

# Energy Networks for the H2 Economy

Hydrogen Breakfast

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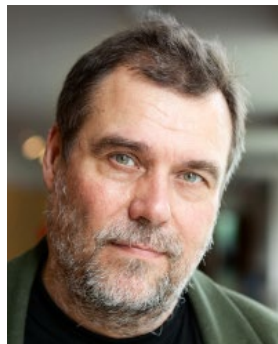
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# Professors in Power Systems and Energy Conversion



Mahdi Pourakbari Kasmaei  
Energy systems



Matti Lehtonen  
Power systems



Janne Seppänen  
Transmission systems



Zhengmao Li  
Energy storage



Jorma Kyyrä  
Power electronics



Mervi Paulasto  
Sustainable electronics



Marko Hinkkanen  
Electric drives



Anouar Belahcen  
Electromechanics



Edris Pouresmaeil  
Renewables

# Electric Drives

## Research themes

- Electric machine drives
- Power converters (including grid-connected)
- Control methods and models

## Application examples

- Wind and solar generation
- Hydrogen compressors
- Electrolyser power supplies

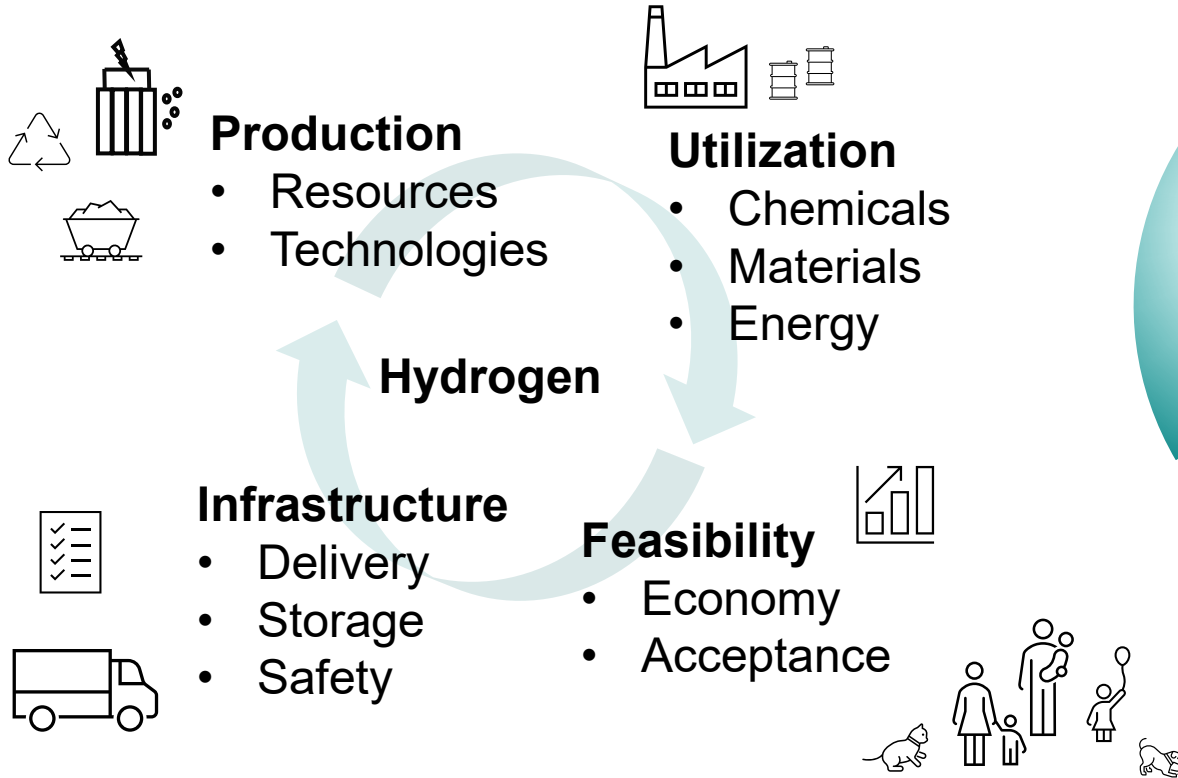
## Active collaboration with industry



# H2 Innovation Center

## Enabling a Sustainable H2 Future

We aim to offer world-class research, talented students, and high-quality education



