

Wellington Perspective

The Emerging Potential of the Waste Management Sector in Indonesia

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Wellington Capital
Advisory



Table of Contents

I.	Introduction to Indonesia's Waste Sector	3
	Indonesia: Waste Statistics	4
	Indonesia: Waste Stakeholders Profile	5
	National Regulation: Waste Reduction Roadmap	6
II.	Opportunities and Challenges	7
	Recycling Challenges	8
	Recycling Opportunity: Demand from Global Brands	9
	Extended Producer Responsibility (EPR) Framework	10
	MSMEs: Waste Collection	11
	Waste to Energy (WtE)	12
	Precious Metals from E-Waste	13
III.	Current Development	14
	Development of Recycling Facilities in Indonesia	15
	Investment Activity: Waste Management Start-Up(s)	16

Section 1

Introduction: Waste Management in Indonesia

Waste management in Indonesia relies heavily on the informal sector, especially for the upstream collection and sorting of waste materials.

However, a number of start-up companies have entered the market in recent years - such that technology-enabled waste processing is creating a rapidly-emerging formal sector

The investment opportunity is founded on these dynamics:

- ❑ Over one-third of aggregate waste volumes (36% in 2021) in Indonesia is still unhandled
- ❑ The Indonesian public is increasingly aware of the environmental impact of ethical waste management policies and procedures, and
- ❑ The Indonesian government is making firm and measurable commitments to national waste reduction



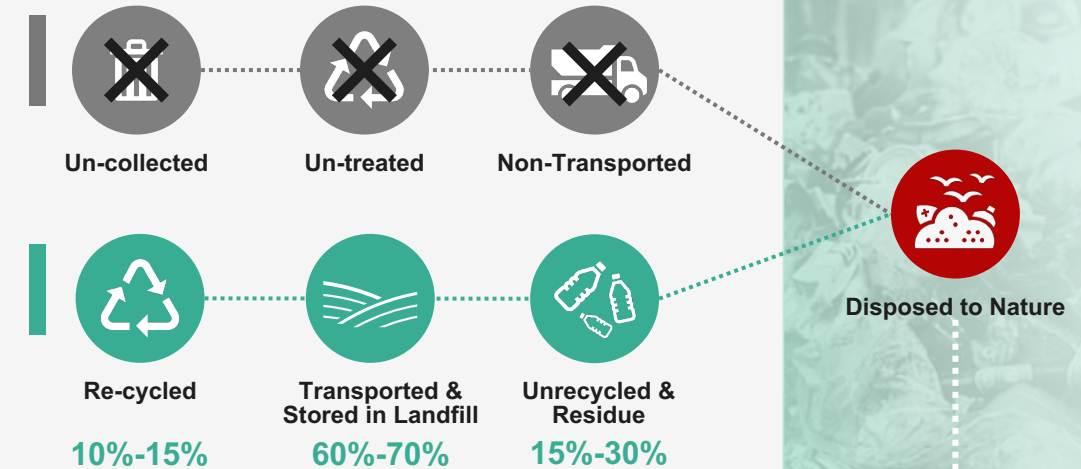
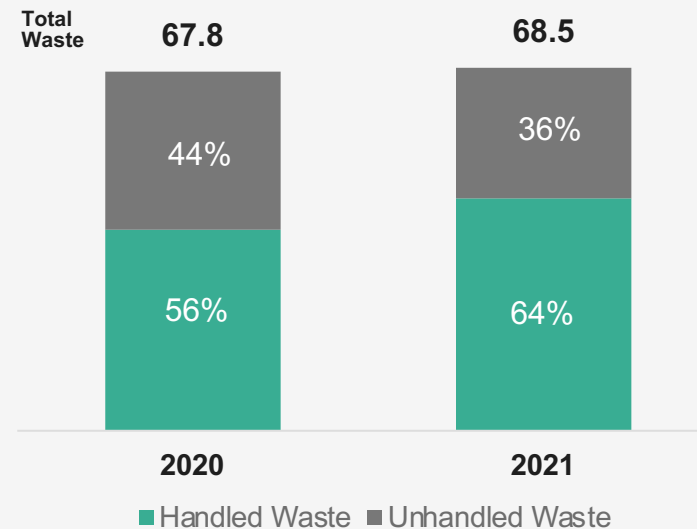
Indonesia: Waste Statistics

- ❑ The Indonesian Government is mandating a target of 70% for total handled waste volumes in 2025
- ❑ It is expected that Indonesia will stimulate public and private participation in order to drive productivity in the waste management system
- ❑ Realistic and realizable efficiency gains in waste management processes have been identified, particularly within the re-cycling eco-system

