Forskningsrådet

Accelerating technology development from laboratory to market

Norwegian experiences

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Executive Director
Research Council of Norway
18. December 2019



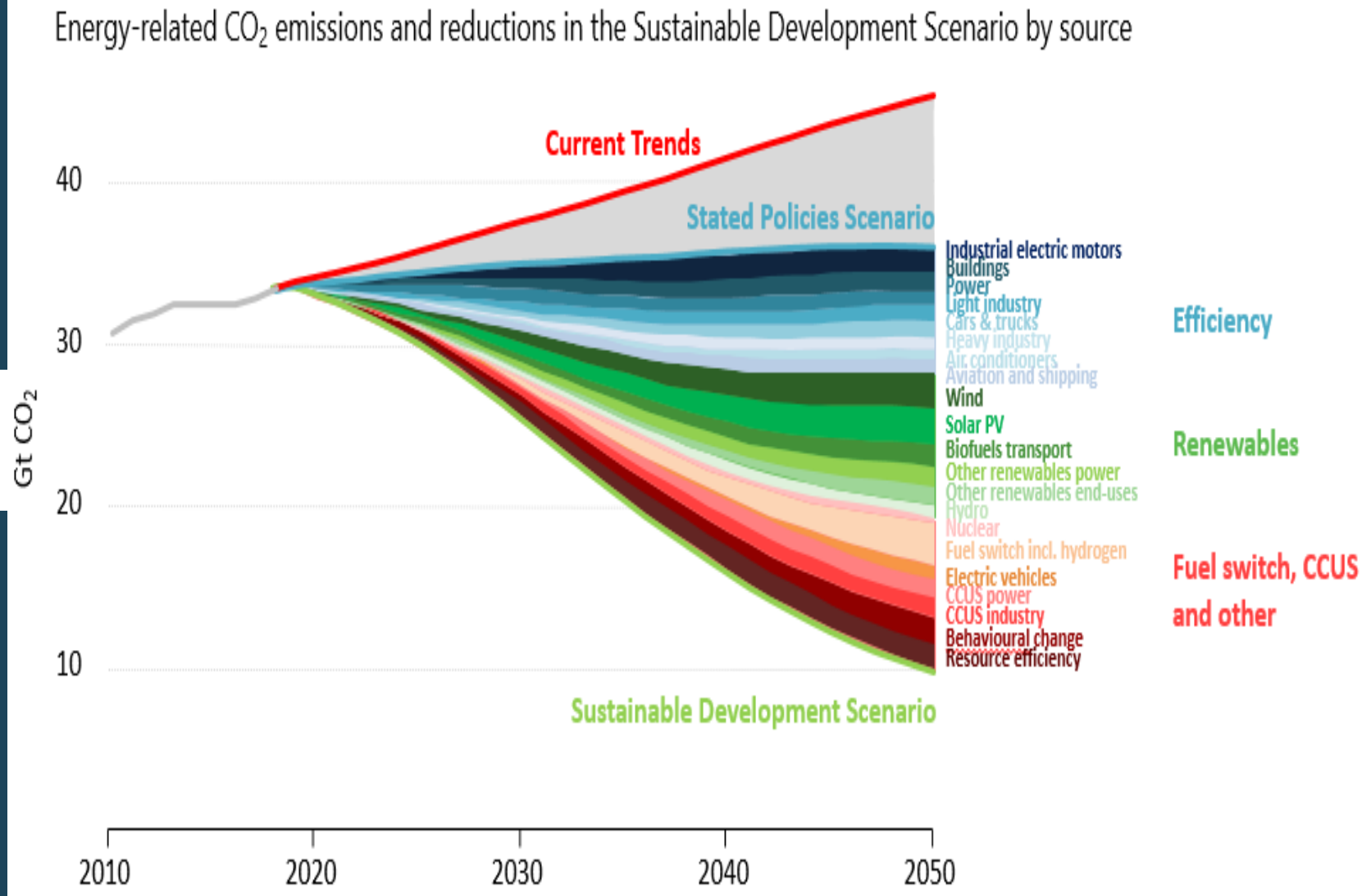
R&D FOR INNOVATION AND SUSTAINABILITY

The Challenge

Meeting climate targets requires a broad technology portfolio

- Large investments needed
- Change from energy expenditures to technology investments
- Gives huge market opportunities

