PCR (generally in flake or pellet form).

In each case, the relevant credit represents a defined quantity of plastic collected or recycled.

PCMs, which vary widely in their level of sophistication, draw heavily upon the framework developed for creating and trading carbon credits. This is particularly clear in their potential as an instrument to offset a voluntary commitment or regulatory obligation connected to plastic recovery or recycling. For example, where a company has an EPR obligation to recover the plastic used in its packaging, it can purchase collection credits to meet – or offset – that obligation. Similarly, where a corporation has made a commitment to using a defined percentage of recycled plastic in its packaging, it can purchase (and retire) recycling credits to meet a shortfall in that commitment, whether it was caused, for example, by the unavailability of recycled plastic or lack of price competitiveness with virgin plastic.

PCMs are very new – a recent study identified at least six offset schemes at various stages of development.¹³² The most advanced of these began accepting applicants to its pilot program only in mid-2020. Nonetheless, PCMs represent a financial innovation that may unlock an additional revenue stream from investment in new or expanded SWM and recycling infrastructure, improving potential returns and broadening the range of potential investors. Further, the ability to pre-sell PCMs that reflect anticipated future collection and/or recycling activity provides potential access to early stage finance that is generally scarce for that infrastructure. The use of those additional monies may also serve a broader social purpose, such as increasing the income of IWCs through higher plastic purchase prices. (Case Study 10).

Case Study 10

Circular Action Hub Circular Credit Mechanism

The Circular Action Hub is a web-based platform developed by BV Rio, the Brazilian NPO, that seeks to connect waste management and recycling projects and activities with entities willing to fund those efforts.¹²⁷ The Circular Credits Mechanism (CCM) is its PCM offering.

The CCM has its roots in an earlier BVRio project involving Reverse Logistics Credits (RLCs) in Brazil.¹²⁸ RLCs are certificates confirming the collection of a defined amount of waste plastic material. By purchasing RLCs, companies are able to meet their obligation to ensure that the packaging used in their products is collected as required by Brazil's national solid waste legislation introduced in 2010. Recognizing the importance of waste pickers to the waste management sector, each waste picker cooperative retains the ability to create and sell the certificates. Those sales, which do not prevent the sale of the underlying physical material which it represents, create an additional income stream. BVRio ran its RLC pilot project from 2013-15.

Likewise, under the CCM, each credit issued represents the "recovery . . . and appropriate destination of 1 [MT] of material."¹²⁹ In addition to plastic, eligible "material" includes glass, paper and metals. Credits may be issued for two main types of activity:

- Waste collection or removal: the collection of material from the environment and its appropriate disposal, so that it doesn't return to pollute the environment; and
- Waste recovery: the recovery of material that would otherwise be landfilled or incinerated.¹³⁰

The CCM does not differentiate between the two activities. The Circular Action Hub platform will maintain a registry of credits created.

At its core, the CCM is an attempt to assign a market value to an externality that existing waste management systems ignore: The environmental service of collecting post-consumer plastic (or other eligible waste materials). A service that is generally, in developing economies, provided by informal sector actors, who are presently paid only for the market value of the plastic they collect and, given their relatively poor negotiating position, often less than that. The CCM therefore encompasses both environmental and social goals. These are reflected in the principles and criteria that govern the creation of credits; in particular, for the creation of a credit, the requirement that the environmental service will be recognized only if it is "fairly paid for, in addition to any payment made for the acquisition of physical recyclable materials."¹³¹

As a market-based mechanism, the CCM does not seek to ascribe a pre-determined or minimum value to the environmental service of collection. Rather, although it will adopt an oversight role, prices for credits will be determined by supply and demand factors by participants on the Circular Action Hub platform. The platform began registering participating projects in July 2020, and 73 projects, representing 290,011 tons per year, were registered as of November 31, 2020.

Case Study 11

3R Initiative

The 3R Initiative, sponsored by Nestle, Tetra-Pak, Danone, and others, aims to increase plastic recovery and recycling activities globally by attracting additional financing through a PCM.¹³³ Credits issued must comply with its Plastic Waste Reduction Standard (Plastic Standard). The Plastic Standard, which was the subject of two public consultations in 2020, will establish consistent and transparent rules and methodologies to quantify and account for the recovery and/or recycling of waste plastic for participating projects, and implement a verification system using independent auditors. Verra, a US-based NPO founded to provide greater quality assurance in the voluntary carbon credit markets, led the development of the Plastic Standard and will act as the registry for credits issued.

Two types of plastic credit may be issued pursuant to the Plastic Standard:

- Waste Recovery Credits, representing 1 Kg of recovered plastic waste; and
- Recycling Credits, representing 1 Kg of recycled plastic waste,

Each as verified by a validation/verification body approved by Verra.

In each instance, a credit will be issued only if the recovered or recycled plastic represents an increase over baseline collection/recycling rates established during the registration process for any relevant project. Independent third parties will verify this additionality, and the result credit will be recorded in a central registry that Verra maintains. A total of 26 projects spread over six continents are piloting the Plastic Standard. The inaugural credits from those projects are anticipated towards the end of 2021. As a market-based mechanism, supply and demand will likely determine the price of each credit type.

As with the Circular Action Hub CCMs, the 3R Initiative (to which BVRio is a technical founding member) expects its PCM to result in additional income to plastic recycling co-operatives and local communities that rely on manual waste collection. This concern is reflected in the Plastic Standard's requirement that social safeguards be integral to participating projects.

