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Enablers for Effective EPR in the Asia-Pacific Region

Lessons from developed and developing countries in the EU and Asia

THAILAND

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It is the author's hope that the insights and recommendations outlined in this report will serve as a catalyst for advancing Extended Producer Responsibility (EPR) systems in Thailand and contribute to broader progress across the Asia-Pacific region.

Dr. Panate Manomaivibool
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ABBREVIATIONS

ADB	Asian Development Bank
BCG	Bio-Circular-Green economy model
BMA	Bangkok Metropolitan Administration
CE	Circular economy
DIW	Department of Industrial Works
DLA	Department of Local Administration
DEPA	Digital Economy Promotion Agency
EEC	Eastern Economic Corridor
EPR	Extended producer responsibility
EU	European Union
FTI	Federation of Thai Industries
GIZ	German Agency for International Cooperation
HHW	Household hazardous waste
IPR	Individual producer responsibility
ITU	International Telecommunication Union
LGOs	Local government organisations
MLP	Multi-layer plastics
MOI	Ministry of Interior
MONRE	Ministry of Natural Resources and Environment
MRFs	Material recovery facilities
MSW	Municipal solid waste
MSWM	Municipal solid waste management
NDC	Nationally Determined Contribution
NGOs	Non-governmental organisations
NSO	National Statistical Office
PAOs	Provincial Administrative Organisations
PCD	Pollution Control Department
PCR	Post-consumer recyclables
PET	Polyethylene terephthalate
PPP	Public-Private Partnership
PRO	Producer responsibility organisation
PROVE	Producer Responsibility Organisation Voluntary Effort
rHDPE	Recycled high-density polyethylene
rPET	Recycled polyethylene terephthalate
SAOs	Sub-district administrative organisations
SCP	Sustainable Consumption and Production
SEP	Sufficiency economy philosophy
SET	Stock Exchange of Thailand
SUPs	Single-use plastics
TA	Technical assistance; Technical Advisory

TBR	Thai Beverage Recycle
TGO	Thailand Greenhouse Gases Management Organization
TIPMSE	Thailand Institute of Packaging and Recycling Management for Sustainable Environment
TISI	Thai Industrial Standards Institute
TRBN	Thailand Responsible Business Network
UNEP	United Nations Environment Programme
WEEE	Waste electrical and electronic equipment
WWF	World Wildlife Fund

1. EXECUTIVE SUMMARY

1.1. Thailand's progress towards Extended Producer Responsibility (EPR)

Thailand is advancing toward a circular economy (CE) where Extended Producer Responsibility (EPR) is recognised as a strategic tool to shift post-consumer waste management responsibilities from municipalities to producers. However, before establishing a full-fledged EPR system, it is crucial to assess Thailand's existing legal framework and current waste management practices to identify gaps, challenges, and opportunities for reform.

This report provides a situational analysis of Thailand's waste management landscape, reviews key policies, and examines enabling factors for successful implementation of EPR policies. It offers actionable recommendations for strengthening EPR adoption and aligning waste management strategies with global best practices.

1.2. Thailand's current legal framework and waste management practices

Thailand's waste management regulations can be broadly categorised into municipal solid waste (MSW) governance and industrial waste regulations. While several laws govern waste handling, gaps in EPR-specific mandates have hindered structured post-consumer recovery systems.

Both the Public Health Act, B.E. 2535 (1992) and the Act on the Maintenance of the Cleanliness and Orderliness of the Country, B.E. 2535 (1992) put local governments in charge of waste collection and disposal. However, the enforcement of proper waste sorting remains weak. The Factory Act, B.E. 2535 (1992) that regulates waste processing facilities, does not impose obligations on manufacturers to ensure proper end-of-life waste management. Valuable items are now traded under the outdated Control of Sale by Auction and Trade of Antiques Act, B.E. 2474 (1931), which lacks structured oversight.

Thailand is in the process of developing EPR-specific laws, including the Draft Circular Economy Promotion Act, Draft Waste Electrical and Electronic Equipment (WEEE) Management Act, and Draft Sustainable Packaging Management Act. While these draft laws introduce mandatory producer accountability, their implementation remains incomplete, delaying structured EPR adoption.

In addition, Thailand's waste management infrastructure faces operational inefficiencies in collection, sorting, and recycling. Despite policy initiatives to enhance material recovery, several challenges persist.

- Thailand generated 26.95 Mt of municipal waste in 2023, yet only 38% was disposed of safely, leaving 7.47 Mt improperly handled, and causing leakage into the environment.
- Local governments struggle with funding constraints, forcing many to rely on low-cost disposal methods rather than improving recycling systems.
- Thailand's secondary resource material (SRM) market is moderately developed for high-value plastics, metals, and paper, but flexible packaging and composite materials remain largely unrecyclable.
- The high cost of recycled plastics compared to virgin plastics discourages businesses from adopting circular production models.
- Household hazardous waste, including WEEE, grew to 680,386 tonnes, but only 143,583 tonnes were properly treated.
- Backyard e-waste recycling operations in Northeast Thailand handle 90% of discarded electronics, often without environmental safeguards, posing significant health risks.

1.3. Enabling factors for EPR implementation in Thailand

Building on the situational analysis, this report identifies five key enabling factors that can drive Thailand's transition to a structured EPR system.

1.3.1. Policy convergence: Aligning Circular Economy with climate targets

Thailand has strategically embedded circular economy (CE) principles into its sustainability agenda, aligning them with climate commitments such as achieving carbon neutrality by 2050 and net-zero greenhouse gas emissions by 2065. Several national strategies, such as the 20-Year Pollution Management Strategy, Sustainable Consumption and Production (SCP) Plan, and the Bio-Circular-Green (BCG) Economy Model, outline pathways to minimise waste and enhance material recovery.

Key policy developments include:

- Drafting of laws such as the Circular Economy Promotion Act, Waste Electrical and Electronic Equipment (WEEE) Management Act, and Sustainable Packaging Management Act, all of which propose mandatory EPR frameworks
- Integration of EPR mechanisms into climate policies to ensure synergy between resource efficiency and greenhouse gas emission reduction
- Financial incentives to encourage manufacturers to adopt recycled content, reinforcing demand for secondary raw materials (SRM)

Despite these advancements, challenges remain, particularly in harmonising fragmented waste management laws and developing midstream recycling infrastructure to support reverse supply chains.

1.3.2. Public participation: Driving source separation and recycling efforts

Public engagement is critical to ensuring the success of EPR policies. In Thailand, waste separation practices vary widely across different regions due to uneven municipal capabilities and a lack of standardised recycling education.

Key initiatives supporting source separation and public participation are listed here.

- The Clean Province Action Plan, issued annually by the Ministry of Interior (MOI), establishes benchmarks for improving municipal waste separation.
- Local waste banks, mandated by the Ministry of Interior (MOI) in 2023, encourage communities to exchange sorted recyclables for financial incentives.
- The Bangkok Metropolitan Administration (BMA) and municipalities are piloting 'Pay-As-You-Throw' pricing models to incentivise waste reduction.
- There are increasing numbers of awareness campaigns promoting sorting at source, particularly for plastic waste, electronic waste, and hazardous household materials.

While local governments and informal sectors play an essential role, further institutional integration and standardised consumer education are needed to expand effective waste separation percents nationwide.

1.3.3. Private investment: Accelerating recycling innovation

Thailand's private sector has significantly contributed to developing recycling infrastructure and advancing technological solutions for EPR implementation. Investment from both domestic corporations and international firms has strengthened the country's capabilities in processing post-consumer recyclables and manufacturing high-quality recycled materials.

Major private sector contributions:

- Thai Beverage Recycle (TBR) – Operates a nationwide network of 45 collection centres, recovering glass, PET, aluminium, and paper waste.
- PTT Global Chemical (PTTGC) – Through its subsidiary Envicco, established one of the largest plastic recycling plants in Southeast Asia, producing food-grade rPET and rHDPE resins.
- Indorama Ventures – Expanded global PET recycling capabilities in Thailand, ensuring high-purity rPET integration into packaging markets.
- Foreign investments fuelling sorting, washing, and pelletising infrastructure, particularly for low-value plastics and multi-layer packaging.

Challenges persist in ensuring proper regulatory oversight of recycling operations. The influx of low-quality imported recyclables has destabilised domestic markets, requiring stricter import controls and enhanced environmental monitoring to prevent illegal dumping.

1.3.4. Pilot initiatives: Testing and scaling EPR approaches

Pilot projects provide valuable insights into EPR feasibility, allowing stakeholders to refine operational mechanisms before full-scale implementation. Thailand has introduced sandbox projects across different industries, focusing on packaging waste recovery, electronic waste collection, and reverse logistics systems for recyclables.

Notable EPR pilot projects:

- PackBack Initiative – A packaging take-back program led by the Federation of Thai Industries, testing financial incentives for recycling.
- PPP Plastics – A collaborative effort involving businesses and NGOs to enhance plastics recovery in urban areas.
- PROVE (Producer Responsibility Organisation Voluntary Effort) – An industry-wide coordination model for post-consumer waste collection.
- Refrigerator and Air Conditioner Reverse Logistics Pilot – A regional initiative testing electronics recycling models, including eco-design improvements for WEEE dismantling.

These pilot percents indicate promising results, but scalability requires further regulatory clarity, standardised financial incentives, and stricter producer accountability to minimise risks such as free-rider issues.

1.3.5. Partnerships and technical assistance: Strengthening capacity

Collaboration with development agencies has significantly accelerated Thailand's transition toward EPR. Multiple international organisations have provided technical assistance, financial support, and expertise to align local policies with global best practices.

Leading initiatives include:

- SWITCH-Asia's EPR Policy Development Project – Establishing foundational policy recommendations
- GIZ's MA-RE-DESIGN Programme – Supporting EPR legislation and PRO structuring
- ITU's E-Waste Management Initiative – Designing policy interventions for structured WEEE recycling
- UNEP's Sea of Solutions Programme – Testing plastic waste reduction strategies
- World Bank's Smart Recycling Hub – Piloting new recovery facilities for secondary raw material processing
- Asian Development Bank's (ADB) Economic Incentive Framework for Plastic Circularity – Exploring tax-based incentives for waste recovery

Strengthening cross-sector partnerships and policy cohesion will be essential to fully institutionalising EPR within Thailand's circular economy framework.