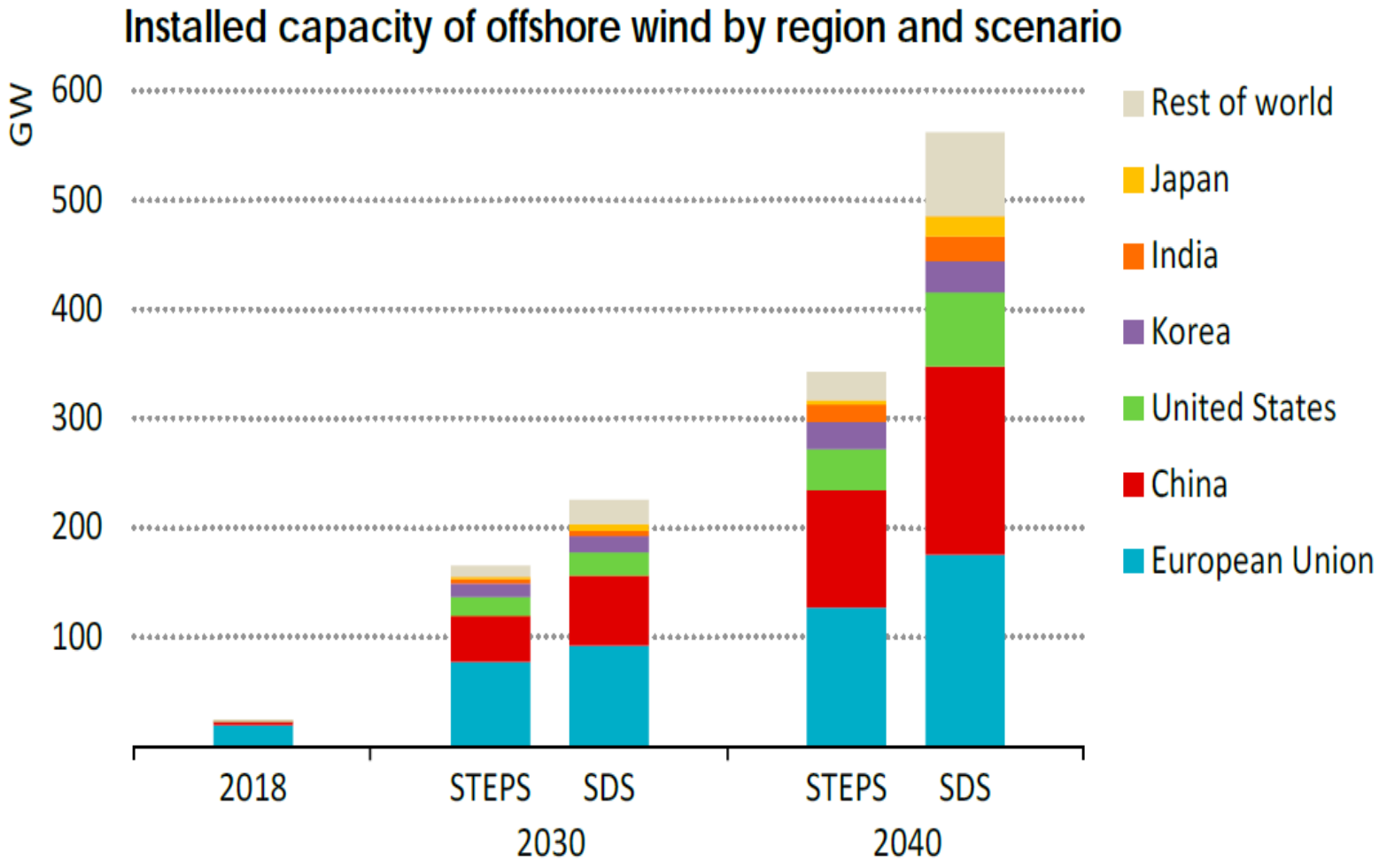
Global CO_2 reductions by technology area