Figure 10: 3R Initiative Plastic Crediting Pathway

Source: 3R Initiative



As the Circular Action Hub CCM and 3R Initiative case studies illustrate, even the most advanced PCM efforts are in their early proving stage. Consequently, several questions remain about their efficacy and governance in practice (notably in relation to ensuring that their purported benefits flow to IWCs).¹³⁴ Three issues stand out with regard to remediating waste plastic leakage to the world's ocean:

- The extent to which the mechanism incorporates a transparent and credible concept of additionality. For any given project that participates in a PCM, more waste plastic should be collected or processed than would have occurred in the absence of the plastic credit's creation.
- The concern that the prospect of an offsetting mechanism may be a disincentive to purchase and use recycled material or to commit to related investments, among entities that have either a commitment or obligation to use recycled material in their packaging.
- The potential for double counting of material (a) within RCMs, (b) between RCMs, and (c) as a consequence of a disconnect between the credit receipt and the underlying material.

Elsewhere, market observers' concerns often flow from the differing characteristics of the carbon credit and prospective plastic credit markets. Unlike carbon, which is a homogeneous and finite commodity, waste plastic comprises a variety of polymers and often comes in a form

where it is mixed with other materials (in MLP, for example). Moreover, factors that are not intrinsically local influence the price for those plastics. Yet, a number of proposed PCMs do not distinguish between polymers or account for the various factors that might influence the price of a credit in a specific location.

Further, the lack of a nexus in a specific geography or regulatory regime requiring the collection and/or recycling of waste plastic may impede the development of liquidity (i.e., the ability to readily find a willing buyer and seller) on PCM platforms, particularly from providers of speculative capital.

Consequently, the voluntary PCM initiatives that focus on a specific geographic area (and have rigorous and transparent credit issuance and registration standards) may have enhanced potential to develop a critical mass of participants and liquidity. This is the case with the Recycled Material Standard being developed by GreenBlue, an environmental NPO, and its associated attributes of recycled content (ARCs), a certificate-based trading scheme that will be focused on the North American recycling market.¹³⁵

Concerns of stakeholders notwithstanding, PCMs represent an innovative financial instrument that could attract additional capital to the waste management and recycling sector in developing economies, and have the potential to facilitate increased incomes and additional social benefits to IWCs.

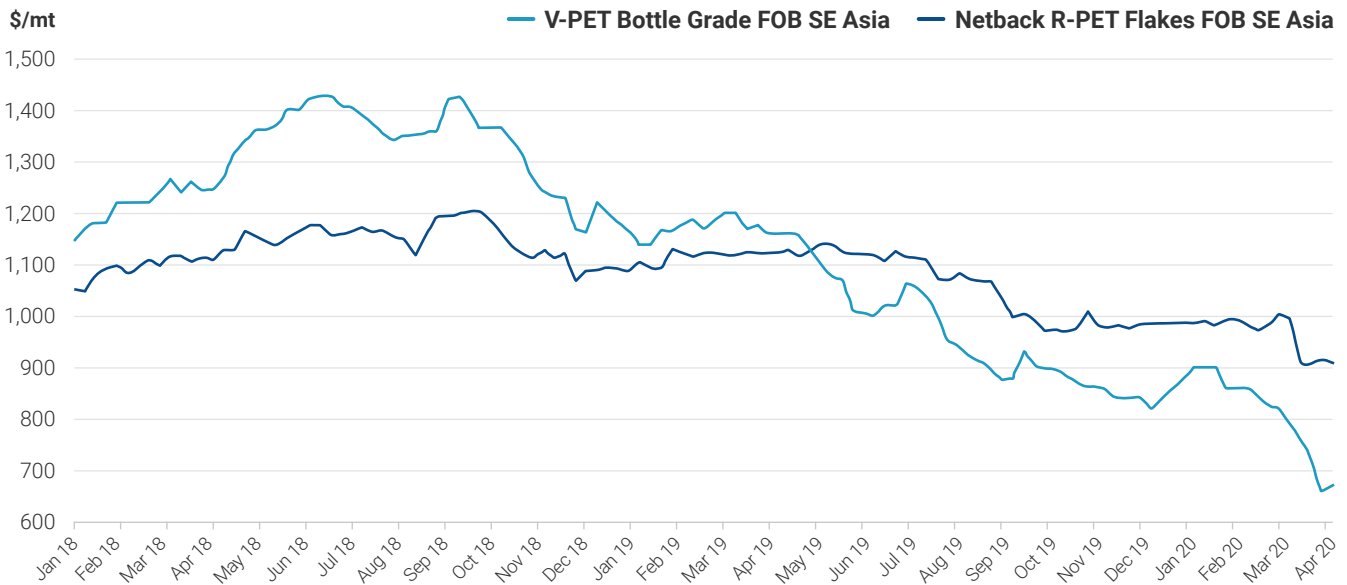
Financial Instruments for Price Volatility

Futures Contracts

Even before the onset of the COVID pandemic, the decline in the price of crude oil – from which plastics are derived – adversely impacted many participants in the plastic recycling value chain. The fall in crude oil prices from a high of US\$84/bbl in September 2018 to a low of just less than US\$25/bbl in April 2020 caused the price of virgin plastics to decline dramatically. This resulted in the price of recycled material moving from a discount to a premium relative to the price of virgin plastic. Not surprisingly, demand for recycled material, particularly rPET, declined considerably, causing income to fall for individuals and entities involved in plastic recycling, notably IWCs.

As in many other industries, futures contracts enable market participants to hedge the price risks they bear in connection with petrochemical products. Such futures contracts are listed and traded on regulated exchanges around the globe. However, no listed futures contract currently exists for any recycled plastic polymer.

