

**PSU Visiting Virtual Professor Programme**

**Lecture presentation Report on**

1. **Solid Waste Management**
2. **Waste-to-Energy**

Lecture by

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# Introduction

Municipal solid waste management has undoubtedly emerged as one of the most pressing issued facing urban local authorities globally. The rising human population has also meant an increase in waste generation and a growing complexity around its management. The special lectures were meant to provide first and overview of the problem at global level, including essential statistics pertaining to solid waste generation, collection and disposal, key emerging issues such as plastic waste management and efforts to address the problems. Secondly, the lectures were meant to provide essentials of waste-to-energy as an option for managing the growing volumes of waste, touching on the technological aspects and key considerations for technology selection. The lectures were held virtually via Zoom application, on the 3rd of December and on the 8th of December 2021 as from 10.00Hrs to 12.00 Hrs. The special lectures were attended by participants from Thailand, Nigeria and Zimbabwe including PSU students conducting various researches related to solid waste management

# Number of participants

The two special lectures were attended by 18 participants working on various researches related to waste management

# Content of lectures

The first lecture was centred around waste management in general while the second lecture focussed on waste-to-energy. Details are provided below

# Lecture 1 (03 December 2021,10.00 hrs- 12.00hrs (Bangkok time)

The lecture was focussed on waste management, touching on essential statistics on the global level and global efforts to address key issues. To prepare participants, basic information was also shared including solid waste indicators such as Per-Capita Waste Generation, The Recycling rate, the Waste Collection Burden etc. Of importance, it was key to share with participants the following take-aways:

* Globally, an estimated 2.01 billion tonnes of municipal solid waste were generated in 2016, and this number is expected to grow to 3.40 billion tonnes by 2050 under a business-as-usual scenario.
* The global per capita generation is about 0.74kg/day (Countries range between 0.11 -4.54kg/capita per day)
* Waste is growing the fastest in Sub-Saharan Africa, South Asia, and the Middle East North Africa regions, where, by 2050, total waste generated is expected to approximately triple, double, and double, respectively.
* Food and green waste comprise more than 50 percent of waste in low- and middle-income countries. In high-income countries the amount of organic waste is comparable in absolute terms but, because of larger amounts of packaging waste and other nonorganic waste, the fraction of organics is about 32 percent
* Electronic waste management and plastic waste management are among the most pressing emerging issues around waste management globally.
* Efforts to address plastic waste include the recently adopted Basel Convention Plastic waste amendments which has streamlined certain plastic wastes as hazardous wastes requiring the prior informed consent procedure during transboundary shipment.

# Lecture 2 (08 December 2021, 10.00 hrs- 12.00hrs (Bangkok time)

The lecture focussed on waste-to-energy (WtE) also referred to as Energy from Waste (EfW) as a valid option for managing the rising volumes of waste around the world. Various techniques were discussed but especially those that have been proven to be viable on a commercial level. Further, the lecture touched on key factors to consider when choosing among the options of various WtE technologies. The following were major take-aways:

* The increasing trend in waste generation (The Throw Away Society), with the global waste generation currently standing at **2.01 bn** tonnes/yr and expected to grow to **3.4 bn** tonnes/year by 2050 (World Bank, 2018) means that the traditional collect and dispose option cannot cope.
* While the world has made significant efforts to recycle waste, recycling alone without WtE is not sufficient. At best, the global recycling of waste is still below 50% and there will always be residual waste requiring further management. This makes WtE not just a valid but necessary option for managing the volumes of waste;
* The various technologies that have been proven commercially include the following:
	+ Anaerobic digestion and MBT plants;
	+ Landfill Gas to Electricity
	+ Pyrolysis
	+ Gasification
	+ Incineration with energy recovery
	+ Refuse Derived Fuels (RDF)
* Choosing Among Options for the appropriate WtE technologies include the following:
	+ Waste characterization to understand the nature and composition of the waste in order to aid decision making
	+ Technology Readiness Level Assessments to ensure that the technology selected is mature;
	+ Techno-economic, environmental and social considerations

# Response and feedback from participants

Participants indicated a keen interest in the subject and asked questions related to WtE technology selection and estimation of landfill gas emissions using various available tools such as LandGEM.

# Conclusion

The lectures were a success and provided participants with an opportunity to understand the global solid waste management problem and efforts to address it. The information shared also provided participants with vital information that can help them in their researches. It is hoped that there will be future lectures to deal with more specific issues, e.g. waste incineration as a technique for solid waste management.