

# Call for Participants for the Joint-Research and Training Program on Low Carbon Green Energy and Environmental Sustainability

## ■ Introduction

The rapid economic development and serious environmental pollution of the Association of Southeast Asian Nations (ASEAN), India, and other Asian countries make their governments a great need on development of cutting-edge green technology. However, the emission of pollutants from the use of fossil fuels and biofuel energy deteriorates the environmental quality in ASEAN, India and other Asian countries. The Southeast Asia region is subject to a very complex pollution scenario, especially air pollution and water management, due to a large number and wide variety of emission sources and varying ambient conditions. Although most countries including ASEAN and India produce petroleum and natural gas, these countries are still in shortage of electricity. Consequently, combustion of biomass releases an even larger amount of pollutants, especially the carbon dioxide. Due to the pressure of global warming and reduction of CO<sub>2</sub> emission, both ASEAN and other Asian countries gradually change the use of fossil fuel to low carbon and green energies to reduce the emission of CO<sub>2</sub> and the cutting-edge technology for low carbon and renewable energies as well as the treatment technology for pollutants are urgently needed. During the past forty years, Taiwan has successfully changed from an agricultural society into an industrial society and has developed good systems for energy management and environmental protection. This “Taiwan experience” will be a treasure for ASEAN countries and India during their transition stage.

**The purpose of this joint-research and training program is to strengthen the academic and educational cooperation between Taiwan and Southeast/South Asian counties including Philippines, Indonesia, Malaysia, Thailand, Vietnam, India, Cambodia, Laos, Myanmar, Sri Lanka, Bangladesh, Bhutan, Nepal and Middle East in the fields of energy and environment. A 12-day course containing sustainable environment, low carbon energy, environmental green technology, and laboratory and field trip will be offered to 30 trainees. Through this training course, the trainees will learn knowledge in cutting-edge technology for low carbon energy and sustainable environment. This would significantly reinforce the close academic collaboration between Taiwan and Southeast Asia in the areas of energy and environment.**

## ■ Curriculum Planning

This training program, funded by the **Ministry of Science and Technology (MOST)**, Taiwan,

will mainly address the impact of industrialization and utilization of fossil fuels on the environmental pollution and global climate change as well as the development and application of low carbon green energy to environmental sustainability. The main concept for curriculum design is mainly based on the life cycle of pollutants and their impacts on environmental sustainability. As shown in Figure 1, the use of fossil fuel will produce large amounts of CO<sub>2</sub> and pollutants to deteriorate the environmental quality as well as to cause the global warming. The introduction of energy-saving and low carbon technology to develop environmentally green technology and low carbon technology are thus needed and urgent to achieve the environmental sustainability.

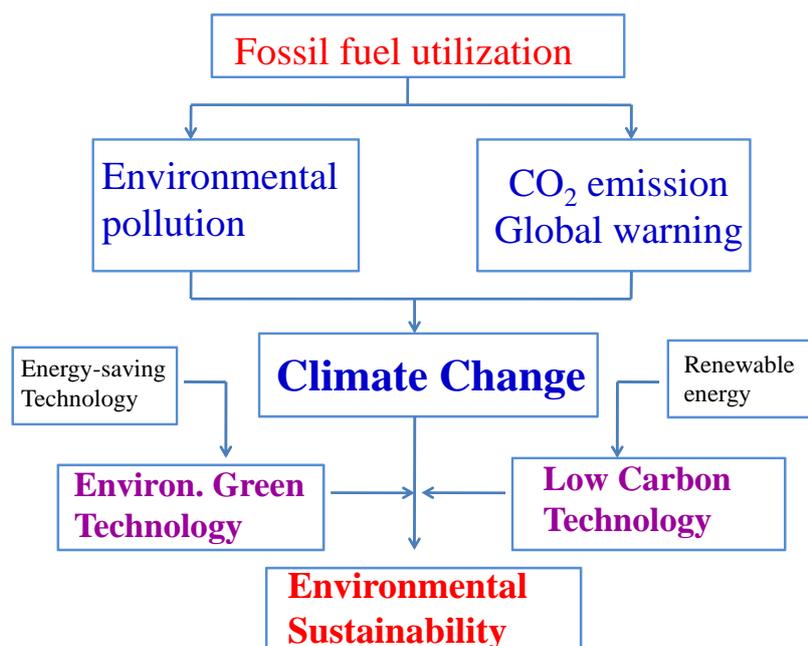


Figure 1. The main concept for designed training curriculum.