IEA WEO 2019

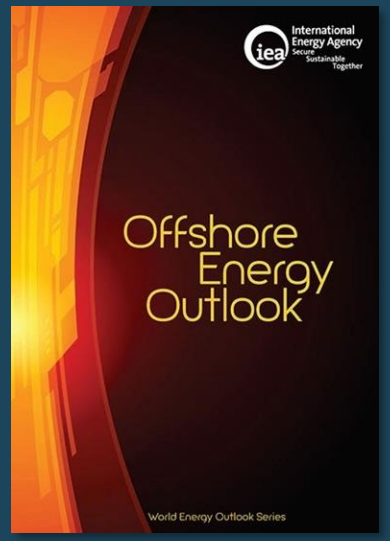
Market opportunities

Offshore wind

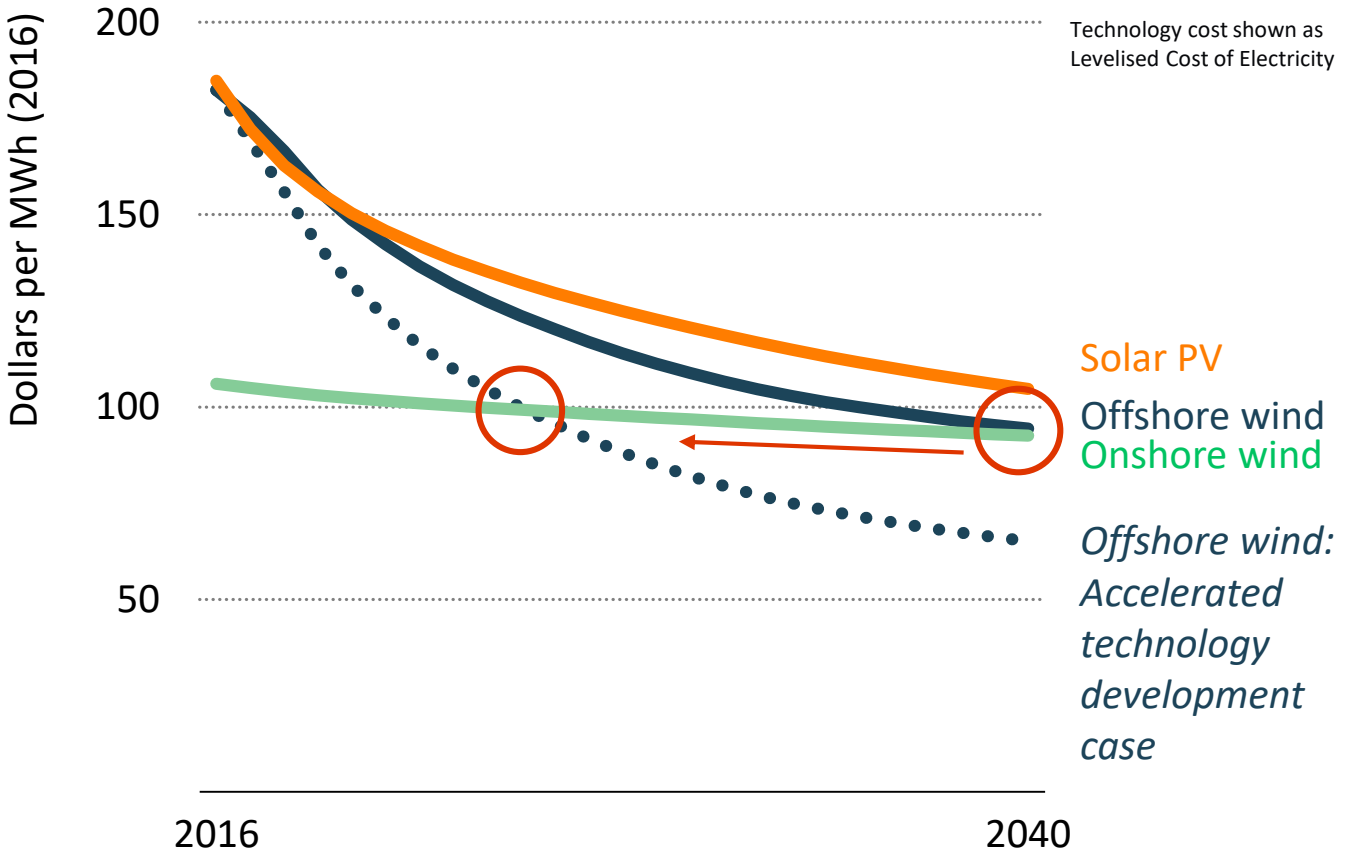


IEA WEO 2019

