



THE VALUE OF THE NORWEGIAN HYDROGEN INDUSTRY STATE AND AMBITIONS

H2 Value Chain – 16. november 2022

«Hydrogen/ammonium are key for the green transition, but also represents an economic opportunity»

- Hydrogen and ammonium are expected to be critical components for the structure transition towards a low-emission society
- A strong and well-developed value chain is important for achieving Norway's climate goals, but also represent an economic opportunity for emerging and established businesses
- In Europe, the hydrogen market may reach revenue levels up towards 1 500 billion Nok in 2050 (Aurora)
 - Investment need of between 2 000 and 4 000 billion NOK (EU)



«This analysis focuses on the economic aspect of the Norwegian hydrogen development»

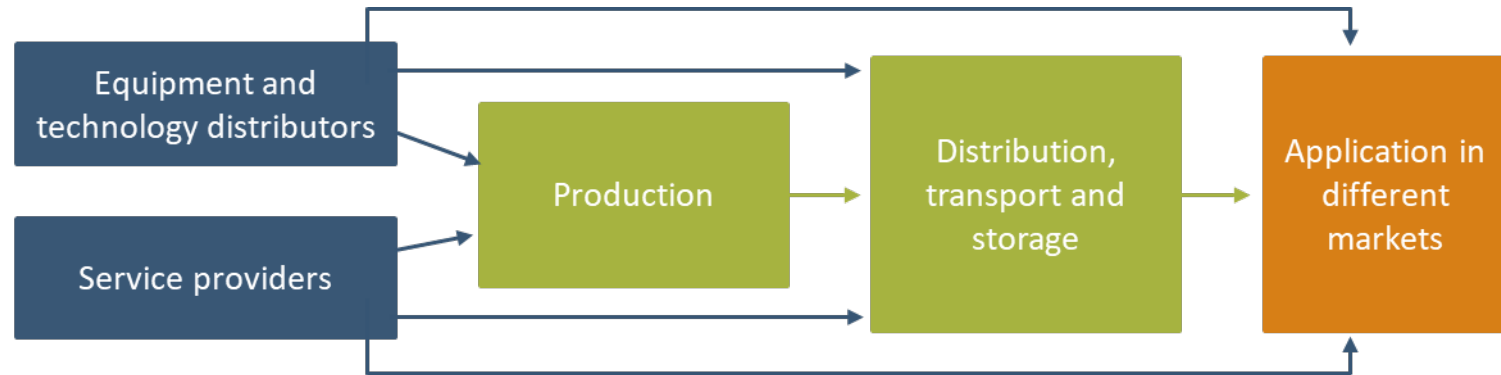
Three main topics

1. State of the Norwegian hydrogen industry and projects under development
2. Ambitions and expectations of the Norwegian hydrogen industry towards 2030
3. Norwegian market players' competitive advantages and barriers for growth, as well as criteria for success



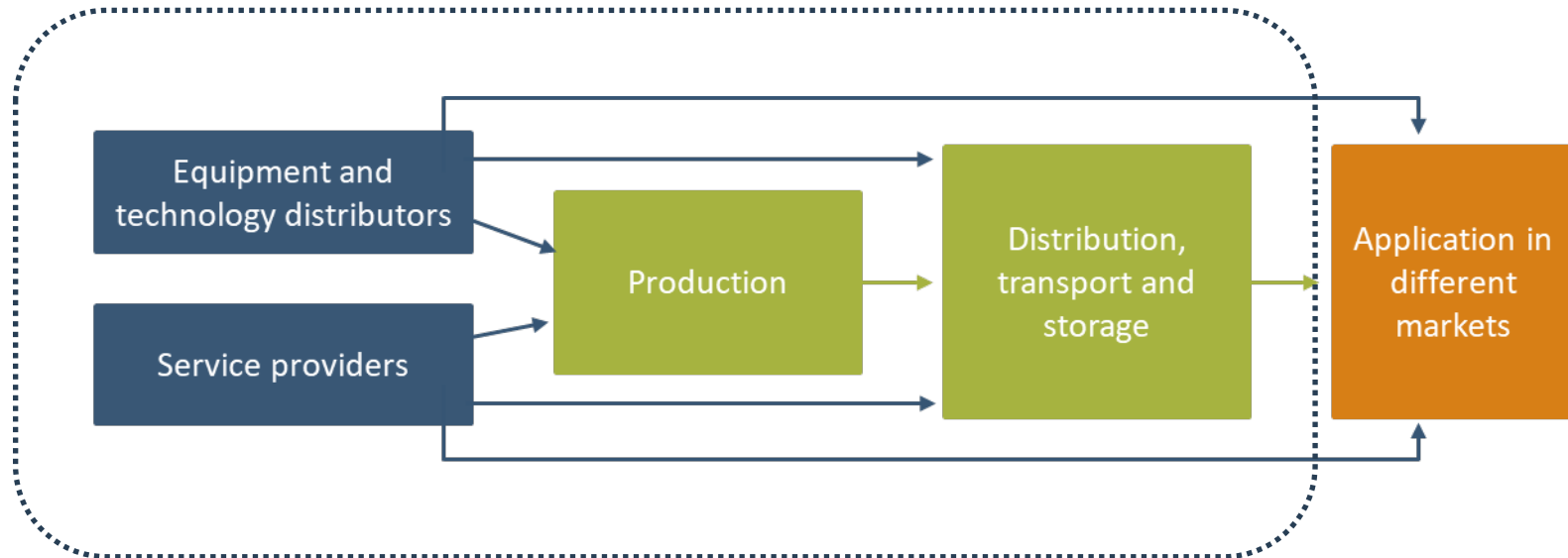
«The Norwegian hydrogen industry – from a value chain perspective»

- The analysis in this is based on the following value chain of the Norwegian hydrogen industry.