Through the designed course, the trainees will first learn the comprehensive knowledge in world energy sources and distribution and current status of energy usage in the world, especially the ASEAN, India and Middle East. The release of toxic chemicals and CO<sub>2</sub> from the combustion of fossil fuels and the impact of these toxic chemicals on global warming as well as human health will be addressed and discussed in the curriculum. In addition, the concept and application of low carbon and renewable energies including solar energy, hydrogen energy, and energy storage will also be introduced. After 45 hours of lecture courses, 4 field trips including laboratory tours, green building of Delta Co, and Center for Space and Remote Sensing Technology at National Central University will be arranged to link and reinforce the lecture courses. The detailed description of course contents is listed below:

### **(I) Environmental Sustainability**

The Southeast Asia region and developing countries are subject to a very complex pollution scenario, especially in terms of air pollution and atmospheric chemistry, due to a large number and wide variety of emission sources and varying ambient (e.g., meteorological) conditions.

Specifically, the region has seen fast and large economic growth over the previous few decades, while environmental impacts were largely disregarded. Consequently, the urban areas, especially the string of cities situated along the coastlines (from southern China down to the Malay Peninsula), have been severely impacted by the multitude of anthropogenic emissions, such as from traffic, power generation, and industry. Aside from characterizing and quantifying the various emission source strengths, it is of crucial importance to better understand the ambient chemical and physical processes and the method to remote sensing and monitoring. Through these introductions and learning, the trainees can understand the meaning of environmental sustainability.

Subject	Time	Subject Description
Introduction to Global Environmental Change	3 hr	The course will briefly introduce composition of environmental media, the most important chemical reactions in the gas and aqueous phase, and the various types of pollutions. The impact of global climate change on environmental quality will be introduced, with an emphasis on anthropogenic influence.
Green Technology	3 hr	The course will briefly introduce the fundamental concept of environmental technology and green chemistry. The application of green chemistry to the environmental technology will be addressed and emphasized to elucidate the environmental green technology.
Fate and Transport of Chemicals	3 hr	This course will introduce the basic concepts of chemical mass and concentration, mass balance and chemical distribution among phases. This would help trainees to understand the formation pathways of pollutants and their impacts on environmental sustainability.
Industrial Sustainable Development	3 hr	The course will briefly explain the planning and evaluation method for urbanization. The mass balance of carbon foot print in urban will be introduced.
Industrial Ecology and Sustainable Engineering	3 hr	This course will emphasis the importance of life cycle assessment and industrial ecology on the sustainability of environment.

## **(II) Low Carbon and Renewable Energy**

This series of courses focuses on introduction to green energy technologies. In addition to a comprehensive coverage on low-carbon and renewable energy sources, special attention will be given to the applications of hydrogen energy and solar energy to reduce the emission of carbon dioxide. In the meantime, novel technologies for energy storage and conversion will also be

discussed. A total of 15 hours is allocated for this series of courses, which are categorized into the following five areas. The overall curriculum design and outline for the twenty four-hour course is as follows:

Subject	Time	Subject Description
Overview of Low Carbon and Renewable Energy	3 hr	Briefly introduce the low carbon energies. The socioeconomic impact of clean energy as well as the energy management will be discussed.
Solar Cells	3 hr	This course will describe the principles of solar cell and various applications of different types of solar cells
Energy and Fuels	3 hr	A brief introduction to the development of gas turbine power generation, gasoline surrogates for improving energy efficiency, and advanced combustion techniques for reducing carbon emission.
Biomass and Biofuel Cells	3 hr	This course will briefly introduce the concept of biofuel cells and the conversion of food and agricultural wastes into biomass and biofuel.
Thermal Energy Management	3 hr	This lecture concerns about the thermal energy managements in various industrial systems

### (III) Environmental Green Technology

The development of environmentally benign and green technology for treatment of toxic pollutants is of most urgent important because of the pressure on the reduction of emission of green house effect gases. Therefore, the goal of this series course mainly focuses on the introduction to energy-saving green technology to treat wastewaters and toxic chemicals. The development of carbon dioxide capture, storage and utilization will be introduced and discussed. Environmental nanotechnology has emerged as one of the most fascinating techniques in modern era and it can actually help solve some of environmental problems. Along with all these benefits, it is important to recognize that nanoparticles are a still relatively unknown area, and therefore their effects must be researched thoroughly as soon as possible.