Sources:
menlhk.go.id, WCA analysis

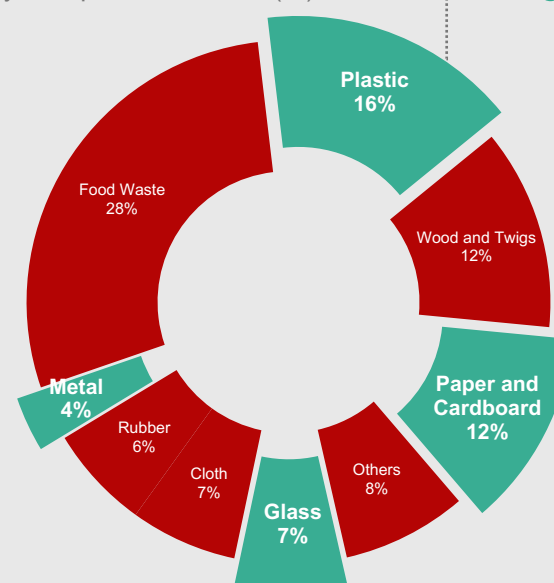
Aggregate Waste Generation

Total waste generation (in Tons) and handling penetration (%)
| 2020 - 2021



Waste Generation:

by Composition in 2021 (%)



Comparative Value of Re-cyclable Waste

- 🗑️ Plastic can typically be recycled just **once or twice** for conversion into alternative materials. The cross-industry demand for recycled plastic components is increasing year-on-year.
- 📄 A unit of Virgin printer paper can now **be recycled 5-7 times** before the fibers degrade significantly. Paper subject to multiple recycling processes can still be used in lower-grade paper-based materials e.g. egg cartons or packaging inserts.
- 🍷 Glassware and metals (including Aluminum) can effectively **be recycled indefinitely**, without a consequent loss of quality. N.B. Aluminum cans have consistently shown **the highest value** among recycled materials and **remain in high demand**.

Improve Waste Management by optimizing pre-Landfill Value Creation



Potential Gains in Re-cycling Eco-system

Indonesia: Waste Management Stakeholder Profile

Established parties active in the Waste Management sector in Indonesia

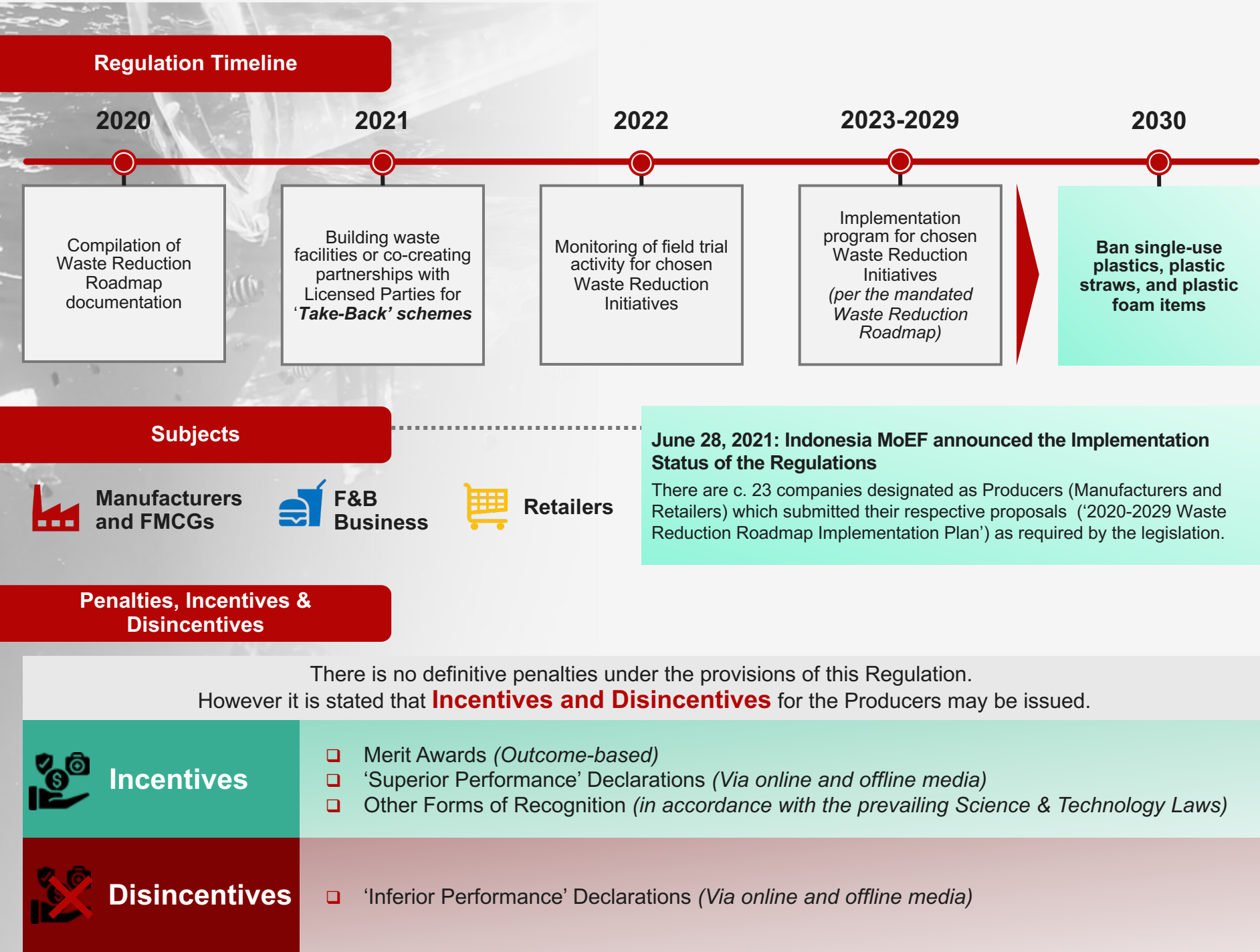
Entity	Association	Added Value	Member Base
 Waste Pickers	Indonesian Waste Pickers Association (IPI)	Collection	3.7 Mn
 Waste Bank Members	Indonesia Waste Bank Association (ASOBSI)	Collection	383 K <i>(Estimated 40 members/banks)</i>
 Waste Banks	Indonesia Waste Bank Association (ASOBSI)	Sorting Pressing	11,617
 Waste Collectors	Indonesia Waste Picker and Collector Association (APPI)	Sorting Pressing	5,360
 Recycler Producers (TPS3R)	Indonesian Plastic Recycling Association (ADUPI)	Sorting, Cleaning, Crushing, Producing raw materials and/or Finished products	2,092

