Emissions Quantification Tool for the Municipal Solid Waste Initiative

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Development of the Municipal Solid Waste Initiative Emissions Quantification Tool

❑ IGES will play the leading role on development of the Municipal Solid Waste Initiative Emissions Quantification Tool in close collaboration with IFEU.

❑ The tool will build based on existing methodologies (e.g. IGES), but tailored to fit the needs of the CCAC and the MSW Initiative by including black carbon in addition to methane and other GHG emissions.

By using this tool cities will be able to:

1) calculate emissions for their current waste management practices based on a number of selected systems

2) compare their business-as-usual scenario against alternative solutions

3) track emissions reductions over time once actions to reduce emissions have been implemented

Methods and approaches for tool development

Inclusion of SLCP and other GHG

❑ The existing tools quantify major GHGs from waste management

❑The MSW Initiative tool will account for both SLCP and other GHG from waste management

Activity	SLCP emissions	Other GHG emissions
Waste collection and transportation	Black Carbon (BC) emission from incomplete combustion	CO_2 emission from fuel combustion and use of grid electricity
Pre-treatment	BC emission from incomplete combustion	CO_2 emission from fuel combustion and use of grid electricity
Recycling and material recovery	BC emission from incomplete combustion	CO_2 emission from fuel combustion and use of grid electricity
Biological treatment e.g. composting / anaerobic digestion etc.	BC emission from incomplete combustion CH_4 emissions from waste degradation	CO_2 emission from fuel combustion and use of grid electricity N_2O emission from waste degradation
Final disposal (e.g. landfill, open dumping, open burning)	Diffuse CH_4 emission BC emission from incomplete combustion	CO_2 emission from fuel combustion and grid electricity

Life Cycle Assessment (LCA) as the basis

❑ Life Cycle Assessment (LCA) based methodology will be used to quantify SLCPs and other GHG emissions from all the phases of waste management cycle

| Collection and transportation | → | Pre-processing | → | Treatment | → | Final disposal |

❑ This tool will account for emissions and emission savings across the life cycle

SLCP and GHG emissions and avoidance from different phases of life cycle

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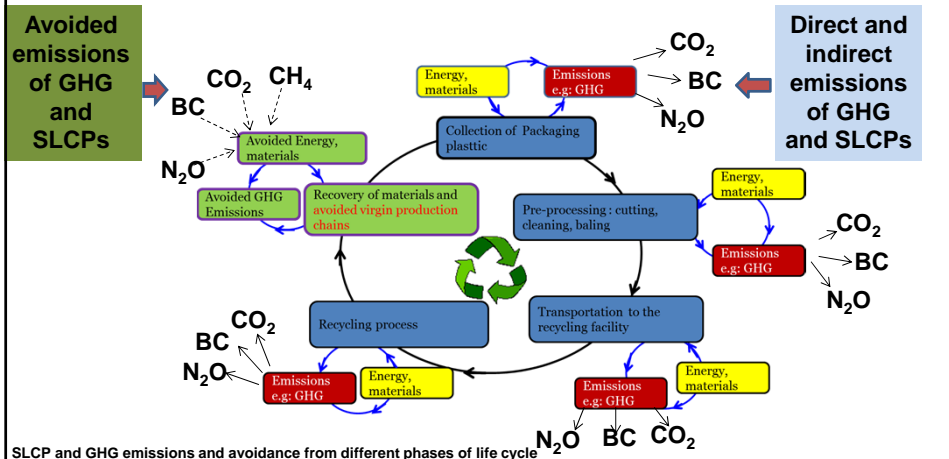
Inclusion of CCAC member countries into geographical coverage

