

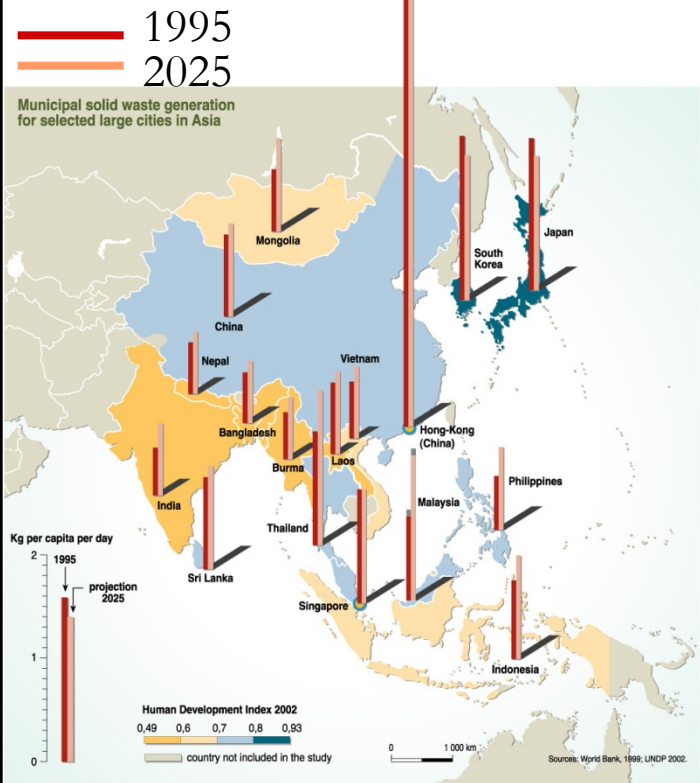
IGES Activities on Accounting Climate Co-benefits from Waste Management in Developing Asia

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Situation of Waste Management in Asia

- Municipal Solid Waste (MSW) management in Asia is becoming an increasingly complex matter
- MSW generation in Asia surpasses 1 million tonnes/day