Figure 11: Southeast Asian Price for virgin PET and rPET (Jan. 2018-Apr. 2020)



Source: S&P Global Platts

A futures contract is a legal agreement to buy or sell a specified quantity of a commodity for delivery in the future:

- (a) at a price determined at initiation of the contract;
- (b) that obligates each party to the contract to fulfill the contract at the specified price;
- (c) that is used to assume or shift price risk; and
- (d) that may be satisfied by delivery of the commodity at the expiration of the futures contract or, if a trader wishes not to take delivery of the underlying commodities, by entering into an offsetting futures contract. For instance, a futures trader could sell a futures contract for the same month in which he bought one to offset an earlier buy, or vice versa.¹³⁶ For futures trading purposes, the definition of a qualifying commodity is quite broad, and includes physical commodities and raw materials (e.g., wheat, gold, oil), as well as financial instruments (e.g., currency and interest rates). Olefin futures contracts are already traded – a Polymer Grade Propylene futures contract is listed on the CME, for example – so the various polymers that are recycled (rPET, rHDPE, etc.) certainly qualify, as well.

In order for futures contracts to operate efficiently, they must exhibit convergence: no matter how widely the price of the futures contract may diverge from the spot price of the underlying commodity during the trading term of the contract, the prices of the contract on the exchange and of the underlying commodity will converge at expiration. It follows, therefore, that in designing a listed futures contract, one must have a transparent spot price, reported at least once a day, which is credible to entities that are exposed to price volatility in that commodity.

Until recently, such a candidate was absent. But in April 2020, S&P Global Platts announced that it would begin publishing three new daily spot price assessments for U.S. post-consumer rPET

bottle bales: Standard and Premium Grades FOB Los Angeles; and Standard Grade FOB Chicago. S&P Global Platts subsequently began publishing daily spot price assessments for U.S. rPET hot-washed clear flake on July 1, 2020. As a result, daily prices are now available for pre-processed and processed rPET.

It's too early to determine the viability of S&P Global Platts' new spot price assessments as the reference prices for potential rPET futures contracts. (A recently announced water futures contract in the U.S., for example, is structured around an index that was started in October 2018).¹³⁷ Nevertheless, if the price of crude oil continues to gyrate wildly, demand should rise for financial products, like futures contracts, that can ameliorate price volatility and thereby maintain more predictable revenues and operating expenses for buyers and sellers of recycled plastic polymers.

While the users of futures contracts are likely to be more financially sophisticated entities operating at the apex of the waste plastic aggregation or processing segments, this does not preclude benefits from accruing to individuals further up the value chain. In late 2018, for example, had a Vietnam-based processor of rPET been able to sell March and April 2020 rPET flake futures contracts that are financially settled, it would have been able to buy back those contracts towards their expiration at a profit that made up for the decline in the spot market price. (Figure 11). The availability of long-dated futures contracts for rPET bales (its feedstock) and rPET flakes (its product) ought to encourage a processor to enter into longer-term contracts with both its suppliers and customers, facilitating less fluctuation in prices along the value chain and, in turn, more predictable incomes for IWCs.

Subsidized Insurance

Although partially supported by public funds, subsidized insurance represents a more market-based approach to compensating an insured party for the adverse impacts of market failures. Such programs are generally structured as a PPP in which governments subsidize premiums and set the terms and conditions of policies taken out with private insurers who write underlying policies. In the U.S., for example, the federal crop insurance program protects farmers from declines in yields, prices, or both.

Developing economies could establish a similar market-driven approach that would compensate insured parties if the market price of recycled plastics falls below a pre-set level. As with crop insurance – which exists for some, but not all, crops and is tied to a specified growing area – plastic price insurance could be structured for specific recycled polymers. Given the relative sophistication of such a financial instrument, in developing economies, it would likely be best developed for larger recycling entities and structured by reference to recycled plastic (flakes or pellets) that conform to global quality standards. The financial benefits of greater price stability ought to flow up the plastic recycling value chain, encouraging the collection and aggregation of better quality (i.e., cleaner) plastic waste.

Case Study 12

Subsidized Crop Insurance in the U.S.

Crop insurance in the U.S. was originally introduced as part of the New Deal in 1938, under the Federal Crop Insurance Act. However, high costs, low participation by farmers, and an inability to accumulate sufficient reserves to pay for catastrophic losses characterized coverage. For decades, it remained limited in scope. Until 1995, only an estimated one-third of farmers purchased crop insurance; most relied on Congress to bail them out in case of catastrophic losses through disaster assistance and emergency loans.

The 1980s saw a desire to abolish government-funded disaster programs, and the beginnings of a move towards a more market-oriented approach. As a result, Congress introduced various pieces of legislation, notably in 1994 and 2000, to encourage greater private sector participation in

crop insurance plans, and discourage disaster aid.

The current crop insurance program is administered by the Risk Management Agency, part of the U.S. Department of Agriculture (USDA). Under the program, Common Crop Insurance, or Combo, policies protect farmers against reductions in the yield or price of their crops, or a combination of both.¹³⁸

Participating farmers pay premiums to the private sector insurance companies that write the policies. There are currently 14 USDA-approved crop insurance companies.¹³⁹ The cost is partly subsidized by the federal government, which pays about 60% of total premiums, on average, and farmers pay about 40%.¹⁴⁰

The development of crop insurance in the U.S. demonstrates that, in order to make such a program viable, it must create (or have the ability to raise) capital reserves large enough to make payouts when the price of covered waste plastic polymers declines. (Case Study 12). However, national governments could potentially fund these programs in advance from their own resources and/or by imposing EPR schemes or similar plastic-related levies. Governments could also establish endowments funded by entities that use plastic packaging for their products and could fund premium subsidies in the same way.

