

Chemical Engineering

Renewable Energy in the Resources Sector (CENG0059)**Description**

Renewable energy is the fastest growing provider of electricity in many energy markets, including the UK, Australia, North America and others. In fact, renewable energy is often used by the extractive industry to operate, especially in remote locations. In addition, several operations for producing renewable energy depend on the availability of rare Earth elements, and other minerals. This module will explore how renewable energy and the resources sector are intimately connected. After a quantitative analysis of various renewable energy operations, including solar, wind, geothermal, and other energy sources, the students will learn how the energy market is tightly connected and the hurdles that are currently preventing the further development of renewables. The students will also learn how to employ Life Cycle Assessment methods for comparing quantitatively the environmental footprint of various processes for generating energy.

Aims:

This module aims at equipping the students with a quantitative understanding of renewable energies, and their relations with the resources sector. Particular attention will be on the relations between different sources of energy, with advantages and disadvantages of each, with attention to current hurdles that prevent the further development of renewables. It will be explored how renewable energies depend on mineral resources, and a quantitative analysis of the environmental impact of various sources of energy will be achieved via the implementation of life cycle assessment calculations. In addition, socio-economic aspects of different renewable energy sources will be discussed in detail, with emphasis on the resources sector.

The module will include:

- The energy market, the current role of coal and the growing contribution of renewables
- The potential mix of fossil, nuclear and renewable energy sources in a future low-carbon energy system

Key information

Year	2020/21
Credit value	15 (150 study hours)
Delivery	PGT L7, Campus-based
Reading List	View on UCL website
Tutor	Miss Isobel MacKay
Term	Term 1
Timetable	View on UCL website

Assessment

- Written examination (December/January): 50.0%
- Coursework: 30.0%
- Group coursework: 20.0%

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- Fundamental description of selected renewable energy sources, including but not limited to geothermal energy, solar power and wind
- Current technological limitations to the expansion of renewables
- Use of renewables in the resources sector
- Life Cycle Assessment as an approach to quantify the environmental impact of a technology
- Socio-economic factors impacting the energy market
- Integration of renewables into energy systems
- 8 Identify the stakeholders, and explain their interests as a function of energy demand
- 9 Describe critically the operation of energy markets and identify competing interests

Learning outcomes:

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Intended learning outcomes of the module

Upon successful completion of this module, the students will be able to:

- 1 Know the principal forms of energy providers in various global markets
- 2 Identify low-carbon alternatives and examine their role in a decarbonised energy system
- 3 Define the technology and the design principles of selected renewable energies, including geothermal energy, solar power, wind, etc.
- 4 Explain the current technological limitations and identify state-of-the-art improvements that could facilitate the further expansion of renewables
- 5 Quantify the impact of renewables in the resources sector
- 6 Understand the relations among different energy providers and resources
- 7 Quantify the environmental impact of various energy sources using a Life Cycle Assessment approach