

PLASTIC POLICIES IN THAILAND

Country Profile

Acknowledgements

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Abbreviations

Asian Development Bank
Alliance to End Plastic Waste
Bangkok Metropolitan Administration
Board of Investment
Compound annual growth rate
Deposit return system
Eastern Economic Corridor
Federation of Thai Industries
Gross domestic product
International Union for Conservation of Nature
Intergovernmental Negotiations Committee
Ministry of Natural Resources and Environment
Material recovery facility
Office of the Secretary-General of the Administrative Committee
Polyethylene terephthalate
Small and medium-sized enterprises
Thailand Business Council for Sustainable Development
Thailand Institute of Packaging and Recycling Management for the Environment
Thailand Institute of Scientific and Technological Research
United Nations Conference on Trade and Development
United States dollar
United Nations Development Programme
Ultra-high temperature
Waste Management & Recycling Academy

1. Context

Estimates suggest that Thailand generates over 3.2 million tonnes of plastic waste annually, amounting to nearly 44.8 kg of plastic waste per capita (Figure 1), which is significantly more than the global average (31.9 kg), and more than twice the average of countries that are covered by the SWITCH-Asia programme (20.1 kg) (EA 2024). Of the generated plastic waste, a total of almost 1.48 million tonnes, or 46%, is mismanaged. Per capita, this is 20.5 kg, which is almost twice as much as the global average of 12.5 kg per capita as well as the average of 12.2 kg per capita in countries where the SWITCH-Asia programme is active.



Figure 1. Plastic waste in Thailand in 2023

Source: Earth Action 2024 data, authors' calculations

Rank of Thailand in global comparison (out of 192, 192 being the highest in pollution/mismanagement)			
Plastic waste in metric tonnes	179		
Plastic waste per capita (kg/year)	138		
Mismanaged plastic waste in metric tonnes	180		
Mismanaged plastic waste per capita (kg/year)	166		
Share of mismanaged plastic waste	70		

With an estimated annual market value of USD 30 billion in 2022, the plastics industry in Thailand is a significant contributor to the country's gross domestic product (GDP). It is expected to grow at a compound annual growth rate (CAGR) of more than 5% until 2029 (Mordor Intelligence 2024). In 2021, the plastics industry accounted for approximately 7.7% of Thailand's GDP, highlighting the industry's critical role in linking the petrochemicals sector with various end-user industries. According to one study, there were roughly 200,000 people directly employed in the plastics industry, making a total of about 1 million people

economically dependent in one way or another on this sector (Marks, Miller, & Vassanadumrongdee 2020). Furthermore, the oil and gas industry, which extracts and processes the raw materials for plastic, contributed 1.4% to Thailand's GDP in 2021, according to World Bank data.

The plastics industry is moderately fragmented, with a mix of large corporations and numerous small and medium-sized enterprises (SMEs). As of 2022, there were 3,262 plastic converters in Thailand, divided between 88.5% SMEs and 11.5% large enterprises. The industry is moving towards a more concentrated structure, as indicated by the Herfindahl-Hirschman Index (HHI)¹ of 2,626 in 2023, up from 2,433 in 2017 (6Wresearch 2022). In order to react to market pressures demanding more sustainable production, Thailand has become the second-largest producer of so-called 'bioplastics'. Most of the overall bioplastics production is exported and only 10% are used domestically (see section 2.1 below) (ADB 2023).

The largest consumer industry of plastics is the packaging industry, which in turn is related to both the food and beverage industry as well as e-commerce. The second-largest consumer is the automotive industry, specifically of engineering plastics which are used to build light-weight components. Plastics in Thailand are further used for construction and building materials, electronics and electrical appliances, and for medical devices (Krungsri Research 2023).

Plastic-related trade data corroborate the important role of the plastic sector for Thailand's economy. Overall, in 2022, Thailand's trade volume of plastic-related goods and products amounted to USD 53.3 billion, which is almost 10% of Thailand's overall trade volume in products, and 2% of the global trade volume according to UNCTAD data. Thailand is a net exporter of plastic-related goods and products with a positive trade balance of almost USD 16 billion in 2022 (Figure 2). Plastics were exported mainly in primary forms (worth almost USD 13.48 billion) and as final manufactured plastic goods (worth USD 13.45 billion), which together amount to almost 78% of the country's total exports. These two product categories are also reflect Thailand's largest positive trade balance (USD 6.6 billion and USD 8.3 billion, respectively).



