



Nordic
electrification
event

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Turku

The MoZEES FME center – a platform for research and industry

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Institute for Energy Technology is a non-profit foundation located in Norway



Location Kjeller



IFE's vision is to be an internationally leading research institute

Turnover:

>1
billion



Annual publications:

130



1948: IFA



1980: IFE

Employees:

650



14.000



Annual visitors

Advanced laboratories:

25



Nationalities: 38

Researchers: 218

PhDs: 105

Centres for
renewable energy:

2



International projects:

> 200



MoZEES

Mobility Zero Emission Energy Systems

Øystein Ulleberg
Chief Scientist IFE | MoZEES Director



The Research Council of Norway

What is a FME centre?

- Centres for Environmentally-friendly Energy Research
- 8-year research centre funded by the Norwegian Research Council
- Currently 11 FME centres in Norway: wind, solar, hydrogen, CCS, hydropower etc

Goals of a FME centre:

help to resolve key challenges in the energy field



develop solutions for a low-emission society



strengthen the innovation capacity of the Norwegian business sector



help to realise Norway's energy and climate targets for 2030 and 2050

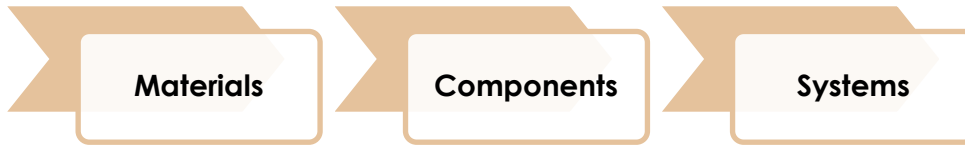


MoZEES – A Research Center on Zero Emission Transport

Battery & Hydrogen – Technology Value Chains



Heavy Duty Transport: Road, Rail, Sea – Areas for Innovation & New Business



MoZEEES: Platform for research and industry partners



- Important to have users from academia, public bodies and industry
 - In addition to international partners
 - 37 partners in MoZEEES
- Period: 2017-2024
- Budget: 26 MEuro
- Educating roughly 13 PhDs and 5 Post docs

MoZEES Research Areas

RA1 Batteries: Objectives

- Develop new battery technology with **improved performance** and **reduced production cost**

RA1 Focus Areas: Li-ion Batteries

- Silicon anodes
- High energy cathodes
- Electrolytes and binders with high stability
- Advanced characterization

RA3 System & applications: Objectives

- Optimize design & controls of battery / fuel cell systems
- Develop **safe battery** and hydrogen **systems**

RA3 Focus Areas

- **Hybrid battery/fuel cell systems** for heavy duty applications, with improved lifetime and lower overall costs
- Li-ion **battery cell lifetime** and **system safety**