Indonesia: National Regulation

Waste Reduction Roadmap

- ❑ The regulation was initiated in order to reduce Producer Waste by 30% (by 2029) and in readiness to ban single-use plastics, plastic straws, and plastic foam items (January 1, 2030).

Sources:
 Ministry of Environment and Forestry Republic of Indonesia
 Envilience Asia
 WCA analysis



Section 2

Opportunities and Challenges

Growing commitment to post-consumer recycling on the part of global brands - coupled with the establishment of a robust EPR framework - are presenting new opportunities in the plastic recycling eco-system.

There is also upside value creation to be derived from Waste-To-Energy (WtE) initiatives and precious metal extraction from E-waste sources.

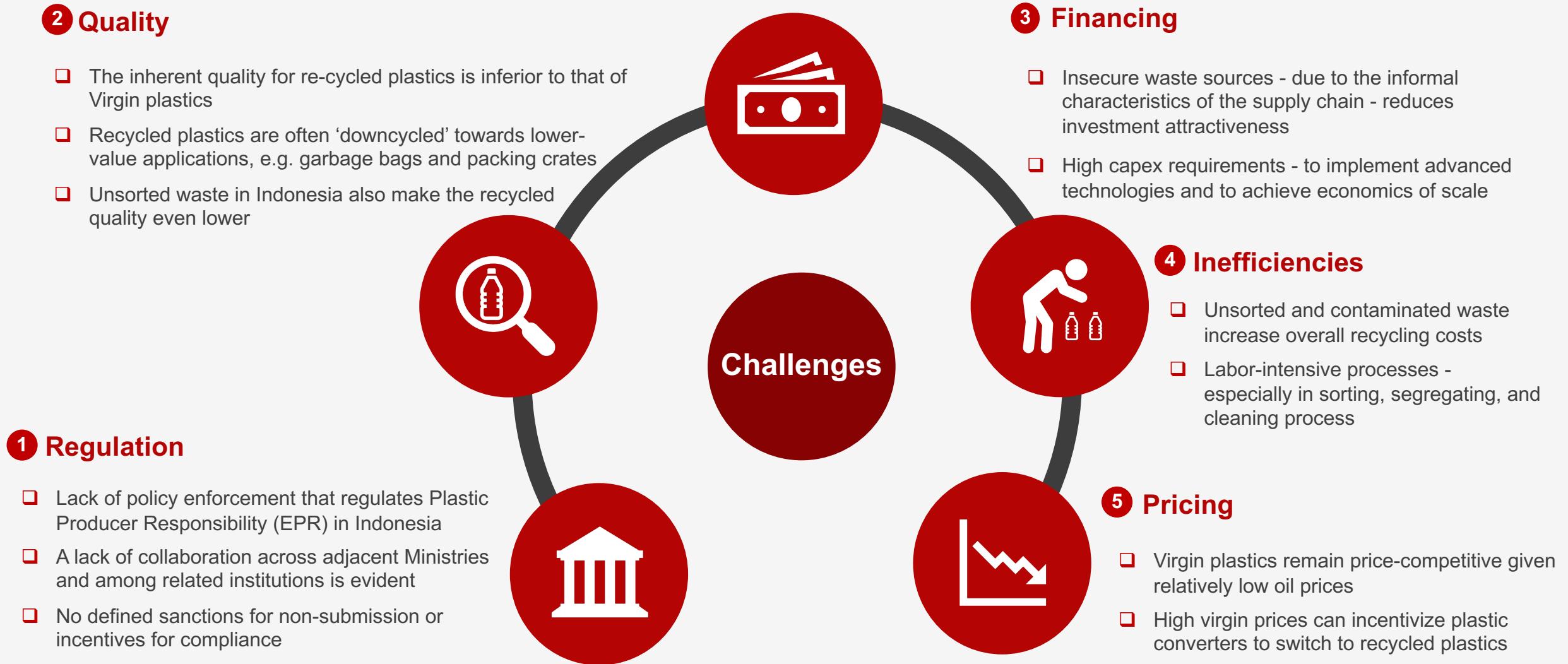
However, Indonesia's main challenge is the lack of a comprehensive regulatory structure and the enforcement of waste management policies and procedures.

