UNITED NATIONS OFFICE FOR SUSTAINABLE DEVELOPMENT
INCHEON, REPUBLIC OF KOREA

Expert Group Meeting on Sustainable Application of Waste-to-Energy in Asian Region

Status of Waste Management and Future Policy Directions for Renewable Energy From Waste and Biomass in Thailand

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Thailand : Fact & Figure

Area:
total: 513,120 sq km

Population:

67,741,401 (July 2014 est.)

Population growth rate:
0.35% (2014 est.)

Major urban areas - population:
BANGKOK (capital) 6.902 million (2009)

GDP (purchasing power parity):
$674.3 billion (2013 est.)

Budget:
revenues: $80.91 billion
expenditures: $92.9 billion (2013 est.)

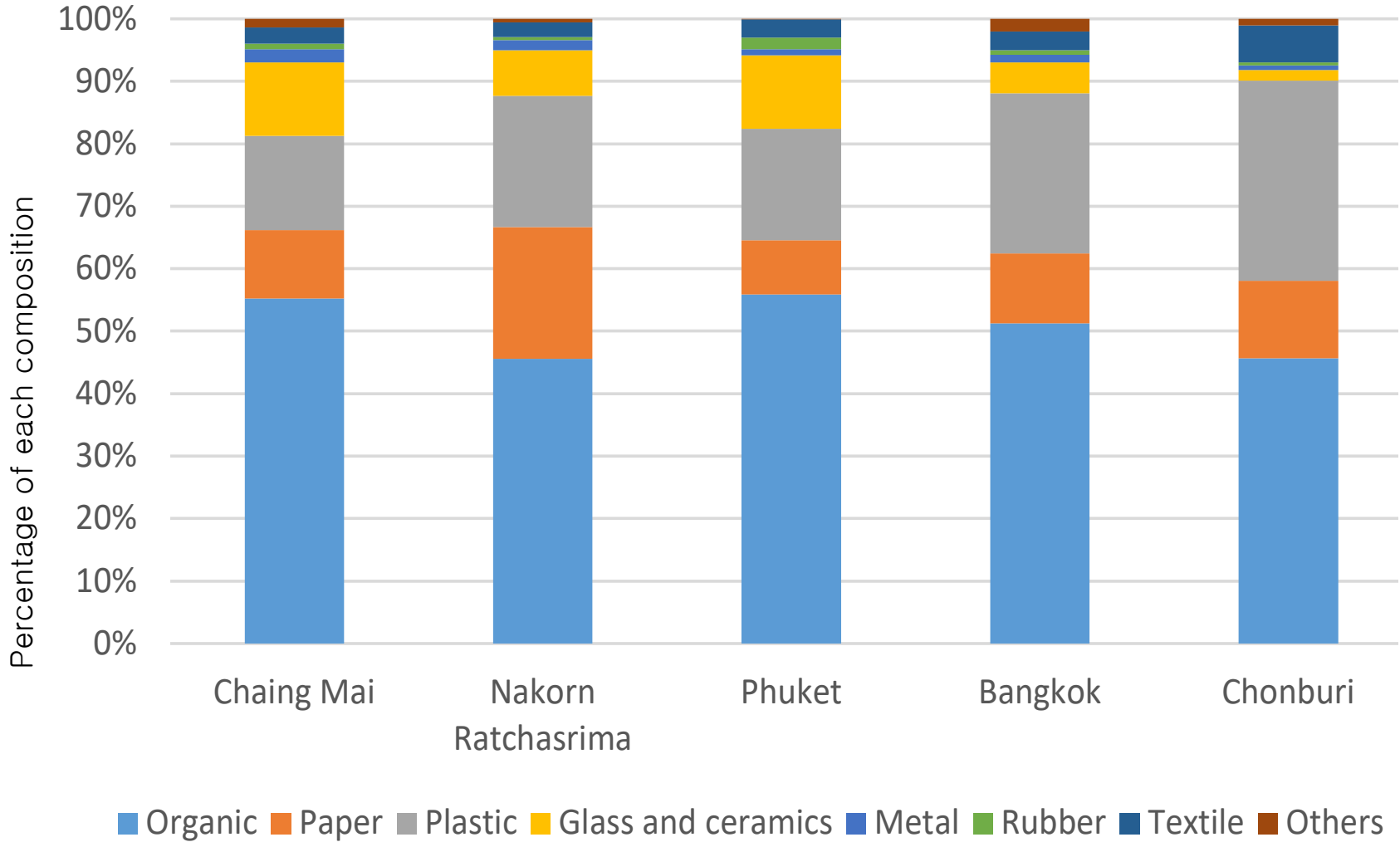
Electricity - installed generating capacity:
32.6 million kW (2012 est.)

