

# Waste Management in Thailand

# Summary

Thailand's waste management has seen an improvement throughout the decades which caused to a higher waste utilization in all type of waste. This is mainly due to the development of waste management system driven by government policy, plans and supports. Moreover, the development of advanced technology has been widely adopted as the disruption in its traditional waste management system which efficiently enhance a proper management. Although Thailand's waste management has increasingly developed, yet still need to improve as Thailand has an opportunity to develop further, particularly by the emerging circular economy in order to approach sustainable growth.

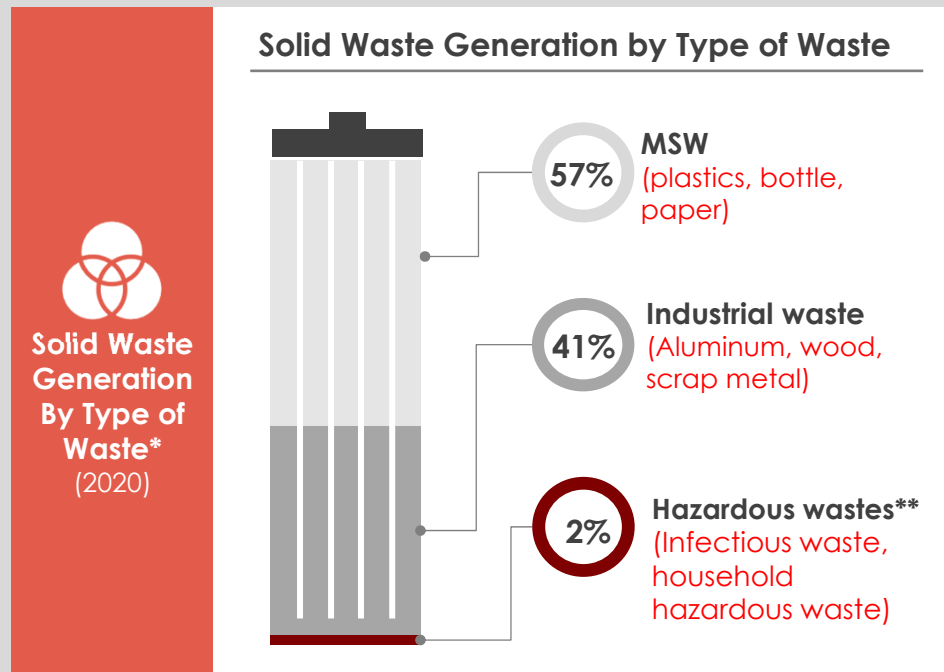


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# Overview of Waste Generation and Management in Thailand

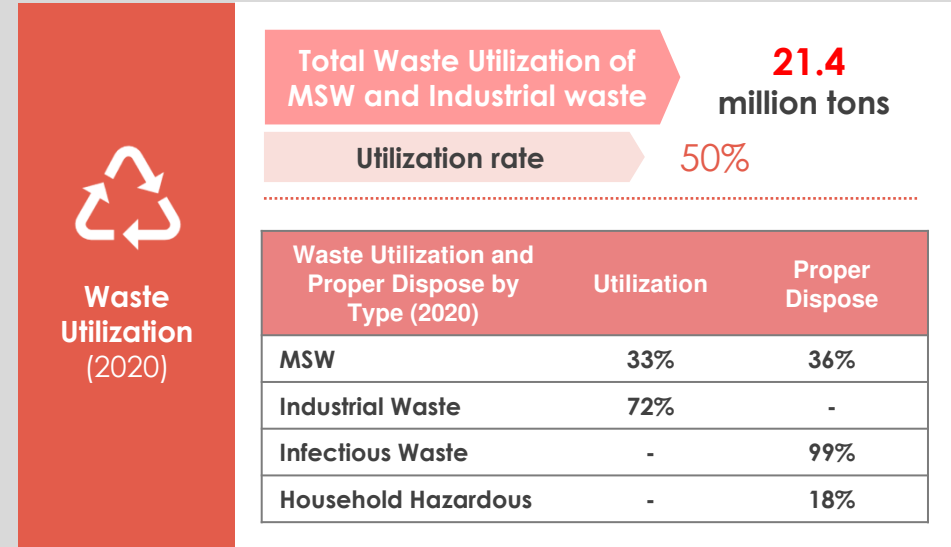


Source: Pollution Control Department (PCD)

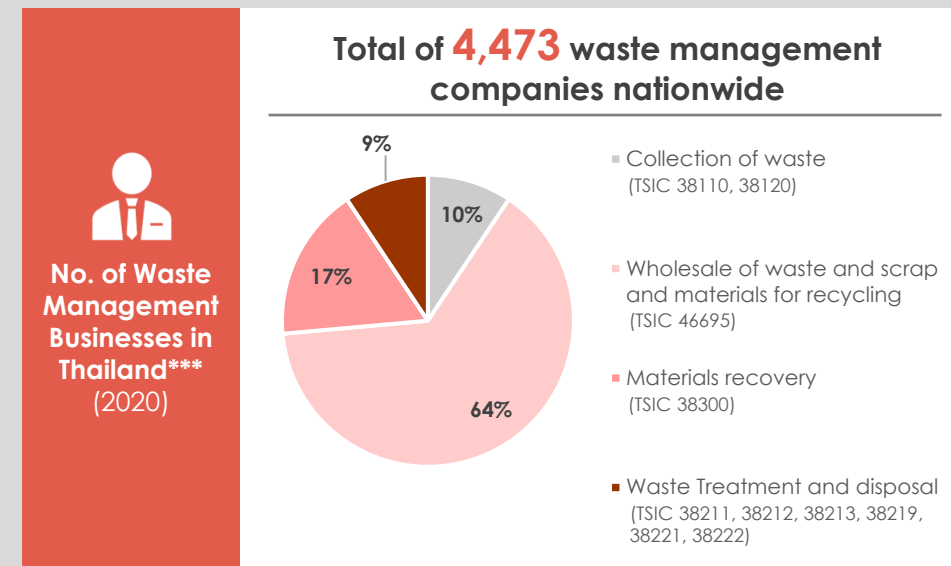
Note: \*Total waste generation includes only solid waste, not include wastewater.

\*\*Hazardous waste mentioned in this section includes household hazardous waste and infectious waste.

\*\*\*Please note that the no. of waste management businesses in this section includes only the company that registered with TSIC.



