



# Overview of Waste Management and Current Status of Waste to Energy Project Implementation in Thailand

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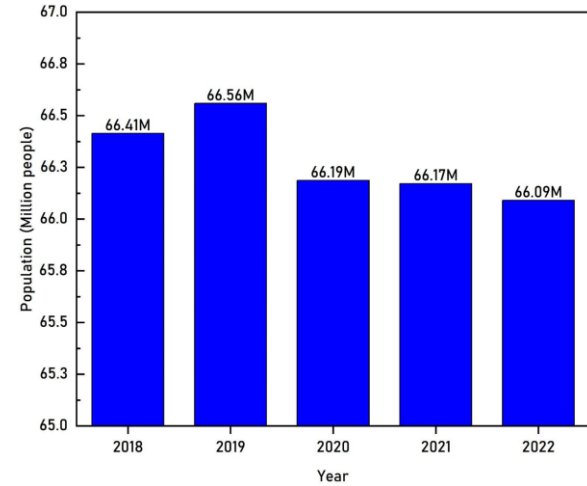
Director of Energy and Environmental Engineering Center (EEEC)

Faculty of Engineering – Kasetsart University

THAILAND

7 November 2023

# About Thailand



Year 2022

-Thai population is 66,090,475

Men 32,270,615 (48.83%)

Women 33,819,860 (51.17%)

-Total area 513,120 square kilometers

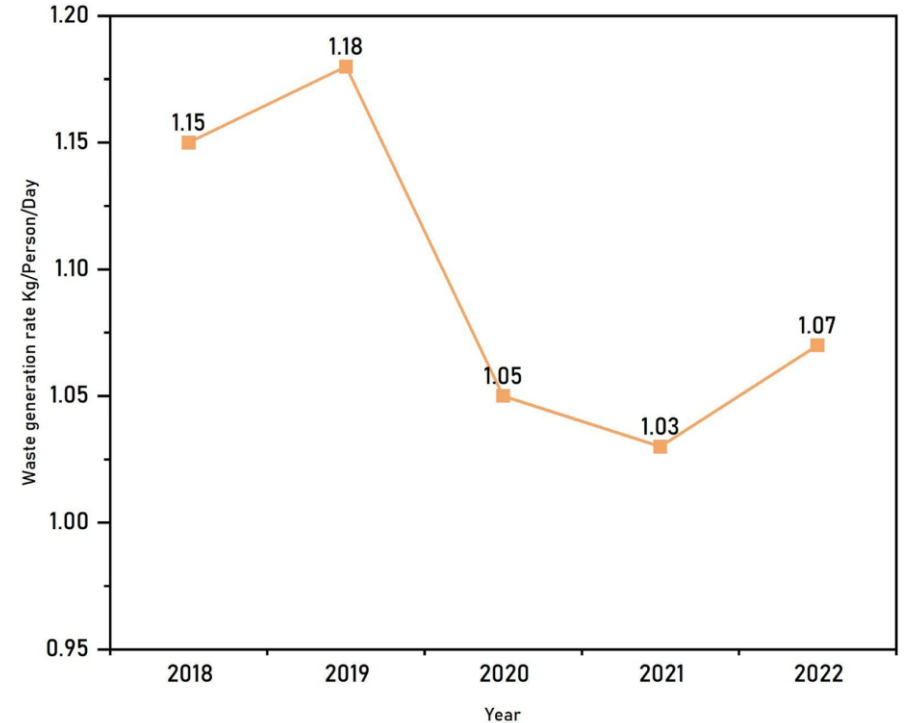
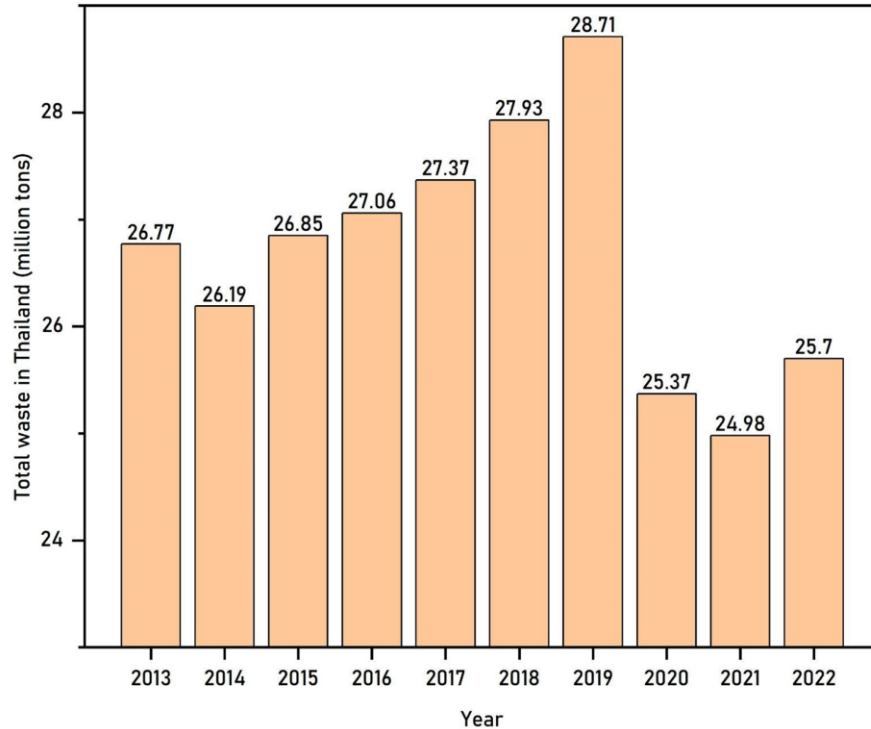
Ground 510,890 square kilometers