Source : CIA world fact book

Amount of Waste Generation : Thailand

Year	Waste Generation (Million Ton)	Waste disposal properly		Amount of Waste that be reused	
		Million Ton	%	Million Ton	%
2008	23.93	5.69	24%	3.45	14%
2009	24.11	5.97	25%	3.86	16%
2010	24.22	5.77	24%	3.90	16%
2011	25.35	5.64	22%	4.10	16%
2012	24.73	5.83	24%	5.28	21%
2013	26.77	7.27	27%	5.15	19%
2014	26.19	7.88	30%	4.82	18%
2015	26.85	8.34	31%	4.94	18%
2016	27.06	9.57	35%	5.81	21%

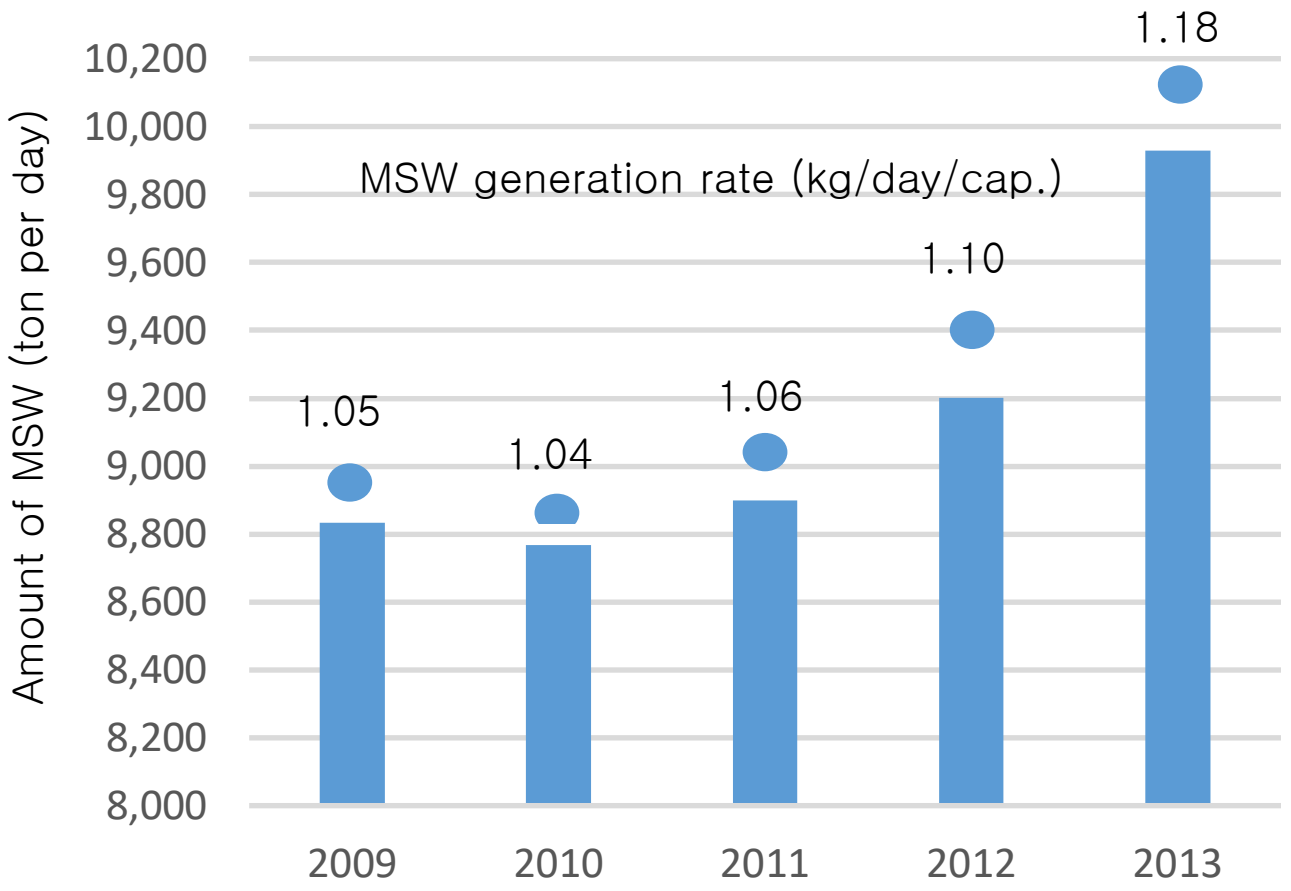
Waste composition in Thailand



Source: Thailand Pollution Situation 2013, www.pcd.go.th

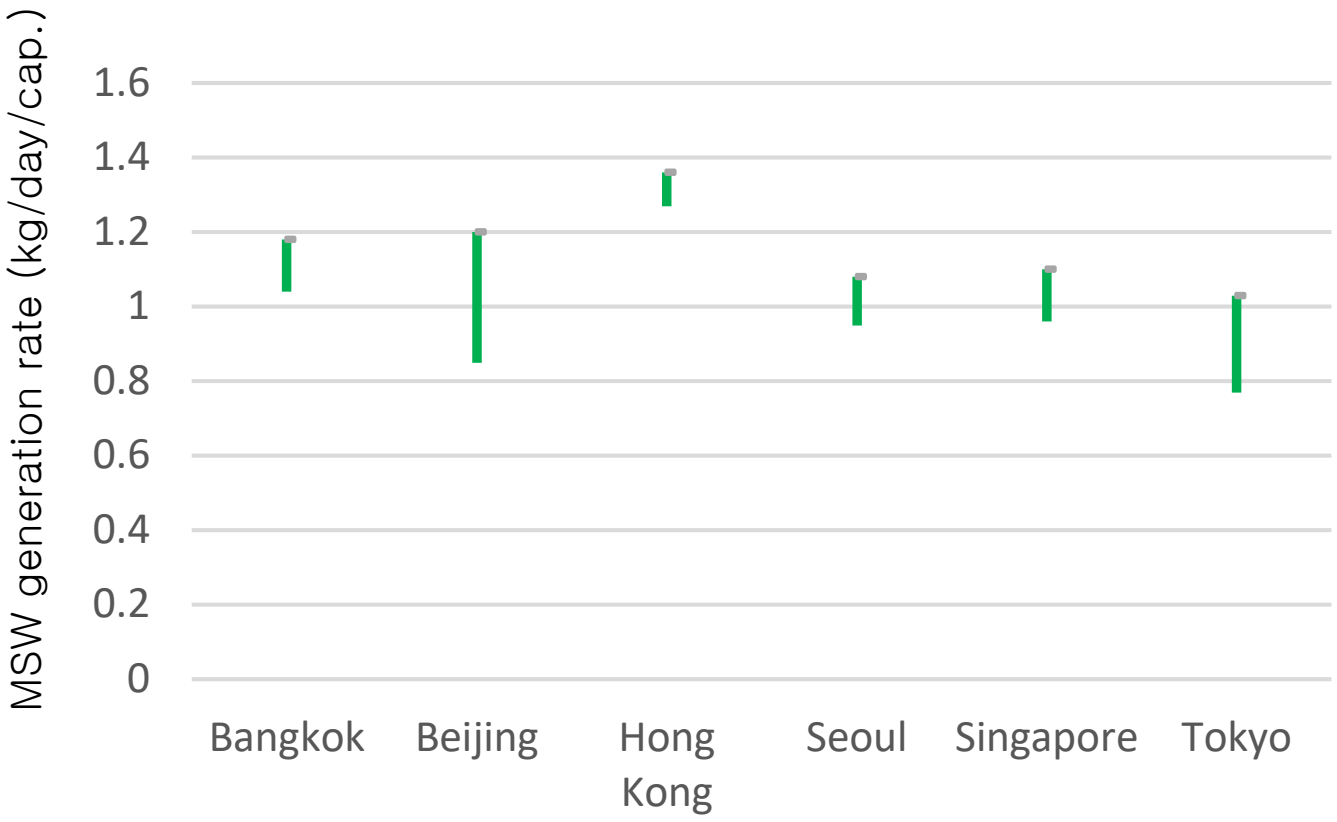
MSW Quantity and its Generation Rate

- MSW generation in Bangkok

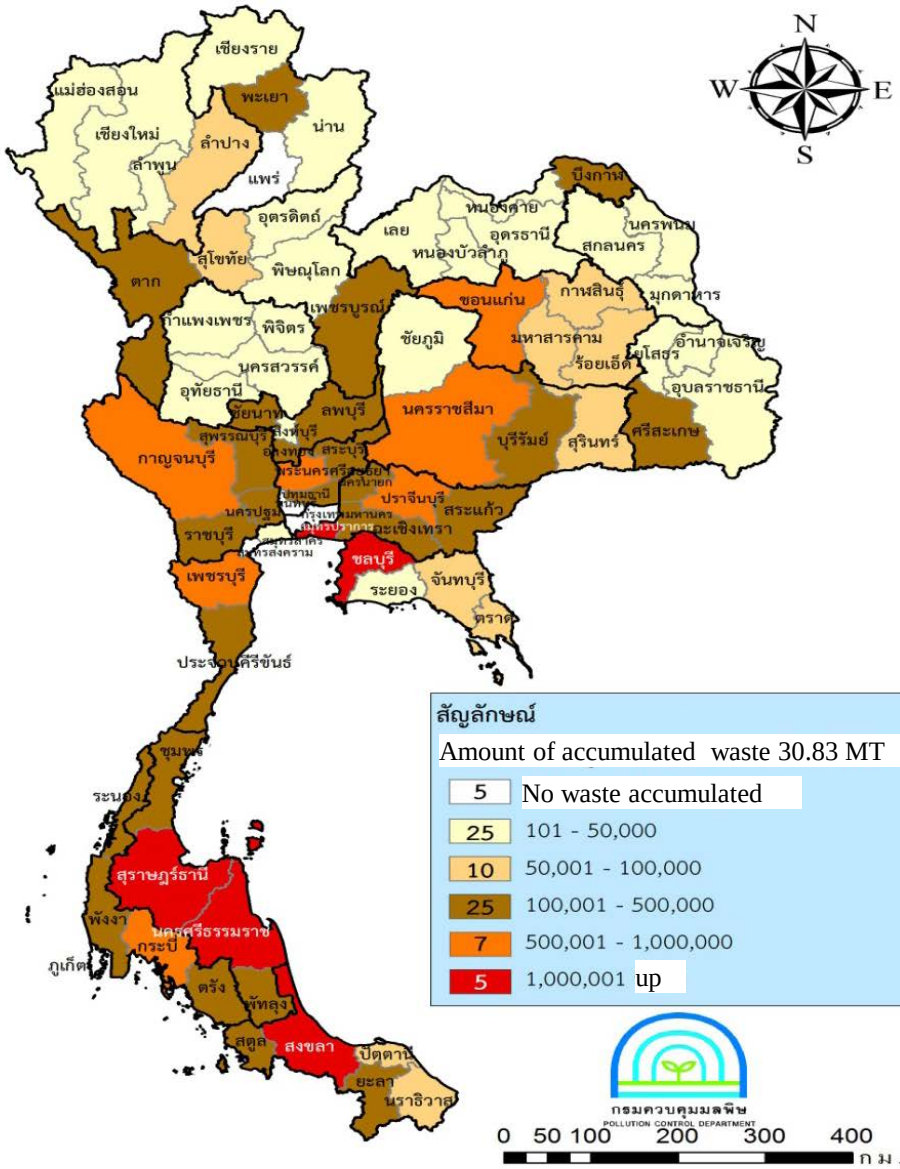