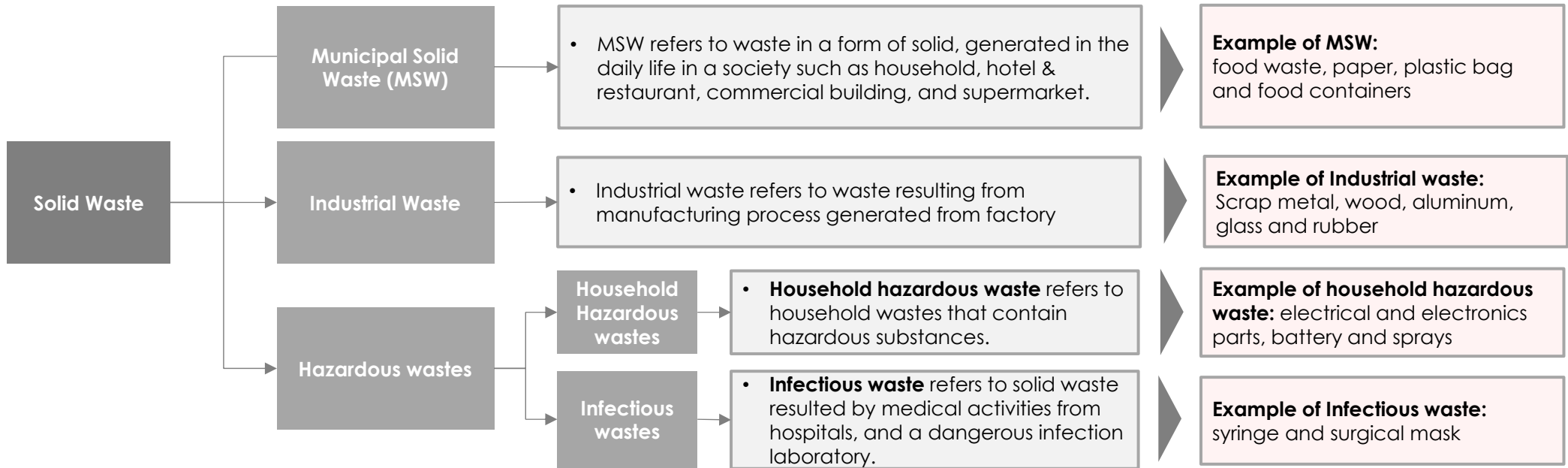
Source: Pollution Control Department (PCD)



Source: Department of Business Development (DBD)

# Classification and Definition of Waste in Thailand

## Classification and definition of waste in Thailand



## Waste Management Structure in Thailand

- The general flow of waste management system in Thailand is divided into three stages: waste generation, waste collection & sorting & transportation and waste processing.

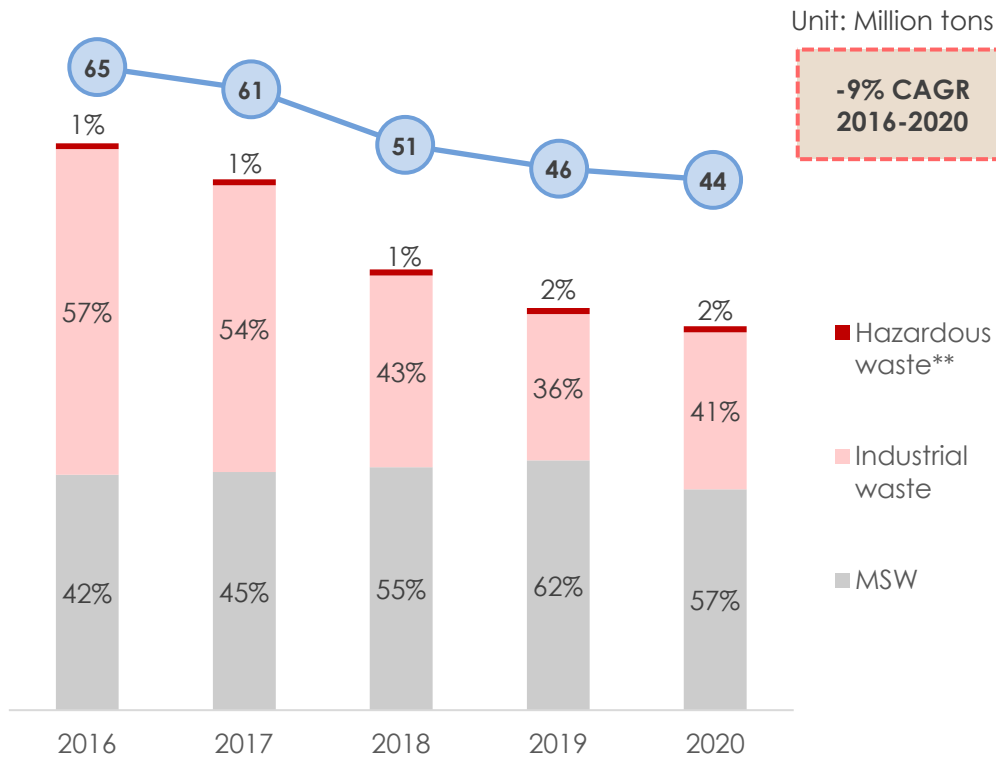


However, Thailand has separated waste management system for MSW and industrial waste, therefore, the process of waste to recycling is different as well as the stakeholders involved in each system.

Source: Pollution Control Department (PCD), Department of Industrial Works (DIW), Krungthai Compass

# Recent Trend of Waste Generation in Thailand

## Total Solid Waste Generation\* (2016-2020)



- In 2020, total amount of waste generation have found a decreasing trend during 2016-2020 period which was accounted at 44 million tons in 2020, decreasing by 5% from 46 million tons in 2019 and grew at -9% CAGR during 2016-2020.
- In 2020, MSW comprised the largest amount of waste generation, at 57%, followed by industrial waste (41%) and other waste generation (2%).

Source: Pollution Control Department (PCD), Public news

Note: \*Total waste generation includes only solid waste, not include wastewater.

\*\*Hazardous waste mentioned in this section include household hazardous waste and infectious waste.

## Factors Affecting The Amount of Waste Generation



- Overall, MSW generation has been increased during 2016-2019 due to
  - an expansion of urbanization
  - an increasing of tourists
  - an increasing in online delivery packaging
- In 2020, MSW generated in the community was declined as a result of a decreasing number of tourists traveling to Thailand during COVID-19.

### Plastics Waste:

- According to Pollution Control Department, plastics waste has been generated approximately at 2 million tons per year which majority is a single-used plastic from food delivery service.
- Only 25% of plastics waste are utilized annually.
- Therefore, the government has implemented the 'Plastic Waste Management Plan 2018-2030' in order to reduce the whole plastics waste in the country.



