

# Hydrogen activities on Åland

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## SOCIETY SCALE SERVICES



Energy System Design



Energy Portal



Citizen Engagement



## ENERGY ASSET DEVELOPMENT



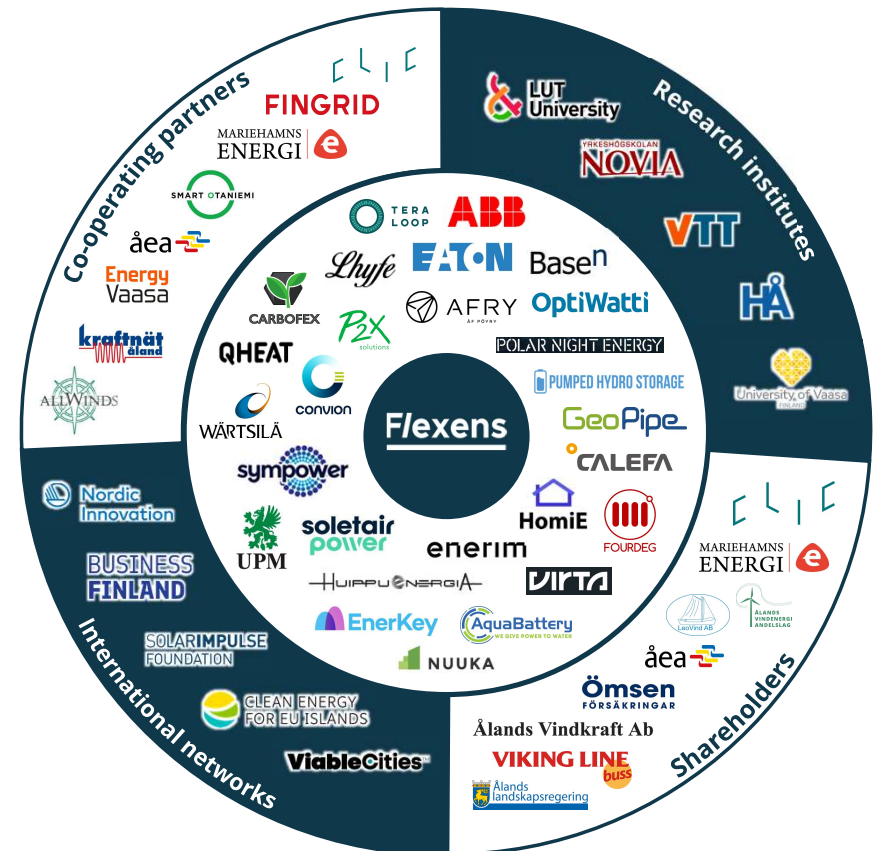
Development



Funding

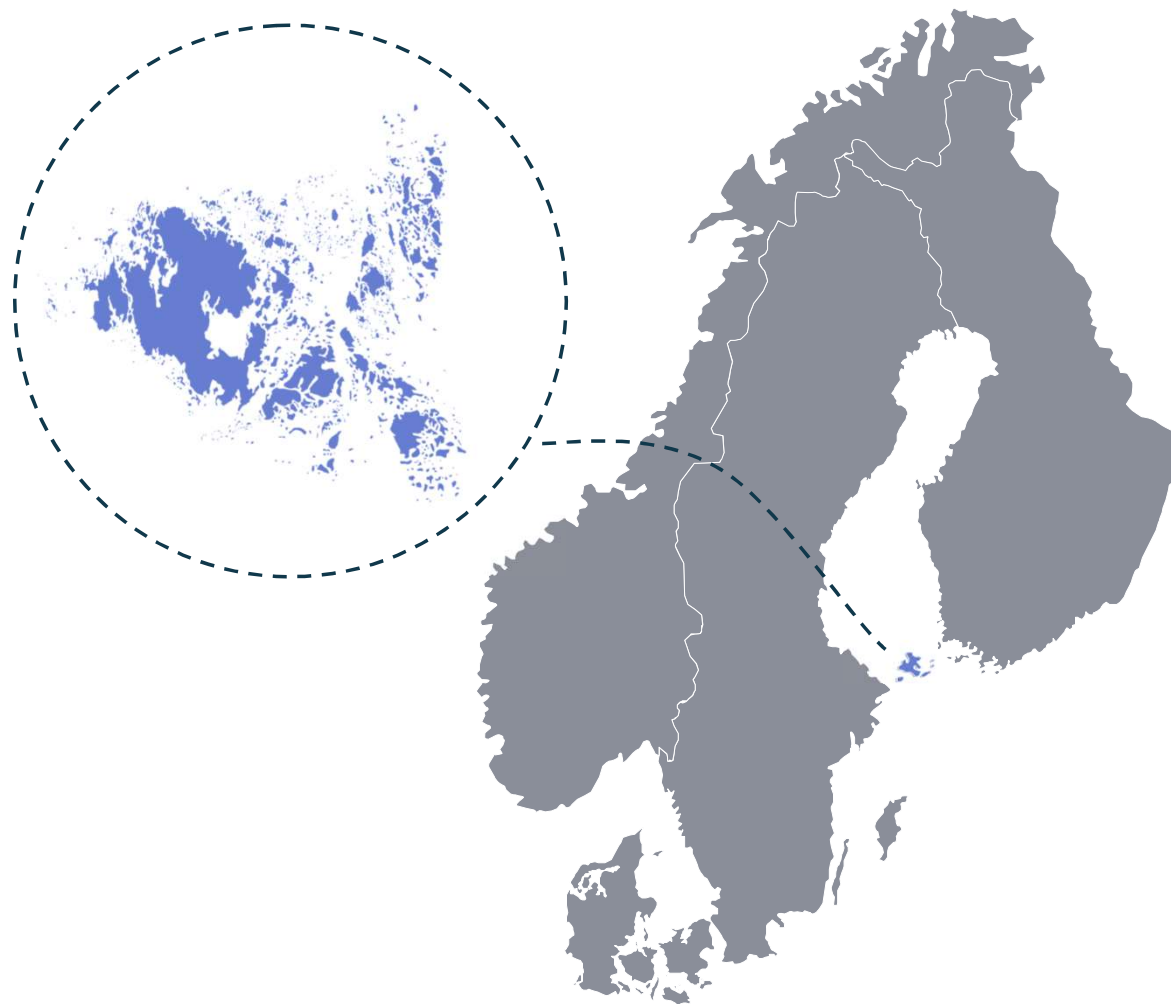
# Our ecosystem

- 26 companies representing the energy sector
- Research institutes and universities
- Public authorities
- Energy utilities
- International networks
- Local co-operating partners on Åland
- Shareholders



# About Åland

- Åland is a self-governed part of Finland
- Consists of 6700 islands (> 0,25ha) of which 60 are inhabited.
- 30 000 inhabitants in total
- 13 300 000 km<sup>2</sup> including water areas
- Good wind conditions, sunniest part of Finland.



# Local hydrogen production in Åland

## MARIEHAMN SHOWS HIGH POTENTIAL FOR LONG-TERM HYDROGEN PRODUCTION PLAN

- + Heat utilization in district heating
- + Multiple application possibilities
- + Strong grid
- Truck delivery of hydrogen to Ålandtrafiken's ferries

## HYDROGEN COULD BE PRODUCED IN HUMMELVIK PORT AS A DEMONSTRATION

- + No truck transport
- + Wind turbine close by
- No waste heat utilization
- No scale-up potential due to grid limitations