1.4. Conclusion and strategic pathways forward

Thailand has made significant progress in integrating EPR principles into national strategies, yet policy gaps, infrastructure limitations, and market constraints hinder full-scale adoption. To accelerate implementation, this report proposes six strategic recommendations.

1. Finalise and enact EPR-specific laws to mandate producer accountability
2. Institutionalise producer responsibility organisations (PROs) for structured waste collection and material recovery
3. Introduce financial incentives (tax breaks, subsidies, eco-labelling) to encourage sustainable production
4. Expand recycling infrastructure by investing in sorting and processing facilities
5. Standardise consumer education to improve public awareness and waste-sorting behaviour
6. Strengthen enforcement mechanisms to prevent illegal waste dumping and free-riding behaviours in recycling markets

By addressing these critical barriers, Thailand can establish a comprehensive EPR system that enhances material circularity, reduces environmental impact, and fosters sustainable economic growth.

2. INTRODUCTION

2.1. Background

The SWITCH-Asia Policy Support Component (PSC), funded by the European Union (EU), aims to promote sustainable consumption and production (SCP) in the Asia-Pacific region. It provides technical assistance, policy guidance, and capacity-building support to help countries adopt SCP practices and align with international frameworks such as the Paris Agreement and the Sustainable Development Goals (SDGs).

As part of the SWITCH-Asia PSC programme, the Technical Advisory (TA) project titled 'Identifying Enablers for Effective Extended Producer Responsibility (EPR) Systems in the Asia-Pacific Region: Drawing Lessons from Developed and Developing Countries in the EU and Asia' focuses on EPR systems. These are systems that hold producers accountable for managing the environmental impact of their products across their life cycle. The project seeks to analyse, derive lessons, and formulate policy recommendations based on success factors, enabling conditions, and strategies to enhance EPR systems in the Asia-Pacific region.

Technical assistance (TA) under this project targets selected countries in the Asia-Pacific and Central Asia regions, including Malaysia, the Philippines, Thailand, and Kazakhstan. The initiative involves developing national overview documents that highlight success factors, enablers for effective EPR systems, material circularity efforts, a compilation of EPR initiatives and stakeholder engagements, and recommendations for advancing EPR implementation. These findings are consolidated into concise country reports and policy briefs to support policymakers and stakeholders in establishing effective EPR systems.

This document serves as Thailand's country-specific overview under the TA.

2.2. Objectives of the Country Report

The TA seeks to explore the critical factors required for the successful implementation of EPR frameworks. It also aims to provide evidence-based policy recommendations for the Asia-Pacific region, drawing on lessons from both European and Asian countries.

The specific objectives for the Thailand country report are as follows:

1. **Understanding key conditions:** Identify the fundamental prerequisites for effective EPR frameworks in Thailand, recognising that these conditions may vary significantly across different nations and contexts
2. **Addressing country-specific challenges:** Analyse the unique challenges and current stage of progress in Thailand's EPR development, providing insights tailored to the country's specific circumstances
3. **Highlighting success and enabling factors:** Assess the success factors, enabling conditions, and opportunities for improving material circularity that can support the transition toward effective EPR practices
4. **Developing a policy framework:** Create practical and actionable policy recommendations to strengthen Thailand's EPR programmes while also contributing to broader policy lessons for the region
5. **Establishing regional benchmarks:** Utilise the findings from Thailand to serve as benchmarks for other countries in the region, facilitating the advancement of EPR systems based on diverse conditions and varying stages of progress

3. STUDY AREA

Thailand is a unitary state located in Southeast Asia, covering approximately 513,120 km^2. It is composed of 76 provinces along with one special administrative area, Bangkok, the capital city. According to the National Statistical Office (NSO), Thailand's population reached 70.2 million in 2023, growing from 69.8 million in 2020. Projections for 2024 suggest the population will climb to 70.5 million.

Figure 1. Map of Thailand[1]

While its roots lie in agriculture, Thailand has evolved into a multifaceted economy driven by exports, industrial manufacturing, and an expanding services sector. In 2024, the number of international visitors to the country rebounded to near pre-pandemic levels, which peaked at 39.9 million visitors in 2019.[2] The country also holds significant global standing in areas like automotive manufacturing, electronics, and agriculture. As of 2023, Thailand's GDP was reported at THB 17.9 trillion in constant prices, with the manufacturing sector accounting for about 27% of the total GDP.[3] Meanwhile, the services sector has experienced robust growth over the past two decades, contributing approximately 55% and forming the bulk of household expenditures on necessities such as food, transportation, education, and healthcare.

1 Nations Online. (2021). Map of Thailand. Retrieved from https://www.nationsonline.org/oneworld/map/thailand-region-map.htm

2 Statista. (2024). Number of international tourist arrivals in Thailand from 2014 to 2024. Retrieved from https://www.statista.com/statistics/994693/thailand-international-tourist-arrivals/

3 Statista. (2023). Gross domestic product (GDP) of Thailand from 2017 to 2023. Retrieved from https://www.statista.com/statistics/1041036/thailand-gdp/

Data from the Pollution Control Department (PCD) indicates that the average solid waste generation per person in Thailand is 1.1 kg/day, and in 2023 there were in total 26.95 Mt of municipal solid waste being generated.[4] Regarding the composition of household waste, food waste and yard waste constitute the largest share, as shown in Figure 2. Efforts to enhance waste management and recycling systems are underway, focusing on reducing food waste and improving the reuse and recycling rates for materials such as plastics and paper.

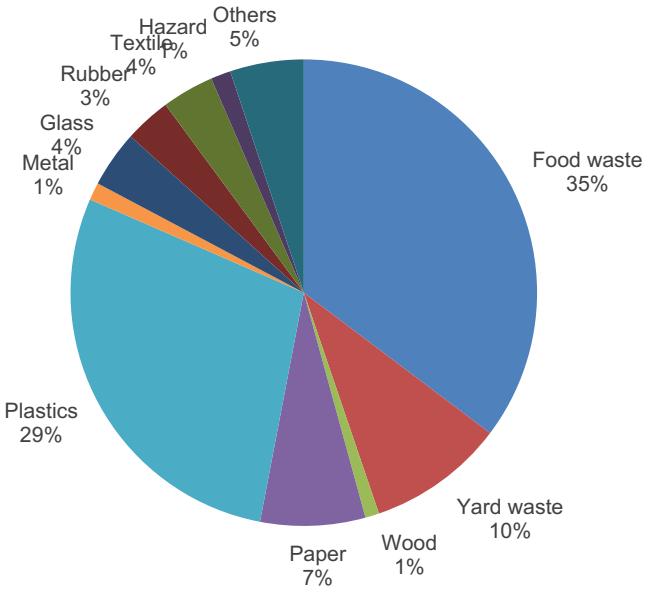

Figure 2. General waste composition in Thailand (% wet weight)

4 PCD. (2024). Thailand State of Pollution Report 2023. Retrieved from https://www.pcd.go.th/wp-content/uploads/2024/06/pcdnew-2024-06-21_06-42-54_474054.pdf

4. REVIEW OF ENABLING FACTORS FOR EPR IN THAILAND

4.1. Baseline waste management situation in Thailand

4.1.1. Existing waste management system

Thailand continues to face significant challenges in waste management. While there have been notable improvements in recent years, the country still struggles with inadequate treatment facilities and insufficient enforcement capabilities for effectively implementing integrated pollution control and prevention measures.

The state of municipal solid waste (MSW) remains a significant concern for Thailand. The total volume of MSW has grown, almost reaching the pre-COVID-19 peak level of 27 million tonnes in 2023.[5] Figure 3 illustrates the flow of MSW.

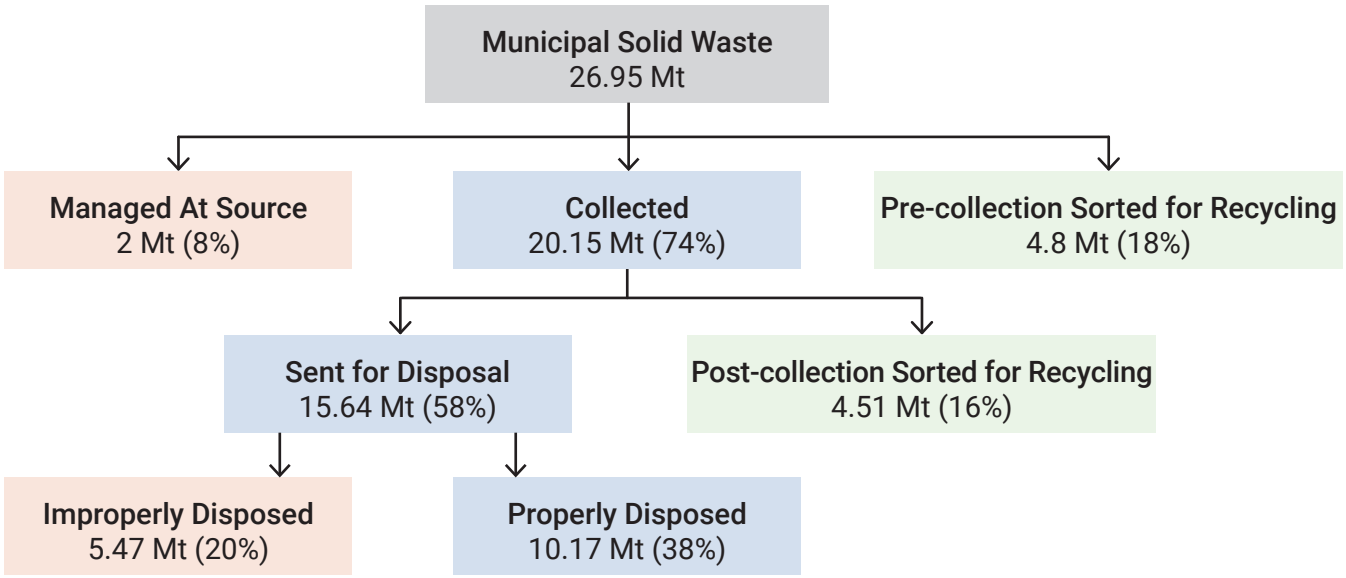

Figure 3. The state of municipal solid waste in Thailand in 2023

Although the majority of waste was collected by local governments, only 38% was sent for safe disposal. Waste generated in areas without collection services was noted as being managed at source and could be a major source of leakages to the environment.[6] A notable trend since the pandemic has been the rise in plastic waste due to the surge in online shopping and delivery services, which in turn rely heavily on single-use plastics (SUPs), reversing many prior efforts to reduce their use.