Figure 2. Plastic-related trade in Thailand in 2022 *Source: UNCTAD data 2024*

¹ The HHI is calculated by summing the squares of the market shares of all firms in a given industry. The resulting value ranges from close to zero, indicating a highly competitive market with many small firms, to 10,000, representing a perfect monopoly (Market Business News 2024).

2. Policy landscape

Thailand has few binding laws, regulations, or policies to address plastic pollution. Table 1 provides an overview of the relevant roadmaps and policies in place for preventing plastic pollution. These include command-and-control measures, provisions for market-based measures, and information requirements.

Two policies are focused on nationwide application:

- 1. The Roadmap on Plastic Waste Management 2018–2030: Phase II of that roadmap (2023–2027) is currently being executed
- 2. The Plastic Scrap Import Control Policy: Phase II of that policy is currently in place.

In addition, a third plastic policy was presented to the cabinet in 2024 and is planned to be implemented from 2027 onwards: the **Sustainable Packaging Act (2024)**.

2.1 The Roadmap on Plastic Waste Management 2018–2030 in its current second phase

The **Roadmap on Plastic Waste Management (2018–2030)** aims to reduce and eliminate the use of plastic, replacing it with 'environmentally friendly materials', and anticipating the re-use of all plastic waste by 2027 (Government of Thailand 2023a).

The second phase of the roadmap, which will run from from 2023 to 2027, has three goals:

- **100% reduction of target plastic waste entering landfills**, including all types of plastic bottles, bottle caps, single-layer plastic film packaging, plastic bags with handles, and plastic cups/glasses.
- 100% recycling of target plastic products, ensuring that all targeted plastic products are recycled.
- **50% reduction of plastic waste potentially escaping into the sea**, aiming to significantly reduce marine plastic pollution.

To achieve these goals, the roadmap seeks to implement 'eco-friendly product design', by promoting the design of products that are 'environmentally friendly' which can be easily recycled. It also aims to promote sustainable consumption, by encouraging the consumption of products and packaging that can be reused, and the implementation of waste management strategies that maximise resource recovery from waste through recycling and energy recovery.

Several points must be highlighted regarding the roadmap and the current phase II.

First of all, knowing exactly what constitutes *environmentally friendly* materials or practices (as well as what do not) will require clarification and specification. A case in point are polymers from non-fossil feedstock (such as sugarcane), which are often labelled 'bioplastic'. Worldwide, Thailand is the second largest producer of these polymers (ADB 2023). The term 'bioplastic' can, however, be misleading to consumers, who may assume that they are environmentally friendly and will eventually biodegrade, although this is not always necessarily the case: some bio-based plastics, like bio-PE, have the same chemical structure as their fossil-based counterparts, and they do not biodegrade. Instead they contribute to plastic pollution if they are not properly managed. This holds true even for bioplastics that are marketed as 'biodegradable'. These bioplastics require very specific conditions, such as a high temperature (~60° C), oxygen, and a certain percentage of humidity that can only be guaranteed in a composting facility. In sanitary landfills, such conditions are difficult to put in place; they never exist in unsanitary landfills. As long as Thailand does not have the necessary composting facilities, the vast majority of this 'sustainable' plastic will not biodegrade after it has been used (World Bank Group 2021). At the same time, depending on the raw materials used for production, new crop cultivation might lead to deforestation, loss of biodiversity and/or competition with

food production. While some countries invest in and heavily rely on the production and use of bioplastic (which can also refer to fossil-based but degradable plastics), others, such as Australia, France, and Taipei have entirely banned several types of bioplastics (ADB 2023).

Second, the roadmap specifically mentions energy recovery in addition to recycling as a sustainable practice. Yet, the issue of energy recovery is as contested as the issue of bioplastics. While the process of using the energy created by incinerating plastics is preferable to dumping, landfilling, open burning or regular incineration, it nonetheless constitutes a loss of resources for the economy while increasing pollution. Additionally, costs for setting up energy recovery plants are high and thus lock investments into an ultimately less sustainable practice: in order to recover investment costs, operators will need to incinerate plastic waste for many years to come. At the same time, incineration might create competition for feedstock between more sustainable mechanical recycling facilities and the energy recovery plants.