Water 2,230 square kilometers

Source : The Bureau of Registration Administration (BORA), 2023

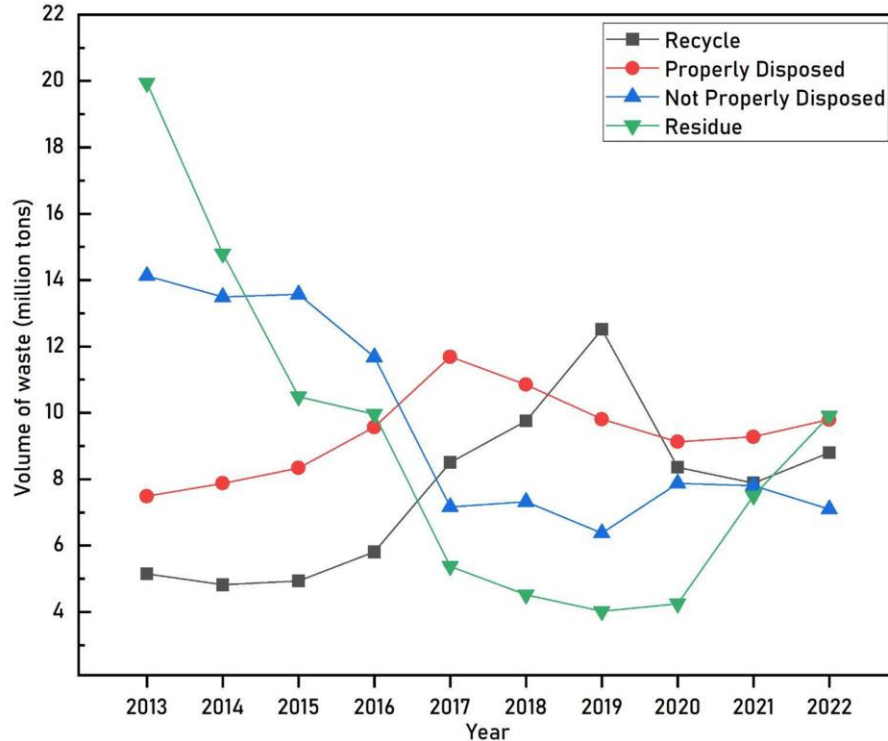


# Amount of MSW in Thailand



Source : Pollution Control Department, 2023

