ICTD
المركز العالمي للتدريب والتطوير
International Centre For Training & Development

EE161

Renewable Energy Technologies

Photovoltaics Fundamentals, Technology and Application

Course Introduction:

Renewable energy is energy that is collected from renewable resources, which are naturally replenished on a human timescale, such as sunlight, wind, rain, tides, waves, and geothermal heat. Renewable energy often provides energy in four important areas: electricity generation, air and water heating/cooling, transportation, and rural (off-grid) energy services.

This aims of this course is to provide the delegates the latest techniques and procedure related to renewable energy. Delegates will be able to identify basic principles of different renewable technologies and their role in energy sustainability.

Course Objectives:

Upon successful completion of this course, the delegates will be able to:

- ✓ Apply the principles on photovoltaics fundamentals, technology and application of renewable energy technologies
- ✓ Discuss renewable technologies such as photovoltaics, solar thermal, wind energy, bioenergy, hydropower and geothermal power generation
- ✓ Explain renewable energy commercialization and identify sustainable energy
- ✓ Distinguish timeline of solar energy, solar powered electricity, solar energy and solar lamp
- ✓ Discuss photovoltaics and apply thin-film PV technology, concentrating PV technologies and peak power limitation
- ✓ Identify photovoltaic effect and carryout photovoltaic applications for power stations, in building, in transport, standalone devices, rural electrification, solar roadways and solar power satellite
- ✓ Analyze photovoltaic performance and discuss its temperature
- ✓ Employ optimum orientation of solar panel
- ✓ Identify concentrating solar thermal power such as solar concentration and CSP systems, solar concentrator beam quality, solar concentration ratio on principles and limitations of CSP systems
- ✓ Apply solar thermal power plant technologies and carryout the operational principles and components of the PTC
- ✓ Identify central receiver solar thermal power plants, solar air preheating systems for combustion and turbines

Who Should Attend?

This course is intended for energy managers, engineers, technologists and technicians active in the energy sector. Architects, planners, developers, government & local authority staff will also find this course very useful.

Course Outline:

DAY 1:

- **Introduction to Renewable Energy Technologies**
  - Renewable Energy Overview
  - Photovoltaics
  - Solar Thermal
  - Wind Energy
  - Bioenergy
  - Hydropower
  - Geothermal Power Generation

DAY 2:

- **Renewable Energy Commercialization**
- **Sustainable Energy**
- **Timeline of Solar Energy**
- **Solar Powered Electricity**
- **Solar Energy**
- **Solar Lamp**

DAY 3:

- **Photovoltaics**
  - Thin-Film PV Technology
  - Concentrating PV
  - Peak Power Limitation
- **Photovoltaic Effect**
- **Photovoltaic Applications**
  - Power Stations
  - In Buildings
  - In Transport
  - Standalone Devices
  - Rural Electrification
  - Solar Roadways
  - Solar Power Satellites
  - Temperature
  - Optimum Orientation of Solar Panels

DAY 4:

- **Concentrating Solar Thermal Power**
  - Solar Concentration and CSP Systems
  - Solar Concentrator Beam Quality
  - Solar Concentration Ratio: Principles and Limitations of CSP Systems
  - Solar Thermal Power Plant Technologies
  - The Operational Principles and Components of the PTC
  - Central Receiver Solar Thermal Power Plants
  - Solar Air Preheating Systems for Combustion
  - Turbines

DAY 5:

- **Energy Storage Methods**
- **Renewable Energy Sources Integration**
- **Further Development of Renewable Energy**

Course Methodology:

A variety of methodologies will be used during the course that includes:

- (30%) Based on Case Studies
- (30%) Techniques
- (30%) Role Play
- (10%) Concepts
- Pre-test and Post-test
- Variety of Learning Methods
- Lectures
- Case Studies and Self Questionaires
- Group Work

Course Certificate:

International Center for Training & Development (ICTD) will award an internationally recognized certificate(s) for each delegate on completion of training.

Course Fees:

US$ 3,300 per Delegate. This rate includes participant's manual, Hands-Outs, buffet lunch, coffee/tea on arrival, morning & afternoon of each day.

Course Timings:

Daily Course Timings:

08:00 - 08:20	Morning Coffee / Tea
08:20 - 10:00	First Session
10:00 - 10:20	Coffee / Tea / Snacks
10:20 - 12:20	Second Session
12:20 - 13:30	Lunch Break & Prayer Break
13:30 - 15:00	Last Session