GHG Calculator for Solid Waste Sector - IGES Tool

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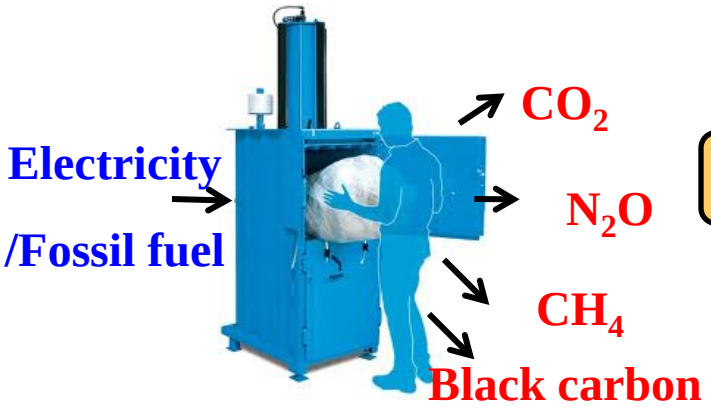
Current Waste Management and Global Climate Change

- **Each and every step of waste management can cause GHG and black carbon emissions**

Phase I-GHG emission from waste transportation



Phase II-GHG emissions from operation

Phase III -GHG emissions from treatment/final disposal

Development of IGES-GHG calculation tool

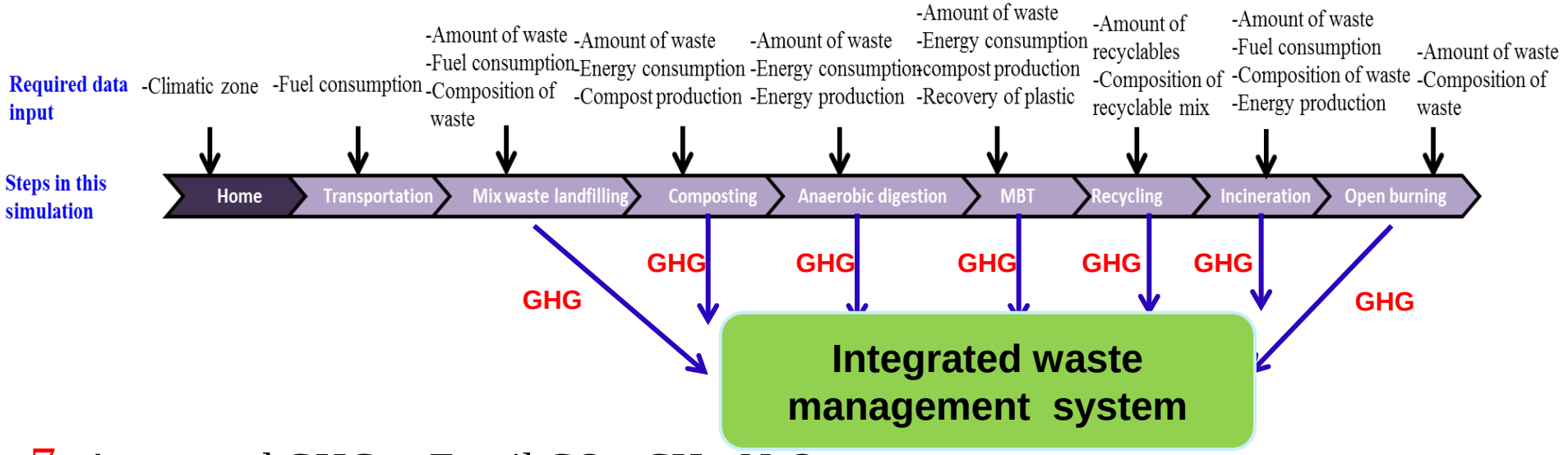
- In 2010, IGES conducted capacity building workshops for local governments in Asian countries to promote effective waste utilisation for climate change mitigation
- Estimations of GHG emissions from waste management was difficult for personnel from local authorities since they are not familiar with the complex equations and mathematics (IPCC waste model)
- In 2012, IGES developed a simple spreadsheet simulation to facilitate the decision-making of local governments on selection of appropriate technology for climate change mitigation (aligned with IPCC guideline)
- By using this model, the user can calculate both direct emissions (use for national greenhouse gas inventory and carbon market) and life cycle GHG savings (use for decision making)