Third, and as with energy recovery, Thailand is relying heavily on chemical recycling, a process that converts plastic waste into its original monomers or other chemicals through chemical reactions. Unlike mechanical recycling, which involves physically shredding and melting plastics, chemical recycling breaks the polymer chains down into their basic building blocks, making it possible to create new, high-quality plastics and other products. There are different types of chemical recycling, e.g. pyrolysis, gasification, depolymerisation, and solvolysis, with varying effects both on energy use and the extent of negative effects on the environment. Regardless of the type, chemical recycling requires substantial energy inputs, often derived from fossil fuels, leading to significant greenhouse gas emissions. At the same time, the yield of usable recycled material from chemical recycling is often low. For example, a pyrolysis process might only yield 60-80% of the input plastic as oil, with the remainder becoming partially hazardous waste. In addition, the resulting oil will not necessarily be used to produce new plastics, but may be used as fuel in industrial processes, further reducing the recycled plastics yield (Quicker 2023). Finally, it is not clear whether any of the four types of chemical recycling can operate at a scale that would render them economically viable (Paddison 2024). Quicker (2023) argues that in developing countries with less stringent environmental regulations in particular, the operation of chemical recycling plants may be more likely to result in damage to the environment and to health. If Thailand includes chemical recycling as well as energy recovery practices in their definition of recycling, this means that the country's 100% recycling target is in actuality less ambitious than it may have seemed at first sight.

2.2 The Plastic Scrap Import Control Policy (2023)

In 2023 Thailand announced a total ban on plastic waste from other countries by the year 2025 in the form of the **Plastic Scrap Import Control Policy (PSICP; 2023)** (Government of Thailand 2023b). The PSICP was a consequence and response to the Chinese ban on the importation of plastic waste, which took effect in 2018. The Chinese initiative had initially led waste exporting countries (predominantly the developed countries) to divert their waste exports to alternative countries, thus overwhelming many already struggling recycling and waste management systems in Asia (Parker 2018). As a reaction, many of these recipient countries, such as Malaysia, Vietnam, and now Thailand, have started to close their doors to plastic waste imports (Igini 2022).

The overall goal of the policy is a total ban of plastic waste imports that is to be achieved in in three phases:

- In 2023, 14 manufacturers in Thailand's free trade zone using plastic waste as a raw material for their products were allowed to continue to import 100% of the amount they had been importing. The imports were not to exceed a combined production capacity of approximately 372,000 tonnes.
- In 2024, these 14 importers were required to halve these plastic waste imports.
- In 2025, no plastic waste imports will be allowed.

With this policy, the government aimed to prevent Thailand from becoming (or remaining) a dumping ground for plastic waste from other countries, and the policy was intended to protect human and animal health and the environment. As with all policies, it will be important to observe how strictly the regulation

will be enforced. If regulations are successful, the result will like be an upscaling of market demand for domestic plastic waste as feedstock for recycling. In this way the PSICP would target both the issue of trade as well as the end-of-life stage of the plastics lifecycle. Thailand may want to consider whether the PSICP could be accompanied by measures increasing demand for recycled materials in order to promote the recycling industry. It is to be noted that the names of the 14 plastics manufacturers were not disclosed in the available sources, so it remains unclear whether they include organisations conducting mechanical or chemical recycling, or even energy recovery.

2.3 The Draft Sustainable Packaging Act (DSPA; 2024)

This policy is in the draft stage. The draft, developed by the Ministry of Natural Resources and Environment, aims at setting the basis for future regulations to implement the principle of extended producer responsibility (EPR) for packaging (Lorax EPI 2024). As such, the draft act is not installing an EPR scheme, but is rather setting the institutional framework under which the scheme should be developed. In addition, the draft act currently anticipates setting the legal groundwork for banning specific single-use packaging. While the DSPA is thus rather ambitious in terms of covering the plastic lifecycle as well as the policy range options, it is unclear which of the proposed elements will make it into the final law.

Following several public hearings and exchanges with stakeholders, the Pollution Control Department is currently revising the draft regulation. Thereafter, the cabinet will need to approve the revised draft. Before relevant government agencies are involved, the Council of State will need to review and further amend the regulation. The final step will involve the House of Representatives considering the regulation before it is submitted to the King for signing.

According to the environmental regulatory information service Enviliance ASIA (2024), the current draft is structured into three sections, each one containing a number of different elements.

The first section aims at promoting sustainable packaging. The actions laid out in the section (developing goals, measures, and guidelines regarding different aspects of sustainable packaging management) are to be undertaken by a newly established Sustainable Packaging Management Policy Committee, chaired by the deputy prime minister and the permanent secretary of the Ministry of Natural Resources and Environment as the secretary of the committee (Enviliance ASIA 2024). To the authors' knowledge, the draft does not (yet) offer a clear definition of what constitutes sustainable packaging.