Accelerated technology development increases the opportunities



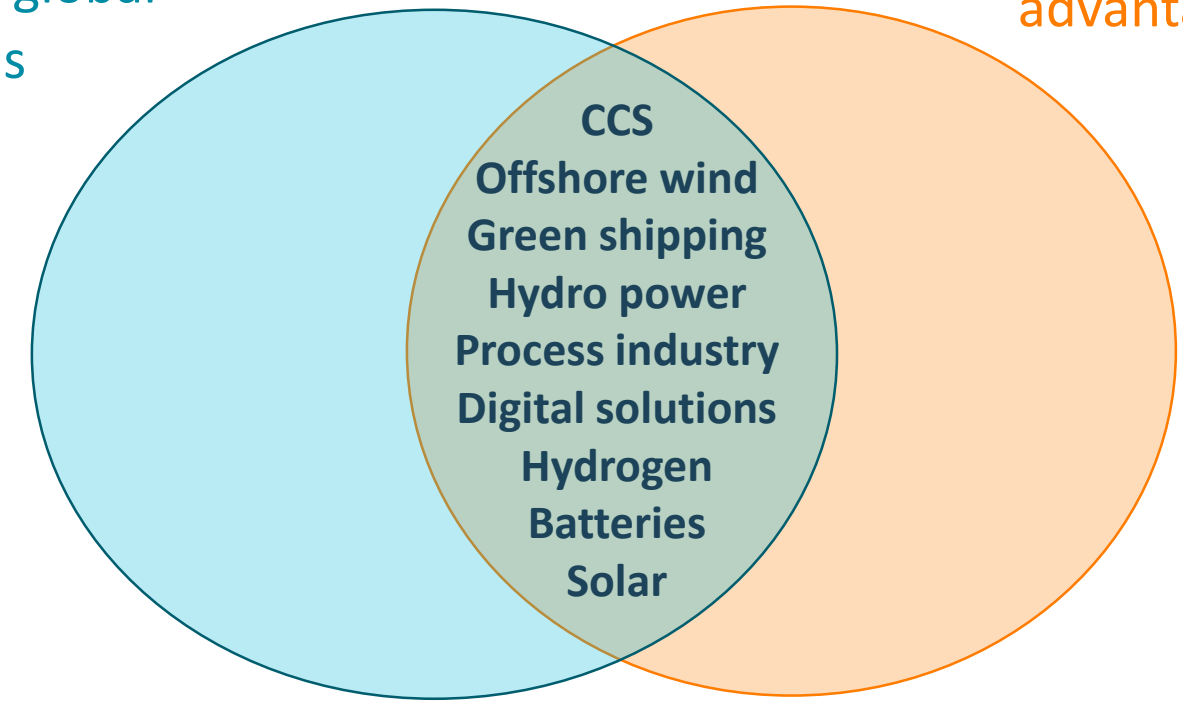
Projected technology costs in Europe (IEA)



