Course: Introduction to Renewable Energy- A Practical Approach

Guided Learning Hours: 24

Pre-requisite: Basic Science

Abstract

Renewable energy is all around us and today more and more people are using it to heat their homes, power their appliances and advance their careers. This course will give you the necessary knowledge about the various forms of renewable energy and provide you with a hands-on approach to the subject.

Target Audience

Individuals and technicians wishing to learn about renewable energy and how to set up renewable energy systems.

Learning outcomes

On completion of this course, learners will be able to:

1. Describe various types of renewable energy and understand the limitations and possible solutions of using Renewable Energy
2. Understand the operation and design of various components of Hydro, Solar and Wind Power systems
3. Be able to design and install simple Renewable Energy systems
Course Content

1. Describe various types of renewable energy and understand the limitations and possible solutions of using Renewable Energy

   Sustainability and renewable energy, Types of renewable energy sources, Understanding electrical terminology, Monetary limitations, Advantages and disadvantages of renewable energy usage, Alternative energy versus carbon based energy sources, Greenhouse effect, Energy efficient building design for the tropics, Green jobs and careers

2. Understand the operation and design of various components of Hydro, Solar and Wind Power systems

   **Hydro:** Energy from the movement of water, System Components, Turbine Types, Site Analysis Legal Requirements

   **Solar:** Energy from the sun, Introduction to Photovoltaic cells and their characteristics, Considerations of a solar powered system, Components of a solar power system, Energy storage, Grid-Tie and Off Grid Systems. Design of a small-scale residential Off-grid system. Building integrated photovoltaic.

   **Wind:** Energy from the wind, Types of wind turbines, Considerations of a wind power systems, Wind turbines electrical characteristics, Site assessment, Energy storage, Components of a small scale wind power system. Design of a Micro wind power system.

3. Be able to design and install simple Renewable Energy systems

   Selection of suitable resources to implement a renewable energy power systems, Connecting inverters, charge controllers, batteries, Siting of components, Electrical safety.
## Assessment Criteria

<table>
<thead>
<tr>
<th>In order to achieve Learning Outcome...</th>
<th>The Learner must...</th>
</tr>
</thead>
</table>
| 1. Describe various types of renewable energy and understand the limitations and possible solutions of using Renewable Energy | 1.1 Understand the meaning of the different electrical terminology  
1.2 Carry out and compare a cost analysis for simple renewable energy systems  
1.3 Understand how renewable energy sources impact on the environment  
1.4 Give example of Energy efficiency being utilized in residential and commercial use |
| 2. Understand the operation and design of various components of Hydro, Solar and Wind Power systems | 2.1 Understand how electricity (energy) is generated in a Hydro-electric, Wind & Solar Power system  
2.2 Understand what components are needed in a Hydro Power, Solar Power and Wind Power systems  
2.3 Understand basic electrical specifications of Inverters, charge controllers and storage batteries |
| 3. Be able to design and install simple Renewable Energy systems | 3.1 Select and connect inverters and charge controller to storage batteries  
3.2 Wire PV (100 watt) modules and Wind Turbines (180 watt) correctly to other system components  
3.3 Undertake proper site location for installations  
3.4 Observe Safety procedures when carrying out installation |
Essential Learning Resources:

Learners will need access to a wide range of publications relating to renewable energy, photovoltaic systems and solar panels. Various manufacturer products specifications and reference data would also be beneficial to learners. Site visits to PV system installations would be encouraged during the delivery of this course.

Lab equipped with LAB Volt Renewable Energy Trainer model 8010

Textbooks and Manuals

1. Practical Guide to Renewable Energy by C. Kitcher

Websites