# Clean Hydrogen

## Produced through water electrolysis

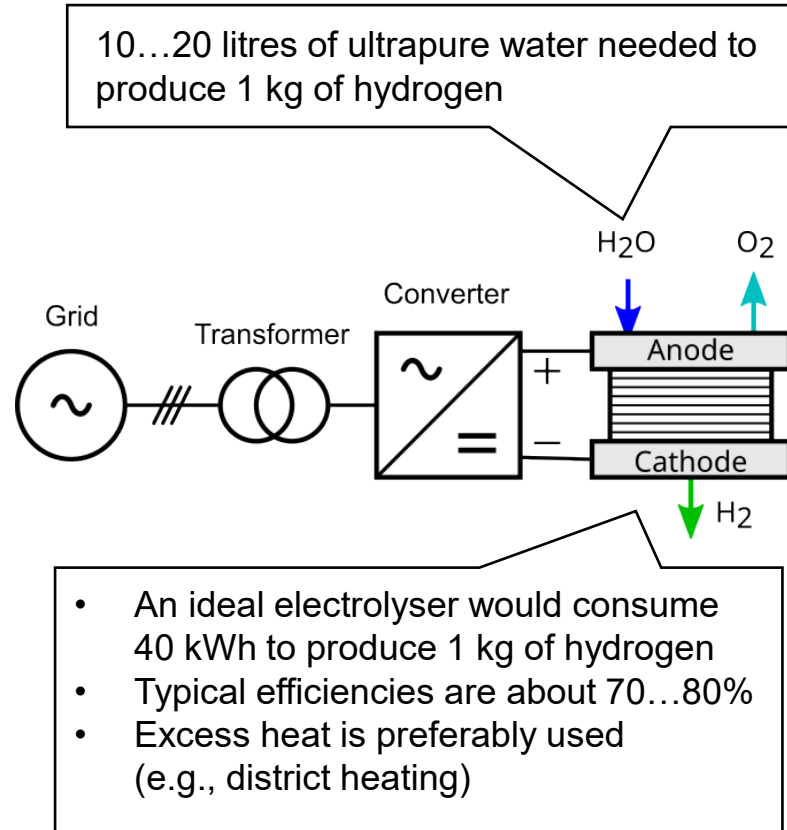
- Powered by clean electricity

## Energy carrier and raw material

- Can be converted to synthetic fuels and chemicals (power-to-X)
- Biogenic CO<sub>2</sub> needed for sustainable synthetic hydrocarbons

## Potential to decarbonise hard-to-electrify transport and industries

- Aviation, maritime, steel, fertilisers



# Hydrogen Production in Europe

## Current production capacity

- 12 Mt/year, mostly based on natural gas
- 0.2% based on water electrolysis (capacity 200...500 MW)

## 2030 clean hydrogen target

- 10 Mt/year own production (plus 10 Mt/year imports)
- Deploy 40 GW of electrolyser capacity in 2030  
(in practice about 140 GW needed to produce 10 Mt/year)

## 2050 scenarios

- Electrolyser capacity 500...1 000 GW

# Hydrogen Production in Finland

## Current production capacity

- 0.15 Mt/year
- 99% based on natural gas

To compare, our electricity consumption is currently about 80 TWh/year

## 2030 clean hydrogen target

- At least 10% of the EU's production
- Production of 1 Mt consumes 50 TWh of electricity (assuming efficiency 80%)

## Finland has several strengths in the hydrogen economy

- Wind, infrastructure, water, biomass, industry, use for heat...

# Enabling a Sustainable Hydrogen Future



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