The amount of hazardous household waste, including electrical and electronic equipment (WEEE), also increased compared to the previous year. Of the 680,386 tonnes of hazardous household waste produced, only 143,583 tonnes were collected and sent for safe disposal,[7] underscoring the ongoing challenges in managing hazardous materials safely.

In 2021, the volume of industrial waste rose to 19.82 million tonnes, including 1.13 million tonnes of hazardous waste.[8] Although the Department of Industrial Works (DIW) has strengthened oversight of industrial waste management through its manifest system, which now includes 64,990 registered factories, the disparity between waste generators and processors remains pronounced, with a ratio as high as 28:1 and uneven distribution, as shown in Figure 4.

5 PCD. (2024). Thailand State of Pollution Report 2023.

6 WWF Thailand. (2020). Scaling Up Circular Strategies to Achieve Zero Plastic Waste in Thailand. Retrieved from https://wwfint.awsassets.panda.org/downloads/zero_plastic_waste_in_thailand_en.pdf

7 PCD. (2024). Thailand State of Pollution Report 2023.

8 PCD. (2024). Thailand State of Pollution Report 2023.

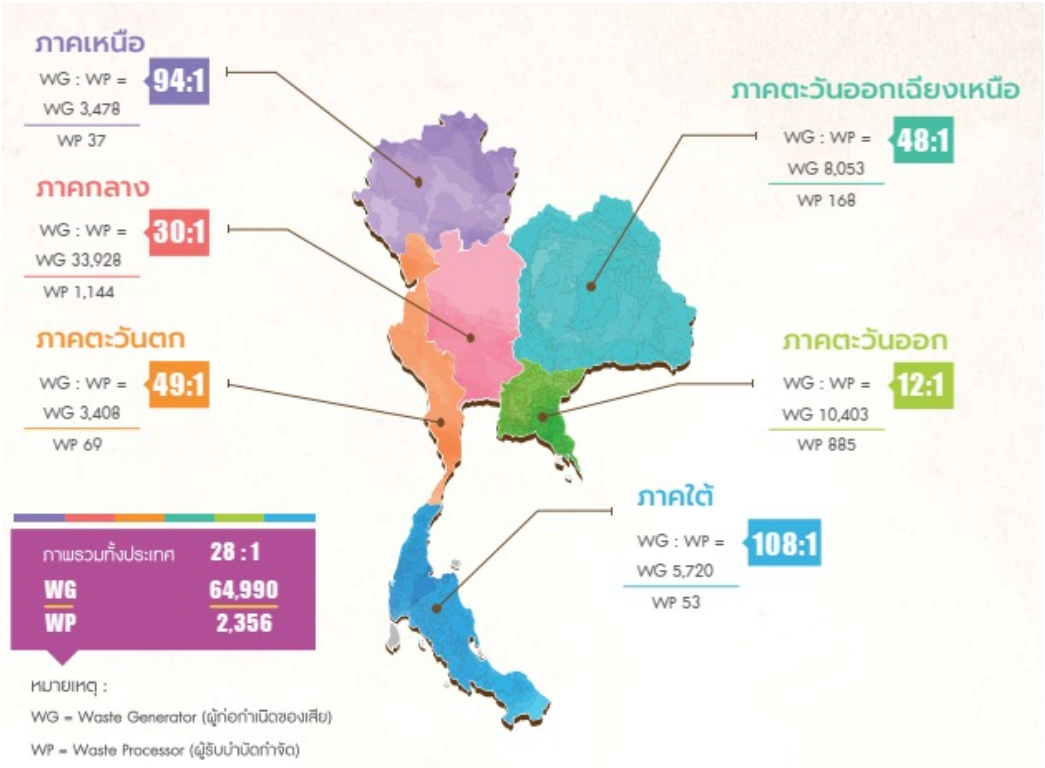

Figure 4. The number of industrial waste generators and processors in Thailand

Regional disparities are further exacerbated by challenges related to agricultural residues. Farmers often resort to burning agricultural residues including empty containers of hazardous substances without adequate safeguards, posing significant environmental risks and health concerns.

4.1.2. Existing laws and regulations

The regulatory framework for waste management in Thailand can be categorised into two areas: regulations on municipal solid waste management (MSWM), which focus on collection and disposal, and industrial laws governing recycling processes. The Public Health Act and the Act on the Maintenance of the Cleanliness and Orderliness of the Country assign responsibility for municipal solid waste manage MSWM to local governments.

- **The Public Health Act, B.E. 2535 (as the 3rd amendment, B.E. 2560)** contains a section on solid waste management. Responsibility is placed on local governments, as mentioned earlier. Although the Act also gives the power to local governments to set waste handling fees and issue local ordinances for source separation, in practice high political costs may ensue. In addition, there were previous rulings by the supervising authorities that could prohibit local governments from refusing to collect incorrectly sorted waste or selling garbage bags for volume-based fees.
- **The Act on the Maintenance of the Cleanliness and Orderliness of the Country, B.E. 2535 (as the 2nd amendment, B.E. 2560)** also has a section on municipal solid waste management; the Act broadly overlaps with the Public Health Act. The interesting development in the 2nd Amendment in 2017 was the new fee table that would allow local governments to charge for both waste collection and waste disposal with the ceiling rates at THB 150 and 200 (approximately USD 5–6) per month, respectively. The table also contains the conversion between volume and weight at 0.20 kg per litre.

Meanwhile, the Factory Act, B.E. 2535 (as amended in B.E. 2562) regulates the operations of waste processing facilities, classified under Factory Types 101 (treatment), 105 (sorting), and 106 (reprocessing). This Act also oversees the transportation of industrial waste between factories through an e-manifest system.

For post-consumer recyclables (PCR) traded by informal sectors and junkshops, the Control of Sale by Auction and Trade of Antiques Act, B.E. 2474 (as amended in B.E. 2481) governs these transactions, highlighting the need for more structured policies to formalise these sectors and ensure effective recycling practices.

4.1.3. Existing institutional structure and capacity

A competent, committed, and responsible workforce is essential for enabling the government to achieve its environmental goals. Figure 5 presents the organisations of key government agencies overseeing the management of waste in Thailand.

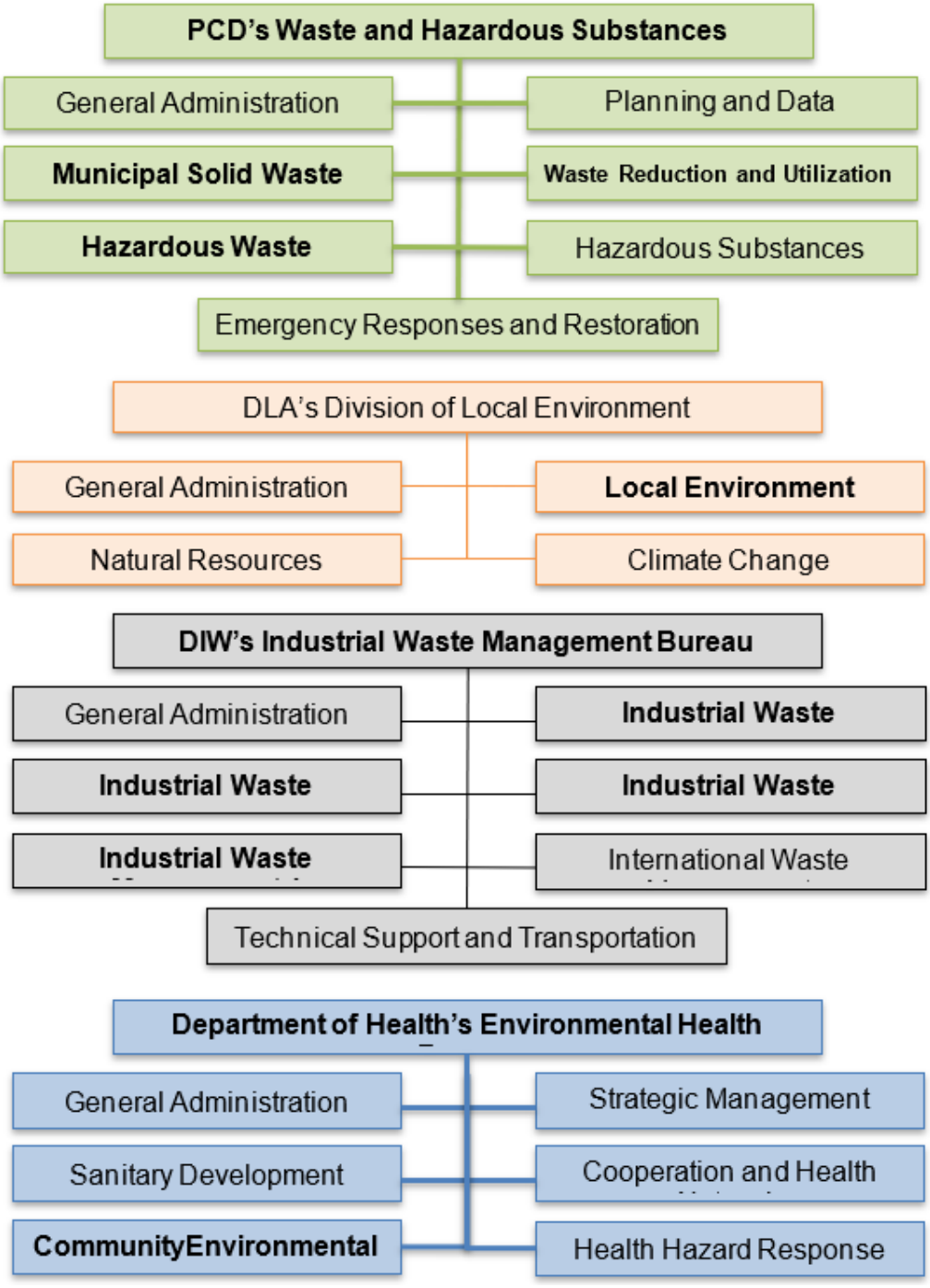

Figure 5. The structures of key governmental agencies. NB: PCD = Pollution Control Department

The Waste and Hazardous Substances Management Division under the Pollution Control Department (PCD) employs a total of 86 staff, with roughly half being government officers and the remainder contracted employees. The division is organised into seven subdivisions.

