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### WASTE-TO-ENERGY IN THE CONTEXT OF GLOBAL WARMING

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#### ABSTRACT

In December 2007 the United Nations Framework Convention on Climate Change (UNFCCC) took place in Bali. It was based on the IPCC report no. 4 presented in Barcelona on November 2007. The messages are briefly:

- Warming of the climate system is unequivocal
- Global greenhouse gas (GHG) emissions due to human activities have grown since pre-industrial times
- Continued GHG emissions at or above current rates would cause further warming and induce many changes in the global climate system during the 21<sup>st</sup> century that would *very likely* be larger than those observed during the 20<sup>th</sup> century
- Key mitigation technologies in the waste sector:  
**Landfill Gas (LFG) methane recovery; waste incineration with energy recovery;** composting of organic waste; controlled waste water treatment; recycling and waste minimisation; biocovers and biofilters to optimise methane oxidation

The above by the IPCC proposed mitigation technologies for the waste sector can be categorized regarding specific waste treatment scenarios and their efficiency expressed in kg CO<sub>2</sub> equivalent emitted per ton of waste.

- Landfill w/o LFG recovery 1850 kg CO<sub>2</sub>-eq
- Landfill with LFG recovery 250-775 kg CO<sub>2</sub>-eq<sup>1</sup>
- Energy-from-Waste plant -1000..-100 kg CO<sub>2</sub>-eq<sup>1</sup>

With a population of little over 300 million people and a per capita municipal waste generation rate of 760 kg/person.year, the total waste generated in the USA is about 230 million Mg/year (OECD). With the treatment scenarios discussed above, the following can be stated:

- If all wastes were landfilled waste disposal would correspond to 425 million tons of CO<sub>2</sub> equivalents.

- If all wastes were incinerated in Energy-from-Waste (EfW) plants, the emissions could be reduced by about 500 million tons of CO<sub>2</sub> equivalents (about 9% of today's US CO<sub>2</sub> output) and make the waste management sector a GHG emissions sink.
- The total electricity generated from EfW plants could be as high as 15,000 MW replacing about 50 standard 300 MW power plant units.

To an average US 4 person household about 3 t/year of municipal solid wastes can be allocated, corresponding to an annual difference between landfilling without LFG recovery and EfW treatment of about 6.9 Mg CO<sub>2</sub>-eq /year. If this household wanted to achieve the same reduction of CO<sub>2</sub> equivalent emissions by other means than having these wastes burnt in a modern EfW plant, they have the following options:

- Remove one automobile from use (EPA: 6.0 Mg CO<sub>2</sub>-eq /year)
- Cut household electricity consumption by 80% (EIA: 7.8 Mg CO<sub>2</sub>-eq /year)

The European parliament commission has proposed to reduce CO<sub>2</sub> emissions in Europe to 20-30% below 1990 levels. In comparison with Europe, annual GHG emissions (CO<sub>2</sub>-eq/person/year) in the U.S. today are on a level about double that of the Europe. In order to achieve a similar reduction in the U.S., significant efforts have to be done on all energy fronts. Energy-from-Waste (EfW) is one of them, which at the same time solves a space and pollution problem and does not leave these issues to future generations.

<sup>1</sup> Depending on amount of energy recovered and source replaced