Importance/Unique elements of the tool (1)

1. This tool is very simple and step by step guidance has been provided to users in all the sheets
2. Special skill is not required and ability to work with excel would be sufficient
3. This tool can be used with only minimal data provided by the user, and also can be applied with the site-specific conditions (e.g: composition) . Most of the country specific data has been added to the tool
4. All the concepts, mathematical formula used in the tool has explained clearly in the user manual
5. The tool and the manual are available in both English and local languages (Thai and Khmer)

Importance/Unique elements of the tool (2)

6. This tool consists of ten spreadsheets which covers most of the existing technologies in Asia



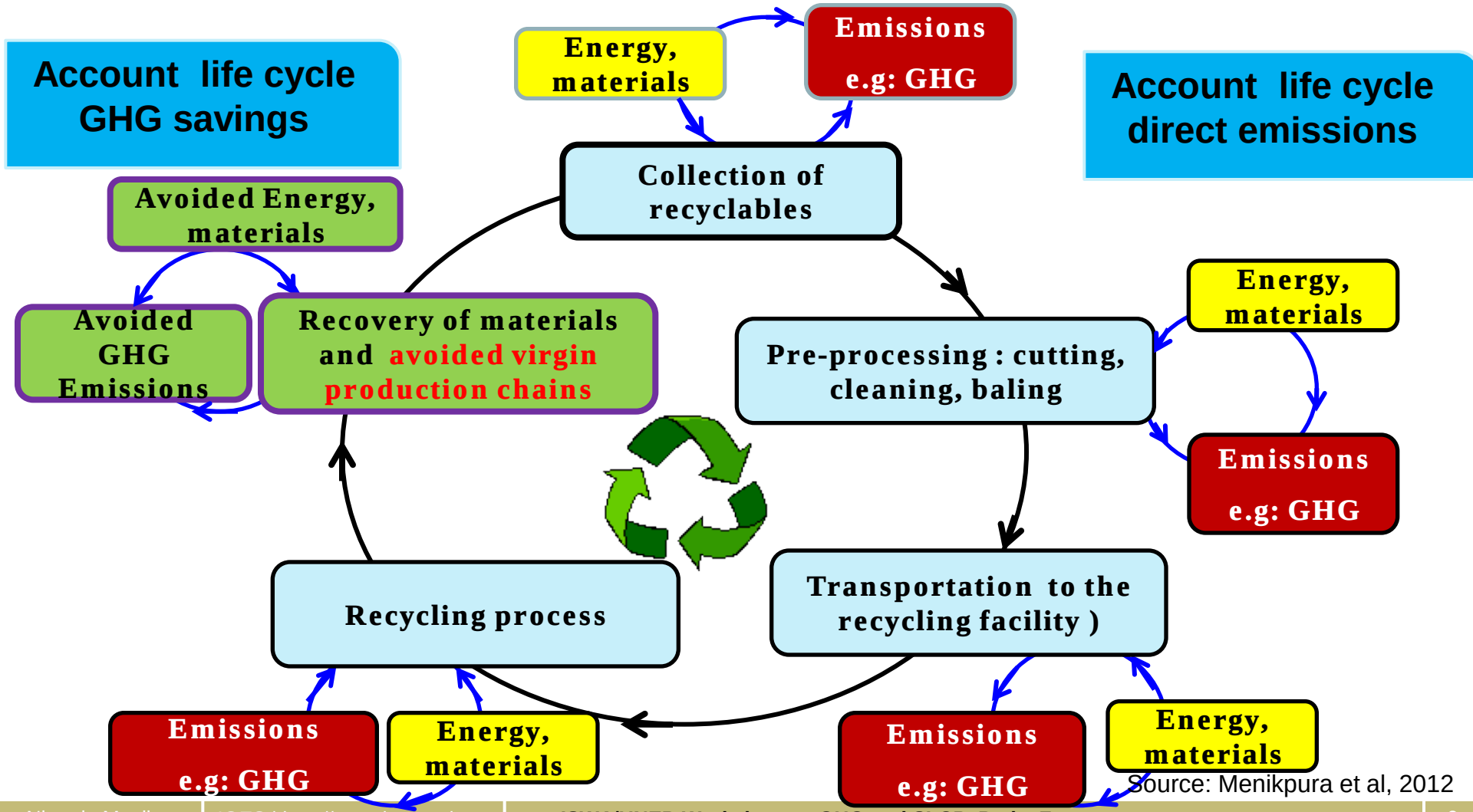
7. Accounted GHGs : Fossil CO_2, CH_4, N_2O