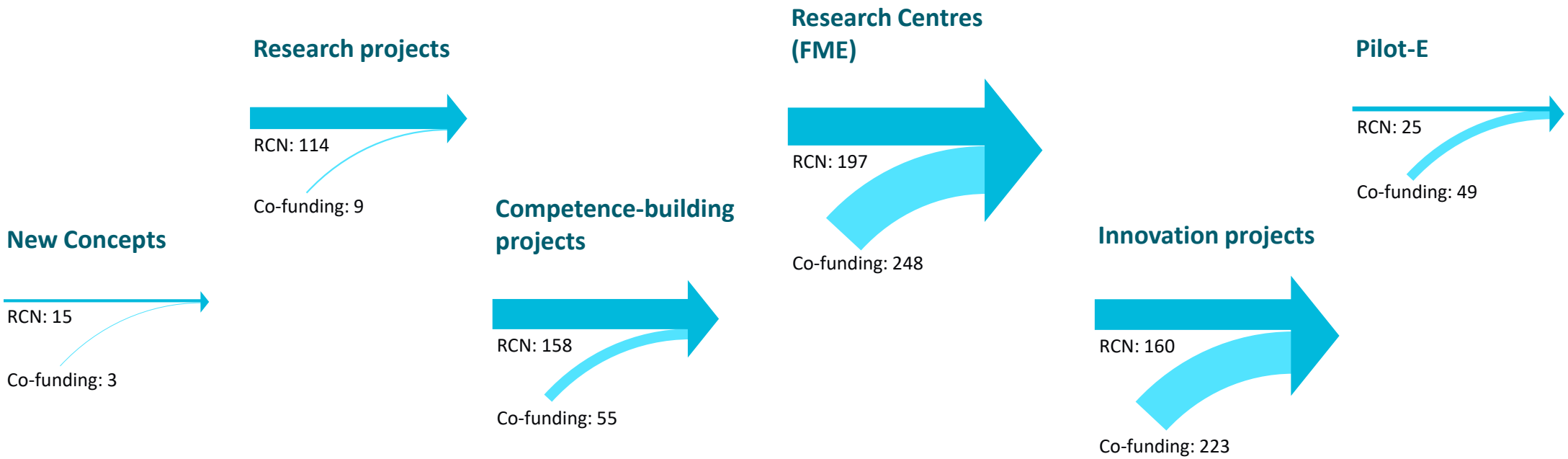
Norwegian Energy R&D priorities developed in collaboration with industry

Technology areas with significant potential for reducing global emissions

Norwegian competence and advantages



RCN funding instruments along the innovation chain



R&D efforts give results: Analysis of impacts

400 million €

Research Council of Norway invested in approx. 670 energy (2008-2017)



48 cases analysed

1,6 billion €

realised economic impact in Norway (2008-2017) and **25 Mtonn CO_2** reduced emissions in Europa

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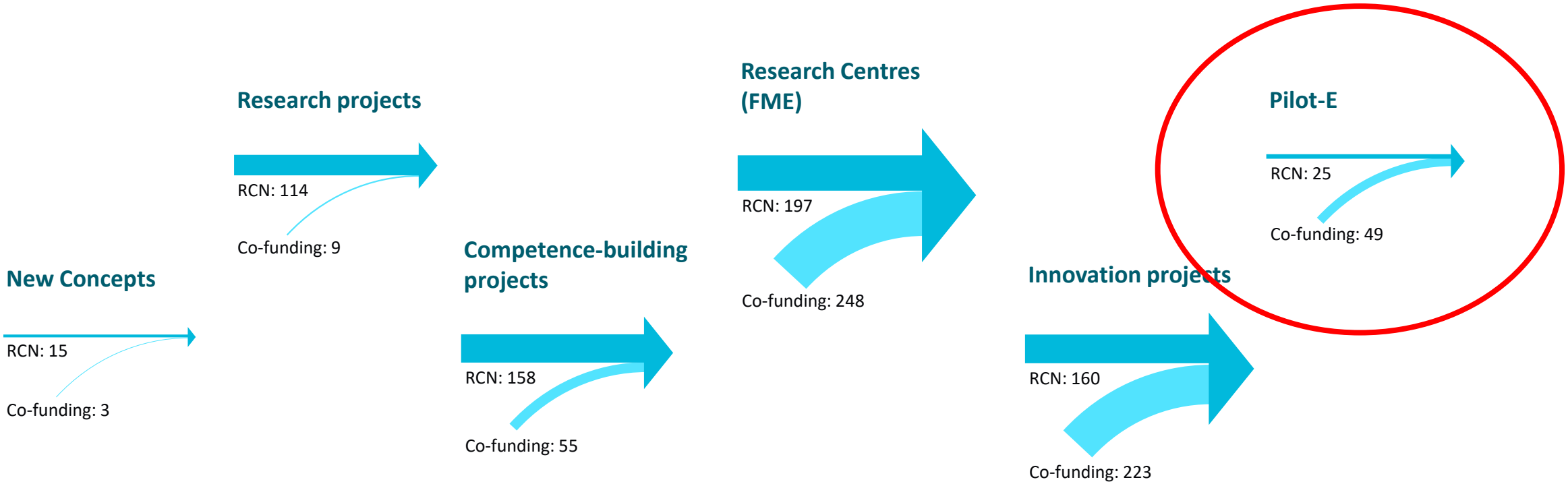