Close collaboration across responsible Government ministries and among adjacent stakeholder groups is also absent.



Re-cycling Waste: Primary Challenges

There are several challenges constraining the growth of re-cycling in Indonesia, such as quality, regulation, financing, etc.



Demand for re-cycled plastic from large brand owners will increase over time

Mass production of re-cycled materials is the emerging 'ethical' manufacturing trend

Post-consumer re-cycling commitment from global brands



Extended Producer Responsibility (EPR)

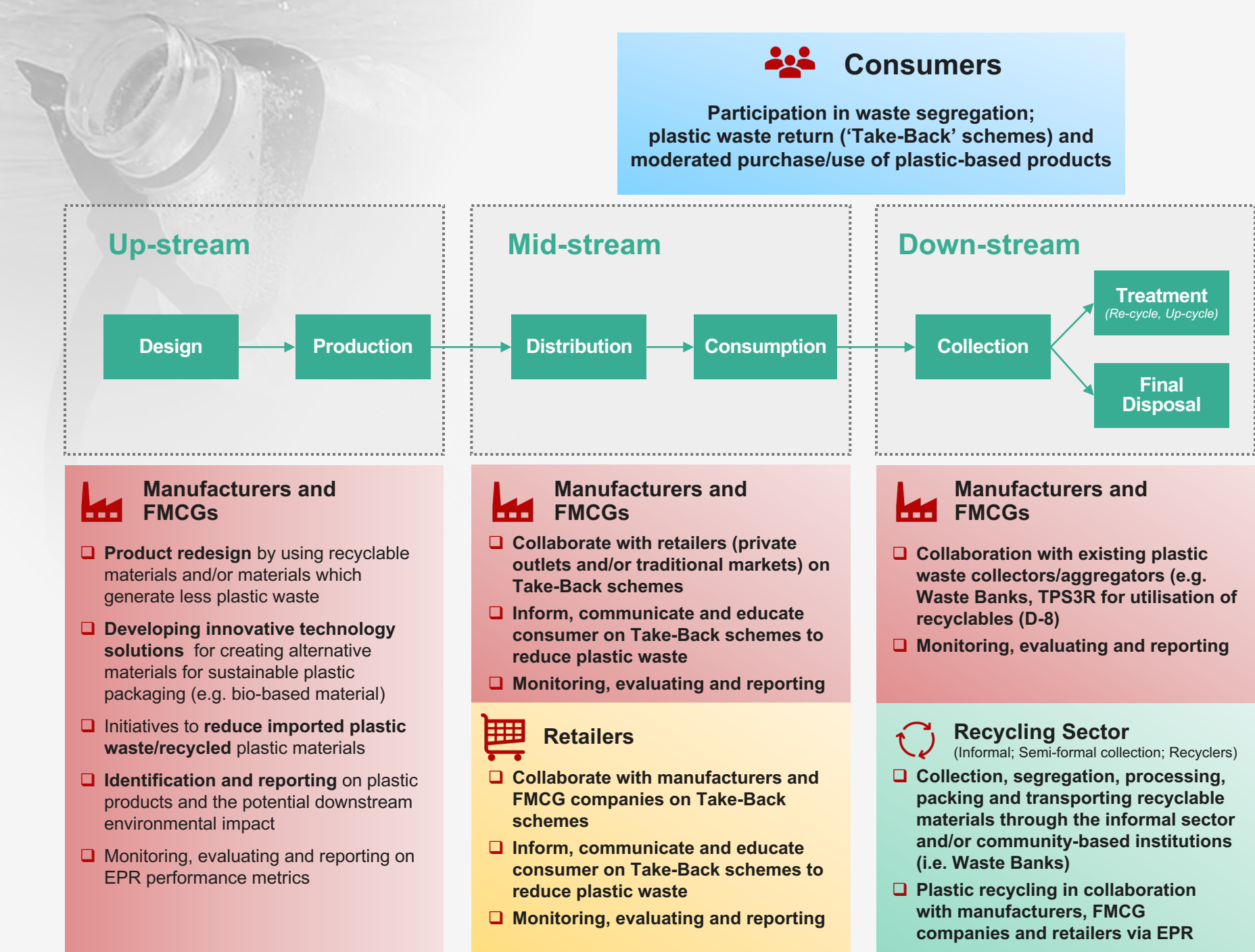
A Framework for Stakeholder Participation