8. Technology coverage: This tool can be used to quantify the GHG emissions from individual treatment technologies as well as from integrated systems.

9. Geographical coverage: The current version can be applied in 13 countries across Asia-pacific region

Importance/Unique elements of the tool (3)

10. Life Cycle Assessment (LCA) used as the basis



Source: Menikpura et al, 2012

Required input data

- Users are asked to enter the basic input data and select the most appropriate conditions which are aligned with the waste-management practices of their local authority
- Monthly data is required on following aspects with respect to different treatment options;

  -Amount of waste use for the treatment

  -Waste composition

  -Fossil fuel requirement for operational, treatment phases

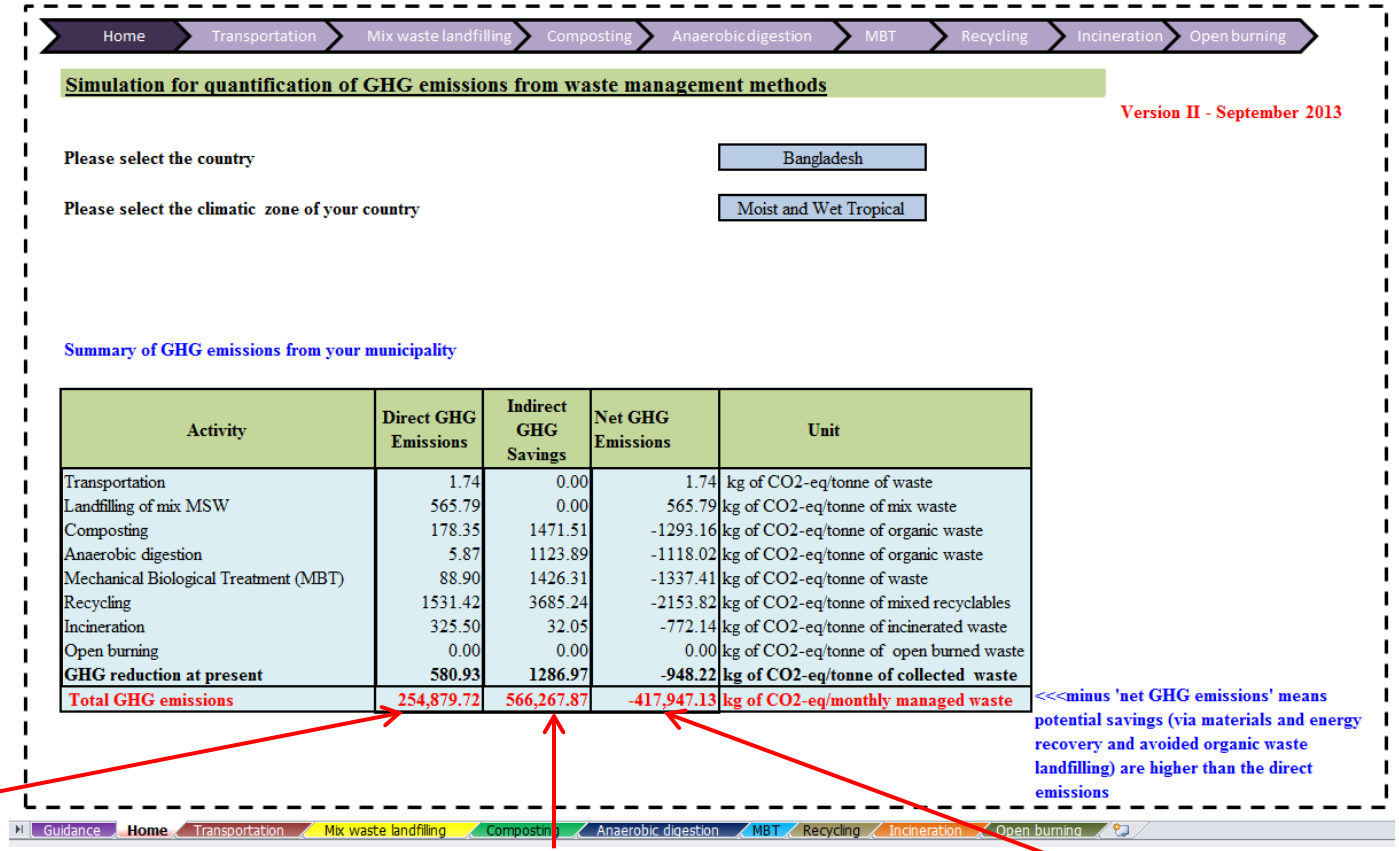
  -Grid electricity requirement for operational, treatment phases

