

International Virtual Training Course on “Sustainable Waste Management in a Circular Economy”

Faculty of Environment and Resource Studies

Mahidol University, Thailand

August 1 - 16, 2023

1. Course Title:

Sustainable Waste Management in a Circular Economy

2. Duration

August 1 -16, 2023

3. Background and Rationale

Waste is a global issue. It has strong linkages to a range of other global challenges and sustainable development such as health, climate change, poverty reduction, food and resource security and sustainable production and consumption. Pollution from waste and wastewater is a major problem in the world that impacts many parts of society and the economy. The increasing in population, advanced technology, social and economic development is causing a rise of waste and wastewater. Inappropriate management of waste is an immediate solution to cope with the tremendous amount of waste generated and the consequences of it causes major problem throughout the world. The uncontrolled emission of greenhouse gases from the degradation of organic substances in waste and wastewater such as methane and carbon dioxide is one of the major concerned in global warming issue. The pollutants and toxic substances released from the illegal dumping sites can contaminate the land, groundwater and surface water nearby. Also the plastic waste in the environment can breakdown into micro plastics that can harm the aquatic lives and finally harm human health via accumulation of toxic in micro plastics through food chain.

A circular economy is an economic system aimed at minimizing waste and making the most of resources. The concept of circular economy is to keep resources in use for as long as possible, extract the maximum value from them while in use, then recover and regenerate products and materials at the end of life. This concept is in contrast to the traditional linear economy which has a 'take, make, dispose' model of production. The circular economy seems intuitive to be more sustainable than the linear economic system. Reducing the resources used, and the waste and leakage created, conserves resources and helps to reduce environmental pollution. The circular economy is an enabler for carbon emissions reduction. The potential of 3R and resource efficiency is in line with the Sufficiency Economy Philosophy (SEP), the realization of the 2030 Agenda for Sustainable Development, and the Sustainable Development Goal, SDG 12 Responsible Consumption and Production and SDG 13 Climate Action.

Waste management has been an active area of study, research and teaching of the Faculty of Environment and Resource Studies. Thailand has made large steps in improving the management in the past decade. For these reasons the Faculty of Environment and Resource Studies intends to organize a training program in Sustainable Waste Management in a Circular

Economy. This program will provide an understanding of the principles of waste management and emerging issue related to waste management and climate change. The course will rely on the expertise that the Faculty has gained through hands on research and also on the experience of Thailand over the last decade in tackling this issue. State of the art waste management and wastewater treatment techniques will be disseminated and the current challenges faced will also be debated. It is expected that this program based on practical experiences in Thailand will be of use to participants in the future.

4. Objectives

- 4.1 To introduce the concepts and principles knowledge of municipal solid waste management and treatment technologies
- 4.2 To enhance practical knowledge, technology and skills via the practice in the lab, workshop and site visits
- 4.3 To apply the concept of circular economy and sufficiency economy through waste management

5. Course Contents

5.1 Course Outline

- 1) Sustainable Waste Management and Circular Economy
- 2) Sufficiency Economy and Waste Management in Circular Economy
- 3) Industrial Waste and Hazardous Waste Management
- 4) Biological Treatment of Waste (Composting)
- 5) Thermal Treatment of Waste (Gasification, Pyrolysis and Incineration) and Waste to Energy: RDF/Cement Kiln/Plastic Waste to Oil
- 6) Waste Disposal in Landfill
- 7) Plastic Waste: Its Application and Its Alternatives
- 8) Marine Debris and Micro plastics
- 9) E-Waste: Responsible Consumption and Production and E-Waste Trafficking
- 10) Overview of Wastewater Treatment/Wastewater Collection System
- 11) Central Wastewater Treatment System for Urban Area (Activated Sludge/ Oxidation Ditch/RBC)
- 12) Waste and Climate Change
- 13) Environmental Persistent Pharmaceutical Pollutants: EPPP and Wastewater Treatment
- 14) WTE: Sludge/Organic Waste Digestion in Anaerobic Process/ Biogas utilization for energy in small scale
- 15) Infectious Waste and COVID-19 Pandemic: Lesson Learned
- 16) Food Waste Management
- 17) GIS Application for Waste Management
- 18) Illegal dumping/discharge: Investigation and Remediation
- 19) Public Participation/Fee collection

5.2 Country Report

Advance Assignments

- 1) Country Report:

1.1 General information of participant (1 page of A4 size paper) including; Name of participant, Educational background, Country, Name of Organization, Participant's position, Duties and responsibilities (Briefly)

1.2 General information of the Country (1-2 page of A4 size paper) including; Geographical status of the country, Climate, Population, Official language, Social, Educational and Economic conditions, Gross National Products (GNP), Per- capita Income, Major import and export goods, Natural resources and environmental situation, etc.

