
N583: Fundamentals of Low Carbon Energy

Instructor(s): Dr. Mark Ireland

Format and Duration

Classroom - 2 Days

Virtual - 4 Sessions

Summary

Business Impact: Participants attending this course will significantly enhance their understanding of alternative renewable energy sources, decarbonization, and carbon capture and storage. Furthermore, they will acquire the skills needed to evaluate low carbon energy solutions across diverse sectors and industries.

The decarbonization of energy systems to achieve net zero carbon emissions will likely require the rapid development of inexpensive and emissions free electricity and alternative solutions for where fuels dominate. It will also require ways in which to quickly and cheaply balance large and uncertain differences between demand and generation. For those organisations with a background in the production of hydrocarbons, many are now looking at low carbon or potentially negative emission, revenue streams to not just support the energy transition globally, but also for long term sustainable business model. Around the globe this includes, but is not limited to, offshore wind, carbon capture and storage, hydrogen production and storage and geothermal energy.

Learning Outcomes

Participants will learn to:

1. Describe the need and context for the energy transition.
2. Evaluate the potential role of different alternative and low carbon energy solutions.
3. Measure the challenges and opportunities of decarbonising different sectors / industries.
4. Identify the fundamentals of a hydrogen economy.
5. Identify the fundamentals of CCS in energy systems.

Training Method

This is a classroom course comprising a mixture of lectures, discussion, case studies, and practical exercises.

Who Should Attend

The course is aimed at those with no specific technical background and should be accessible to all levels.

Course Content

This course will focus on 1) current energy usage globally and the associated emissions, 2) established technologies that can already drive down emissions and 3) consider different pathways for decarbonising energy. Specifically, the course will cover key concepts that underpin many strategies:

Alternative and renewable energy

- In some cases renewables are now growing faster than demand and replacing fossil fuels, the session will describe these energy sources and their future growth potential



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Decarbonization

- Decarbonisation of energy and transport systems will require a concerted effort to both replace fossil fuels with alternative and renewable energy sources, as well as demand reduction through improved efficiencies. The session will explore these concepts in industry, residential, transportation and agriculture.

Hydrogen

- A much-discussed possibility for reducing reliance on natural gas, hydrogen could be an important part of decarbonising energy systems. There a number of ways in which hydrogen can be produced, stored and utilised and these will be summarised.

Carbon Capture and Storage

- CCS affords one of the best strategies for mitigating carbon dioxide emissions, where those emissions cannot currently be avoided. Across the world there are now a number of industrial scale projects that plan to safely store CO₂ under the ground permanently. The session will cover core concepts that underpin CCS.