To establish premiums and structure appropriate payouts in the event of claims, the market will need credible historic price data for the relevant recycled polymers. At times, regional phenomena caused historic price oscillations — fluctuations in price resulting from the annual monsoon season, for example — that also factor in when determining appropriate underwriting periods.¹⁴¹ Clearly, insurers or government entities would have to perform additional research in specific

jurisdictions to determine the viability of such programs there.

While posited as a solution to market failure, subsidies are by their nature potentially market distorting and can provide opportunities for rent-seeking, particularly in developing economies where governance frameworks may not be well developed. Therefore, the introduction of such a scheme would ideally take place as part of a holistic, national plan to address the issue of ocean plastic by encouraging the recycling of plastic waste and migration to other materials where collection and recycling are unlikely. Careful consideration of the qualifying criteria for prospective insured parties could address possible criticisms of corporate welfare or rent-seeking.¹⁴² Similarly, constructing the entity administering the program properly to minimize the potential for graft would be vital.



Price Floors

Some stakeholders, citing the example of India's price stabilization regime for certain food staples beginning in the 1960s, floated addressing price volatility by establishing a price floor for plastic waste.¹⁴³ As with subsidized insurance, this mechanism would provide defined actors in the plastic recycling value chain with a guaranteed price (and hence income) for their waste plastic.

Given its anti-competitive nature, national leaders would need to legislate price floor(s), although they could devise either national or regional floors. There are, however, significant operational issues to address. These include: Who acts as the buyer of last resort? What polymers are included in the regime? Of what minimum quality and quantity must the polymers be? Where in the plastic recycling value chain does the floor price apply? Is the floor price intended to encourage collection of plastic waste and/or processing into pellets/flakes? How does the administering authority prevent parallel importing of plastic waste from other jurisdictions?

Case Study 13

Food Corporation of India

Maintaining access to low-priced food staples (notably wheat and rice), particularly for the nation's poorest citizens, while supporting and stabilizing prices through the procurement and management of food stocks is a key feature of India's agricultural policy.¹⁴⁴ In 1964, against a background of grain shortages, India's Food Corporation Act established the Food Corporation of India (FCI), with three specific objectives:

1. Provide effective price supports to safeguard the interests of farmers;
2. Distribute food-grains throughout the country; and
3. Maintain a satisfactory level of operational and buffer stocks of food-grains to ensure national food security.¹⁴⁵

The FCI effects its price support operations through a Maximum Support Price. The Commission for Agricultural Costs and Prices — an office of the Ministry of Agriculture and Farmers Welfare — recommends an MSP for 23 commodities ahead of each relevant growing season, although effective price support occurs principally in wheat and rice, in selected states.¹⁴⁶ Historically, the FCI's purchases typically account for about 50% of all marketed surplus, although it ranges as high as 60–80% in some Indian states.¹⁴⁷

While the Indian government's broad price stabilization activities have effectively limited price volatility in food staples and provided economic security for small farmers, some have criticized the economic inefficiency of the FCI's inherent food subsidy and the associated waste of millions of tons of food-grains through inadequate storage.¹⁴⁸ In 2015, a government committee found, among other things, that the benefits from price support accrued to a small number of large farmers as a consequence of its "highly skewed incentive system in [their] favor."¹⁴⁹ That critique became more voluble as the FCI faced mounting financial deficits financed not by allocations from the national budget, but by loans extended by the National Small Savings Fund. In September 2020, the government of prime minister Narendra Modi passed three laws aimed at deregulating the domestic trade in agricultural commodities, prompting demonstrations by farmers fearful of exploitation by corporate agribusinesses.¹⁵⁰

Regardless of the answers to these operational questions, the history of the FCI illustrates that any such scheme must be part of a comprehensive national plan. The Government of India's pursuit of price stability in food staples has ranged far beyond price floors, to include occasional bans on food exports and the termination of trading in futures contracts for certain foods on India's commodity exchanges.

The FCI's example also suggests that three foundational considerations are critical even to prima facie viability of a price floor:

- **Funding:** an ongoing source of finance to support purchases under the scheme must be in place. Given the constrained national budgets of many developing country governments, an external source (e.g., from an EPR regime) would need to be identified.
- **Administration:** while the role of the purchasing entity can be fulfilled by a government, a PPP or a private sector entity, it must be managed efficaciously and insulated from graft. A floor price is a subsidy, which is intrinsically economically distorting and thus subject to rent-seeking.
- **End-Markets:** there needs to be a coherent plan for utilizing any plastic waste purchased through the scheme. While built-up stores of plastic are not subject to deterioration in the manner of foodstuffs, they nonetheless represent an economic asset whose value should be realized.

Thematic Financing Opportunities

Although awareness of the global ocean plastic crisis has grown markedly over the past several years, few people appreciate the capital investment it will require to address the mismanagement of waste at its root. For institutional investors, the financial requirements of the waste management and recycling sector in developing countries remain overshadowed by those of its infrastructure siblings, such as water and sanitation, transportation, and housing. Only relatively recently have financial intermediaries and established PE/VC firms expressed interest in the area as a thematic investing opportunity.¹⁵¹ Even among DFIs, stakeholders note that waste management rarely constitutes a theme within those institutions' activities.¹⁵²

Given the intense competition for investment, and against a likely backdrop of limited fiscal capacity in developing country governments after the COVID pandemic, waste management and recycling sector entities could adopt a variety of thematic approaches to raise capital. Beyond structuring financial offerings to meet the growing demand for green assets that contribute to the development of a more circular economy, five additional themes seem ripe for exploration.

