

## Thailand's Annual International Training Course (AITC) 2017

### **“Best Available Technique (BAT) and Best Environmental Practice (BEP) under the Context of United National Industrial Development Organization (UNIDO)”**

**I Course Title:** Best Available Technique (BAT) and Best Environmental Practice (BEP) under the Context of United National Industrial Development Organization (UNIDO)

**II Duration:** 2 – 20 October 2017

**III Closing date for application:** 31 July 2017

#### **IV Background and Rational**

In response to the Stockholm Convention, the ESEA (East and South East Asia) countries are committed to reduce/eliminate unintentionally produced persistent organic pollutants (UP-POPs) emission releases. The ESEA Forum, formally launched on October 5, 2007, is a programmatic regional initiative of the United Nations Industrial Development Organization (UNIDO) on the introduction of the Best Available Technique (BAT) and Best Environmental Practice (BEP) measures on priority sectors defined by participating countries. The main objective of the Forum is to serve as a platform for information dissemination and exchange of experiences between countries in the region on different aspects of implementation of BAT/BEP and provide regular reporting on the impact of these in the industrial sectors cited in Annex C of the Convention. Countries have been grouped based on their priority sectors of interest, as mentioned in annex C of article 5 of Stockholm Convention.

The regional project "Demonstration of BAT and BEP in the Fossil fuel-fired Utilities and Industrial Boilers in response to the Stockholm Convention on POPs", officially approved for full implementation by the Global Environment Facility (GEF) in April 2010, is the first integral project of the ESEA BAT/BEP FORUM. In accordance with the relevant resolutions of the third session of the Conference of the Parties (COP3) of the Stockholm Convention (SC), the overall objective of the regional project aims at reducing and, where feasible, eliminating unintentionally produced POPs (UP-POPs) releases (in particular PCDDs- Polychlorinateddibenzo-para-dioxins and PCDFs-Polychlorinated-dibenzofurans) by enhancing guidelines and guidance on best available techniques and best environmental practices (BAT/BEP) for fossil fuel-fired utilities and industrial boilers through addressing specific features of industry, common practices in the region and related socioeconomic considerations. In addition, the project also targets the identification of possible options for the simultaneous reduction of PCDD/PCDFs and CO<sub>2</sub> from fossil fuel-fired utilities and industrial boilers in response to Stockholm Convention and Climate Change requirements. While it focuses on the introduction of BAT/BEP measures, it also considers increasing energy efficiency, as required in Annex C Part V B (a)(iv) of the

Convention. The evaluation of the mercury emissions by specific monitoring programs has been added afterwards according to the raising concerns on these pollutants.

The Annual International Training Course on **“Best Available Technique (BAT) and Best Environmental Practice (BEP) under the Context of United National Industrial Development Organization (UNIDO)”** aims at introducing the concept of clean technology with the benefits of releasing low industrial waste under the context of Eco-industry as well as BAT/BEP concept under the context of UNIDO. The training programme will be organized by Siripattana Training Center, National Institute of Development Organization (NIDA), under a supervision of Professor Dr. Siwatt Pongpiachan, National Project Manager of Demonstration of BAT/BEP in Fossil Fuel Fired Utility and Industrial Boiler in Response to the Stockholm Convention on POPs in Thailand for UNIDO and Director of NIDA’s Center for Research & Development of Disaster Prevention & Management.

## **V Course Objectives**

By the end of the course, participants will be able to:

- Understand the concept of clean technology with the benefits of releasing low industrial waste under the context of Eco-industry.
- Transfer the knowledge of clean technology by using low toxic chemicals to both government and private sectors at his/her own country after completing this training course.
- Learn the process of recycling industrial waste in the most practical manner.
- Perceive the significance of BAT/BEP concept under the context of UNIDO and be able to apply this knowledge to industrial sector of his/her own country.
- Conscious of the toxicity of dioxins and polycyclic aromatic hydrocarbons as both carcinogenic and mutagenic substances coupled with learning the advance of scientific technology associated with the chemical analysis of these two chemicals.
- Interpret the toxic chemicals released from each type of fuels including their heat efficiencies.
- Provide the knowledge of specialty associated with industrial boilers coupled with its heat efficiencies.
- Understand the public participation as one of the social tools to raise public awareness between industrial sector and local community around the industrial estate. Public participation is one of the major keys for leading urban city to Eco-industrial town.
- Learn the knowledge associated with EU committee authorized BAT/BEP concepts.

## **VI Course Contents**

### Course Outline

#### **Introduction to Boiler Technology**

- Define a boiler.
- Describe its major component and operation, and enumerate its uses.
- Differentiate between the common types of boilers and their specific application.

#### **Fuels for Boiler**

- Enumerate and describe the characteristics of the various fuel types that can be used in a boiler.
- How to match the fuel types for use with the appropriate boiler types.
- How to connect boiler fuel characteristics with combustion performance and waste formation.

#### **Combustion Analysis in Boilers**

- Describe the combustion process in a boiler and enumerate the materials entering and leaving the boiler system.
- Simple material balance of the combustion process boiler.
- Describe the potential source of energy losses around the boiler system after combustion.
- Simple energy balance of the combustion process boiler.

#### **Environment Impacts of Boiler Technology**

- Identify the materials coming from boiler operation and maintenance that are potentially harmful to people and the environment.
- Case study of the impacts of harmful materials to people and the environment.