The Department of Local Administration (DLA) has established a dedicated division to address municipal solid waste (MSW) and other local environmental concerns. The Division of Local Environment consists of 21 staff members, including 12 government officers. This division is further structured into four subdivisions, with the Local Environment subdivision specifically handling MSW-related responsibilities.

The Industrial Waste Management Bureau, part of the Department of Industrial Works (DIW), includes 34 government officers and seven contracted employees. The bureau is organised into seven subdivisions.

Similarly, the Department of Health oversees the Bureau of Environmental Health, which employs 70 staff members, 58 of whom are government officers. The bureau is divided into six subdivisions.

These central offices are supplemented by regional and provincial offices operated by their respective ministries, ensuring more localised support for implementing environmental and waste management initiatives.

4.1.4. Existing waste management practices

Municipal solid waste (MSW) is under the supervision of local governments. There are over 34,000 local government officers and employees involved in managing municipal solid waste (MSW) in Thailand; however, their distribution is highly uneven. Thailand has five types of local administrative organisations:

- **Bangkok Metropolitan Administration (BMA)**: One of two special organisations, governed by an elected Governor and directly administering all 50 districts in Bangkok.
- **Pattaya City:** The other special organisation, located in Chonburi Province.
- **Provincial Administrative Organisations (PAOs):** These operate in Thailand's 76 provinces and primarily handle tasks requiring economies of scale or coordination across multiple localities, such as the shipment of household hazardous waste for safe disposal. A few PAOs, including those in Rayong and Ayutthaya, also manage waste disposal facilities.
- **Municipalities:** These are divided into three classes based on urbanisation levels: Nakorn, Muang, and Tambon Municipalities.
- **Sub-district Administrative Organisations (SAOs):** Responsible for sub-district levels, often managing waste collection and disposal locally.

BMA employs the largest share of waste-related workforce, with more than 11,000 workers dedicated to waste collection. The BMA's Environmental Department includes a Division of Solid Waste, which coordinates waste management across all 50 districts in Bangkok. Similarly, Pattaya City has its own Bureau of Public Health and Environment to handle waste collection and related services. Larger PAOs and municipalities often have comparable bureaus or divisions.

BMA, Pattaya City, and many Nakorn-class municipalities in urban centres frequently contract private companies for waste collection and disposal services. For instance, the BMA operates a fleet of 1,536 contracted garbage trucks. In stark contrast, smaller municipalities and SAOs may have only a single officer trained in public health or a related field managing all public health and environmental issues. Furthermore, the majority of the local workforce consists of garbage collection crews, most of whom have minimal formal training and are employed on short-term contracts.

Of the 7,772 Municipalities and SAOs, approximately one-third lack the capacity to provide waste removal services, leading to significant volumes of mismanaged waste across the country. For those that do offer waste collection, households are charged a flat monthly fee of THB 20–30 (<USD 1. However, limited cost recovery forces local government organisations (LGOs) to subsidise waste collection and disposal from their restricted budgets, leaving little room to invest in advanced waste infrastructure.

Fortunately, private actors play a crucial role in recycling post-consumer recyclables (PCR). Waste separation in Thailand is largely driven by the informal sector and waste traders. Many low-income individuals, often referred to as waste pickers, earn their livelihoods by collecting saleable items in the streets and in dumpsites. These waste pickers operate in both serviced and under-serviced areas, helping to reduce uncollected waste volumes. Equipped with carts or tricycles, they frequently purchase recyclables from households and focus on high-value plastic waste, such as bottles and hard containers, for resale. Unlike junk shops or waste traders, waste pickers seldom register with any authorities, operating entirely within the informal economy.

4.1.5. Existing market for secondary resource materials (SRM)

The secondary resource materials (SRM) market in Thailand, which focuses on recycled materials used in place of virgin raw materials, is moderately developed for high-value materials like rigid plastics, metals, and paper. However, the market for low-value and hard-to-recycle materials, such as multilayer flexible packaging, remains underdeveloped due to technological gaps and inconsistent feedstock availability.

Recycling in Thailand is supported by both formal and informal sectors. Informal waste collectors play a vital role in recovering high-value recyclables, but they operate without regulation, raising concerns about safety and environmental practices. The recycling value chain is fragmented, with materials passing through multiple intermediaries before reaching recycling facilities.

Figure 6 shows the disparity between the consumption of virgin plastics and the collection of plastics for recycling. Two key factors contribute to this:

- **Cost Challenges**: The high demand for recycled plastics globally has driven up raw material costs, making recycled feedstock more expensive than virgin plastic, which benefits from lower oil prices. The price disparity often leads industries to favour virgin plastics over recycled alternatives.
- **Regulatory Gaps:** The lack of mandatory regulations requiring recycled content in manufacturing leaves the adoption of recycled plastics voluntary, further limiting local demand.

While Thailand has large capacity to recycle PET plastics, part of the feedstock is imported due to its superior quality compared to locally sourced materials, which are often contaminated and require additional processing.

Thailand currently lacks regulations mandating the use of SRM in manufacturing. However, the implementation of EPR policies could incentivise producers to use recycled materials and drive investment in recycling infrastructure. Efforts to standardise and certify recycled materials are also underway, which could improve industry confidence and expand the SRM market.

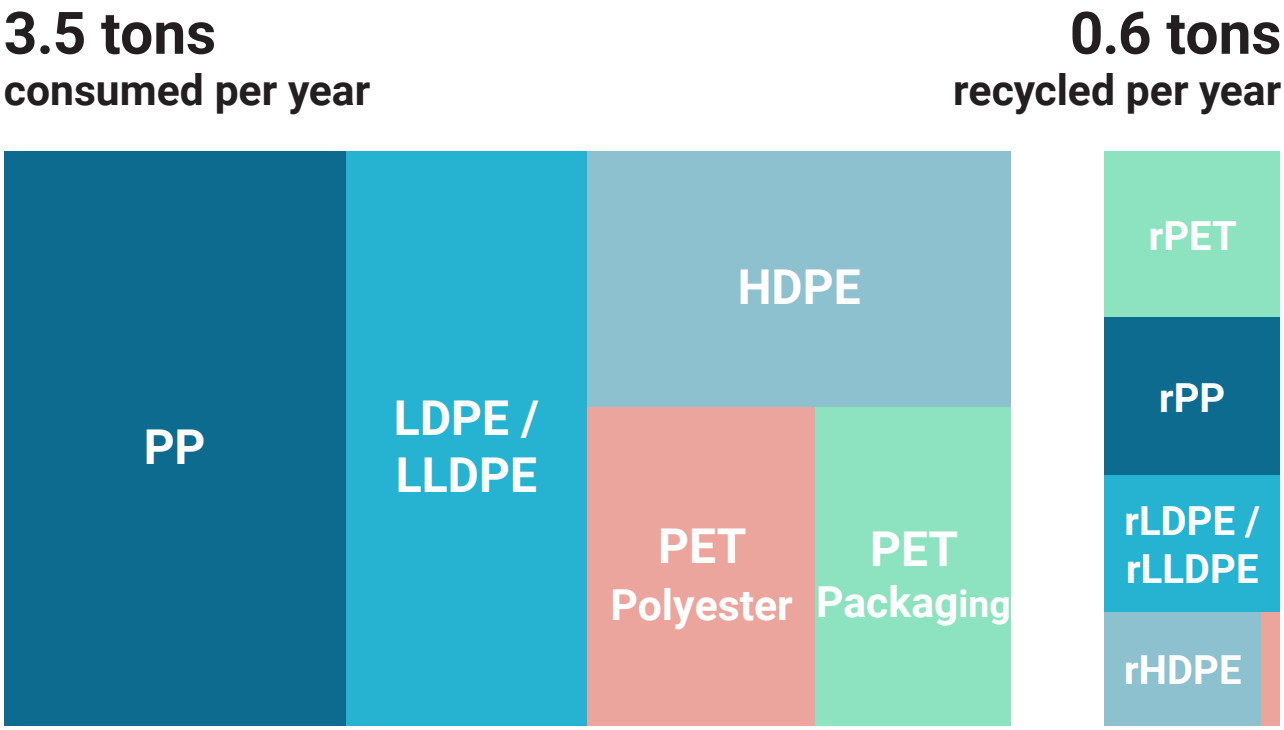

Figure 6. Estimated collection for recycling of various plastic resins[9]

9 World Bank Group. (2021). Market study for Thailand: Plastic circularity Opportunities and barriers. Marine Plastic Series, East Asia and Pacific Region. Washington DC.

4.2. Baseline EPR implementation in the country

4.2.1. Policy development

Thailand's commitment to sustainability is enshrined in Article 65 of the Constitution of the Kingdom of Thailand (B.E. 2560), which mandates the implementation of a 20-year National Strategy (B.E. 2561–2580). This strategy envisages Thailand becoming a developed country characterised by security, prosperity, and sustainability by 2037, guided by the Sufficiency Economy Philosophy (SEP). Among its six strategic priorities, green growth is explicitly identified to improve the quality of life.

Three long-term strategies are closely aligned with the CE vision:

- **The 20-Year Strategy for Pollution Management (B.E. 2560–2579):** This strategy envisages a low-carbon, zero-waste society, built on the principles of SEP and participatory approaches.
- **The 20-Year Sustainable Consumption and Production (SCP) Plan (B.E. 2560–2580):** This plan emphasises an innovation-based economy and society that adheres to the principles of sufficiency and sustainability.
- **The Industry 4.0 Strategy (B.E. 2560–2579):** This strategy aims to develop knowledge-based industries that align with global economic demands. It positions green growth as a core driver of economic progress while minimising environmental impact.

