



Reuse Realized: Unleashing Solutions in the ASEAN Region

Guidance to Address Barriers & Scale Opportunities for Reuse & Refill Solutions to Plastic Pollution

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Glossary & Acronyms

B2B	Business-to-Business
B2C	Business-to-Consumer
DFI	Development Finance Institution
DRS	Deposit Return Scheme
EMF	Ellen MacArthur Foundation
EPR	Extended Producer Responsibility
F&B	Food & beverage
FMCG	Fast-Moving Consumer Goods
GHG	Greenhouse gas
ISWM	Integrated Solid Waste Management
LCA	Life cycle assessment
LGU	Local government unit
MSME	Micro, small and medium sized enterprises
NGO	Non-governmental organization
ODA	Official development assistance
PRO	Producer responsibility organization
PPP	Public Private Partnership
RSP	Reuse service provider
RVM	Reverse vending machine
SDG	Sustainable Development Goal
SME	Small and medium sized enterprises
SPC	Sustainable Packaging Coalition
SUD	Single-use disposable
SUP	Single-use plastic
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme

Key Definitions

These definitions come from an evaluation and synthesis of various definitions in use globally conducted by the New European Reuse Alliance (New ERA) and Perpetual, taking into account current ISO, PPWR, and other definitions like Ellen MacArthur Foundation, with modifications to ensure completeness. Presented in alphabetical order.

Closed Loop: Closed-loop environments are physical spaces where products (e.g., food and beverage) are both served and consumed on-site and there is a controlled number of monitored entry and exit points. Closed-loop systems take place in these spaces.

Deposit-Return Systems (DRS): Deposit-return systems combine a fee on product consumption with a rebate when the product or its packaging is returned for recycling. Consumers buying a product pay a deposit that is reimbursed upon the return of the packaging or product to a collection point.

Extended Producer Responsibility (EPR): A policy mechanism that shifts the responsibility for end-of-life product and packaging management to producers. EPR can be designed to prioritize reuse and refill solutions using mechanisms such as targets, fees, and other tools to shift the emphasis from downstream waste management to upstream waste prevention.

Integrated Solid Waste Management: Integrated solid waste management refers to the strategic approach to sustainable management of solid wastes covering all sources and all aspects, covering generation, segregation, transfer, sorting, treatment, recovery and disposal in an integrated manner, with an emphasis on maximizing resource use efficiency; including implementation of upstream and midstream solutions like reuse and refill.

Open Loop: Open-loop systems take place in spaces, such as cities, where items circulate across locations and are frequently consumed in locations other than where they were purchased.

Package Repurposing or Informal Packaging Reuse: The use of a consumer-owned container by a consumer for the original or a different purpose than that for which it was designed.

Refill System: A process or operation in which manufacturers or contracted third parties fill pooled, manufacturer or third-party owned reusable packaging at their facilities. The pre-filled container + product is distributed and ready for the customer at the point of purchase. Packaging is intended to be returned to designated drop points or via home collection and used again for the same purpose for which it was originally designed.

Refill: An operation by which a container, owned by the end user, is filled by the end user or by the final distributor with a product purchased by the end user.

Reuse: Any process or operation in which an item (e.g. packaging) is used again for the same purpose for which it was originally designed. The concept of reuse applies in particular to items that are typically considered or treated as single use or disposable.

Reuse System: The organizational, operational, technical, or financial framework, including any necessary infrastructure and incentives, that facilitates and supports the reuse of products such as packaging.

Reusable Packaging: Packaging designed and introduced to the market with the intention of being used multiple times. This type of packaging is capable of being emptied, unloaded, washed, sanitized, refilled, or reloaded, while still maintaining its ability to perform its intended function.

Semi-Closed Loop: Some settings mimic the conditions of closed-loop venues, but are not as controlled and are therefore considered semi-closed. For example, a food court in the mall.

Table of Contents

Acknowledgements	iii
Glossary & Acronyms	iv
Key Definitions	v
Table of Contents	vi
List of Figures	vii
List of Tables	vii
Executive Summary	ix
Introduction	1
1.1 Reuse and Refill as Potential Solutions to Plastic Pollution	1
1.2 Barriers to Realizing the Potential of Reuse and Refill Solutions	3
The Current Landscape	7
2.1 Current Reuse and Refill Solutions	7
2.2 The Regulatory Landscape for Reuse and Refill Solutions	9
2.2.1 EPR as a Mechanism for Scaling Reuse and Refill.....	11
Unlocking the Potential of Reuse and Refill in the ASEAN Region.....	13
3.1 A Framework for Action	13
3.1.1 How Government, Businesses, Investors, and Other Stakeholders Can Accelerate the Adoption of Reuse & Refill	13
3.2 Priority Opportunities for Reuse & Refill.....	20
3.1.2 Finance Mechanisms to Support Reuse & Refill	17
3.2.3 Opportunity 1. Prefill Bottled Beverages	21
3.2.4 Opportunity 2. Water Refill Stations	26
3.2.5 Opportunity 3. Staple Goods Refill, Primarily Commodity Products	30
3.2.6 Opportunity 4. Prefill for FMCG, Primarily Branded Products.....	34
3.2.7 Other Opportunities	37
Conclusion	40
Annexes	41
A. Regulatory Landscape for Reuse & Refill: Additional Detail	42
B. Impact Calculations.....	46
C. Opportunity 1: Further Guidance	47
D. Opportunity 4: Further Guidance	47
E. Methodology: Scope, Approach and List of Interviewees.....	48
References	50

List of Figures

Figure 1. Overview of Priority Opportunities xi

Figure 2. Number of Reuse & Refill Solutions by Type and Country 7

Figure 3. Investment in Reuse & Refill Compared to Overall Plastics Circularity, 2018-2023..... 18

Figure 4. Refillable Beverage Bottle (including Beer & Cider, Carbonates, Energy & Sports, Waters, Iced Tea & Coffee, Juices) Market Share by Sales Volume by Country 22

List of Tables

Table 1. Highlighted Policy & Regulation Relevant to Reuse & Refill Solutions 10

Table 2. Framework for Implementation by Stakeholder 15

Table 3. Overview of Priority Opportunities 20

Table 4. Implementation Steps for Opportunity 1 24

Table 5. Implementation Steps for Opportunity 2: Water Refill Stations 28

Table 6. Implementation Steps for Opportunity 3: Staple Goods Refill, Primarily Commodity Products 32

Table 7. Implementation Steps for Opportunity 4: Prefill for FMCG, Primarily Branded Products 36



Executive Summary

Countries in Southeast Asia are facing the mounting challenges of plastic waste management and pollution.

Single-use disposable packaging and products create an enormous amount of waste, with over 31 million tonnes of plastic waste generated annually in six out of ten ASEAN countries (Indonesia, Malaysia, Myanmar, Philippines, Thailand, and Viet Nam; this metric does not include Cambodia) (Zorzi 2023). Since 95% of plastic used in packaging is disposed of after one use, single-use packaging makes up a significant portion of this waste, with items like plastic bags, food packaging, and expanded polystyrene (sometimes known as “styrofoam”) containers among the most ubiquitous (World Economic Forum, EMF and McKinsey & Company 2016; Sari et al. 2022; World Bank Group 2022). These numbers are projected to grow as consumption levels in the region increase, driven by macro-level trends of population growth, a growing middle class, and increased urbanization, and as legacy reuse and refill models are replaced with disposable alternatives simultaneously (Potia and Remes 2016).

The leakage of this waste into the environment is detrimental to human health and an infringement upon human rights, especially for groups in the most vulnerable situations, including women and youth (Gross and Enck 2021; UNEP 2021b). It harms both terrestrial and marine animals and ecosystems and strains the financial and other resources of national and local governments working to manage it.

Reuse and refill systems are an underleveraged solution to this crisis of single-use disposable packaging and products.

Reuse and refill systems, both legacy and new, that operate efficiently and at scale dramatically reduce waste, provide net greenhouse gas (GHG) emissions reductions on a lifecycle basis, create local jobs and economic opportunity, and can support a just transition. The environmental and societal benefits of reuse and refill compared to single-use are particularly strong in locations without sufficient collection, waste management, and recycling systems in place, as is the case in most of the ASEAN region

(Akenji et al. 2019). Including reuse, prefill, and refill systems when establishing or expanding Integrated Solid Waste Management (ISWM) can create a cohesive and comprehensive waste management foundation.

Despite its potential, **reuse and refill will not reach meaningful scale or deliver their full potential environmental and social benefits without necessary baseline enabling conditions in place, including policy and regulatory mechanisms, to make reuse and refill viable alternatives to single use**, with the exception of legacy and premium product systems.

Four **key barriers** prevent reuse and refill from playing more significant roles in addressing the plastics crisis, with barriers #3 and #4 resulting from the first two barriers.

Barrier#1: Mismatched costs from unpriced externalities. Disposable packaging and products currently benefit from externalizing the costs of collection, management, and disposal, while reuse and refill models necessarily incorporate the costs of collection, washing, and redeployment. Internalizing these costs makes it difficult to achieve competitive pricing when pitted against the artificially low cost to businesses of using single-use disposable packaging.

Barrier#2: Misaligned policy and regulatory hindrances. The unclear policy and regulatory landscapes undermine the ability of companies and reuse service providers to build successful reuse and refill programs. The dynamic and piecemeal nature of regulatory requirements for reuse and refill systems creates uncertainty and high costs of compliance for operators.

Barrier#3: Limited funding and investor hesitancy. In the absence of clear market dynamics enabling reuse and refill, both public and private investors are hesitant to fund reuse and refill solutions as there is no clear line of sight to a return on investment if the solutions face regulatory challenges or cannot compete with single-use on price. Creating new and enhancing existing reuse and refill systems requires significant investment.

Barrier#4: Lack of a collaborative commitment to scale. Legacy reuse and refill systems like bottled beverages

have demonstrated what can be achieved when scale and infrastructure are in place. But with the exception of a few of the very largest companies, creating the full open-loop reuse 'ecosystem' - the infrastructure, services, and behavioral cues – will require collaboration. As with Barrier #3, the absence of clear market dynamics driving reuse and refill, such as policy and regulatory clarity, means there is little incentive or motivation for decision makers within companies to grow initiatives nor for competitors to collaborate to develop shared packaging, infrastructure, or other initiatives to the extent necessary to enable reuse and refill at scale. Without a push, whether from business leadership or regulatory action, reuse and refill programs will remain underdeveloped.

These barriers are addressable, but **achieving the level of adoption, scale, and investment needed to unlock the potential benefits of reuse and refill will require decisive action by government, non-governmental organizations (NGOs), business, and investors.** The **framework of actions** in this report outlines the sequencing, roles, and actions needed by each of these players in the ecosystem.

Governments are unique in their ability to establish the enabling conditions for reuse and refill via policy and regulations. Priority actions for governments are to address unpriced externalities, harmonize and clarify the national and local regulatory landscape to remove technical or regulatory barriers, incorporate and prioritize reuse and refill in existing or upcoming Extended Producer Responsibility (EPR) laws, and provide clear signals to industry to prioritize reuse and refill solutions, and run public awareness campaigns. Governments can mandate reuse and refill in government facilities and through public procurement. Governments can mobilize funding to support reuse and refill and can directly fund or create other incentives for innovation and shared infrastructure. Governments can foster pre-competitive collaboration and facilitate a just transition pathway for informal sector workers, including women and other groups in vulnerable situations. Governments also have the ability to regulate in favor of the right to access information, which can impact consumer behavior. In addition, governments can embed ISWM including reuse and refill into their national circular economy strategies. In each of these actions, governments should apply a human rights-based approach and facilitate participation from stakeholders, especially from groups in vulnerable situations, to help ensure gender equality and non-discrimination.

Businesses have a key role to play in establishing the

infrastructure for reuse and refill systems and can invest in shared infrastructure in addition to company-specific facilities and equipment. In-house innovation teams can focus on product design for reuse and refill and pre-competitive collaboration can address standardized packaging, adopting a universal reuse symbol, and aligning inventory tracking conventions where possible. Using their marketing capabilities, businesses are uniquely positioned to 'sell' reuse and refill to consumers to build volume and scale in the system. Over time, businesses will drive the expansion of reuse and refill systems, with enhancements from ongoing efficiencies and innovation. Businesses that recognize the value of a holistic regulatory approach to packaging can advocate for EPR laws that prioritize reuse and refill. Throughout, businesses should support a just transition pathway for informal sector workers and ensure solutions are accessible to all consumers.

As conveners, **NGOs** can work with governments and other stakeholders to establish or harmonize standards for reuse and refill as well as facilitate pre-competitive collaboration and innovation. NGOs, in concert with governments, will be critical to help micro-, small, and medium-sized enterprises (MSMEs) build capacity in reuse and refill and ensure MSMEs are considered in the creation of shared infrastructure. NGOs can also support capacity-building by supporting worker training for reuse and refill jobs, run advocacy and awareness campaigns to support consumer adoption, and support the participation of groups in vulnerable situations in system design and development.

As policies are being developed, **investors and other capital providers** can provide a perspective as to whether planned interventions will successfully mobilize capital, or if they need to be adapted to do so, if governments include them in consultations. Different types of capital providers including Development Finance Institutions will be needed to meet the funding needs for the development of reuse and refill systems at scale. Investment will be needed for everything from reuse and refill startups and enabling technologies to shared infrastructure, company-specific innovation, facilities, and equipment.

Pursuing the actions to achieve baseline enabling conditions, as set forth in the Framework for Action, will unleash the following complementary set of opportunities (Figure 1), whose implementation would result in a significant impact on reducing plastic pollution in the ASEAN region, along with numerous other co-benefits.

FIGURE 1. PRIORITY OPPORTUNITIES MAPPED

Complementary interventions to mobilize multiple sectors and contexts for (re)adoption of reuse

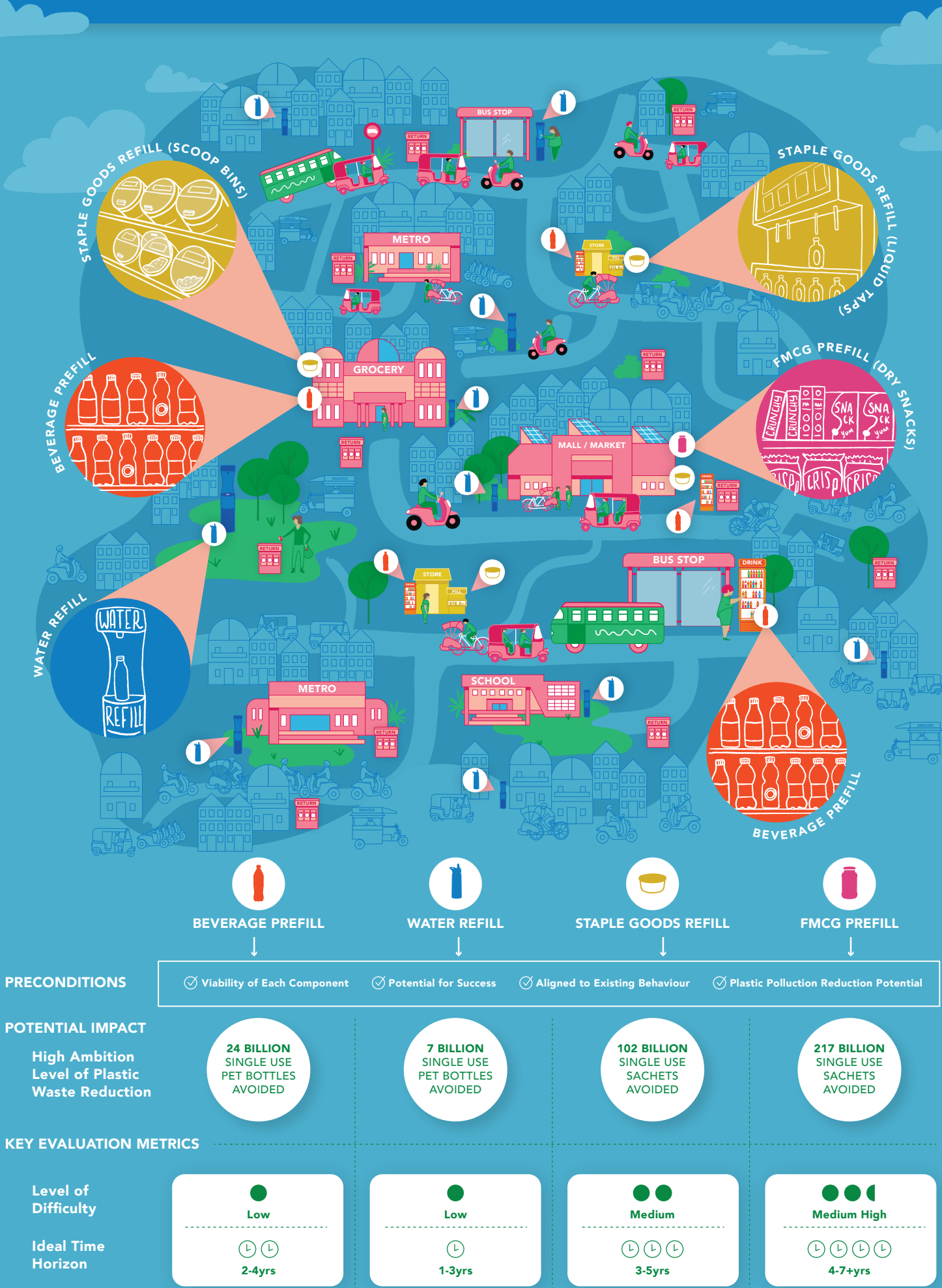


Figure © Emma Segal

The potential impact of these opportunities is significant: assuming these four priority opportunities were able to reduce single-use plastic bottle and single-use sachet consumption by an average of 67% across the opportunities, this would result in **an annual plastic use reduction of 1.1 billion metric tonnes**, the equivalent of 30 billion single-use bottles and 319 billion sachets. This would in turn **reduce annual plastic leaked into the environment by 1.2 billion single-use bottles and 12.8 billion sachets** and achieve an annual greenhouse gas emissions reduction of 3.3 million metric tonnes of carbon dioxide equivalents, as well as other significant co-benefits.

All priority opportunities listed below require baseline enabling conditions to maximize their potential positive impact.

1. Beverage prefill: Time-tested, this is a model where soda, beer, sports drinks, juices and other beverages, including water, are sold in returnable bottles that are collected, washed, and returned to the manufacturer for refilling before being distributed again to retailers. Refillable bottles and infrastructure are already in place in the region (levels vary by country) and are being used across beverage categories. In addition to the use of prefill for beer & cider and carbonates, there are also examples of refillable bottles for energy & sports drinks, juices, and waters (Reloop 2021). Businesses of various sizes can build off existing facilities and operations to increase the percentage of products sold in reusable bottles. Beverage prefill systems from other parts of the world, such as the strong water prefill system in Germany, can also serve as relevant examples for applying and expanding this model (Bielenstein 2022). Reversing the sharp growth in single-use disposables (SUDs) in the beverage category offers the most straightforward glide path to meaningful impact (Reloop 2021).



Prefill beverages in returnable, reusable bottles, Jakarta, Indonesia.
Photo © Perpetual / Dagny Tucker

2. Water refill: Bottled water is one of the most commonly purchased single-use items in the world and in Southeast Asia specifically it accounts for 24.5 billion SUP bottles each year, creating an enormous opportunity for refill stations (in addition to water prefill, as noted above) to reduce plastic waste and pollution. While bottled water was once needed to provide clean and safe drinking water, advancements in the efficacy and cost of water refill stations where consumers fill their own containers, coupled with cultural norms of water refill, open a significant opportunity to offer a safe, more equitable solution while addressing the pollution and human health risks from single-use water bottles (Geueke et al. 2023).



Bottle free seas, Bangkok, Thailand
Photo © Environmental Justice Foundation

3. Staple goods refill in neighborhood shops: Refilling of goods from bulk containers or dispensers into user-owned packaging is an age-old practice still employed in some form in virtually every country of the world. While modern lifestyles have shifted, and packaged goods now dominate the shopping experience, there remains a short list of products that naturally lend themselves to refill and are bought frequently enough to ensure



Bulk Refill Sari Sari, Manila, Philippines.
Photo © Perpetual / Eridanis Tucker Dixon

product freshness in the refill system. A transition to refill in targeted product categories offers a low-hanging fruit opportunity for countries to start transitioning to reuse and refill even in the absence of some enabling conditions because the needed infrastructure is minimal.

4. Fast-moving consumer goods (FMCG) prefill: With prefill, FMCG products currently packaged in small format single-use packaging would instead be packaged in reusable packaging that is returned, collected, washed, refilled by the producer or a designated third party, and redistributed. Products best suited to this model are manufactured locally or regionally and do not present significant washing challenges such as from oil residue. Reusable packaging systems for these goods have been successfully implemented, can be safer, and provide numerous co-benefits in addition to the enormous scale of the pollution reduction potential.