EPR initiatives demand total commitment from manufacturing and FMCG companies

▼

Across all product and service categories

Sources:
Ministry of Environment and Forestry
Republic of Indonesia Report



MSME* sector: A potential source of active and engaged participants

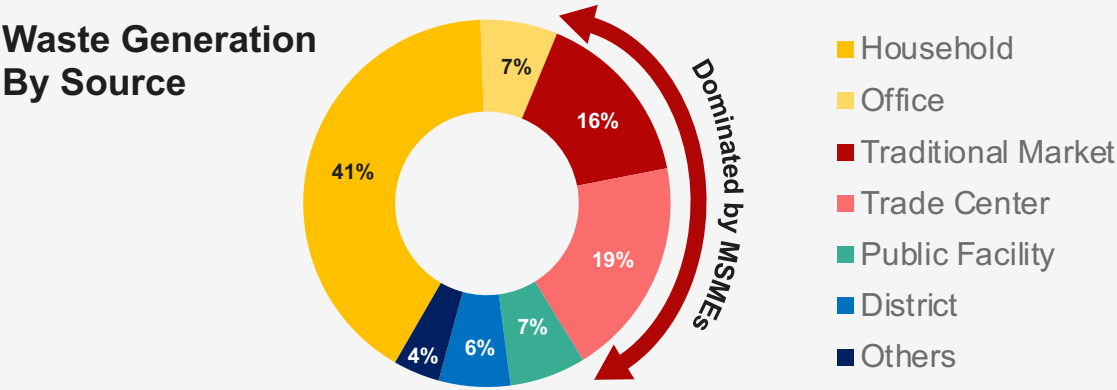
Three primary attributes signal the appeal of MSMEs to be involved in waste management participation

* MSME : Micro, Small and Medium-Sized Enterprises

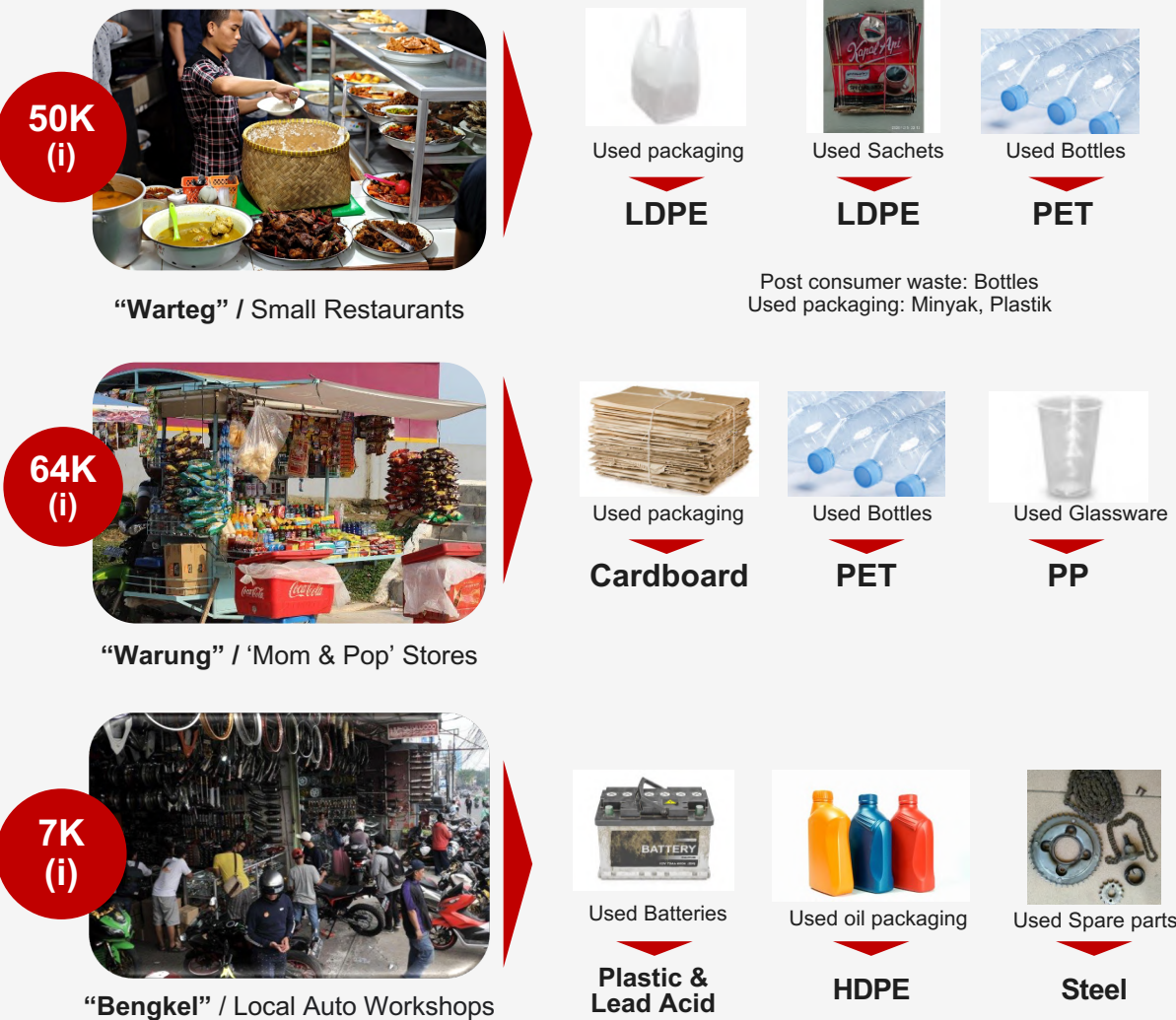
1 Large community of MSMEs in Greater Jakarta



