

# Introduction to Renewable Energies

## ***A 2-day Comprehensive Overview of Renewable Energy Resources, Technologies & Markets.***

### **Course objectives**

Whether you are new to the industry or want to refresh and update your knowledge, this comprehensive yet time-effective two-day training course will ensure you are up-to-speed with the key aspects of the renewable energy/power industries and the economic factors and technologies that are driving them. It is ideal for those new to the industry, or in related sectors such as finance, law, regulation, publishing etc.

You will learn how to evaluate renewable energy resources and the economic cases and market conditions which argue for (or against) them. You will understand the different, competing and complementary technologies available to harness and store renewable energy - including solar, wind, wave, biofuels and geothermal - exploring the potential of each to contribute to current energy needs.

### **Level & Style**

While the course will explain some key concepts in energy physics and technology, it assumes no prior technical knowledge and will do so at a very basic level. Indeed the course is specifically designed to be of value to those working in *non-technical* functions - those who need to understand the fundamentals of the industry; its economics and the development of technologies and market applications, but not the nuts-and-bolts of engineering or hands-on installation.

The course will run in an informal manner, encouraging time for discussions and questions to ensure that participants get the most out of their time. In order to better understand and illustrate the various topics, some simple calculations and other explanatory exercises will be incorporated.

### **Approximate Timing**

Day 1: Course begins:	09:00	Course ends:	17:30
Day 2: Course begins:	09:00	Course ends:	16.30

(NB. timings are approximate and include lunch plus morning and afternoon refreshment breaks)

### **Agenda Details**

#### ***Key concepts in understanding Renewable Energies***

- **Introducing key energy concepts:**
  - Energy, work and power
  - Forms of energy and energy conversion
  - Energy cycles and engines
  - Energy demand in the various industrial and residential sectors
- **Renewable resources:**
  - Understanding the real physical and practical limits on available resources for solar, wind, bio-energy and geothermal
  - Tools, resources and simple calculations for analysing and comparing renewable energy proposals

## ***Integrating Renewable Energy into the World Economy***

- **Power Grids**
  - Understanding the structure and operation of The Grid - and how this affects the deployment of renewable power
  - Power Demand and its impact on Price and Generation/Supply
  - The future: "Smart Grids"
- **Energy Storage**
  - Methods of energy storage, local and grid-based
  - The impact of energy storage on the renewable energy business case
  - The technology and infrastructure basis of a 'Hydrogen economy'

## ***Introducing the key Renewable Energy technologies***

- **Solar Energy**
  - Photovoltaics (PV) and a comparison of different types of PV material
  - Solar thermal and solar cooling
  - Concentrated solar power (CPV and CSP) for utility-scale applications
- **Bioenergy**
  - Sources of biomass feedstock, including processing residues, waste sources and energy crops
  - Conversion of biomass into fuels and/or electricity
  - 'Next-generation' biofuels, such as algae
- **Wind Energy**
  - The characteristics of wind
  - Wind turbine basics: operation, siting and control
  - Issues of intermittency and grid supply
- **Wave & Tidal**
- **Geothermal Energy**
  - Mechanisms for deep geothermal heat extraction and power generation, including dry-steam, flash-steam and binary-cycle
  - Shallow geothermal and heat-pumps

## ***The Markets and Economics of Renewable Energy***

- Market context: the wider energy market and competing energy/power sources
- Grid Parity and Levelised Electricity Costs
- Renewable Market Drivers (and hurdles):
  - Competition between and beyond renewable energies
  - Regulatory instruments and their impact
  - Financial markets, trading instruments and investment trends
  - Carbon Capture and Storage (CCS) from fossil sources
  - Consumer and social factors