Nestle-Alner Refillable Packaging, Jakarta, Indonesia.
Photo © Perpetual / Dagny Tucker

Additional Opportunities: Legacy and bridge-building: In addition to these four priority areas, there is an opportunity to expand legacy reuse and refill and support bridge-building opportunities. While the resulting plastic reduction impact is smaller, these opportunities are relatively easy places to maintain existing reuse and refill practices or transition to reuse and refill, bringing it into venues with high visibility to familiarize and educate the population on reuse and refill and the importance of addressing plastic pollution.

These opportunities include:

- **Legacy reuse and refill:** existing reuse and refill practices, often facilitated by cultural norms and/or deeply ingrained in existing habits, such as using dishware at streetside establishments.

- **Reuse in dine-in, closed, and semi-closed environments**



Reusable Foodware in Food Court at Mall, Manila.
Photo © Perpetual / Dagny Tucker

- **Reuse on regional flights**



Viet Nam Airlines Reusable Cups.
Photo © Perpetual / Dagny Tucker

- **Reusable coffee cups in specific locations**



Reusable Coffee Cups, Bangkok, Thailand.
Photo © Perpetual / Dagny Tucker

There is a clear and compelling opportunity in the ASEAN region for reuse and refill solutions to address plastic pollution and deliver significant co-benefits to businesses, consumers, governments, the informal waste sector, and other stakeholders (PEW Charitable Trusts and Systemiq 2020). Further, since plastic pollution has disproportionate negative effects on the human rights of groups in vulnerable situations, including, women, children and youth, and Indigenous peoples, reuse and refill systems can provide disproportionate benefits for those groups.

The barriers to deploy and scale reuse and refill solutions can and should be overcome. The time for action is now.



Street Vendor Washing Dishes, Bangkok, Thailand.
Photo © Perpetual / Dagny Tucker

01

Introduction

Plastic waste and pollution in the ASEAN region is an urgent problem. Plastic pollution is widely recognized as a global crisis threatening terrestrial and aquatic ecosystems as well as human health (Wilcox, Van Sebille and Hardesty 2015). Ninety five percent of the plastic used in packaging is disposed of after one use, a loss to the economy of up to \$120 billion¹ annually (World Economic Forum, EMF and McKinsey & Company 2016). Only eight percent of plastics in Asia, excluding China and India, is collected for recycling (UNEP 2019; Ritchie, Samborska and Roser 2023).

Plastic accounts for 80% of waste in the oceans (Fava 2022), and studies show that most waste leaked into the environment does not come from the countries using or producing the most plastic but rather from countries that, “due to their conformation, coastline, rainfall and inadequate waste management systems, are carrying more plastic to the sea through their polluted rivers” (Meijer *et al.* 2021). Due to these dynamics, six out of ten of the highest polluting countries are in the ASEAN Region. As such, the ASEAN Region is exceptional both in the burden of plastic pollution it bears and the opportunity to address the issue.

Small-format packaging, such as sachets, represent a particular challenge. An estimated 550 billion sachets are sold annually in Southeast Asia (Greenpeace 2019). Sachets are frequently cited as the item most commonly lost to the environment, and they are rarely recycled in practice (GAIA 2020). Investment to address the challenge of sachets has focused on chemical recycling, which assumes effective collection that to date has not been achieved given the low material value of sachets, or alternative material innovation, which comes with other problems including unknown impacts on human and ecosystem health (Geueke *et al.* 2023; Bell and Gitlitz 2023; Singh and Walker 2024).

Pollution and toxic substances significantly impact various human rights, including the rights to life, health, water, food, housing, and those of children and Indigenous peoples, as identified in the report transmitted to the UN

General Assembly on the implications for human rights of the environmentally sound management and disposal of hazardous substances and wastes (A/76/207). The recognition of the right to a clean, healthy, and sustainable environment in a resolution adopted by the General Assembly in 2022 underscores the critical importance - and, in fact, the binding legal obligation - of achieving a non-toxic environment (A/RES/76/300).



“How long til it’s gone” T-shirt spotted in Viet Nam.
Photo © Perpetual / Eridanis Tucker Dixon

1.1 Reuse and Refill as Potential Solutions to Plastic Pollution

Reuse and refill interventions have been identified as key potential solutions to address plastic pollution.

A landmark study on solutions to plastic pollution found that reuse and refill has the greatest potential to reduce the amount of plastic entering the environment compared to reduction, substitution, mechanical and advanced recycling, and waste management (PEW Charitable Trusts and Systemiq 2020). UNEP’s *Turning off the Tap* report highlighted “Accelerate Reuse” as Market Shift One in their recommendations for market transformation (UNEP 2023).

These reports and others highlight that reuse and refill solutions provide environmental and health benefits and economic opportunity, particularly in countries with under-developed waste management systems.

¹ Note: all amounts noted with \$ in this report are listed in USD. Some amounts are provided in local currency.

- **Energy Use and Climate Impact:** Reuse and refill solutions can and should be designed and operated to use less energy and produce lower GHG emissions than single-use disposables (Reloop and Zero Waste Europe 2020; UNEP 2021a; Hitt, Douglas and Keoleian 2023).
- **Water:** For multiple forms of packaging studied, reuse models reduced total life cycle water usage (PricewaterhouseCoopers 2011; Upstream 2021). Washing facilities located in water-stressed areas can use advanced filtration, UV and other technologies to enable hygienic water recirculation to keep total water usage low.
- **Human Health:** Research has identified thousands of chemicals of concern in single-use food and beverage packaging (Geueke *et al.* 2024). Plastic and plastic waste more generally have also been shown to expose humans to a broad range of hazardous chemicals (Symeonides *et al.* 2024). Women and marginalized communities can be particularly affected by the harmful effects of the chemicals found in plastics (United Nations A/76/207 2021).
- **Jobs:** Reuse is fundamentally a service industry, requiring labor to distribute, collect, wash, and inspect reusable items. Estimates for the reuse sector broadly indicate that reuse creates about 10x more jobs than recycling and 200x more than landfilling and incineration (Institute for Local Self-Reliance 2000; Ribeiro-Broomhead and Tangri 2021).

Research also notes that the benefits of reuse and refill are maximized with effective and efficient system design and operation. Multiple reports, academic studies, and LCAs have determined that these factors are most important (ZWE, University of Utrecht and Reloop 2020; UNEP 2021a; Eunomia 2023):

- Maximizing number of uses through high return rates and multiple rotations.
- Designing packages to find the optimal balance of durable yet lightweight materials.
- Using environmentally efficient transportation such as clean energy vehicles, back-hauling, fully utilizing vehicle capacity, and minimizing the miles driven.
- Using efficient, high-throughput washing equipment at high utilization.
- Using a decarbonized grid for washing and, if applicable, charging electric vehicles.
- Replacing the highest impact single-use items first.

Reuse and refill solutions are also recognized as delivering further distinct benefits to specific stakeholder groups.

Businesses get new opportunities to engage with customers, enhance customer loyalty, offer new purchase options, and provide enhanced functionality and experience. When using an existing pool of reusable packaging, they have reduced sourcing and price risk. Embracing reuse and refill solutions also mitigates the business, reputational, and legal risk created by the growing recognition of the harms of plastic pollution (Muncke *et al.* 2020).

Governments benefit from a lower amount of waste to manage, reducing cost. In low-income countries, waste management can be the highest budgetary expense for local municipalities (Kaza *et al.* 2018, p.1). Single-use items tend to make up a significant portion of litter on streets and in public spaces, with reuse and refill requiring less clean up and keeping public spaces cleaner and more appealing for tourists and residents alike (Eunomia n.d.).

Consumers benefit from reuse and refill systems that fit their purchasing preferences, reduce their exposure to chemicals of concern (assuming reuse systems use safe/inert packaging), reduce the amount of waste they need to dispose of, and reduce the amount of litter and pollution that they are exposed to where they live and work. Women and marginalized groups in particular benefit from reuse and refill, as these burdens disproportionately affect these populations (Hausmann 2024). Reusable packaging can also provide consumers with a better experience: for example, major producers note that customers prefer drinking out of glass bottles and carbonation is better retained in glass (Oceana 2023, Gress, Müller and Sänglerlaub 2024).

Informal sector workers can benefit from being able to provide the labor needed to facilitate the circulation of reusable items, creating opportunities for safer, more reliable employment that is not subject to materials price fluctuations. These opportunities can benefit women in particular, whose roles in the plastics value chain, including in the informal sector, result in them bearing more of the economic and health impacts (see the box [below](#) and the later box on a [Just Transition](#) or more information).

This report focuses on opportunities for reuse and refill systems for food and beverage and personal and home care products within the B2C context in Cambodia, Indonesia, Malaysia, Philippines, Thailand, and Viet Nam.

These product categories were selected both for their contribution to the current single-use plastic problem and their suitability for reuse and refill solutions. They include products that people purchase frequently, have high levels of repeat purchasing, and are typically packaged in single-use packaging.

Leveraging the solutions in the region with the greatest potential for overall plastic pollution reductions will be key to success in the global fight against plastic pollution. To realize the benefits of reuse and refill and successfully mitigate plastic waste and pollution, these solutions must be implemented at scale (EMF 2023).

IMPACTS AND OPPORTUNITIES FOR WOMEN AND GROUPS IN VULNERABLE SITUATIONS

Plastic pollution disproportionately affects women and groups in vulnerable situations.

Petrochemical industry facilities are often located near low-income, Indigenous, and marginalized people, as are landfills, incineration facilities, and waste recycling facilities, exposing these communities to the resulting toxic air pollution.

Women have higher exposure to toxic substances in plastic because they are often responsible for a larger share of household responsibilities and they commonly use disposable feminine hygiene products. This increased exposure is linked to negative health outcomes.

Plastic pollution also perpetuates economic and social inequalities. Women are often employed in lower-paid, less-skilled positions in waste management and plastic production. Groups in vulnerable situations, in particular waste pickers, have often been denied access to information on the risks of exposure to plastic waste and pollution, they frequently do not have access to tools or protective equipment to protect themselves, and they are not afforded opportunities to participate in decision-making processes that would reduce their risks.

Reuse and refill systems can advance gender equality and uphold human rights.

Reuse systems create jobs, particularly for women and members of groups in vulnerable situations, fostering economic empowerment and providing potential for training and income opportunities that contribute to improved gender and social equality.

Women also have the potential to play a key role as changemakers in shifting to reuse and refill systems. Women engage in more sustainable consumption behaviors than men, both in private and public consumption, and do more of the purchasing of food and home items. Limited research on individuals with nonbinary gender identities suggests that gender identity rather than biological gender influences consumption patterns.

Women and marginalized groups should be actively involved in designing and implementing these systems, amplifying their voices in decision-making processes and creating stronger, more equitable systems that serve all stakeholders. Successful reuse and refill systems will foster equitable access to resources, reduce environmental and health burdens, create economic opportunities, and promote participation and inclusivity in sustainability initiatives.

Sources: Bloodhart and Swim 2020; Jadhav et al. 2021; Johnsson-Latham 2007; Geueke et al. 2024; Sbicca 2012; UNEP 2021; UN General Assembly 2021; UN General Assembly 2024

1.2 Barriers to Realizing the Potential of Reuse and Refill Solutions

If reuse and refill are such compelling solutions, why haven't they already taken hold and begun to scale?

There are four key barriers that need to be overcome to unlock the enormous potential of reuse and refill solutions. The first two barriers are the foundation of the current challenge, and the second two are outcomes of the first two as well as barriers on their own.

1) Mismatched costs from unpriced externalities.

Reuse and refill solutions are not able to achieve the scale needed to compete on price with single-use without scale – but adoption is hindered by today's higher cost. Companies that choose to utilize single-use packaging and disposables pay only the market cost of production. There are numerous other costs that result from this choice that are imposed on others: unpriced externalities of resource extraction, material production, and product and packaging manufacturing; economic costs of end-

of-life management; and economic, environmental, and human costs of mismanaged waste and pollution.

The economic cost of managing the resulting waste and pollution falls on governments, and by extension on taxpayers and consumers. The environmental and human costs are borne acutely by those who live and work where items are made and disposed, and broadly at a societal level.

In contrast, reuse systems incorporate the cost of collection, washing, and redistribution, as well as recycling or disposal of reusable items at the end of their useful life, into operational costs. Fewer reusable items are needed, reducing impacts of production by requiring less material over time. (In refill systems, the consumer manages the container, a different form of cost internalization.)

Currently, single-use packaging and products typically cost less to businesses than do reuse and refill solutions, creating an economic barrier to the adoption and scaling of reuse and refill. Interviews with businesses utilizing packaging and those offering B2C reuse services confirmed this: the difference in cost to businesses between single-use systems and reuse systems creates an enormous obstacle to adoption of reuse systems by businesses. (The significant exception is beverage prefill, where reusable bottles can be the lowest cost way to get products to market, with the appropriate infrastructure, business model, and consumer acceptance.)



Sachets in Wahrul, Indonesia.

Photo © Perpetual / Eridanis Tucker Dixon

It does not have to be this way. The current system of single-use items and downstream waste management has been created through billions, if not trillions, of dollars of investment over decades, but without taking into account all of the resulting costs and impacts. With sufficient investment, reuse and refill solutions can achieve a level of scale, shared infrastructure, innovation, and optimization that brings the per-use cost closer to and even in line with the cost of single-use, particularly in categories where single-use packaging is more expensive to purchase, while minimizing the negative externalized costs and impacts of single-use items. However, the lack of price parity now limits the ability of reuse and refill systems to achieve these efficiencies, creating a chicken-and-egg dilemma.

2) Missing or misaligned policy and regulatory hindrances. *The unclear policy and regulatory landscapes undermine the ability of companies and service providers to build successful reuse and refill programs.* The policy landscape in the ASEAN region includes some policies that are supportive of reuse and refill solutions thanks to the work of advocates and policymakers, but there remains a challenge of dynamic and sometimes piecemeal nature of regulatory requirements for reuse and refill systems, creating uncertainty and high costs of compliance for operators. For example, a reuse service provider serving thousands of consumers in Indonesia had to significantly pivot overnight, shifting the business model and product categories offered due to an abrupt change in regulation pertaining to the refill of personal care products.

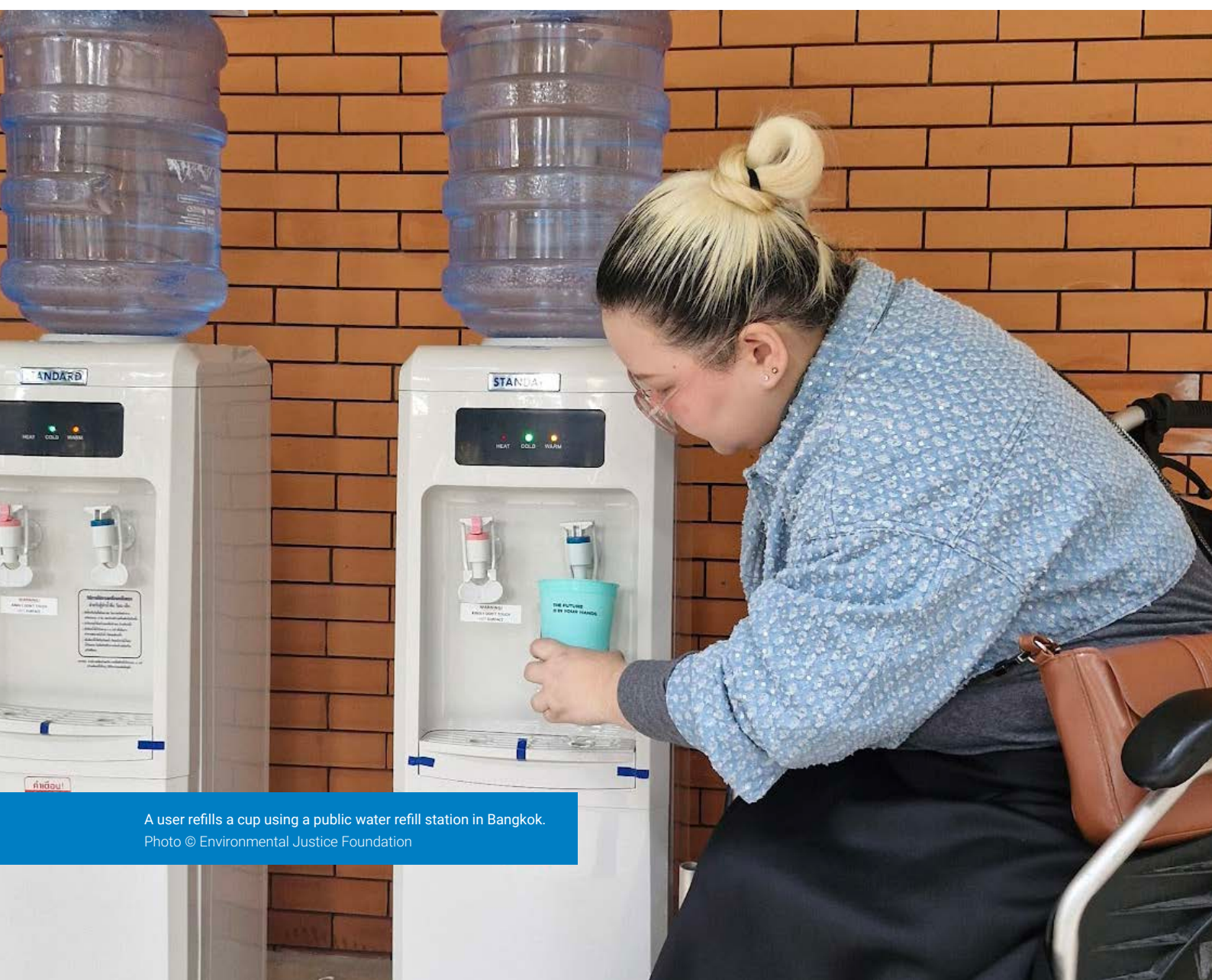
3) Limited funding and investor hesitancy. *Creating and enhancing reuse and refill systems requires significant investment, but it is challenging to mobilize funds for reuse and refill operations when they are at a cost disadvantage and have an uncertain regulatory landscape.* While some reuse and refill infrastructure exists in the ASEAN region at varying levels by country, achieving the levels of scale needed to unlock the full benefits of reuse and refill will require both enhancing existing systems and building new infrastructure. The cost of transitioning to reuse and refill systems at scale will require investment from companies for their own facilities, equipment, and technology, as well as from a combination of companies, governments, investors, and other institutions to support the creation of shared infrastructure. Without confidence in the ability of this infrastructure to provide financial returns over time, it will be difficult, if not impossible, to mobilize the level of investment needed. Reuse and refill solutions are also

competing for funding and attention with downstream solutions such as general waste management, recycling, and plastic ‘credits,’ which companies can purchase to obtain credit for the clean-up of plastic waste to offset their plastic footprint (WWF 2021).

4) Lack of a collaborative commitment to scale.

Reuse and refill are systemic solutions that require coordination and collaboration at a scale not yet widely achieved across product categories in the packaging and consumer goods sector, with the exception of beverages in some markets. Legacy reuse and refill systems have demonstrated what can be achieved when scale, collaboration, and infrastructure are in place. The largest beverage companies, such as Coca-Cola and ABInBev, have the scale to create their own reuse systems, but the vast majority of companies do not. To meet the potential of reuse and refill, collaboration and a system design approach is required, so that all needed elements can be in place to enable system success.

Though often cited as a barrier, consumer behavior does not have to be a significant challenge for the success of reuse and refill systems. While some pilots have found that consumers struggled to successfully participate in reuse and refill programs, other pilots both within and outside the region show that with awareness, safety assurances, infrastructure enabling convenience, product options, and price parity consumers do choose reuse and refill and behave appropriately within the system, for example, by returning packaging (Castillo 2024; Greenpeace 2024; Mastria, Vezzil and De Cesarei 2024). In Aarhus, Denmark, a recently deployed reusable cup system with supporting infrastructure in public spaces and strong communication has seen high levels of adoption despite a lack of prior community awareness. Germany’s scaled reuse iteration “Pfand,” or deposit return scheme, is one of the highest performing in the world and demonstrates how norms and infrastructure can drive consumer uptake (Bielenstein 2022).



A user refills a cup using a public water refill station in Bangkok.
Photo © Environmental Justice Foundation

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Children refill their water bottles using a water refill station in Bangkok provided by Bottle Free Seas.
Photo © Environmental Justice Foundation

02

The Current Landscape

The majority of products in the food and beverage and personal and home care categories are currently packaged in single-use plastic, with significant emphasis on sachet packaging (WWF 2020). The widespread shift to sachet packaging over the last two decades has been driven by the desire for affordability, ease of storage and display, convenience, easy transport, and portion size, in addition to its resonance with existing cultural norms (and financial constraints) of making small purchases at a time. Typically, these products provide unit economic gains for manufacturers but impart a poverty tax on consumers since they are more expensive by unit of volume. An estimated 550 billion sachets are now used every year in the ASEAN region, but it is within living memory that refill and alternative packaging was used instead (Greenpeace 2019; GAIA 2020).