Hydrogen ferry expected  
Hummelvik – Torsholma

450 t H<sub>2</sub>/a

Full electric or hydrogen  
ferry expected

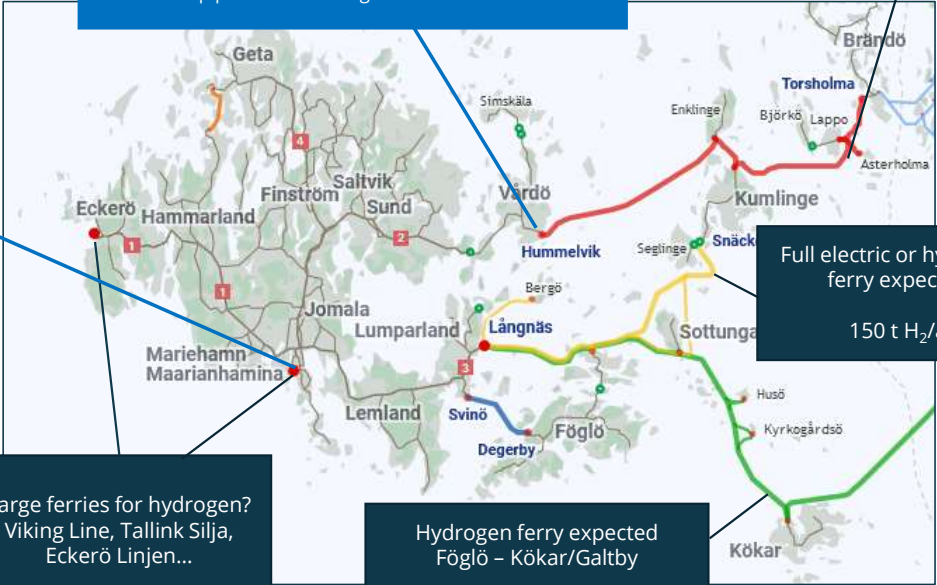
150 t H<sub>2</sub>/a

Large ferries for hydrogen?  
Viking Line, Tallink Silja,  
Eckerö Linjen...

12 000 – 15 000 t H<sub>2</sub>/a

Hydrogen ferry expected  
Föglö – Kökar/Galtby

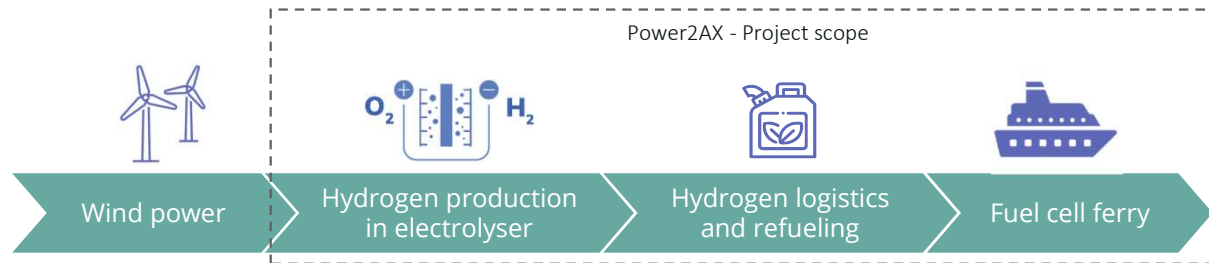
300 t H<sub>2</sub>/a



# Power2AX Project

Local green hydrogen production for a fuel cell ferry in Åland, Finland

Preliminary studies on hydrogen ferry operation in the Åland islands were started several years ago in the Finnish national research programs. Flexens took the project over in 2019 and launched a feasibility study with the Government of Åland on different concepts in May 2020. The overall scope covers hydrogen production, logistics and use in one or more ferries.



The best-case scenario for implementation of the Power2AX project



# Hydrogen ferry network

## CURRENT ACTIVITIES



### Ferry comparison

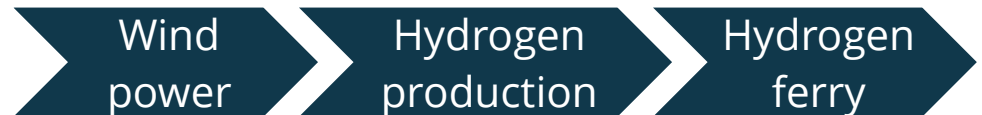
Assess rough cost estimates and operation of single hydrogen ferry on a specific route in Åland archipelago



### Hydrogen production and logistics

Assess rough cost estimates, scaling and operation of hydrogen in the Åland region

## EMERGING TECHNOLOGY INTEGRATION



## KEY TASKS FOR FLEXENS DURING 2021-2022

1. Secure funding from EU calls
2. Create and manage consortium
3. Create detailed project implementation and business plan



# Port as future energy hubs

Phasing out fossil fuels from logistic chains



## Expected integrated solutions

### For ferries

- Onshore power supply
- Recharging of batteries
- Hydrogen supply
- E-fuel supply
- Biofuel supply

### For road traffic

- Recharging of batteries
- Hydrogen supply
- E-fuel supply
- Biofuel supply

### For port equipment

- Recharging of batteries
- Hydrogen supply

### For industrial energy

- Electrification
- Demand response
- Wind and solar power
- Smart grid
- Hydrogen and e-fuels
- Heat pumps
- District heating

# From idea to investments

## WE TURN FUTURE SCENARIOS INTO PRACTICAL IMPLEMENTATION PLANS

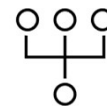


Co-creation with Flexens and selected partners, such as other port operators, engineering offices, shipping companies, technology suppliers, utilities and policy makers. Deep understanding on the future development of the maritime industry.



Energy System Design Service turns numerous individual solutions, such as onshore connections, recharging and hydrogen delivery, into optimized system scenarios.

