

## Local initiatives towards zero waste in Phitsanulok Municipality, Thailand

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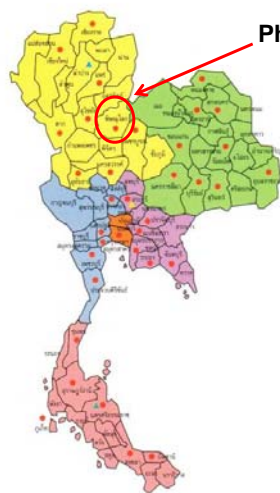
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IGES-SCP  
Phitsanulok zero waste model



### Phitsanulok Municipality, Thailand



Phitsanulok

- 18.26 km<sup>2</sup> of municipal area
- 24,000 households
- 90,000 registered population
- 50,000-100,000 non-registered
- Waste generation in 2011 is about 76 tonnes/day
- Estimated waste composition is 40% organic, 40% recyclables, 20% others

## Driving force of the zero waste policy in Phitsanulok Municipality

- Rapid increase of waste generation (1.5 kg/person/day)
- The municipality changed open dumping sites very often and each time the distance from the town to dumping site is further
- Increase social resistant from local community on disposal sites
- Land price is increasing

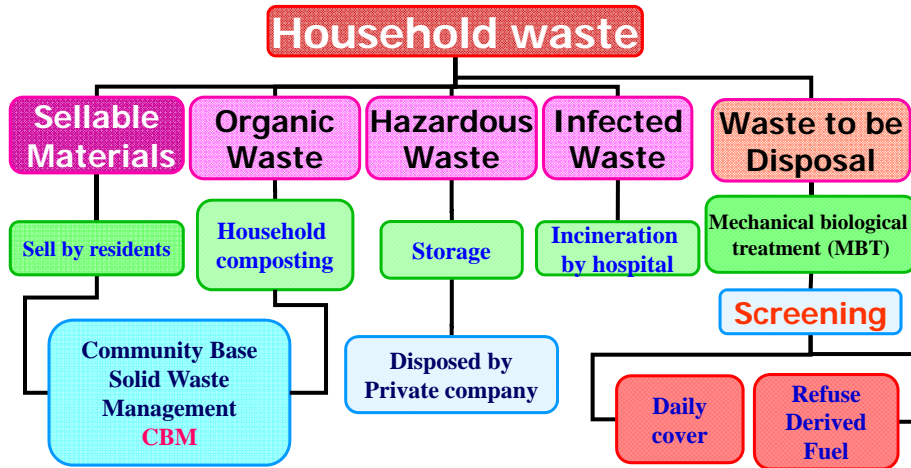


Photo: Suthi Hantrakul

## Improvement of municipal solid waste management toward zero waste landfill

- **Started in 1996 with support from GIZ** (Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH)
- **Aimed for zero waste landfill since 2007**
- Introducing the 3Rs (reduce, reuse, recycle) based on **voluntary basis**
- Introducing polluter pay principle
- Introducing community based waste management and public participation
  - Avoiding use of non-biodegradable and promoting reuse
  - Household and community composting
  - Recyclable waste separation for sale
- Applying mechanical biological treatment (MBT) prior to sanitary landfill
- Converting plastic to oil (not fully operated yet)

## Phitsanulok Model on municipal solid waste



Source: Phitsanulok Municipality

## Examples of awareness raising campaign and training on community based waste management



Photo: Suthi Hantrakul

## Promoting recycling business

- Involvement of waste buyers since the beginning of project development process.
- Active interaction with residents (e.g. door knocking program) and other stakeholders.
- Involvement of educational institutes (schools, university).
- Continuous awareness raising and follow-up activities.
- Facilitating the mechanism of waste separation for sale and regulating the environmental and health impacts, without interfering with the business mechanism.
- Introduction of waste bank program
- Free market competition = many waste buyers.