Production infrastructure for the relevant products also varies across the region. In Indonesia and the Philippines, manufacturing of FMCG and F&B products, including by multinational brands, is well-established and supported by production facility capacity, efficient distribution, and well-developed infrastructure and logistics networks (Dietplastik 2024; Makesense 2024). This capacity and infrastructure can be leveraged for reuse and refill

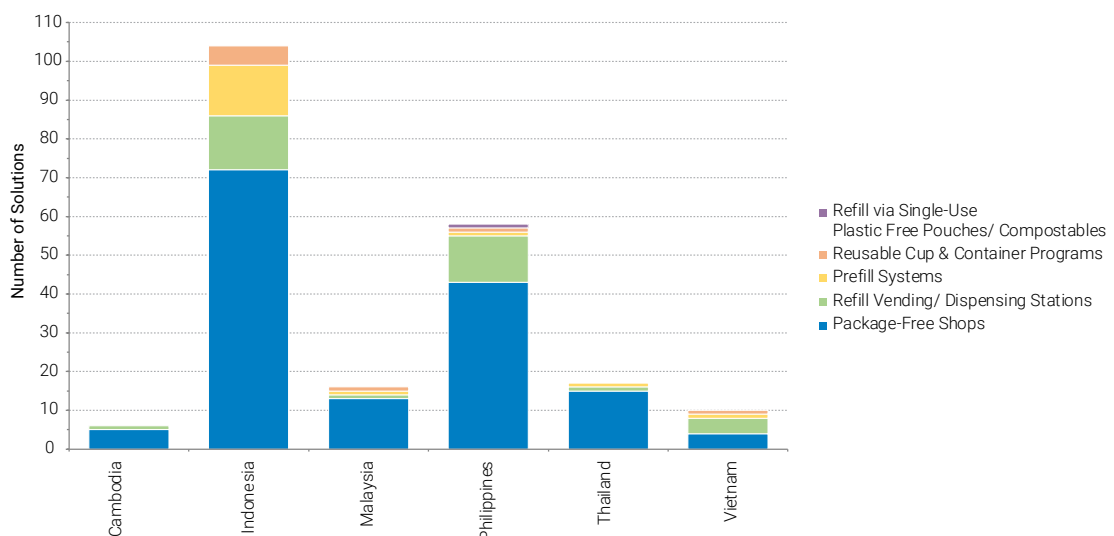
systems, as is already being done for refillable glass bottles, with systems that are successful even in the archipelagic context of these countries. Countries without domestic production of these products will need to leverage different strategies for scaling reuse and refill systems.

2.1 Current Reuse and Refill Solutions

Many forms of reuse and refill remain woven into everyday life, such as five gallon jugs for drinking water, bulk rice refill at traditional markets, and informal dish washing stations in alleyways and food halls. These enduring practices, together with modernized versions of reuse and refill, are present throughout the ASEAN region, though their prevalence varies by country.

In addition, new reuse and refill solutions are emerging in the region: 110 active solutions have been identified and characterized. Package-free or zero waste shops are the most common solution, selling goods such as household and personal care products to customers via refill. Other common solutions are refill vending/dispensing stations and prefill systems, such as those currently used for reusable glass bottles.

Figure 2. Number of Reuse & Refill Solutions by Type and Country



Source: The Living Landscape of Reusable Solutions (www.reuselandscape.org)

These are examples of each solution type currently operating successfully in the region.

Prefill System (Indonesia): [Kecipir](#), established in 2015, is a fresh grocery and consumer goods home delivery service that serves Greater Jakarta and employs nearly 100% reusable packaging. They work only with local brands and farmers to sell organic produce and other food, beverage, and personal and home care products. They have 50,000 users signed up and over 3,000 consistent, repeat customers, sophisticated forward and reverse logistics, washing and warehouse facilities (including bottling of dairy products and cold storage), and an upgraded e-commerce platform.

Refill Vending/Dispensing Stations (Viet Nam): [Cocoon x Guardian Viet Nam](#). This collaboration has established 20 refill stations across Ho Chi Minh City. Customers can refill their own bottles with Cocoon products, such as skincare and haircare items, at a discount compared to buying new containers (Hoa 2024).

Package-Free Shops (Viet Nam): [Refillables Hoi An](#) sells eco-friendly products via refill. The company also has a branch in Ha Noi, which offers over 200 affordable products via refill. The Refillables Ha Noi store has grown over the last several years and is considering expanding. The company estimates they have diverted almost 100,000 single-use containers (Vu, Batchelor and Hytinen 2024).

Refill Sections In-Store (Philippines): [Watson's Pharmacy](#) has a refill section in their stores for some personal care products. Human Nature, a local health and body care company, also offers in-store refill for a selection of their products.



Kecipir Milk Bottling, Jakarta, Indonesia.
Photo © Perpetual / Eridanis Tucker Dixon



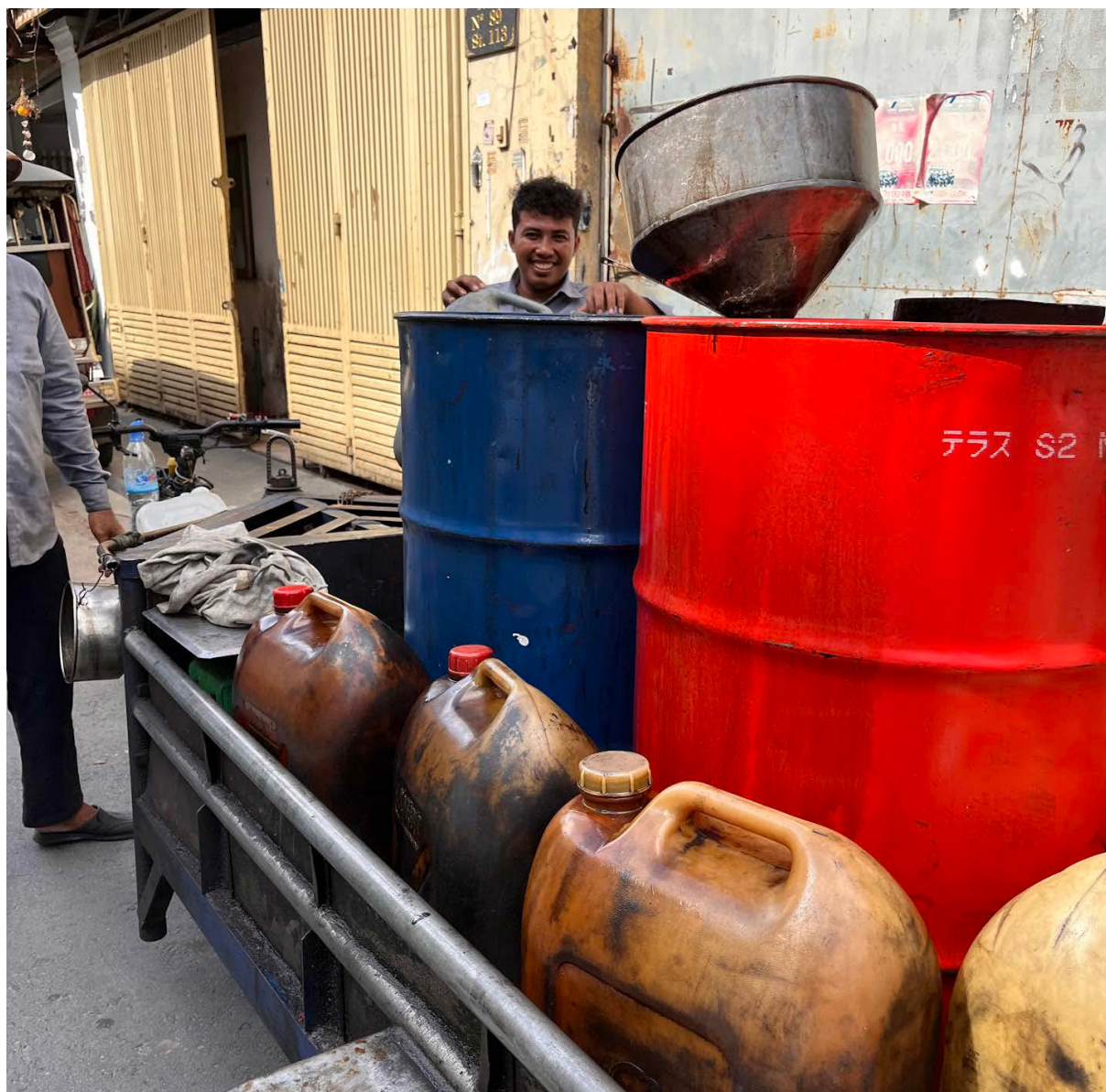
Refillables Ha Noi, Ha Noi, Viet Nam.
Photo © Perpetual / Eridanis Tucker Dixon



Watson Pharmacie, In-store Refillable Personal Care, Makati, Philippines.
Photo © Perpetual / Eridanis Tucker Dixon

While there has been significant innovation and growth of reuse and refill solutions in the region, at least 48 solutions are known to have closed over the last four years. Most of the failures were due to one or more of the key barriers highlighted in the [Barriers to Scale](#) section. Interviews with reuse and refill businesses in the region reiterated the key barriers to success as the ability to

be **competitive on price** with single-use packaging, restrictive or ambiguous **regulations** around packaging requirements; a **lack of incentives** to encourage manufacturers to consider reuse or refill models, and an environment of heavy discounting by venture-backed e-commerce startups.



Motor Oil Refill, Phnom Penh, Cambodia.
Photo © Perpetual / Dagny Tucker

2.2 The Regulatory Landscape for Reuse and Refill Solutions

Each of the ASEAN countries evaluated for this report has implemented regulation related to plastic waste management, with varying levels of scope and scale. While each country has passed legislation seeking to address the challenges of plastic waste, their approaches

differ, and each has advantages and disadvantages. Highlighted policies are described in [Table 1](#), and the [Annexes](#) includes more detail on specific examples of both enabling and restrictive policies and other relevant regulations in the six countries studied.

Table 1. Highlighted Policy & Regulation Relevant to Reuse & Refill Solutions

Policy	Requirements	Implications for Reuse & Refill
Indonesia		
PermenLHK No. 75/2019, Roadmap to Waste Reduction by Producers Effective date: 2020 (beginning of covered period)	- Mandates a 30% reduction in waste at the source for covered producers and requires the creation of a Producer Waste Reduction Roadmap. - Prohibits single-use plastic bags and eating and drinking utensils and encourages bulk purchases and the use of reusable bags, utensils, and packaging. - Bans certain single-use plastics for products smaller than 50mL or 50g effective January 1, 2030.	Pros: - Requires producers to take action and encourages reuse. Cons: - No penalties for non-compliance. - Lacks specific mandates or incentives for reuse and refill, which may lead to a focus on recycling over reuse.
BPOM Regulation No. 12/2023 Effective date: 2023	Specifies regulations for the production and distribution of refillable cosmetics (a category that includes body wash, hand wash, shampoo, conditioner), including hygiene standards and storage requirements.	Pros: - Clearly legalizes the refilling of cosmetics. Cons: - Technical guidance needed for implementation. In particular, start-ups and small enterprises will need support to meet the standards.
Regulation No. 86/2019 Effective date: 2019	Prohibits the reopening and repackaging of final food products, except for large quantities intended for repackaging into smaller sizes.	Pros: - Establishes a legal path through gaining a license to refill. Cons: - Complicates the reuse of food packaging, and license requirements can be restrictive.
Philippines		
Extended Producer Responsibility Act (EPRA) Effective date: 2022	Aims to address plastic pollution by mandating large enterprises and businesses with total assets worth more than ₱100M to recover and divert 20% of their 2022 plastic packaging footprint, 40% by 2024, and 10% increase annually, capped at 80% by 2028.	Pros: - Provides an existing framework for action on plastic waste. Cons: - Critics argue it focuses too heavily on waste collection with recovery targets based on annual plastic production, rather than reduction or reuse.
Administrative Order 2024-0008, recently issued guidelines from the Food and Drug Administration (FDA) Effective date: 2024	Requires permits for refilling stations and mandates strict operational controls for certain product categories, including personal care.	Pros: - Enhances the safety of refill. Cons: - Dampens expansion of reuse and refill systems, especially for MSMEs, by creating significant barriers to entry and operational sustainability. - Without sufficient guidance and ease in permitting, it could lead to an increased price on products sold via refill or in reusable packaging.
Viet Nam		
Law on Environmental Protection 2020 with implementation guidance through Decree No. 08/2022-ND-CP Effective date: January 1, 2022	- Establishes recycling requirements for covered products and packaging, including packages containing foodstuffs and cosmetics. - Decree No. 08/2022 - Official definition of "waste reuse." - Requires businesses to meet circular economy criteria, which includes extending product life cycle through reuse. - Requires the gradual reduction of the production and importing of some SUPs (including food containers and cups), with an eventual ban by 2031.	Pros: - Specifically identifies reuse as a circular economy strategy and one way for businesses to meet requirements. - Mandated reduction of SUPs could create opportunities for reuse & refill alternatives. Cons: - Enforcement is challenging.
Cambodia		
Environment and Natural Resources Code Effective date: June 2024	- Article 90 establishes rules for the promotion of sustainable consumption and production, including sustainable public procurement. - Article 101 indicates that the government shall define targets for collection, processing, refinement, and reuse.	Pros: - Strengthens governance of the environment and natural resources. - Establishes a mechanism for the government to set reuse targets. Cons: - To be determined as the policy is further developed.
Malaysia		
Plastics Sustainability Roadmap (2021-2030)	- Sets targets for plastic waste recycling and management, including phasing out problematic SUPs and targets for recycling, recyclability, recycled content, and collected-for-recycling rate. - Lays out a planned transition to mandatory EPR by 2026.	Pros: - Targets for recycled content and phase-outs could create opportunities for reuse and refill. - Reuse is identified as a key strategy for plastic sustainability. Cons: - Targets do not include reuse and refill. - Not yet clear if/how much mandatory EPR scheme will incentivize reuse and refill.
Thailand		
Plastic Waste Management Roadmap 2018-2030 A draft EPR act is expected in 2026.	- Aims to reduce and prevent plastic waste, including through reducing consumption of SUPs. - Bans thin plastic bags, expanded polystyrene food boxes, plastic straws, and thin single-use plastic cups in 2022. - Calls for reducing use of additional single-use plastics by 2026. - Targets 100% plastic waste in the circular economy (recycling) by 2027.	Pros: - Bans problematic items and calls for reduction in use of SUP, creating opportunity for reuse and refill alternatives to get traction. Cons: - Does not emphasize reuse and refill. - Ultimate focus on recycling rather than reuse and refill which can enable source reduction.

2.2.1 EPR as a Mechanism for Scaling Reuse and Refill

EPR laws recognize and put a price on the cost of managing waste from covered packaging and products and require producers to be wholly or partially responsible for this cost. While EPR has traditionally focused on downstream waste management, expanding it to incorporate reuse and refill is logical and practical. Economic analyses have shown that investing in reuse and refill infrastructure lowers the downstream costs of waste management (OECD 2024). The producer responsibility organizations (PROs) established to support compliance with EPR bring together the same businesses and stakeholders that will need to collaborate to successfully scale reuse and refill. EPR laws that collect fees from producers are then able to use those funds to support infrastructure development. And EPR that leverages all strategies to address the challenge of single-use packaging waste is more coherent than a piecemeal approach.

France's 2020 law provides one example of this approach. Citeo, the PRO, is facilitating collaboration on the design of the countrywide reuse system. The law takes these specific measures to help promote and fund reuse (Zero Waste Europe 2021).

- Dedicates 5% of total fees (estimated to be about €100 million) to the development of reuse including stakeholder engagement, planning, piloting and infrastructure development.
- Sets targets for reused packaging.
- Allows bulk sales of all food products by default, unless there are particular concerns for specific products.
- Requires preferential price for consumers for bulk sales.
- Requires waste reduction objectives.
- Requires a minimum amount of contributions be used to promote reusable packaging.
- Sets source reduction targets and bans specific plastic products.

The United Kingdom of Great Britain & Northern Ireland's EPR law provides another example. It exempts reuse and refill packaging from EPR fees, since the fee is only required to be paid the first time packaging is introduced on the market. Producers save on each rotation cycle that the reusable package (or refill) takes to deliver new product, helping to incentivize a transition to reuse and refill (*The Producer Responsibility Obligations (Packaging and Packaging Waste) Regulations 2024*).



A customer prepares to return an empty refill package to her neighborhood shop in Indonesia.

Photo © Perpetual / Dagny Tucker



Gasoline prefill in glass, Greater Jakarta, Indonesia.
Photo © Perpetual/Dagny Tucker

03

Unlocking the Potential of Reuse and Refill in the ASEAN Region

The collective opportunities presented in [the Priority Opportunities section](#) represents the potential for massive impact. At an average of 67% adoption across these four opportunities, they would **reduce annual plastic consumption by 1.1 billion metric tonnes, reduce annual plastic leaked into the environment by 1.2 billion single-use bottles and 12.8 billion sachets**, and achieve annual greenhouse gas emissions reduction of 3.3 million metric tonnes of carbon dioxide equivalents, among other significant co-benefits. The Framework for Action describes the steps that need to be taken by key stakeholders to unlock the benefits of these opportunities.

3.1 A Framework for Action

3.1.1 How Government, Businesses, Investors, and Other Stakeholders Can Accelerate the Adoption of Reuse & Refill

Governments are unique in their ability to establish strong enabling conditions for reuse and refill via policy and regulations, while **businesses** are best positioned to leverage existing design, innovation, and marketing capabilities to provide their consumers with reuse and refill solutions that work for them. **Investors** are key players as capital is needed to support the transition

to reuse and refill solutions and to establish them at sufficient scale to unlock their environmental, social, and economic potential. **Non-governmental organizations** (NGOs) are already playing a critical role in the ASEAN region and globally by developing reuse and refill standards (PR3 Alliance n.d.), convening precompetitive collaborations (e.g., GreenHub Viet Nam, Greenpeace Philippines), developing educational material (e.g., Dietplastik publications, Mother Earth Foundation educational campaign), establishing grant programmes, and providing technical assistance to MSMEs.

Specific actions that each type of stakeholder can and should take are listed in Table 2. This approach has been developed specifically with the ASEAN context in mind, but many of these actions would be similar for other parts of the world as well.

Throughout the transition, all stakeholders should meet their responsibility to respect human rights according to the UN Guiding Principles (United Nations 2011), incorporate recommendations and research from engagement with stakeholders, including women and groups in vulnerable situations, and support a just transition pathway for informal sector workers. (See the call-out box below for additional detail on this topic).

Role of MSMEs

MSMEs are pivotal in advancing reuse and refill systems and are responsible for driving much of the innovation seen in the space today (see Case Studies). MSMEs also play important roles in underserved areas. For example, in Cambodia, local MSMEs have successfully implemented refill systems for daily commodities. One example is The Refill Store by Dai Khmer in Phnom Penh, selling personal care, home care, and tea and coffee products through refill. This store also focuses on empowering Cambodian women, employing women in poverty and teaching them skills to help them gain financial independence.

Involving MSMEs in the implementation and growth of reuse and refill systems, expanding their capacity, and helping them overcome challenges like limited access to finance and infrastructure can help expand the reach of reuse and refill to the communities these enterprises serve. Leveraging sari-sari stores in the Philippines and Warungs in Indonesia through the provision of infrastructure, training and consumer campaigns has been key in the deployment of successful reuse and refill models in the region.

Ensuring a Just Transition for the Informal Waste Sector

A just transition, as defined by the International Labour Organization (ILO), means “greening the economy in a way that is as fair and inclusive as possible to everyone concerned, creating decent work opportunities and leaving no one behind” (ILO 2024 p.1). It is critical to ensure that the transition from single use to reuse includes the individuals who earn a living collecting and recycling waste, and in particular those who operate within the informal sector. It must be noted that refill models, where customers own and manage the packaging themselves, do not create earning opportunities for informal sector workers, though they can have other benefits such as the ability to access small amounts of product at low cost.

In Southeast Asia, the informal sector is integral to recycling, responsible for more than 90% of PET bottles collected for recycling (GA Circular 2019). There are more women than men in the informal waste sector in many cities (Kaza et al. 2018). Women are more likely to perform more labor-intensive and lower-paid jobs, have less access to resources and equipment, and bear higher risk, including through exposure to harmful chemicals (World Bank Group 2023).

Reuse represents an opportunity to involve informal sector workers in creating an inclusive new system, and to mitigate the dangers present in informal sector work (Gutberlet and Uddin 2017; Zolnikov et al. 2021). Reuse systems should be designed from the beginning to offer decent work and safe working conditions, fair labor practices, and basic protections. This can particularly benefit women in the informal sector, contributing to increased wages, improved job safety and decreased risk. Providing labor protections also enables greater collaboration between informal workers and multinational companies, as the lack of basic protections makes these companies reluctant or unwilling to work with the informal sector.

The role that most closely mirrors existing informal sector workers’ activities is the collection of reusable packaging. Additionally, reuse systems can provide opportunities in transportation, sorting, washing, and redistribution. Workers can leverage their existing skills in resource recovery and sorting, and their existing networks and practices for collection and material management. A just transition should also involve reskilling to train informal workers in reuse systems and logistics.

