

Conference Marine Energy, 13-14 September 2017, Florø

MoZEES

Mobility Zero Emission Energy Systems

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The Research Council of Norway

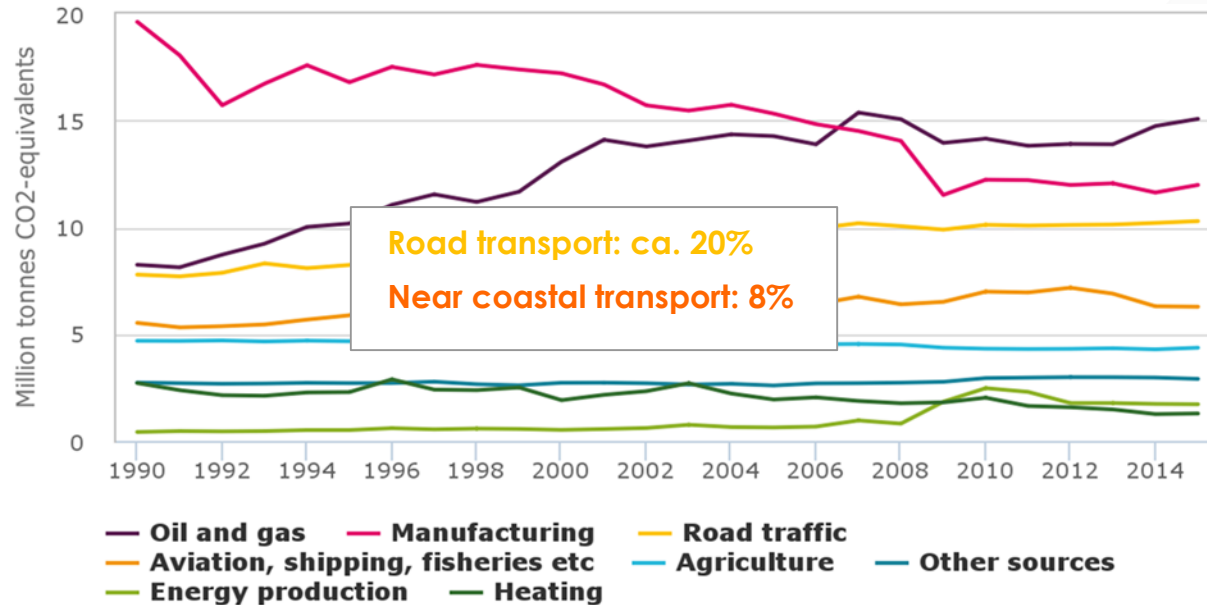
MoZEES – Research Center

- Norwegian Research Center on **Zero Emission Transport (2017-2024)**
- **Battery & Hydrogen** technology for future zero-emission transport, with focus on heavy duty applications (**road, rail, sea**)
- **Safe, Reliable & Cost competitive** technologies & systems for transport
- Research collaboration between **40 partners** (hosted by IFE)



Motivation – Reduction of GHG-emissions

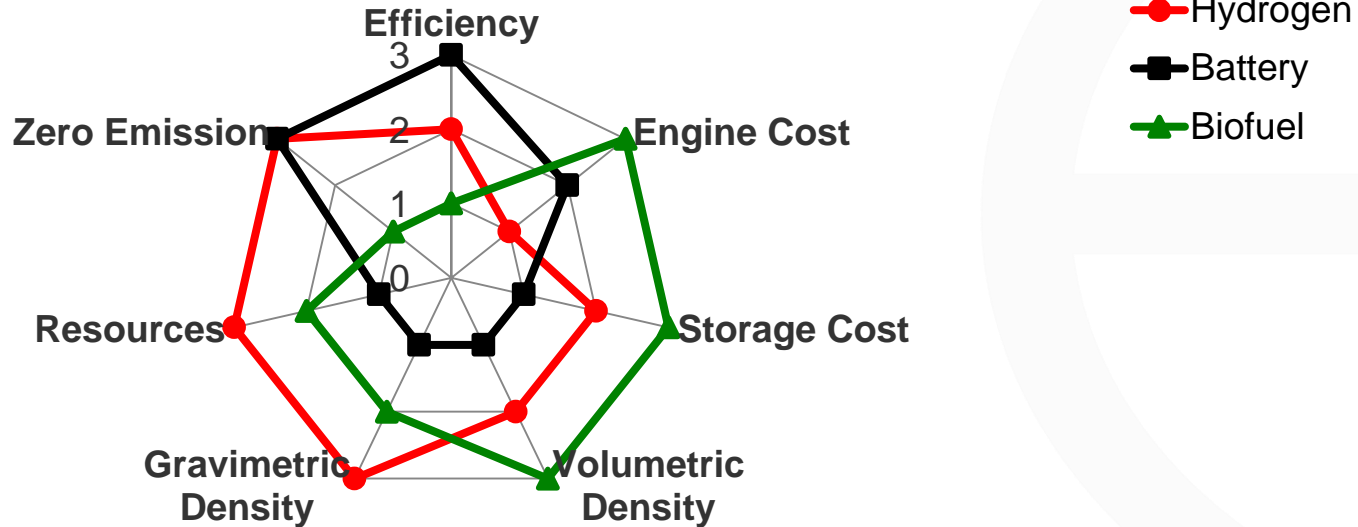
- Norway: 54 million tonnes of CO₂-equivalents per year → **30% from Transport**