MSW generation per capita in selected large cities in Asia



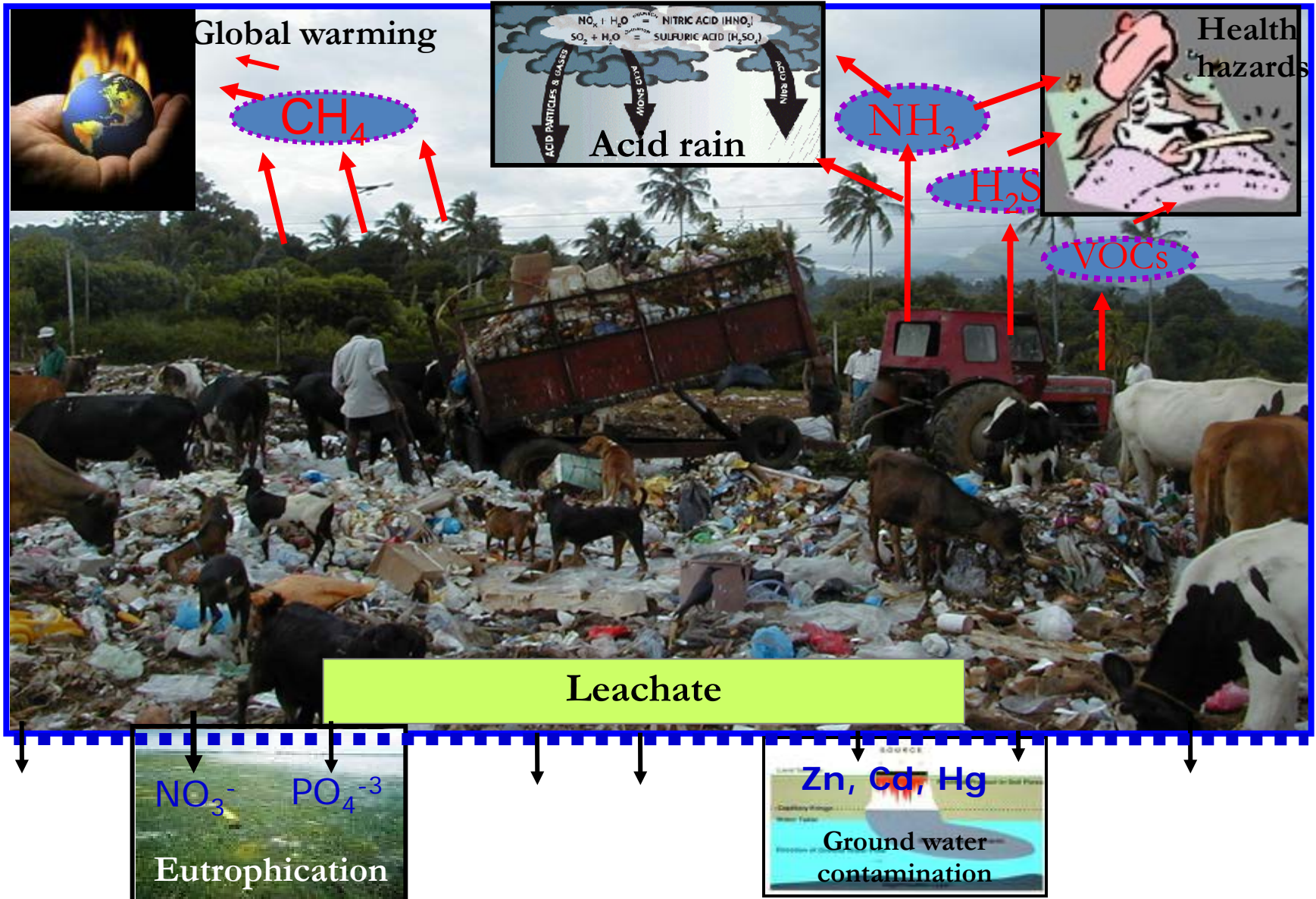
Source: UNDP, 2011

Problems associated with MSW management in developing Asia

- Inadequate institutional facilities and sound policies
- Lack of appropriate low-cost technologies and their effective integration
- Lack of financial resources
- Lack of public awareness

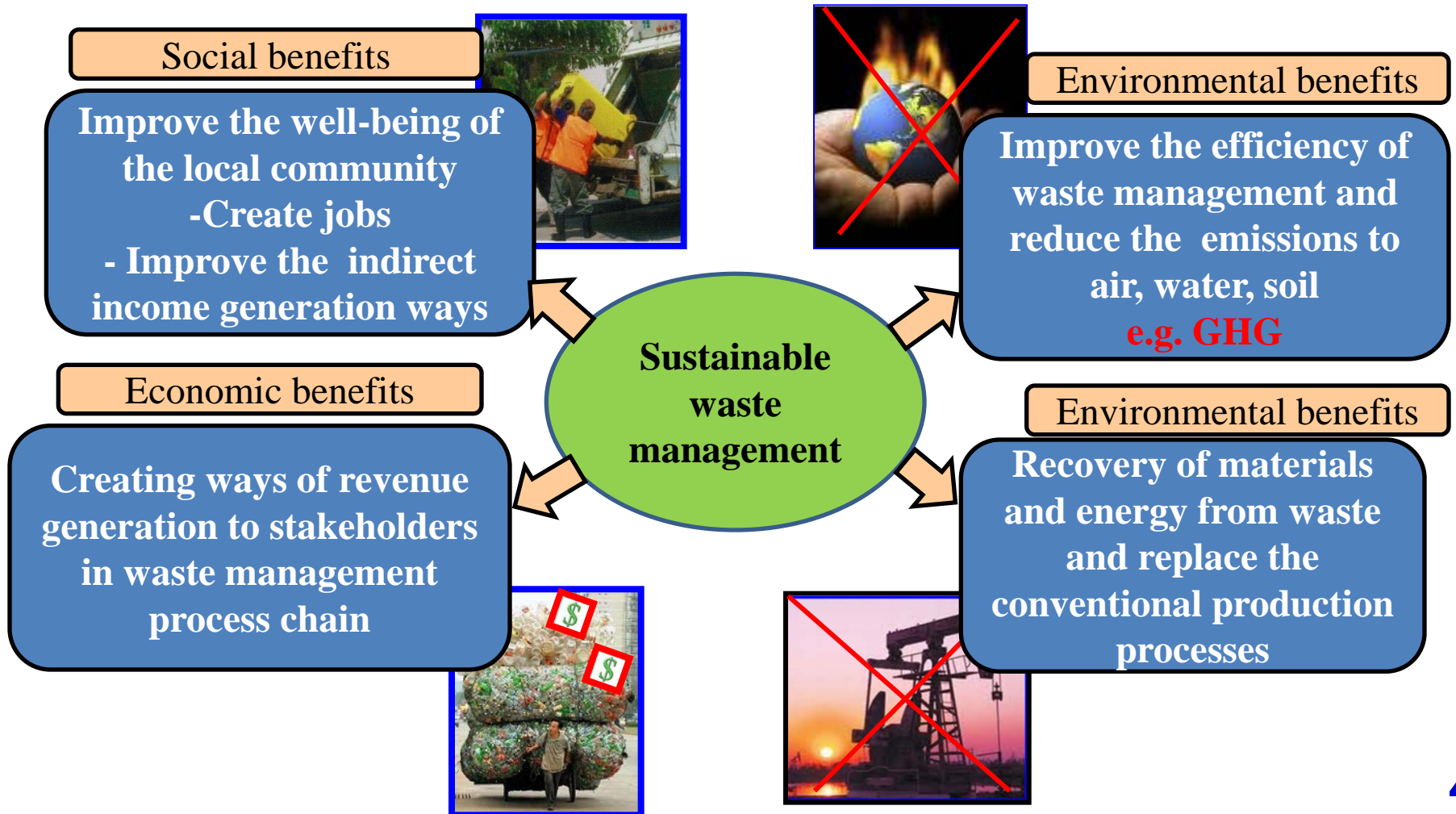
Situation of Waste Management in Developing Asia