«The Norwegian hydrogen industry – from a value chain perspective»

- The analysis in this is based on the following value chain of the Norwegian hydrogen industry.



**State of the
Norwegian hydrogen industry:
High ambitions – and established individual
industry players**

The Norwegian hydrogen industry: Key figures - 2021



Revenue in 2021: **1,5 billion NOK**

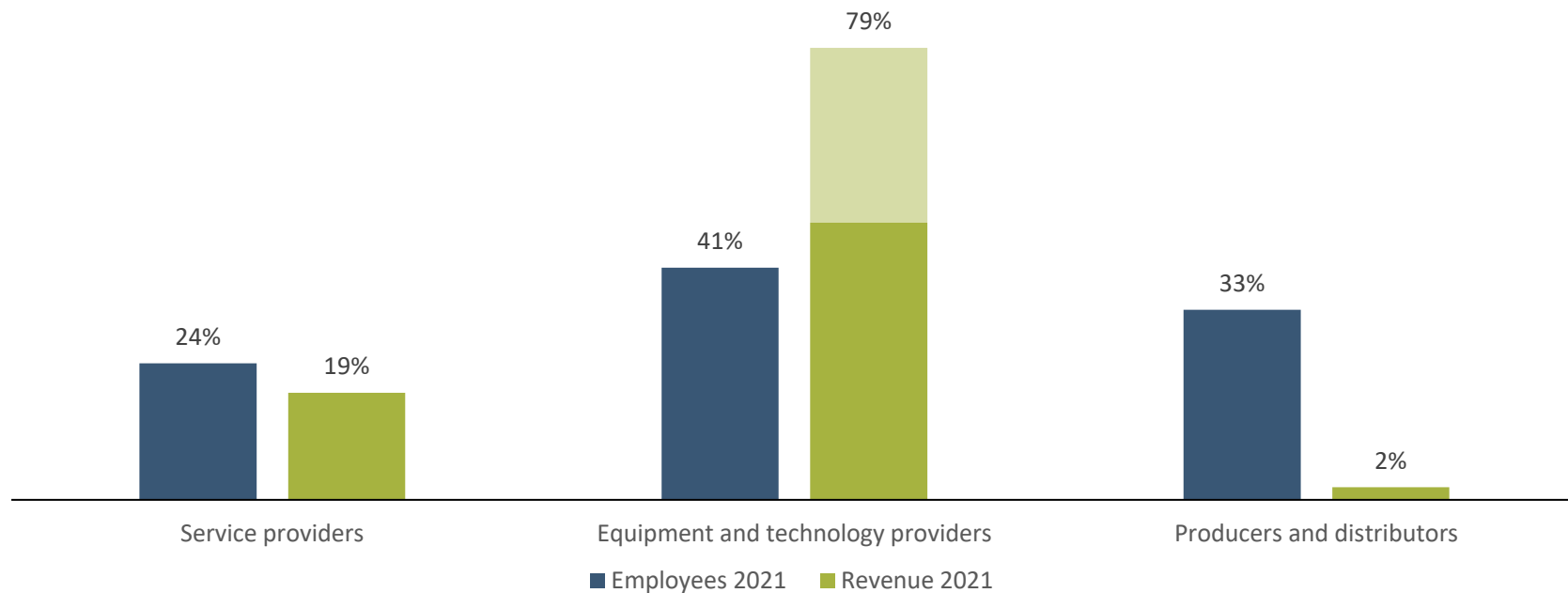


Employees in 2021: **815 employees (full time equivalents)**

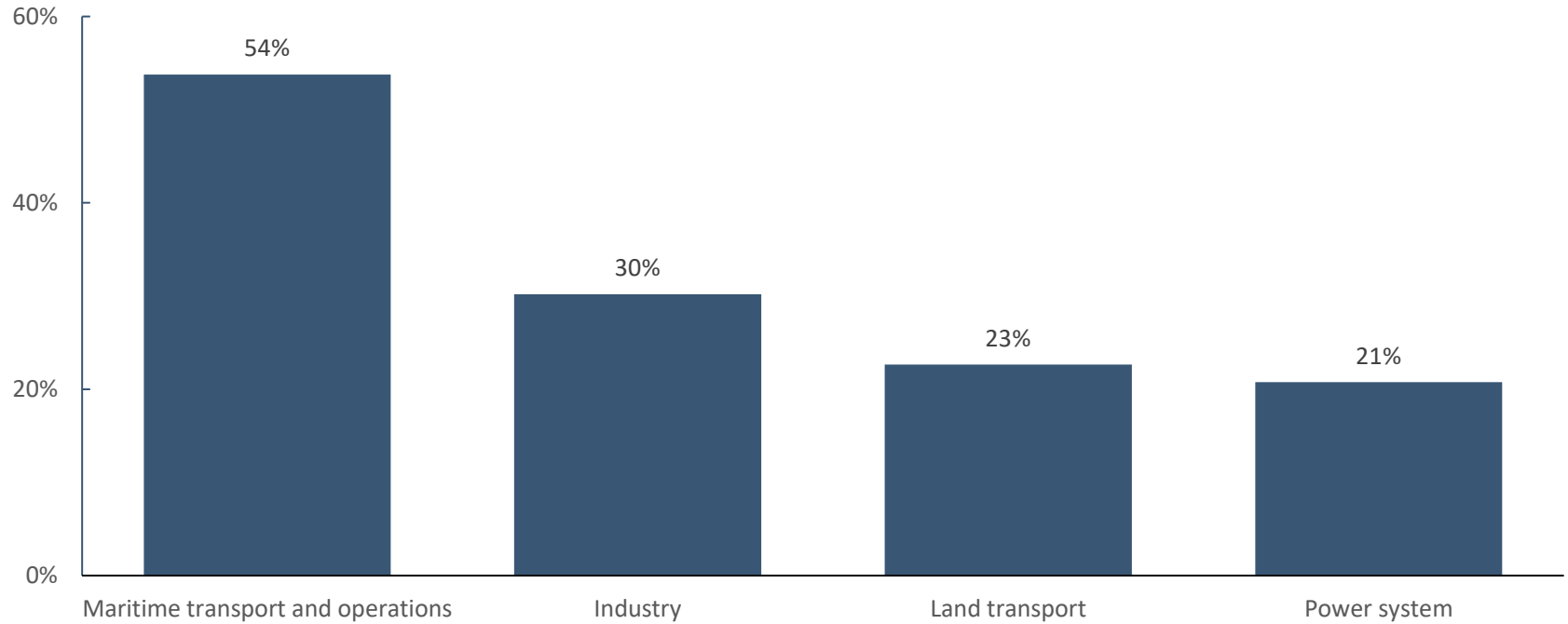


Export in 2021: **990 millioner NOK / 67%**

«Equipment and technology distributors dominates today, but the producers have high ambitions»

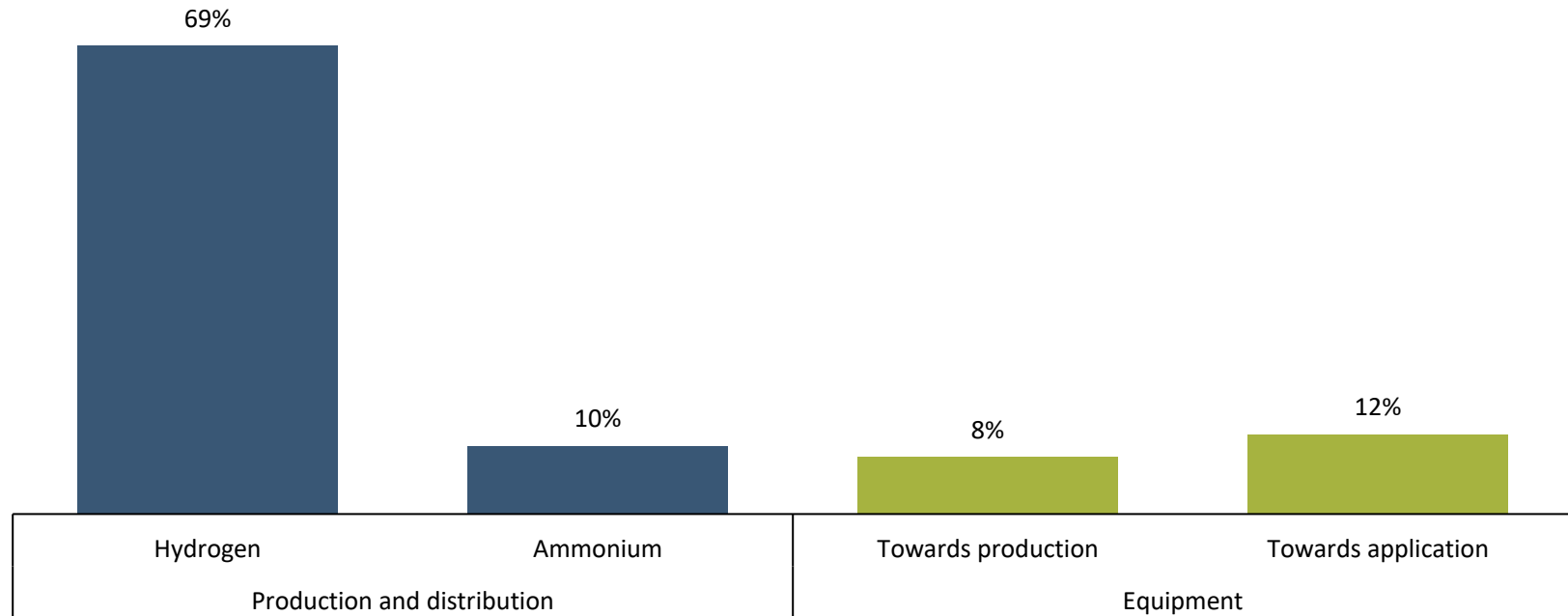


«Established domestic markets dominate on the customer side»