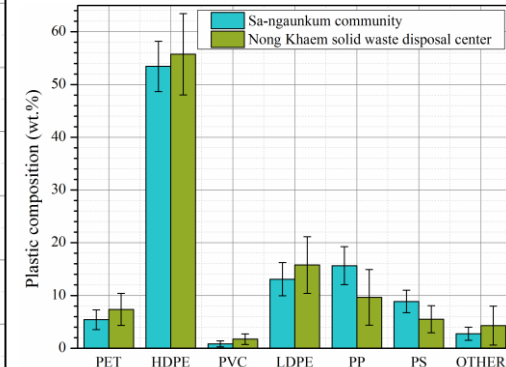
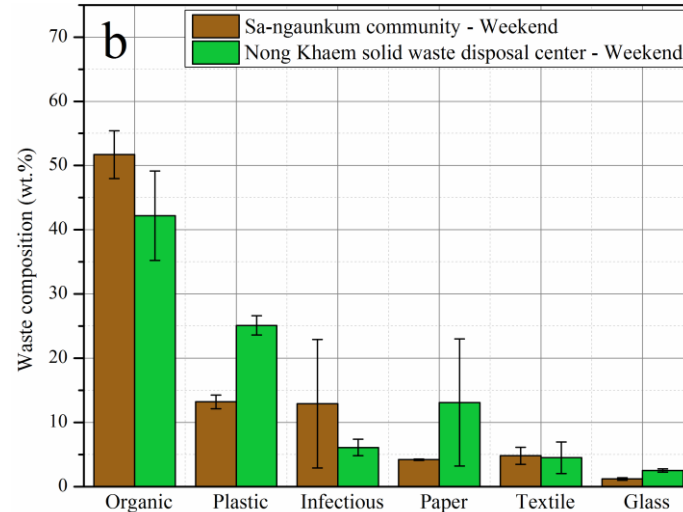
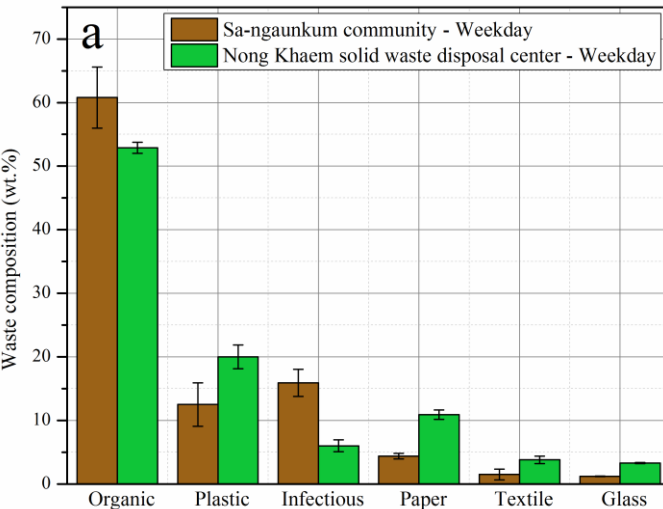
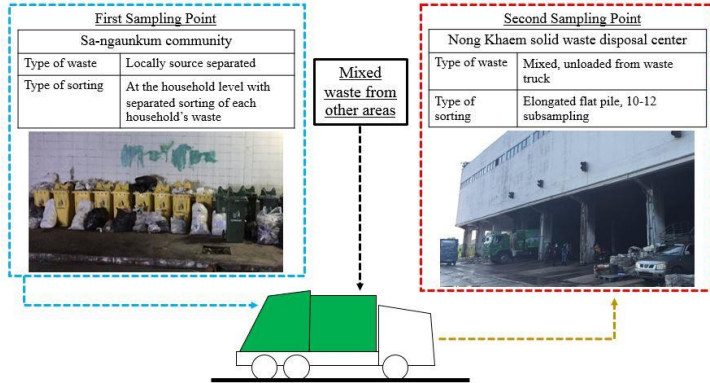
# MSW Management