Between 2016 and 2020, industrial waste emissions decreased by half (37Mton (2016)→18Mton (2020)). The decline in industrial waste generation is caused by

- **The government policies** to control the amount of waste generation and efficient management.
  - **Industry 4.0 Strategy (2017-2036)** to promote the resource utilization to reduce waste across the production supply chain for industrial factory.
  - **Ministerial Notification of industrial waste disposal** under the DIW (Department of Industrial Works).
  - **Restrictions on excess imports** of recyclable industrial waste from abroad, particularly China, started since 2018.

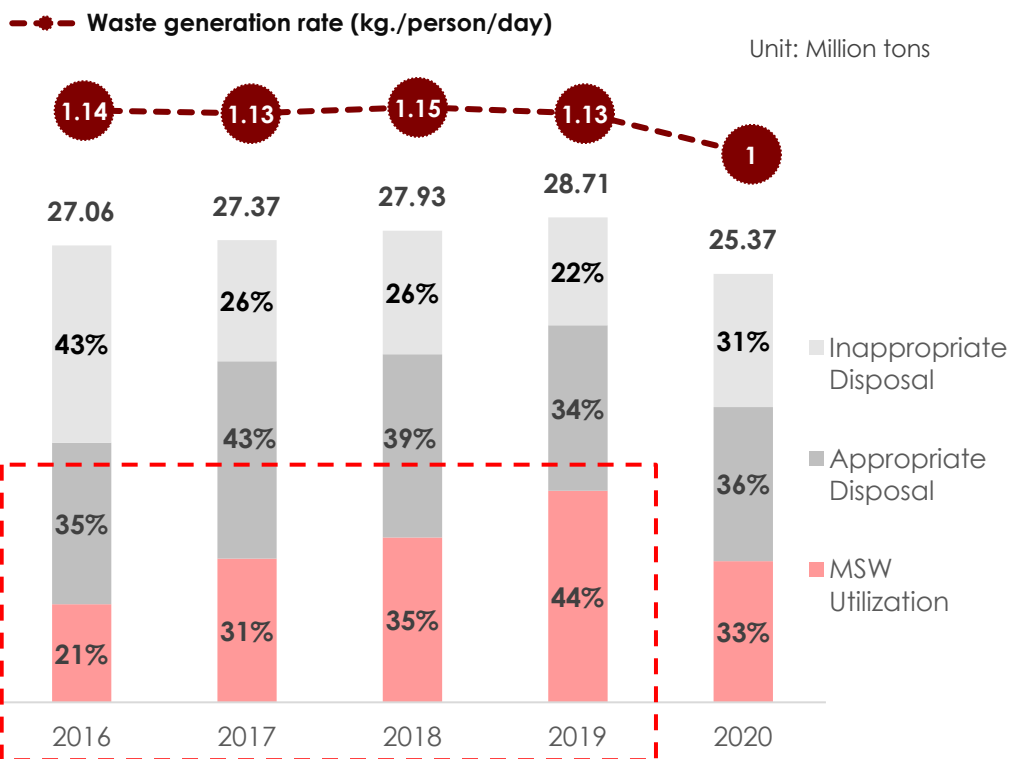


- The COVID-19 pandemic has resulted in a higher amount of infectious waste, caused mainly by medical activities particularly used mask.

# Recent Waste Management Situation in Thailand: MSW

- Overall, waste management in Thailand has been improved during 2016-2019 as the proportion of MSW utilization had increased from 21% in 2016 to 44% in 2019 mainly due to government policies such as Plastic Waste Management 2018-2030 (To reduce plastics in the whole country) and 3Rs strategy adopted under Thailand's 20-year National Strategy 2017-2036 (Reuse, reduce, recycle to achieve sustainable development goal).
- Meanwhile, The implementation of various policies drives a better separation at generated source causing to a decline in an inappropriate disposal from 43% in 2016 to 31% in 2019.
- In 2020, the COVID-19 caused negative impacts on waste management as the proportion of MSW utilization and appropriate disposal were declined and inappropriate disposal was increased, mainly caused by
  - The difficulty for waste pickers or waste collector that come to collect or purchase waste at generated source in a community during lockdown.
  - Lower capacity of waste disposal due to a ceased operation of many waste management companies.

## MSW Management Trends (2016-2020)



- Recently, there are total 2,274 disposal sites and transfer stations in Thailand.
- However, various disposal sites still operate improperly such as open dump, open burning and incineration without an air pollution treatment system.
- Therefore, Thailand still need to improve since more than 80% of total disposal site and transfer station is inappropriate.

### No. of MSW Disposal Site and MSW Transfer Station

	2019	2020
Appropriate MSW Disposal Sites	409 (15%)	335 (16%)
Inappropriate MSW Disposal Sites	2,257 (84%)	1,891 (83%)
Transfer Stations	25 (1%)	28 (1%)
<b>Total</b>	<b>2,691</b>	<b>2,274</b>

Source: Pollution Control Department (PCD)