- Open dumping and non engineered landfilling are the main disposal practice



Waste Management and Co-benefits

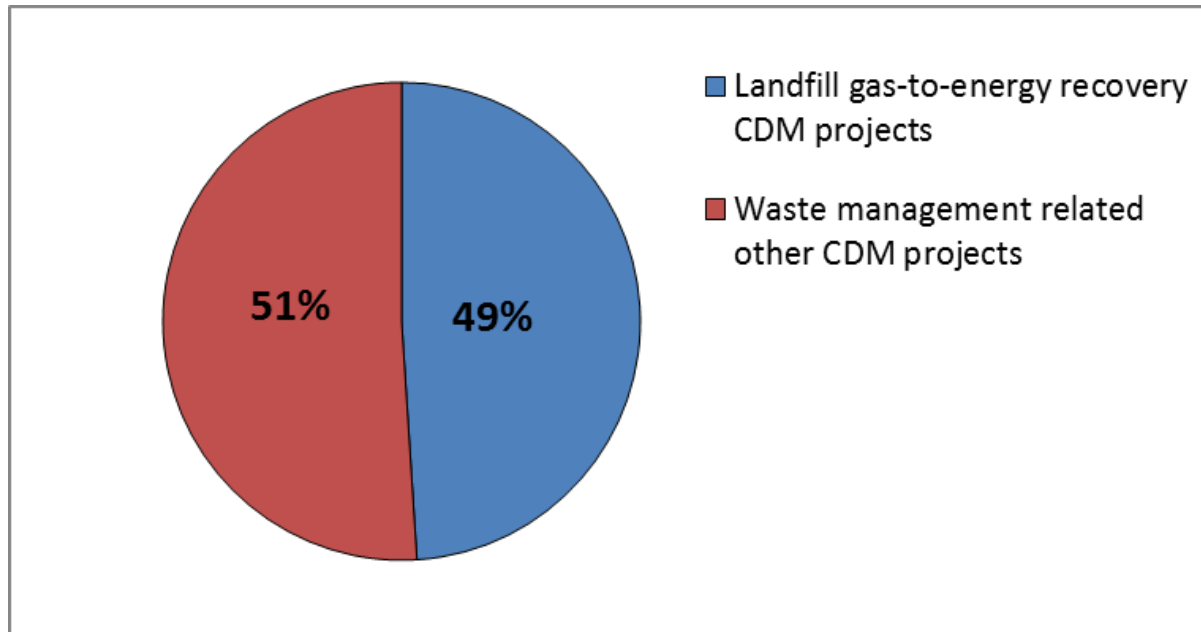
- Co-benefits can be achieved by selecting and adapting the best suited waste management technologies



Waste Management and Climate Co-benefits

Sanitary landfilling with gas recovery – an option ?

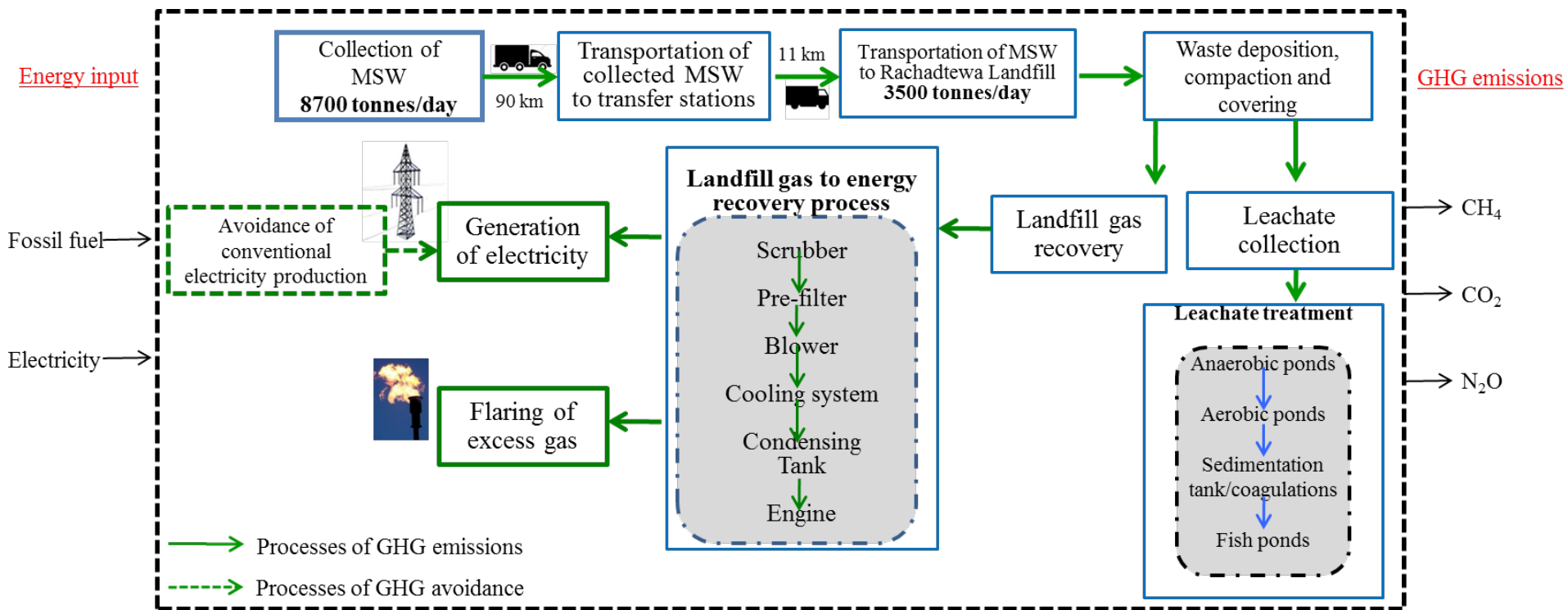
- There is a growing interest in Asia in moving towards properly designed, constructed and managed sanitary landfills with gas recovery system



