

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

Faculty of Environment and Resource Studies

Mahidol University, Thailand

August 7 - 23, 2023

1. Course Title:

Sustainable Waste Management in a Circular Economy

2. Duration

August 7 - 23, 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 waste as resources and circular economy
- 2) Sufficiency economy and waste management in circular economy
- 3) Industrial waste and circular economy
- 4) Thermal treatment of waste (combustion, gasification, pyrolysis) and waste to energy
- 5) Biological treatment of waste (composting)
- 6) Waste disposal in landfill
- 7) Illegal dumping/discharge: Investigation and remediation
- 8) Environmental persistent pharmaceutical pollutants: EPPP and wastewater treatment
- 9) E-Waste: Responsible consumption and production and e-waste trafficking
- 10) Infectious waste and COVID-19 pandemic: Lesson learned
- 11) WTE: Sludge/ organic waste digestion in anaerobic process/ biogas utilization for energy in small scale
- 12) GIS application for waste management
- 13) Plastic waste/ Packaging waste
- 14) Overview of wastewater treatment/ wastewater collection system
- 15) Central wastewater treatment system for urban area and water reclamation
- 16) Waste and climate change
- 17) Marine debris and microplastics
- 18) Food waste management
- 19) Public participation

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. 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

7. 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
- 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.

8. Evaluation

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

9. Institution

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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10. Expenditure and Funding

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 prior to the training and managing the system during the training | 200 baht/person/day | 200 x 5 x 12 | 12,000 |
| 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> |
| 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.

11. (Draft) Schedule

| Time | Activities | |
|---------------------------------|--|---|
| Monday 7 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 Ussawaruchikulchai ☒ Group photo | |
| 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 |
| Tuesday 8 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 |
| Wednesday 9 August, 2023 | | |
| 09:00 – 12:00 | Topic 4: Thermal treatment of waste (combustion, gasification, pyrolysis) and waste to energy | Dr. Bundit Channarong Mahidol University |
| 13:00 – 16:00 | Topic 5: Biological treatment of waste (composting) | Thailand Institute of Scientific and Technological Research (TISTR) |
| Thursday 10 August, 2023 | | |
| 09:00 – 12:00 | Topic 6: Waste disposal in landfill | Asst. Prof. Dr. Achara Ussawaruchikulchai Mahidol University |

| Time | Topic | Instructor |
|----------------------------------|--|--|
| 13:00 – 16:00 | Topic 7: Illegal dumping/discharge: Investigation and remediation | Asst. Prof. Dr. Warapong Tungittiaplakorn King Mongkut's University of Technology North Bangkok |
| Friday 11 August, 2023 | | |
| 09:00 – 12:00 | Topic 8: Environmental persistent pharmaceutical pollutants: EPPP and wastewater treatment | Asst. Prof. Dr Parinda Thayanukul Mahidol University |
| 13:00 – 16:00 | Topic 9: E-Waste: Responsible consumption and production and e-waste trafficking | Chulalongkorn University |
| Saturday 12 August, 2023 | | |
| Sunday 13 August, 2023 | | |
| Monday 14 August, 2023 | | |
| 13:00 – 16:00 | Preparing for country report presentation | |
| Tuesday 15 August, 2023 | | |
| 09:00 – 12:00 | Topic 10: Infectious waste and COVID-19 pandemic: Lesson learned | Asst. Prof. Dr. Tawach Prechthai Mahidol University |
| 13:00 – 16:00 | Topic 11: WTE: Sludge/ organic waste digestion in anaerobic process/ biogas utilization for energy in small scale | Assoc.Prof.Dr. Benjaphorn Prapagdee Mahidol University |
| Wednesday 16 August, 2023 | | |
| 09:00 – 12:00 | Topic 12: GIS application for waste management | Assoc. Prof. Dr. Kanchana Nakhapakorn Mahidol University |
| 13:00 – 16:00 | Topic 13: Plastic waste/ Packaging waste | Mrs.Poranee Kongamornpinyo Dow Chemical Thailand Ltd. Asst.Prof.Dr. Seksan Udomsri Wongpanit Krabi Co., ltd |
| Thursday 17 August, 2023 | | |
| 09:00 – 12:00 | Topic 14: Overview of wastewater treatment/ wastewater collection system | Dr. Chaiyo Juisiri Pollution Control Department |

| Time | Topic | Instructor |
|----------------------------------|---|--|
| 13:00 – 16:00 | Topic 15: Central wastewater treatment system for urban area and water reclamation | Assoc.Prof.Dr. Jaruwan Wongthanate Mahidol University |
| Friday 18 August, 2023 | | |
| 09:00 – 12:00 | Topic 16: Waste and climate change | Dr.Paweena Panichayapichet Thailand Greenhouse Gas Management Organization (TGO) |
| 13:00 – 16:00 | Topic 17: Marine debris and microplastics | Asst. Prof. Dr. Achara Ussawaruchikulchai Mahidol University |
| Saturday 19 August, 2023 | | |
| Sunday 20 August, 2023 | | |
| Monday 21 August, 2023 | | |
| 09:00 – 12:00 | Topic 18: Food waste management | Mr.Arrut Navaraj Suan Sampran Riverside & Model for Research Project |
| 13:00 – 16:00 | Country report presentation | All lecturers |
| Tuesday 22 August, 2023 | | |
| 09:00 – 12:00 | Topic 19: Public participation | Dr.Naim Laeni Thammasat University |
| 13:00 – 16:00 | Country report presentation | All lecturers |
| Wednesday 23 August, 2023 | | |
| 09:00 – 12:00 | Country report presentation | 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 | |