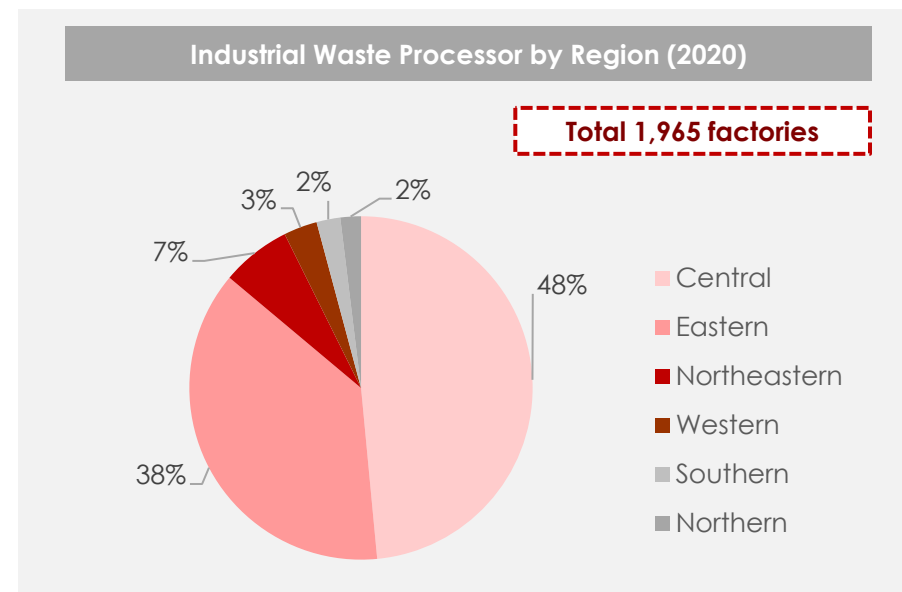
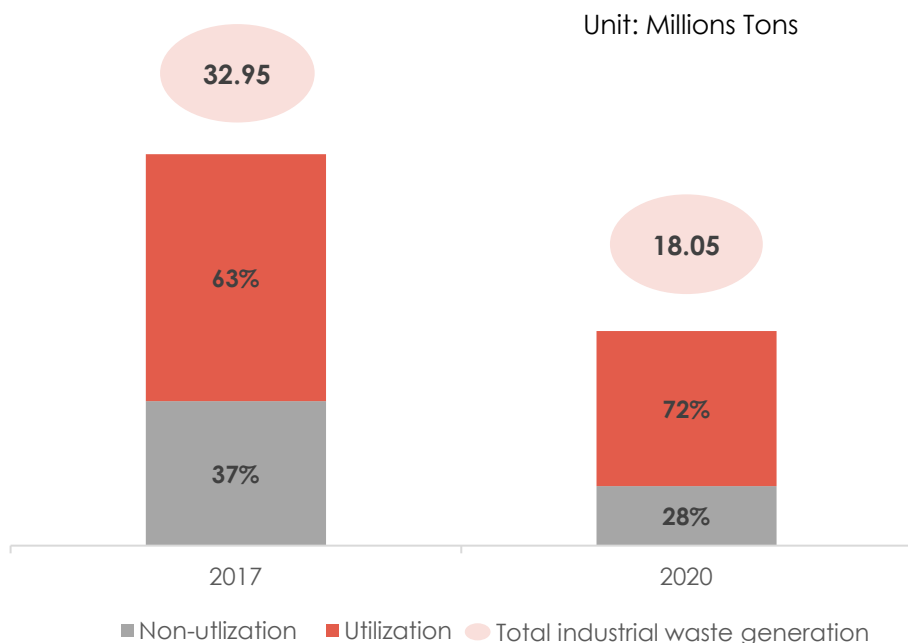
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# Recent Waste Management Situation in Thailand: Industrial Waste

- Overall, industrial waste generation has been decreasing mainly due to waste related policies and regulations by Thai government as listed below, as well as a decrease in domestic production due to economic slowdown caused by the COVID-19 pandemic;
  - ✓ Industry 4.0 (2017-2036): Promoting waste reduction and utilizing the use of resource throughout the supply chain.
  - ✓ Notification of Ministry of Industry Re: Hazardous waste manifest system B.E. 2547 (2004): Efficiently control a proper waste disposal methods to enhance a proper waste utilization.
  - ✓ Restriction of imports quota since 2018: Limiting the amount of imports quota from abroad.
- Industrial waste utilization rate has increased from 63% in 2017 to 72% in 2020, resulted mainly by the Circular Economy model and other related policies such as 3Rs and Thailand's 20-year National Strategy.

## Industrial Waste Management Trends



Source: Pollution Control Department (PCD)

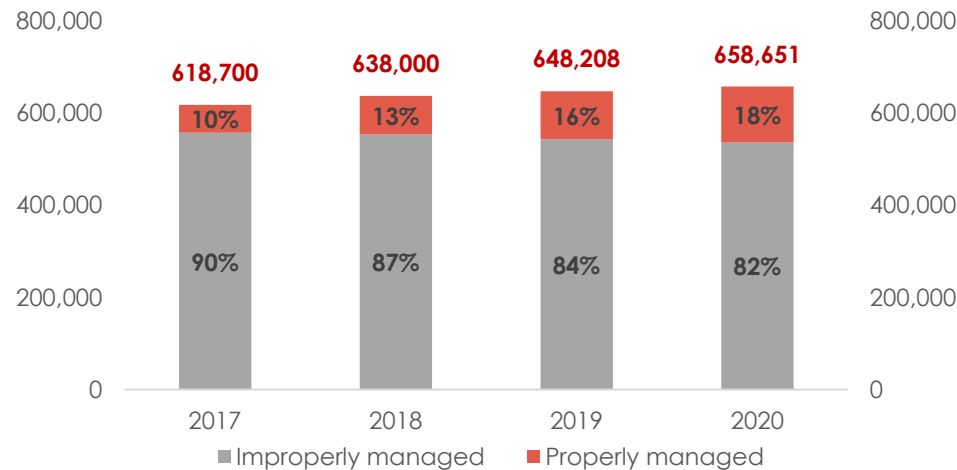


# Recent Waste Management Situation in Thailand: Hazardous Wastes

- Hazardous wastes comprise of household hazardous waste and infectious waste which totally account at 706,613 tons or 2% of total waste generation in 2020.
- Overall, household hazardous waste management still requires an effective law and regulation implementation as well as the promotion to increase the people awareness towards its impact to reinforce the waste management system of this waste.

## Household Hazardous Waste Generation

Unit: Tons

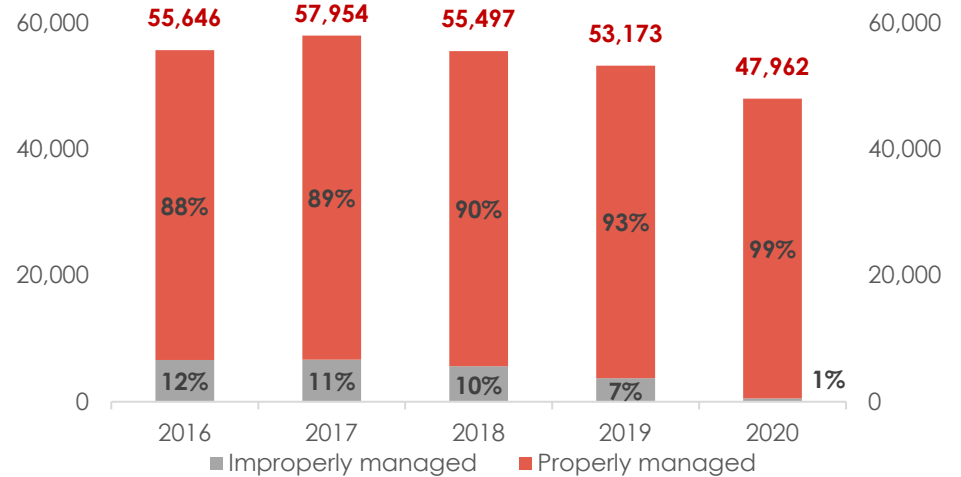


Of total, 65% was electrical and electronics parts and equipment, while 35% was other type of household hazardous waste such as batteries, chemical containers, and aerosol spray.