In the initial phase of the 20-year development strategy, the circular economy has been identified as one of three key pillars in the BCG Action Plan (B.E. 2564–2570) as a transformative framework for sustainable development. Each pillar of the model addresses specific national strengths and challenges:

- **'B' – Bio-Economy**: This pillar leverages Thailand's rich biological diversity and cultural heritage. By employing technology and innovation, the government aims to transform Thailand into a value-based, innovation-driven economy. The model focuses on four key industries: agriculture and food, medical and wellness, bioenergy and biomaterials, and tourism and the creative economy.
- **'G' – Green Economy**: This pillar reflects the shifting dynamics of global markets. Thai industries are increasingly required to prioritise sustainability – and in particular to addressing climate change – to remain competitive on the international stage.
- **'C' – Circular Economy**: This pillar addresses existing weaknesses in resource utilisation, advocating for a shift from the traditional linear production model of 'take-make-dispose' to a circular economy. Circular economy strategies emphasise product design, production processes, and post-consumption approaches that extend the life cycle of materials while promoting natural system regeneration. Strategies span the entire product life cycle from *before use* (Refuse, Rethink, Reduce) to *during use* (Retain, Reuse, Repair, Remanufacture) and to *after use* (Recycle, Return).

The BCG Economy Model embodies Thailand's medium- and long-term ambitions, envisaging 'sustainable economic growth powered by science, technology, and innovation'.[10]

- **The focal point for the 20-Year Master Plan for the Prevention of and Solutions for Waste Pollution and Hazardous Waste (2018–2037)** is the Pollution Control Department (PCD). The plan follows several principles such as
  - the 3Rs and CE
  - the Polluter-Pays Principle (PPP)
  - Public–Private Partnerships
  - EPR
- PCD is also the focal point for the **Plastic Waste Roadmap (2018–2030)** as well. The Roadmap sets a timeline for banning selected single-used plastics such as cap seals, plastic bags, styrofoam boxes, plastic cups and plastic straws by 2022. There are also recycling targets for 2027 and the implementing plans.

10 NSTDA. (2021). BCG in Thailand. Retrieved from https://www.bcg.in.th/eng/

- Finally, PCD is the focal point for **t**he **Action Plan for Plastic Waste Management, Phase 2 (2023–2027)**. There are three sets of measures: 1) reduction at source, 2) reduction during the consumption, and 3) post-consumer reduction, which includes upcycling.

The institutional framework for the CE in Thailand remains highly fragmented. However, progress is underway, with several draft laws in development, including the draft Act on the Promotion of Circular Economy, the draft Act on the Sustainable Management of Packaging, and the draft Act on the Management of Waste Electrical and Electronic Equipment (WEEE). Notably, the latter two drafts aim to introduce EPR for packaging waste and WEEE, establishing a direct link between producers and product end-of-life management.

4.2.2. The Draft Circular Economy Promotion Act

The Draft Circular Economy Promotion Act, developed by Chulalongkorn University and proposed in Thailand, aims to establish a legal framework for advancing CE principles across various sectors. The Act seeks to promote sustainable resource management by transitioning from a linear to a circular economy and emphasises waste reduction, product life cycle extension, and the regeneration of natural systems.

Key Provisions:

- **Extended Producer Responsibility (EPR)**: The Act introduces EPR policies, requiring producers to take responsibility for the end-of-life management of their products, including packaging, waste electrical and electronic equipment (WEEE) and other waste streams.
- **Sectoral Integration**: Circular economy principles are incorporated into manufacturing, consumption, and waste management processes, encouraging innovation and sustainable practices.
- **Incentives for Circular Practices**: The Act proposes financial and regulatory incentives to encourage businesses to adopt circular economy models, such as using recycled materials and reducing waste generation.
- **Monitoring and Enforcement**: The Act also outlines mechanisms for monitoring compliance and enforcing circular economy practices.
- **Stakeholder Collaboration**: Collaboration among government agencies, private sectors, and communities is encouraged so as to achieve CE goals.

This draft legislation represents a significant step toward institutionalising CE practices in Thailand, fostering environmental sustainability and economic resilience.

4.2.3. The Draft Waste Electrical and Electronic Equipment (WEEE) Management Act

Thailand generates approximately 400,000 tonnes of WEEE annually, accounting for a significant portion of the 600,000 tonnes of household hazardous waste (HHW) produced nationwide. Alarmingly, 90% of e-waste ends up in informal backyard recycling operations, particularly in the Northeast region, where unregulated practices pose severe risks to human health and the environment. The absence of standardised e-waste management exacerbates pollution and hinders Thailand's progress toward sustainable waste-management practices.

To tackle these challenges, PCD is drafting a legal framework that introduces Extended Producer Responsibility (EPR) as the cornerstone of e-waste management. The Draft WEEE Management Act has undergone multiple rounds of public consultation to incorporate feedback from stakeholders, including industrial representatives and private-sector entities. The Act aims to address the growing e-waste crisis by establishing structured management systems and improving the end-of-life treatment of electronic products.

The Draft WEEE Management Act targets several high-priority products that generate substantial volumes of waste and require proper disposal, including: television sets, refrigerators, air conditioners, personal computers, and mobile phones. In the future, the Act can cover new and emerging products, such as: solar panels or even batteries from electric vehicles (EVs) if their increasing adoption and the environmental risks associated with their disposal.

Key Provisions:

- **Producer Responsibility Organisation (PRO)**: The Act envisions a system where producers are responsible for managing the collection and recycling of WEEE through PROs.
- **Individual Producer Responsibility (IPR):** Alternatively, producers can opt for Individual Producer Responsibility (IPR), where they submit customised compliance plans to the PCD.
- **Mandatory Targets:** PROs and IPR plans are required to meet specific collection and recycling targets, ensuring accountability and measurable outcomes.
- **Consumer Obligations:** Consumers must properly sort and discard designated products to facilitate efficient collection and recycling processes.
- **Role of Local Governments:** Local governments are tasked with organising facilities and/or collection services for separate collection of e-waste from households and other sources.
- **Distributors:** Currently, the draft Act does not impose any obligations on distributors, leaving gaps in the supply chain's contribution to WEEE management.
- **Reduced Backyard Recycling:** By diverting e-waste from informal recycling operations, the Act seeks to minimise environmental contamination and health risks. There is a provision that bans non-authorised persons from dismantling WEEE.

The Draft WEEE Management Act underscores Thailand's commitment to establishing sustainable e-waste management systems and aligning with global best practices.

4.2.4. The Draft Sustainable Management of Packaging Act

Thailand is currently undergoing a transitional phase in its approach to EPR for packaging waste management. While a fully implemented mandatory EPR system is not yet operational, the country is making significant strides through legislative efforts. The Draft Sustainable Packaging Management Act represents a pivotal step toward establishing a structured and mandatory EPR framework to address the growing challenges of packaging waste.

Key Provisions:

- **Producer Responsibility Organisation (PRO):** The Act envisions a system where producers are responsible for managing the collection and recycling of WEEE through a PRO. There is a special provision that will mandate the establishment of a single national PRO for the first 5 years. After the initial implementation, this structure will be reviewed and multiple PROs and IPR can be allowed.
- **Specified Packaging Types:** The Act targets a range of packaging materials, including plastics, paper, glass, metals, and composite materials including multi-layer packaging, which is particularly challenging to recycle due to its complex composition.
- **Enhance Resource Efficiency:** The EPR framework will encourage producers to adopt eco-friendly packaging designs and materials.
- **Reduce Packaging Waste:** By promoting recycling and reuse, the Act will help reduce the volume of packaging waste entering landfills and the environment.
- **Consumer Responsibilities:** Consumers will be obligated to properly sort and dispose of designated packaging waste to facilitate efficient collection and recycling.
- **Separate Collection:** Local governments will play a crucial role in organising facilities and collection services for packaging waste.
- **Damage Fees:** For packaging that deems unfit for recycling, the government may select to charge a damage fee at 60 THB per kg instead of designating it to the EPR programme. The revenues from the fees will be sent to the National Environmental Fund to support waste prevention and cleanup efforts.

The Draft Sustainable Packaging Management Act represents a transformative step in Thailand's journey toward sustainable waste management. By establishing a mandatory EPR framework, the Act aims to create a shared responsibility among producers, consumers, and local governments, paving the way for a cleaner and more sustainable future.

4.2.5. Voluntary initiatives and partnership

Over the past decade, Thailand has seen significant growth in circular economy networks, spurred by increasing awareness of plastic pollution and its environmental consequences. This awareness has prompted businesses, authorities, and communities to take action. Below are some of the key voluntary initiatives undertaken to address this issue.

1. PPP Plastics

The Public Private Partnership for Sustainable Plastic and Waste Management (PPP Plastics) was established on June 5, 2018, by the Federation of Thai Industries (FTI) and the Thailand Business Council for Sustainable Development (TBCSD). Supported by the Alliance to End Plastic Waste and major players in the plastics industry, such as PTT Global Chemical, Dow Thailand Group, SCG Chemical, Indorama Ventures, and BASF, —PPP Plastics implemented the Rayong Less-Waste Project.

This community-based initiative promotes a 3Rs approach (Reduce, Reuse, Recycle) to minimise single-use plastics (SUPs) and improve plastic waste separation. The pilot project, which began in Rayong Province (see Figure 7), has expanded to 60 municipalities and 228 schools, successfully recovering 990 tonnes of plastic waste as of 2022.

Figure 7. The signing of MOU between PPP Plastics and mayors in Rayong Province on 20 September 2021[11]

2. Voluntary Ban on Plastic Bags

In 2019, the death of Mariam, a baby dugong who ingested plastic, triggered a nationwide outcry. In response, the Ministry of Natural Resources and Environment (MONRE) requested major retailers, department stores, and supermarkets to stop distributing free plastic bags. Ninety distributors joined the campaign, and in January 2020, the voluntary ban on free plastic bags began (see Figure 8).

11 Manager Online. (2021). Rayong Less-Waste. Retrieved from https://mgronline.com/business/detail/9640000093472.

Figure 8. The Prime Minister and the cabinet members promoting the No Plastic Bag campaign[12]

During the first month alone, it was estimated that 3.7 billion plastic bags were avoided. However, enthusiasm waned as businesses reverted to SUPs during the COVID-19 pandemic. Today, some stores have transitioned to paper bags or charge fees for plastic bags without brand logos.

3. Sukhumvit Model

Launched in 2020 by the Thailand Responsible Business Network (TRBN), a corporate social responsibility (CSR) initiative under the Stock Exchange of Thailand (SET), the Sukhumvit Model aimed to address the increased use of SUPs during the pandemic. 38 organisations along Sukhumvit Road established drop-off points for plastic waste (Figure 9), setting a target to collect 500 tonnes of plastic for recycling and energy recovery. The initiative has now ceased operations.