48 cases analysed

1,6 billion €
realised economic impact in Norway (2008-2017) and **25 Mtonn CO_2** reduced emissions in Europa

10 billion €
identified future economic potential in Norway/Europa and pontentially several hundred **Mtonn CO_2**

Funding instruments along the innovation chain



Research Council of Norway
Innovation Norway
Enova

Norwegian experience with mission-oriented instruments

PILOT-E – Fast-track from research to market

Instruments for building knowledge

Industry-oriented instruments for developing knowledge and solutions

Regulation and procurement

Research Council of Norway

Researcher Projects

Knowledge-building Projects

Targeted centre schemes (SFI, FME)

Innovasjonsprosjekter ✓

Innovation Norway

Environmental technology

Public sector R&D contracts (PRD) ✓

Low-risk and innovation loans

Enova

Sectoral policy instruments ✓

PILOT-E

Public Sector



Basic research

Industrial research

Experimental development

Demonstration

Introduction to market

Market

Pilot-E call on zero emission maritime transport

Supply

Siemens
0-emission offshore wind service ship



Passenger ferries

Wartsila
Urban Water Shuttle

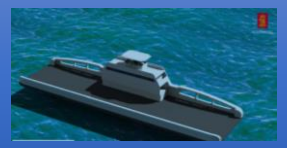


Brødrene Aa
Sigthseeing



Car ferries

Kongsberg
0-emission autonom ferry



New zero-emission maritime cluster

Fiskarstrand
World first Hydrogen ferry



Battery electric

Hydrogen battery electric

Mission- oriented approach to develop world leading industries

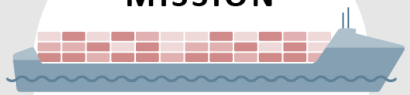
Zero-emissions maritime transport



SOLUTIONS

- Hydrogen from gas
- Renewable hydrogen
- Forest-based biofuels
- Batteries
- Digitalisation

MISSION



World-leading technology supplier for zero-emission maritime transport


INDUSTRIAL OPPORTUNITIES
CO_2 management
Hydrogen transport
Electrolysis
Lignocellulose conversion
Materials for batteries
Marinising battery systems
Autonomy
SOLUTIONS
Hydrogen from gas
Renewable hydrogen
Forest-based biofuels
Batteries
Digitalisation
MISSION
World-leading technology supplier for zero-emission maritime transport

RELEVANT SECTORS

- Oil and gas companies
- Suppliers to the oil and gas industry
- Forest-based industries
- Metal industries
- Maritime industries
- ICT

INDUSTRIAL OPPORTUNITIES

- CO_2 management
- Hydrogen transport
- Electrolysis
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- Autonomy

SOLUTIONS

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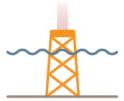
Mission- oriented approach to develop world leading industries

Offshore Wind



SOLUTIONS

Bottom-fixed



Floating



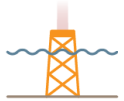
MISSION

A competitive Norwegian offshore wind industry

INDUSTRIAL OPPORTUNITIES

- Cables
- Foundations
- Substations
- Vessels and equipment
- Installation
- Inspection and maintenance
- Offshore logistics
- Project management

SOLUTIONS

- Bottom-fixed 
- Floating 

MISSION

A competitive Norwegian offshore wind industry

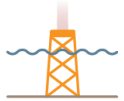
RELEVANT SECTORS

- Cable manufacturers
- Oil and gas companies
- Suppliers to the oil and gas industry
- Maritime industries
- Shipping companies
- Consultancies

INDUSTRIAL OPPORTUNITIES

- Cables
- Foundations
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SOLUTIONS