## Participatory recycling business model in Phitsanulok, Thailand

### Municipality:

Initiator, Motivator,  
Facilitator, Regulator  
and Inspector

Sharing roles



### Waste buyers and sorting facility: Wongpanit

Active recyclable waste collectors,  
waste buyers and waste circulators

Motivate and encourage  
residents on recyclable  
waste separation for sale



Train waste pickers and itinerant  
waste buyers on environment, health,  
waste sorting techniques, etc

### Residents

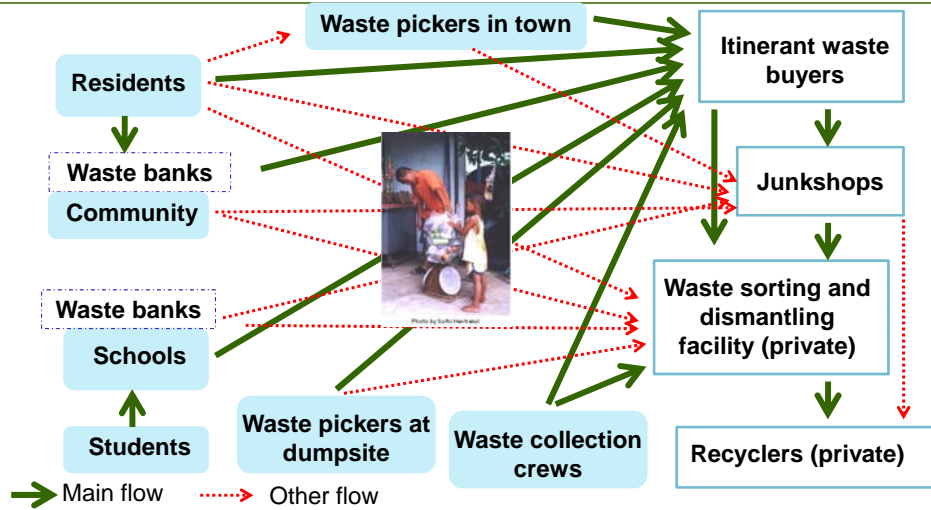
- ✓ Operate waste banks
- ✓ Join waste market events
- ✓ Sell household waste



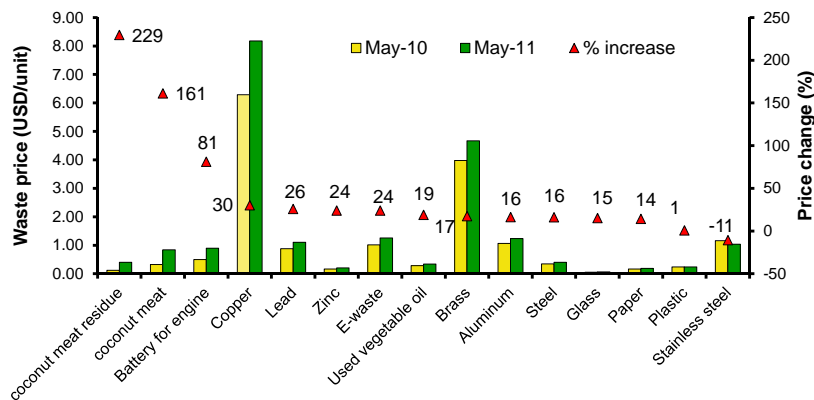
### Waste pickers and buyers

- ✓ Act as volunteers for environments
- ✓ Buy recyclables and sell sorting materials to recyclers