- In Asia, 147 waste-related projects have been registered under the Clean Development Mechanism (as of 1 September 2012), about half of these projects are on landfill gas recovery.

Development of LCA Framework for Quantification of GHG Emissions

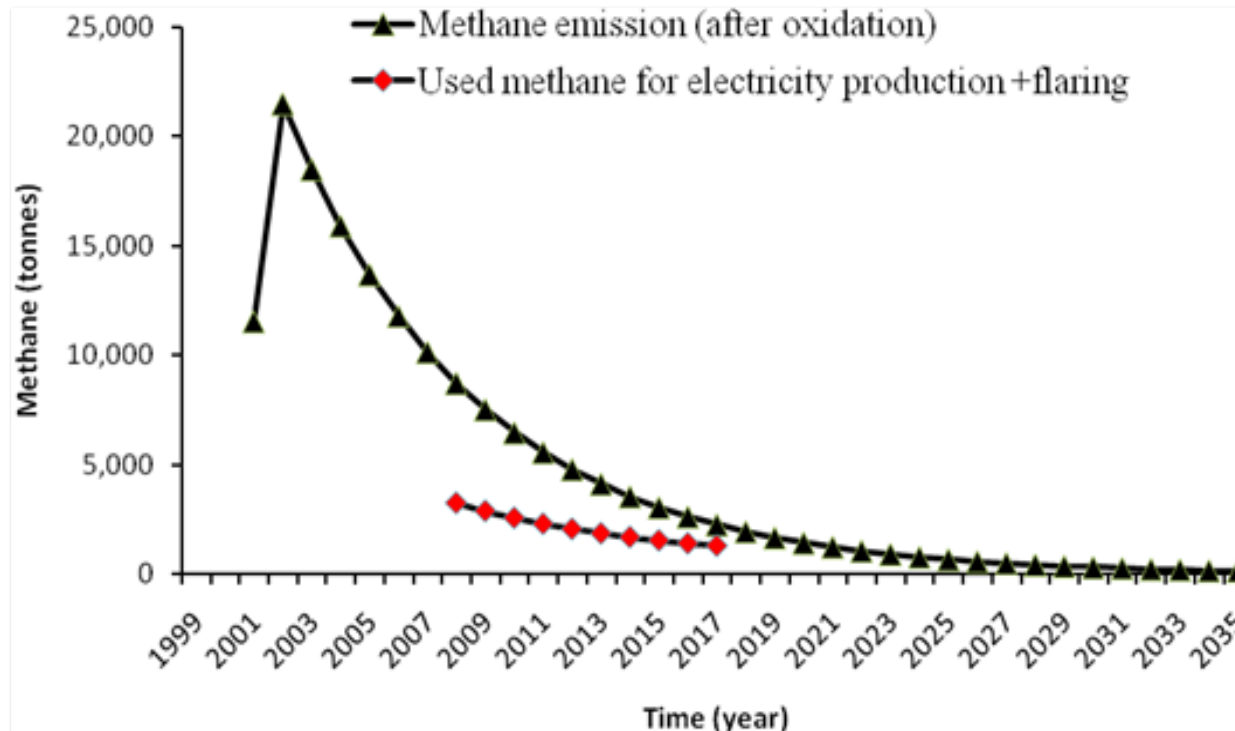
- Life Cycle Assessment (LCA) is a useful methodology for estimating environment impacts
- LCA framework designed to quantify GHG emissions considering all the phases of life cycle related to the waste management and its impact