In this process, it will be important to preserve the elements that informal sector workers may want, such as flexibility and autonomy. While there could be pathways to formalization for informal waste workers, a just transition should not necessarily require structured formalization, and, besides improving conditions and basic protections, it should not necessarily transform how these workers work.



Government managed Tradional Markets Implement Reusables Containers and Bags, Jakarta, Indonesia.
Photo © Perpetual / Dagny Tucker

Table 2. Framework for Implementation by Stakeholder

Note: Steps 1, 3, and 5 apply across all opportunity areas, as well as some actions under Step 2. Other actions of Step 2 and all of Step 4 are specific to each opportunity and are described in detail in those sections. A step-by-step plan of action can be found for each opportunity described in [Section 3.2 Priority Opportunities for Reuse & Refill](#).

Objective	Action	Government	NGOs	Business	Investors
1) Establish enabling conditions (applies to all priority opportunities)	Address unpriced externalities to enable price parity for reuse and refill vs disposables	Potential mechanisms: Taxes/fees Subsidies/tax breaks Others	Showcase technically viable reuse and refill options		Provide reality check on whether planned policies will successfully mobilize capital as investors participating in discussions encourages government action
	Prioritize reuse and refill within EPR regulation	Incorporate reuse and refill solutions in EPR. Where EPR collects fees, direct a % of fees collected be dedicated to reuse infrastructure	Advocate that EPR prioritize reuse and refill	Advocate that EPR prioritize reuse and refill	
	Harmonize and clarify the national and local regulatory landscape	Clarify and harmonize policies governing repacking, refilling, washing, and others that impact reuse and refill operations Include drinking water refill station requirements in public infrastructure guidelines and building codes Integrate reuse and refill into ISWM strategies	Identify bottlenecks, gaps, and barriers in the legal and regulatory landscape	Identify bottlenecks, gaps, and barriers in the legal and regulatory landscape	
	Provide a clear signal to industry that it is time to prioritize reuse and refill solutions	Potential mechanisms: Set reuse/refill targets Set requirements to offer reuse/refill Regulate food contact materials to eliminate exposure to chemicals of concern	Leverage gender analysis for the development of strategies to build capacity and awareness		
	Ensure interoperability and maximize efficiency for reuse and refill systems	Establish / harmonize standards Facilitate pre-competitive collaboration	Establish / harmonize standards Facilitate pre-competitive collaboration	Participate in pre-competitive collaboration Align existing processes within the supply chain	
2) Design and plan, leveraging collaboration	Convene Working Group of relevant stakeholders with clear governance for decision making Ensure consideration of consumers, unions, civil society organizations, women, youth, and other stakeholders including groups in vulnerable situations	Research and engage to understand stakeholder considerations relevant to reuse and refill, including gender considerations in consumer behavior	Research and engage to understand stakeholder considerations relevant to reuse and refill, including gender considerations Facilitate participation of groups in vulnerable situations in decision-making	Start now to review and align existing processes with reuse and refill solutions Conduct user experience research and incorporate recommendations from NGOs & gov in planning new offerings Collaborate on standardized packaging, a universal reuse symbol, and inventory tracking conventions, where possible	
	Additional specific actions by opportunity: 1, 2, 3, 4				

Table 2 (continued)

Objective	Action	Government	NGOs	Business	Investors
3) Mobilize private and public investment - See Individual Opportunities for funding needs	Fund innovation in all aspects of reuse and refill systems at scale	Fund or incentivize innovation through grant programs, prize competitions	Facilitate collaborative innovation, engaging MSMEs in the process	Task and resource in-house innovation teams to focus on reuse and refill Ensure systems are aligned with consumption patterns and accessible to all consumers, taking gender into account, and are	Invest in corporate innovation projects Invest in reuse and refill startups and enabling technologies
	Fund infrastructure and transition costs	Invest and support investment in creation of shared infrastructure, e.g., by providing guarantees or other risk mitigation mechanisms, including gender responsive strategies Incorporate reuse and refill into public procurement requirements Explore Public Private Partnerships for reuse systems	Ensure shared infrastructure is created to serve MSMEs	Invest in shared infrastructure Invest in company-specific facilities and equipment	Invest in shared infrastructure Fund corporates to invest in company-specific facilities and equipment Consider public private partnerships for reuse systems
4) Implement solutions at scale	Specified by opportunity				
5) Support the solution's success	Support all workers in the transition to the reuse and refill economy	Provide just transition pathway for informal sector workers	Support worker training for reuse and refill jobs	Provide just transition pathway for informal sector workers	Provide funding for equipment needed by informal sector workers
	Activate consumers	Run advocacy and awareness campaigns to support business and consumer adoption of reuse and refill	Run advocacy and awareness campaigns to support business and consumer adoption of reuse and refill	Market reuse and refill to consumers to build volume and scale in the system Ensure solutions are accessible to all consumers	
	Grow share of products delivered through reuse and refill channels	Require that certain product categories explore reuse and refill options	Provide technical support to MSMEs to adopt reuse and refill	Expand reuse and refill systems with enhancements from ongoing efficiencies and innovation	Provide capital to enable expansion
	Additional specific actions by opportunity				

Discussion of Key Levers

Extended Producer Responsibility

See the [Regulatory Landscape](#) section for a discussion of why and how Extended Producer Responsibility policies could be relevant to enabling reuse and refill systems.

Targets

Governments can use targets to provide a clear signal to industry to prioritize reuse and refill solutions. Options here include mandatory reuse/refill targets phased in over time, requirements that businesses offer reuse/refill options, and regulation of food contact materials to eliminate exposure to chemicals of concern. For example, Germany has set a target of 70% reusable

beverage packaging (Bundesministerium der Justiz 2019). Critics argue that government targets without mechanisms to support and ensure compliance are unlikely to be successful.

Companies can set targets to demonstrate their commitment to reuse and refill. For example, Pepsico set a target of 20% of beverage servings through reusable models by 2030 (PepsiCo 2022). The disadvantages of voluntary targets are that there is no mechanism for enforcement, they are often not met. For example, most signatories will fail to meet The Ellen MacArthur Foundation's New Plastics Economy Global Commitment 2025 targets.

Public Private Partnerships

A public private partnership (PPP) is a long-term contract between a government agency and a private sector company to deliver a public service or asset. These structures are often used to enable the government to provide services or assets it does not have the financial resources to do on its own. For example, Indonesia used a PPP to establish a safe drinking water system in Semarang (World Water Forum (n.d.)). This model could also be applied to establish infrastructure for reuse and refill programs where they are delivering a public service, such as provision of safe drinking water through water refill stations (Priority Opportunity 2) or collection infrastructure to support prefill food and beverage programs (Priority Opportunities 1 and 4).

Pre-competitive Collaboration

Pre-competitive collaboration will be key to optimizing reuse and refill systems achieving efficiencies and that result in environmental and economic benefit. One recent study found that executing scaled reusable packaging

systems in concert brought significant reductions in the cost of reuse for beverage and personal care. These scaled systems result in per unit costs that are 6% lower for beverage applications and 10% lower for personal care compared to single use, though food applications were slightly more costly (EMF 2023, p.36).

Innovation

Reuse and refill models today have barely scratched the surface of what is possible. Companies understand their customers' wants and needs better than anyone else, and are better positioned to design reuse and refill systems that will work. In addition to pre-competitive collaboration, companies must also push the frontier of how reuse and refill systems work, including innovation in business models, product and packaging design, and user experience to ensure that consumers face low barriers to adoption and to being good participants in the systems. In particular, startup, small and medium businesses have a key role to play as they are more nimble, less invested in the status quo, and able to see new ways to meet consumer needs.

A Note on Corporate Fiduciary Responsibility

While the legal interpretation of shareholder primacy and fiduciary responsibility can vary based on where a corporation is incorporated, a common interpretation is the obligation to maximize shareholder profit (Berle 1932; Bratton and Wachter 2008), even at the expense of some stakeholders. As such, even if there is a desire by company leaders to make less polluting choices, the decision to do so would require having an option that had reasonable price parity, was required by law, or could be justified by other factors with the anticipated potential to impact profitability at a comparable level. This constraint on corporate leadership must be recognized for public companies: **their ability to adopt reuse and refill models is limited by their ability to make a compelling argument that adopting reuse and refill systems is aligned with their fiduciary duty to their shareholders.** (Notably, in the case of prefill, this may already be true.) This is a critical role that policy can play in establishing legal requirements that companies then must comply with, building it into the cost of doing business and relieving them of the burden of justification to shareholders. Some corporations are openly asking for a regulatory environment that levels the playing field and allows them to justify transitioning from SUDs to reuse and refill systems. For example, Unilever's statement that "Government policy, including setting standards and providing incentives for refilling and reusing packaging, can create the right enabling environment for these models to flourish." (Unilever (n.d.))

3.1.2 Finance Mechanisms to Support Reuse & Refill

Enabling conditions such as policies that level the playing field with disposables are critical for reuse and refill models to be economically viable. The shortage of examples of financially sustainable reuse and refill businesses today both reflects the challenge these businesses face under current conditions and is itself a limitation to bringing more investment into this space. Even if concessionary funding can be mobilized to establish infrastructure, without sustainable operational

economics, reuse and refill businesses will not survive. Establishing enabling conditions must be step one in this process.

[The Circulate Initiative's Plastics Circularity Investment Tracker](#) reports that \$8 billion has been invested globally, and \$3.3 billion in Asia, in reuse and refill-focused transactions from 2018 to 2023, of which only \$1.78 million was invested across 11 deals (transactions with individual companies) in Indonesia, Philippines, and Viet Nam. There was no investment in reuse or refill in Cambodia, Malaysia, or Thailand. This compares to a

total of \$190 billion invested across all plastics circularity topics and all regions.

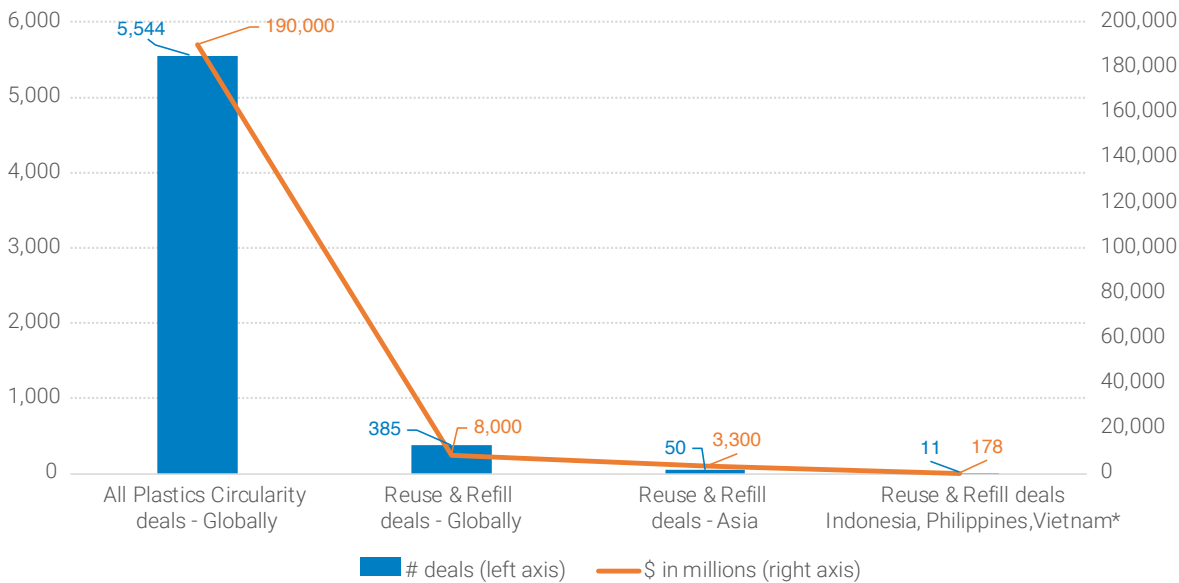
Reuse and refill solutions investment will appeal to a range of investors, with the right investment structures.

- **Infrastructure investors** typically focus on deals with large upfront capital costs that may take several years to break even, but that will provide ongoing returns over a long period of time. Large scale washing facilities and municipal reuse systems are good targets for this group.
- **Early stage or venture growth stage investors** would find reuse startups, spinouts, and growth stage reuse-enabling technology companies to be appealing. These companies could provide full-service reuse systems or individual components.
- **Outcomes-based, Impact or Systemic Investors (philanthropic, concessionary, and non-concessionary)** deploy funds with specific outcomes or the transformation of the whole system in mind, though only 2% of organizations and 1% of impact Assets Under Management are in Southeast Asia (Hand, Ringel and Danel 2022). Appealing investment targets for this group could include technology platforms for inventory tracking and management (which facilitate high quality outcomes reporting), purchase of collection equipment including for workers transitioning from the informal sector, and holistic funding approaches to city or regional-level reuse systems.

- **Development Finance Institutions (DFIs)** are concessionary public funders who deploy capital in line with development targets, including through investments in the private sector. DFIs can also provide Official Development Assistance (ODA) loans and/or grants to low-income countries for use in achieving development goals such as expanded access to clean water, expanded economic opportunity, and environmental preservation, all of which are also outcomes of reuse systems. DFIs are well-suited to provide funding at a city, regional or national scale to implement a holistic reuse system.

Blended finance can enable the deployment of all the capital types above, and is a good fit for reuse and refill systems because there are strong social and environmental benefits alongside the potential risks and returns. In a blended finance approach, concessionary or public capital, often from DFIs, is combined with return-seeking private capital to fund projects. In 2023, there was \$15 billion of blended finance across 99 projects (Convergence 2024). In the reuse context, a potential project could be a coalition of nonprofits, foundations and impact investors focused on funding shared reusable packaging washing facilities or a development bank together with a commercial bank capitalizing shared collection infrastructure for an entire country. It must be noted that some countries have regulatory barriers that prevent this model as it can be seen as leveraging public funding to support private investment returns (Saxena and Joseph 2021).

Figure 3. Investment in Reuse & Refill Compared to Overall Plastics Circularity, 2018-2023



*There was no investment in reuse or refill in Cambodia, Malaysia, or Thailand.
Source: The Circulate Initiative's Plastics Circularity Investment Tracker, accessed December 2024

Potential Sources of Funding for Reuse and Refill Infrastructure and Startup Capital

POLICY MECHANISMS

- **Legislation that provides funding to objectives aligned with reuse and refill.** Governments can provide grants, subsidies, or tax incentives to offset initial costs for infrastructure and ongoing operational costs. The co-benefits that reuse and refill provide can open up potential funding sources targeted for climate, pollution, and job creation. For example, in the Philippines, the Green Jobs Act and the Innovation and Start-up Act both make funding available for programs that create the outcomes that the government is trying to achieve.
- **Extended Producer Responsibility fees.** See 2.2.1 EPR as a Mechanism for Scaling Reuse and Refill.

BOND ISSUANCES

- **Impact-linked financing** could provide capital to companies, municipalities or regional or national governments. A broad range of companies and government entities have used Green, Social, Sustainability, and Sustainability-Linked Bonds for sustainability initiatives, with a total of \$4.9 trillion worth of issuances as of January 2024 (World Bank Treasury 2024). Through this structure, the entity receiving the capital pays back the funding with an interest rate that is linked to the specific sustainability targets set for the bond. If the targets are missed, they pay back the funds at a higher interest rate.
- **National, sub-national, or municipal government bonds** could be used to raise capital for reuse infrastructure, with the recognition that municipalities will experience a range of benefits, including potential cost savings, from reuse and refill systems at scale within their boundaries. It should be noted that this may not be appropriate for all governments or municipalities given constraints in credit, capacity, and country context.

Potential Sources of Revenue for Reuse Operations

PACKAGING-AS-A-SERVICE REVENUE MODELS

- **Service fees charged to businesses.** In this model, businesses pay a packaging-as-a-service fee to a reuse service provider instead of paying to purchase single-use packaging. This is a common model for reusable foodware programs today.
- **Fees charged to consumers.** In this model, the incremental cost of reusable packaging is passed

on to the consumer. For example, some stadiums or venues in the US add a 'facility surcharge' to the purchase of food and drinks to cover this cost. This revenue model only works in a context where consumers are not price sensitive (White, Hardisty and Habib 2019) and is unlikely to be an effective or appropriate mechanism for reuse at significant scale due to consumer willingness or ability to pay and equity considerations (UNDP 2023).

POLICY MECHANISMS

- **Fees imposed through policy.** Fees on virgin plastic, plastic items with viable reuse alternatives, or disposable items could be used to provide reusable alternatives. Fees or fines for non-compliance could also generate some revenue (ideally diminishing over time as businesses come into compliance).
- **Government subsidies or tax incentives** for businesses participating in reuse systems could also help reduce the cost to businesses and encourage more participation, freeing up funds to cover the cost of reuse (SPC 2022).
- **Government procurement** can add needed volume and associated revenue, and direct partnerships can help build legitimacy with businesses and consumers.
- **Deposit-Return Systems (DRS)**, in which customers pay a refundable deposit typically have a portion of deposits that are not redeemed, which can be recognized and used as revenue to cover the costs of administering the program. While high return rates are always the goal, the revenue from unclaimed deposits can be significant even from a small percentage of non-returns on a system doing a lot of volume (Bielenstein 2022).

PHILANTHROPY

Philanthropic funding can support these efforts, but is unlikely to be sufficient to mobilize the amount of funding needed or to sustain that funding over a long time. These philanthropic approaches that could lend themselves to supporting the growth of reuse and refill.

- **Outcomes-based financing.** One example is rePurpose Global's Reuse Outcomes Fund, launched in early 2024, which provides funding based on measurable, verified upstream outcomes, such as tons of waste avoided.
- **Multi-stakeholder collaboration** providing grant funding and/or tailored technical assistance. For

example, TRANSFORM, a joint project of Unilever, the UK's Foreign Commonwealth and Development Office and EY, uses grant funding, business insight, on-the-ground experience, resources and networks to support projects across Africa and Asia, and has included reuse and refill projects (TRANSFORM n.d.).

As with any investment strategy, investors must take into account a range of different investment conditions and risks that will vary from country to country, which will determine the specific viability of any of these particular approaches.

3.2 Priority Opportunities for Reuse & Refill

A Suite of Reuse and Refill Opportunities

The opportunities prioritized here have been identified through primary and secondary research, observation, interviews, and collaboration with local experts. The prioritization included an evaluation of system components that are already in place or have been successfully tested for functional viability in market applications, coupled with an assessment of the opportunities' potential to significantly decrease plastic pollution.

The following opportunities are presented as a set of complementary interventions to mobilize multiple sectors and use contexts in a way that supports the normalization and (re)adoption of reuse and refill. The opportunities represent varying degrees of difficulty

and time horizons for implementation, and balance the demands of the transition to reuse and refill across different types of businesses and other stakeholders. This approach seeks to realize synergies across activities such as developing regulatory guidance and mobilizing funding for implementation.

Together, these opportunities create an ecosystem of reuse and refill that paves the way for a domino effect, allowing other product categories to tie into a foundational system of infrastructure and supporting services to ultimately make reusable packaging a standard across multiple food, beverage, home and personal care categories.



Guana Zero Sari Sari, Philippines.
Photo © Perpetual / Eridanis Tucker Dixon

Table 3. Overview of Priority Opportunities

Opportunity	Target Single-Use Packaging	Retail Context	Degree of Difficulty	Ideal Time Horizon for Implementation	Capital Intensity	Impact on Plastic Reduction and Pollution Across 6 SEA Countries - High Ambition Level
Prefill Bottled Beverages	Bottles	All retail formats	Low - expansion of proven system	2-4 years	Medium	23.9 billion single-use PET bottles avoided (622,000 mt single-use PET) Plastic pollution reduction of 957 million bottles
Water Refill Stations	Bottles	All retail formats except ecommerce, public water stations	Low - proven models exist	1-3 years	Low	6.6 billion single-use PET bottles avoided (171,000 mt single-use PET) Plastic pollution reduction of 263 million bottles
Staple Goods Refill (primarily commodity products)	Sachets and small format packaging, plastic bags used for bulk / portion purchases	Traditional markets, corner stores and micro-retail (MSMEs), modern retail	Medium - already in play but requires some systems change to scale	3-5 years	Low	102 billion single-use sachets avoided (102,000 mt) Plastic pollution reduction of 4.1 billion sachets (4,000 mt)
FMCG Prefill (primarily branded products)	Sachets and small format packaging	Large and small format retail	Medium - High	4-7+ years	Medium to High	217 billion single-use sachets (217,000 mt) Plastic pollution reduction of 8.7 billion sachets (8,000 mt)

Reuse or Refill model	Bottled Beverage Prefill
Products	Iced Tea & Coffee, Beer & Cider, Carbonates, Energy & Sport, Waters
Notable examples	Coca-Cola (Philippines), San Miguel Brewery (Philippines), Glassia Water (Viet Nam), Kecipir (Indonesia)
Where products are sold in reusable packaging	Grocery, convenience, small neighborhood shops, street-vendors, traditional markets, public collection bins
Where packages are returned	Most retailers, small neighborhood shops
Financial incentive (for consumers)	Deposit model ("cash-back" in Indonesia)
Potential plastic reduction (annual) – high ambition	23.9 billion single-use PET bottles avoided (622,000 mt single-use PET) Plastic pollution reduction of 957 million bottles
Potential GHG reduction (annual) - high ambition	2,800,000 mt CO ₂ e
Ideal time horizon	2 to 4 years for implementation

3.2.3 Opportunity 1. Prefill Bottled Beverages

How Beverage Prefill Works

In beverage prefill systems, beverage manufacturers fill reusable containers instead of single-use containers at their facilities. The beverage containers are collected after use, either returned by consumers to participating retailers or other deposit return scheme points or collected by informal sector workers. Returned bottles are picked up by manufacturers or a third party, who sort and wash them so they can be refilled again by manufacturers.