  -Amount of resources recovered (energy, materials)

- In addition to these data, country specific emission factors, IPCC recommended default values have been assigned to the mathematical formula

User friendliness and required competence

- **It is easy to see the overall results: Homepage has been designed to display a summary of the GHG emissions from a particular waste management system**



Home | Transportation | Mix waste landfilling | Composting | Anaerobic digestion | MBT | Recycling | Incineration | Open burning

Simulation for quantification of GHG emissions from waste management methods

Version II - September 2013

Please select the country: Bangladesh

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

Summary of GHG emissions from your municipality

Activity	Direct GHG Emissions	Indirect GHG Savings	Net GHG Emissions	Unit
Transportation	1.74	0.00	1.74	kg of CO2-eq/tonne of waste
Landfilling of mix MSW	565.79	0.00	565.79	kg of CO2-eq/tonne of mix waste
Composting	178.35	1471.51	-1293.16	kg of CO2-eq/tonne of organic waste
Anaerobic digestion	5.87	1123.89	-1118.02	kg of CO2-eq/tonne of organic waste
Mechanical Biological Treatment (MBT)	88.90	1426.31	-1337.41	kg of CO2-eq/tonne of waste
Recycling	1531.42	3685.24	-2153.82	kg of CO2-eq/tonne of mixed recyclables
Incineration	325.50	32.05	-772.14	kg of CO2-eq/tonne of incinerated waste
Open burning	0.00	0.00	0.00	kg of CO2-eq/tonne of open burned waste
GHG reduction at present	**580.93**	**1286.97**	**-948.22**	**kg of CO2-eq/tonne of collected waste**
Total GHG emissions	254,879.72	566,267.87	-417,947.13	kg of CO2-eq/monthly managed waste

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

Guidance | Home | Transportation | Mix waste landfilling | Composting | Anaerobic digestion | MBT | Recycling | Incineration | Open burning