Rachatewa landfill in Bangkok

Climate Co-benefits from Landfill Gas to Energy Recovery Systems

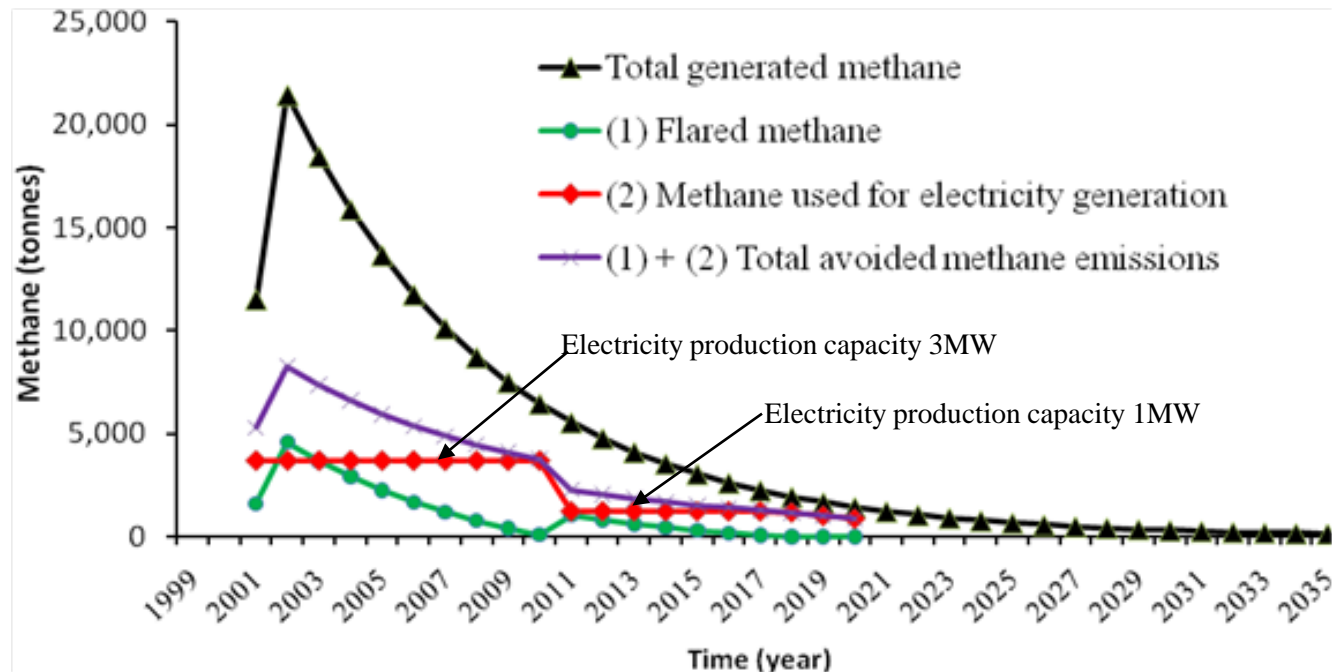
A case study of Rachatewa landfill in Bangkok Metropolitan Administration (BMA)



- Project start: 7 years after the closure of the landfill
- Duration of the CDM revenue: 10 years
- Total recovery: 12%

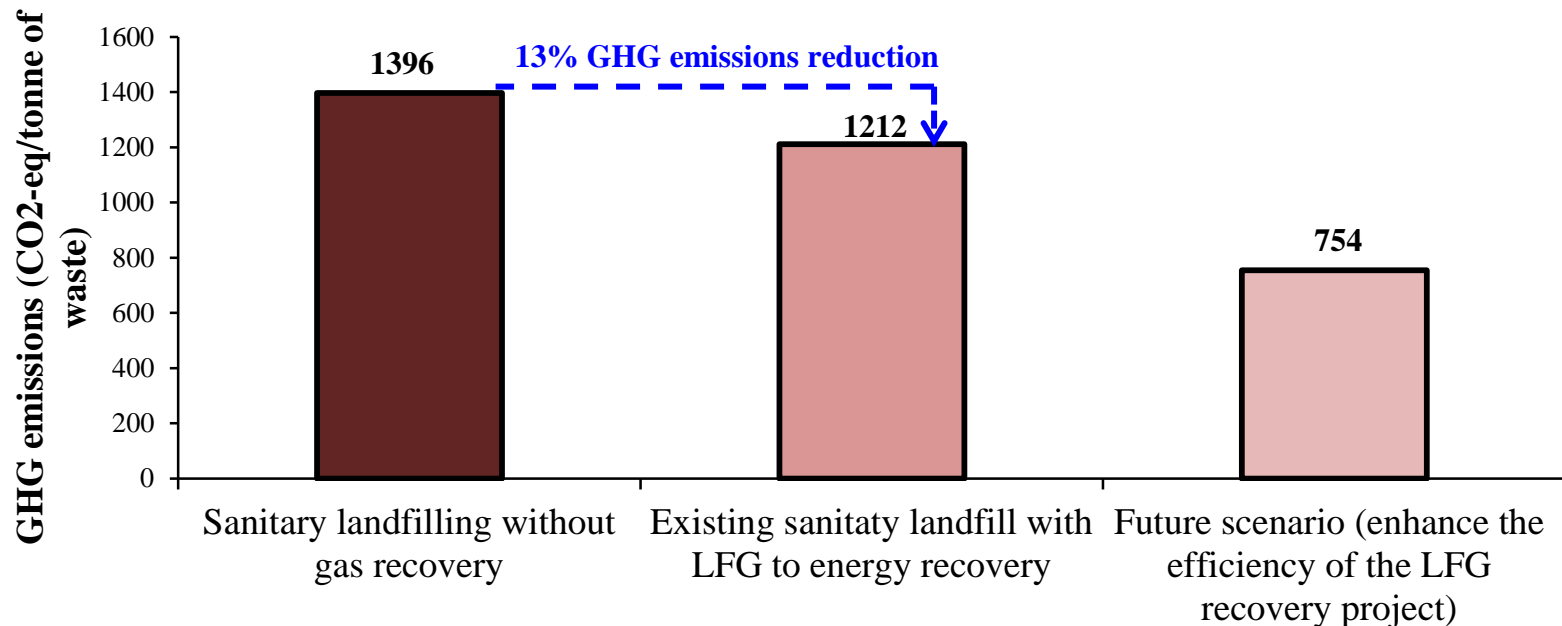
Potential Improvements of Climate Co-benefit

