

Minor

# Sustainable Energy Technology



**Are you interested in renewable energy resources? And do you want to create an application for renewable energy and understand how a fuel cell, a solar panel or a windgenerator operates? Then the sustainable Energy Technology minor programme is for you.**

## Why?

The depletion of natural resources, the steadily rising cost of fossil fuels and climate change caused by greenhouse gas emissions, has made the search for other sources of energy inevitable. The European Union has set mandatory targets of 20 percent more renewable energy by 2020, and carbon neutral electric energy by 2050. We will need to use renewable carbon-free and low-carbon energy resources like wind, wave, solar and biomass to meet these targets. This makes sustainability an important aspect of the future energy systems.

The Sustainable Energy Technology minor will give you an introduction to the complexity of exploiting sustainable energy resources and provide you with knowledge about currently available renewable energy resources. You will learn about different methods of production, distribution and utilisation of electric energy, how to integrate resources in the network and how to keep them both sustainable and economically viable.

## Who is this minor for?

This minor is recommended to all BSc students who are interested in sustainable energy. The minor programme is also open to Bachelor students from Dutch universities of applied science, although it does require a thorough knowledge of technology. This minor is a good introduction for any student considering joining the Master programmes of 'Electrical Sustainable Energy' and 'Sustainable Energy Technology'. The maximum number of students that can attend the minor is 50 students, so be sure to enrol and register now at [www.minors.tudelft.nl](http://www.minors.tudelft.nl)

*'The minor has made me feel hopeful for the future and inspired me to keep learning more about sustainable energy.'*

*Ron van Mierop, Electrical Engineering student*



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*'It was really interesting to learn more about sustainable energy from icons like Wubbo Ockels and Joris Melkert.'*

*Alex Verhage, Electrical Engineering student*

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### Programme

Minor consist of four compulsory courses, nine elective courses and two compulsory projects.

### Compulsory Courses

The list of compulsory courses depends on your prior knowledge and the BSc programme you are following. These compulsory courses for every student include: Solar cells, which are presented as advanced semiconductor devices that deliver electricity directly from sunlight. In this course you will learn all about the way Solar Cells work, how they are fabricated, how the PV module is constructed and how to design a PV system. Renewable energy is an introduction course of the main renewable energy technologies, including solar, wind, nuclear and hydro power, biofuels and renewable energy storage. You will learn about the effect of current fossil fuel on the climate and get an introduction to sustainability from an ethical perspective.

### Elective courses

There are nine different elective courses. Depending on your prior knowledge and your BSc programme you can choose from such courses as:

**Wind Energy**, during this course you will learn to understand wind energy and wind energy conversion systems. You will learn to integrate knowledge from various fields of engineering related to wind turbine analysis and design.

**Fuel Cell Systems**, during this course you will learn to describe the processes taking place in fuel cells and fuel cell systems. You will also learn to explain the effects of various design options on the performance of fuel cell systems (PEMFC and SOFC systems).

**Applied Sustainable Science and Technology**, during this course you will gain an understanding of the mechanisms of oil peaking and climate change and you will learn to calculate the efficiencies of different sustainable energy solutions (such as solar, wind and biomass).

### Compulsory Projects

In these projects you will gain hands-on experience with renewable energy and its integration in an electricity network.

### Integrating Renewable Energy

In a Matlab/Simulink software environment you will be working on the integration of renewable energy sources and storage in an electricity network with specific time-dependent loads. The electricity network may be a micro autonomous grid or part of a large network. You may validate your project in a real-life system.

### Renewable Energy

During this project you will work with an experimental setup of fuel cells. The goal of this project is to understand how a fuel cell operates. You will learn how to extract the maximum operation point from a fuel cell, to understand how to use the DCDC converter, power point tracking and how to determine the losses in the system.

For more information about all courses and projects, see [www.studyguide.tudelft.nl](http://www.studyguide.tudelft.nl)

#### For further information

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