Useful for GHG inventory and carbon market

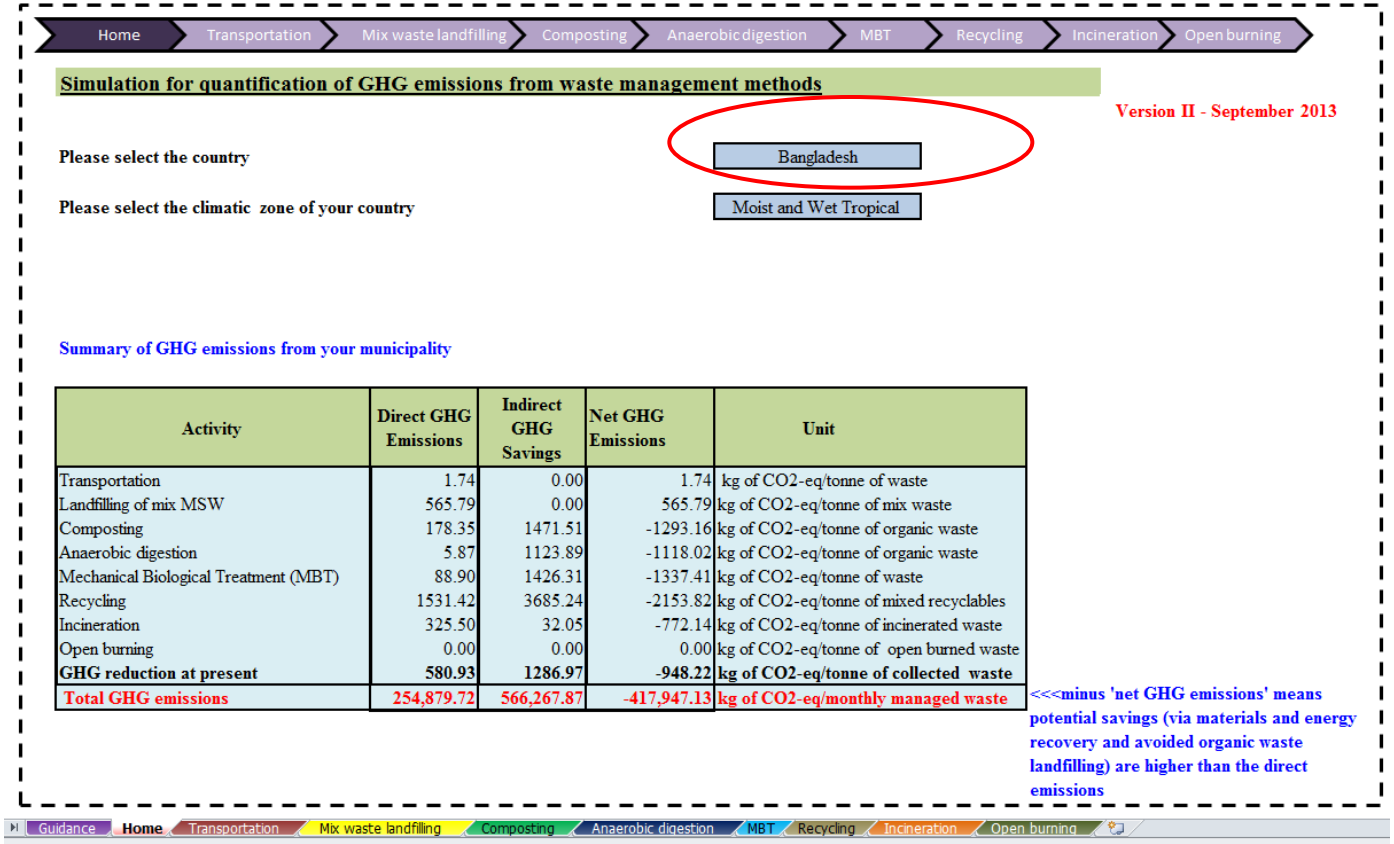
User understand the potential savings via material/energy recovery, avoided landfilling

Useful for decision making on selection of climate friendly technologies

Planned/possible enhancement: proposal to CCAC

1. Inclusion of CCAC member countries into the country list

Country specific data need to be gathered



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Planned/possible enhancement: proposal to CCAC

2. Inclusion of summary SLCP emissions to the home page

Summary of GHG emissions from your municipality

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Summary of SLCP emissions

SLCP	Composting		Sanitary landfill with gas recovery		.....	Total	
	Direct	Indirect	Direct	Indirect	.....	Direct	Indirect
Methane							
Black carbon							

Planned/possible enhancement (2)

3. Black carbon emission from fossil fuel burning from all the treatments and combustion of waste is one of the key aspects to be accounted in this tool.

4. With compare to other treatment options, GHG mitigation potential from an appropriate recycling scheme is remarkable. Due to lack of country-specific data, this simulation uses an inventory data of recycling in Thailand. IGES plans to develop a more comprehensive version to account total GHG emission including SLCP from recycling more precisely for each country

Planned/possible enhancement (3)

5. This version uses the sanitary landfill without gas recovery or open dumping as the baseline scenario to account the avoided emissions. However, other kind of treatments exist (e.g. incineration) and those options should be included in the next version

6. Translation of both the tool and manual into the local languages of the CCAC member countries: Thai and Khmer versions are available

THANK YOU VERY MUCH FOR YOUR ATTENTION

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