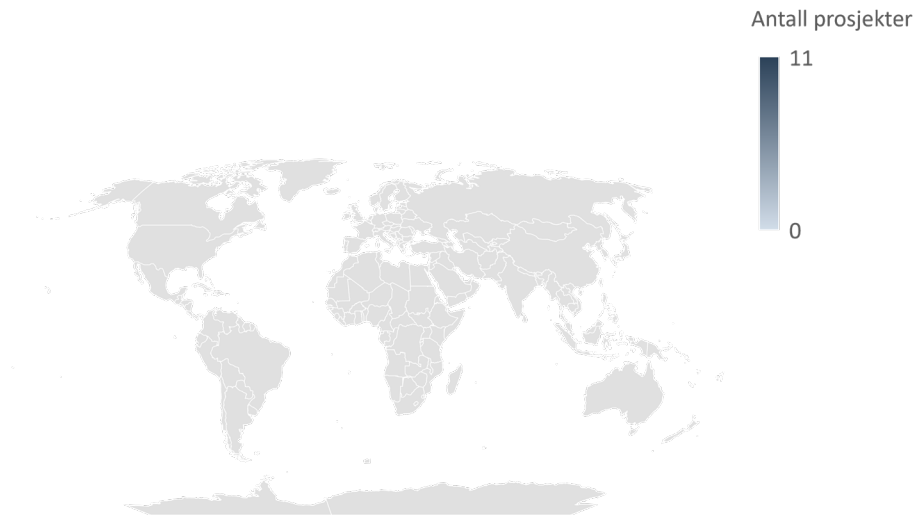


State of the Norwegian hydrogen industry: Hydrogen and ammonium projects in Norway

«Broad investment portfolio – small and large scale development»

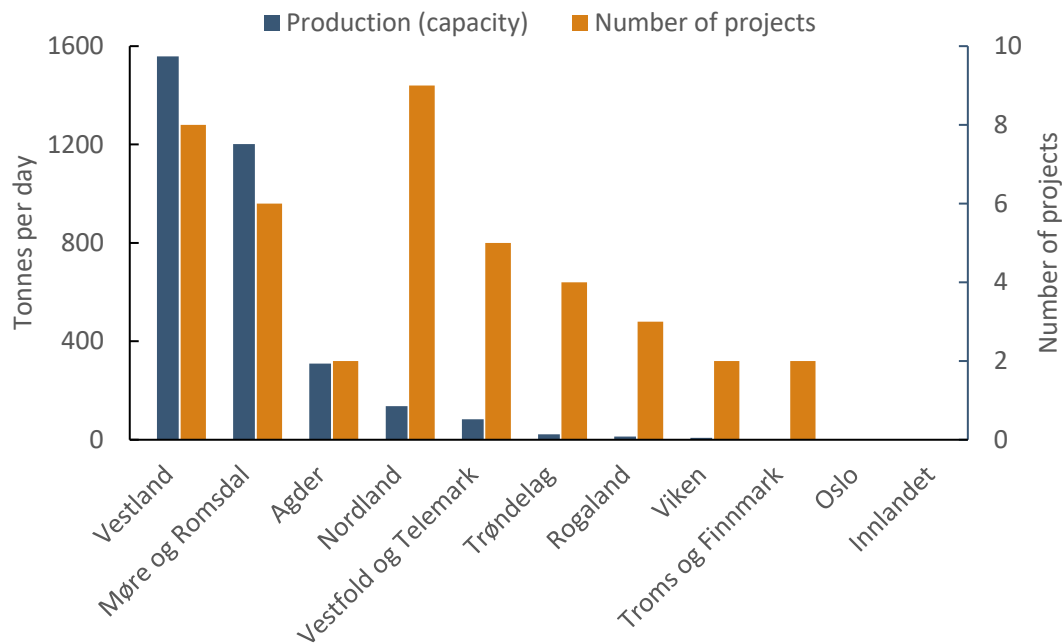


«Coastal areas dominate, strong links towards maritime application»



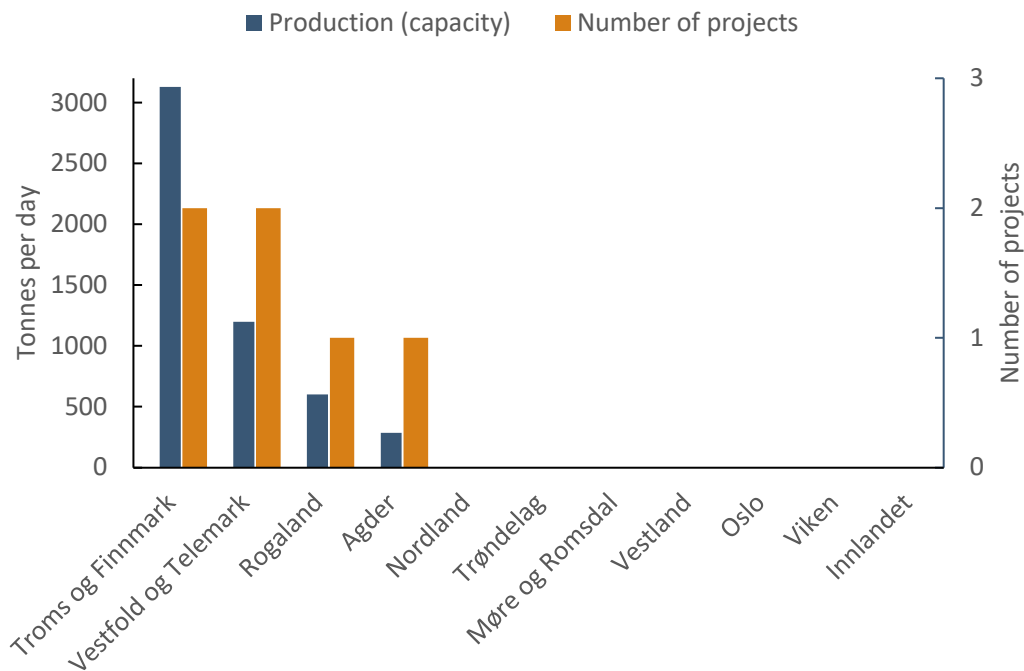
- A majority of the projects identified in this study is located in Western and Northern Norway (Vestlandet and Nordland), as well as in Vestfold and Telemark
- When we look at capacity, the picture changes

«The hydrogen portfolio – mix between large-scale and distributed production»



- Largest planned hydrogen production in Vestland and Møre og Romsdal (capacity), but most projects in Nordland.
- Largest single project is in Møre og Romsdal (Aukra Hydrogen Hub)
- In Nordland, there are many smaller hydrogen projects of around 8-13 tonnes, as well as several that have not stated a capacity yet.