- The amount of household hazardous waste that has been properly managed has seen an increasing trend, yet still relatively low, at 121,695 tons or only 18% of total generation.
- This is due to a lack of people awareness on the impact of household hazardous waste that cause to health and environment as well as no strict regulation to control and manage this type of waste, leading to a rise in non-separation and collection at the first stage.

## Infectious Waste Generation

Unit: Tons



Infectious waste is caused by medical activities from hospitals, private hospitals, clinics, animal hospitals and a dangerous infection laboratory.

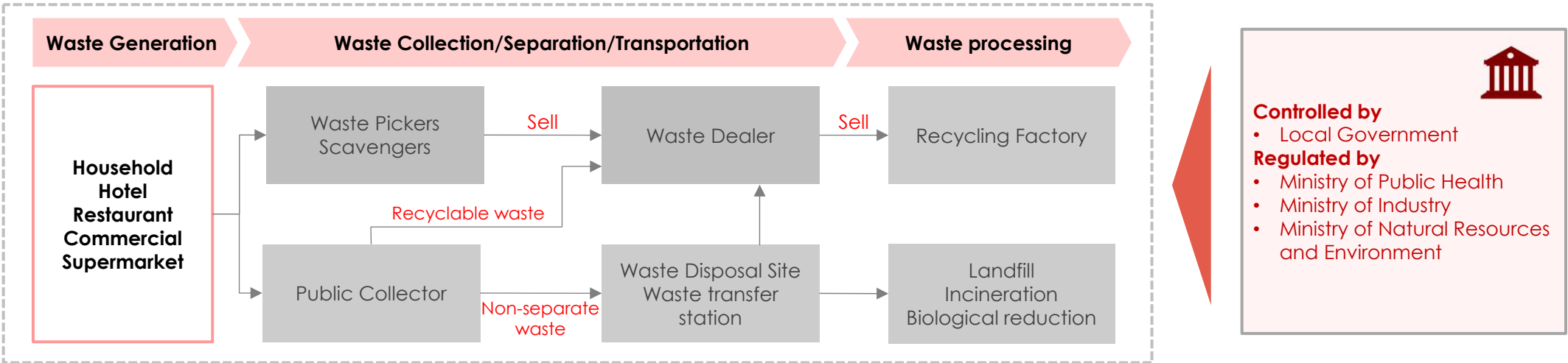
- The infectious waste has been properly managed, at 99% of total infectious waste generation in 2020 due to a highly control and manage to prevent the spread of infectious disease that are done by various department including PCD, local and public authorities.
- Those infectious waste were managed through various methods including disposing in landfill, burning in the incinerator and steam sterilization.

Source: Pollution Control Department (PCD)

# Waste Management Structure in Thailand: MSW

- The flow of MSW management process starting from collecting waste by public collector, waste pickers or scavengers from waste generators such as households, restaurants and commercial buildings, and further sell to waste dealer or transfer to waste disposal site for further waste processing process such as recycling, landfill, incineration or biological reduction.
- Waste pickers and waste dealer played a significant role in Thailand's MSW management as waste picker act as an intermediate role to management waste at source, while waste dealer has a control over waste trading before transferring to waste processor.
- Thailand's MSW management is unsystematic since there is no centralized control as local government in each region has different regional regulation and policy.

## MSW Management Process



- Controlled by**
- Local Government
- Regulated by**
- Ministry of Public Health
  - Ministry of Industry
  - Ministry of Natural Resources and Environment

### Public Collector:

- A local government that collect waste from a community such as household, restaurant and commercial.
- After a primary separation, recyclable waste will be sold to waste dealer.
- Non-separate waste will be transferred to disposal site for further process.



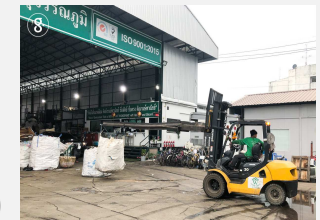
### Waste Pickers:

- A person who collect or buy reusable or recyclable waste from a community such as household, restaurant and commercial for personal consumption or to sell to waste dealer.
- They are responsible for a primary separation from waste source as well.
- Waste pickers mostly are small and informal businesses.



### Waste Dealer:

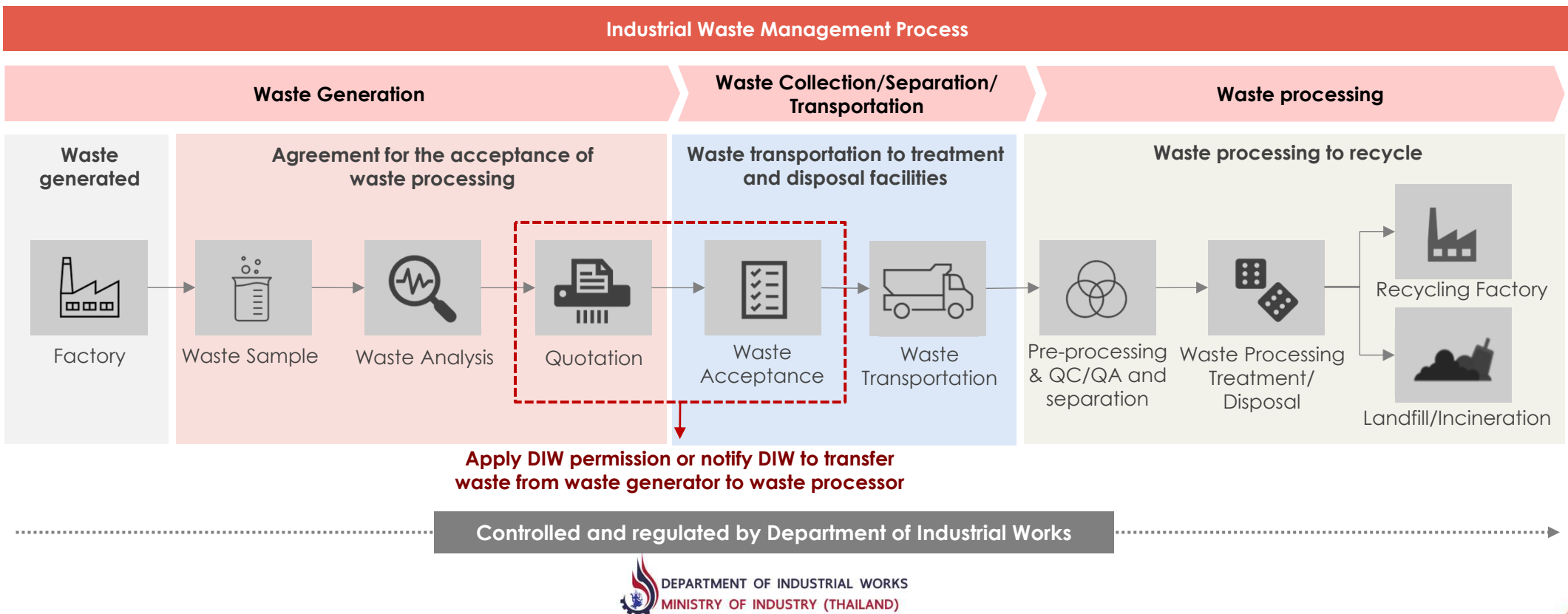
- A person or business who act as intermediary to purchase, separate and subsequently sell to recycling factory.
- Large waste dealers have high negotiation power to control over waste trading as they have several value-added services before selling to recycling factory (i.e. sort and pre-treatment)