1.3 Content (up to 4-5 pages of A4 size paper): The detail in your country report should cover with the following topics. The current situation on Waste Management and Wastewater Treatment in your country. Country policy related to Waste and wastewater treatment and management The best available technologies/ practices related to Waste recycling, treatment, and disposal processes and Wastewater treatment Lessons learned from past practices of Waste management and wastewater treatment

Training methodologies employed during this course via online Zoom platform include following activities:

- Lecture delivered by experts
- Discussion among participants
- Presentation of case study/mini-project by participants
- Country Report Presentation
- Online evaluation form

6. Invited Countries

7. Venue

This 17-days online course will be conducted August 7 - 23, 2023 via Zoom cloud meetings from Faculty of Environment and Resource Studies, Mahidol University, Thailand

8. Expecting Results

Expected key results for participants after completion of the training course:

- Basic knowledge of waste management and wastewater treatment
- Meaningful information about advanced technology for treatment, disposal and remediation processes related to waste and wastewater in Thailand and participants' countries
- Better understanding of further applications through workshop
- Information about current Laws, Regulations and Policies of waste and wastewater management in Thailand and participants' countries
- Understand the emerging issues of waste and its impacts and know how to tackle with the coming problems.

9. Evaluation

- No paper examination after completing this training course
- Participant must attend the class, workshop, and presentation online for no less than 80% of total training period.

10. Institution

10.1 Executing/Implementation Agency

- Implementation organization:
Faculty of Environment and Resource Studies, Mahidol University
- Staff availability:
17 Lecturers will participate in this training.
30 Supporting staff will be in charge in this training.
- Training materials:
Hand-outs, VDO clips, electronic version of document and manual related to course topics are available.

- Equipment:
Computers, printers, LCD, media equipment
- Other facilities:
Phone, fax and internet access are available
- Address:
999 Phuttamonthon 4 Rd., Salaya, Phuttamonthon, Nakhon Pathom
73170
- Course Leader:
Dean of Faculty of Environment and Resource Studies
- Course Director:
Asst. Prof. Dr. Achara Ussawarujikulchai
- Contact Person:
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11. Expenditure and Funding

11.1 Sponsored by:

Thailand International Cooperation Agency (TICA)

No.	Item	Rate	Calculation	Total (Baht)
1	In-class lecturers (57 hours)	2,000 Baht/hour	2,000 x 57	114,000
2	Field lecturers (9 hours)	1,000 Baht/hour	1,000 x 9	9,000
3	Facilitators and Overtime			
	3.1 Weekdays (5 persons, 12 days)	200 Baht/person/day	200 x 5 x 12	12,000
	3.2 Overtime pay for the staff preparing the multimedia system	420 baht/person/day	200 x 5 x 12	12,000

	prior to the training and managing the system during the training			
4	Refreshment Breaks			
	12 days, 10 persons	50 baht/person/time	50 x 10 x 23	11,500
5	Training materials and equipment			
	Course notes (19 Topics)	2,000 Baht/topic	2,000 x 19	38,000
6	Miscellaneous			86,700
	Zoom Meeting Subscription Fee	3,000 baht		
	Rental fees for the classroom and the equipment used to make the instructional media and live stream the training online	6,800 baht x 11 days = 74,800 baht 3,600 baht x a haft day = 3,600 baht		
	Expense on after-training report	300 baht x 1 book = 300 baht		
	Communications (phone, fax, courier)	5,000 baht		
	Sub Total			<u>283,200</u>
No.	Item	Rate	Calculation	Total (Baht)
7	Overheads (14% of total operation cost)			39,648
	Total			<u>322,848</u>

Remark:

1. **In-Class** total 19 topics. = **57 hrs.**
2. **Field lecturers total 9 hrs.** consist of:
 - Country report = 9 hrs.