The most common type of beverage prefill uses a Deposit Return Scheme (DRS) in which a deposit is used to incentivize return of the reusable bottle. Modern DRS systems can include automated reverse vending machines (e.g., TOMRA machines), digital bottle IDs, and supporting apps, such as RetornApp used by Coca-Cola Chile. A version of DRS is also used to recover single-use bottles for recycling.

Current Status of Bottled Beverage Prefill in ASEAN Region

Reusable beverage packaging has significantly shifted to single-use packaging over the last 20 years, as seen in Figure 3. While in 2000, four out of the five countries had more than 50% of beverage sales in refillable containers, by 2019 only the Philippines remained above that level with 59%, and Indonesia was down to 4% (Reloop 2021). Data is not available for Cambodia.

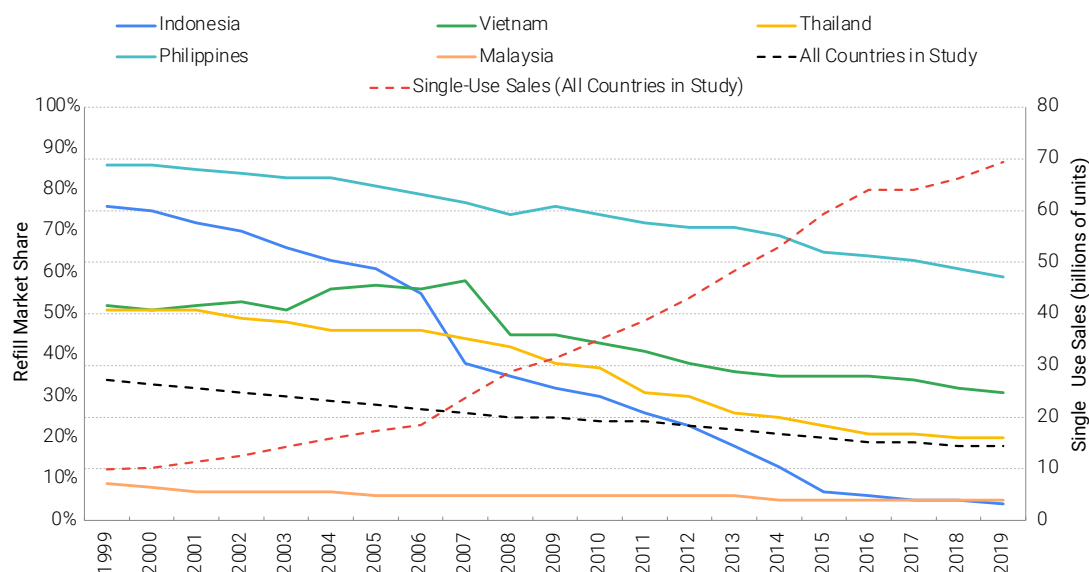
Bottled beverage prefill tends to be most economical where there is fully amortized equipment and assets, and a distribution network that can be leveraged for simultaneous delivery and collection. Even though beverage prefill

systems can be profitable in the right circumstances, these data show that companies have nonetheless shifted to single-use. Reasons given in interviews with beverage companies were that single-use is more profitable, simplifies balance sheet accounting of reusable bottles, avoids the need to track and manage packaging inventory and deposits, and customers prefer it.



Filled bottled (above) and bottles being returned (below), Indonesia.
Photo © Perpetual / Dagny Tucker

Figure 4. Refillable Beverage Bottle (including Beer & Cider, Carbonates, Energy & Sports, Waters, Iced Tea & Coffee, Juices) Market Share by Sales Volume by Country



Source: Reloop 2021

Why Prioritize Bottled Beverage Prefill Now

Numerous reports on how to scale reuse have identified bottled beverages as a ripe sector for the transition (back) to reuse (Global Plastics Policy Centre 2023), and Southeast Asia is well-positioned to benefit from this opportunity.

- **Scale of impact:** In the six ASEAN countries studied, the use of nearly 24 billion single-use plastic bottles could be avoided annually, of which more than 950 million would have ended up as pollution in the environment.
- **Behavioral alignment:** Many people in the ASEAN region already understand and are in the habit of using refillable beverage bottles, or can remember doing so. Further, deposit return schemes are already a cultural norm in many ASEAN countries. For example, the Philippines sells 40% of the volume of all packaged non-alcoholic beverages in reusable bottles (Oceana 2023, p.19).
- **Clear regulatory landscape:** These systems have already been operating at large scale for many years with accompanying regulations on what is allowed, and there is producer and supply chain familiarity with how it works.
- **Demonstrated success:** Multinationals and MSMEs have examples of successful implementation across categories such as soda (50% of Coca-Cola's market share in the Philippines is prefill), beer (San Miguel Brewery in the Philippines sells most of its beer in

reusable glass bottles with over 90% collected for reuse), milk and kombucha (Kecipir in Indonesia), and others (San Miguel Corporation 2023; Coca-Cola Europacific Partners 2024).

- **Existing infrastructure:** Given the existence of currently operating refill models, refilling capacity already exists for some large multinationals and some SMEs, and return infrastructure is already in place in some areas, though new infrastructure will be required for significant expansion.
- **Jobs:** Prefill beverage systems will bring back jobs for handling and washing and could be a great opportunity for a just transition.



Prefillable Beverage Bottles, Siargo Island, Philippines.
Photo © Perpetual / Dagny Tucker

- **Moment of ripeness:** There are indications that both government and producers recognize the opportunity to shift back toward reusable bottles. For example, Coca-Cola has recently re-launched reusable bottles in Indonesia and Viet Nam (Coca-Cola Viet Nam 2023; Martinez 2024).

Potential Challenges

- **Reduced prefill production capacity:** The shift to single-use has reduced the existing prefill bottling plants and supporting assets, so a reversal of this trend will require re-establishing this capacity (Verallia Group 2022).
- **Reduced handling capacity:** Labor capacity will need to be ramped up again, requiring workforce development.
- **High upfront investment costs:** The infrastructure required for beverage prefill to be successful requires significant initial investment. For example, in 2018, the Coca-Cola Brazil soda brands invested \$25 million to unify the design of their reusable PET bottles and

\$400 million in bottle cleaning and refilling facilities (Packaging Europe 2020). While this shows it can be done, hitting internal hurdle rates to rebuild this infrastructure can be challenging.

- **PET bottles are a high-value item for informal sector workers** and reducing the amount of this packaging could reduce their income. Opportunities to collect returnable bottles, and other opportunities created by the prefill system, can offset this loss.
- **Geographic distances within countries and the region:** Shorter supply chains are better for reuse in general and for glass in particular, where shorter travel distances compensate for the increased GHG impacts of heavier bottles. More extensive systems for local reusable bottle supply chains will need to be scaled - an opportunity for collaboration.
- **Archipelagic context:** Distribution and reverse logistics are generally more challenging in archipelagos where transportation of goods to many small islands can add cost and complexity. Leveraging back-haul is one way to mitigate this.



C-Store, Viet Nam.

Photo © Perpetual / Dagny Tucker

Table 4. Implementation Steps for Opportunity 1

Players Involved	Actions & Description
1) Establish enabling conditions: See Framework for Action for detail	
2) Design and plan, leveraging collaboration	
Producers, Bottlers, Distributors, Retailers, Informal Sector, RSPs, Industry Groups, Regulatory Agencies, NGOs	Action: Engage small and medium producers locally to gain buy-in prior to design of shared infrastructure. Action: Convene producers and regional stakeholders to design the shared elements of the prefill bottle ecosystem such as infrastructure and pooled assets. Guiding detail on this design process is provided in the Appendix.
3) Mobilize public and private investment	Capital expenses requiring funding include reusable bottles, bottling equipment, washing infrastructure, and public collection infrastructure. Pooled systems may be more attractive investments than brands or retailers operating in isolation (EMF 2023). Other costs include re-tooling and servicing of existing bottling or washing facilities and educational campaigns for retailer and consumer awareness. See Framework for Action for action steps.
4) Implement solutions at scale	
Government, Producers, Informal sector, Investors	Action: Build new bottling and washing facilities, procure assets, deploy collection infrastructure, develop logistics capabilities/agreements, and upgrade existing facilities or equipment where needed. Work with experts and existing local bottlers to ensure locally relevant knowledge and best practices. Ensure that return points are convenient and easily accessible. (SPC 2022; GIZ 2024; ZWE 2024)
	Action: Develop workforce and training programs for washing and logistics. Inclusion of the informal sector supports a just transition and system success. Work closely with the informal sector to understand their desired role and the mechanisms of support needed for their inclusion as active participants in the reuse system.
	Action: Work with local authorities to gain approval for placement of infrastructure in the public right-of-way or other locations where necessary. Public collection infrastructure, such as return bins on sidewalks, enhances the convenience of returning packaging, especially in areas with fewer retail return points.
5) Support the solutions' success	
Government, Brands & Retailers	Action: Design and launch education campaigns and offer consumer incentives. Retailers should be supplied with marketing and explanatory materials to support consumer understanding and the conversations that inevitably happen at point of sale, and ensure consumers can locate return points (SPC 2022; GIZ 2024; ZWE 2024). In addition to the deposit refund, programs should offer incentives such as loyalty rewards or discounts on future purchases (Reloop North America 2022; ZWE 2022).
PROs where applicable, Brands & Retailers, Industry Group, Supply Chain Operators, Informal sector	Action: Implement reporting mechanisms to track the system's performance, including return rates, cost efficiency, and bottle lifecycles. Tracking operational and financial performance data helps identify opportunities for improvement and substantiates the business case for innovations that optimize the program (Bielenstein 2022).



A user refills a bottle using a public water refill station in Bangkok.

Photo © Environmental Justice Foundation

Water Prefill in Viet Nam: Glassia Water

Glassia is a social enterprise active in Da Nang, Ho Chi Minh City, and Vung Tau City that aims to transform the linear water bottling value chain into a closed-loop system through a local, decentralized model of glass bottling facilities. Glassia offers branded or white label (using hotel or business's brand) plastic-free water service to businesses, such as hotels, which then provide water to their guests for free. Glassia offers full-service delivery, pickup, washing and refilling services.

The first Glassia facility began operations in March 2021. Glassia opened a second facility in Ho Chi Minh City in 2023 and a third in Vung Tau in early 2024.

Implementation: Key technologies and equipment include:

- **State-of-the-art purification systems** for high-quality bottled water.
- **Sterilization and refill systems** for refillable glass bottles.
- **Decentralized bottling facilities** to minimize carbon footprint and support local operations.
- **Consolidated delivery schedules** reduce CO₂ emissions by optimizing delivery routes to ensure bottles never travel more than 50km between the bottling facility and the customer.

Environmental Impact: Since launching in 2021, the company reports their operations have refilled more than 5 million bottles, avoiding the use of 125 metric tons of plastic.

Economic Impact: Glassia offers an affordable reusable option for consumers and businesses. Customers pay a slight premium over single-use PET bottles. Since its inception, Glassia has partnered with over 50 businesses.

Social Impact: Glassia creates jobs in local bottling facilities and logistics for bottle collection and delivery. Glassia has invested in education and awareness materials for customers, helping to support a shift in consumer behavior.

Sources: Glassia Water 2024; Glassia and PXP 2024; Weina 2024



Glassia bottling facility in Viet Nam.
Photo © Courtesy of Glassia Evergreen Labs

Reuse or Refill model	Refill
Products	Water
Notable examples	Bottle Free Seas - public water dispensers in Bangkok Izifill - no-touch water stations in Indonesia ClearCambodia water filter systems installed in schools Drinkwell - though not in ASEAN region, an example of water filtration and dispensing stations in Bangladesh & India
Where refill stations are available	Public, accessible spaces such as parks, transit stations and airports; high-traffic community hubs such as malls, hospitals, universities and schools; retail locations
Where packages are returned	N/A
Financial incentive (for consumers)	Cheaper than purchasing water in single-use plastic bottles, with the option for businesses to offer premium products at higher price points
Use of advanced technology	Filtration system; Dispenser Filter status display, optional additional user-facing features and interface
Potential plastic reduction (annual) - high ambition	6.58 billion single-use PET bottles avoided (171,000 mt single-use PET) Plastic pollution reduction of 263 million bottles
Potential GHG reduction (annual) - high ambition	536,000 mt CO ₂ e
Ideal time horizon	1 to 3 years for implementation

3.2.4 Opportunity 2. Water Refill Stations

How Water Refill Works

In this opportunity, water refill stations are installed in public areas and institutions for consumers to refill their own containers with clean water. Dispensers should be strategically located in accessible public spaces, particularly in densely populated or highly visited areas such as transit centers, malls, or tourist sites, as well as retail locations. Dispensers can be free, public water refill stations or paid dispensers that may be branded and/or offer a distinct product (e.g., mineral water).

Dispensing stations can either be connected to the municipal water supply, which is then filtered and treated by the station if needed, or filled with filtered or treated water using large jugs that are manually replaced when empty. Stations can also include refrigeration or heating to offer cold or hot water in addition to ambient temperature, though this adds cost. For paid stations, an interface is required for user payment, which can be processed using coins, card, QR code payment systems, contactless smart cards, or subscription models. Dispenser payment could also be linked with existing services such as public transit cards in major cities.



Water refill jugs during transport, Jakarta, Indonesia.
Photo © Perpetual / Dagny Tucker

Current Status of Water Refill in ASEAN Region

Water refill can be observed throughout the region, but widespread, accessible, safe, and trusted public refill stations are generally not common. In several countries, including Indonesia, the Philippines, and Viet Nam, water refill in five-gallon (18.9 liter) jugs is common. In Cambodia, Malaysia, Thailand, and Viet Nam, water refill stations can be found to some extent in public spaces such as airports, offices, train stations, hospitals, and schools, though public confidence in the hygiene of outdoors, publicly accessible stations varies, with good reason: a 2016 study found that 40% of water dispensing machines failed to meet water quality standards for general consumption (Bangkok Post 2017). But solutions are emerging: Izifill in Indonesia provides no-touch, multi-filter refill systems in malls, public spaces, and residential complexes where users scan a QR code to select the amount and temperature of water (Izifill (n.d.)). The RefillMyBottle app maps water refills stations in countries across the ASEAN region. ClearCambodia's School WASH Program is an NGO-led initiative which installs filter systems that provide clean water for drinking and handwashing (ClearCambodia (n.d.)). And Bottle Free Seas is innovating in Bangkok - see [Case Study](#).



Bottled Water, Thailand.
Photo © Perpetual / Dagny Tucker

Why Prioritize Water Refill Now

Proven model: There is consumer participation in existing systems and demand for additional refill stations, as demonstrated in the Bangkok [model outlined below](#). Expanding availability of clean water via refill stations, particularly in urban areas where one clean water station could serve many people, can significantly decrease demand for SUP water bottles, and provide needed infrastructure for planned phase-outs of SUP bottles.

Straightforward implementation: Water refill stations are relatively straightforward to install, have low capital and logistics requirements, and the necessary equipment and technology already exists.

Economic benefits: These stations can provide cost savings to consumers, especially where dispensers are free. Communities with increased access to clean water enjoy lower health costs and increased productivity (Water.org (n.d.)). Business locations that install water refill stations enjoy increased traffic, returning users, and goodwill.

Job opportunities: These stations can create jobs, particularly for women and members of vulnerable groups, in managing and operating the stations, fostering their economic empowerment.

Social benefits: Refill stations offer access to clean drinking water for all via free or paid dispensers, increasing equity and non-discrimination, and in alignment with SDG6, Ensure availability and sustainable management of water and sanitation for all.

Preserves market opportunity for brands: This opportunity includes both free refill stations and paid dispensers. Without single-use packaging as a differentiator, emphasis shifts to product differentiation, customer experience, and accessibility of dispensing stations.

Potential Challenges

- **Verifying cleanliness:** Stations will need to be well maintained to inspire consumers to trust their safety. This is particularly relevant in countries with limited access to safe drinking water and where existing dispensers are not well-maintained. Assurance mechanisms such as a sticker showing the last date of inspection and water quality test results can demonstrate cleanliness and, where relevant, differentiate refill station water from tap water.
- **Consumer obligation to provide a container:** Water refill stations require consumers to bring their own

vessels to fill. For some, this may be inconvenient, though it can be mitigated with strategic and widespread dispenser placement. Gravity fed dispensers with precautionary design can prevent contamination even if people are reusing single-use bottles.

- **Lost income from bottled water sales for some stakeholders:** Brands and individuals or small shops that currently make significant income selling bottled water may resist losing these sales. This can be at least somewhat mitigated by creating opportunities for them with paid refill stations. Affected bottled water sellers should be involved in the transition

to identify ways to replace lost revenue and align stakeholder incentives.

- **Informal sector impacts:** SUP water bottles are a high-value item for informal sector workers. Income from this material stream can be replaced with income streams that accompany reuse systems. With training, informal waste workers could play a role in dispenser maintenance. Bottled beverage prefill (Opportunity 1) can help offset these losses with collection of reusable bottles, a cleaner waste stream than SUP water bottles. Free or low cost clean water will also decrease cost of living for low-income populations.

Table 5. Implementation Steps for Opportunity 2: Water Refill Stations

Players Involved	Actions & Description
1) Establish enabling conditions: See Framework for Action for detail	
2) Design and plan, leveraging collaboration	
Govern- ment, IGOs, NGOs	Action: Determine the number and type of water refill stations needed to provide adequate access to clean drinking water within a geographic area. Plan the number and placement of stations, taking into account location and status of existing stations. Use metrics like "x number of stations per y population" to ensure equitable access. Initial priority should be placed on public spaces such as transit hubs, parks, malls, markets, tourist spots, and schools. Stations should be accessible to people living with disabilities and placement should take into account input from women and marginalized communities. Evaluate water quality in the project area to determine the filtration system(s) needed and where reservoir stations will be needed. Create a map of all verified stations.
	Action: Develop operational and quality verification standards. Set clear standard operating procedures to ensure refill stations are well maintained, and establish transparent verification protocols to build confidence with the community.
3) Mobilize public and private investment	Capital expenses include purchase and installation of dispensers. Operating expenses include ongoing repairs, filter replacement, cleaning, water testing, and maintenance. See Framework for Action for action steps.
4) Implement solutions at scale	
Public and Private Sectors	Action: Upgrade existing dispensers and install new ones. Consider running a bulk procurement process for industrial filtration or reverse osmosis systems based on local needs. Incentivize local entrepreneurship in water stations by offering financial support. Innovation from within the community will foster trust and widespread support.
5) Support the solutions' success	
IGOs, NGOs, Govern- ments, Brands	Action: Launch public education campaigns. Mobilize existing NGO-led refill programs and others engaged in the space. Focus on promoting the benefits of refill and building trust that the water is safe and hygienic. Include women and marginalized groups in this process.
	Action: Communicate locations of water refill stations and proper methods of filling. Consider a range of options, including advertisements in public spaces, a website or app showing locations, and clear signage at refill locations.
Govern- ment, Station Owners/ Hosts, NGOs	Action: Track water refill stations' usage and functionality over time. Tracking usage will be critical for reporting and determining which stations are most successful and why. This will assist in developing strategies for further expansion and support ongoing partnerships.

Public Water Refill Stations in Thailand: Bottle Free Seas

Overview: Catalyzed by the Bangkok governor's policy around free, clean, and safe drinking water throughout the city, the Environmental Justice Foundation (EJF) Thailand team launched their Bottle Free Seas project to set up free public refill stations around Bangkok in 2023 in partnership with the Bangkok Metropolitan Administration (BMA). The first 10 stations are located at public locations like parks, bus stops, and shopping centers. Stations filter and refrigerate tap water and are free to the public. Advertisements around the city promote them as free, drinkable, and safe sources of water. In some cases, location owners have also implemented a ban on water in single-use plastic bottles, which helps encourage use of the refill stations.

The project has been so successful that the BMA has already announced plans to install 200 more stations across the city. BMA will be investing in these stations, financing them from its budget as well as from private sector and foundation partnerships. EJF is aiming to expand to 2,500 in 2025 and 5,000 in 2026.

Environmental Impact: Since the August 2023 launch, more than 1 million plastic water bottles have been avoided. Each station is capable of avoiding the use of 100,000 600 mL bottles per month, or 1.2 million annually.

