



SAVONIA

Savonia University of Applied Sciences

Energy technology

**Education
&
Research – Development - Innovation**



Presentations Savonia UAS, Varkaus Campus

- 30th October 2013 from 12.30 to 13.30
- Overview Savonia UAS Education and RDI
Ritva Käyhkö, Senior Lecturer, Savonia UAS
- District Heat/Heat distribution centers, hybrid heating systems,
Jukka Huttunen, Lecturer, Savonia UAS
- Heat pumps for heating and cooling,
Harri Heikura, Senior Lecturer, Savonia UAS



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North Savo



www.savonia.fi

Numbers of SavoniaUAS 2012

➤ Students	5800
➤ Staff	600
➤ Degree Programmes	35
➤ Bachelor's Degrees	27
➤ Master's Degrees	8
➤ Budget	60 M €



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Energy Technology at Savonia UAS Varkaus Campus

Education

- Bachelor Degree Programme, Energy Technology

RDI- Energy technology

- facilities; energy laboratory
- co-operation with the local industry
- students are closely connected to RDI (CDIO/OIS)





COMPETENCES AND INTERESTS

Fields of Expertise

In the Eastern Finland there has been a strong research and development work going on to find technical solutions for more sustainable, green energy production, which can be listed as a field of expertise:

- CHP (combined heat and power production) technologies and energy production in industry
- bioenergy and combustion techniques
- biofuel procurement, refinement, distribution
- biogas technology; thermal gasification and anaerobic degradation
- material technologies for the energy sector
- heat entrepreneurship and other small scale business operational concepts
- biomass, wind and solar energy and other distributed energy production.

Willingness to gain knowledge

The local universities, research institutions, business development bodies and lead enterprises have established a set of official and unofficial networks to meet the needs of the field and further catalyse the development of sector within the region.

Local universities are seeking also new areas of application and fields to further develop their expertise in cooperation in other promising regions of Europe. In practice, this means new research networks, business-to-business-relations and training cooperation.



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Bachelor's Degree Programme in Energy Technology

- Started 2010
- Curriculum based on CDIO standards
(Engineering Education Standard)
- 240 credits, 4 years, final thesis 15 credits



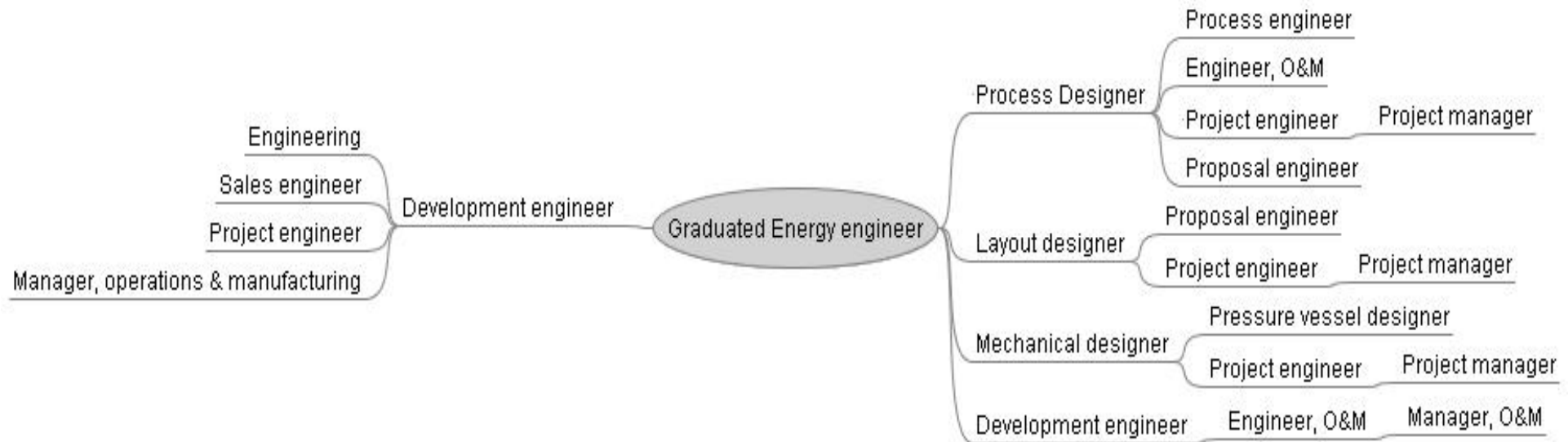
Expertise focus areas in Energy Technology Programme

- **Process know-how of Energy**
 - ✓ Combustion technology, heat transfer, HVAC
- **Renewable energy:** bio-energy, energy stocks
- **Engineering Expertise**
 - ✓ Process Design and Modeling
 - ✓ 3D plant design
 - ✓ Pressure vessel design
 - ✓ Material technology
- **Operation and maintenance expertise**
 - ✓ Power Plant Automation
 - ✓ Maintenance Engineering
- **Project Management Skills**

Career paths for the Energy Engineers

SME sector,
Distributed and renewable
energy systems

Power Plant Industry,
The system developers and suppliers,
Industrial Operation Engineering



1. Major subject : Distributed and renewable energy

2. Major subject : Power Plant Engineering



Energy technology at Savonia UAS

- Energy technology included in the focus **Energy, Environment, and Safety**
- Distributed energy production is one leading edge of this focus.
- Research contexts of this leading edge are:
 - I. Bio processes in energy production (Environment)
 - II. Technologies for thermal utilization of renewable energy (small scale plants) (Energy)
 - III. Distributed energy production – enhancing energy efficiency (Energy)



The main goals of the activities in the Energy Laboratory at Savonia UAS

- 1) to develop and produce Testing and Measurement Services:
 - for laboratory works, project works and training courses (*for students*)
 - for R&D -projects of the local companies (*co-operation with local companies*)
 - for research projects (*co-operation with universities and other research units*)
- 2) to carry out Applied Research Projects and act as a research partner in the R&D projects of the local companies.
- 3) to organize and produce Education and Training Courses for companies and public sector.



Develop testing and measurement environment and services

- Construction of the Research Laboratory
 - for research of thermal utilization of renewable bio energy and REF (community waste) and to control of emissions
 - for testing machines and materials under different energy production processes
 - for research of small scale CHP (Combined Heat and Power)

Organize and produce Education and Training Courses

- Energy production based on renewable energy (Intensive course/6 credits)
- Technologies to produce energy using renewable energy sources (Course/26 credits)

Research Project (Distributed energy production – enhancing energy efficiency)

- ERKKA – Energy-efficient buildings in agriculture
- SECRE- Social Enterprises in Community Renewable Energy (NPP project, lead partner Karelia)

Applied Research Projects (other previous projects)

- Thermal energy accumulation as a part of an energy system in a building.
(Optimize the structure and volume of the heat accumulator and the heat exchangers inside the accumulator)
- Modelling and simulating of heat transfer and air flow in a public building.
- A set of experimental and techno-economic studies to enhance energy use in dwelling houses, production facilities and production processes.



1. Fuel Analyses; particle size, moisture content, ash content, lower and gross calorific value (*Calorimeter 6200 CLEF*)
2. Flue Gas Analysis; percentages of flue gas components, flue gas temperature and volume flow rate (*Gasmet Dx 400 FTIR - analyser, Calcmeter STD –analysis program, Gasmet ZrO2 –sample detector*)
3. Testing of Heat Exchangers and Heat Accumulator
4. Modelling and Simulation Services
5. Distributed Optical Temperature Measurement System (DTS) (*Sentinel DTS-SR*)
6. Testing of Battery (Li-ion)
7. Testing of High Temperature Corrosion

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