Source: SSB (2015)

Zero Emission Alternatives for Transport

Norway: A balanced approach

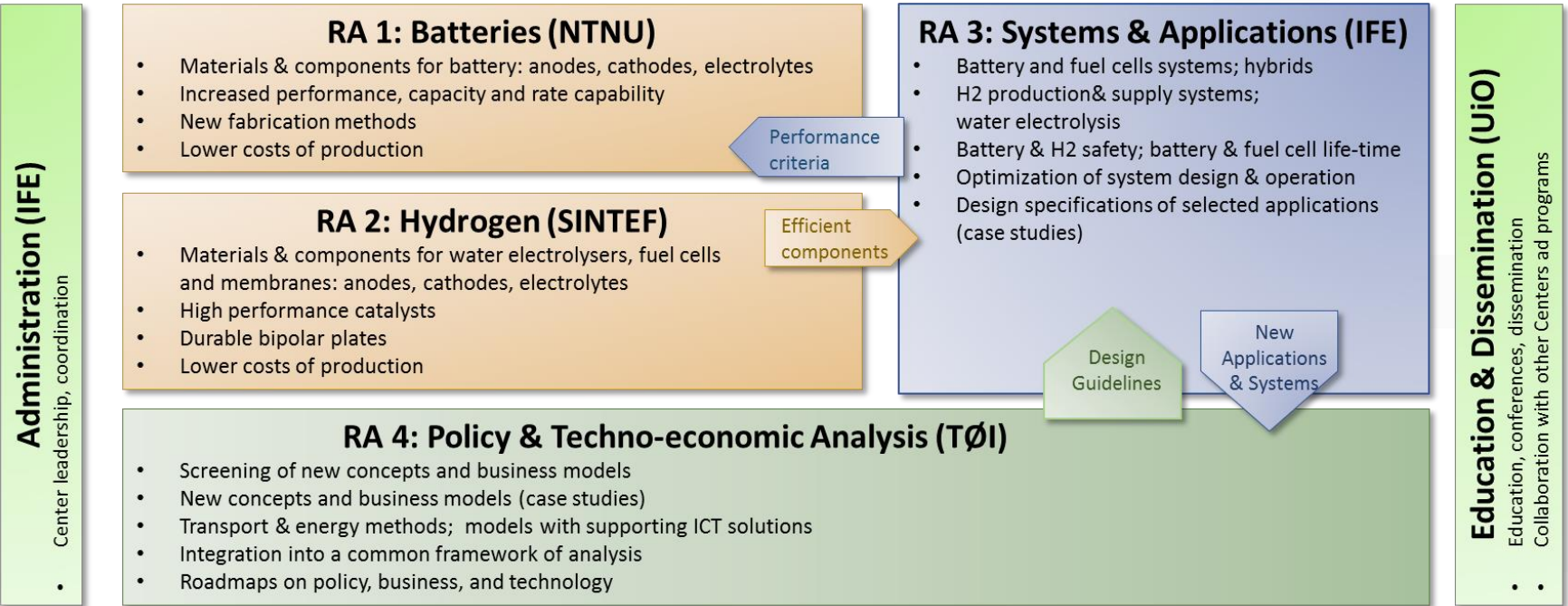


Source: IFE (2016)

MoZEES – Research Areas

- **New materials and processes** that enable industrial User Partners to compete in niche markets in the battery industry
- **Battery and hydrogen key components and technologies** for export-oriented products
- **Battery and hydrogen systems for application** by User Partners into near to medium term transport markets (road, rail, and sea), with a particular focus on maritime applications
- **Integrated zero-emission energy and transport solutions and services**, including battery charging and hydrogen refueling infrastructures

MoZEES – Research Areas



MoZEES – Case Studies

- **RA3 – Battery & Hydrogen Systems & Applications**
 1. Maritime: High-speed passenger ferry (MFSF; Brødrene Aa) (2017-2018)
 2. Road: Heavy-duty vehicle
 3. Rail: Locomotive
- **RA4 – Policy & Techno-Economic Analysis**
 1. Maritime: Zero Emission passenger vessels for public tendered services
 2. Road: Zero and low emission heavy duty freight vehicles
 3. Rail: Zero Emission flexible train solution from Oslo to Trondheim