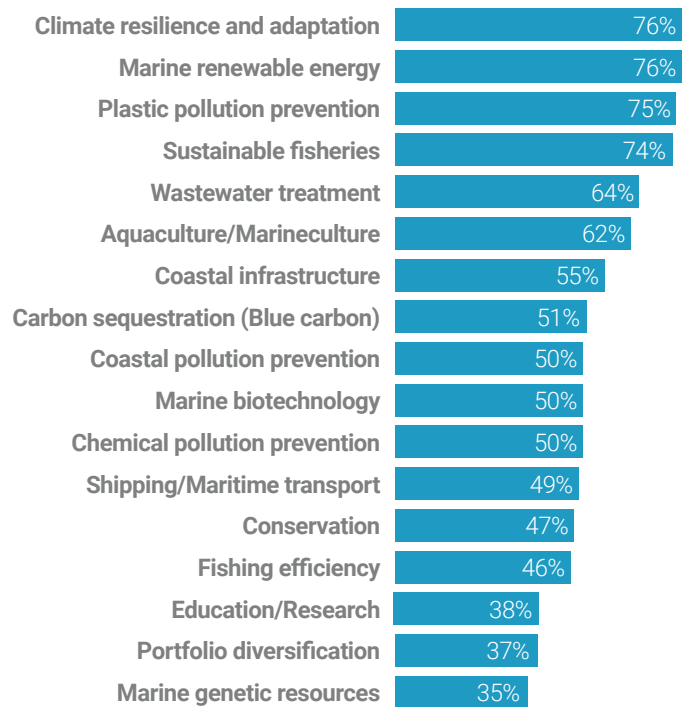
Ocean/Blue Finance

Land-based sources account for at least 80% of plastic waste leaking into the world's oceans, so institutions can leverage interest in investing in projects that support ocean health. A 2020 Credit Suisse-Responsible Investor survey on the global Blue Economy found that three-quarters of investors are familiar with the concept, and 45% of asset managers surveyed had clients who actively seek sustainable Blue Economy investments.¹⁵³ When asked where opportunities for investment lie in the Blue Economy, 75% indicated plastic pollution prevention. (Figure 12)

In 2019-20, successful capital raises by the Circulate Capital Ocean Fund (US\$106 million) and the Althelia Sustainable Ocean Fund (US\$132+ million), both of which have portfolio investments that seek to prevent plastic leakage, reinforces the growing investor interest in ocean/blue finance.

Figure 12 Investor Opportunities in the Sustainable Blue Economy

% of respondents, 218 respondents



Source: Credit Suisse-Responsible Investor

Islamic Finance

Indonesia and Malaysia rank second and eighth, respectively, among countries that contribute to mismanaged plastic waste.¹⁵⁴ Both countries also have growing Islamic finance sectors. By 2030, Malaysia can expect half of its banking assets to be Islamic.¹⁵⁵ Similarly, under its Shariah Economy Masterplan, Indonesia aims to increase domestic market share of Islamic finance from just under 6% at the end of 2018 to 20% by 2024.¹⁵⁶

Investment portfolios with Shariah-compliant mandates can have disproportionate exposures to commercial property, which often forms the underlying asset or usufruct – the legal right to use and derive income temporarily from a third party's property – as required by several Islamic finance structures. This encourages Islamic financial institutions to seek opportunities for more optimal risk management through portfolio diversification.¹⁵⁷

Moreover, a 2020 S&P Global study cites the development of ESG-related financial products as one of three potential accelerators for future growth in the Islamic finance sector, and another

report estimates the latent demand for ESG financial products in Organisation of Islamic Cooperation countries at US\$23 billion.¹⁵⁸

The global Islamic financial markets, while considerably smaller than their conventional equivalents, nonetheless present an opportunity for waste management and recycling efforts to raise capital. In March 2018, Indonesia tapped into that interest when it listed a US\$1.25 billion sovereign green sukuk (Islamic bond) on NASDAQ Dubai and the SGX. Proceeds from the bond included expenditure on waste management projects. The country returned to the market with further green sukuk issuances in 2019 and 2020, with cumulative issuance now totaling US\$2.5 billion.

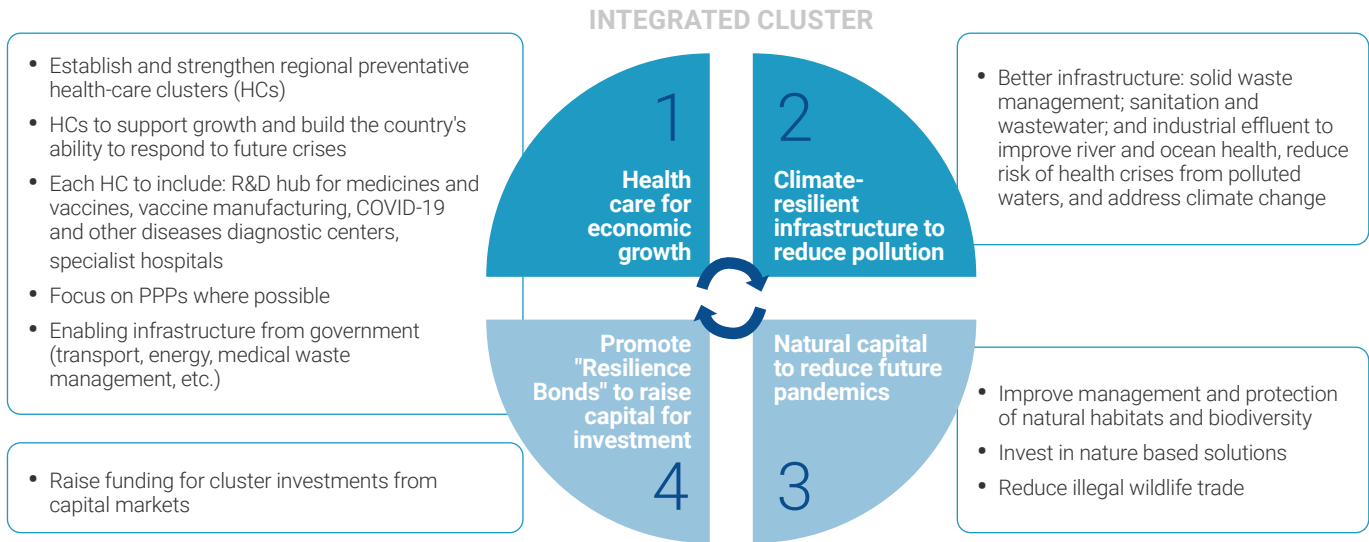
Furthermore, innovative financial instruments such as RBF, where financial returns depend on the performance of the underlying asset, present structures closer to the risk-sharing model that is supposed to be central to speculative ventures under Islamic law. These sorts of instruments offer the potential to construct innovative financial instruments that are Shariah-based rather than merely Shariah-compliant.¹⁵⁹