Year	Total waste	Recycle	Properly Disposed	Not Properly Disposed	Residue
2013	26.77	5.15	7.49	14.13	19.94
2014	26.19	4.82	7.88	13.49	14.8
2015	26.85	4.94	8.34	13.57	10.49
2016	27.06	5.81	9.57	11.68	9.96
2017	27.37	8.51	11.69	7.17	5.38
2018	27.93	9.76	10.85	7.32	4.52
2019	28.71	12.52	9.81	6.38	4.02
2020	25.37	8.36	9.13	7.88	4.25
2021	24.98	7.89	9.28	7.81	7.5
2022	25.7	8.8	9.8	7.1	9.91

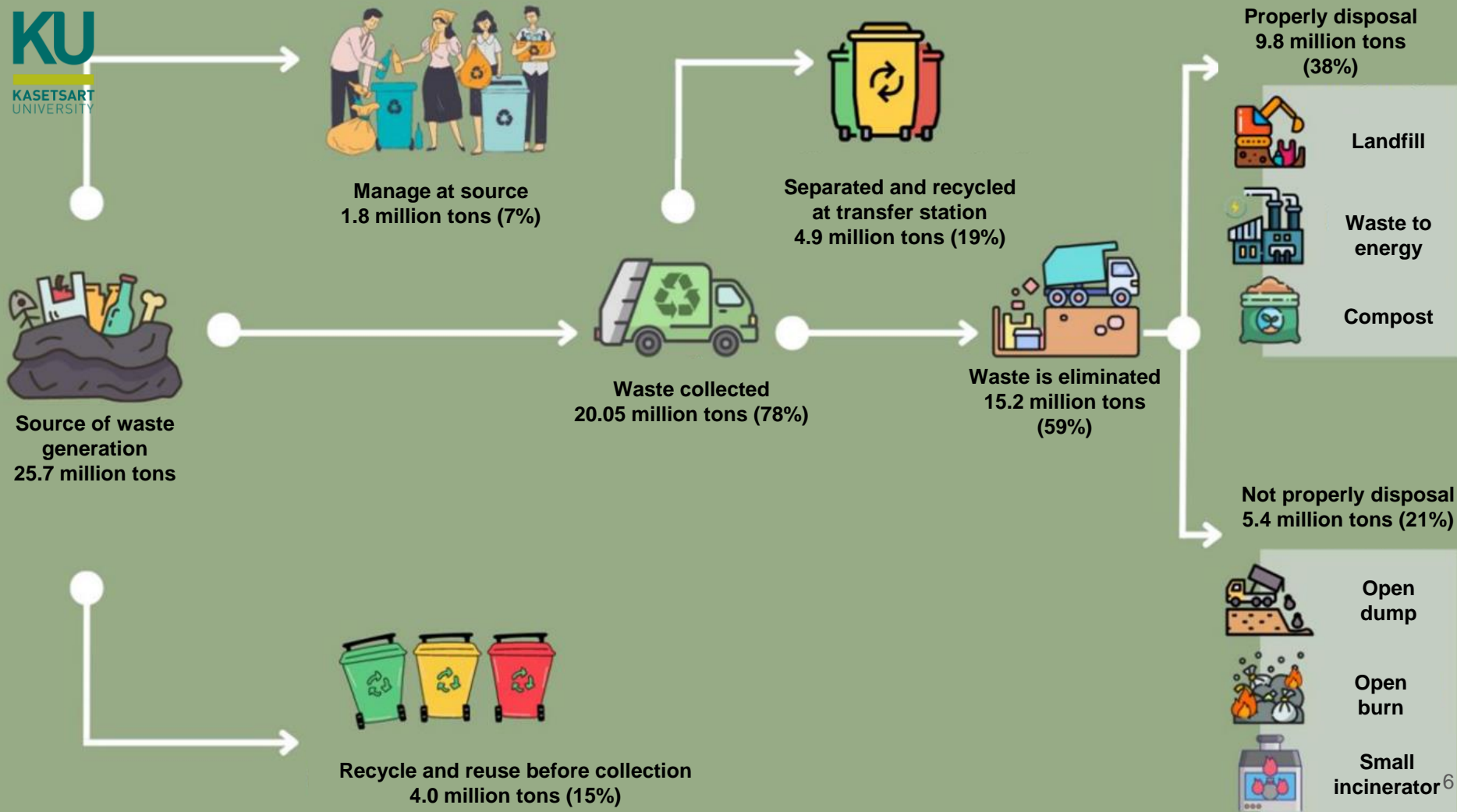
Source : Pollution Control Department 2023