The second section prescribes the formation of a Sustainable Packaging Management Committee chaired by the Minister of Natural Resources and Environment. The Secretary of the Committee will be the Secretary General of the Pollution Control Department, which also headed the development of the Plastic Waste Management Roadmap (2018–2030). The duties of the Committee include recommending policies, formulating plans, determining types of packaging for reuse, establishing criteria for prohibiting single-use packaging, and setting compensation fees for environmental impact. The committee will also establish guidelines for labelling, registration of entrepreneurs, and promoting environmentally friendly packaging design. Manufacturers, on the other hand, will be made responsible for using environmentally friendly packaging, managing packaging through buy-back or deposit systems, and promoting the sorting and return of used packaging. These measures specifically targeting manufacturers are important steps in the realisation of EPR. Meanwhile, government agencies are required to reduce the use of difficult-to-manage packaging, procure products with minimal raw-material use, separate used packaging from other waste, and raise public awareness about sustainable packaging Enviliance ASIA 2024).

The third section aims at giving the relevant authorities the power to supervise and inspect relevant establishments, and to issue respective orders of compliance.

The Draft Sustainable Packaging Act represents a significant shift towards mandatory EPR obligations and away from previous voluntary actions: the aim is to reduce plastic pollution and promote sustainable packaging practices in Thailand.

2.4 Market-based policies

There are several market-based policy measures in Thailand whose purpose is to support 'eco-friendly' and bioplastic industries, including a variety of tax incentives intended to encourage investment and consumption in these sectors. Key measures include corporate tax exemptions and the promotion of environmentally friendly activities. For instance, companies in the bioplastic industry benefit from a 25% corporate tax exemption, initially implemented in January 2019 and extended in 2022, which supports the purchase and use of bioplastics in products (OOSGA 2023). Since 2021, a 5-year corporate income tax exemption is offered by the Board of Investment (BOI) to manufacturers of 'eco-friendly' polymers (ADB 2023). The BOI promotes various environmentally friendly business activities including the manufacture of eco-friendly chemicals and polymers, recycling and waste treatment, and the development of industrial estates or zones dedicated to environmental conservation (Baker McKenzie 2022).

In summary, the only measure touching upon primary plastic production are tax and non-tax benefits for producers of biofuels and biochemicals, which includes bioplastics under the Eastern Special Development Zone Act B.E. 2561 (Government of Thailand 2018). While these measures are presumably intended to reduce primary plastic production, they face the ambiguities regarding bioplastics that were outlined above.

Table 1. Overview of plastic-related policies in Thailand.

Source: Authors' work.

	Production (primary polymers)	Manufacturing (plastic products)	Consumption	Waste management/ End-of-life	Trade	
COMMAND AND CONTROL						
Mandatory performance/outcome standards (incl. targets)		Draft Sustainable Packaging Act (2024)		Draft Sustainable Packaging Act (2024)		
Mandatory process standards (incl. targets)			Draft Sustainable Packaging Act (2024)	Draft Sustainable Packaging Act (2024)		
Technological standards (incl. targets)				Draft Sustainable Packaging Act (2024)		
Prohibitions/bans (incl. phaseout)			 Prohibition of Single-use Plastics from National Parks Marine Fisheries Management Plan 2020- 2022 		 Draft Sustainable Packaging Act (2024) Plastic scrap import control policy (2023-2024) 	
MARKET-BASED						
Taxes/levies			Draft Sustainable Packaging Act (2024)			
Subsidies/grants/tax reductions	Eastern Special Development Zone Act B.E. 2561 (2018)					
Public procurement						
EPR/deposit refund schemes		Draft Sustainable Packaging Act (2024)		Draft Sustainable Packaging Act (2024)		
Liability schemes						
INFORMATION						
Taxonomies						

