4TU.Energy PhD course 2026

Opportunities and Impact Beyond Academia

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ISPT selected partners



Several recurring expectations

1. Understand the **broader energy-transition landscape** and how **individual research projects fit within it**.
2. Gain insights into **current challenges, opportunities and future directions**.
3. Connect **technology-level research with system, sustainability and societal perspectives**.
4. Learn from **real-world examples and practical applications**.
5. Understand how **different disciplines, methodologies and stakeholders** contribute to the energy transition.

1. Understand the broader energy-transition landscape

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clusters

- Large green power potential
- Access to salt caverns for large-scale storage
- Availability of ports for import terminals
- Strong knowledge base from being a gas hub



- Import and export corridor to Ruhrgebiet
- Connection with Antwerp
- High-tech suppliers
- Existing gas infrastructure can be re-used

The **Paris Climate Agreement** is a legally binding international treaty adopted on **12 December 2015** at COP21 in Paris, aiming to **limit global warming** to well below 2°C and pursue efforts to limit it to 1.5°C above pre-industrial levels.

GroenvermogenNL

1. How individual research projects fit within it.

R&D

1. Making carbon neutral H_2
2. Transport & storage of H_2
3. Direct use of H_2
4. Green H2 & e- for C-based chemistry
5. Green H_2 & e^- for N-based chemistry
6. Green H_2 & e^- for specialties
7. Socio-economic aspects & H_2 implementation

177 M€

- Workshops for 2nd Phase WP2 and Wp3 start in 2026

Pilot support

Projects throughout the value chains of production, transport, storage and industrial use of green hydrogen (carriers).

- Ca 10 projects in H_2 value chain
- Small scale demonstration
- Regional testing facilities

100 M€

DEI regulations open between 27 januari and 31 july 2026

Demo support

Support for the manufacturing industry

Demonstrating value chain projects

Feed/feasibility studies

Potential endurance testing facility

500 M€

- OWE Hydrogen hubs open Q2 2026
- Second round IMKE open in Q4 2026
- Regulations FEED/Feasibility studies open again in May 2026

Human Capital

Regional learning communities

Digital knowledge platform

National coordination

50 M€

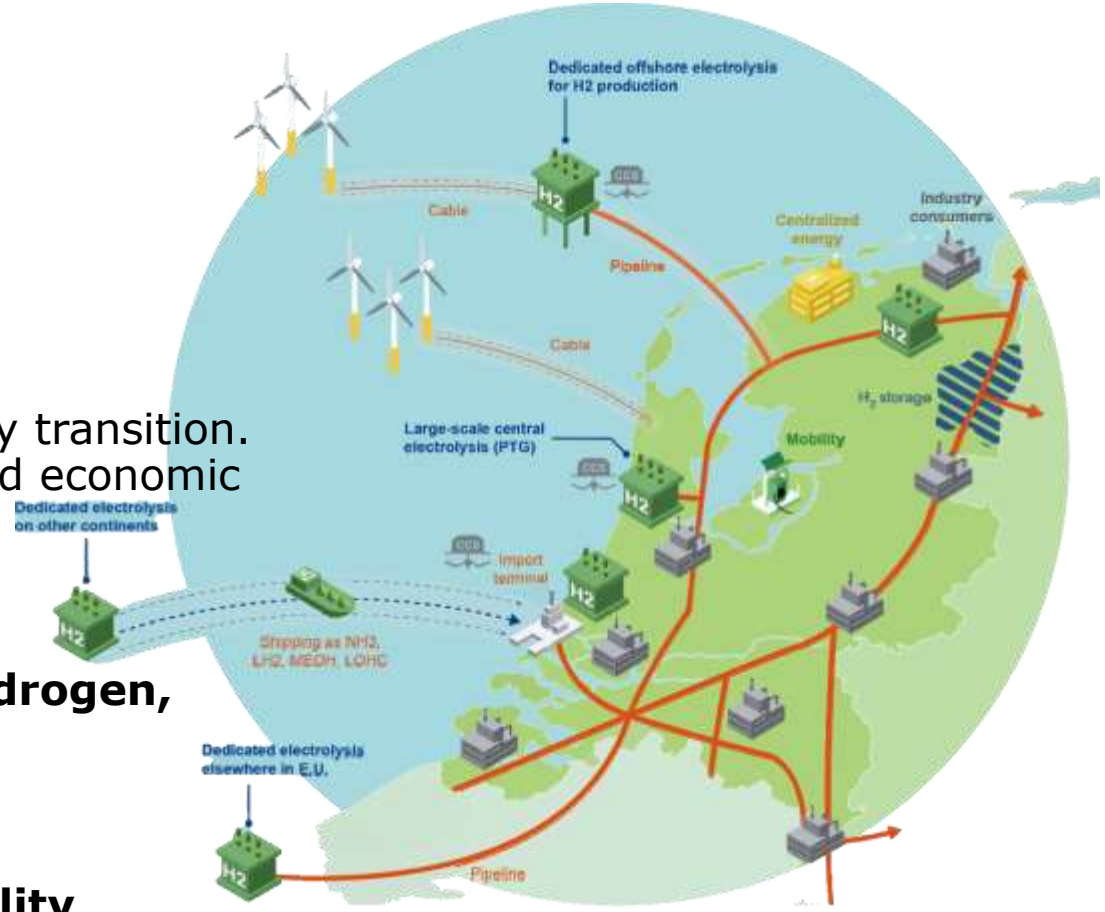
- 2nd phase subsidiy for regions in Q2 2026
- Prototype knowledge platform Q3 2026
- Make Hydrogen Work
- SME support