Simulation of an improved landfill gas recovery project scenario:
Rachatewa landfill in BMA



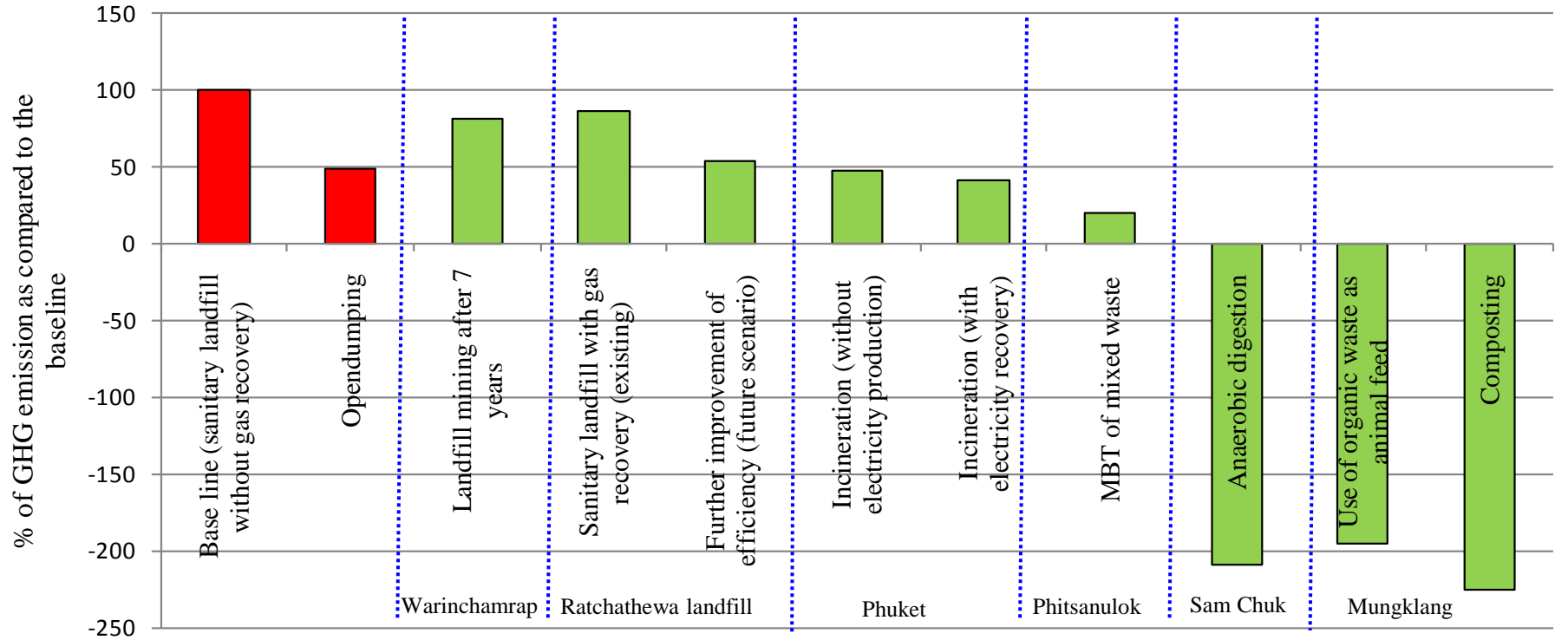
- Project start: at the closure of the landfill
- Duration: 20 years
- Total recovery of methane: 43%

Climate Co-benefits from Landfill Gas to Energy Recovery in Comparison to BAU Practice



- To continue sanitary landfill disposal with gas recovery, it is necessary to greatly enhance the efficiency of LFG recovery systems to improve both the climate co-benefits and economic benefits.