Economic Impact: The cost per liter to dispense water is estimated at \$0.0002, taking into account the purchase, installation, expected lifespan, and maintenance cost for the dispenser. The water is being dispensed to consumers for free. For comparison, the cost to consumers for water from a commercial dispenser (non-branded) is \$0.029 per liter and for water in single-use bottles is \$0.338 per liter.

Social Impact: Access to clean water has many well-documented positive impacts. In addition, host locations benefit from community goodwill and businesses may attract additional customers.

Sources: BMA 2024; EJF 2024

Reuse or Refill model	Refill
Products	Food & Beverage Staples such as rice, spaghetti, cooking oil, white vinegar, sauces (e.g., soy sauce, tomato sauce, fish sauce) Personal & Home Care Products such as liquid soap (dish soap or hand soap) and liquid laundry detergent
Notable examples	Kuha Sa Tingi and JuanaZero Zero Waste Stores - sari-sari store pilots in the Philippines - see Case Study at end of this section Sonke - an example of successful cooking oil refill in South Africa
Where products are sold	Primary focus: small neighborhood shops, traditional markets Secondary focus: modern grocery retailers / supermarkets
Where packages are returned:	N/A
Financial incentive (for consumers):	Cheaper than purchasing the same amount of product in single-use packaging
Use of advanced technology:	Dispensing systems (gravity-fed, scoop bins, or smart dispensers) Scale for products sold by weight
Potential plastic reduction (annual) - high ambition	102 billion single-use sachets avoided (102,000 mt) Plastic pollution reduction of 4 billion sachets (4,000 mt) Additional reduction of other small format packaging and single-use plastic bags used for bulk purchasing - not quantified
Potential GHG reduction (annual) - high ambition	645 mt CO ₂ e
Ideal time horizon	3 to 5 years for implementation

3.2.5 Opportunity 3. Staple Goods Refill, Primarily Commodity Products

How Refill Works

Refill, or bulk sale, lets customers refill their own containers with the precise amount of product they need. Existing dispensing systems that are sanitary and effective include:

- **Gravity-fed dispensers or bins:** used for liquids or dry goods, a spout or lever turned by the customer uses gravity to dispense the product into a customer's container.
- **Pump dispensers:** typically used for thicker liquids, customers manually pump the liquid into their containers.
- **Tap or valve dispensers:** used for liquid products, the customer opens a tap or valve to dispense product into their container.
- **Scoop bins:** customers scoop dry goods into their containers.
- **Smart dispensers:** a higher-tech option, automated digital dispensers allow customers to select a quantity via a technology interface and automatically dispense that amount of product.

Products are priced either by weight (non-liquids) or volume (liquids). In modern retail, smart dispensers can calculate the price based on product dispensed, or pricing is based on weight or volume at checkout. In traditional and small-format retail, the shopkeeper will typically weigh the container prior to filling, then subtract that weight from the final weight for pricing. For liquids, standard bottle sizes are typically used, enabling easy pricing based on volume.

Distribution logistics for retailers involve either swapping empty dispensing units for full ones, or using large-format bags or containers, ideally reusable, to refill dispensers. This requires a B2B prefill model by manufacturers with supporting forward and reverse logistics similar to water jug delivery systems in place in the region now. Using single-use B2B packaging for refills undermines the waste reductions of the refill model, but can still be environmentally better than individually packaged items.

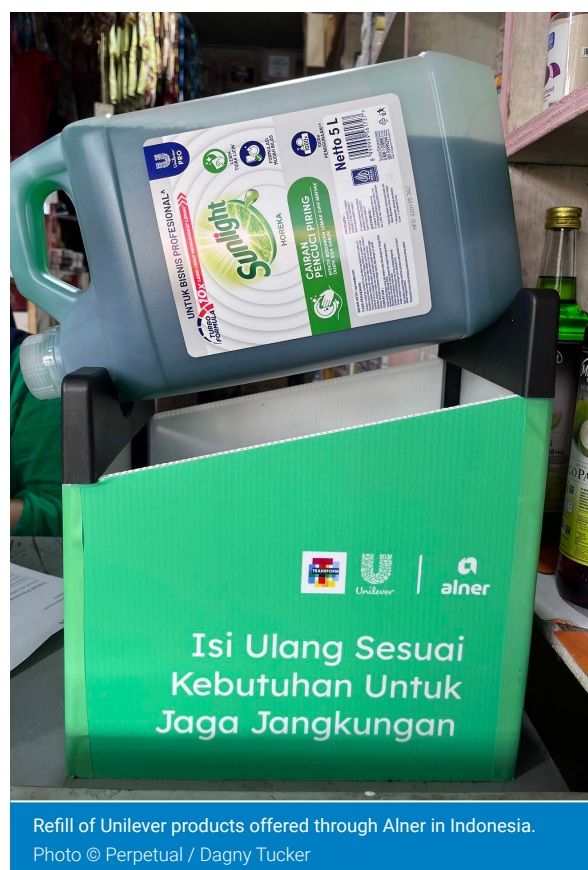
Current Status of Refill in ASEAN Region

The ASEAN region has significant culturally embedded refill practices as well as dedicated refill or zero waste stores - at least 80 package-free stores and 15 refill vending/dispensing stations in 2024. In Indonesia, particularly in traditional markets (pasar) and small

shops (warungs), it is common for customers to bring their own containers for bulk items like rice, cooking oil, and spices, though bulk items are also typically offered with single-use bags. This bulk practice has been part of daily life for many Indonesians for generations, and is strong in rural areas in particular. In the Philippines, there are initiatives aiming to expand refill in existing sari-sari stores. The box at the end of this section below explores two such pilots, projects of Greenpeace and Mother Earth Foundation.

Refill is a particularly effective strategy when applied in traditional markets and informal neighborhood shops because customers are making frequent trips to these settings. This proximity makes it more convenient for people to bring their own containers to fill.

Refill can be successful in larger modern retail settings as well, with design variations to accommodate customers' different shopping habits such as making less frequent trips and larger purchases. Some modern retailers offer bulk refill sections, but it is not typical. Advanced refill technologies, such as smart dispensers, are most consistent with the consumer experience of modern retail. Refill pilots in modern retail contexts have shown that without strong implementation, the system can add cost due to increased labor and shrink (wasted or stolen product).



Refill of Unilever products offered through Alner in Indonesia.
Photo © Perpetual / Dagny Tucker

Why Prioritize Refill Now

- **Complementary to other reuse and refill solutions and forthcoming regulation:** In a regulatory environment that restricts sales of products in packaging under a certain size (such as in Indonesia under Decree No. 75/2019, effective in 2030), refill for small amounts (this Opportunity) and reusable prefill (Opportunity 4) would be ways for retailers to be able to offer smaller portion sizes.
 - **Culturally embedded practice:** Refill, often using saved and repurposed containers, has been a common practice in all of the focus countries and it has been observed that many variations still persist today in each of the countries studied, though the practice is stronger in some than in others. This provides a behavioral foundation to build from, providing a clearer path to establishing the necessary consumer behavior patterns for refill to work.
 - **Promising pilots & partnerships:** From refill shops to refill in sari-sari stores, pilots are providing encouraging results. In one example, waste banks in Indonesia are being used as sites for refill and return stations for home & personal care products, promoting the reuse of containers by allowing customers to refill them with home cleaning products (Unilever 2024).
 - **Technical and logistical feasibility:** Refill systems have a long history of safe and sanitary implementation. Proven models and technologies for refill systems for both liquid and dry goods exist, are widely available, and can be adapted to various scales of operation. In addition, the existing logistical networks of retailers, including neighborhood shops and traditional markets, can integrate refill solutions into existing supply chains without significant overhaul.
 - **Cost savings for businesses & consumers:** In micro-enterprises, it has been demonstrated that shifting to refill can increase profits for businesses even as it decreases costs to consumers, making neighborhood shops ideal for implementation (Castillo, Draper and Mamaril 2024).
- **Ensuring safe and hygienic use:** Sanitary dispensing systems exist and have been approved by consumer safety organizations, but education and technical assistance can help ensure systems are set up and used correctly. Education will also be needed to ensure that consumers only refill containers that are safe to reuse. Additionally, some materials have been shown to leach chemicals of concern into food and beverage products, such as certain plastics with cooking oils (Geueke *et al.* 2022).
 - **Protecting product integrity:** Producers do have concern with imitation products being sold under a brand's name. To ensure product safety, there must be clear, accessible, and agreed upon regulatory guidelines and methods for verifying product source and quality and for maintaining the connection to brand names that consumers trust.
 - **Branding:** Manufacturers may be reluctant to lose the marketing opportunity that comes with individual packaging. While highly branded products are not recommended for refill for this reason, there may still be a need for branding in refill systems (such as for ensuring product integrity). Replacement marketing channels could use technologies such as QR codes or other creative point of sale materials for refill systems to maintain and even potentially increase brand visibility.
 - **Customers bringing containers for filling:** Sufficient communication and education coupled with a transition period will be important to habitualize the need for customers to bring their own containers.



Scoop Bins, Bangkok, Thailand.

Photo © Perpetual / Dagny Tucker

Potential Challenges

- **Limited product selection:** Refill as a solution is most viable for fast-moving staple products with relatively little differentiation between brands or suppliers and for products that are especially oily or fragrant, such that they are not a good fit for other reuse models like prefill. Products that are highly perishable or

Table 6. Implementation Steps for Opportunity 3: Staple Goods Refill, Primarily Commodity Products*

Players Involved	Actions & Description
0) Preliminary Step: Establish Products Suitable for Refill Refill as a solution is not viable for all products due to its requirements of consumers, space restrictions in retail, and operational limitations for some products. Products well suited for refill are frequently purchased, high-volume staples that are already commonly being sold in bulk formats and can be easily distributed in micro-retail shops. The initial list of recommended staple products includes rice, spaghetti, cooking oil, white vinegar, sauces (e.g., soy sauce, tomato sauce, fish sauce), liquid soap (dish soap or hand soap), and liquid laundry detergents. Some staples are specifically included in the refill list because they are NOT well-suited for prefill. This is because of viscosity, smell, or difficulty in cleaning packaging. Product selection should be verified with actual data and testing. Country-level priority products should be as consistent as possible to increase efficiencies for producers.	
1) Establish enabling conditions: See Framework for Action for detail	
2) Design and plan, leveraging collaboration	
Government, Brands, Distributors & Retailers including MSMEs, NGOs	Action: Develop operational standards. Leverage and adapt best operational and hygiene practices from around the world. Work with relevant health agencies to develop protocols for cleaning and maintenance of dispensers. Standards should not necessarily prescribe specific models or types of refill systems, but rather general requirements, allowing innovation of safe and sanitary systems.
	Action: Modern retailers make their implementation plans. Test and refine refill approaches that work in the modern retail context, and create a roll-out plan to provide refill options for target products across all stores.
	Action: Create engagement program for small and traditional retailers. Small and traditional retailers will need technical assistance to maximize adoption, impact, and success. The first step is to engage these retailers to get insight into their constraints, requirements, and preferences, and provide them with information on how refill will affect their business operations. Implementing refill as a regional or national change will normalize it and facilitate adoption.
	Action: Plan for optimized distribution to small / traditional retailers. Consider direct or networked distribution of bulk product to retailers, using existing distribution networks where possible. Identify need for new transfer depots or extended parking time in transfer centers, and take into account access for diverse consumer groups, including women and marginalized groups.
3) Mobilize public and private investment	Capital expenses include the purchase and installation of refill system equipment. Other funding is required to support educational campaigns for the community broadly on refill practices. The program to enable small and traditional retailers to adopt refill will require funding for outreach and education, subsidies for purchase of refill dispensers for qualifying retailers, and point of sale and educational material. See Framework for Action for action steps.
4) Implement the solution at scale	
Producers, Brands, Retailers, Government, NGOs	Action: Provide technical assistance to enable adoption by small and traditional retailers. Retailers will need access to standards/guidelines, information on any subsidies available, and support on how to communicate with their customers. Explanatory signage or other supporting materials can help with this communication.
Producers, Brands, Retailers	Action: Implement refill systems in modern retail. Align timing and messaging on safe refill practices with other retail formats.
5) Support the solution's success	
Producers, Brands, Retailers, Government, NGOs	Action: Education and awareness campaigns for the general public. Thoughtful educational campaigns need to be developed to help consumers understand how refill works, how they can participate, and what benefits are associated with the system so that the burden of educating consumers does not fall only on retailers.
Government, Brands, Retailers, NGOs and others	Action: Deploy and install subsidized refill dispensing systems. Install the appropriate dispensing systems. This will require capital investment from businesses and can be enabled by government incentives like rebates or subsidies.
Businesses, Industry Groups, Government	Action: Define key attributes and means of monitoring to inform innovation. Monitor and assess the consumer experience and retailers' cost to operate and maintain the refill equipment to inform ongoing design innovation. Quantifying shrink, how much product is lost without earned revenue, is important to understand whether measures need to be taken to reduce spillage and/or theft.

*Note on Table 6: It is anticipated that small and traditional retailers will need more support to shift to refill than modern retailers, and this is reflected in the implementation steps proposed here. To enable a successful transition at significant scale, small and traditional retailers are expected to require technical assistance at the individual level for planning, implementation and initial operations, and at the collective level for consumer education. Modern retailers are better resourced to conduct their own planning and implementation, but would still benefit from the broader collective effort to share best practices, provide incentives for the transition to refill, and educate consumers.

Refilling in Sari-Sari Stores in the Philippines: Kuha Sa Tingi and JuanaZero Zero Waste Stores

Overview: Greenpeace Philippines and Mother Earth Foundation (MEF) have established initiatives to reduce sachet use by introducing refilling stations at affordable prices in small neighborhood stores (e.g., sari-sari stores and small retail shops). Both projects involved collaboration with local government units and other partners.

The Greenpeace project, Kuha Sa Tingi, initiated pilots in San Juan and Quezon City for dishwashing liquid, laundry detergent, fabric conditioner, and shower gel. From the initial 2022 pilot with 10 stores in San Juan, the project has expanded to Quezon City and to Pasig City. In Quezon City, after a successful initial rollout with 30 stores, 1,000 stores across the city are now participating. In August 2024, it was announced that the project would be expanding to all cities across Metro Manila.

The MEF initiative, JuanaZero Zero Waste Stores, started in early 2023. From the initial launch with 1 pilot store, 19 more stores were established in December 2023 in Malabon and Navotas City. Rice, cooking oil, and condiments are the main products sold, along with soy sauce, vinegar, fish sauce, fabric conditioner, dishwashing soap, and other package-free items like pasta.

Environmental Impact: In San Juan, refilling stations at 10 stores avoided the use of 8,453 sachets in 6 weeks through refill – selling the equivalent of 253 liters of products. In Quezon City, stores avoided using 47,601 sachets to deliver 1,428 liters of products in 8 weeks. The expansion of Kuha sa Tingi to 1,000 stores will help avoid an estimated total of about 13 million sachets annually. Projected across the 1.3 million sari-sari stores in the Philippines, 9.5 billion sachets per year would be avoided. In 2024, the JuanaZero stores avoided using 42,500 plastic sachets (42.5kg of plastic), 4,500 plastic labo (thin, semi-transparent film) bags, and 9,700 plastic sando (shopping) bags.

Socio-Economic Impact: Customers of Kuha Sa Tingi stores saved an average of 201% for the four products, while stores had a ~15% profit increase. JuanaZero store owners estimated that their income increased by 70% with refill stations. 75% of sari-sari stores in the country are owned and managed by women, making them particular beneficiaries of this shift. Some store owners stopped selling dishwashing liquid in sachets due to decreased demand and improved profits after the transition to refill.

Social Impact: Customers have become accustomed to bringing their own containers, and older customers have appreciated the return to previous practices. Both stores and customers of the Kuha Sa Tingi initiative requested products in reusable packaging that can be returned and refilled, revealing additional demand. As women make up 60% of grocery shoppers in the Philippines, they are frequently at the forefront of leading this change.

Sources: Adobo Magazine 2017; Break Free From Plastic 2020; Greenpeace 2024; Greenpeace Philippines 2024; Makesense 2024; Talavera 2023



Oil in Plastic Bags, Siargao Island, Philippines.

Photo © Perpetual / Dagny Tucker

Reuse or Refill Model	Prefill
Products	Food & Beverage products such as snacks, coffee, instant noodles, dry seasoning, tea; Home Care products such as dry soaps and detergents; Personal Care products like shampoo; and Products currently Packaged in Glass such as spreads, purees, sauces
Notable examples	Alner with brand partners including Nestlé, P&G, Unilever (Indonesia) Kecipir (Indonesia)
Where products are sold in reusable packaging	Most retailers, small neighborhood shops
Where packages are returned	Most retailers, small neighborhood shops, waste banks, public return bins
Financial incentive (for consumers)	Deposit model ("cash-back" in Indonesia)
Use of advanced technology	QR codes used to track serialized containers Optional consumer-facing app to track personal usage and impact, maintain connectivity with brand
Potential plastic reduction (annual) - high ambition	217 billion single-use sachets (217,000 mt) Plastic pollution reduction of 8.7 billion sachets (8,000 mt)
Potential GHG reduction (annual) - high ambition	1,368 mt CO ₂ e
Ideal time horizon	4 to 7+ years for implementation

3.2.6 Opportunity 4. Prefill for FMCG, Primarily Branded Products

How FMCG Prefill Works

FMCG prefill provides the convenience consumers are accustomed to and enables businesses to still merchandise a large range of products, particularly in a small space.

FMCG products currently packaged in single-use small format packaging are instead packaged in reusable packaging that allows for branding and retains or enhances the functional requirements of single-use packaging. The packaging is filled and distributed by manufacturers or a third party to retailers, including small neighborhood stores, and can be available for consumers to purchase on the go or for home delivery. At the time of purchase, consumers pay what is effectively a deposit for the packaging, though terms vary by geography; for example, in Indonesia, 'cash back' is preferred. Empty packaging is collected by retailers, via home pick-up, and at other accessible locations, such as waste banks or by the informal sector. The deposit is refunded upon return of the package. The packaging is then washed, refilled, and redistributed by the manufacturer or by a third party.

Prefill programs can provide incentives for consumers to return the packaging to achieve high return rates, making it cost competitive for consumers and even alleviating the poverty tax of small quantity purchases.

Products best suited to prefill models are those that are manufactured and packaged locally and that do not present significant washing challenges such as from oil residue. Dry food products like packaged snacks or seasoning and easy-to-wash home & personal care products are most feasible.

Current Status of FMCG Prefill in ASEAN Region

FMCG prefill is an emerging solution in the ASEAN region. FMCG companies such as Nestlé and start-ups in the ASEAN region such as Alner and Hepi Circle have piloted or have ongoing programs for reusable packaging for small portions of home care and food products that have demonstrated consumer and operational feasibility, though as acknowledged elsewhere it is challenging for reuse to compete with single use on cost, limiting its potential to scale. See Case Study about Alner below.



Prefill food products packaged by Alner, Jakarta, Indonesia.
Photo © Perpetual / Dagny Tucker

Why Prioritize FMCG Prefill Now

- **Unique solution to challenging problem:** There are very limited opportunities to provide viable alternatives to the 550 billion sachets sold in the ASEAN region in 2024. This proposed approach is a real opportunity for source reduction.
- **Existing habits facilitate adoption and implementation:** The products targeted by this opportunity have fast use cycles, which is beneficial as it reinforces the consumer reuse behavior, and packaging can be reused frequently. The deposit / cash back model is familiar to consumers given their experience with returnable beverage bottles.
- **Necessary foundational pieces have been tested or are established:** Existing distribution networks are in place for sachet distribution, particularly important given the archipelagic nature of much of the region (Sy-Changco *et al.* 2011). There are examples of innovative packaging, existing return infrastructure, including partnerships that facilitate return, and third-party washing that is economically viable.
- **Win-win-win-win for stakeholders:**
 - **Brands and manufacturers** benefit from the consumer loyalty enhanced by prefill (Root Innovation 2022).
 - **Consumers** pay only for the product, receiving the money back for the packaging when returned. This opportunity also meets a growing consumer demand for reusable packaging (Verallia Group 2022).
 - **Operators** like Alner benefit by providing the service of reusable packaging, generating an additional revenue stream from the handling of packaging.



Customer orders packaged for delivery by Alner, Jakarta, Indonesia.
Photo © Perpetual / Dagny Tucker

- **Local governments** benefit from reduced waste and pollution. In Indonesia, for example, the environmental and social costs of improperly handled plastic sachets are estimated at around Rp 1.7 trillion (\$150 million) per year (Souisa and Mann 2024).