	Production (primary polymers)	Manufacturing (plastic products)	Consumption	Waste management/ End-of-life	Trade	
Data collection, reporting and disclosure		Draft Sustainable Packaging Act (2024)				
Labels		Draft Sustainable Packaging Act (2024)		Draft Sustainable Packaging Act (2024)		
Awareness raising/ capacity development						
GOVERNANCE/COORDINATION						
Roadmaps, plans and strategies		Phase II of the Roadmap on Plastic Waste Management 2018–2030 (2023–2027)	Phase II of the Roadmap on Plastic Waste Management 2018–2030 (2023–2027)	 Roadmap on Plastic Waste Management 2018–2030 Phase II of the Roadmap on Plastic Waste Management 2018–2030 (2023–2027) 		
Inter-ministerial coordination	 Draft Sustainable Packaging Act (2024) Roadmap on Plastic Waste Management 2018–2030 Overarching policies are being developed by and implemented through different ministries and institutions in Thailand, showing the countries coordinating efforts to ensure cooperation among different ministries, departments, and agencies, as well as industry associations and NGOs (Rujivanarom 2021). 					
Public-Private partnerships	PPP Plastics (2018): jointly led by the Thailand Business Council for Sustainable Development (TBCSD) and the Plastic Industry Club, and the Federation of Thai Industries (FTI). Network partners include petrochemical giants (e.g. Dow Thailand, BASF), consumer product giants (Nestlé, Unilever, Colgate-Palmolive) one car manufacturer (Mitsubishi Company), several ministries (natural resources and environment, industry, interior, higher education, science, and research & innovation) and connected departments (pollution control department, department of environmental quality proportion among others), international organisations, (IUCN, UNDP, Yunus Thailand Foundation), educational institutions, and industry organisations, predominantly from the petrochemical industry, as well as one organisation from civil society (Thailand environment institute).					
SPECIAL FOCUS SECTOR: AUTOMOTIVE						
	Use of plastic in the Thai automotive industry and supply chains is set to grow in the years to come.					
	Reasons are the demand for ever-lighter materials to decrease fuel and/or energy consumption and, in particular for electric vehicles (EVs), to increase vehicle driving range.					
	To date, there are no efforts being made to decrease the use of plastic in the Thai automotive industry (including supply chains).					
	A recent proposal for an EU regulation regarding the end-of-life of vehicles intends to prescribe that 25% of the plastic materials used in new vehicles must be recycled materials and that 30% of plastic materials from vehicles reaching their end-of-life must be recycled. (EU Commission 2024).					
	If the proposed EU legislation is adopted in its current form, this may also affect or inspire the Thai automotive industry to take action.					

3. Private sector innovations

While the private sector in Thailand is actively engaged in various innovative efforts to reduce plastic pollution, efforts are strongly tied to downstream measures (e.g. waste sorting, waste management or recycling), instead of being focused on re-use and reduction activities. The most significant and widespread activities that can be counted as efforts towards reducing fossil-based primary plastic production have been those that were undertaken in promotion of bioplastic production, the problems of which have been outlined in Section 2.

In Thailand the private sector has been instrumental in promoting an 'extended producer responsibility' (EPR) system. In 2019 a coalition of private companies voluntarily established the Packaging Recovery Organization Thailand Network (PRO-Thailand Network), which was officially launched in June 2023. This network aims to support a system for collecting and recycling used packaging to reduce environmental

waste. The PRO-Thailand Network includes seven member companies: Coca-Cola (Thailand) Limited, Suntory PepsiCo Beverage (Thailand) Limited, Tetra Pak (Thailand) Limited, Thai Nam Tip Corporation Limited, Nestlé (Thailand) Limited, Pepsi-Cola (Thailand) Trading Limited, and SIG Combibloc Limited. Through a pilot project from 2020 to 2022, the network successfully collected and recycled three types of used packaging: PET (Polyethylene Terephthalate) plastic bottles, Ultrahigh-temperature (UHT) treated beverage cartons, and flexible packaging. Their efforts resulted in the collection of more than 25,100 tonnes of PET bottles, over 180 tonnes of UHT treated beverage cartons, and almost 80 tonnes of used flexible packaging.

A circular economy requires more than reuse and recycling, which for plastics, remain costly, degrade material quality, and cover only 9% of global plastic waste. A more effective circular economy approach must prioritize reduction, eliminate harmful plastics, and design products for durability, reuse, and recyclability. Strengthening waste management, making recycled materials competitive, and preventing plastic leakage are also key. Beyond recycling, a well-coordinated strategy integrating regulatory, market-based, and design-driven measures is essential for a sustainable and resilient plastics economy.

Additionally, the Thailand Institute of Packaging and Recycling Management for the Environment (TIPMSE), under the Federation of Thai Industries, launched a pilot EPR packaging project in Chonburi province in 2021. Known as PackBack, this project aims to promote sustainable packaging management by involving various stakeholders, including local communities, informal recyclers, scrap dealers, and collectors. The PackBack project serves as a model for a nationwide EPR system, gathering valuable data and lessons learnt to inform those who will potentially propose future legislation. TIPMSE has also collaborated with Kasetsart University on a research project to support a future EPR system which involves analysing the material flow of five types of packaging, evaluating costs throughout the packaging value chain, and assessing the environmental impact of managing all of these types of packaging wastes. The findings will provide a database for developing a nationwide EPR system (Enviliance ASIA 2024).