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Extra projects: HyXchange, Ideation Lab, MEETH2 and COPE

Groene Waterstofhuis (5&6 Nov 2026); H2Café's, **ECNS conference**, **Graduation School**

2. Gain insights into current challenges, opportunities and future directions.



The Energy Transition:

A System Transformation

Key message: The energy transition is not a technology transition. It is a transformation of the entire energy, industrial, and economic system.

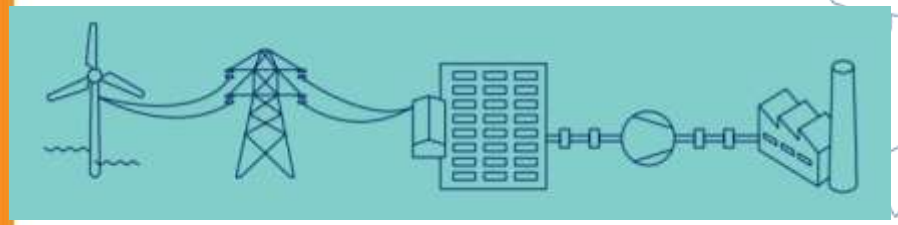
- Past and Today: **Coal → Oil → Natural Gas**
- Today's ambition: **Renewables, Electrification, Hydrogen, CCUS, Circular Carbon**
- Future: **Integrated multi-energy systems**

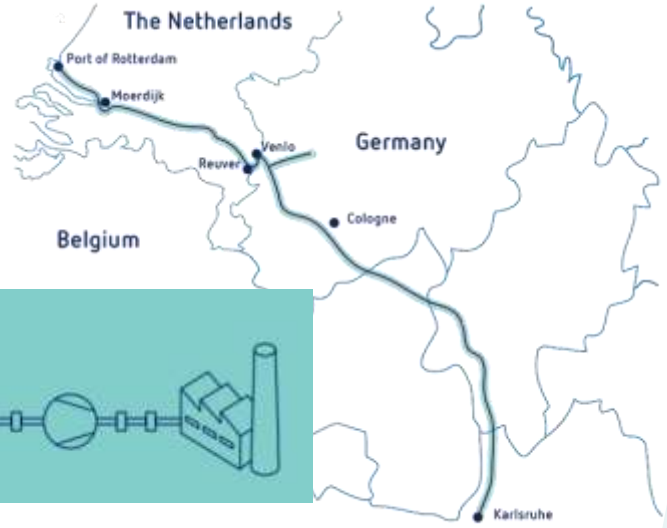
Drivers: **Climate targets**, **energy security**, **affordability**, **industrial competitiveness**

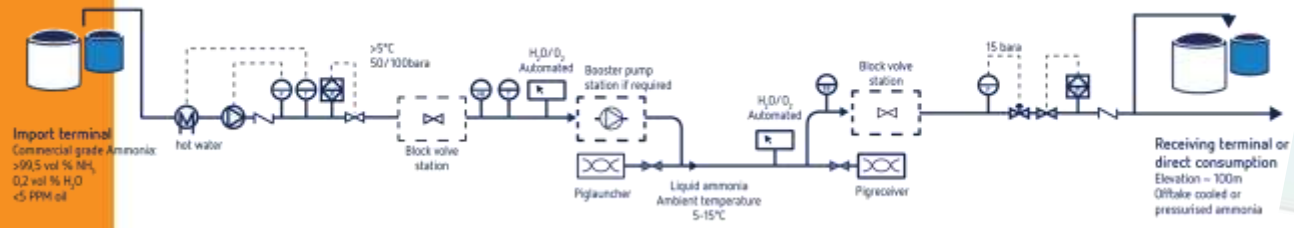
Takeaway

We are moving from a fossil-based energy system to an integrated low or net zero-carbon energy ecosystem.