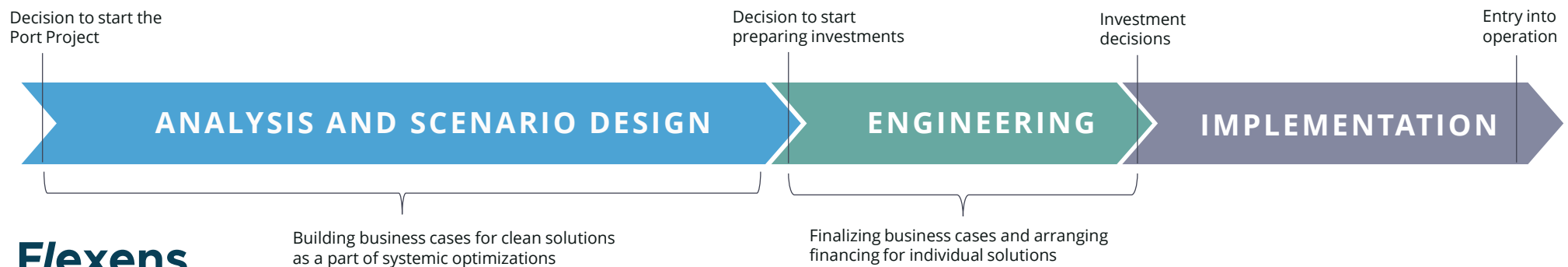
## WE MATERIALISE THE OPTIMISED GREEN SYSTEM STEP BY STEP



Based on the high quality system scenarios and established co-operation, delivery of individual investment projects is efficient.



Through efficient project coordination and financing capabilities of Flexens and our ecosystem partners, project implementation is de-risked and accelerated.