The voluntary EPR system will be replaced by a government-led nationwide mandatory EPR system once the Draft Sustainable Packaging Act is approved and subsequently implemented (starting probably in 2027, see section 2.3).

Another initiative, the Thailand Public Private Partnership (PPP) for Plastic and Waste Management, also known as PPP Plastic and launched in 2018, is a collaborative effort between government ministries and private entities, and it includes international organisations and educational institutions as well. Under the leadership of the Thailand Business Council for Sustainable Development and the Plastic Industry Club of the Federation of Thai Industries, its mission is to promote sustainable plastic waste management across different sectors. As of 2022, 39 organisations had joined. The primary objective of PPP Plastic is to advance Thailand's Roadmap on Plastic Waste Management 2018–2030 (see Section 2.3 and Table 1). The

specific targets include first reducing and phasing out certain plastics by adopting eco-friendly alternatives, and then achieving a 100% reuse rate of targeted plastic waste by the year 2027.

One very active player in Thailand is the Alliance to End Plastic Waste (AEPW), which is made up of large multinational corporations as well as smaller companies active in the plastics, packaging, and related industries. The AEPW has faced significant criticism from civil society organisations and other actors, primarily due to accusations of greenwashing and failing to meet objectives. Greenpeace has been a vocal critic, labelling the Alliance as a marketing ploy by big oil companies to generate positive headlines while continuing to expand global plastic production. This criticism intensified in 2021 after a Reuters investigation revealed the collapse of AEPW's flagship project, Renew Oceans, which was claiming to clean the Ganges River but fell drastically short of its targets, and having collected only a fraction of the promised plastic waste (Wheeler 2021).

Nevertheless, one significant initiative of the AEPW in Thailand has been the collaboration with the Thailand Institute of Scientific and Technological Research (TISTR), Bangkok Metropolitan Administration (BMA), PPP Plastics, and the Eastern Economic Corridor (EEC). The partners are working on the Smart Recycling Hub Project, which aims to establish a Material Recovery Facility (MRF) infrastructure, focusing on recovering high-quality plastic waste and transforming it into alternative feedstocks for the recycling industry (The Nation 2023).

A further programme financed by the AEPW, the Incubation Network, is another key player supporting earlystage start-ups focused on circular economy solutions. It has launched initiatives in Thailand to tackle plastic pollution by aiding local entrepreneurs. The network collaborates with the Thai Government's Public Private Partnership for Plastic and Waste Management (PPP Plastic), which aims to reduce over 50% of marine plastic debris by 2027 (The Incubation Network 2021).

An additional two organisations investing in the Incubation Network are SecondMuse and Seedstars, which have launched the Thailand Waste Management & Recycling Academy (WMRA) to support innovative entrepreneurship in waste management and recycling. The academy provides development activities, mentoring, and support for start-ups to pilot their solutions, notable among which are included Plaplus, which focuses on bioplastic waste processing and recycling; ReNew Innovations, which develops biocoating solutions for cellulose-based products; Micro Greentech, which creates Reverse Vending Machines for PET plastic bottles and aluminium cans; and REBOON, which establishes waste separation and recycling centres within community temples (SecondMuse 2023). For the moment these projects remain in the pilot phase, and whether they will reach significant scale and impact any time in the future is uncertain.

Finally, Thailand is also one of the countries participating in an initiative funded by the International Atomic Energy Agency to explore the potential of radiation technologies in plastic recycling (IAEA 2024).

4. Challenges

Thailand's fight against plastic pollution is deeply influenced by the country's geographical and climatic conditions, industrial activities, and policy enforcement capabilities, each adding layers of complexity to the issue.

The country's topography, featuring a long coastline and numerous rivers, significantly contributes to the plastic waste challenge, as these water bodies often carry mismanaged waste from urban areas to the ocean, including from other countries. A study by the World Bank (2022) highlighted that districts near Bangkok are major contributors to plastic waste entering Thailand's water systems. Further geographical challenges in managing waste include the stark differences in terms of waste management capacities between rural and urban areas. According to the same study, rural areas have no efficient or coordinated waste management, leading to lower collection rates compared to urban areas, which in turn leads to more open dumping (including directly into waterways).