# Composition



Areeprasert, Chinnathan, et al. "A comparative study on characteristic of locally source-separated and mixed MSW in Bangkok with possibility of material recycling." *Journal of Material Cycles and Waste Management* 20 (2018): 302-313.





# Proper Waste Disposal Location in Thailand



	Government Sector	Private Sector
Technically legal Landfills	59	13
Energy production incinerators (WTE)	-	8
Air pollution treatment incinerator	3	-
Composting Location	1	3
Refuse derived Fuel	1	1
Combined waste disposal	17	5
Total	81	30

Source : Pollution Control Department 2023

# Improper Waste Disposal Location in Thailand



	Government Sector	Private Sector
Open Dump	1,548	30
Controlled Dump less than 50 tons	187	3
Controlled Dump more than 50 tons	4	4
Open Burn	59	2
No Air Pollution Treatment Incinerator	91	3
Other	29	12
<b>Total</b>	<b>1,909</b>	<b>54</b>

source : Pollution Control Department 2023



# Landfills



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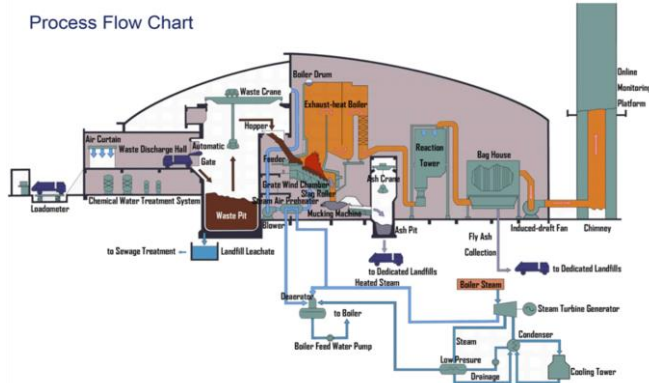
Waste landfill by  
Eastern Energy Plus Co., Ltd.

- Landfill in a controlled dump
- Landfill area 254,400 m<sup>2</sup>
- Support waste from 48 local government organizations in Samut Prakan province.
- Use the soil cover area to control the smell.
- Install the gas drain pipe in the landfill.

source : <https://www.easternenergyplus.com/wordpress/>

# Incinerator

Process Flow Chart



Waste incinerator plant by  
PJT Technology (Thailand) Co., Ltd.

- Incinerator size 700 TPD  
(12 MW power generation)
- Phuket province





# Composting



- This is often done at the household level, small communities.
- Food waste, leaves.
- Compost product will be used as soil amendment

# Refuse Derived Fuel (RDF)



- Form of solid fuel obtained from municipal waste and with improved chemical and physical composition.
- Make by Separation process, Dehumidification process, Densification process etc.
- TPIPP has installed capacity to receive waste into the production process of 14,400 tons per day for produce RDF 7,200 tons per day.

Source : <http://www.tpipoleneenergy.co.th/>  
<https://www.energynewscenter.com/>

# Energy Production by Incinerators (WTE) in Thailand



- TPI Polene Power Public Company Limited (Saraburi Province)
- Alliance Clean Power Company Limited (Khon Kaen Province)
- Global Power Synergy Public Company Limited (Rayong Province)
- Eastern Energy Plus Company Limited (Samut Prakan Province)
- Alliance Clean Power Company Limited (Krabi Province)
- GIDEC Company Limited (Songkhla Province)
- C&G Environmental Protection (Thailand) Company Limited (Bangkok Province)
- PJT Technology Company Limited (Phuket Province)