Source: Department of Industrial Works (DIW), Krungthai Compass, WWF Thailand

# Waste Management Structure in Thailand: Industrial Waste

- Thailand's industrial waste management is more systematic since factories that are intended to dispose industrial wastes are required to register for waste disposal in the industrial waste management system, which is controlled and regulated by Department of Industrial Works (DIW).
- The management process of industrial waste is systematically obtained various procedures before the final process, including waste analysis from sample, waste transportation, pre-processing and waste separating in order to prevent the hazardous substances to the community.
- Before the process of waste processing, waste generator (WG) must apply for DIW permission to transport waste outside the factory in the case of hazardous waste, while WG only notify DIW for non-hazardous waste.
- In Thailand, various waste processors mostly offer one-stop service from waste sample to the final process, while there are also some companies that offer few process in the supply chain such as offering only waste transporting and waste sorting.



Source: Department of Industrial Works (DIW)

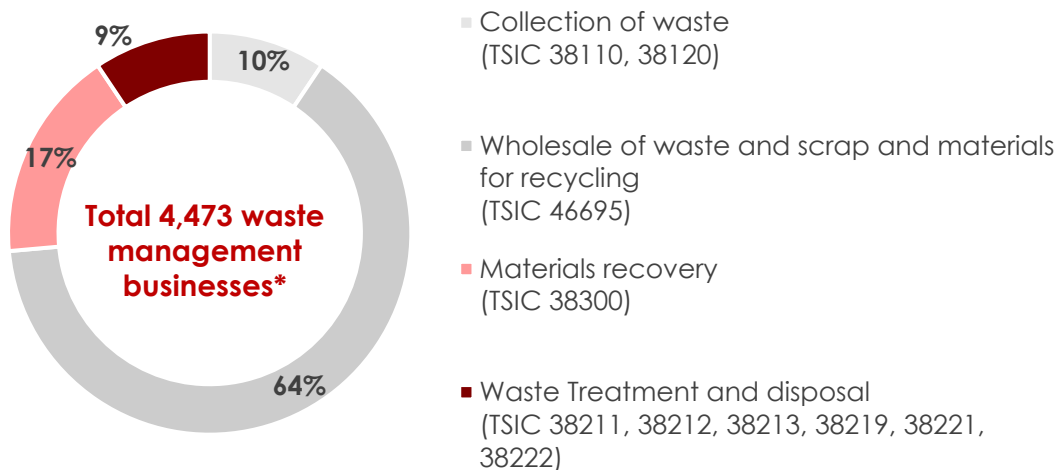
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# Waste Management Business in Thailand

- Currently, there are 4,473 waste management businesses in Thailand, comprising of collection of waste, wholesale of waste, scrap and materials for recycling, material recovery and waste treatment and disposal.
- Majority of waste management businesses in Thailand is wholesaler of waste, scrap and materials for recycling which contributed more than half, at 64%. This is because this type of business did not require high investment to operate, therefore, wholesaler of waste, scrap and materials is mainly small and medium-sized company.

No. of Waste Management Businesses\* (2020)



Source: Department of Business Development (DBD)

Note: \*Please note that the no. of waste management businesses in this section includes only the company that registered with TSIC.

TSIC 38110: Collection of non-hazardous waste from household, commercial and industrial.

TSIC 38120: Collection of hazardous waste from hospital and manufacturer.

TSIC 46695: Wholesale of waste and scrap and materials for recycling which include disassembling of unused products such as car, computer and television.

TSIC 38300: Processing of metal and non-metal scraps and parts which include waste separation back into the process to be used for recycling by mechanical or chemical transformation such as crushing and compressing.

TSIC 38211: Treatment and disposal of non-hazardous waste by a proper sanitary landfill.

TSIC 38212: Treatment and disposal of non-hazardous waste by a proper incineration excluding open dump.

TSIC 38213: Treatment and disposal of non-hazardous waste by a proper biological reduction.

TSIC 38219: Treatment and disposal of non-hazardous waste by other non-hazardous treatments such as open dump, open burning and other non-hazardous treatments that is not classified elsewhere.

TSIC 38221: Treatment, transport and disposal of radioactive nuclear waste generated from hospital.

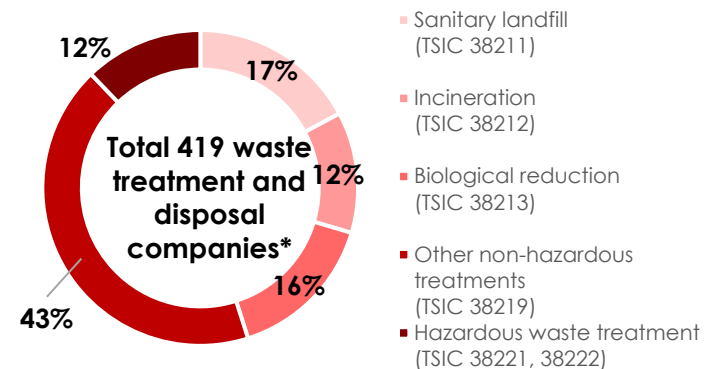
TSIC 38222: Treatment and disposal of hazardous waste both solid and non-solid by other treatments for such as flammable liquid, infectious waste and other hazardous waste.