MSW Quantity and its Generation Rate

- MSW generation rate in Bangkok compared to other Asian countries



Waste Accumulated



Source : www.pcd.go.th

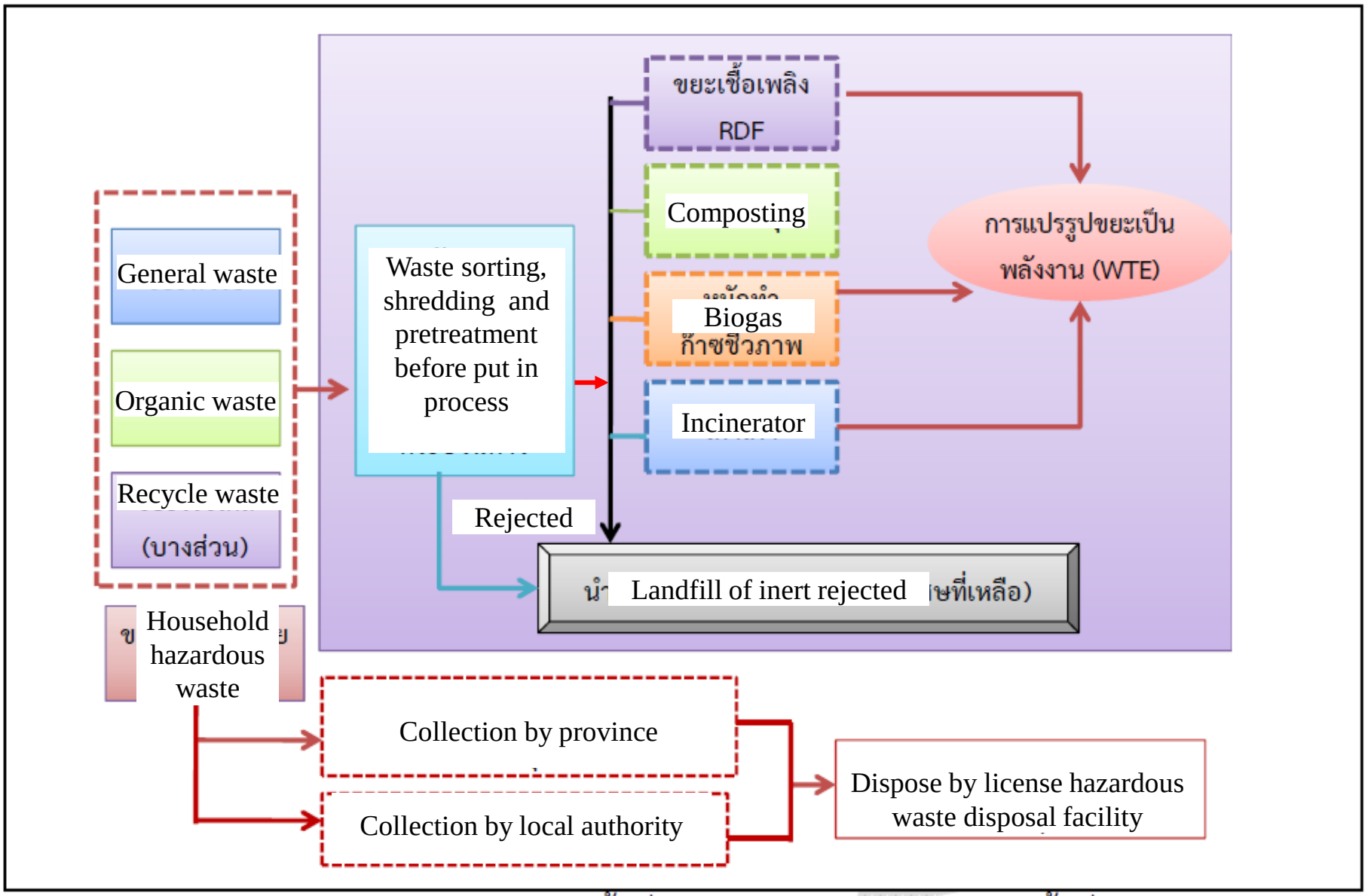
Source : www.manager.co.th

Source : Greenpeace

Master plan of sustainable waste management

- Waste Accumulated in Dumping Site
  - Site cleaning (land reclaiming)
  - RDF : send to cement plant for co-firing
- Clustering Waste Management
  - Model L : > 300 TPD
    - Waste sorting at WTE plant
    - Waste to Energy plant by RDF/Incineration/Biogas/Composting
    - Rejected to landfill
  - Model M : 50 to 300 TPD
    - Same as Model L
  - Model S : < 50 TPD
    - Source separation
    - Integrated Disposal Technology