«The ammonium portfolio reflects that economies of scale are important»



- In light of ammonia production capacity, Troms og Finnmark is largest – followed by Vestfold og Telemark.
- Individual projects are large:
 - Blue Barents
 - HEGRA
 - Iverson eFuels (Sauda)

Ambitions and expectations

A dominant industry in 2030?

«Today's hydrogen industry expects substantial growth towards 2030»



Industry players' *expectations* for revenue in 2030:

83 billion NOK



Value creation

20 billion NOK



Industry players' *expectations* to employment in 2030:

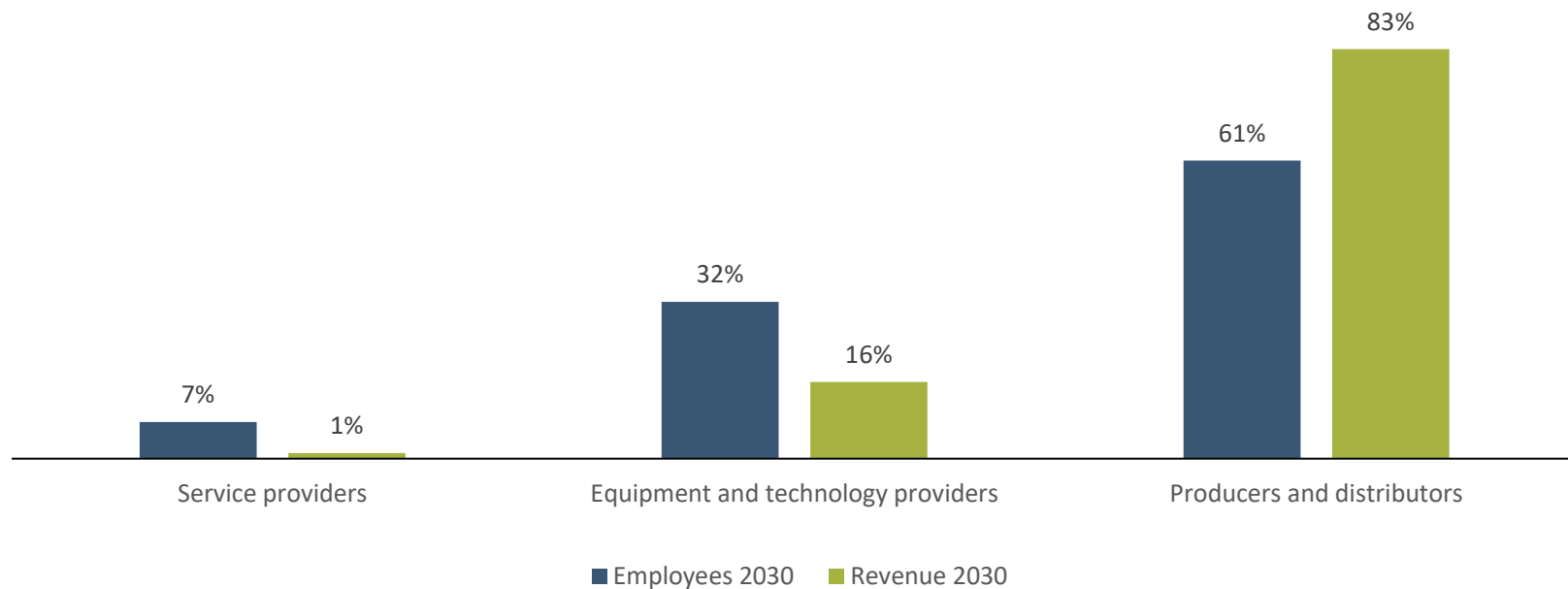
5 800 employees (FTE)



Industry players' *expectations* to export in 2030:

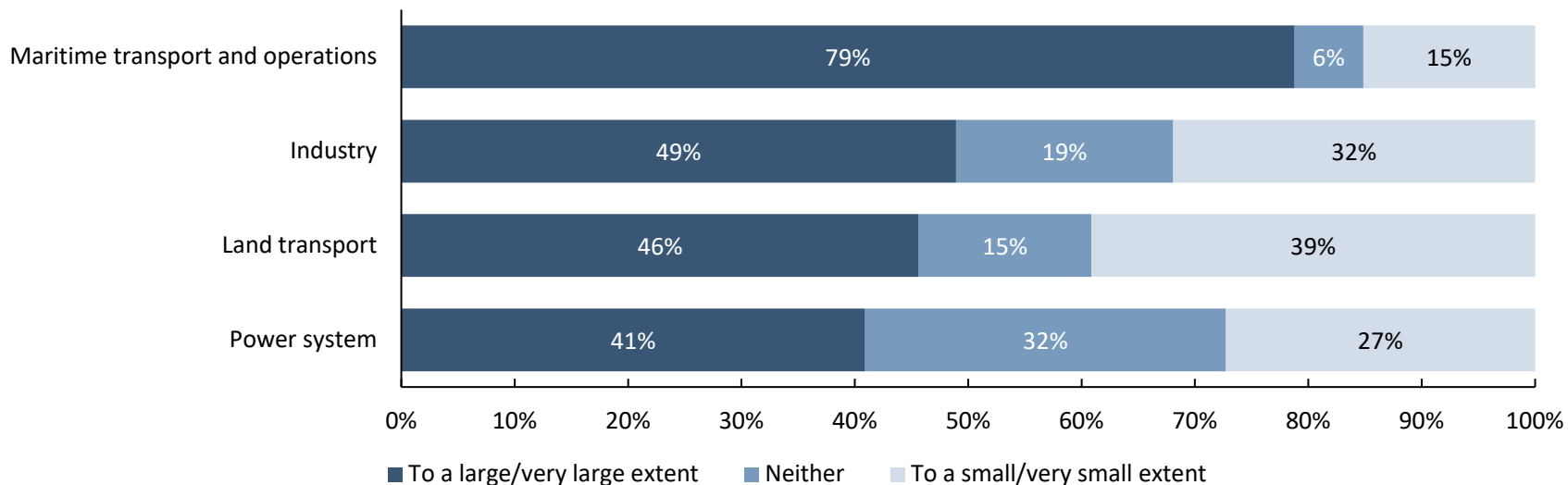
61 billion NOK / 73%

«Expectations for revenue growth are especially high within production and distribution, but also among equipment/technology distributors»



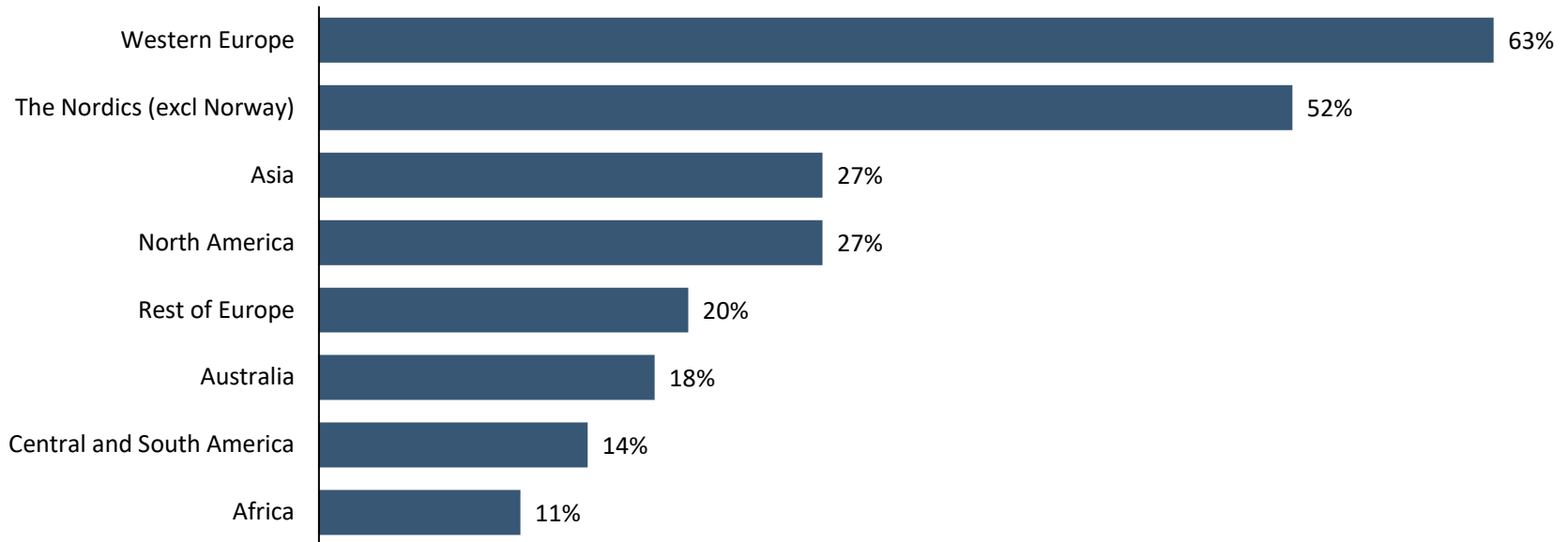
«Maritime transport and operations is expected to be the most important market segment »

Important end-user markets for companies' turnover growth until 2030



“Industry players expect to increase activities abroad”

Norwegian industry players’ expected geographical presence in 2030

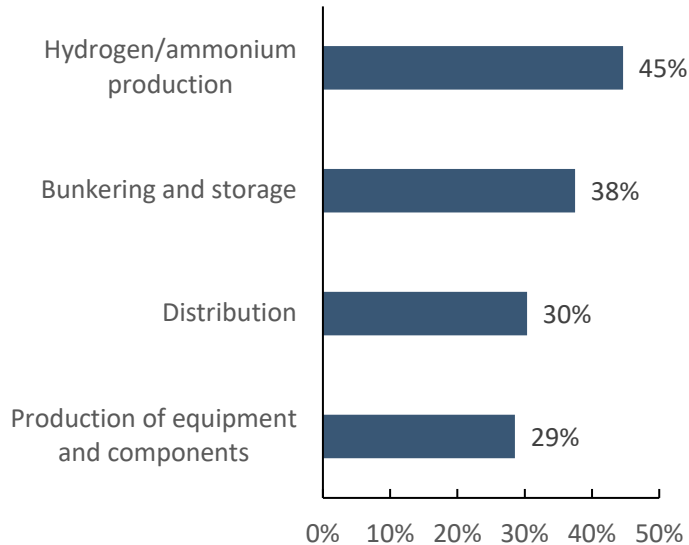


«The industry’s investment activities will affect the industry’s size in the years to come»



**98 billion NOK
investments towards 2030**

Where in the value chain?