MoZEEES Zero Emission Heavy Duty Transport Roadmap

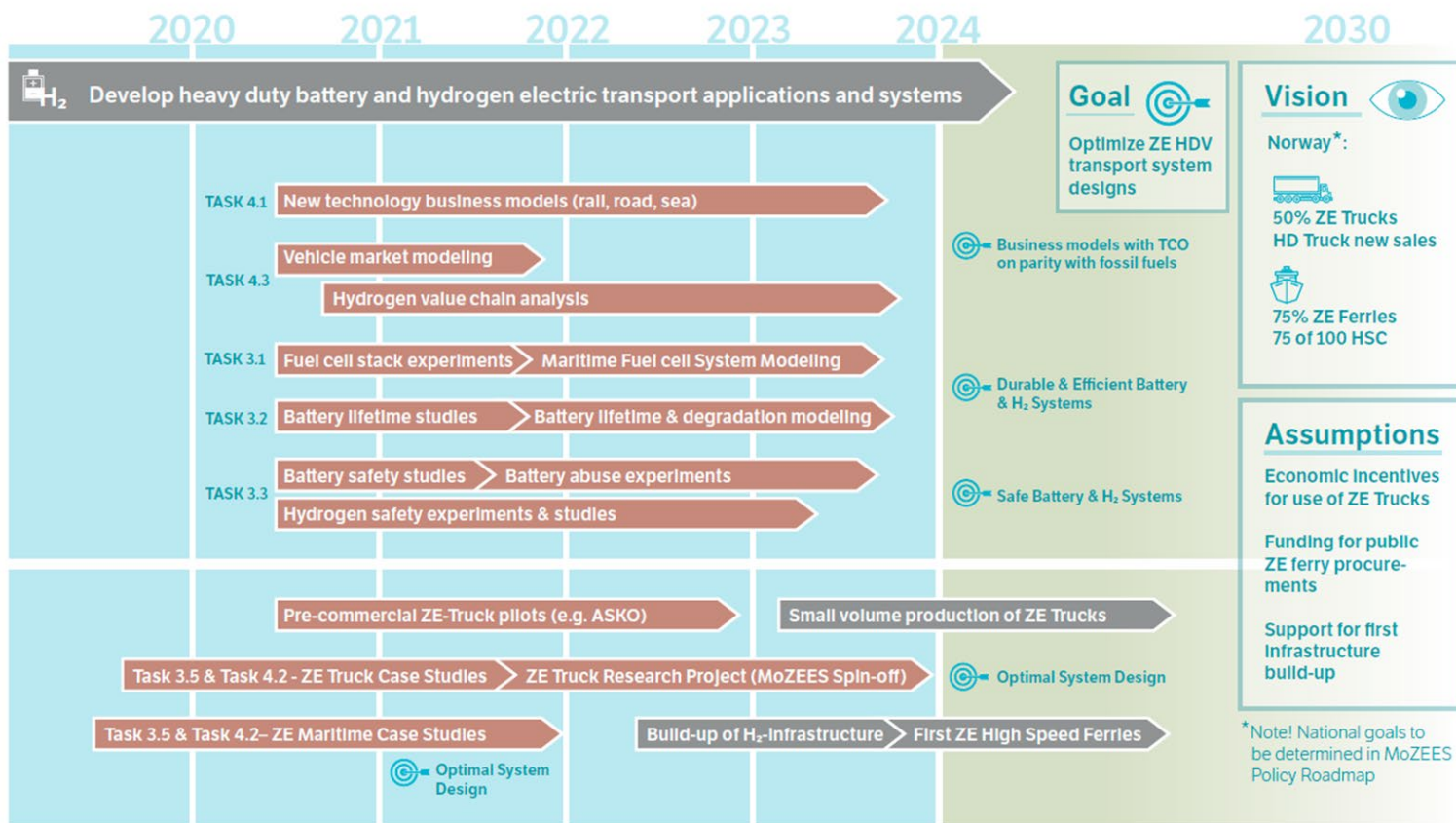


Status today:
A few ZE heavy duty trucks pilots in operation
Several battery electric ferries, but no H₂ ferries in operation

Legend

- Research Action
- Innovation Strategy
- MoZEEES program
- Post MoZEEES
- Goal(s)

Actions, Goals & Targets



MoZEEES Battery Value Chain



Tools for interaction between industry and academia

Innovation committee

- Committee lead by industry partner
- Ensuring relevant innovation is communicated and spun out of the research centre
- Ensures ownership from industry partners to research topics
- Arranging open forum days to discuss innovation and commercialization and how the industry can pull together

Pre-projects funded by MoZEES

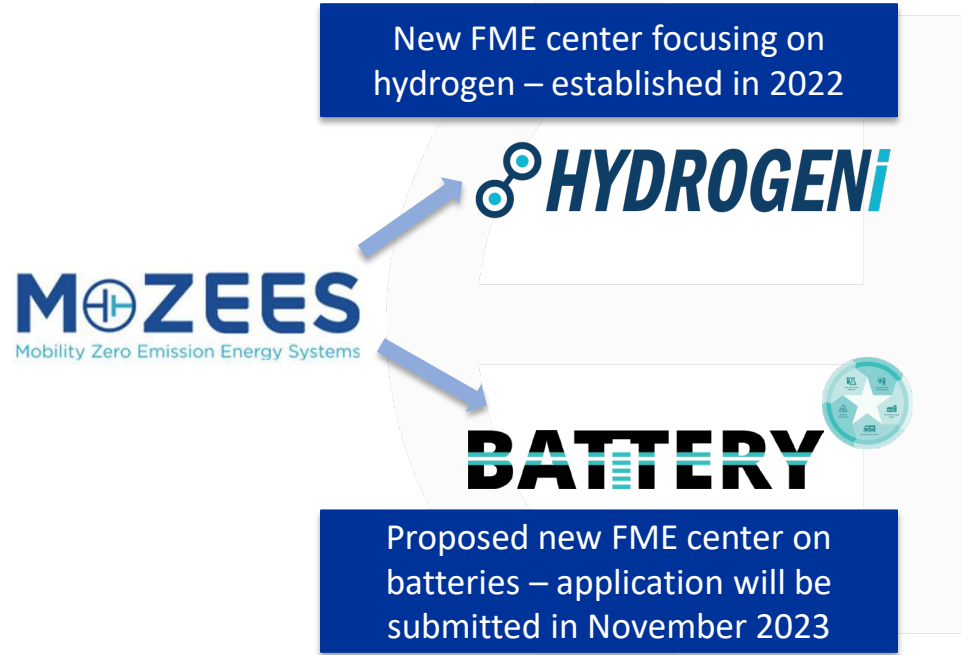
- Allocating centre funds to support pre-projects
- Encourage industry and research partners to investigate how they can cooperate
 - Industry to lead the proposals
- Should lead to spin-off research projects (usually funded by RCN or HEU)
- Should build on results that are developed in MoZEES

Topical events

- Organizing events based on topics, such as Battery Days
 - In addition to the annual meetings and research area meetings
- Invited new (and old) industry partners to visit the research partners
- Get acquainted with infrastructure and learn how to build a battery

What comes after MoZEES?

- The MoZEES centre will continue until end of 2024
- Ecosystem around both hydrogen and especially batteries have grown enormously in Norway since the beginning of MoZEES
- Now natural to have dedicated FME centers on both topics



Battery FME: working title

M⊕ZEES

Mobility Zero Emission Energy Systems

Thank you for your attention!



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