#### **Best Available Techniques (BAT) and Best Environment Practices (BEP) for Boilers**

- Best Available Techniques (BAT) and Best Environment Practices (BEP) for industrial boilers for mitigating the impacts and increasing boiler efficiency.
- Stockholm Convention on Unintentionally – produced Persistent Organic Pollutants (UP-POPs) and other similar international agreement and local laws on mitigating the impact of boiler, operation and maintenance to the environment.
- How to connect the guideline of Stockholm Convention on Best Available Techniques (BAT) and Best Environment Practices (BEP) for boilers to actual UNIDO boiler case studies from selected East and South East Asia (ESEA) countries.

#### **Green Boiler Design, Operation and Maintenance**

- How to apply the knowledge of BAT and BEP for industrial boilers in the design, operation and maintenance of environmentally sound and green boilers.

- Observe and assess an existing boiler system in order to identify opportunities to increase boiler efficiency and to prevent or minimize potential environment impacts.

### **Dioxin Analysis (General) I (Lecture & Group Discussion)**

- Current Policies of POPs Analysis.
- Introduction of Dioxin survey (in situ) and analysis.
- Introduction of quality control/management.
- Detailed explanation of pre-treatment techniques for Dioxin analysis.
  - Extraction (liquid/liquid extraction, Soxhlet extraction, Dean-Stark apparatus extraction, ASE (Accelerated Solvent Extraction), Solid phase extraction, Co-precipitation extraction).
  - Acid treatment
  - Dehydration
  - Silica gel column chromatography
  - Multi-layer silica gel column chromatography
  - Activated charcoal silica gel column chromatography
  - Alumina column chromatography
  - Concentration (vacuum, spray-purge)
- Final preparation for GC/MS measurement (solvent keeper, <sup>13</sup>C syringe spike for isotope dilution analysis)

### **Dioxin Sampling**

- Sampling method/procedure for listed sample medium (preparation of sampling apparatus/hardware, assembly, operation method, pre-in situ survey, sampling method, transportation of sample, preservation of sample, sampling spike, duplicate analysis, travel blank testing, recording method):
  - Stack gas (normal temperature, high temperature)
  - Ash
  - Ambient air (short term/long term)
  - Soil
  - Sediment (river, lake, sea)
  - Water/Wastewater/Tap-water
  - Living organism (fish and shell-fish, animal)
  - Air fallout (flux)

### **Site visits**

- Red Bull Beverage Co., Ltd. (Samut Sakhon province)
- OLEEN Co., Ltd. (Samut Sakhon province)
- Bara Scientific Co., Ltd. (Phra Nakhon Si Ayutthaya province)
- Community Partnership Association (CPAP) (Map Ta Phut, Rayong province)

### **Country Report Discussion**

All participants are required to submit and prepare for a presentation of a country report which contains information on situation in their respective countries/territories concerning the training topic. Template will be circulated to successful candidates.

**Seminar** on special issues include;

- What is the most appropriate clean technology for industrial sectors in your country/territory?
- What are the levels of dioxin contaminants in environment of your country/territory?
- What is the most practical BAT/BEP under the context of industrial sector in your country/territory?
- Case study of public participation as social tool for enhancing the mutual understanding between industrial sector and local community.

### **Reading Assignment**

For best learning results, participants are requested to prepare themselves by having a look through these following assigned reading before coming to class.

- <http://www.sciencedirect.com/science/article/pii/S0016236116000120>
- <http://www.sciencedirect.com/science/article/pii/S0048969714017215>
- <http://www.sciencedirect.com/science/article/pii/S187802961600102X>

### **Topics that should be reviewed prior to attending the class:**

- Environmental Toxicology,
- Industrial Engineering,
- Analytical Chemistry

**VII Number of Participants:** 20 persons

### **VIII Qualifications**

Candidates must possess qualifications as specified in “Guideline for Thailand’s Annual International Training Course Programme” No. 2 “Qualifications” as well as following qualifications.

- hold a Bachelor degree in Science or Engineering.
- should be officer from government/public sectors who are currently working on environmental control and management, and would like to enrich his/her professional skills and experiences in these areas.

## IX Application

- Nomination must be made by central government agencies in charge of nomination of national candidates (such as Ministry of Foreign Affairs) **or** by relevant central government agencies for which the nominated candidates currently work. Nomination must be in line with relevant rules and regulations of the nominating countries/territories.
- Each eligible countries/territories are invited to nominate up to two (2) candidates per course.
- The application must be submitted to TICA through the Royal Thai Embassy/ Permanent Mission of Thailand to the United Nations/ Royal Thai Consulate-General accredited to eligible countries/territories. (See “List of Eligible Countries/Territories”)

For more information on qualifications, application forms, and application procedures, please visit our website at <http://www.tica.thaigov.net/main/en/information/73803-Annual-International-Training-Course.html>

## X Evaluation

- Evaluation will be made through Country Report and group presentation.
- Participants are required to attend all activities organized during the course as attendance in all sessions is obligatory. TICA reserves the rights to revoke its fellowship offer or take appropriate action deemed appropriate in case a participant is in attendance of less than 90 percent of the training hours.

## XI Training Institution and Venue:

Siripattana Training Centre  
National Institute of Development Administration (NIDA)  
118 Seri Thai Rd., Bangkok, Bangkok 10240, Thailand

## XII Contact

For more information, please contact;  
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