Subject	Time	Subject Description
Introduction to Environmental Green Technology	3 hr	The course will briefly introduce the fundamental concept of environmental technology and green chemistry. The application of green chemistry to the environmental technology will be addressed and emphasized to elucidate the environmental green technology.
Energy-Saving Biological Treatment	3 hr	This course will combine the energy saving concept and biological treatment technology to develop the energy-saving

Technology		biological system for treatment of pollutants in swages and wastewaters.
Carbon Dioxide Captures, Storage and Utilization	3 hr	This course will address the chemical and physical methods for capture and storage of CO <sub>2</sub> . The techniques for conversion of CO <sub>2</sub> into biomass or hydrocarbon will be discussed.
Nanotechnology in Environmental Sciences	3 hr	The course will briefly introduce nanotechnology in environmental applications, including heavy metal detection, characterization and distribution of pollutants and their health effect.
Environmental Toxicology and Risk Assessment	3 hr	This course will address the fundamental concept of toxicology and the toxic effect of toxicant on human beings. The method for risk assessment and the importance on risk assessment on green technology will be introduced

#### **(IV) Technical and Cultural Tours**

##### **(a) Center for Space and Remote Sensing Research**

The Center for Space and Remote Sensing Research (CSRSR) is a prime research center at National Central University, Chungli. Its primary missions are in the research and teaching of space and remote sensing related sciences, and in the development of new remote sensing technology and applications. The center strives to advance into a world-class remote sensing research facility that encompasses basic technical developments, widespread educational services, and promote relevant applications in various fields in order to strengthen remote sensing technology and fundamental development infrastructure. One of the development policies for CSRSR is the application of remote sensing in Asia Pacific region's environmental changes development. With the implementation and execution of these goals, it is expected to uplift further the center's technological level in remote sensing, and contribute more to government policies on land use, environmental monitoring and disaster preventions.

##### **(b) Laboratory tours of University System of Taiwan**

The University System of Taiwan (UST) is a consortium of four top research universities in Taiwan, namely National Central University (NCU), National Chiao Tung University (NCTU), National Tsing Hua University (NTHU) and National Yang-Ming University (NYMU). The UST has launched environmental Science and Technology (UST-EST) program which focuses on the research fields of Environmental Remote Sensing, Environmental Engineering, Environmental Chemistry and Molecular Science, and Environmental and Occupational health Science. The visit of UST laboratories will integrate state-of-the-art environmental science and technology.

##### **(c) Technical Tour of North Visitors Center of Taiwan Power Company:**

The North Visitors Center of Taiwan Power Company was established by Taiwan Power Company for several purposes, including (i) the enhancement of community understanding of nuclear energy, (ii) the promotion of the use of nuclear power, and (iii) the demonstration of the operation and safety of nuclear power plants. The Center offers plenty of exhibitions about nuclear energy and radiation safety including principles of nuclear energy, various methods of generating electricity, safety and environmental concerns and protection measures. There is a half-scale reactor model showing visitors the operation of boiling water reactors. Many graphic demonstrations and animations are provided to introduce the structure of power plants, the management and disposal of nuclear waste, the use of nuclear power around the world and future development of nuclear energy. Through this technical tour, we believe the trainees will have a clearer picture about low carbon energy and its safety.

**(d) Technical Tour of Delta Co. Ltd and Green Building:**

Delta Group is a world-known electronic company. Their innovations and teamwork are focused on a cleaner, greener tomorrow, building a better world for future generations to improve the energy efficiency of products through advanced research and product development. The company mission is "To provide innovative, clean and energy-efficient solutions for a better tomorrow". The LEED Platinum Green building located in Taoyuan, Taiwan is an example of their commitment to the mission statement. The visit of green building of Delta Groups will give us the integrated idea on energy saving and environmental sustainability.

**■ Tentative course timetable (November 1~11, 2015)**

Date	9:00~12:00	12:00-13:30	13:30-16:30	16:30~18:00
11/1 (Sun)			Registration	Opening Ceremony/ Welcome Reception
11/2(Mon)	Lectures	Lunch	Lectures	Campus tours
11/3 (Tue)	Lectures	Lunch	Lectures	Laboratory Tour I
11/4 (Wed)	Lectures	Lunch	Lectures	Laboratory Tour II
11/5(Thu)	Lectures	Lunch	Lectures	Visit NTHU Labs
11/6(Fri)	Visit NCU Labs and CSRR	Lunch	Technical Tour: Delta Co Ltd. and Green Building	
11/7 (Sat)	Technical Tour: North Visitors Center of Tai Power Company		Culture Tour: National Palace Museum	
11/8 (Sun)	Free Time			
11/9 (Mon)	Lectures	Lunch	Lectures	Laboratory Tour III
11/10 (Tue)	Lectures	Lunch	Lectures	Forum: Low Carbon Energy
11/11 (Wed)	Lectures	Lunch	Lectures	Laboratory Tour IV
11/12 (Thu)	Lectures	Lunch	Forum: Environmental Sustainability	Closing remarks/ Banquet

## ■ Training Venue

The training program will be held at Institute of Environmental Engineering (IEE), National Chiao Tung University, Hsinchu, Taiwan.