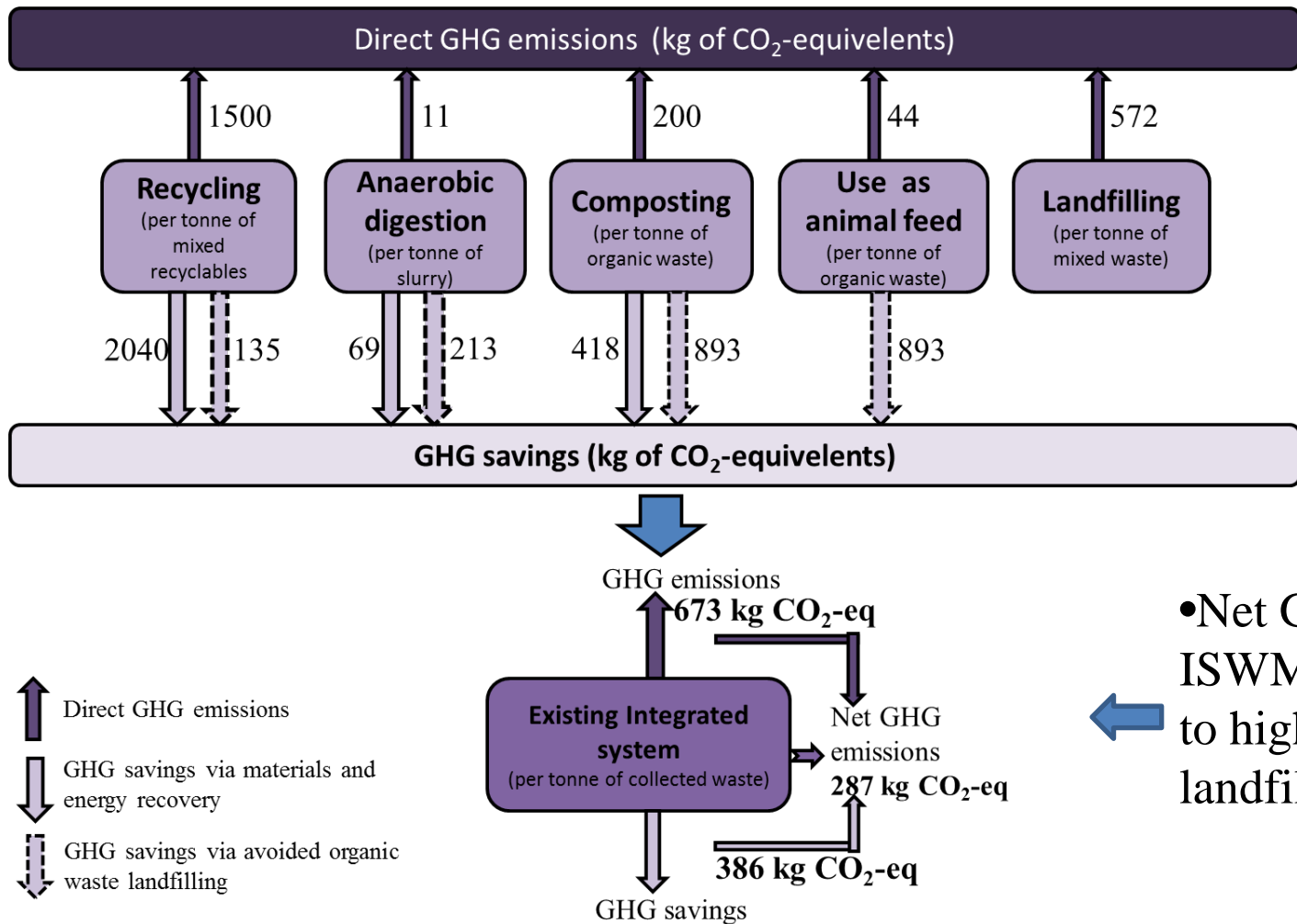
GHG Emissions from Different Waste Treatments Technologies in a Life Cycle Perspective - Investigation in Thailand



Note: climate benefits of use of discharge from anaerobic digestion and manure as organic fertiliser is not included due to lack of data

Integrated Solid Waste Management (ISWM): A Practical Solution to Enhance GHG Mitigation

- ISWM would be the most promising approach to solve the waste management crisis since it provides multiple benefits

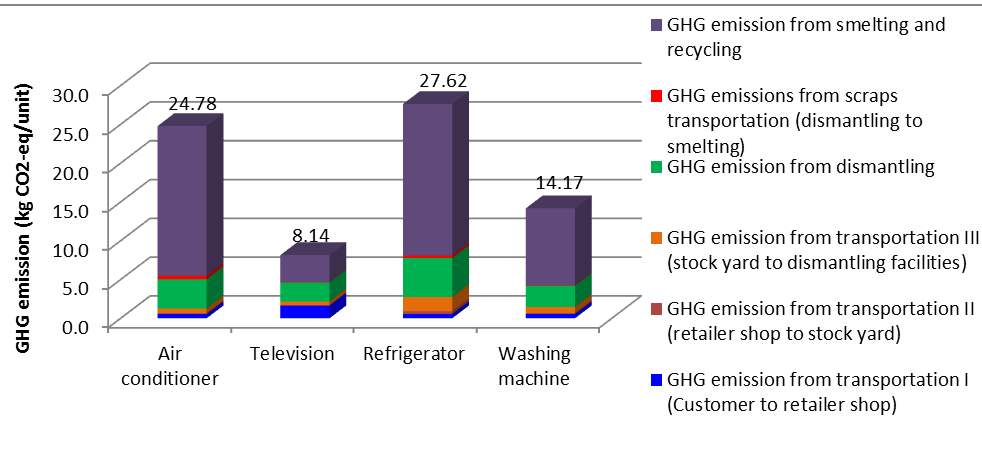


• Net GHG emission from ISWM is still positive due to high fraction of waste landfilling (69.6%)