MoZEES – Partners

7 Research Partners

- Research institutes: IFE (host), SINTEF, TØI, FFI
- Universities: UiO, NTNU, HSN

28 Commercial & Industrial Partners:

- **Battery** & **hydrogen** materials, components, and system suppliers; developers; end users

7 Public Organizations:

- Norwegian Road, Rail, and Coastal authorities; Akershus and Sør-Trøndelag counties; Oslo Port authority, Enova

Project

- Period: 2017-2024
- Budget: **260 MNOK (26 MEUR)** **13 PhDs & 5 Post.Docs**

MoZEES – Innovation Areas

- Heavy Duty Transport Systems, with focus on Maritime Applications



- Battery & Hydrogen Technology Value Chains

Materials

Components

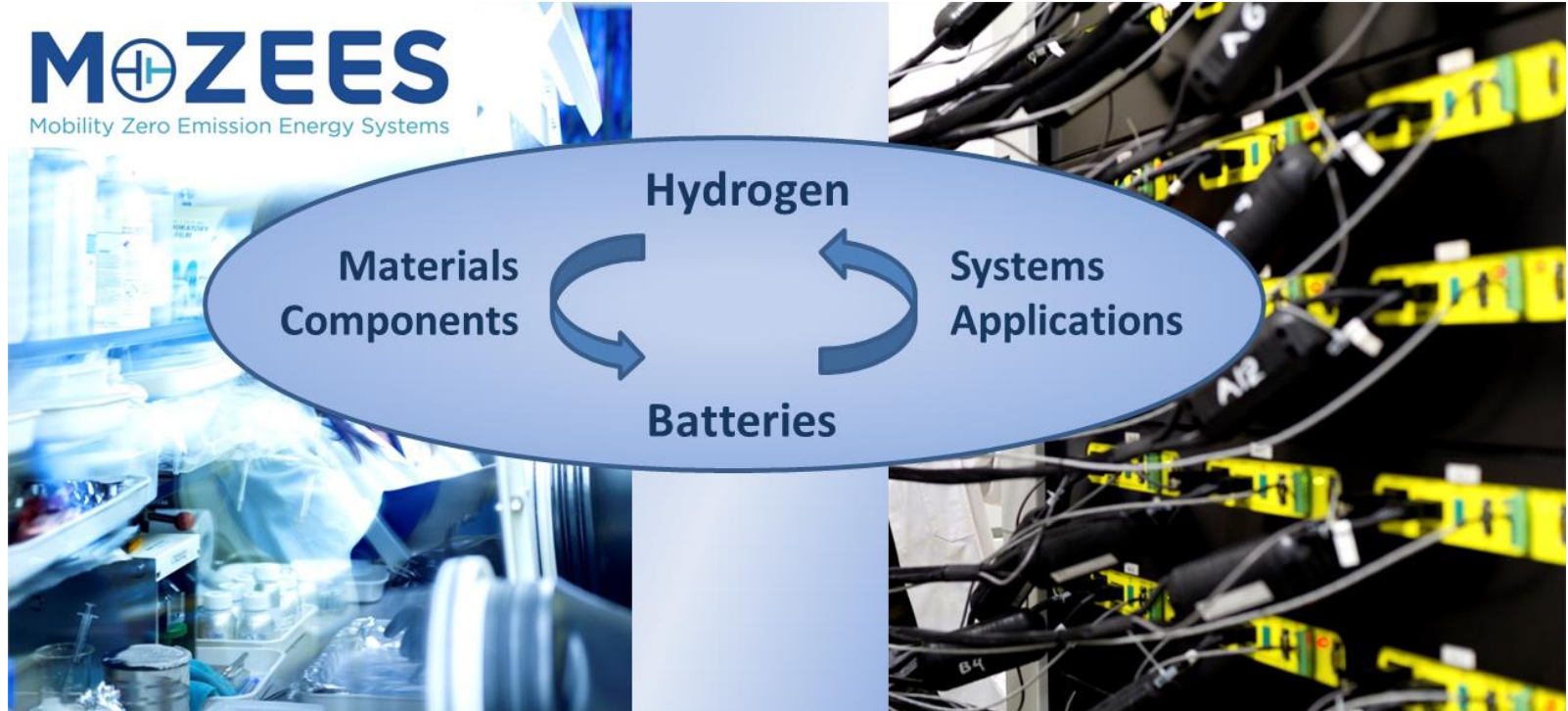
Batteries &
Fuel Cells

Modules

Systems

Summary

Research on Batteries & Hydrogen, from materials and components to systems



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