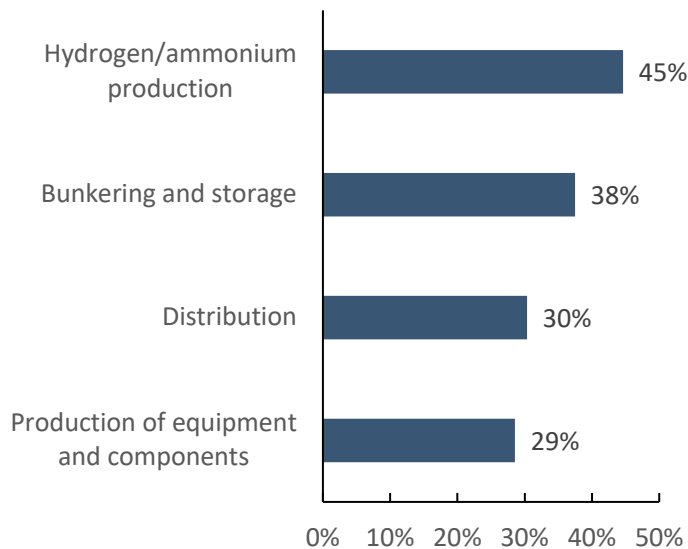


«The industry's investment activities will affect the industry's size in the years to come»

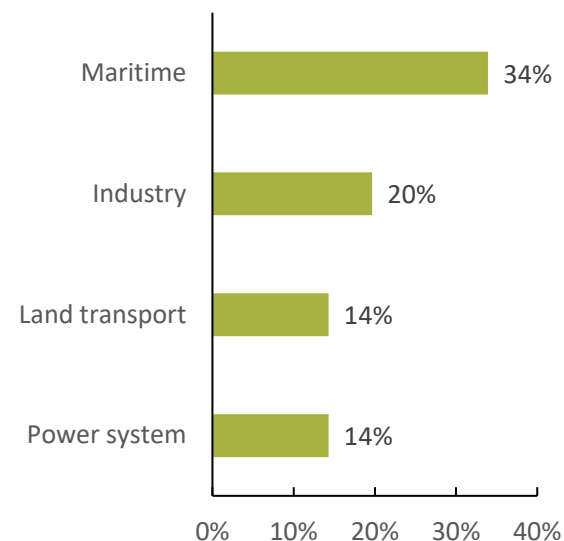


**98 billion NOK
investments towards 2030**

Where in the value chain?



In which market?



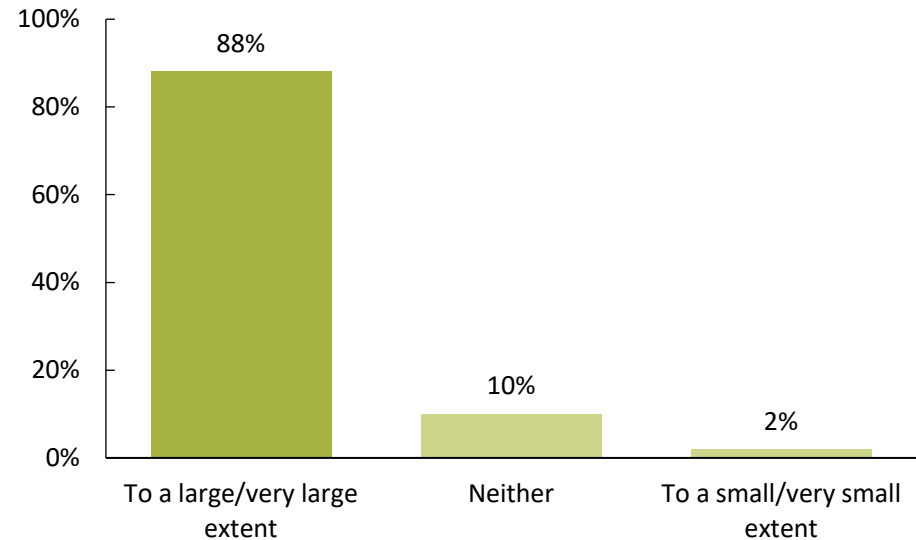


Competitive advantages, barriers and success criteria

«The Norwegian hydrogen industry has multiple competitive advantages, but certain barriers may hinder the potential»

- Access to renewable energy and natural gas is identified by the industry players as a strong competitive advantage

