Research into sustainable energy and intelligent energy systems

Empowered by: KU Leuven, VITO, imec & UHasselt
EnergyVille is a collaboration between the Flemish research partners KU Leuven, VITO, imec and UHasselt in the field of sustainable energy and intelligent energy systems. Our researchers provide expertise to industry and public authorities on energy-efficient buildings and intelligent networks for a sustainable urban environment. This includes, for example, smart grids and advanced district heating and cooling.
Solar

Photovoltaic (PV) or solar technology is a widely known and promising technology to facilitate the transition to a sustainable energy system. EnergyVille’s research covers a broad spectrum: from materials to efficiency, reliability and energy yield prediction.

Research topics:
- Silicon PV, thin film PV and new materials for PV
- High efficiency PV-cell/module technology
- PV-cell/module analysis and performance optimisation
- PV module ageing and reliability study
- PV module-level converters (including modelling, testing and reliability)
- PV energy yield metrology, simulation & forecasting

Contact: solar@energyville.be

Storage

Storage can be used to facilitate the implementation of renewable energy sources, which vary by nature and are difficult to predict. The EnergyVille battery research covers the whole value chain from basic material research, over cell architectures and new battery concepts to battery management and system integration.

Research topics:
- New materials for batteries
- Modelling, characterisation and testing of batteries and battery materials
- Solid state battery technology
- Exploratory cell concepts
- New battery concepts
- Battery management systems
- Battery integration support
- Thermal storage

Contact: storage@energyville.be
Networks

EnergyVille investigates the development, operation and use of electrical and thermal networks. We focus on a seamless integration of renewable energy sources in these networks.

Research topics:

Electrical networks:
- High Voltage Direct Current systems for meshed networks and offshore applications
- Interoperability and decision support for grid operators
- Device interoperability using hardware-in-the-loop
- Medium-Voltage Poly-Phase grid sensorics

Thermal networks
- Smart District Heating & Cooling controller
- Network design
- Fault detection and management of heating substations

Contact: networks@energyville.be

Power control and conversion

Operating a power system installed with only renewable generation is challenging, due to the characteristic differences and the high uncertainty in the availability of these sources. Therefore, it is necessary to introduce power electronics as an interface between renewable energy sources and the grid.

Research topics:

- New materials for power devices
- Advanced and integrated power components
- Compact power converters
- DC unipolar and bipolar nanogrids
- Energy conversion

Contact: powercontrolandconversion@energyville.be
Buildings and districts

A large proportion of energy usage can be attributed to the urban landscape, which forms a significant challenge. EnergyVille develops knowledge to support the European Commission, regional and local governments and industry in the transition to a sustainable urban environment. We develop new technological insights, tools and assessment methods and support new business models.

Research topics:
- Building & district modelling
- Building technology assessment

Strategies and markets

The transition towards a sustainable energy supply goes hand in hand with a massive transformation of the energy sector. EnergyVille examines the economic, technological and behavioural aspects of the current and future energy system and gives advice about the changes in the short and long term.

Research topics:
- Energy monitoring and policy advice
- Long-term energy system planning
- Interoperable flexibility trading solutions for energy markets
Lab facilities

Our various labs allow us to perform a wide range of tests and simulations. These top facilities can be interconnected and are complemented by strong multi-disciplinary knowledge, forming the ideal environment to drive the transition to a future-proof sustainable energy system.
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