2 Dominant contribution to aggregate Waste volume



3 High Waste eneration

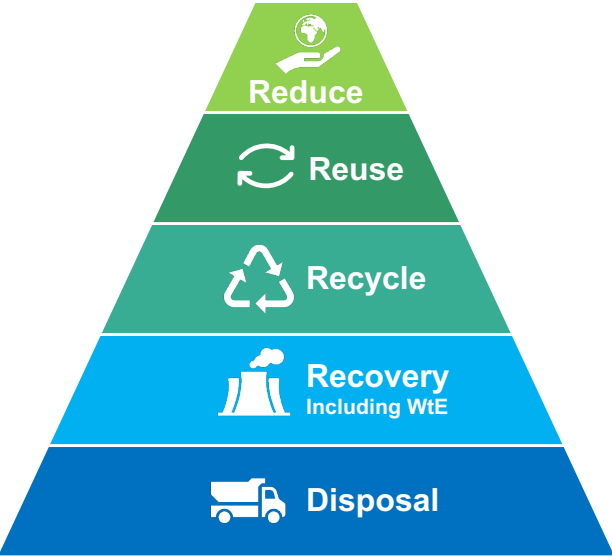


(i) Estimate of MSME locations in Greater Jakarta

Waste to Energy (WtE)

An Alternative Waste Management Solution

Waste Hierarchy





WtE falls below 3R (Reuse/Recycle/Recover) in the conventional **Waste Hierarchy**



However it facilitates the processing of **Mixed Waste** materials.

WtE Methods Comparison: Incineration vs Mechanical Biological Treatment (MBT)

	Definition	Product	Customer	By-Product	Pros and Cons
 Incineration	Conversion of waste into energy : by combustion	Heat and electricity	<input type="checkbox"/> Utility company <input type="checkbox"/> Industrial captive	<input type="checkbox"/> Ash <input type="checkbox"/> Non-combustible	<ul style="list-style-type: none">+ Regulated pricing+ Assigned off-taker (PLN)- High capex
 MBT	Conversion of waste into a solid fuel : by sorting and drying	Refused Derived Fuel (RDF)	<input type="checkbox"/> Industrial captive with solid fuel <input type="checkbox"/> Cement industries	<input type="checkbox"/> Non-combustible	<ul style="list-style-type: none">+ Moderate Capex+ Potential off-taker: Cement sector- Unregulated pricing

Incineration is preferable in Indonesia due to the mandate from the Presidential Decree, leading to guarantees on tipping fees and electricity tariff levels

Opportunities and challenges of the WtE incineration method

Opportunities	Challenges
<p>Regulation</p> <p>Presidential Decree No. 35/2018: the Government wants 30% of all waste to be reduced, reused and recycled and the remaining 70% to be fully managed (by 2025)</p> <ul style="list-style-type: none"><input type="checkbox"/> Tipping fee up to IDR500K/ton (c.USD32/ton) remitted from the Government budget<input type="checkbox"/> Electricity tariff: USD 13 cent /kWh<input type="checkbox"/> Governs WtE pilot projects in 12 cities	<p>Low Calorific Value</p> <p>The average calorific value of waste in Indonesia has not yet reached the required standard for incineration.</p>
<p>Financial Payback</p> <ul style="list-style-type: none"><input type="checkbox"/> Indonesia’s waste could generate electricity of 2.06 GW*<input type="checkbox"/> Market value ~ USD 3.2 Bn/annum (from tipping fees and electricity tariffs) <p><small>* Ministry of Energy and Mineral Resources</small></p>	<p>High Capex Requirement</p> <p>An incineration facility capex is approximately \$100 million and require at least 1000 ton waste / day to achieve economics of scale.</p>
	<p>Environmental and Community Health</p> <p>The incineration system produces a wide variety of pollutants that are detrimental to human health. Advanced control systems are required to reduce toxic emissions.</p>