No. of Waste Management Businesses by Type (2020)

No. of Waste Collector by Type



No. of Waste Treatment and disposal by Type





# Key Players in Waste Management Business in Thailand

- Among all business categories, wholesale of waste, scrap and metal generated the highest revenue.

## Key Players in Waste Collection, Wholesales of waste and Waste recovery in Thailand

Type of Businesses*	List of Major Companies	FY	Total Revenue (THB)	Waste Type	
				MSW	Industrial
Waste Collection (TSIC 38110, 38120)	Metal Copper Co., Ltd.	Dec 2020	982,715,582		✓
	Amata Facility Services Co., Ltd.	Dec 2020	480,454,330	✓	✓
	Eastern Green World Co., Ltd.	Dec 2020	170,412,278	✓	
Wholesale of waste and scrap and materials for recycling (TSIC 46695)	Hidaka Yookoo Enterprises Co., Ltd.	Dec 2020	5,919,567,753		✓
	America Metal Industry (Thailand) Co., Ltd.	Dec 2020	3,486,190,040		✓
	Pong Suk Chai Talan Co., Ltd.	Mar 2020	3,161,305,003		✓
Waste Recovery (TSIC 38300)	Suntech Recycle & Decarbon Co., Ltd.	Dec 2020	1,424,734,765		✓
	Siam Cullet Co., Ltd.	Dec 2020	888,242,833	✓	✓
	Erigh Metals Co., Ltd.	Dec 2020	501,855,300		✓

## Key Players in Waste Treatment and Disposal in Thailand

Type of Businesses*	List of Major Companies	FY	Total Revenue (THB)	Treatment Type			
				Landfill	Incineration	Biological reduction	Others
Waste Treatment and Disposal (TSIC 38211, 38212, 38213, 38219, 38221, 38222)	Italian Thai Hongsa Co., Ltd.	Dec 2020	1,892,195,372			✓	
	CR Asia (Thailand)	Dec 2020	1,621,929,644				✓
	SCI Eco Services Co., Ltd.	Dec 2020	1,411,147,813				✓
	Insee Ecocycle Co., Ltd.	Dec 2020	1,234,144,812				✓
	Better World Green Plc.	Dec 2020	926,032,729	✓			

Source: Department of Business Development (DBD), BOL

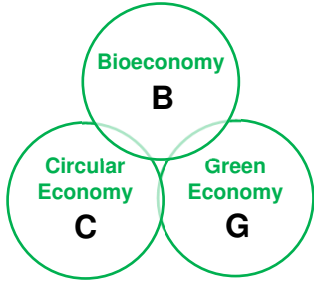



Note: \*Please note that type of waste management businesses mentioned in this section is categorized by TSIC number and is included only the businesses that registered with TSIC that submit the financial statement to DBD.

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# Government Policy and Plan

- Thai government has developed various policies and plans to develop Thailand's waste management system, including the BCG Economic Policy, the Plastic Waste Management Plan, and the 3R Policy.
- Many of these policies are aimed at managing waste at its source, reducing waste, and promoting the reuse and recycling of waste.

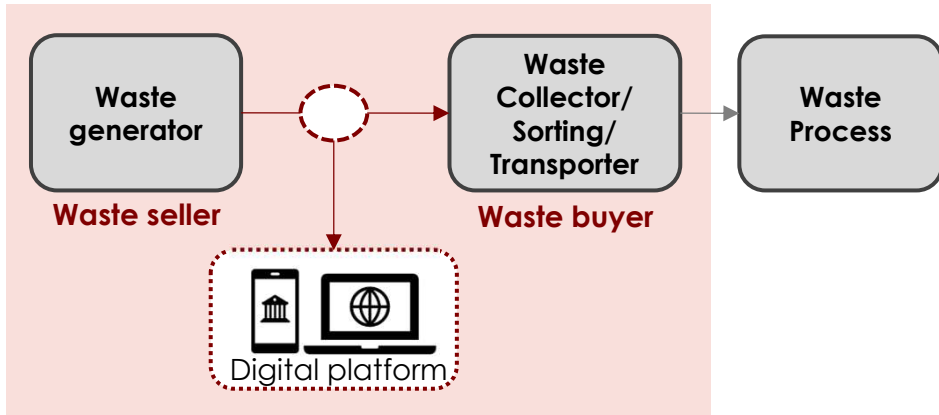
Government Policy and Plan	Target	Goal
<p><b>BCG model: Circular Economy (2021-2027)</b></p> <ul style="list-style-type: none"> <li>• In 2021, Thai government announced BCG Economic Policy as a national strategic model. The BCG Economic Policy aims to achieve sustainable growth by leveraging Thailand's strengths, such as its abundant biological resources, diversity, and agriculture.</li> <li>• One of the BCG's concepts, "Circular Economy," aim to maximize its available resources by promoting resource reuse, recycling, etc.</li> </ul> 	<ul style="list-style-type: none"> <li><b>2022-2023</b> <ul style="list-style-type: none"> <li>✓ Reduce 10,000,000 kgCO2e of GHG emission</li> <li>✓ 100% of industrial waste pulled into management system</li> <li>✓ Industrial symbiosis* in 5 industrial area (*Reuse of waste between different industries)</li> </ul> </li> <li><b>2024-2025</b> <ul style="list-style-type: none"> <li>✓ Reduce 2.5 millions kgCO2e of GHG emission in industrial estates</li> <li>✓ Industrial symbiosis in 10 industrial area</li> </ul> </li> <li><b>2026-2027</b> <ul style="list-style-type: none"> <li>✓ Industrial symbiosis in 15 industrial area</li> <li>✓ 90% of Industrial waste utilization</li> <li>✓ Waste reduction by 16.5 million tons</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>❖ <b>Carbon Neutrality</b></li> <li>❖ <b>Sustainable development</b></li> </ul>
<p><b>Plastic Waste Management Plan 2018-2030</b></p> <ul style="list-style-type: none"> <li>• Plastics waste management plan aims to serve as a direction and framework to prevent and solve plastics waste issues in Thailand.</li> <li>• The plan is divided into 3 phases, starting from reduce and replace some single-use plastic by using environmentally friendly products to achieve 100% targeted plastics waste recycle in 2027.</li> </ul>	<ul style="list-style-type: none"> <li><b>Phases 1 2018-2019</b> <p><b>Reduce and stop using:</b></p> <ul style="list-style-type: none"> <li>✓ cap seal</li> <li>✓ Oxo</li> <li>✓ Microbead</li> </ul>  </li> <li><b>Phases 2 2020-2022</b> <p><b>Stop using:</b></p> <ul style="list-style-type: none"> <li>✓ Plastic bag &lt; 36 micron</li> <li>✓ Foam food container</li> <li>✓ Plastic straw</li> </ul>  </li> <li><b>Phases 3 2023-2030</b> <ul style="list-style-type: none"> <li>✓ Reducing and stop using other single-use plastics</li> <li>✓ 100% of target plastic wastes will be recycled by applying Circular Economy Principle.</li> </ul>  </li> </ul>	<ul style="list-style-type: none"> <li>❖ <b>To serve as a framework and direction for sustainable plastics management in the country by Circular Economy</b></li> <li>❖ <b>To reduce plastic wastes in the country</b></li> </ul>