### Common flows of recyclable waste under free market conditions in Phitsanulok Municipality

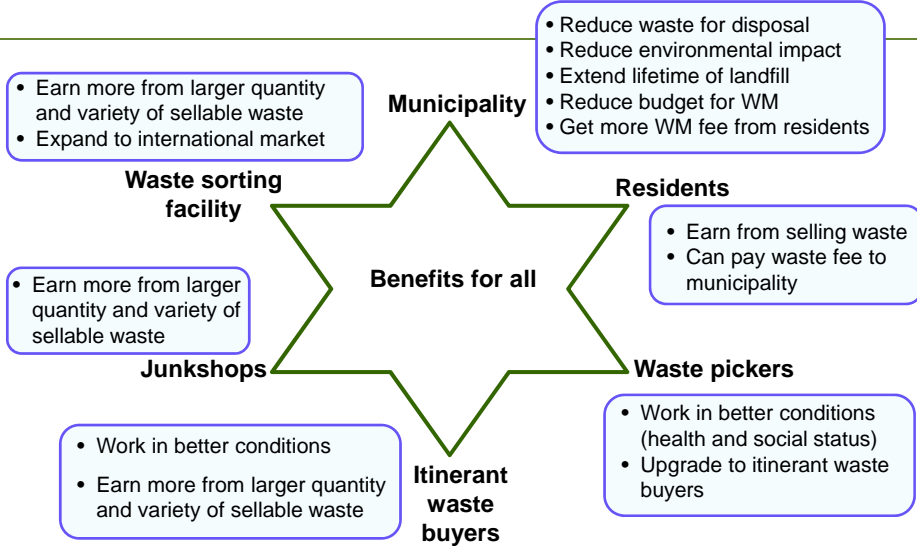


### Price of recyclable materials is fluctuated but mostly increase



Note: Domestic price of recyclable materials in Thailand (Wongpanit's price)  
 1 unit = 1 kg for most of materials expect for E-waste and glass

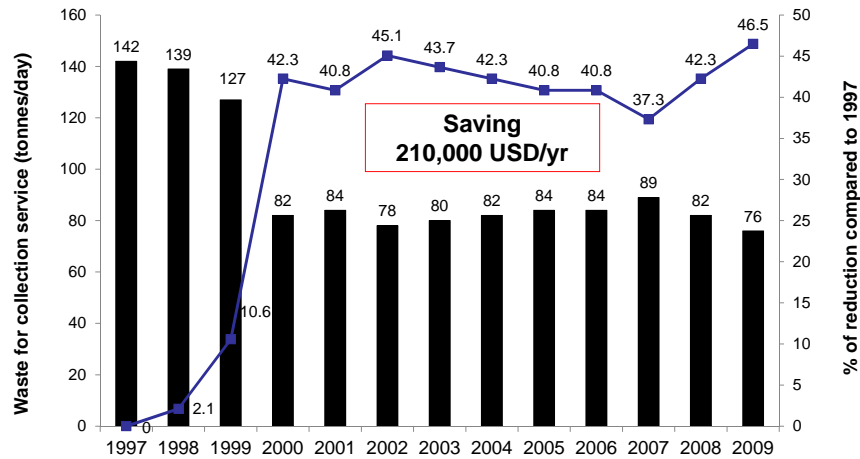
## Benefits of sustainable recycling business



## Sustainable organic waste management: household and community composting



## Changes in MSW to landfill site after introducing the 3Rs in Phitsanulok, Thailand



## Change in socio-economic conditions

### The business sector

- Increase recyclable materials available for the production side
  - Quantity of recyclables increased
- Increase business opportunity
  - Numbers of junkshops increased (4 → 9 shops)
  - Numbers of tricycle waste buyers increased
  - Numbers of waste pickers decreased (240 → 70)

### The residents

- Earn from selling recyclable wastes  
→ (3.3-13.3USD/month)
- Possible to pay for waste management fee  
(1USD/month)