Waste Management : Model L , M

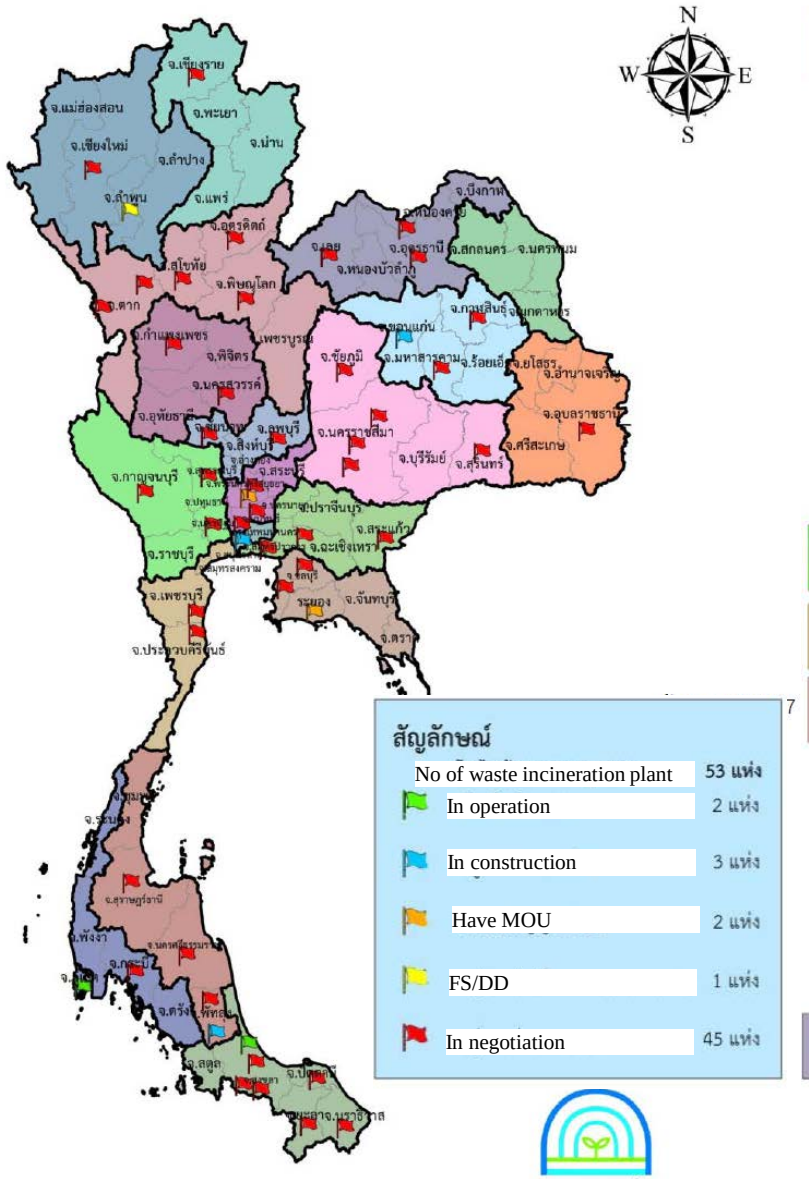


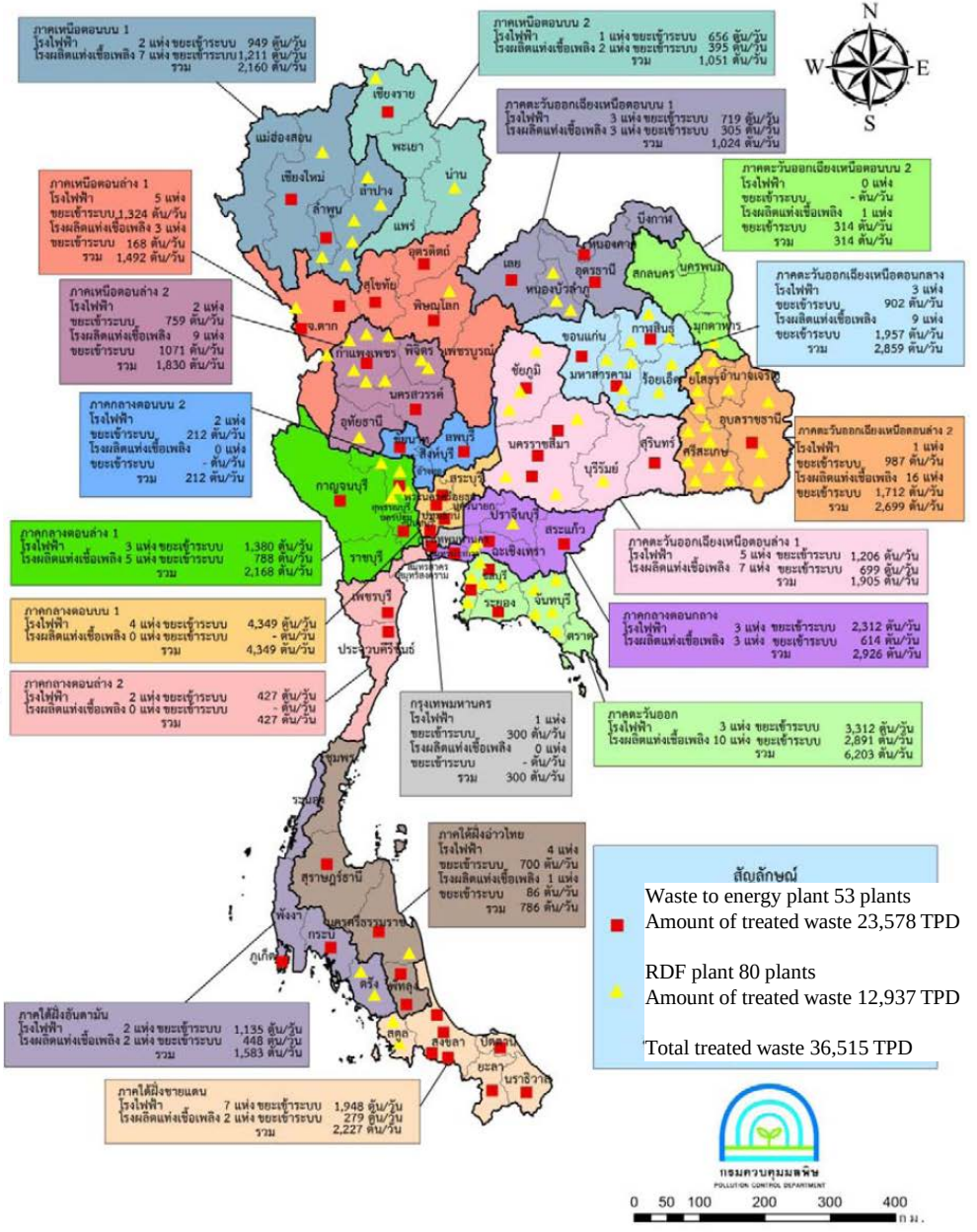
Source : www.pcd.go.th

Waste Management : Model S

Source : www.pcd.go.th

Projected Waste to Energy Plant





Source : www.pcd.go.th

Thailand National Agenda on Waste Management

2014 : Road Map on Waste and Hazardous Waste Management

Approved by National Council for Peace and Order on 26th August 2014

2016 : National Solid Waste Management Master Plan (2016 – 2021)

Approved by the cabinet on 3rd May 2016

2016 : Action Plan “Thailand Zero Waste”