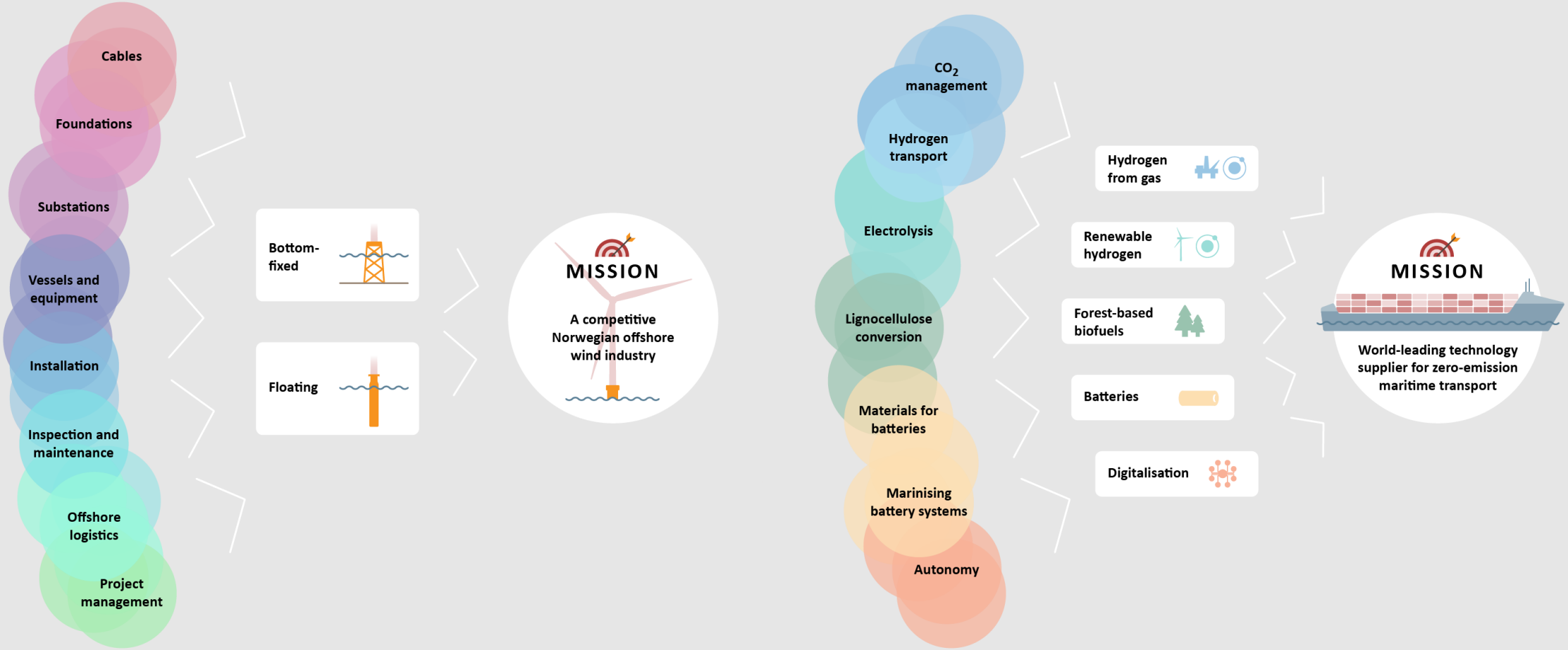
- Bottom-fixed 
- Floating 

MISSION

A competitive Norwegian offshore wind industry

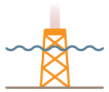
Mission- oriented approach to develop world leading industries

Zero-Emission Maritime Transport & Offshore Wind



Cables
Foundations
Substations
Vessels and equipment
Installation
Inspection and maintenance
Offshore logistics
Project management