Economically, Thailand's reliance on plastic is evident in sectors like food and packaging, which are integral to both domestic consumption and exports. The plastic industry supports economic growth and employment. This is probably one of the reasons why industry groups (e.g. plastics, packaging and food sectors) are highly influential players in designing and implementing policies. For example, industry lobbyists ultimately stopped an approach by Prime Minister Abhisit Vejjajiva in 2010 to develop a tax on packaging (Marks et al. 2020). The Roadmap for Plastic Waste Management was watered down mostly so as to suggest voluntary actions, as opposed to laying out legally binding incentives and disincentives. The importance and presumable influence of the (plastic) industry also became visible at the fourth session of the Intergovernmental Negotiations Committee (INC) to develop a legally binding instrument on plastic pollution, when for the first time in the process, the Thai delegation was officially enlarged by two representatives from the Federation of Thai Industries (UNEP 2024). One delegate was employed by petrochemical giant Dow Thailand, the other by SCG Chemical Public Company Limited.

Policy enforcement and waste management strategies in Thailand have nonetheless been evolving. As outlined in the policy sections above, the government's Roadmap on Plastic Waste Management in particular will rely on voluntary measures to significantly cut plastic waste by 2030. A strong legal foundation that would have enabled the government to effectively enforce the measures in case of non-compliance has thus not been provided. If voluntary measures fail to make good on what they promised, the threat of binding regulations can encourage actors to strengthen their efforts. In addition, voluntary measures are oftentimes built on collaboration across all sectors of society to manage plastic waste appropriately, and thus in the final result they can be quite effective. Yet, a representative of an international NGO in the study of Marks, Miller and Vassanadumrongdee (2023) highlighted that without binding regulations, there is little legal basis for the executive to enforce commitments, and companies would therefore be hesitant to act.

Thailand's reliance on energy recovery and chemical recycling as outlined above, in tackling plastic pollution, poses further challenges to the achievement of a truly sustainable systemic transformation into a circular economy. Investments in both technology and related infrastructure will ultimately pay off only if the country (and the world) continue to produce plastic and the resulting waste at current rates. There are thus no incentives for the overall reduction of plastic waste through improvements during the design stage, by the use of secondary materials, or by switching to more sustainable non-plastic materials and business models.

Negative repercussions and external costs of plastic production in Thailand

Environmental

- 322,000 tonnes of plastic enter the oceans annually
- Marine life is endangered (e.g. through plastic ingestion)
- Ecosystem disruption in aquatic environments (The Incubation Network 2022)

Economic

- USD 3.6 billion lost annually from improper plastic recycling
- Only 17.6% of key plastic resins recycled (2018), below the target of 22%
- True cost to society and the environment ~10x higher than market price (World Bank 2021)
- Plastic waste on beaches lowers revenues in the tourism sector

Societal

- Rapid increase in plastic waste (12% annually)
- Burden on local waste management systems
- Health risks from environmental degradation (WWF Thailand 2020)
- Health risks from unregulated hazardous chemical additives

5. Way forward

To tackle plastic pollution, Thailand might need to consider several strategic adjustments and enhancements to current national policies and practices.

The ambiguity surrounding 'environmentally friendly' materials, particularly bioplastics, would need to be addressed through the clarification and standardisation of terms and materials. Clear definitions and standards would be beneficial to guide consumers and industries in understanding what constitutes truly sustainable material. This task will involve educating the public about the realities of bioplastics, including their extremely negative environmental repercussions and the conditions required for proper biodegradation, as well as clear legislation to limit the potentially harmful impact of non-biodegradable materials.

Given the significant production of plastics in Thailand, and the relative power of the producing corporations, and despite the negative effect of plastics production, consumption and waste, it seems unlikely that Thailand will intrinsically reduce overall plastic production in a rapid manner. A more realistic scenario would be a shift from fossil feedstock to bio-based feedstock accompanied by an increase in the market share of 'bioplastics'. If this is to be the chosen path, it would be advisable to set material standards and subsequently invest in the necessary composting facilities to ensure that bioplastics will be disposed of correctly. Such vigilance would prevent bioplastics from further contributing to the disaster of plastic pollution. The issue of bioplastics is also being discussed in the realms of the INC under the heading of 'alternative plastics and plastic products', which include bio-based, biodegradable and compostable plastics. Most states agree that these need to be safe, environmentally sound and sustainable, though what exactly this entails is still open for debate.