Sustainable Infrastructure

Even where waste management systems can access additional funding – by, for instance, imposing EPR regimes – governments in developing countries may still find that operating costs exceed the revenues they can raise by way of service charges.

Treating waste management as an element of a broader municipal or urban architecture plan, rather than an isolated activity, creates the potential to structure more attractive investments. Combining, or clustering, high-revenue, net-monetary contributing elements of urban infrastructure with others that are low-revenue or incur losses, can facilitate private sector involvement.

Figure 13: Infrastructure and Health Care Clusters



Source: ADB

The ASEAN Sustainable Urbanization Strategy promotes an urban development framework that clusters waste management with water and sanitation, energy, and food into a Quality Environment category designed to promote the development of a high-quality urban environment.¹⁶⁰ In the context of post-COVID green strategies for economic recovery in Southeast Asia, ADB also suggests incorporating waste management into a “climate resilient infrastructure to reduce pollution” – clustering it alongside healthcare elements as an integral part creating sustainable infrastructure. (Figure 13).¹⁶¹

Regardless of the particular framework a developing country adopts, local or national governments can cluster elements of sustainable infrastructure in innovative financial instruments – for example, in bonds benefiting from credit enhancement – that may unlock private sector capital for waste management and recycling infrastructure.

Local Capital Market Development

MDBs and DFIs support local capital market development in the belief that deep and efficient markets facilitate access to long-term, local-currency finance, and form the foundation for job creation and economic growth. In addition to protecting economies from capital-flow volatility and dependency on foreign debt, the availability of a broad range of financial instruments denominated in local currency also provides a channel to allocate domestic savings to economically productive assets.

To that end, MDBs and DFIs have issued local currency-denominated bonds and developed associated instruments, such as partial credit guarantees, to assist structuring financial instruments in the local currencies of several emerging market economies.¹⁶² While a de facto minimum transaction size may have precluded the involvement of MDBs and DFIs in the past, mounting calls for greater flexibility by these institutions may pave the way for greater support for smaller entities seeking finance in developing countries.¹⁶³ For waste management or recycling companies or projects with substantial local currency exposure, this may be an attractive source of capital.

Gender Lens Finance

While there is no official definition of gender lens investment, it can broadly be described as adopting an investment approach that (a) seeks to address gender issues or promote gender equity by improving the welfare of women and girls globally, and/or (b) examining gender dynamics in order to better inform investment decisions.¹⁶⁴

Over the last decade, the growth of investment vehicles that use a gender lens in making investment decisions has accelerated. According to one study, the number of gender lens PE/VC firms grew from 58 with US\$1.1 billion under management in 2017 to 138 firms with US\$4.8 billion in assets in 2019.¹⁶⁵ Many DFIs and bilateral aid agencies have also adopted a specific gender lens theme in their activities.¹⁶⁶

While the pool of capital represented by investors with a dedicated gender lens approach is relatively small, it is growing. Achieving gender equality and women's empowerment is arguably integral to each of the 17 SDGs, so the pool of potential gender lens investors may be significantly greater than studies indicate.

Given the large number of women involved in activities along the plastic recycling value chain, especially in the informal sector, a gender lens approach could constitute both a compelling element of capital raising efforts and an opportunity to develop innovative financial instruments.¹⁶⁷ In Southeast Asia, there are indications of its successful appeal to private sector investors: In 2017 and 2020, Women's Livelihood Bonds were issued on the SGX in Singapore; in April 2020, Circulate Capital Ocean Fund extended a loan to Tridi Oasis Group, a women-owned and managed recycling entity in Indonesia; and, in May 2020, Althelia Sustainable Ocean Fund made a US\$2 million investment in Plastics for Change, which seeks to "transform waste-pickers into waste-preneurs."¹⁶⁸

Supporting Funding Mechanisms

Private sector capital institutions will be prepared to invest in waste management infrastructure only if they can be confident that the underlying assets will generate sufficient cash flow to repay their initial investments plus an attractive risk-adjusted return over time. To adequately fund municipal waste collection, developing countries require additional sources of revenue that contribute to operating expenditures and can support the application of the innovative financial instruments described earlier in this survey. Absent those revenues, prospective private capital providers will likely find waste management and recycling projects not creditworthy. Public policy with regard to waste management is therefore critical, as national and local governmental decisions that increase funding of collection activities, buttressing operating expenditures, may facilitate the application of financial instruments that are otherwise not viable.