Figure 9. A drop-off location in one of the buildings on Sukhumvit Road.[13]

12 Amarin TV. (2019). D-Day for No Plastic Bag Campaign on 1 January 2020. Retrieved from https://www.amarintv.com/prnews/news/20325.

13 Thai Post. (2020). 10 drop-off locations along Sukhumvit to bring back plastics. Retrieved from https://www.thaipost.net/main/detail/68007.

4. PackBack Initiative

Anticipating Thailand's EPR (Extended Producer Responsibility) law for packaging, the FTI launched the PackBack Project on December 16, 2021. Managed by its subsidiary, the Thailand Institute of Packaging and Recycling Management for Sustainable Environment (TIPMSE), the initiative involved 70 organisations (Figure 10). The pilot project in Chonburi tested three key mechanisms:

- Category A: Financial incentives to recover low-value packaging materials, such as multilayer plastics (MLP), beverage cartons, and glass bottles.
- Category B: Infrastructure support to improve sorting, logistics, and recycling capacity.
- Category C: Education and awareness campaigns to engage consumers and stakeholders.

Figure 10. PackBack and partners organisations[14]

5. PRO-Thailand Network

The Packaging Recovery Organization Thailand Network (PRO-Thailand Network) was founded in 2019 by seven companies, including Coca-Cola Thailand, Nestlé Thai, and Suntory Pepsico Beverage Thailand (Figure 11), and is managed by GEPP Sa-ard. It serves as a prototype for EPR implementation in Thailand. As of June 2023, the initiative had supported the recovery of 25,134 tonnes of PET bottles, 180 tonnes of beverage cartons and 29 tonnes of multilayer plastics (MLP).

Figure 11. Founding members of the PRO-Thailand Network[15]

14 Matichon. (2022). More than 70 organisations support PackBack's pilot project in Chonburi. Retrieved from https://www.matichon.co.th/publicize/news_3589797.

15 Thairath. (2023). Future Perfect & founding members launch PRO-Thailand Network. Retrieved from https://www.thairath.co.th/futureperfect/articles/2705555.

5. NATIONAL CONSULTATIONS AND STAKEHOLDER ENGAGEMENTS

The primary goal of this Technical Advisory (TA) is to support the advancement of EPR in Thailand by identifying critical factors that contribute to its success and alignment with the principles of CE. This includes evaluating key success factors, identifying gaps, and offering recommendations to establish effective EPR systems and improve material circularity through consultations with relevant stakeholders.

A successful implementation of EPR requires the identification of key experts and stakeholder groups. A crucial component of this effort is understanding how these groups can be empowered and equipped to actively contribute within a circular EPR system, ensuring their effective engagement and the overall sustainability of the framework.

To achieve this, the TA involves the following forms of stakeholder engagement:

- **Individual Stakeholder Interviews**: Targeted discussions with key agencies drafting EPR legislation and defining standards for material circularity to gather insights into challenges and opportunities
- **National Consultation Workshops**: Collaborative sessions to engage stakeholders across sectors and develop actionable strategies

The findings from these interviews and workshops have been carefully documented and analysed in this section to provide actionable insights for advancing EPR in Thailand.

5.1. Individual stakeholder interviews

The engagement sessions with officers from the Pollution Control Department (PCD) and the Thai Industrial Standards Institute (TISI) were conducted separately. The meeting with the PCD took place on January 31, 2025, while the meeting with the TISI was held on February 14, 2025.

The meeting with PCD focused on the current state of EPR legislation and CE initiatives in Thailand. The discussions highlighted that while efforts were ongoing, they remain fragmented. Previous initiatives in waste management and recycling policies were reviewed, with participants identifying challenges related to implementation and enforcement. Concerns were also raised about the lack of comprehensive legal frameworks and the fragmented responsibilities among various ministries handling waste management. Policy and legal gaps were emphasised, particularly the need for stronger regulations to ensure that businesses comply with EPR policies. The absence of a harmonised system for waste collection and recycling was identified as a significant barrier to progress.

During the discussion on the role of the private sector in waste collection the growing interest in EPR policies was reported. However, financial incentives and clearer regulatory guidance are essential to accelerate engagement. Companies require stronger incentives, such as tax reductions, to adopt sustainable practices, and certain sectors – plastics, textiles, and construction – were seen as being more ready for EPR implementation. The Ministry of Finance was noted as a key stakeholder in providing incentives for companies adopting sustainable practices.

Consumer awareness and waste management were also focal points. Challenges in promoting proper waste separation among consumers were noted, along with the need for public awareness campaigns highlighting the benefits of recycling along with CE principles. The role of municipalities in implementing effective waste management strategies was deemed critical.

Finally, international collaboration was highlighted as a vital component of advancing waste management and recycling efforts. Cross-border cooperation and the development of common sustainability standards for products were seen as essential to achieving CE goals.

The meeting with TISI focused on the development of standards in Thailand to advance CE goals. The conversation outlined three levels of standards under consideration.

- Material standards aim to establish guidelines for the use of recycled content while ensuring that recycled materials perform on par with virgin materials.
- Product standards are being developed to maintain the high performance and durability of products, even when incorporating recycled content.
- Additionally, product design guidelines are intended to encourage manufacturers to simplify designs and reduce the use of mixed materials, which often complicate recycling processes.

The discussion revealed that many products in Thailand and internationally have complex designs, making the separation and recycling of different materials challenging. It was suggested that design guidelines promoting uniform material use and eco-friendly product designs be developed to address this issue. Furthermore, collaboration between the Thai government and relevant standardisation bodies was emphasised as essential for establishing national standards for EPR that align with global best practices. Industry involvement was also highlighted as critical to ensuring that the standards developed are both practical and enforceable.

The meeting also explored the potential application of Design for Recycling (D4R) principles in Thailand, as demonstrated in the previous collaboration between TISI and the Federation of Thai Industries (FTI). Interest was expressed in incorporating D4R principles into the broader EPR and circular economy policy framework. The discussion included the possibility of integrating D4R into Thai product standards, particularly in industries with significant recycling potential, such as packaging, electronics, and textiles. A multi-stakeholder approach was proposed, involving collaboration between government, industry, and standardisation bodies to develop guidelines informed by D4R principles.

5.2. National Consultation Workshop

The National Consultation Workshop for Thailand was held on March 4, 2025, providing a platform for country-level dialogue among key stakeholders. The workshop brought together representatives from government agencies, trade associations, producers, recyclers, academia, environmental NGOs, and development agencies to exchange insights and discuss key issues.

The SWITCH-Asia team presented an overview of the project, followed by a country expert's presentation of preliminary findings from the Thai case, after which stakeholders provided their feedback. The workshop took place onsite at the Sivatel Bangkok Hotel (Figure 12), where all Thai participants convened for a half-day session with spontaneous Thai-English translation services. Meanwhile, other project experts joined remotely via a virtual meeting platform.

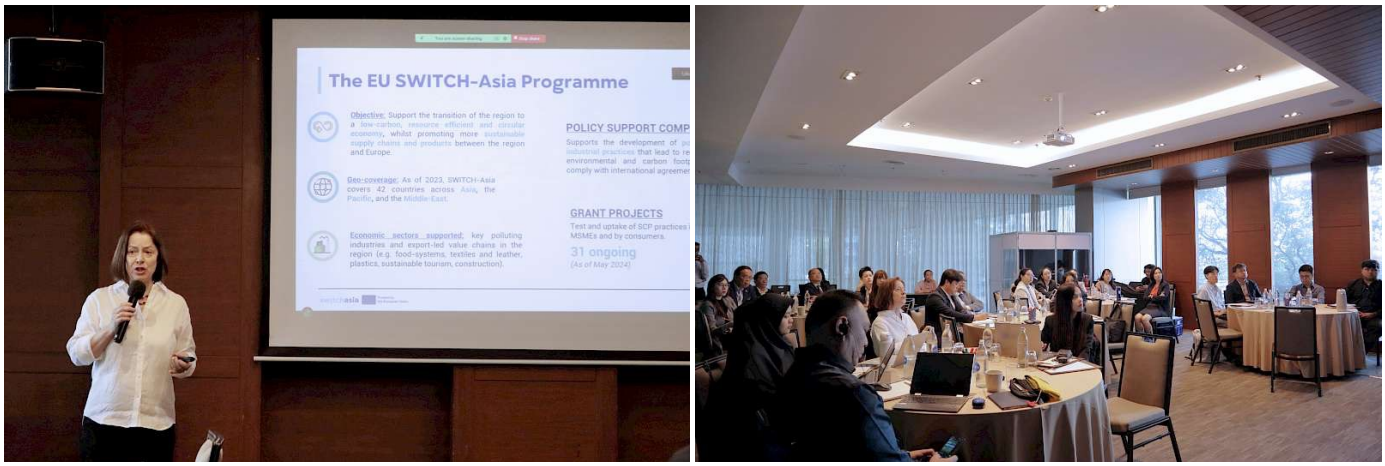

Figure 12. National Consultation Workshop in Thailand, March 4, 2025.

A total of 31 stakeholders actively participated, contributing valuable perspectives to the discussion. Table 1 summarises key points and inputs from the Thailand's consultation workshop.

Table 1. Key points and input from National Consultation Workshop

EPR Enabling Conditions	Inputs/Suggestions
Clear institutional arrangement, EPR policies/legislation	• Need for political champion • Need for harmonisation of policies and laws • Governance reform may be needed
Phase approaches	Solving puzzles – one by one
Standards and demand for use of recycled material	• Incentives for industries to practice closed loop • Product design
Informal sector	• Need to incorporate into an EPR/CE system
Collection & segregation	• Need to improve collection infrastructure
Collaboration/capacity Building	• Capacity building greatly needed for implementer • Collaboration from all stakeholders a key

6. ASSESSMENT OF ENABLING FACTORS FOR EPR IN THAILAND

Based on the review of existing policies, roadmaps, and regulations, as well as of findings derived from interviews and consultations with relevant stakeholders, an assessment has been carried out to review the current local situation against the enabling conditions for an effective EPR system.

