“If we want things to stay as they are, things will have to change.”

Dr. Ir. Jan-jaap Aué
Dean Centre of Expertise Energy
Professor Energy Transition
Hanze University of Applied Sciences

- Established in 1798
- Professionally oriented higher education
  - 29,995 students
  - 3500 employees
- 55+ bachelor programs, 18 master programs
  - 22 studies with an energy route
  - 3 energy master programs (one under development)
  - 8 professorships with topic energy
  - Energy testing ground EnTranCe

share your talent. move the world.
Speeding up Innovation

At the Centre of Expertise Energy, we speed up innovations needed for the transition towards a sustainable energy society. We contribute by applied research and education.

HOW?

• An interdisciplinary and multilevel approach
• The establishment of co-ownership from Society
• Involving young people
• Showing options and their impact
• In dialogue with stakeholders
Hydrogen related projects (‘17 – ‘18)

- Power to Flex project *Interreg*
  - Experiments on house, mobility and small industrial level

- Flex Node *RVO*
  - Reversible fuel cell: efficiency improvement
  - How to get a sound business case

- Coupling of electrolyser with Digestion process *private*
  - Peak shaving and increase of output performance

- Setup of a small hydrogen filling station for cars and trucks at EnTranCe *interreg*

- Speed up and increasing efficiency of an electrolysis process by using *dedicated pulsed* electrical power. *interreg*

- Humsterland / Holthausen: Large PV-field coupled with a electrolyser dynamic behaviour; medium size hydrogen filling station *private*
Hydrogen related projects (‘17 – ‘18)

• Store and go H2020
  – Temporary energy storage (if hydrogen is used as storage-medium)
  – Determination of the characteristics of loads and gen’s: electrolyser, PV-fields, wind turbines
  – Damping over and under voltage.

• Student project - thesis at Resato Assen private
  – Characteristics of hydrogen
  – Filling strategies of hydrogen w.r.t. compression

• HHO-application 'less emission CO\textsubscript{x}, SO\textsubscript{x}, NO\textsubscript{x}, pm EUR 2 => EUR 6 private
  – Usage of a H\textsubscript{2} / O\textsubscript{2} mixture as input for heating / burning

• Hybrid hydrogen motor RVO
  – Testing of block heating and power generation, fired by mix of hydrogen and natural gas motor.
Hydrogen related projects (’18 – ’19)

- **H2Grow - DKTI**
  - Social acceptance study and realisation of hydrogen filling stations. (social) business case

- **Hydrogreenn, Hoogeveen - RVO**
  - Development of new city district / neighbourhood houses powered and heated by hydrogen. Infrastructure, configuration, topology, construction
  - Testing of house heating on 100% hydrogen (Bekaert, EnTranCe)

- **Megawatt testcenter for electrolysers TKI Industry and energy + NPG**
  - Price down of TCO of equipment
  - Procedown of price of H₂
  - location : EnTranCe

- **(green) Hydrogen booster (Hanze, Stork) SNN open innovation call**
  - Kindergarten, testing ground for entrepreneurs (SME) in the domain of hydrogen applications. Breeding and developing area for enterprises in the North.
Educational programs

• Energy Routes in 22 schools leading to EAE certification

• Learning Community (Energy Transition Community EnTranCe)

• Master (MSc) portfolio
  – European Master Renewable Energy
  – Master Sustainable Energy System Management
  – Master Energy 4 Society
  – Master International Communication (specialisation Energy)
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