



Hanze
University of Applied Sciences
Groningen



EnTranCe: Centre of Expertise Energy

“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

share your talent. move the world.

EnTranCe
ENERGY TRANSITION CENTRE

Energy Academy Europe

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



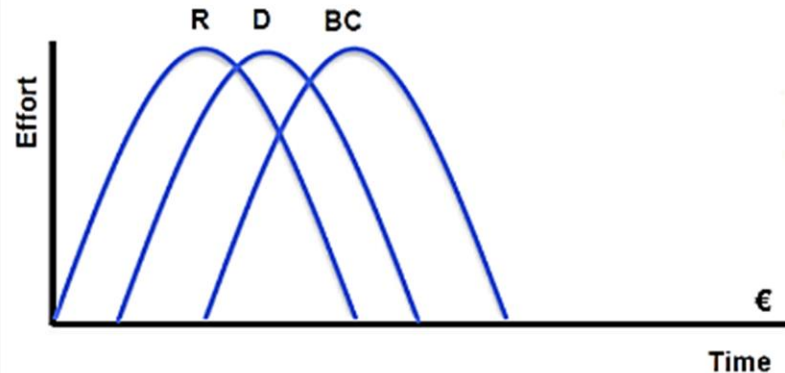
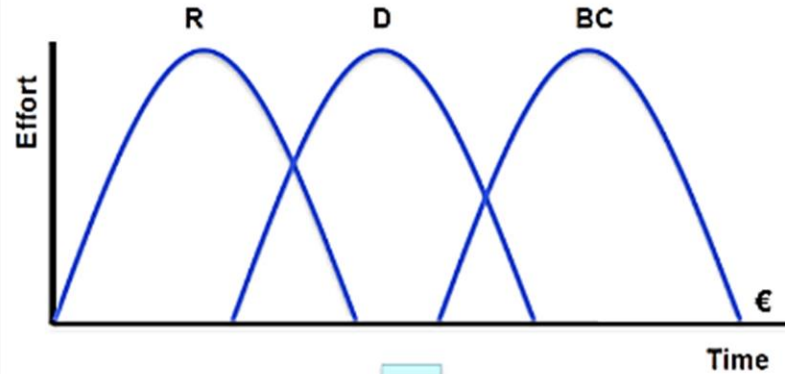
share your talent. move the world.

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.

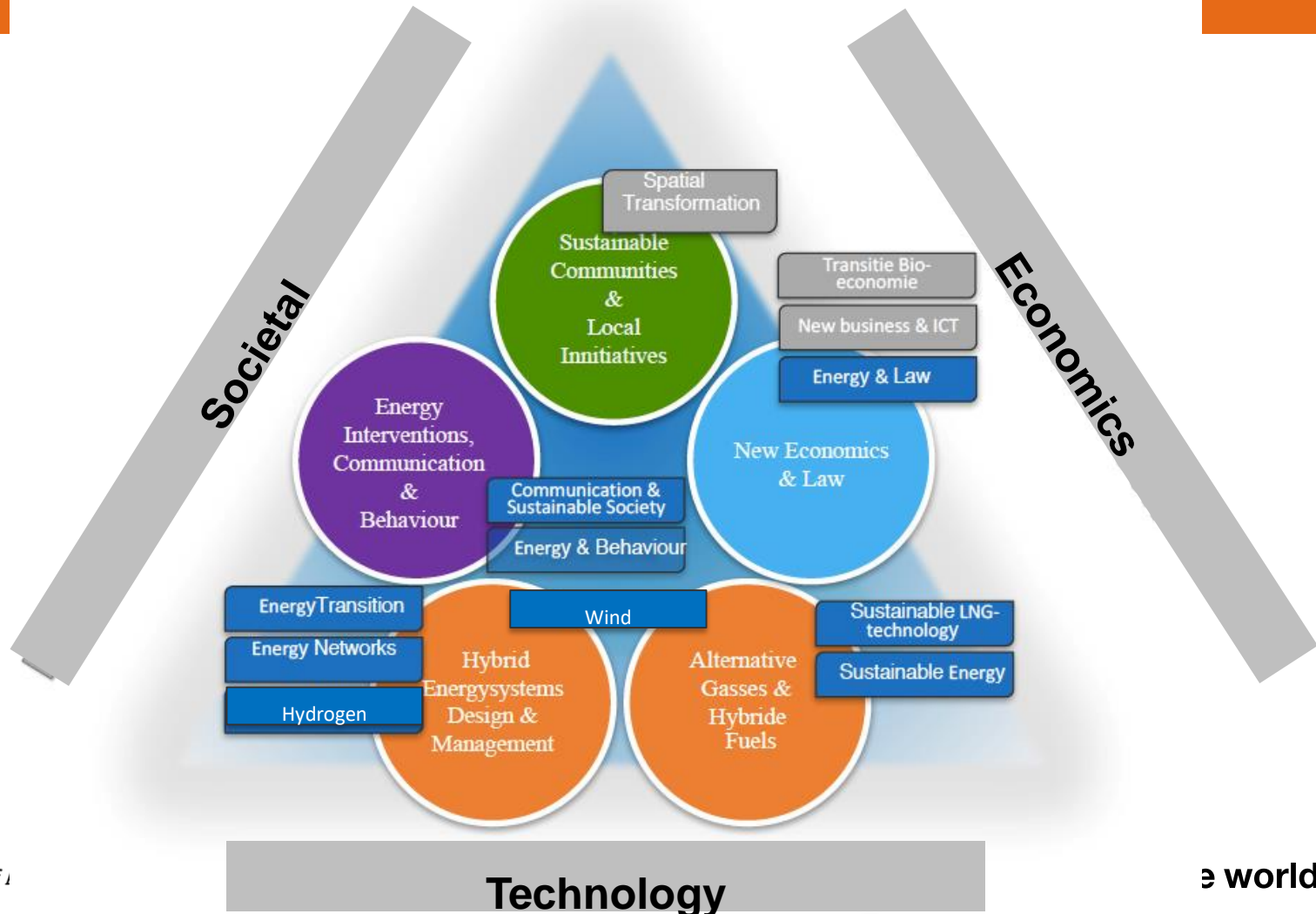
HOW?

- An interdisciplinary and multilevel approach
- The establishment of co-ownership from Society
- Involving young people
- Showing options and their impact
- In dialogue with stakeholders





share your talent. **move** the world.



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_x SO_x NO_x pm EUR 2 => EUR 6 *private*
 - Usage of a H₂ / O₂ 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 electrolyzers *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)

Dr. Ir. Jan-jaap Aué

Dean Centre of Expertise Energy

j.aue@pl.hanze.nl