6.1. Policy convergence: Aligning climate and CE Policies to support closed-loop solutions

As Thailand advances its sustainability agenda, the convergence of climate policies and CE frameworks presents a critical opportunity to accelerate the adoption of EPR. This alignment fosters a more integrated approach to waste management, in which recycling becomes a fundamental mechanism for achieving national and international climate goals, including carbon neutrality and zero-emission targets. By positioning recycling as a key strategy to mitigate resource depletion and reduce greenhouse gas emissions, policymakers can create a more cohesive system that incentivises both public and private stakeholders to implement closed-loop solutions.

A major driving force behind this policy convergence is the increasing demand for recycled content from both climate-related policies and CE objectives. Climate policies emphasise carbon-footprint reduction, which aligns well with CE efforts that promote material efficiency and reduced waste generation. Consequently, businesses are encouraged to incorporate high-quality recycled materials into their production processes, ensuring that secondary resources perform as effectively as virgin materials. By embedding EPR mechanisms into this policy landscape, Thailand can systematically reinforce the recovery and reuse of resources while simultaneously addressing carbon-reduction goals.

Thailand has made significant climate commitments that align with circular economy principles to promote recycling across various sectors. The country has pledged to achieve carbon neutrality by 2050 and net-zero greenhouse gas emissions by 2065, as outlined in its updated Nationally Determined Contribution (NDC) under the Paris Agreement. These commitments drive policy measures that encourage sustainable resource use, including enhanced recycling efforts in key industries.

One of the primary sectors benefiting from these climate commitments is packaging and plastics, where Thailand has set ambitious targets to reduce plastic waste and increase the use of recycled materials. The government has introduced policies to phase out single-use plastics and promote EPR for post-consumer waste. Additionally, Thailand's BCG Economy Model emphasises sustainable production and waste reduction, further reinforcing the demand for recycled content in packaging materials.

The electronics sector is another area where recycling is gaining traction due to climate policies. With increasing concerns over WEEE, Thailand is working to integrate eco-design principles into product standards, ensuring that electronic devices are easier to dismantle and recycle. This aligns with global sustainability trends and supports the country's broader decarbonisation strategy.

In the textile industry, Thailand is exploring ways to incorporate recycled fibres into production processes, reducing reliance on virgin materials and lowering the sector's carbon footprint. Policies encouraging closed-loop recycling systems and sustainable textile manufacturing are being developed to align with international climate goals.

In this context, EPR serves as a strategic lever to consolidate the reverse supply chain, enabling more efficient collection, sorting, and processing of post-consumer waste. When integrated with CE frameworks, EPR policies incentivise manufacturers to design products with recycling and reuse in mind, thereby strengthening sustainable production systems. Additionally, manufacturing industries can leverage EPR policies to enhance their resource security by securing consistent access to recycled raw materials, which are increasingly sought after due to global supply chain pressures.

However, despite these advantages, the transition towards an EPR-driven closed-loop economy may face significant challenges. One of the most pressing concerns is a fragmented policy framework and limited waste infrastructure. Intermediary recycling facilities like material recovery facilities (MRFs) remain underdeveloped, requiring substantial investment to bridge the gap between collection systems and industrial demand for secondary raw materials. Without adequate funding and governance support, inefficiencies in midstream processing may hinder the realisation of a fully integrated CE.

To address these barriers, targeted investments in waste infrastructure, policy incentives, and industry collaboration are necessary. The government must prioritise waste collection reforms alongside EPR implementation, ensuring that producers, recyclers, and policymakers work together to establish a coherent and economically viable reverse supply chain. Additionally, financial mechanisms such as subsidies and tax benefits could encourage businesses to adopt recycled materials on a larger scale, reinforcing Thailand's transition toward policy-driven circularity.

As Thailand moves forward in harmonising climate and CE policies, ensuring EPR compatibility with broader environmental targets will be essential for long-term success. By overcoming infrastructure limitations and enhancing regulatory coherence, the country can build a robust foundation for a sustainable, closed-loop economic model that benefits businesses, communities, and the environment alike.

6.2. People participation: Advancing source separation for a sustainable waste management system

Public participation in waste management is an essential enabler for establishing a functional EPR framework in Thailand. Since 2018, the Ministry of Interior (MOI) has played a central role in promoting source separation by issuing an annual Clean Province Action Plan to set targets and prescribe improvements for solid waste management. For the upstream measures, the MOI, through the Department of Local Administration, has actively encouraged households to adopt home composting as a method of organic waste management.

To further incentivise local governments, MOI has collaborated with the Thailand Greenhouse Gases Management Organization (TGO) to issue carbon credits to municipalities that successfully implement composting programmes. By integrating climate incentives into local waste management initiatives, this approach aligns with Thailand's broader commitment to reduce greenhouse gas emissions and transition toward a circular economy at a local level.

Building on these efforts, the MOI issued a directive in 2023, requiring all local governments to establish recyclable waste banks as part of a more structured and participatory waste collection system. These waste banks serve as decentralised hubs where citizens can bring sorted recyclables in exchange for monetary incentives, fostering active community engagement. The initiative reflects an effort to formalise the informal waste sector, ensuring that collected materials are efficiently processed and reintegrated into manufacturing supply chains. This system has the potential to increase the availability of high-quality secondary raw materials, thereby supporting industries in transitioning toward a closed-loop production model.

In addition to these policy measures, some local governments, including the Bangkok Metropolitan Administration (BMA), have introduced unit-based pricing for waste fees, as mentioned in the previous section. This 'pay-as-you-throw' pricing model aims to incentivise waste reduction at the source while encouraging residents to sort recyclables more effectively. Economic instruments such as these can play a vital role in reshaping consumer behaviour, thus reinforcing the environmental and financial benefits of adopting responsible waste disposal practices.

Despite these advancements, challenges remain in ensuring the effective customisation and scalability of these policies across diverse municipal settings. While top-down policies provide structure and coherence, they must accommodate the varying operational capacities of different local governments. Rural and urban municipalities often have differing waste compositions, infrastructure limitations, and stakeholder dynamics, necessitating adaptive implementation strategies rather than standardised, one-size-fits-all approaches. Additionally, improved coordination in material trading could lead to greater economies of scale, maximising the efficiency of recycling markets and incentivising private sector investment. By facilitating stronger linkages between recyclers, manufacturers, and policymakers, Thailand can enhance the viability

of its circular economy model and make EPR mechanisms more effective at addressing systemic waste challenges.

Moving forward, reinforcing public engagement through targeted education and awareness campaigns will be crucial. Ensuring that citizens understand the long-term benefits of source separation, composting, and recycling can significantly improve compliance rates and material recovery efficiency. Furthermore, integrating digital platforms for tracking, as well as incentivising participation may strengthen transparency and accountability in the waste management system. By aligning people participation with policy incentives, Thailand can foster a more inclusive and resilient circular economy, ensuring that waste is treated as a valuable resource rather than a discarded burden.

6.3. Private investment: Driving recycling innovation and circular economy in Thailand

Private investment has played a pivotal role in advancing Thailand's economy and the recycling industry is no exception. In recent years, both domestic corporations and foreign investors have made significant contributions to the development of state-of-the-art recycling technologies and facilities. These investments not only enhance the country's capacity for material recovery but also align with global sustainability trends, fostering closed-loop recycling systems that minimise waste and maximise resource efficiency.

Among the leading Thai corporations, Thai Beverage Recycle (TBR) stands out as a key player in the recycling sector. A subsidiary of Thai Beverage Public Company Limited, TBR focuses on managing post-consumption packaging, including glass bottles, PET plastic, aluminium cans, and paper. With over 45 collection and sorting facilities across Thailand, TBR has established a robust supply chain for recovering and processing recyclable materials. By integrating innovative sorting technologies, the company ensures that recovered materials meet high-quality standards, enabling their reintegration into production processes. TBR's efforts exemplify how private investment can drive systemic change in waste management while contributing to environmental and social benefits.

Another notable example is PTT Global Chemical (PTTGC), which has invested in its subsidiary Envicco to advance plastic recycling in Thailand. Envicco operates one of the largest recycling plants in Southeast Asia, utilising cutting-edge technologies to produce high-quality recycled PET (rPET) and high-density polyethylene (rHDPE) resins. These materials are used in various industries, including packaging and textiles, demonstrating the potential for recycled content to replace virgin materials without compromising performance.

Foreign investors have also played a significant role in expanding Thailand's recycling capabilities. Indorama Ventures, a global leader in PET production and recycling, has established multiple facilities in Thailand to process post-consumer PET bottles into recycled PET (rPET) flakes and pellets. These facilities leverage advanced technologies to achieve high levels of material purity, supporting the production of food-grade packaging and other applications. Similarly, Ecoblue, an international recycling company, has expanded its operations in Thailand, focusing on the recovery and processing of plastic waste. These investments not only enhance Thailand's recycling infrastructure but also position the country as a regional hub for sustainable materials management.

The adoption of state-of-the-art technologies by these corporations underscores the potential of private investment to achieve closed-loop recycling. Advanced sorting, cleaning, and processing systems enable the recovery of high-quality secondary raw materials, reducing reliance on virgin resources and lowering the environmental footprint of production. Moreover, these facilities contribute to job creation and economic growth, demonstrating the multifaceted benefits of investing in recycling infrastructure.

However, the rapid growth of Thailand's recycling sector has also exposed significant challenges. The lucrative but poorly regulated recycling market has attracted unscrupulous operators, leading to the relocation of shady recycling businesses to Thailand. These entities often operate without proper oversight, resulting in environmental disasters such as illegal dumping and pollution from poorly managed facilities. Additionally, the global recycling landscape shifted dramatically after China banned imports of recyclables in 2018 under its Operation National Sword initiative. As a result, Thailand and other Southeast Asian countries experienced a surge in imports of secondary materials, including plastic waste and e-waste.

The influx of recyclables into Thailand's market caused a price collapse in the domestic recycling industry, severely affecting waste trading networks. Local recyclers struggled to compete with the flood of imported materials. These illegal imports often bypassed environmental regulations, leading to improper disposal and contamination. For example, cases of municipal waste mixed with hazardous materials being dumped at customs checkpoints have highlighted the vulnerabilities in Thailand's enforcement mechanisms. Such practices not only undermine the integrity of the recycling sector but also pose significant risks to public health and the environment.