Potential Challenges

- **New infrastructure is needed:** Additional infrastructure (washing, copacking and/or filling capacity) could be established by individual manufacturers or through shared facilities, and needs to be able to accommodate a range of package types.
- **Matching the low (internalized) cost of sachets is challenging:** The cost manufacturers pay for packaging as a percentage of cost of product is lowest for sachets, leaving very little room for reuse models. Enabling regulatory and policy frameworks will be necessary to address this.
- **Building the return behavior:** As with all return models, the environmental benefits are unlocked when a single unit is reused many times. Achieving the return rate necessary for success will require awareness raising, convenience, and competitive pricing.
- **Space constraints:** Businesses, especially small enterprises like neighborhood shops, rely on the merchandising density of small-format packaging. Additional packaging innovation and strategic selection of product categories are needed.
- **Regulatory considerations:** In Indonesia, for example, Food Safety Regulations (Government Regulation No. 86 of 2019) prohibit the reopening and repackaging of final food products, except for large quantities intended for repackaging into smaller sizes. This restricts the reuse of food packaging to those who obtain a license to refill, such as Alner has obtained. While regulation that ensures food safety and product integrity is essential, it should include paths to compliance that are accessible to MSMEs.
- **Cultural purchasing habits:** In the Philippines, products in sachets can be sold for the price of a single coin (e.g., 5 or 10 pesos), and products that cost one coin sell better than those that require either change or multiple coins (Sy-Changco 2011).
- **Safety concerns:** Consumers may perceive reusable packaging to be less hygienic than single-use packaging, but quality control systems to ensure sanitization will mitigate health-related risks and should be able to address hygiene concerns over time.

Table 7. Implementation Steps for Opportunity 4: Prefill for FMCG, Primarily Branded Products

Players Involved	Actions & Description
1) Establish enabling conditions: See Framework for Action for detail	
2) Design and plan, leveraging collaboration	
Producers, RSPs, Distributors, PROs if applicable, Government, Informal Sector, NGOs	Action: Conduct pre-competitive design process. Convene the relevant stakeholders to select 5-10 product categories and make key system design decisions to harness the efficiencies of a shared system. See Opportunity 4: Further Guidance in the Appendix for detailed recommendations.
3) Mobilize private and public investment	Capital expenses include developing new packaging formats, altering, retooling or replacing production lines, and the development of shared washing, collection, and other infrastructure. If a Deposit Return Scheme will be utilized, then startup funding is needed. See Framework for Action for action steps.
4) Implement solutions at scale	
Producers, RSPs, Distributors, PROs if applicable, Government, Informal Sector, NGOs	Action: Develop workforce development and training programs. Shared washing facilities and logistics not handled by existing distribution networks will require trained labor. This is an opportunity for the inclusion of the informal sector for a just transition, which further supports system success.
	Action: Build new or additional washing and co-packing facilities. If not already present, washing and co-packing facilities must be established to empower a localized prefill supply chain. Ideally wash hubs will be co-located with filling operations to reduce unnecessary transportation.
	Action: Work with local authorities to gain approval for placement of collection infrastructure in the public right-of-way or where necessary. Public collection infrastructure, such as return bins on sidewalks, enhances the convenience of returning packaging, especially in areas with fewer retail return points.
	Action: Deploy additional methods for collecting from consumers. Explore other methods of collection, leveraging insights from informal sector workers. This could include, for example, neighborhood collection depots.
5) Support the solutions' success	
Government, Brands, Retailers, NGOs	Action: Create education and awareness campaigns for consumers. Thoughtful campaigns can nudge existing behaviors to habitualize return, increase awareness of return options, and support high return rates.
	Action: Deploy training programs for the informal sector on collection. Developed in collaboration with the informal sector, these training programs offer workforce development opportunities and contribute to system success.
Brands, System Operators, Industry Groups	Action: Monitor, report and improve operational performance. Track and analyze performance metrics such as return rate and cycle cost to identify areas for impactful innovation. Refine packaging design and system design based on consumer feedback and operational insights.



Sachets in Vietnam.

Photo © Perpetual / Dagny Tucker

FMCG Prefill in Indonesia: Alner

Overview: Alner is a reusable packaging system provider in Jakarta offering soaps, detergents, and ready-to-eat foods in tech-enabled returnable and refillable containers. Started in 2020, the company collaborates with FMCG brands, MSMEs, and retailers to facilitate the transition from single-use packaging to refillable alternatives. Alner's partners include micro-retailers, such as warung stores, waste banks, and individual resellers who act as product sales points and expand reach. The resulting reuse ecosystem offers hundreds of products and enables consumers to purchase daily essentials in packaging that can be used up to 20 times. As of mid-2024, Alner had more than 3,000 customers and 850 retail sales points, including warung stores and waste banks, of which more than 70% are women-led. Alner also works with more than 10 brand partners, including Unilever, Wipro, and Nestlé.

How it Works: After Alner and the manufacturer find suitable refillable packaging for the product, consumers buy the product from one of Alner's refill sales points or online. Consumers return empty containers to reseller locations and receive their deposit back, saving around 10% on their next purchase. The empty packaging is returned to Alner for washing and sterilization before refilling either by Alner or brand partners. Alner currently achieves a packaging return rate of 70%. As with any system not yet at scale, this number does not reflect the full potential; Alner expects this rate to increase with time as product and return hub availability increase.

Environmental Impact: From 2022 to 2023, Alner's system eliminated the need for more than 650,000 pieces of single-use packaging and saved more than 24 metric tons of CO₂e from the production, transportation, and end-of-life stages.

Economic Impact: Since its inception, Alner has directly created 23 jobs and has generated more than \$95,000 additional income for sales point partners, who are primarily microentrepreneurs and majority women. As these points are spread out, the impact is widespread across Greater Jakarta, helping empower local communities and generating economic impact that benefits women in particular. The company is currently raising \$1.5 million to expand to three major Indonesian cities, boost its online presence, expand its offline channels, and add more products.

Sources: Alner 2022; Alner 2024; Enviu 2024; Zero Waste Living Lab 2023

3.2.7 Other Opportunities

Foster and Grow Legacy and Current Reuse and Refill Practices

Reuse and refill practices happening in the ASEAN region should be preserved at a minimum and expanded where possible. For example, use of reusables by street vendors, large format bottled water, and returnable bottle systems. These existing practices normalize reuse and refill behaviors, making new models more easily relatable and adoptable.

To maintain, further solidify, and ideally grow these legacy practices, the following actions should be considered:

- Validate common reuse and refill practices through campaigns, highlighting their alignment with environmental and social well-being.

Ensure regulation both ensures safe practices and supports existing reuse and refill models. For example, an [administrative order](#) by the FDA in the Philippines that



Stocked shelves in Alner warehouse, Jakarta, Indonesia.
Photo © Perpetual / Dagny Tucker

requires permits for refilling stations is hindering current practices, and could be modified to meet both objectives.

Provide guidance, standards, and education on proper hygiene.

Closed-Loop and Semi-Closed-Loop Reuse

Closed-loop environments are physical spaces where food and beverages are both served and consumed on-site and there is a controlled number of monitored entry and exit points. These can be ideal settings for reusable food container and cup programs because they simplify the reuse and return processes and may achieve high return rates with only minimal operational and behavioral changes. They can be permanent, such as schools, stadiums, and office buildings, or temporary, such as festivals. Semi-closed settings mimic the conditions of closed-loop spaces but are not as controlled, such as corporate or university campuses or mall food courts. In these spaces, accountability systems (e.g., deposits), technology (e.g., apps), and incentive programs may be necessary to ensure items are returned.

Examples of systems in use today include food courts and school and office cafeterias use reusables for foodware and utensils in the Philippines, where quick-service food network The Jollibee Food Group has shifted all dine-in transactions to reusable utensils (Jollibee Foods Corporation n.d.). Providers like Cloudwash in the Philippines and BALIKIN in Indonesia provide reusable food and beverage containers for delivery and takeout services for quick-service restaurants and reusable food containers for music festivals, sporting events, and other large-scale events respectively (Cloudwash n.d.; Dietplastik n.d.). Reuse in hotels is also expanding, as hotels shift away from single-use for amenities (Zengkun 2019).

Closed-loop and semi-closed-loop reuse can be considered low-hanging fruit in terms of the adoption of reuse systems. Though closed and semi-closed reuse systems do require upfront investment and sales and setup processes, implementation is well understood and requires minimal changes to existing behavior or operations. It also does not require extensive collaboration among stakeholders or significant policy interventions to succeed, though local policy as well as incentives or subsidies can help encourage adoption.

These systems can also serve as anchor locations that can help provide scale and infrastructure to support other reuse and prefill initiatives.

Reuse on Regional Flights

Switching to reusable cups, foodware, and cutlery for in-flight service on passenger flights is an attractive, viable, and ripe opportunity. A recent report assessing single-use plastic products in the airline sector and exploring opportunities for replacement found that there is passenger demand for reduction in SUPs (75% of passengers would feel better about flying if it did not involve SUPs), the waste reduction potential is significant, and there are successful examples, and acknowledged that there is a need for harmonized guidance and hygiene protocols, modifications to existing logistics, and consideration of weight implications (IATA 2024). Airlines that are using or testing reusables and/or setting targets to do so include Viet Nam Airlines, Lufthansa, Air New Zealand, LATAM Airlines Group, and Delta Airlines.

Open-Loop Reusable Coffee Cup Program in Specific Locations (e.g., Phnom Penh, Cambodia)

There is a robust coffee culture in Cambodia with out-of-home coffee revenue (i.e., revenue generated in restaurants and bars) amounting to \$122.6 million in 2024 (Statista 2024a). Coffee vendors offer products serving all socioeconomic classes. Implementing a reusable cup program would be a first step toward pursuing other opportunities identified in this report.

A reusable cup program would replace current single-use coffee cups with reusable ones, stocked by a reuse service provider at participating cafes and coffee shops. Customers would receive their drink in a reusable cup and pay a deposit that is returned when the empty cup is returned. Returned cups would be collected, transported to a washing facility, cleaned, and then redistributed to cafes. Empty cups could either be returned by customers to return bins at participating coffeeshops, or by the informal sector, which is active in Phnom Penh.

This type of reusable cup program would provide valuable socialization of reuse and, if accompanied by policy interventions like restrictions on the use of SUDs for dine-in coffee consumption, it could avoid significant waste from the estimated 34 million single-use coffee cups used in Cambodia each year.²

² Calculated based on population, using 16 billion coffee cups used globally (Nowell 2024).



Coffee Kiosk, Phnom Penh, Cambodia.
Photo © Perpetual / Dagny Tucker

04

Conclusion

It is clearer than ever that the linear economy of take-make-waste is a central driver of the triple planetary crisis broadly and of plastic pollution specifically. It is well established that plastic waste is detrimental to human health, especially for groups in vulnerable situations, and that it harms terrestrial and marine ecosystems and strains the financial and other resources of national and local governments working to manage it. Solutions at scale are urgently needed.

There has been significant work done to date to investigate and implement solutions across the plastic value chain and the waste hierarchy such as source reduction, substitution, reuse and refill systems, mechanical and advanced recycling, and enhanced waste management systems.

Among these solutions, reuse and refill systems have been underleveraged; this report provides a roadmap on how to unleash this untapped potential.

The four high-impact opportunities for scaling reuse and refill identified here hold tremendous potential for environmental, economic, social, and societal benefits. Reuse and refill systems, both legacy and new, that operate efficiently at scale, dramatically reduce waste, provide net GHG emissions reductions and net water use reductions on a lifecycle basis, create local jobs and economic opportunity, and can support a just transition. Despite this potential value, with the exception of legacy and premium product systems, reuse and refill will not reach meaningful scale or deliver these benefits without specific enabling conditions. Exposing the barriers preventing reuse and refill solutions from reaching their full potential, and illuminating the enabling conditions required for their success, are the first step.

The Implementation Steps provided for each priority opportunity are intended to provide a clear starting place and high-level map of the process, with sectoral focuses that can galvanize concerted efforts with an inclusive, systems thinking approach to develop a detailed plan for each opportunity at the country, regional or city level as appropriate. It is acknowledged that the implementation steps provided are high-level and that reuse and refill

systems require granular planning and coordination among many stakeholders beyond what one report can prescribe.

In the face of numerous complex and overwhelming challenges, it is encouraging that reuse and refill offer tangible, implementable solutions that can start working today to alleviate plastic pollution, even while barriers will need to be addressed and there is much work still to do. Reuse and refill solutions do not require us to wait for technological advances nor the invention and testing of a new material. Importantly, the potential for long-term, negative, unintended consequences is very low. While reuse and refill systems can involve a complex concert of many players, the nuts and bolts of these systems are well understood and implementation can start immediately.

All that is required to manifest the significant value of reuse and refill is the will to do it, starting with governments prioritizing and codifying reuse and refill as critical solutions to the plastic pollution crisis. Bold action in policy making will dislodge the other barriers to unleash reuse and refill solutions, creating the opportunity for businesses, investors, and nonprofits to each play their roles in fully realizing the untapped potential of reuse and refill solutions. Now it is time to mobilize stakeholders and resources to realize the full potential of reuse and refill solutions.



Street Vendor Reusable Dishwashing, Bangkok, Thailand.
Photo © Dagny Tucker/Perpetual

Annexes

A. Regulatory Landscape for Reuse & Refill Additional Detail

- Cambodia
- Indonesia
- Malaysia
- Philippines
- Thailand
- Viet Nam

B. Impact Calculations

C. Opportunity 1: Further Guidance

D. Opportunity 4: Further Guidance

E. Methodology: Scope & Approach

- Scope
- Approach
- Interviews Conducted

A. Regulatory Landscape for Reuse & Refill: Additional Detail

Cambodia

The government, with support from the UNDP, initiated the development of EPR policies in 2021. Proposed measures include take-back programs operated by manufacturers and the development of production standards to increase the recyclability of plastic products (Economic Research Institute for ASEAN and East Asia (ERIA), n.d.).

In 2021, Cambodia launched a [National Circular Economy Strategy and Action Plan](#), which identifies the establishment of EPR schemes as a priority to transition Cambodia from a linear to a circular economy (Cambodia National Council for Sustainable Development 2021). One of the goals of the plan is to promote “product reuse and repair,” including supporting reuse and repair business models.

The Ministry of Environment also established Sub-Decree No. 168 on the Management of Plastic Bags, which imposed a levy on plastic bags and promotes the 4R (Refuse, Reduce, Reuse, and Recycle) approach (UNDP Cambodia 2021; ERIA n.d.).

The [Environment and Natural Resources Code](#) was adopted in 2023 and came into force in June 2024. It aims to overhaul Cambodia’s environmental governance framework and includes several articles relevant to reuse and refill (Cambodia Ministry of Environment 2023):

- Articles 13 and 14: Introduce the “polluter pays” and “user pays” principles.
- Article 90. Establishes rules for the promotion of sustainable consumption and production, including:
 - Sustainable public procurement
 - Environmentally friendly labeling
 - Resource efficiency assessment/evaluation
 - Producer responsibility (see Article 101)
 - Verification and assessment/evaluation of environmentally friendly technology
- Article 101. “To enhance producer responsibility for generated waste with high risks to the environment, the ministry responsible for environment and natural resources, relevant ministry or institution, and sub-national administration shall define the following mechanisms and measures:
 - a. Voluntary or mandatory participation by producers responsible for products, product

groups, and waste streams.

- b. Targets for collection, processing, refinement, and reuse.
 - c. Quotas for taking back products.
 - d. Responsibilities for stakeholders in the supply chain, including domestic producers and importers of foreign products and technologies.
 - e. Capacity development for stakeholders
 - f. Responsibility of other producers and groups with legal binding.”
- Article 158. Liabilities of exclusive producers, importers, or suppliers. “Individuals who exclusively produce, import, or supply equipment or consumer materials considered hazardous waste after usage shall be responsible for developing and implementing a collection system for tools, equipment, or consumer materials and returning them to the country of origin or to be treated, processed, eradicated locally without causing environmental or public health dangers.”

These provisions seem to imply a form of EPR system or responsibility for producers of certain products and give the Ministry of Environment some foundation to institute EPR.

Indonesia

Government regulation [No. 81/2012](#) on waste management of household waste and household-like waste obliges all individuals to reduce and manage their waste through reduction, recycling, and reuse (3Rs) and requires producers to establish programs or plans, produce products with easily degradable packaging, and collect product packages for recycling in order to limit and recycle their production waste (Wang and Karasik 2022).

As a derivative regulation of the Law of the Republic of Indonesia No. 18 of 2008 concerning Waste Management, the Ministry of Environment and Forestry Regulation No. 75/2019, “[Roadmap to Waste Reduction by Producers](#),” established Indonesia’s EPR legislation, mandating a 30% reduction in waste at the source and aiming for 70% improvement in waste handling by 2029 for covered producers in manufacturing, food and beverage services, and retail. This regulation also encourages practices such as reuse and refill to further reduce waste and includes the following requirements:

- Manufacturing Sector: Includes reduction of plastic use, recycling mandates (e.g., using 50% recycled

material), and promotion of reusable packaging.

- Food and Beverage Services: Prohibits some single-use plastics (plastic bags and single-use eating and drinking utensils such as spoons, forks, and straws) and encourages the use of reusable utensils and packaging.
- Retail Sector: Bans single-use plastic bags and promotes bulk sales and reusable shopping bags.

Additionally, it includes a ban on certain single-use plastics, including flexible plastic packaging for products smaller than 50mL or 50g effective January 1, 2030.

While this law can be effective in reducing plastic waste and increasing recycling, it does not include punishment or penalties for non-compliance, lessening the implications for producers, and it lacks any specific mandates or incentives for reuse and refill, thereby giving more motivation to manufacturers to focus on recycling over reuse (WWF Indonesia 2022).

Other regulation is also in place that could help enable reuse or refill.

- National and Regional Policies and Strategies for the Management of Household and Household-like Waste target a 30% reduction in household and household-like waste and 70% handling rate by 2025 and require regional governments to draft and implement localized strategies.
- BPOM Regulation No. 12 of 2023 specifies regulations for the production and distribution of refillable cosmetics (a category that includes body wash, hand wash, shampoo, conditioner), including hygiene standards and storage requirements. While it supports refill in that it clearly legalizes the refilling of cosmetics, there is a need for technical guidance for implementation. In particular, start-ups and small enterprises will need support to meet the standards.
- Local policies: For example, in the traditional markets in Jakarta, managed by the government, plastic bags were banned in 2019.

On the other hand, some existing regulations are limiting for refill systems.

- Food Safety Regulations (Government Regulation No. 86 of 2019): Prohibits the reopening and repackaging of final food products, except for large quantities intended for repackaging into smaller sizes. Legal paths exist to gain a license to refill, but this can be restrictive.

Malaysia

Malaysia is progressing towards implementing EPR legislation. Voluntary initiatives such as the Malaysian Recycling Alliance (MAREA) paved the way for mandatory EPR, and a transition to mandatory EPR is planned by 2026, as laid out in the [Malaysia Plastics Sustainability Roadmap](#) (2021-2030) (ERIA n.d.). This roadmap sets targets for plastic waste recycling and management, specifically covering four types of resin most commonly produced and disposed of in Malaysia and commonly used for single-use packaging: PP, PET, HDPE, and LDPE/LLDPE. National targets are: 1) phase out problematic SUPs; 2) 25% post-consumer plastic packaging recycled by 2025; 3) 100% recyclability of plastic packaging by 2030; 4) 15% average recycled content by 2030; (v) 76% average collected-for-recycling rate by 2030 (Malaysia Ministry of Environment & Water (Kasa) 2021).

Along with the Plastics Sustainability Roadmap, the [National Cleanliness Policy 2019](#) also identifies EPR as a strategy to promote a circular economy. Though the policy has yet to be implemented, it identifies initiatives like reverse vending machines and stakeholder engagement platforms.

In June 2024, Natural Resources and Environmental Sustainability Minister Nik Nazmi Nik Ahmad said that the government is considering introducing a dedicated law to address plastic disposal and pollution. He also revealed that the ministry was in talks with the Economy Ministry to conduct a proper study on a national plastic policy (Chua 2024).

Malaysia has other national roadmaps, policies, and regulations in place that are relevant to reuse and refill or single-use plastic regulation.

[Malaysia's Roadmap Towards Zero Single-Use Plastics 2018-2030](#) focuses on reducing single-use plastics and encouraging biodegradable alternatives. There is no direct reference to reuse or refilling systems but it does push for SUP bag use reduction, SUP prohibition and elimination, and circularity/recycling of plastics.

[Environmental Quality Act \(EQA\)](#): Sec. 30B of the EQA gives the Minister the power to specify rules on return and rebates schemes.

[National Solid Waste Management Policy 2006](#): Established a holistic solid waste management system emphasizing the waste management hierarchy.

[Solid Waste and Public Cleansing Management Act \(SWPCMA\) 2007](#): Section 102 allows for the establishment of take-back and deposit refund systems,

although these are not mandatory. SWPCMA does not apply in Sabah and Sarawak - these two states address their solid waste problems by implementing their respective state laws.

In 2021, the federal government launched the No Plastic Bag Day campaign for each Saturday. This initiative aimed to reduce the use of plastic bags and applied to all retail outlets, supermarkets, and hypermarkets. On these days, participating stores do not give out free plastic bags and charge a levy of MYR0.20 for each new plastic bag requested by customers during the program (Asmuni *et al.* 2015).