12. (Draft) Schedule

Time	Activities	
1 August, 2023		
12:00 - 13:00	Opening ceremony <ul style="list-style-type: none"> • Audio visual presentation: Thailand International Cooperation Agency (TICA) and Mahidol University • Welcoming speech by Dean of the Faculty of Environment and Resource Studies • Opening speech by Thailand International Cooperation Agency (TICA) • Introduction of Participants • Course Introduction by Asst. Prof. Dr. Achara Ussawarujikulchai 	
Time	Topic	Instructor

13:00 – 16:00	Topic 1: Sustainable Waste Management Waste as Resources and Circular Economy	Asst. Prof. Dr. Achara Ussawaruchikulchai Mahidol University
2 August, 2023		
09:00 – 12:00	Topic 2: Sufficiency Economy and Waste Management in Circular Economy	Mr. Patarapol Tularak Solid Waste Management Association (Thailand)
13:00 – 16:00	Topic 3: Industrial Waste and Circular Economy	Dr. Kittiphan Taparugssanagorn Department of Industrial Work
3 August, 2023		
09:00 – 12:00	Topic 4: Thermal Treatment of Waste (Gasification, Pyrolysis and Incineration) and Waste to Energy: RDF/Cement Kiln/Plastic Waste to Oil	Dr. Bundit Channarong Mahidol University
Time	Topic	Instructor
13:00 – 16:00	Topic 5: Biological Treatment of Waste (Composting)	Dr. Rewadee Anuwattana Thailand Institute of Scientific and Technological Research (TISTR)
4 August, 2023		
09:00 – 12:00	Topic 6: Waste Disposal in Landfill	Asst. Prof. Dr. Achara Ussawaruchikulchai Mahidol University
13:00 – 16:00	Topic 7: Plastic Waste	Mrs. Poranee Kongamornpinyo Dow Chemical Thailand Ltd. Asst. Prof. Dr. Seksan Udomsri Wongpanit Krabi Co., Ltd

7 August, 2023		
09:00 – 12:00	Topic 8: Marine Debris and Microplastics	Asst. Prof. Dr. Achara Ussawaruchikulchai Mahidol University
13:00 – 16:00	Topic 9: E-Waste: Responsible Consumption and Production and E-Waste Trafficking	Assoc. Prof. Dr. Pichaya Rachdawong Chulalongkorn University
8 August, 2023		
09:00 – 12:00	Topic 10: Overview of Wastewater Treatment/Wastewater Collection System	Dr. Chaiyo Juisiri Pollution Control Department
13:00 – 16:00	Topic 11: Central Wastewater Treatment System for Urban Area and Water Reclamation	Assoc. Prof. Dr. Jarawan Wongthanate Mahidol University
9 August, 2023		
09:00 – 12:00	Topic 12: Waste and Climate Change	Dr. Paweena Panichayapichet Thailand Greenhouse Gas Management Organization (TGO)
13:00 – 16:00	Topic 13: Environmental Persistent Pharmaceutical Pollutants: EPPP and Wastewater Treatment	Asst. Prof. Dr. Parinda Thayanukul Mahidol University
10 August, 2023		
09:00 – 12:00	Topic 14: WTE: Sludge/Organic Waste Digestion in Anaerobic Process/ Biogas utilization for energy in small scale	Assoc. Prof. Dr. Benjaphorn Prapagdee Mahidol University
13:00 – 16:00	Topic 15: Infectious Waste and COVID-19 Pandemic: Lesson Learned	Asst. Prof. Dr. Tawach Prechthai Mahidol University
11 August, 2023		
09:00 – 12:00	Topic 16: Food Waste Management	(1) Mr. Werner Kossmann, GIZ Thailand (2) Ms. Anuda Tawatsin Pollution Control Department

		(3) Mr. Daniel Bucher Planet B Sustainability Agency (Thailand) Ltd.
13:00 - 16:00	Topic 17: GIS Application for Waste Management	Assoc. Prof. Dr. Kanchana Nakhapakorn Mahidol University
14 August, 2023		
09:00 - 12:00	Topic 18: Illegal dumping/discharge: Investigation and Remediation	Asst. Prof. Dr. Warapong Tungittiplakorn King Mongkut's University of Technology North Bangkok (KMUTNB)
13:00 - 16:00	Topic 19: Public Participation	Dr. Naim Laeni Thammasat University
15 August, 2023		
09:00 - 12:00	Country Report	All lecturers
13:00 - 16:00	Country Report	All lecturers
16 August, 2023		
09:00 - 12:00	Country Report	All lecturers
13:00 - 13:30	Overall Conclusion and Course Evaluation	
13:30 - 15:00	Closing Ceremony <ul style="list-style-type: none"> • Closing speech by Dean of the Faculty of Environment and Resource Studies • Thank you Speech by the representative from all participants 	