# Mariehamn Hydrogen Pilot

22-11-2021

# Project Aims



**ESTABLISH A CONSORTIUM**



**REALISE A SMALL-SCALE H<sub>2</sub> PILOT**



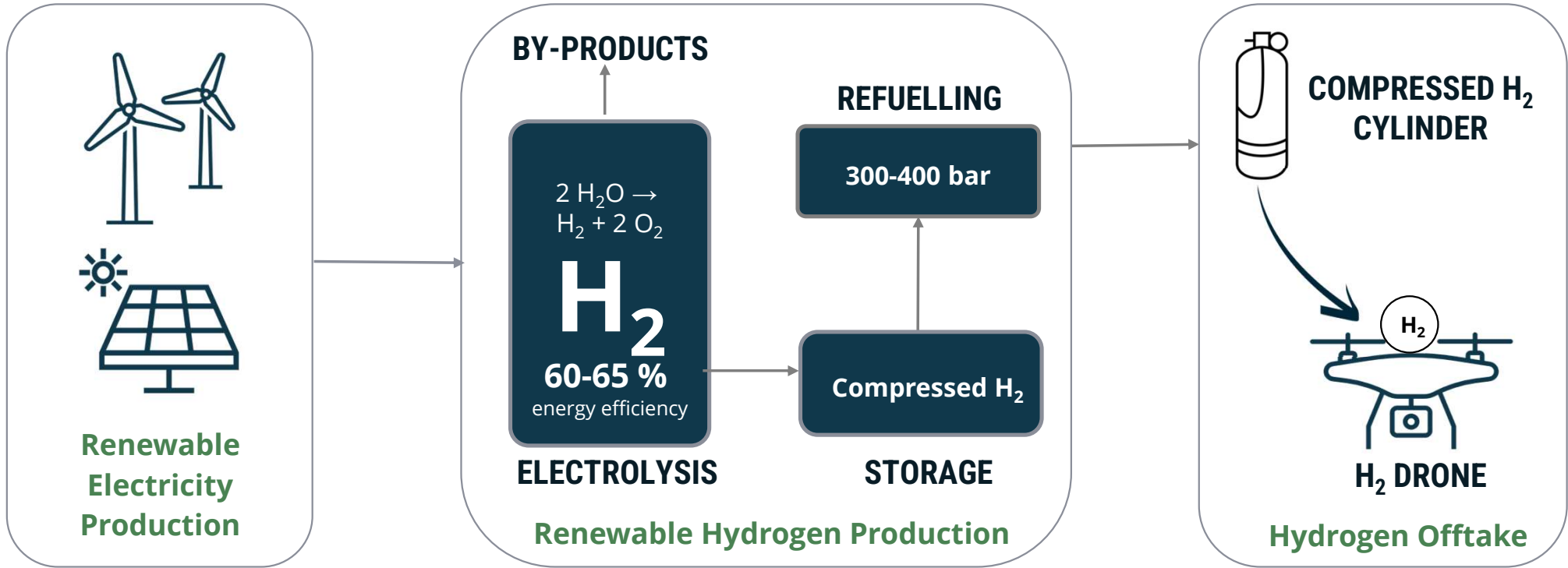
**PLAN A SCALE-UP**

**2021**

**2022**

**2023**

# H<sub>2</sub> production and offtake scheme



# What are the use cases of drones on Åland?



## DELIVERY SERVICES

Postal, medical, food



## SURVEILLANCE

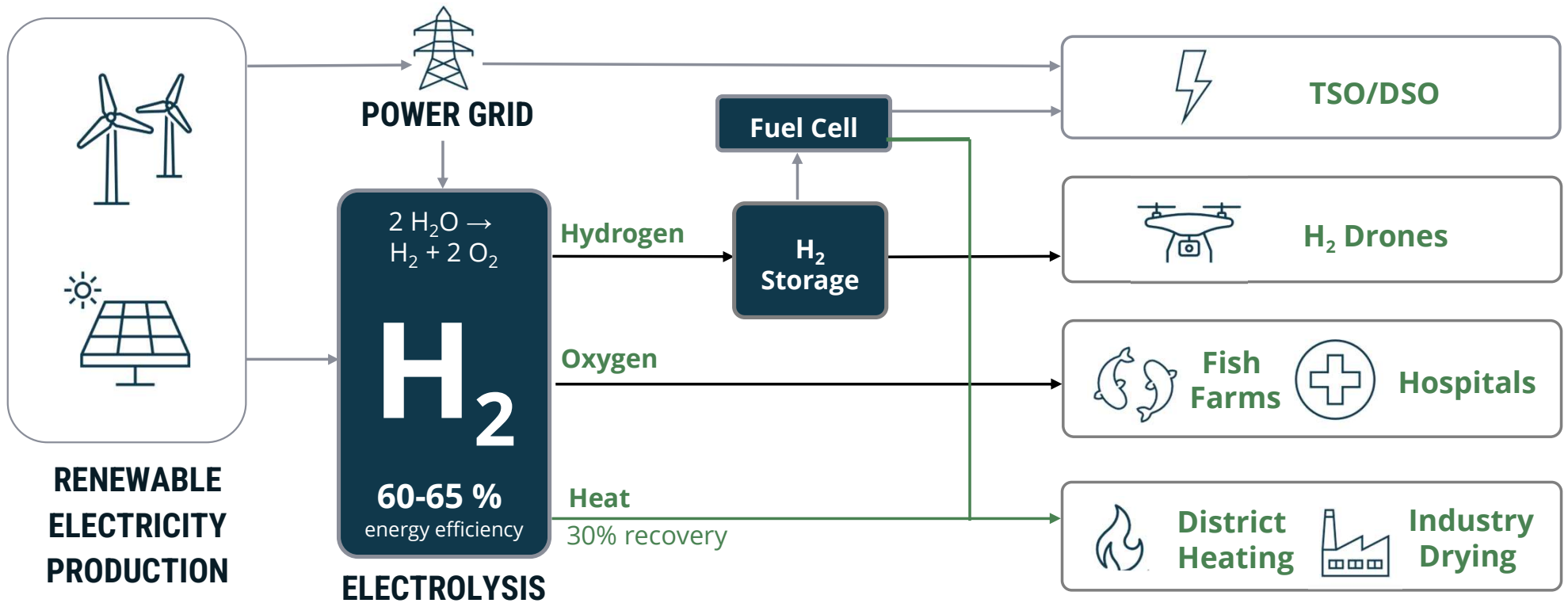
Coastal, agricultural



## EDUCATION & RESEARCH

H<sub>2</sub> aviation in cold climates

# Going beyond hydrogen



The background of the slide features a serene landscape of a dark sea under a vast, cloudy sky at dusk or dawn. The sky transitions from a deep blue at the top to a soft orange glow near the horizon. In the upper left corner, there is a white, semi-transparent network diagram consisting of interconnected nodes and lines. The Flexens logo is positioned in the upper right area, with the word 'Flexens' in a bold, dark blue font and the tagline 'FLEXIBLE ENERGY SOLUTIONS' in a smaller, green font below it.

**Flexens**  
FLEXIBLE ENERGY SOLUTIONS

**Thank you!**