# TPI Polene Power Public Company Limited



- Kaeng Khoi District, Saraburi Province
- RDF production 7,200 TPD
- W2E 180 MW
- Fluidized-bed technology



# Alliance Clean Power Company Limited



- Mueang District, Khon Kaen Province
- 1 project 6 MW
- Stoker incineration technology
- Volume of waste 450 TPD

# Global Power Synergy Public Company Limited



- Mueang Rayong District,  
Rayong Province
- Moving grate system
- 1 project 9.8 MW
- Volume of waste 500 TPD

# Eastern Energy Plus Company Limited



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- Mueang Samut Prakan District  
Samut Prakan Province
- 1 project 9.9 MW (RDF-fired)
- Volume of waste 300 TPD

# Alliance Clean Power Company Limited



- Mueang Krabi District,  
Krabi Province
- 1 project 6 MW
- Volume of waste 450 TPD

# GIDEC Company Limited



- Hat Yai District, Songkhla Province
- Ash-melting gasification
- 1 project 7 MW
- Volume of waste 250 TPD



# C&G Environmental Protection Company Limited



- Nong Khaem District, Bangkok
- 1 project 9.8 MW
- Stoker type
- Volume of waste 500 TPD
- Now continue phase 2 – 1600 TPD



# PJT Technology Company Limited



- Phuket province
- 12 MW
- Volume of waste 700 TPD

# Waste Management/Disposal Model



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## S model

- Lower than 50 ton/day
- Source separation
- Municipal collecting station
- Transferring to provincial collecting station
- Integrated waste management
- Recycling, Fertilizer production
- Landfilling

## M model

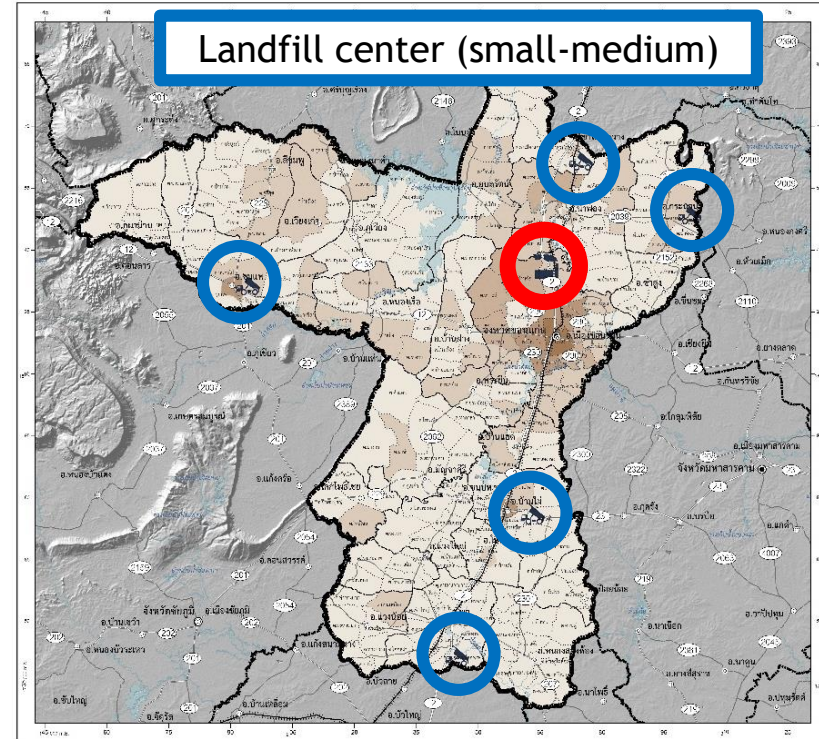
- 50 – 300 ton/day
- Source separation
- Provincial collecting station
- Transferring to private company
- Integrated waste management by private company
- Fertilizer production
- Waste to Energy; Biogas; Incineration & electricity production

## L model

- More than 300 ton/day
- Source separation
- Provincial collecting station
- Transferring to private company
- Integrated waste management by private company
- Waste to Energy; Incineration & electricity production
- Retrofitting sanitary & engineered landfill

Waste-to-Energy Plant (large)