## ■ Application

Applicants who are interested in this training program can be applied on-line or from e-mail with the application form and necessary documents (PDF files are preferred). Followings are the details of application.

### ➤ Qualification

Candidates should be, but not limited to, postgraduates, lectures, faculties, or researchers who are highly interested in learning environmental science and low carbon energy. No previous experience in sustainably environmental and/or energy science and technology is necessary.

### ➤ Selection criterion

The training program will select 30 trainees from ASEAN, India, Sri Lanka, Middle East and other developing countries. The selection criterion is based on the CV, statement of purpose and other documents the applicants provided.

### ➤ Award details

Once selected as the trainees, the round-trip air flight ticket directly from university or Institute to Taiwan, housing, foods, and fees for field and cultural trips will be provided during the training period.

### ➤ Reimbursement for overseas transportation expenses

We offer every participant a subsidy for purchasing round trip economy-class airflight tickets directly from home country to Taiwan. The reimbursement will follow the standards of Ministry of Science and Technolog (MOST), Taiwan.

➤ **Airport Pick-up**

Airport pick-up will be arranged according to every participant's flight schedule.

➤ **Accommodation**

Two participants share one room with two single beds. Each room is equipped with TV and wireless internet.

➤ **Meals**

Breakfast, lunch and dinner are all included. If you have any special dietary requirement, please inform us in advance.

- More information about this training program can be found

<http://nucl-eei.vm.nthu.edu.tw/>

- **Contact us**

**For further information or questions, please contact Ms. Josephine CH Hsieh, Institute of Environmental Engineering, National Chiao Tung University, Hsinchu, Taiwan**

Tel: +886-3-5712121 ext 55520

Fax: +886-3-5725958

E-Mail: [josephine010@nctu.edu.tw](mailto:josephine010@nctu.edu.tw) (Ms. Josephine CH Hsieh)

[radoong@mx.nthu.edu.tw](mailto:radoong@mx.nthu.edu.tw) (Prof. Ruey-an Doong)

website: <http://www.ev.nctu.edu.tw/main.php>

## Application Form

<b>PERSONAL INFORMATION</b>			
First Name		Middle Name	
Family Name			
Date of Birth	(DD-MM-YYYY)	Gender	<input type="checkbox"/> Male <input type="checkbox"/> Female
E-mail address			
Contact Phone			
Contact Address			
English proficiency	<input type="checkbox"/> Fluent	<input type="checkbox"/> Good	<input type="checkbox"/> Fair <input type="checkbox"/> Poor
<b>NATIONALITY AND RESIDENCE</b>			
Country of Residence			
Passport No.		Place of Issue	
Date of Issue	(DD-MM-YYYY)	Date of Expiry	(DD-MM-YYYY)
Please attach a scanned copy of your passport (ID Page) (JPEG image or PDF file)			
<b>EDUCATION BACKGROUND</b>			
Affiliation (Institute/ University/Company)			
Current Position			
Highest Degree			
Majoring Field			
<p><b>Please provide your CV and the 1-page statement of purpose for this symposium.</b></p>			

<b>EMERGENCY CONTACT</b>	
Full Name	
Relationship	
Contact Phone	
Contact Address	
E-mail	
<p><b>DECLARATION</b></p> <p>I certify that the information I have provided in this application is complete and correct. I understand that any misrepresentation, omission, or submission of false information is grounds for rejection of my application, withdrawal of acceptance, cancellation of enrollment, and/or disciplinary action at a future date. If my application is accepted, I agree to abide by the policies, rules, and regulations of the Republic of China and National Tsing Hua University, Taiwan.</p> <p>Applicant's signature _____ Date _____</p>	

※ All documents should be sent to the Institute of Environmental Engineering, National Chiao Tung University by e-mail **NO LATER THAN July 31<sup>st</sup>, 2015**. An acknowledgement letter will be sent to you after receiving the complete documents.

■ **Contact Information :**

**Ms. Josephine CH Hsieh**

Institute of Environmental Engineering

National Chiao Tung University

1001 University Road, Hsinchu, 30010, Taiwan

E-mail: [josephine010@nctu.edu.tw](mailto:josephine010@nctu.edu.tw) or [radoong@mx.nthu.edu.tw](mailto:radoong@mx.nthu.edu.tw)

Tel: +886-3-5712121 ext 55520

Fax: +886-3-5725958

Office Hours: 8:30 AM to 5:00 PM, Monday to Friday, Taiwan time (GMT + 8 h)