Addressing these issues requires stronger regulatory frameworks and enforcement mechanisms to ensure that investments in recycling align with environmental and social standards. Thailand must prioritise the development of transparent import controls and stricter monitoring systems to prevent illegal dumping and smuggling. Collaboration between the government, private sector, and civil society is essential to establish a well-regulated recycling market that fosters innovation while safeguarding environmental and public health. Furthermore, targeted policies to stabilise the domestic recycling market, such as subsidies for local recyclers and incentives for high-quality material recovery, could help mitigate the impact of global market disruptions.

6.4. Pilot projects: Testing and scaling voluntary EPR actions

Pilot projects represent a critical enabler in Thailand's journey toward establishing a robust EPR framework, allowing industries to experiment with new mechanisms, establish baselines, and refine processes for take-back systems and producer responsibility organisation (PRO) structures. These voluntary initiatives not only provide valuable insights into operational and logistical challenges but also pave the way for scaling successful approaches across industries. Pilot projects can be broadly categorised into three levels, each targeting different stages of implementation and action.

Level 1: Establishing baselines through commissioned studies

At the foundational level, pilot projects focus on commissioning studies to establish baselines, ensuring that stakeholders have a clear understanding of the current waste landscape. For example, studies on pesticide containers and car tyres have been initiated to assess the volume, types, and recovery rates of these waste streams, as well as the challenges associated with their collection and recycling. Such research is critical for mapping out the scope of the problem and identifying opportunities for intervention. Baseline studies also provide an evidence-based foundation for designing effective EPR mechanisms tailored to the specific needs of various industries. By capturing data on material flows, environmental impacts, and economic feasibility, these studies guide policymakers and industry leaders in setting realistic targets and implementing context-specific solutions.

Level 2: Testing collection mechanisms through sandbox projects

Sandbox projects represent the next level of engagement, where industries actively test the practicality and effectiveness of collection mechanisms for specific waste streams. These projects provide a controlled environment to experiment with innovative approaches, refine logistics, and evaluate stakeholder participation. Notable examples include PPP Plastics, a public-private partnership focused on plastic waste management, and PackBack, a take-back programme for packaging waste. Similarly, the sandbox for air conditioners and refrigeration in the eastern region has been instrumental in exploring reverse logistics and dismantling operations for electronic waste, while island-based projects have served as testbeds for implementing circular economy models in geographically isolated communities. These initiatives allow for iterative learning, enabling stakeholders to address bottlenecks and optimise processes before scaling up operations.

Sandbox projects also foster collaboration among multiple stakeholders, including manufacturers, recyclers, local governments, and non-governmental organisations (NGOs). By creating a shared platform for innovation, these initiatives demonstrate the viability of EPR mechanisms in real-world contexts. They also highlight the potential for aligning business incentives with environmental objectives, encouraging industries to adopt circular practices that contribute to resource efficiency and waste reduction.

Level 3: Scaling collective action through industry-wide initiatives

The most advanced level of pilot projects involves collective action at an industry-wide scale, exemplified by the Producer Responsibility Organisation Voluntary Effort (PROVE). This initiative unites industry stakeholders under a shared framework for managing post-consumer waste, promoting standardisation and economies of scale. By pooling resources and expertise, industry-wide efforts can achieve greater impact than isolated initiatives, facilitating the development of comprehensive take-back and recycling systems. Collective action also strengthens the bargaining power of producers in negotiating with recyclers and other downstream actors, ensuring more efficient and cost-effective operations.

However, voluntary pilot projects face significant challenges. A key concern is the issue of 'free riders': companies that benefit from improved waste management systems without actively contributing to their development. This creates an uneven playing field and may discourage first movers from investing in pilot initiatives. Additionally, the absence of clear regulatory or financial incentives can make it difficult to sustain voluntary actions, as companies may struggle to justify the upfront costs without tangible short-term benefits.

To address these challenges, stronger policy support and coordinated governance mechanisms are needed to ensure the scalability and sustainability of pilot projects. Offering incentives such as subsidies, tax benefits, or recognition programmes can motivate companies to participate actively. Furthermore, creating transparent reporting systems and engaging multiple stakeholders can enhance accountability and reduce the prevalence of free riders. By overcoming these barriers, Thailand can leverage pilot projects as a cornerstone for building a robust EPR framework benefiting both the economy and the environment.

6.5. Partnerships for sustainability: Technical Assistance to advance Thailand's circular economy

Development agencies have played a crucial role in advancing Thailand's sustainability agenda by providing technical and financial assistance to support the implementation of EPR frameworks and circular economy principles. Their contributions span a wide range of initiatives, from policy development to capacity-building and pilot projects, fostering collaboration among stakeholders and driving systemic change.

SWITCH-Asia's EPR Project

The SWITCH-Asia programme has been instrumental in promoting EPR systems in Thailand by drawing policy lessons from European and Asian countries. This initiative focuses on aligning Thailand's waste management policies with circular economy principles, emphasising the importance of product design improvements and material recovery. Through technical assistance, SWITCH-Asia has conducted baseline assessments of domestic policies and practices, identifying gaps and opportunities for enhancing EPR systems. The programme has also facilitated multi-stakeholder workshops to validate findings and advocate for policy reforms, ensuring that Thailand's EPR framework is both effective and inclusive.

GIZ's MA-RE-DESIGN Project

The German development agency GIZ has launched the MA-RE-DESIGN project to address marine litter and promote sustainable plastic packaging in Thailand. This initiative supports the development of draft legislation and subordinate laws for EPR, along with the establishment of producer responsibility organisations (PROs). The project also includes capacity-building activities and sandbox projects to test innovative waste management solutions. By collaborating with stakeholders across the plastic value chain, GIZ aims to reduce plastic leakage into the marine environment as well as enhance Thailand's circular economy systems.

ITU's E-Waste Project

The International Telecommunication Union (ITU) has focused on creating a circular economy for electronics and electrical appliances in Thailand. This project provides technical assistance to develop a regulatory framework for e-waste management based on EPR principles. It includes drafting legislation, designing administrative arrangements, and establishing financing mechanisms to support sustainable e-waste

management. ITU's efforts aim to align public and private sector stakeholders in a common vision for e-waste governance, ensuring the retention of valuable materials and safeguarding environmental health.

UNEP's Sea of Solutions Initiative

The United Nations Environment Programme (UNEP) has spearheaded the Sea of Solutions initiative to tackle plastic pollution at its source. This programme serves as a platform for knowledge sharing as well as fostering collaboration among governments, businesses, academia, and civil society. It promotes market-based solutions and enabling policies to transform plastic value-chain management. Sandbox projects under this initiative test innovative approaches for reducing plastic waste, contributing to Thailand's efforts to advance circularity within the plastic value chain.

DEPA's Technical Assistance

The Digital Economy Promotion Agency (DEPA) has provided technical assistance to support the development of data systems for producer registration and source separation. These systems enhance transparency and accountability in waste management, enabling more efficient tracking of materials and compliance with EPR policies. DEPA's initiatives align with Thailand's broader goals of integrating digital solutions into sustainability practices.

The World Bank's Smart Recycling Hub

The World Bank has collaborated with Thai stakeholders to establish the Smart Recycling Hub, a pilot facility designed to recover and process recyclable materials. This hub incorporates advanced technologies to create high-quality secondary raw materials, supporting the circular economy. The initiative also includes feasibility studies and engineering designs to expand the hub's operations to other regions, such as the Eastern Economic Corridor (EEC), further strengthening Thailand's recycling infrastructure.

ADB's Technical Assistance for Plastic Circularity

The Asian Development Bank (ADB) has provided technical assistance to promote economic instruments for plastic circularity in Thailand. This includes analysing the feasibility of taxes on virgin plastics, deposit-refund schemes, and advanced recycling fees. ADB's blended approach combines short-term policy reforms with capacity-building and knowledge-sharing activities, helping Thailand balance economic and environmental gains while addressing marine plastic pollution.

These partnerships underscore the importance of international collaboration in driving Thailand's transition to a circular economy. By leveraging technical expertise, financial resources, and innovative solutions, development agencies have significantly contributed to the country's sustainability goals, fostering a more resilient and inclusive waste management system.

7. CONCLUSIONS AND WAY FORWARD FOR EPR IN THAILAND

The implementation of EPR in Thailand remains in its early stages, with policy frameworks increasingly identifying EPR as a key mechanism to support the circular economy. Although roadmaps and strategic plans highlight their importance, Thailand has yet to establish specific EPR-related regulations, resulting in limited practical experience with this approach.

Proposals for laws addressing the circular economy are underway, and coordination among different sectors is improving, albeit not yet fully optimised. At present, the emphasis on EPR is primarily on waste collection, with less focus on actual recycling processes and the broader circularity of materials.

Recommendations for enhancing EPR implementation in Thailand

Based on the findings and assessments throughout the report, presented here is a list of key recommendations for going forward.

Strengthen policy and legal frameworks

- Finalise and enact EPR-related legislation, particularly the Draft Circular Economy Promotion Act, Draft WEEE Management Act, and Draft Sustainable Packaging Management Act
- Establish clear institutional responsibilities and governance mechanisms to ensure efficient EPR implementation

Enhance stakeholder collaboration

- Foster stronger partnerships between government agencies, private industries, and informal waste collectors to ensure a seamless materials recovery process
- Encourage multi-sectoral cooperation for harmonising regulations and aligning incentives for EPR adoption

Improve collection and recycling infrastructure

- Invest in waste collection and sorting facilities to improve source separation and streamline the flow of recyclables into the circular economy
- Expand pilot projects to test scalable EPR solutions in different regions, particularly in under-served areas

Promote consumer awareness and participation

- Launch educational campaigns to encourage proper waste separation and recycling among households and businesses
- Implement financial incentives such as buy-back, trade-in or deposit-return schemes to promote responsible disposal practices

Encourage private investment in recycling innovation

- Provide tax breaks and subsidies to companies adopting sustainable production practices and utilising secondary raw materials
- Strengthen enforcement to prevent illegal waste imports and improper recycling practices

Establish a centralised EPR oversight body

- Create a national EPR coordination body to monitor compliance, set recycling targets, and facilitate data-sharing across industries
- Introduce mandatory reporting requirements for producers to improve accountability and transparency

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