Public and Private Policy Options

In its policy playbook, Ocean Conservancy provides an overview of measures that can improve collection activities funding. This section builds upon that foundation by briefly reviewing that work's relevant fund generating options and suggesting certain additional measures. It distinguishes between mandatory public policy measures imposed by government and voluntary actions taken by private sector actors, such as producers and users of plastic packaging. (Table 3). It also reviews the application of a voluntary EPR regime in Mexico and South Africa that will likely be extended to other developing countries (particularly in Southeast Asia), as well as recent policy developments in one LMIC – Vietnam – that combine three funding models. While different private or public sector entities may control the funding conduits under each relevant policy option, every one represents additional monies entering the waste management system.^{169 170}

Table 3: Examples of Public and Private Policy Options for Supporting Funding Mechanisms

Implementor	Policy Option					
Public	Mandatory EPR			Pay-As-You-Throw		Taxation
	Packaging Material Fees	Deposit Return Schemes	Plastic Credits	PAYT	Levy on Virgin Resins	On Difficult-to-Recycle Plastics
	Vietnam Environmental Protection Fund	Vietnam	RLCs in Brazil (BV Rio)	Taiwan	Italy	Vietnam
Private	Voluntary EPR					
	Voluntary Contributions	Collection Subsidy	Plastic Credits			
	Sea the Future Minderoo Foundation	ECOCE (Mexico) / PETCO (RSA)	Circular Credits (3R Initiative)			

Source: Author

Publicly Implemented Measures

Packaging Material Fees

Packaging material fees require producers and/or users of such materials to pay fees according to the amount of packaging material they put on the market. A producer responsibility organization (PRO) pools these fees and uses them to fund packaging waste management activities.

Of particular note, The Recycling Partnership, a U.S.-based NPO funded by several major brands and consumer goods companies, recently released a policy white paper calling for the imposition of packaging material fees to fund U.S. residential recycling infrastructure and educate residents in order to reduce waste contamination rates.¹⁷¹ Similarly, in November 2020, Vietnam passed legislation that provides for packaging material fees. (Box 3)

Deposit Return Schemes

DRS (also known as deposit refund schemes) are fees levied at the point of purchase. Utilized for many years in connection with glass bottles, their use has expanded markedly to encourage recycling of plastic bottles (particularly PET bottles). The fee, or part of it, is refunded when a customer returns the container to the point of sale or another drop-off location (e.g., a reverse-vending machine).

One advantage of this system is that countries can roll it out on a localized basis. The U.S., for example, does not have federal DRS legislation, but 10 states have bottle bills to encourage recycling. California has recycled an estimated 300 billion aluminum, glass, and plastic beverage containers since it introduced the legislation in 1987.¹⁷² Critics note that the revenues such schemes raise are not necessarily placed in a lock-box for investment in waste management

or recycling infrastructure, but may instead go into a general budget fund, where they can easily be used to cover other, unrelated expenses.

Plastic Credit Mechanisms

Producers and commercial users of plastic packaging may use PCMs to meet their EPR obligations by purchasing those certificates as offsets. PCMs can also attract additional financing to the waste management and recycling sector for capital and/or operating expenses by entities along the plastic recycling value chain. However, as noted earlier, several of these initiatives are in the early stages of development.

Brazil's RLCs are PCMs mandated by public policy and structured to encourage recycling of plastic waste materials and foster the flow of additional funds into the collection segment of the value chain. However, as observers of the RLC note, the severability of the credit for tax credit purposes from the underlying plastic which it represents must not compromise the system's ability to ensure that the material collected is ultimately recycled, rather than disposed of in an environmentally damaging manner.¹⁷³ Similarly, safeguards must ensure that the value of the environmental service informal sector actors provide in collecting waste plastic and other materials actually accrues to them, and not to intermediaries between them and the brands and consumer product companies that purchase RLCs to meet their EPR obligations.¹⁷⁴

Pay-As-You-Throw

Under PAYT schemes, which are generally operated and administered at the municipal level, households pay a variable amount depending on the quantity of waste they generate and the corresponding service received for its disposal. The city of Taipei in Taiwan is a prime example of the successful application of the PAYT model.¹⁷⁵

If developing countries charge at all for waste management services, they generally do so through general taxation at a flat rate, given the inherent simplicity of calculation and understanding.¹⁷⁶

In much of Southeast Asia, waste management fees levied on households form the bedrock of waste management systems' operational funding, although they generally cover only a part of the costs. In Hanoi, Vietnam, for example, the estimated total cost of municipal waste management provision is US\$39 per ton versus household fees of US\$9.7 per ton.¹⁷⁷ Despite anecdotal commentary suggesting that citizens would be willing to pay more for such services, governments in the Indo-Pacific region have often shown reluctance to increase fees. However, ongoing experiments in Indonesia by SYSTEMIQ and McKinsey.org could provide data to inform that policy option.¹⁷⁸

Taxation

Governments can use taxation in many ways to raise monies for SWM operation and/or to encourage recycling of or use of recycled plastic. These range from taxes on the production of

virgin plastics, to taxes on non-reusable plastic packaging, and levies on plastic packaging that do not contain a minimum quantity of recycled material.

Globally, perhaps the most significant move is the European Council's adoption of a proposal, as part of its COVID recovery package, to levy a plastic tax beginning on January 1, 2021. While questions of implementation remain, the EU will tax non-recycled plastic packaging at a rate of €0.80 per kilogram. In a related move, Italy had planned to impose a €450/ton tax on virgin plastic on the same date, although it is understood to have been postponed to July 2021.¹⁷⁹

In developing countries, Vietnam's recently approved EPR regime incorporates a levy on difficult-to-manage waste products. (Box 4).