Local governments in Selangor, Penang, Melaka, and Kedah have imposed bag taxes and banned the use of straight bags and plastic drinking straws, respectively, and the Federal Territories of Kuala Lumpur, Putrajaya, and Labuan have banned plastic straws as of 1 January 2020 (Zakaria and Ibrahim 2022).

Philippines

The cornerstone of waste management policy in the Philippines is Republic Act No. 9003, also known as the [Ecological Solid Waste Management Act \(ESWMA\) of 2000](#) (Congress of the Philippines 2000). While comprehensive in its approach to waste management, this legislation has notable gaps in addressing the specific challenges posed by single-use plastics and the emerging reuse and refill economy (Senate Economic Planning Office 2023). A key feature of the ESWMA is a mandate for local government units (LGUs) to implement waste diversion strategies and establish materials recovery facilities, a result of the devolution of waste management functions from the national to the local government. However, implementation has been inconsistent, with many LGUs still lacking approved waste management plans and adequate infrastructure.

In the absence of overarching national legislation on SUPs and with the decentralized nature of Philippine government, many LGUs have passed ordinances regulating single-use plastics within their jurisdictions. This has resulted in a patchwork of local regulations, creating a complex policy environment across the country. However, these city-level efforts play a vital role in addressing plastic waste, presenting a potential solution that is targeted and community-specific.

In 2022, the Philippines enacted the [Extended Producer Responsibility Act \(EPR\)](#), which, along with its [implementing rules and regulations](#) (IRR) in 2023, aims to address plastic pollution by mandating large enterprises

and businesses with total assets worth more than ₱100M to recover and divert 20% of their 2022 plastic packaging footprint and 40% by 2024, increasing by 10% annually up to a cap of 80% by 2028. (Congress of the Philippines 2021; Philippines Department of Environment and Natural Resources 2023). While it represents progress, critics argue it focuses too heavily on waste collection, with an emphasis on recovery targets based on annual plastic production, rather than reduction or reuse.

Beyond a lack of specific promotion, reuse and refill systems also face regulatory challenges, particularly from the Food and Drug Administration (FDA) and the Department of Health (DOH). For example, the FDA recently issued guidelines, [Administrative Order 2024-0008](#), that require permits for refilling stations and mandate strict operational controls for certain product categories, including personal care (Philippines DOH 2024). This has complicated the expansion of reuse and refill systems, especially for MSMEs, creating significant barriers to entry and operational sustainability for refill models. Many organizations are actively engaging with the FDA to further understand the implications of this order and details of implementation.

Other policies do not specifically address reuse or refill systems, but this lack of explicit guidelines can create ambiguity over compliance.

[Republic Act No. 10611 \(Food Safety Act of 2013\)](#). This act emphasizes strict regulations and requirements related to food safety but does not explicitly address reuse and refill systems. This can make compliance ambiguous and confusing for how these systems should adhere to the law, which can discourage the adoption of reuse and refill practices, especially for food and beverage products. Moreover, it may favor the use of single-use containers over refillable options (Congress of the Philippines 2013).

[Republic Act No. 7394 \(Consumer Act of the Philippines\)](#). While this act does not necessarily prohibit the adoption of reuse and refill systems, its provisions may create challenges that can slow widespread adoption. The strict regulations and requirements relating to product quality and safety, labeling and packaging requirements, and consumer protection can unintentionally create hurdles for businesses attempting to adopt a reuse or refill model, which could deter implementation (Congress of the Philippines 1992).

The most notable examples of enabling regulation are on a local level in city ordinances and regulations. However,

while these ordinances are enabling in that they ban or regulate SUPs, they do not specifically promote reuse and refill as alternatives.

[Ordinance No. SP-2876 \(2019\) of Quezon City](#): This ordinance prohibits the distribution and use of single-use plastics in hotels and restaurants in the city, such as plastic cutlery, plates, cups, straws, coffee stirrers, sachets, expanded polystyrene, and similar items.

[Ordinance No. 2003-095 of Makati City](#): Also known as the Solid Waste Management Code of the City of Makati, this ordinance includes a section wherein restaurants, supermarkets, and similar establishments are required to dispose of their plastic and expanded polystyrene in 9 years and replace them with environmentally friendly materials. The alternatives identified include paper plates, paper bags, paper cups, paper board-food packs and “other similar biodegradable materials.”

[Ordinance No. 09 of Pasig City](#): With this ordinance, the use of plastic on dry items is strictly prohibited and its use on wet goods is lightly restricted. This ordinance also prohibits the use of expanded polystyrene and similar materials for food containers, produce, and other products.

[Ordinance No. 2013-403 of Iloilo City](#): The use of non-biodegradable plastic shopping bags as wrapping, bagging, and packaging is prohibited under The Plastic Ordinance of Iloilo. Sari-sari stores, market vendors, hawkers or bolaneros, supermarkets, department stores/malls, food stores, canteens, fast-food chains, bakeries, coffee shops, hotels, catering services and other similar establishments are covered.

[Ordinance No. 0500-21 of Davao City](#): enacted in 2021, the No to Single-Use Plastics Ordinance of 2021 in Davao regulates the sales and distribution of single-use plastics such as cups, condiment packets and containers, stirrers, straws, and cutlery. It also bans the usage of these plastics.

Thailand

While Thailand does not yet have mandatory EPR legislation in place, EPR had been outlined in the Roadmap on Plastic Waste Management 2018-2030 as a possible measure, and, in March 2024, the Thai Ministry of Natural Resources and Environment proposed the [Draft Sustainable Packaging Management Act](#) which, if implemented, would serve as the country's EPR legislation. This draft law focuses on sustainable packaging management, holding producers responsible for the recovery and recycling of packaging waste (Lee

2024; Thailand Pollution Control Department 2024). It also outlines the formation of a committee to develop policies that support sustainable packaging practices, including the reuse of packaging materials, and it includes provisions for establishing buy-back or deposit and refund systems to encourage the return and reuse of packaging (Envilience Asia (n.d.)). A draft EPR Act is expected to be submitted by 2026, based on the Plastics Waste Management Action Plan Phase II (2023-2027).

The [Plastic Waste Management Roadmap 2018-2030](#) aims to reduce and prevent plastic waste, including through reducing plastic at production, reducing consumption of SUPs, and managing plastic waste after consumption. This roadmap targets specific bans and reductions, including bans on plastic cap seals, OXO-degradable Plastic, and microbeads starting in 2019 and bans on thin plastic bags with thickness less than 36 microns, expanded polystyrene food boxes, plastic straws, and single-use plastic cups less than 100 microns starting in 2022. The roadmap aims to have 100% of remaining plastics waste recycled by 2027.

Viet Nam

In general, Viet Nam's legal system, especially environmental protection laws, indirectly encourages reuse and refilling through regulations on waste management principles and circular economy development, though there is a lack of policy directly promoting or incentivizing reuse or refill models.

Passed in 2020, the [Law on Environmental Protection](#), which took effect January 1, 2022, promulgates EPR. On January 10, 2022, the Government issued the [Decree No. 08/2022/ND-CP](#) guiding in detail some articles of the Law on Environmental Protection. It establishes recycling requirements for covered products and packaging, including packages containing foodstuffs and cosmetics. These recycling responsibilities went into effect starting January 1, 2024 (Government of Viet Nam 2022).

The Decree legalizes the definition of “waste reuse” for the first time, meaning reuse either directly or after pre-processing. It also requires business owners to take one or more measures to meet circular economy criteria, of which extending the life cycle of products and their components through reuse is one.

In addition, the Decree bans the production and importing of certain non-biodegradable plastic bags starting in 2026 and requires the gradual reduction of the production and importing of some SUPs, with an eventual ban by 2031. These SUPs include: “trays, food

containers, bowls, chopsticks, glasses, cups, knives, spoons, forks, straws, other eating utensils with plastic components that are designed and marketed with the intention of one use before they are discarded” (Article 3; Clause 14) (Government of Viet Nam 2022).

Another relevant piece of legislation is the National Action Plan for Management of Marine Plastic Litter by 2030, which commits to eliminating single-use plastics from coastal tourism areas and plastic litter from marine protected areas by 2030 (UNDP 2020). Specifically, it includes the following milestones (UNDP 2020, p.4):

- Reduce marine plastic litter by 50% by 2025 and 75% by 2030
- Prevent the use of single-use plastics and non-biodegradable plastic bags in 80% of coastal tourism areas by 2025 and 100% by 2030
- 80% of marine protected areas free of plastic litter by 2025 and 100% by 2030

In addition, a National Action Plan on implementing the circular economy is in the process of being developed. A draft is proposing some solutions that affect reuse/refill potential in Viet Nam, including: develop regulations on eco-design towards a circular economy (standards and technical regulations on ecological design for recycling, reuse, extending product life cycle, etc.); complete existing supporting policies and regulations (EPR, Ecolabel, public procurement, etc.) raising awareness and capacity for consumers, businesses, and authorities; support market development and trade promotion for secondary materials and for products and goods created from applying a circular economy approach (products and goods created from recycling, reuse, refurbishment, repair activities to extend product life cycle) (Ministry of Natural Resources and Environment 2024).

B. Impact Calculations

These impact calculations are intended to be directional and to provide a sense of the order of magnitude impact which could be achieved. Calculations were simple. Robust modeling of impacts was out of scope for this project.

Opportunities 1 and 2

There are approximately 46 billion single-use PET beverage containers sold and disposed each year in the six countries covered in this report. Of these, 24.5 billion are single-use water bottles. (Reloop 2021).

It was assumed that 35% of SUP water bottles would be replaced by prefill beverage bottles (Opportunity 1), 35%

of SUP water bottles in urban areas would be replaced by water refill stations, and 17.5% of SUP water bottles in rural areas would be replaced by water refill stations (Opportunity 2).

For beverages other than water, calculations assumed that 70% of current single-use bottles were replaced by refillable glass bottles that are used a conservative average of 25 times before being recycled, though reusable bottles often get closer to 50 reuses with some bottles circulating up to 100 times (Oceana 2023). As all beverages used to be sold in reusable bottles, and in some countries this is still as high as 50%, 70% represented an ambitious but reasonable assumption. Reusable plastic is also an option but was not calculated here.

To estimate the GHG savings, we calculated a 70% lifetime GHG savings for reusable glass bottles over SUP bottles (Upstream 2022).

To estimate the avoided pollution, we used the estimate that 4% of plastic waste generated becomes pollution (Jambeck *et al.* 2015).

Opportunities 3 and 4

Sachet data is used as a proxy for small-format packaging for these calculations. Southeast Asian countries accounted for nearly 50% of the approximately 855 billion single-use sachets sold globally in 2018 (Greenpeace 2019). At that growth rate, 1.1 trillion sachets would have been sold globally in 2024. Given this, we estimate that 550 billion sachets were sold in Southeast Asia and 508 billion were sold in the six countries covered in this report.

It was assumed that 70% of the 508 billion, or 355 billion, of 2024 single-use sachets were replaced by reusable packaging in either prefill or refill models. This is an ambitious assumption based on the recognition that with the specified enabling conditions, reuse can become normalized and highly adopted. Of those avoided sachets, we assume 32% are avoided by refill programs the remaining 68% avoided by prefill. Sachets are used as a proxy for small format single-use packaging.

To estimate this GHG impacts both for prefill and refill, it was assumed that reusable packaging reduces lifetime carbon emissions by 70% compared to single-use packaging.

Earth Action’s 2024 [mismanaged waste index](#) was used to calculate the number of mismanaged sachets avoided by the refill and prefill programs, weighted by population at country level.

C. Opportunity 1: Further Guidance

Guiding Notes on Designing the Expanded Ecosystem

Packaging Alignment & Pooling

- Align on packaging specifications to ensure high efficiency throughout collection, washing and redistribution. While packaging formats do not need to be universal, a high degree of interoperability is important for system efficiency.
- Prioritize pooled systems, which allow the bottle to return to any producer so bottles can automatically go to the closest bottling plant, reducing logistics and sorting complexity, and minimizing financial risk.
- Align on a material first, as the reuse infrastructure needs to be designed to accommodate a material's performance. Plastic and glass are both used in reusable bottle systems, though glass is much more common currently. Each material has its tradeoffs.
- Explore use of technologies such as bottle track-and-trace systems and innovations such as lightweighting glass bottles without compromising durability to improve reuse system efficiency. Glass manufacturer Vetropack, for example, introduced a reusable glass bottle that is a third lighter than standard glass bottles yet just as durable and impact resistant (Vetropack (n.d.)).

Given the current active ecosystem, full alignment may not be necessary. Initially, shared design may best serve small and medium producers who are transitioning to reuse for the first time. Choices should be harmonized with systems already in place so as to maximize interoperability and efficiency over time. This process of alignment may need to be repeated at the country level to capture smaller producers, distributors, and MSMEs. Although it will be important to have representation at a regional level, it will not be the place to capture country-specific nuances.

Collection Infrastructure & Logistics

- A centralized management function or inventory control is recommended to track bottle circulation, ensure standardization, and maintain quality (Bielenstein 2022).
- Shared infrastructure for collection and reverse logistics empowers smaller geographic areas to achieve scale more quickly and generates favorable unit economics.
- Shared packaging and infrastructure make the

logistics more efficient and reduce costs related to sorting, cleaning, and handling and help ensure the logistics network can handle large volumes and operate efficiently across regions (Bielenstein 2022; Unpackaged 2022).

- The system should consider building hyper-local capacity for transport from cleaning facilities to beverage producers/bottlers.
- The informal sector should be an integral part of logistics and collection planning with their experience and capacity leveraged for system success.
- Reverse vending machines (RVMs) can be a good solution, especially in rural areas, to automate returns and deposit refunds. RVMs have been shown to boost return rates in some geographies (Verallia Group 2022; ZWE 2022).

Mapping, Route Optimization, and Shared Infrastructure Siting

- Planning phases to understand routing and map infrastructure placement are key to designing optimized systems. Tools like GIS combined with local expertise and know-how can be utilized to guide important decisions like shared infrastructure site selection. Engaging bottlers, distributors and others already working with refillable bottles in the geography will be invaluable in this process.

D. Opportunity 4: Further Guidance

Guiding Notes on Designing the Ecosystem:

General Considerations

An initial focus on products with low complexity in filling operations is important. As scale is achieved, a business case for vertically integrating localized filling may emerge. Shared infrastructure utilized across brands is most efficient in scenarios where packaging is standardized or at the very least return infrastructure is designed to accommodate multiple formats. Standardized packaging positions collection infrastructure to be a shared investment across brands and local or regional government entities. When packaging is standardized, pooled systems help unlock economies of scale, improving the unit economics. Shared infrastructure is a key strategy to minimize individual brand risk while providing the operational benefits of scale in the aggregate.

Develop Partnerships

Partnerships can support the functional needs of

reuse service systems. For example, regional filling will be necessary, so brands may choose to develop partnerships with localized co-packers; similarly, collection and reverse logistics may be best handled through partnerships between reuse service providers, PROs, and the informal sector. Each ecosystem will have its own mix of existing players well positioned to plug in, all of which will better emerge and strengthen through ecosystem partnerships.

Packaging Design

Standardized packaging is highly recommended for system success. Developing consensus around standardized packaging is highly recommended.

Moving from a sachet to a reusable format requires a thoughtful design process to develop packaging that is cost-effective in a circular supply chain and works for customers. Focusing on standardized formats with wash-off labels for brand differentiation is recommended. Given that packaging design can take years, it may be easier to start by leveraging off-the-shelf packaging with minor design adjustments to reduce costs and allow for early learnings.

It is also crucial to design with the retail environment in mind. Packaging should be easy for retail associates to unpack and efficiently display is necessary. From a reuse operations standpoint, wide-neck containers with simple closures are the most cost-effective to sanitize. Containers that nest efficiently inside each other reduce collection and logistics cost.

Build on Existing Supply Chains & Product Formats other than Sachets

Identifying the right product categories to start with requires an analysis of existing supply chains to identify filling infrastructure, existing or potential fractional manufacturing, and/or existing distribution channels. Other factors to inform this decision include length of supply chain, product suitability for pooled packaging, rapid use cycles and higher margins.

Products currently packaged in glass should be considered for the prefill system. Glass is more expensive than plastic and other lightweight single-use packaging, which makes reusing it desirable. Glass has the added benefit of avoiding potential negative health impacts from the exposure to chemicals of concern that have been associated with plastic packaging (Geueke *et al.* 2023).

Remove from consideration products that are challenging to clean (i.e., oils) or are accompanied by strong odors

(i.e., seafood), which introduce challenges for collection and washing.

Design for Adoption

Make it easy to return the reusable packaging and use incentives and/or deposits as motivation for consumers to bring back the packaging. To engage consumers effectively, deploy ubiquitous return infrastructure and consistent messaging and signage to communicate deposit amount.

Collection and Logistics

Collection infrastructure must be convenient for consumers and able to be efficiently serviced by system operators. In many cases, existing systems for collecting recycling can be leveraged, such as waste banks. Identifying opportunities to leverage existing collection systems, infrastructure, and know-how is essential, as is working with PROs, NGOs, and the informal sector to design this element of the system.

E. Methodology: Scope, Approach and List of Interviewees

Scope

User scope: consumer-facing packaging solutions (B2C).

Product scope: food & beverage, including packaged products and food & beverage on the go, and personal & home care products, such as shampoo, dish soap, or cleaning products.

Sector scope: retail and hotel, restaurant, cafe/catering (HoReCa) sectors.

Geographic scope: Cambodia, Indonesia, Malaysia, Philippines, Thailand, and Viet Nam, with insights that are applicable to the whole ASEAN region. Across the six countries, urban centers are the focus, given their population concentrations.

Approach

1. Established working agreements with local contractors in Indonesia, the Philippines, and Viet Nam.
2. Engaged stakeholders, conducted research including primary research in four of the six countries, and collected and analyzed data.
3. Identified and assessed opportunities for reuse & refill.
4. Developed technical guidance & recommendations for success.

Interviews Conducted

We extend special thanks to our interview partners for their invaluable contributions and insights, which were essential in preparing this report: Mr. Hisyam Adhisatrio (Yayasan Pengembangan Biosains dan Bioteknologi (YPBB)); Ms. Dang Nguyet Anh (National Plastic Action Partnership); Mr. Tanyo Bangun and Team (Kecipir); Ms. Alison Batchelor (Refillables Hanoi); Ms. Emmanuelle Bautista (Citeo); Mr. Peter Börkey (OECD); Ms. Irma Castillo (Castillo Store, Brgy. San Agustin); Ms. Emily Comyn (Unilever); Mr. Nguyen Van Cong (Centre for Supporting Green Development (GreenHub)); Ms. Jenica Cruz (Nestlé); Ms. Debora (Perumda Pasar Jaya); Ms. Sharon Draper (Nanay Erma's store, Brgy. Longos); Mr. Bintang Ekananda (Alner); Ms. Krishia Ellis (Salin PH); Ms. Lia Esquillo (Back to Basics Ecostore); Ms. Reska Nurul Fadila (WWF); Mr. Fictor (Piki) Ferdinand (YPBB); Mr. Valentin Fournel (Citeo); Ms. Malti Gadgil (Plastic Solutions Fund); Ms. Laura Griestop (WWF); Mr. Michael Hytinen (Refillables Hanoi); Ms. Jarunee Jarusruangchai (Environmental Justice Foundation (EJF)); Mr. Punyathorn Jeungsmarn (EJF); Mr. Ben

Jordan (Coca-Cola); Mr. Anton Kurniawan (Siklus); Mr. Crispian Lao (PARMS (Philippine Alliance for Recycling and Material Sustainability)); Ms. Marian Ledesma (Greenpeace); Mr. Titus Loh (SecondMuse); Mr. Umesh Madhavan (Circulate Initiative); Ms. Lilibeth Mamaril (Yna Store, Brgy. Tinajeros); Mr. John Martinez (Coca-Cola); Ms. Darina Maulana (Enviu Indonesia); Ms. Francesca Montevocchi (UNEP); Ms. Isna Muflihah Mulyaningrum (YPBB); Ms. Regine Nayve (Mother Earth Foundation); Ms. Anna Oposa (Save Philippine Seas); Ms. Milly Pearson (PepsiCo); Mr. Bonang Titian Rahardjo (GIZ); Ms. Daru Rini (Ecoton); Mr. Chaiyong Sakulborrirug (Nestlé); Mr. Peter Schelstraete (Ubuntoo); Ms. Jessica Bella Situmeang (Siklus); Ms. Sing Suen Soon (SecondMuse); Mr. Suparno (Perumda Pasar Jaya); Ms. Kumala Susanto (Hepi Circle); Ms. Ibu Susi (warung owner); Ms. Taylor Cass Talbott (International Alliance of Waste Pickers); Mr. Rondell Torres (Unilever); Ms. Salisa Traipipitsiriwat (EJF); Ms. Hanh Vu (Refillables Hanoi); Ms. Kasia Weina (Glassia/Evergreen Labs); Ms. Yunita (Perumda Pasar Jaya); Ms. Jade Zhu (PepsiCo)

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