Source: Pollution Control Department (PCD), National Science and Technology Development Agency, Public news

# Digitalization on Waste Management

## Digitalization on Waste Management

- Digitalization has been increasingly adopted in waste management process which to manage unused materials or recyclable waste efficiently.
- This is driven by various government initiatives such as BCG and Thailand 4.0 which accelerates the adoption of digitalization in every dimensions to achieve sustainable growth.
- Currently, there are many digital platforms that play the role in waste management supply chain for instance:
  - Act as intermediary that connect waste sellers (i.e. households, condo, restaurants) and waste buyers (i.e. waste pickers or waste dealers) together in one place.
  - Allow to trade recyclable waste online.
  - Offer real-time data such as waste selling price, trading status and environmental attributes performance.



**Big data obtained from the digital platform (e.g., waste source data by region, activity of waste management companies by type, etc.) allows for analysis and planning, which will be used for more effective waste management.**

## Example Recycle Platforms



Digital platform that acts as intermediary which connects recyclable waste sellers and waster buyers to enhance waste management issues in Thailand.



### Services:

- Waste sellers such as retails, restaurants or households, can schedule a pickup through the application and the collector will come to pick up and send to waste buyers.
- GEPP collects data from its platform to analyze which will be reported the performance and the contribution of environmental attributes.
- GEPP also provide data analytics for any organizations that seek for recycled market data in Thailand.



Digital platform that provide one-stop services for recyclable waste trading of residential, which aims to enhance waste management at source.








### Services:

- Waste seller can make appointment to pick up recyclable waste through the application to sell their waste.
- Waste seller can check the selling price of recyclable waste on the application in which the trading transaction will be transferred directly to seller's registered account.
- The application provide transparency for seller to monitor their trading performance and notify the transactions in every steps.

Source: GEPP website, Public news

# BOI Investment Incentives

## BOI Investment Incentives for recycling and waste treatment or disposal

Business and Conditions	 CIT Exemption	 Exemption of import duties on machinery	 Exemption of import duties on raw materials used in R&D	 Exemption of import duties on raw materials used in production for export	 Non-tax Incentives**
<b>▶ Recycling and reuse of unwanted materials</b>					
○ Sorting/separation	<b>5 years</b>	✓	✓	✓	✓
○ Sorting/separation with additional processing of recycling or recovery of valuable substances.	<b>8 years</b>	✓	✓	✓	✓
<Conditions>					
<ul style="list-style-type: none"> <li>▪ Must be approved by relevant government agencies.</li> <li>▪ Must be located in an industrial estate or promoted industrial zone. Exceptions to this requirement may be granted by the Board on a case-by-case basis.</li> <li>▪ Unwanted materials in the project must be generated from domestic sources only.</li> <li>▪ Must have separation or processing of unwanted materials using modern technology, as approved by the Board.</li> <li>▪ Promoted projects will receive rights and privileges, as follows:</li> </ul>					
<b>▶ Waste treatment or disposal</b>					
	<b>8 years</b>	✓	✓	✓	✓
<Conditions>					
<ul style="list-style-type: none"> <li>▪ Project must be approved by relevant government agencies.</li> </ul>					

\*\*Non-tax incentives include

- (1) Permission for foreign nationals to enter the Kingdom for the purpose of studying investment opportunities
- (2) Permission to bring into the Kingdom skilled workers and experts to work in investment promoted activities
- (3) Permission to own land
- (4) Permission to take out or remit money abroad in foreign currency

Source: BOI

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# Future Trends and Opportunities

## Challenges

### High Investment Cost and expertise

- High investment costs and know-how in waste treatment and recycling are essential for proper waste treatment operations. However, in Thailand, there are still only a few companies that are able to conduct proper waste treatment business due to lack of cost and know-how (proper waste disposal sites still account for about 18% of all waste disposal sites).

### Inefficient MSW, E-waste and Industrial waste management

- An unsystematic MSW supply chain and no strict control and regulation towards MSW and e-waste management causes a rise in non-separation and improper management at source.
- Insufficient appropriate disposal sites as only 18% of total disposal site and transfer station is appropriate.
- Treatment and disposal facilities are not coverage across the country as 86% of facilities are concentrated in central and eastern region.

### Lack of people awareness on environmental impact

- Lack of people awareness on environmental impact cause non-separation and improper management at source as, only 18% of electricity and electronic waste were properly managed.



## Future Trends

### Sustainability and Circular Economy

- Awareness of environmental issues is growing around the world and sustainability is an emerging global trend. Meanwhile, Thai company also aim to achieve sustainable growth and recently many companies are focusing on not only on financial aspect but also ESG (Environment, society, governance) investing.
- In addition, various global brands are promoting a circular economy and increasing the percentage of recycled products in their production. For example, Nestlé aims to use at least 8% recycled plastic bottles by 2020 and to increase this to 50% by 2025. This trend is expected to progress in Thailand in the future.



### Stricter Waste Management Policy and plan

- Thai government promote to reduce waste through 3R approach and recycling by strict waste management policies and action plans.
  - Promote the manufacture of E&E product that reduce the use of hazardous substances which can be reuse or recycle.
  - Promote and support the segregation of plastic waste in the country to bring back to the factory as raw materials.

### Digital Transformation



- Big data analytics enhance the understanding of waste situation such as amount of waste generation and amount of bin by location in order to form a proper strategy to tackle the issue of waste management.
- Blockchain technology enables transparency, traceability and security of every transaction of waste management system in the digital platform.

## Business Opportunities

### ❖ Technology

#### More integrated technology in waste management system

- Investing in advanced technology for recycling process.
- More investment in R&D for system development such as big data analytics and blockchain technology to enhance digital waste management platform.

### ❖ Investment

#### More investment in recycling plant

- More investment in developing efficient waste recovery and recycling of electronics parts plant

#### More investment in recycle products

- More investment in developing innovations and technologies that are environmentally friendly especially recycling and upcycling technology.

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