Box 4

Vietnam's New EPR Regime

Vietnam first passed a Law on Environmental Protection in 1993, and has since amended it twice. In November 2020, the National Assembly approved a new law incorporating the 'polluter pays' principle, and providing for three different potential funding models:

- A deposit return scheme
- An EPR regime with three conduits through which companies can fulfill their recycling obligations:
 - The Vietnam Environmental Protection Fund, to which producers and importers of products and packaging pay fees, which are subsequently distributed to recycling entities
 - Self-implemented recycling, or
 - PRO-supported recycling
- A fiscal contribution, or plastic tax, on waste products that are difficult to manage, including single-use plastics.

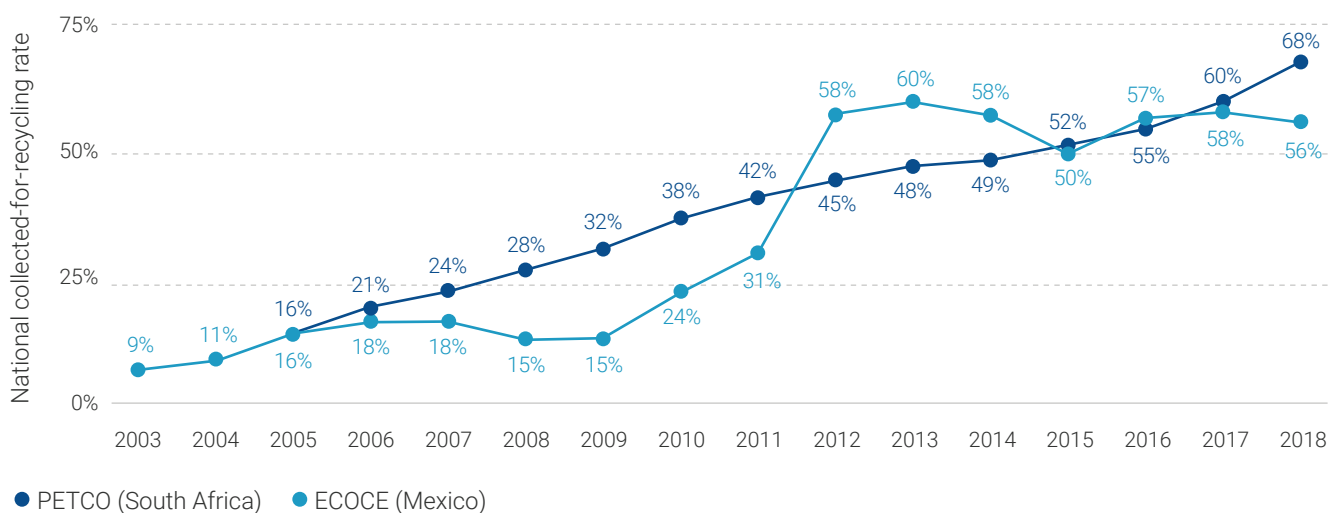
The new law, which will require further implementing regulations, goes into effect on January 1, 2022.

Privately Implemented Measures

Voluntary Subsidies

The use of subsidies to increase the prevailing market prices of plastic waste represents additional funding entering the waste management system. While a number of pilot programs have provided price subsidies to encourage the collection of plastic polymers used in specific consumer goods packaging, these have generally been of limited geographic scope and length. However, in 2002, Mexico established ECCOE, a voluntary PRO to stimulate demand for post-consumer PET bottles, and in 2004 South Africa founded PETCO to do the same. Both PROs offer price incentives to encourage PET bottle collection, improving collection rates and encouraging investment into each country's underdeveloped recycling industry.¹⁸⁰

Figure 14: rPET Bottle Collected-for-Recycling Rate in Mexico and South Africa



Note: Rates rounded to the nearest %.

Source: GA Circular

Although comprehensive economic studies on the multiplier effect of these additional monies entering the waste management sector are not available, both countries experienced a demonstrable increase in collection rates. (Figure 14). Further, the annual running costs of each PRO, estimated at US\$6-7 million in 2017, represent a baseline proxy estimate of the additional funding. Additionally, stakeholders indicate that Mexico has invested an additional US\$339 million in recycling infrastructure.¹⁸¹

Plastic Credit Mechanisms

Rather than incorporating a PCM within a mandatory EPR regime, a region or country could introduce it as a voluntary measure, as contemplated under the BVRio and 3R Initiatives described earlier. (See Plastic Credit Mechanisms).

Voluntary Financial Contributions

In September 2019, the Minderoo Foundation, established by Australian iron-ore producer Fortescue Metals founder and former chairman Andrew Forrest and his wife Nicola Forrest, announced a US\$300 million plastic waste-focused initiative called Sea the Future. Akin to a voluntary EPR program, it envisions a voluntary contribution on the use of virgin plastics by entities along its value chain that would incentivize the collection and recycling of waste plastics. No contribution would be required on recycled plastics.

Since announcing the initiative, the Foundation has released little additional information on its proposed voluntary participation model. However, in September 2020, the Indonesian Coordinating Minister for Maritime Affairs and Investment signed a memorandum of understanding and a letter of intent concerning green industries and marine plastic waste reduction with Fortescue Future Industries and the Minderoo Foundation. And the NPAP financing roadmap for Indonesia notes that the foundation will pilot a market-based model that incentivizes investment in waste collection and recycling infrastructure and operations.¹⁸² Cultivating a feed-in tariff for recycled plastic, analogous to that used in the renewable energy sector, will be key to this model.

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