❑ This tool will design to cover waste management systems in larger geographical area including the regions of the MSW Initiative. IGES needs supports in data collection in other region than Asia
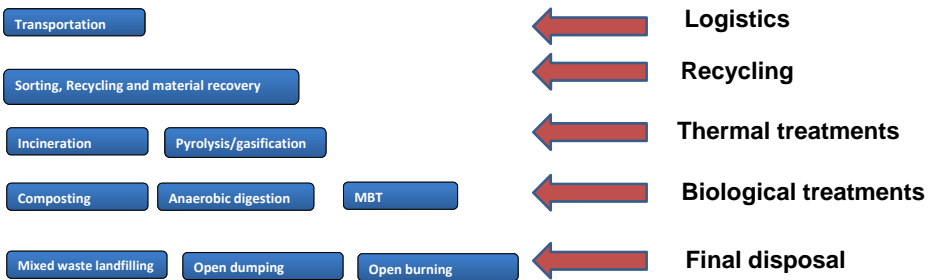
- Asia
- MENA
- OtherLatin America
- Africa

❑ Therefore, country specific data/default values need to be gathered and incorporated into the tool e.g.

- Emission factors for grid electricity production
- Type of fossil fuel use for logistics and the energy content of the fuel
- Electrical and thermal net efficiency of energy generation
- Etc.

Capacity to quantify emissions from relatively basic waste management technologies to advanced technologies

❑The tool should be used in both developing and developed countries and should therefore have the capacity to quantify emissions from relatively basic waste management technologies to advanced technologies

Transportation				Logistics
Sorting, Recycling and material recovery				Recycling
Incineration	Pyrolysis/gasification			Thermal treatments
Composting	Anaerobic digestion	MBT		Biological treatments
Mixed waste landfilling	Open dumping	Open burning		Final disposal

Option for users to navigate the default data or possibility to enter site specific data

❑ Data collection and data reporting is a major barrier in developing countries

❑Therefore, this tool will provide regional specific/country specific data to the extent possible

❑The tool will encourage users to collect and use the real data. Therefore, the tool will have the both options either to use default values or enter more appropriate site specific data for accurate estimation

Input data requirement

❑ The user will be required to input the following city-specific data for more accurate estimation. Therefore data collection and recording at city level is necessary.

-Population of this city

-Location and climate;

-Waste quantities (generated and collected);

-Waste composition;

-Waste treatment methods;

-Type and quantity of energy and fuel consumption for operational activities;

-Material/energy recovery rates

-Landfill gas capture rate and use of collected landfill gas;

Output/Results

❑ The results of the business-as-usual and alternative scenarios will be disaggregated for each pollutant and presented per gas in tonnes

SLCP and GHG	Composting				Sanitary landfill (without gas recovery)			
Emissios (kg/tonne of waste)	Direct emission (A)	Indirect emission (B)	Avoided emissions (C)	Net emissions (D) = (A) +(B)- (C)	Direct emission (A)	Indirect emissio n (B)	Avoided emissions (C)	Net emissions (D) = (A) +(B)- (C)
CH_4								
CO_2								
N_2O								
BC								
Total Climate impact (kg CO2-eq/tonne of waste)								

❑ Also total climate impacts from current waste management system and business as usual practices will be illustrated graphically for easy comparison

Challenges

❑ To meet the requirement of CCAC MSW Initiative tool, Excels programing languages e.g. Visual basic and macros, will be used

  ❑ To choose specific waste management option and enter the corresponding data

  ❑ To transfer the data in separate sheet and facilitating new data entry of next technology

  ❑ To develop a user friendly interface with self-explaining steps

  ❑ To generate summary report of the evaluation for print and email

  ❑ To create monitoring and reporting module in order to quantify emission reductions over time

  ❑ To save old data and facilitate new data entry to track emission reductions

Challenges

❑ Thus, an expert support on programming language (e.g. Visual basic and macros) is required to design the tool

❑ However macro and visual basic code may not be compatible from one version of Excel to another (e.g. excel 2003). Users in developing countries may face the problem in operating the tool on quite old computers

❑ Effects of Back Carbon (BC) on climate is not clear as of yet and need from contribution from group of experts to validate the existing emission factors

THANK YOU VERY MUCH FOR YOUR ATTENTION

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