Photo by Suthi Hantrakul

## Mechanical - Biological Waste Treatment prior to sanitary landfill

Area: 35.2 hectares



Homogenizing and forming the pile



Passive composting for 9 months



Compost like product



Plastic

## Conversion of plastic to oil

Refuse Derived Fuel :RDF



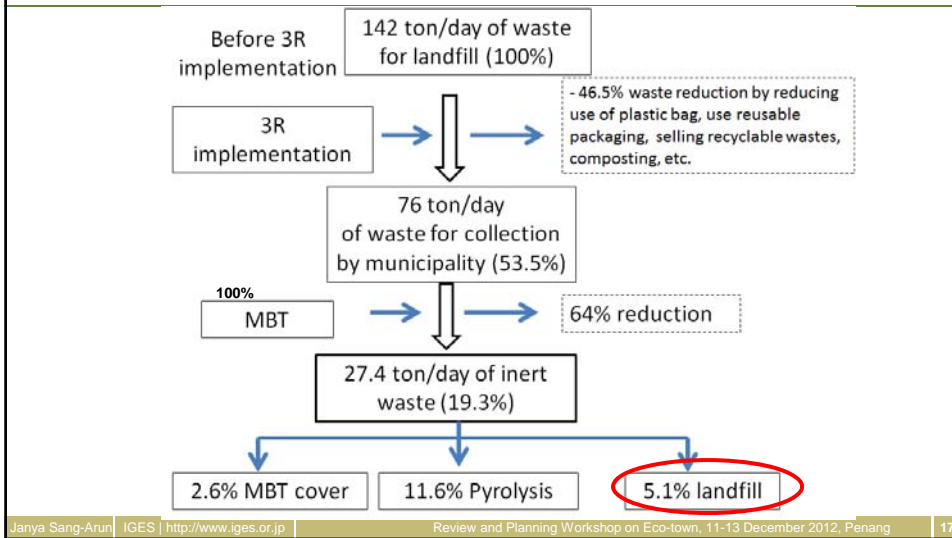
Pyrolysis



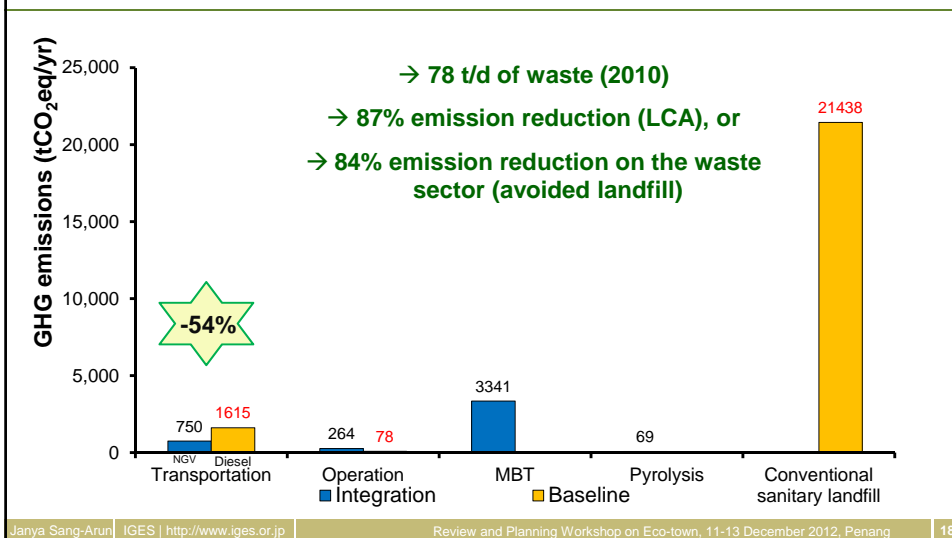
Source: Phitsanulok Municipality



### Achievement of zero waste target



### Reduction of GHG emissions (Lifecycle approach)



## GHG emissions from material recycling (rough estimation)

Recyclables	Weight (t/d)	GHG emissions per tonne (tCO <sub>2</sub> eq)	Total emissions (tCO <sub>2</sub> eq/d)
Paper	8.7	-2.08	-18.0
Plastic	5.4	0.25	1.4
Aluminium	1.4	-12.08	-17.4
Steel	5.0	-1.85	-9.3
Glass	15.5	-0.46	-7.1
<b>Net</b>	<b>36</b>		<b>-50.5</b>

**Phitsanulok Municipality contributes to avoidance 50.5 tCO<sub>2</sub>eq/day when compare with non-recycling**

**If this emission is included, the Municipality can achieve zero GHG emissions (LCA).**

Note: Suchada et al., (2003), approximate composition of collected recyclables by various participants in the municipality is 24% paper, 15% plastic, 43% glass, 4% aluminum and 14% steel.

## Conclusion

- Phitsanulok Municipality has gradually achieved the zero waste target through the 3Rs implementation, polluter pay principle, public participation, pre-treatment prior to landfill and pyrolysis
- The remaining waste to landfill is approximately 5%
- Further action is required but cost and economic incentives is a critical issue.

## Transfer of software technology to Battambang City, Cambodia

- Started in July 2012 with financial supports from the Ministry of Environment of Japan under a New Market Mechanism Program (carbon market)
- IGES and Phitsanulok Municipality provided technical supports
- Implementation in October 2012 with multi-stakeholders engagement: City Government, NGOs, Waste collection company, and Market committees.