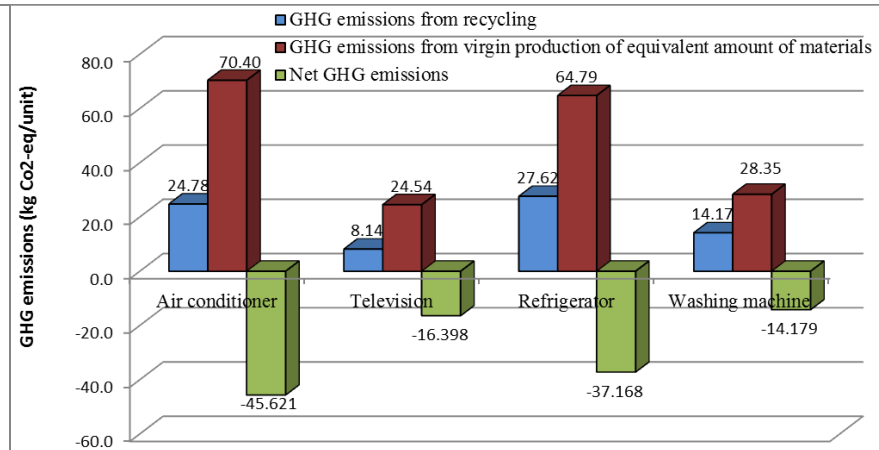
Assessment of Climate Co-benefits from Waste Electrical and Electronic Equipment (WEEE) Recycling

- IGES developed a LCA based methodology to assess the sustainability of WEEE recycling chain in selected Asian countries
- Assessment of climate co-benefits from WEEE recycling in Japan (Fukoka) is completed and similar study will be conducted in other countries e.g. China, Taiwan
- Results revealed that recycling of WEEE and recovery of considerable amount of materials makes a great contribution for GHG mitigation

GHG emission from different types of WEEE recycling in Japan



Comparison of GHG emissions from recycling of WEEE with virgin production



Capacity Building Activities

1. Guides for promoting urban organic waste utilization in Cambodia, Lao PDR and Thailand
2. Organizing national capacity building workshops for local governments in Cambodia, Lao PDR and Thailand
 - Promoting implementation of climate friendly waste management practices
 - Estimation of GHG emissions from municipal solid waste management



Development of GHG Calculator for Local Authorities

- IGES developed a spread sheet model for calculating GHG emissions from various waste management technologies taking into account the climate benefits of waste recovery in a life cycle perspective
- This simulation can be utilized as a training material and a supporting tool for decision making at the local authority level

Home
Transportation
Compostin
Anaerobic digestion
MBT
Recycling
Mix waste landfilling

Trial Version - March 2013

Simulation for quantification of GHG emissions from waste management methods

Please select the country Thailand

Please select the climatic zone of your country Moist and Wet Tropical

Summary of GHG emissions from your municipality

Activity	Direct GHG Emissions	Life Cycle GHG Savings	Net GHG Emissions	Unit
Transportation	5.39	0.00	5.39	kg of CO ₂ -eq/tonne of waste
Composting	177.90	1628.66	-1450.76	kg of CO ₂ -eq/tonne of organic waste
Anaerobic digestion	14.22	1981.99	-1967.77	kg of CO ₂ -eq/tonne of organic waste
Mechanical Biological Treatment (MBT)	124.64	1484.15	-1359.50	kg of CO ₂ -eq/tonne of waste
Recycling	1217.59	4000.18	-2782.59	kg of CO ₂ -eq/tonne of mixed recyclables
Landfilling of mix MSW	946.32	0.00	946.32	kg of CO ₂ -eq/tonne of mix waste
GHG reduction at present	686.13	776.86	-90.73	kg of CO₂-eq/tonne of collected waste
Total monthly GHG emissions from waste management in your Municipality	113,013.98	128,959.47	-15,945.49	kg of CO₂-eq/month

<<<minus 'net GHG emissions' means potential savings (via materials and energy recovery and avoided organic waste landfilling) are higher than the direct emissions

Activities on MRV and NAMAs

- Facilitating domestic MRV development for reducing GHG emissions from the solid waste management in Thailand
- Develop a policy framework to promote the 3R application for NAMAs in developing Asian countries

Potential Collaboration with NIES

- Improvement of the GHG calculator for local authorities in developing countries
- Accounting black carbon emissions from open burning and landfill fire
- Landfill fire protection and fighting
- Increase accuracy of data collection and accounting GHG emissions reduction to serve the JCM
- Utilizing MFA, LCA and other methodologies for carbon accounting of the 3Rs suitable for developing Asian context
- etc.



THANK YOU VERY MUCH
FOR YOUR ATTENTION