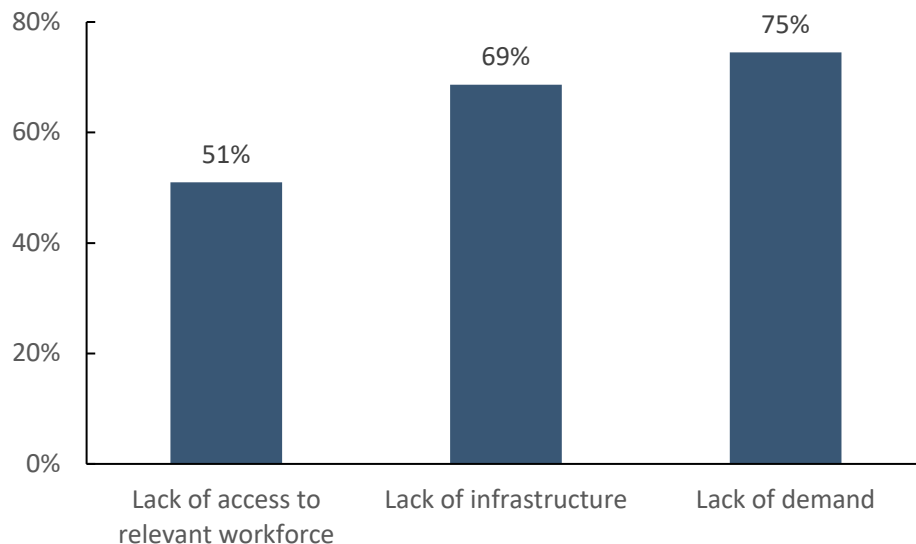
To what extent is access to resources a competitive advantage, compared to international competitors? N=50



«The Norwegian hydrogen industry has multiple competitive advantages, but certain barriers may hinder the potential»

- Access to renewable energy and natural gas is identified by the industry players as a strong competitive advantage
- But we find that there is...
 - Lack of access to (relevant) workforce
 - Lack of infrastructure
 - Lack of demand

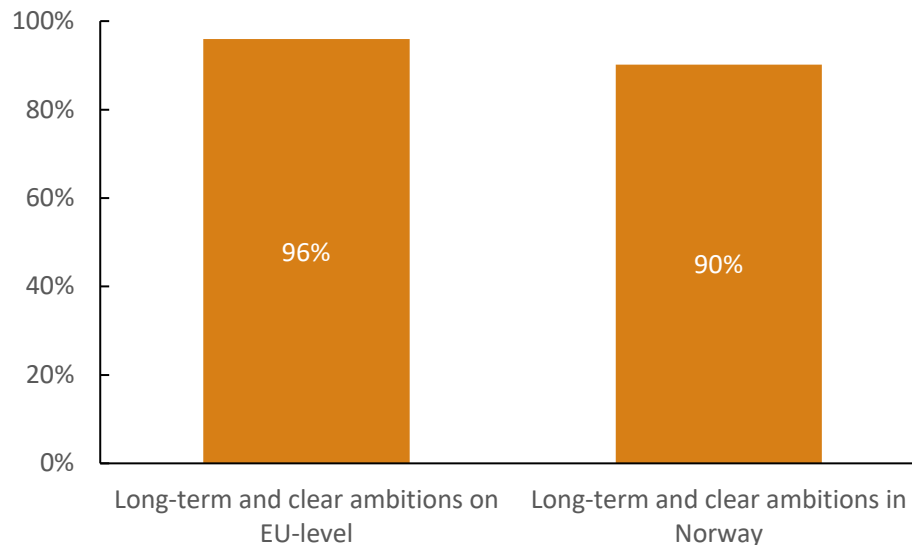
Share of respondents stating that the following will to a large/very large extent be a barrier to the company's further growth until 2030. N=51



“Clear ambitions and conditions set by authorities, as well as demand and willingness from the private sector will be needed”

- Industry players: Need for clear long-term ambitions from Norwegian and European authorities

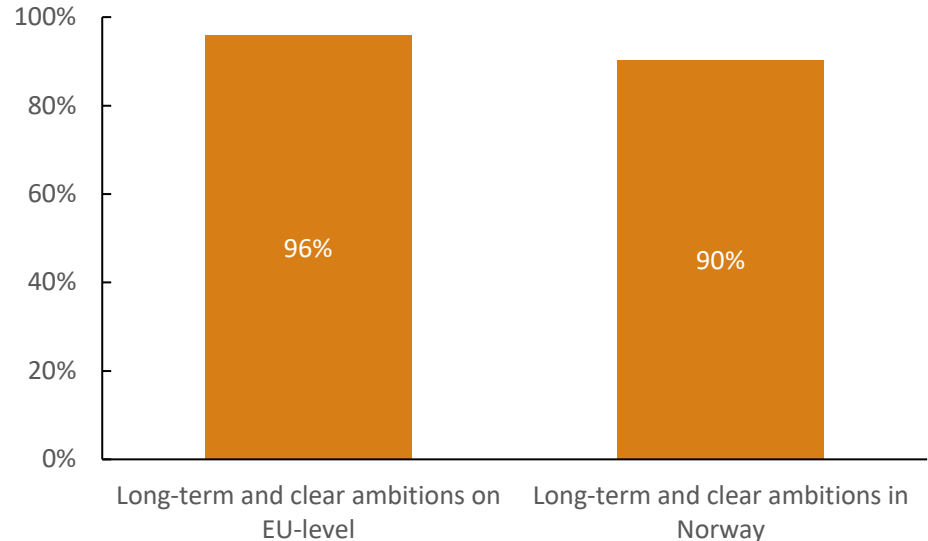
Share of respondents stating that the following will to a large/very large extent be an important success criteria for the Norwegian hydrogen industry until 2030. N=51



“Clear ambitions and conditions set by authorities, as well as demand and willingness from the private sector will be needed”

- Industry players: Need for clear long-term ambitions from Norwegian and European authorities
- Need for willingness for transformation and investment
- Cooperative approach is key – development of an ecosystem with a wide range of players

Share of respondents stating that the following will to a large/very large extent be an important success criteria for the Norwegian hydrogen industry until 2030. N=51





THANK YOU

Even Winje

Partner – Menon Economics