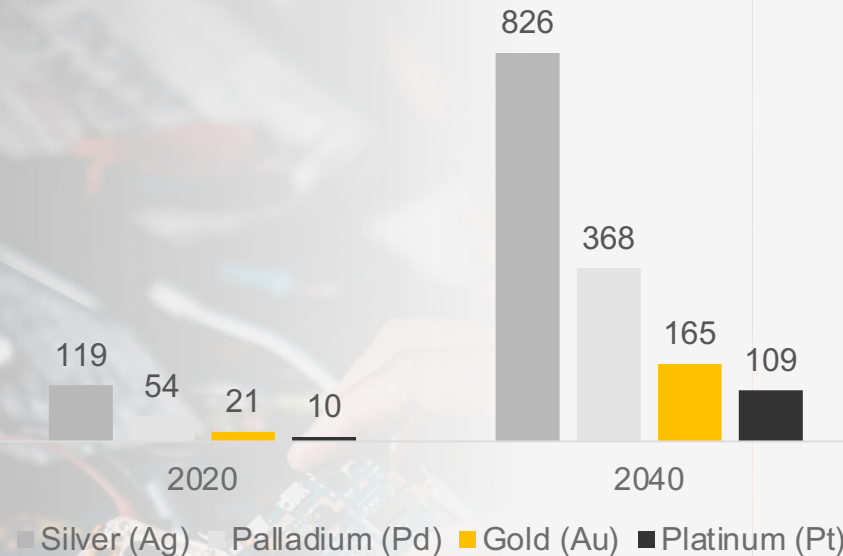
Potential for Precious Metal Extraction from E-Waste in Indonesia

- It is estimated that Indonesia has an annual potential to process c. 2 million tonnes of E-waste (based on 2021 levels).
- This is the highest potential in the **SE Asia region**.
- However, E-waste is categorized as hazardous and toxic material within the current Indonesia regulatory framework and is already incorporated in the Omnibus Law.

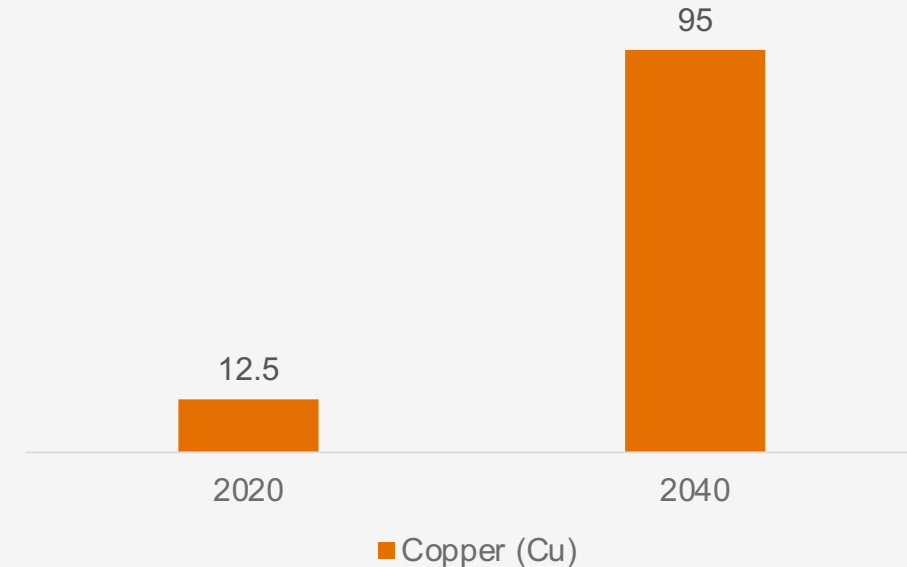
Sources:

Aulia Qisthi Mairizal et al (2021)

Potential Extracted Precious Metals in Indonesia's E-waste
(in Tonnes)



Potential Extracted Copper on Indonesia's E-waste
(in Kilotonnes)



- The current E-waste recycling rate in is estimated to be at a maximum level of 5%. This means that by 2020 the equivalent of USD 94 m. worth of metals had been recovered, thereby implying an 'opportunity loss' of USD 1.8 billion.
- It is estimated that the E-waste volume generated in 2021 totalled 1,989 Kilotonnes – equivalent to a per capita output of 7.3 Kg.
- This total is projected to increase to 3,200 Kilotonnes in 2040 with a per capita yield of 10 Kg.
- The aggregate material value expected in IT products is forecast to be worth USD 14 billion by 2040