3. Connect **technology-level research with system, sustainability and societal perspectives**.









4. Learn from **real-world examples and practical applications**





Hydrogen projects ISPT

Hydrohub MW Test Centre (< 1 MW)



Gigawatt Electrolyser Plant (1 GW)



[Hydrohub Innovation Platform: green hydrogen at industrial scale]

Electrolyser plant 200MW

The Holland Hydrogen 1 project





Shell Hydrogen Projects | Shell Global

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missi0n



Electric furnace technology for steam cracking, offering a promising pathway to decarbonize ethylene production. This collaborative initiative between **Shell, Dow, TNO, and ISPT** investigated two electrification approaches:

1) **Retrofitting** existing furnaces with electric heating elements
2) Developing **novel reactor** designs.

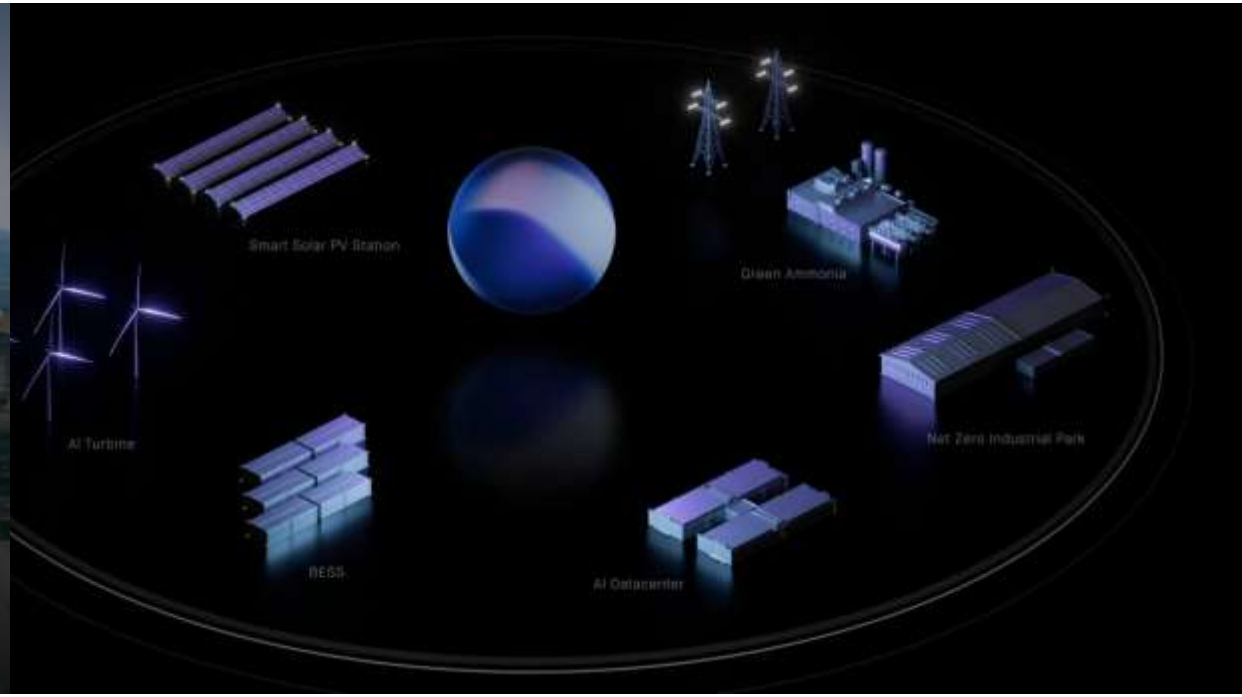
[e-Mission: e-cracking for producing low-carbon olefins]

DOW®

TNO innovation for life

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The Envision Energy hydrogen production plant in China has an initial capacity of **500 megawatts** and is projected to **produce 1.5 million tons of green ammonia annually by 2028**. This facility is designed to be fully AI-enabled and powered directly by renewable energy sources **(off-grid)**, making it a significant step towards clean energy production.

Envision Energy is investing US$1 billion in an integrated green hydrogen industrial park in Spain that will manufacture electrolyzers, develop ammonia production facilities and a Green Hydrogen Centre of Excellence, supporting up to **5 GW of electrolysis capacity**, nearly half of Spain's 2030 hydrogen target.
Location in Spain

5. Understand how **different disciplines, methodologies and stakeholders** contribute to the energy transition.

















2018 2019 2020 2021 2022 2023 2024 2025 2026 2027 2028

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Thank you!

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