Landfill center (small-medium)



# Purchase Electricity from MSW Project



- ❖ Support electricity from waste (W2E project) in the form of Feed-in Tariff (FiT).
- ❖ Energy regulatory commission has opened applications for proposals for electricity sales in 2022.
- ❖ Scheduled Commercial Operation Date in 2025-2026

Source : Energy regulatory commission : <https://www.erc.or.th/th/power-purchasing3/2710>

# Alternative Energy Development Plan Future of WTE



The National Energy Policy Committee, during its 3/2565 meeting (Meeting No. 158) on May 6, 2022, approved the plan to increase electricity production from clean energy sources under the Power Development Plan for Thailand 2018-2037 (PDP 2018), with the first revision, for the years 2021-2030. It was decided to add 200 MW of electricity generation capacity from waste in 2025 and additional 200 MW in 2026.

Year SCOD	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	Total (MW)
MSW					200	200					400

Source : Department of Alternative Energy Development and Efficiency



Energy and Environmental Engineering Center  
Kasetsart University



# Power Generation from Landfill Gas

Nakhon Pathom Province, Thailand  
(Royal Project)



Subsidized by:

- National Energy Policy and Planning Office (NEPO), Thailand
- Kasetsart University Research and Development Institute (KURDI), Thailand

## Detail design for Solid Wastes Recycling Project (Royal Project)





# Feasibility Study and Detail Design for Sludge and Solid Wastes Disposal



## The Study and Detail Design for Solid Waste Disposal



Subsidized by : Chum-sang Municipality  
Nakhornsawan Province, Thailand



Subsidized by : Petchaburi Municipality, Thailand

# Research and Development of Organic Wastes Fermentation Technology Implementation in Thailand



Subsidized by : Pollution Control Department (PCD), Thailand



# Solid Waste Disposal Detail Design for Sra-kaw Municipality, Sra-kaw Province, Thailand



Subsidized by : Sra-kaw Municipality, Sra-kaw Province, Thailand

# Upgrading of Biogas by Purification to Biomethane



Subsidized by : Department of Alternative Energy Development and Efficiency (DEDE), Ministry of Energy



# Monitoring and Assessment of Biogas Production System in Thailand



Subsidized by : Department of Alternative Energy Development and Efficiency (DEDE), Ministry of Energy

# Soil and Groundwater Monitoring for Industries



กรมโรงงานอุตสาหกรรม  
DEPARTMENT OF INDUSTRIAL WORKS



# Current Activity: Source separation and organic wastes composting in Khu Khot Municipality, Pathum Thani Province, THAILAND

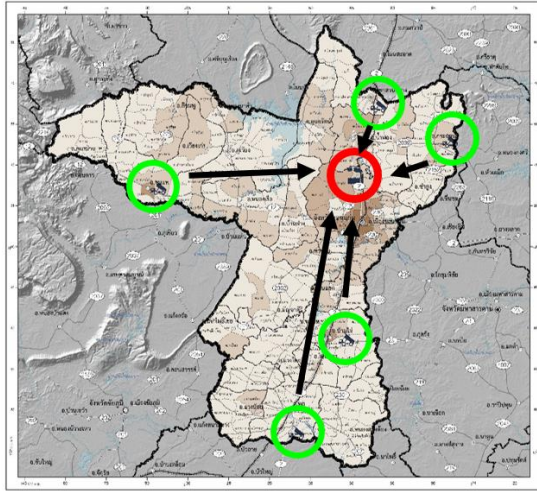


## “Zero Waste Community”





# Current Activity: Promote RDF production by “Hydrothermal Treatment” for small to medium size location as fuel supply for W2E



Fuel Property	Example of RDF Standard I	Example of RDF Standard II	Refuse-Derived Fuel (RDF) from Hydrothermal Treatment
LHV	4,500 kcal/kg	3,500 kcal/kg	5,898 (kcal/kg)
%MC	<20%	<35%	3.87
CI	<1%	<0.6%	0.5115%
Ash	-	-	12.01%





**Thank you for your  
kind attention**

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