



RESEARCH IN SUSTAINABILITY

ENERGY

The flexible and resilient energy systems of tomorrow

By 2050, Denmark must be independent of coal, oil, and gas. This means that renewable energy sources such as wind and solar energy must be able to meet Denmark's increasing energy demands.

To optimise energy consumption, the energy system must be integrated and designed in a way that can handle the fact that energy production and consumption do not always align. This requires, among other things, that we develop technologies for storing renewable energy.

In addition, it is crucial to connect the energy sources to create a flexible and robust energy system that can withstand breakdowns, accidents, or sabotage.

At DTU, we have the latest research in areas such as:

- Resilient and data-driven energy systems
- Energy markets
- Wind and solar energy
- Alternative fuels
- New forms of energy
- Power-to-X
- Heat pumps and heat storage
- Batteries

At DTU we are committed to a responsible future

In Europe we must transition towards a more viable society based on more sustainable solutions.

At DTU, we lead cutting-edge research in engineering and natural sciences, supported by one of Europe's most robust innovation ecosystems.

Our strength lies in interdisciplinary collaboration, where we develop advanced technologies and sustainable solutions to benefit society.

Kind regards,



Christine Nellemann,
provost



Technological diversity

At DTU, we conduct research in and develop the entire energy system across sectors and technologies to make future energy systems as sustainable as possible.

DTU's infrastructure ensures that basic research and materials science, development, and testing have the best conditions. Across state-of-the-art laboratories for the development of everything from nanoscale catalysts to the world's largest wind turbines, DTU contributes knowledge at the highest international level.

DTU researches and provides scientific advice on solutions for the green transition of the energy system:

■ Wind energy

World-leading research and scientific advising in wind energy, covering materials, components, and testing of wind turbines onshore and offshore. Wind energy is indispensable in the future global energy system.

■ Solar energy

Development and testing of solar cells and solar panels in Living Labs (on land, in water, or in buildings) with a focus on optimization of systems, functionality and performance.

■ Hybrid power plants

Coupling wind and solar energy in hybrid power plants with battery storage and electrolysis.

■ Power-to-X

World leading in electrolysis technologies and processes to produce hydrogen, ammonia, methanol, and aviation fuel.

■ Batteries

Development of battery storage systems and new materials for batteries with a focus on sustainable materials and processes.

■ Thermal energy storage

High-temperature heat storage using molten salts and stones can ensure more sustainable energy and is adaptable to the fluctuating wind and solar production of electricity.

■ New forms of energy

For example, research, technology development, and experimental facilities for fusion, fission, and geothermal energy.

■ Integrated energy systems

A more flexible energy system that can monitor and adjust energy system flexibility. Everything from specific equipment to large-scale systems across national borders and sectors. DTU leverages the possibilities of digitalisation to research how best to manage the balance between production and consumption.

■ Resilient energy system

Development of solutions that make the energy system resilient to extreme weather situations, digital and physical threats.

■ Energy markets

Ensuring a socio-economically optimal energy system, where the technologies deliver services in open competition. Analytics helps us understand how energy technologies are best implemented in the energy market.

CONTACT

Lone Falsig Hansen
Tel.: +45 4030 5067
lfal@dtu.dk



dtu.dk/energy

DTU's Centre for Absolute Sustainability develops models to calculate the absolute sustainability of products and our behaviour based on our planet's resources and planetary boundaries. The models show whether something is sustainable in an absolute sense and not just less environmentally harmful than the alternatives.