Bottom-fixed



Floating



MISSION

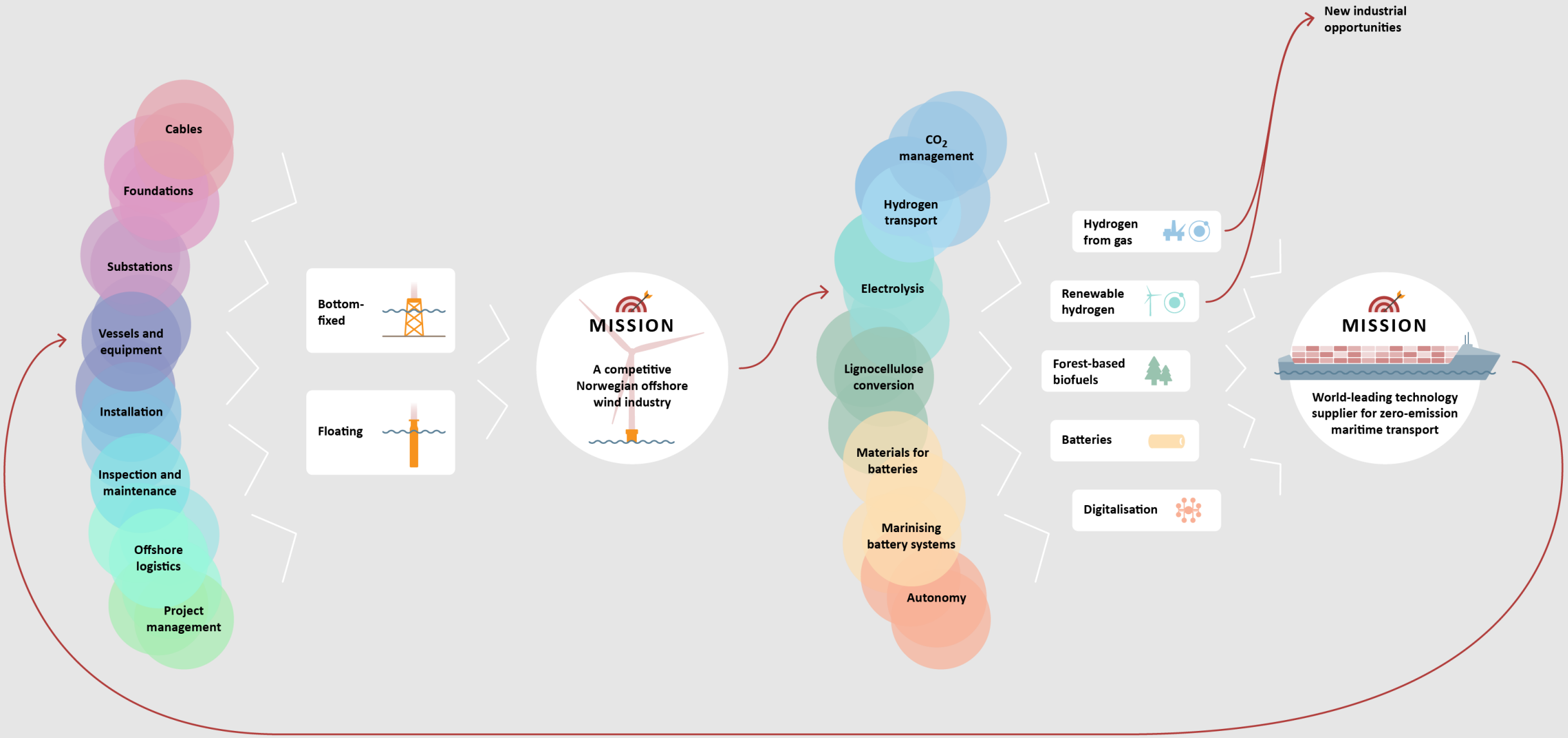
A competitive Norwegian offshore wind industry

CO_2 management
Hydrogen transport
Electrolysis
Lignocellulose conversion
Materials for batteries
Marinising battery systems
Autonomy

Hydrogen from gas
Renewable hydrogen
Forest-based biofuels
Batteries
Digitalisation

MISSION

World-leading technology supplier for zero-emission maritime transport


Cables
Foundations
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Vessels and equipment
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MISSION
A competitive Norwegian offshore wind industry
CO_2 management
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Autonomy
Hydrogen from gas
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Forest-based biofuels
Batteries
Digitalisation
New industrial opportunities
MISSION
World-leading technology supplier for zero-emission maritime transport

Summary

- Stimulation of R&D and innovation must be accelerated to meet climate targets and to enhance industrial competitiveness
- National policies and instruments should address both technology “push and pull”
- Need for coordinated and flexible instruments along the innovation chain
- Mission-oriented approaches should be defined with clear targets but with broad mobilisation across solutions and industries and with public sector engaged to drive markets
- Address balance between international collaboration and competitiveness




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