In addition, the practices of energy recovery and chemical recycling should be evaluated. Although these form part of the current waste management strategy, they are questioned by many experts in terms of their long-term sustainability. The economic and environmental costs of these methods might need to be considered and more sustainable alternatives be explored, such as enhancing mechanical recycling capacities, and supporting innovations that reduce the need for virgin plastic production. While the issue of chemical recycling did not make it into the latest draft of the negotiation text at the INC, countries strongly disagree whether or not energy recovery should be viewed as a sustainable measure in the waste hierarchy. The fact that chemical recycling is not mentioned in the negotiation text might result from the fact that the proponents of this recycling method do not want to encourage any debate on environmental and health implications, because all of them are clearly negative. When the UN Environment Programme in 2023 mentioned chemical recycling as one option to solve plastic waste issues in a report (UNEP 2023), there was a loud outcry at INC-2 in Paris, France, in particular from civil society organisations.

The Draft Sustainable Packaging Act and its focus on EPR is an important initiative, and it would be important to assure that this policy is robustly implemented by requiring producers to take responsibility for the entire lifecycle of their products. EPR compliance could reduce the volume of plastic entering the waste stream as well as promote the use of recyclable and reusable materials. It is likely that the Global Plastic Treaty will include a provision mandating EPR. By taking early actions, Thailand would already be a step ahead in terms of the Treaty's implementation.

Import controls, in particular regarding the Plastic Scrap Import Control Policy, can moreover be strictly enforced to prevent international waste shipments being mishandled and contributing to the plastics waste problem. This policy could be complemented by measures encouraging the use of domestically generated recycled materials, thus supporting local recycling industries. Such measure could be included in a National Action Plan, as will likely be prescribed by the Global Treaty.

Regarding industry, it would be advisable for market-based incentives for the adoption of sustainable practices in the plastic and packaging industries to be expanded, including tax incentives for companies that reduce the use of virgin plastics and increase the use of recycled materials. This could also become part of a National Action Plan under the Global Agreement.

To foster industry, it would be beneficial to support innovation and technology. Investing in research for alternatives to plastic, as well as technologies that can recycle plastics more efficiently and with reduced environmental impact, is of great importance. Exploring alternatives to plastics offers numerous advantages. Economically, it could encourage innovation and open new markets and job opportunities within the green technology sector. Environmentally, reducing reliance on traditional plastics may help mitigate pollution and conserve natural resources, contributing to a healthier ecosystem. Societally, this transition could lead to improved public health outcomes and foster a culture of sustainability and responsibility. Establishing innovation hubs in Thailand could provide a platform to develop and test new recycling technologies and sustainable materials. Additionally, the country could gain significantly from enhanced sharing of innovation and technology, as anticipated in the latest draft of the Global Plastic Treaty.

Moreover, raising public awareness about the long-term environmental impacts of plastic pollution, alongside the importance of recycling, could greatly influence systemic change. Educational campaigns might focus on health aspects, including the dangers of micro- and nanoplastics and added chemicals. Campaigns could also take up systemic aspects, including the role of vested interests in promoting further plastics proliferation, the limited economic advantages, as well as plastics growth trajectory in a situation of regulation and enforcement gaps. Educational campaigns could also inform about individual choices regarding reduction of plastic usage, as well as the relatively limited role that downstream measures, such as increasing re-use, proper pre-sorting of waste, and recycling can play to solve the looming environmental crisis.

Continuous monitoring and evaluation of policy effectiveness can help adjust strategies in real-time to ensure that the goals of reducing plastic proliferation and pollution will be met. Such actions can include data collection of plastic waste generation, recycling rates, and policy compliance. Such data would also likely be needed in order to comply with the respective provisions of the Global Plastic Treaty.

By embracing a comprehensive approach to managing plastic pollution, and defining a new balance between companies' interests and societal expectations of lowering pollution levels and limiting environmental degradation, Thailand has the potential to significantly enhance its sustainability efforts. This would lead improved environmental quality, which is essential for Thailand given the economic significance of its tourism sector. In addition, it would lead to enhanced public health, and the creation of new economic opportunities through innovation in sustainable materials and practices. By leveraging these potential benefits, Thailand may position itself as a leader or sustainable development in the region, and globally.

How would the Global Plastics Treaty help? Through its provisions the treaty could:

- By developing clear definitions and material standards for materials, including bioplastics or what constitutes an 'environmentally friendly' material
- By stimulating awareness-raising, education and research through treaty provisions on these issues
- By supporting the introduction of EPR in other countries through treaty provisions and guidance thereon, thus potentially levelling the playing field for Thai producers
- By fostering international collaboration via provisions on international cooperation, information exchange and technology transfer
- By facilitating data collection through a provision on transparency, tracking, monitoring and labelling
- By providing funds for investments into waste management via treaty mechanisms for raising financial resources
- By fortifying capacity and strengthening regulatory frameworks via support for capacity-building initiatives and technical assistance

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