According to the Participatory “Civil-State” Principle

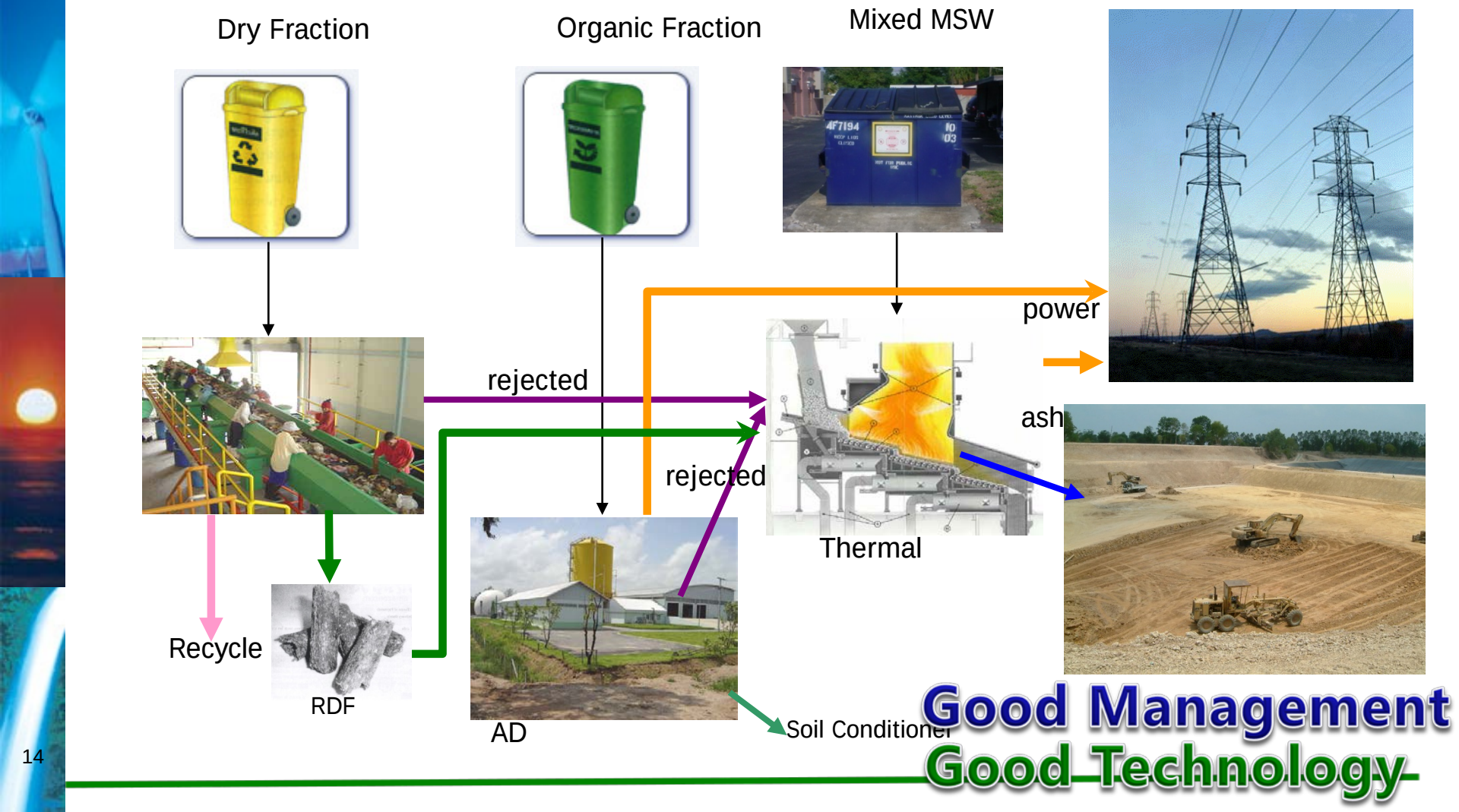
Approved by the cabinet on 20th September 2016

Source : www.pcd.go.th

Target of SWM Roadmap

Waste Management Model for Thailand

3R + Source Separtion



Good Management
Good Technology

Development of WtE project: technology and economic aspects

- Technology Aspects
  - Incineration/Gasification : site > 300 TPD
  - Anaerobic Digestion : site < 300 TPD
  - Mixed waste : cannot separate food waste from mixed waste at WTE plant
    - Low Heating value : < 1,500 kcal/kg
    - High Moisture content : > 60%
  - RDF may suitable with reclaim landfill
    - Use as feedstock in cement kiln
    - Price : still depend on market demand
- Economic Aspects
  - Almost of Business Model is BOT
  - Tipping fee is quite low : 300 ฿/Ton
  - Almost 80% of revenues come from selling of electricity to grid line

Obstacle and how to overcome the barriers

- Technology Barriers
  - Mixed waste, cannot separate waste at WTE plant effectively
  - Not easy to gather waste from different communities
- Economic Barriers
  - Revenues are not easy to cover the investment
  - Local community pays for Tipping fee
    - Cannot increase
  - Central government pays for electrical power
    - Power purchasing agreement is guarantee
- Public Perception Barriers
  - Not In My Backyard (NIMBY)
  - Strong objection from NGO, locally and international level

Future directions and key implications for investors

- WTE is still a profitable business in Thailand?
  - Properly waste disposal is still needed
    - There are always market and customer
  - No investment from government
    - Just pay adder or feed-in-tariff
  - Business model : BOT or BOO
  - Optimum size of project
    - > 200 TPD
  - Need a proved and feasible Technology
    - Proved : must be able to treat Thai's waste
    - Feasible : Technology, Environmental Impact and Economic
  - Public acceptance
- However, there is always a place for market
  - Target of WTE : 500 MWe and more...

Thank You