Section 3

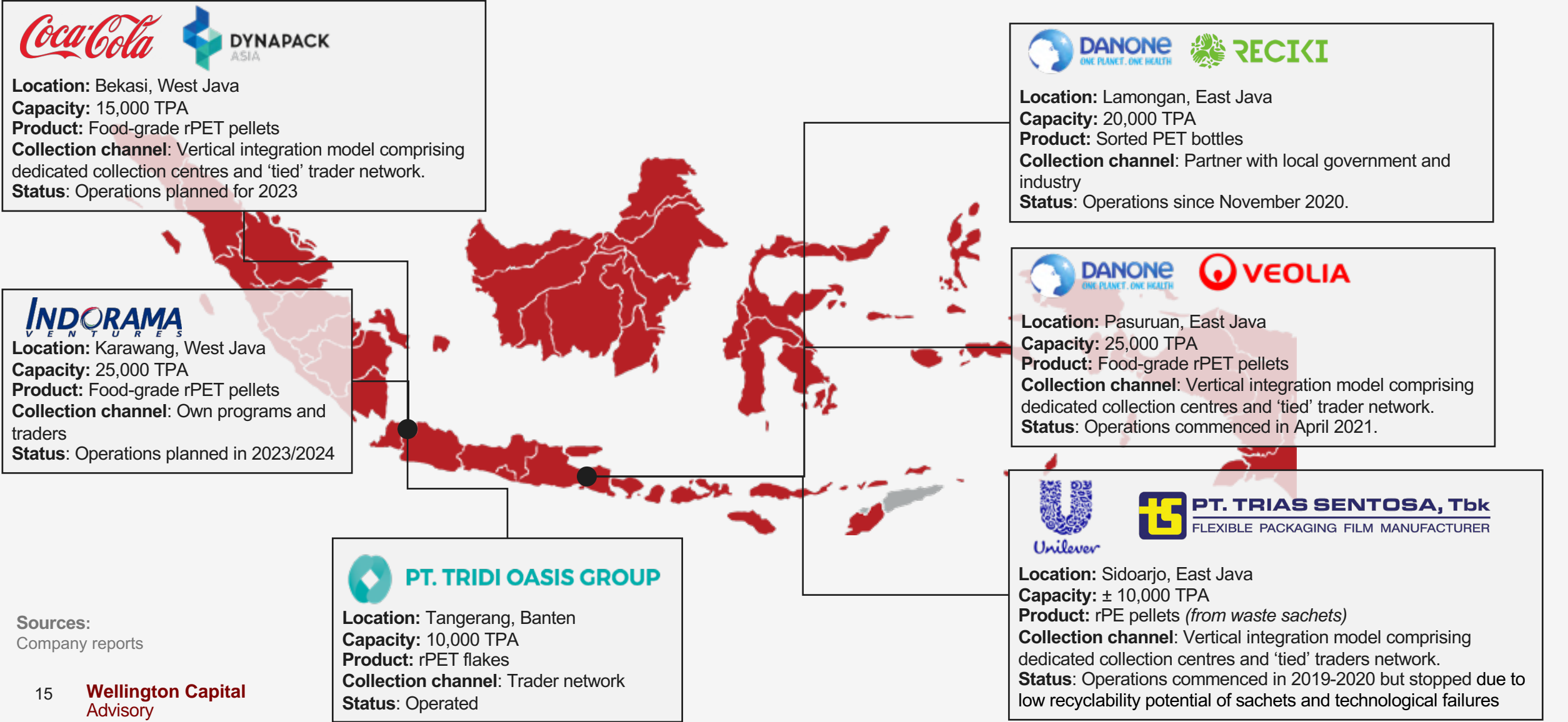
Current Development

Several multi-party recycling projects have been ongoing since 2019, whereby FMCG brands have made contractual commitments to purchase plastic materials from their partners in the re-cycling eco-system.

A growing number of international investor groups have also participated in the early-stage funding of in-country Waste Management start-up enterprises.


















PET Re-cycling or Processing Facilities: ‘Take-Back’ Schemes



Funding Rounds: Waste Management Start-ups

The pace of funding activity has been accelerating since 2019: Gayo Capital and Circulate Capital are the most active investors to date

Investment Stage				Investee(s) ⁽¹⁾
Pre-Seed	Seed	Venture	Debt Financing/ Convertible Note	
 	 	  	  	<div>Waste Management</div> <div>Core business focus:</div> <ul style="list-style-type: none">• Waste collection• Waste management• EPR solutions
			 	<div>Recycler</div> <div>Core business focus:</div> <ul style="list-style-type: none">• Re-cycling

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