

MoZEEES – presentasjon av Statkrafts hydrogensatsing

8 November 2019

Ulf Eriksen, VP hydrogen

Europe's largest producer of renewable energy

PRODUCTION

62 TWh

OWN CAPACITY

19 300 MW

THIRD PARTY CAPACITY IN OPERATION

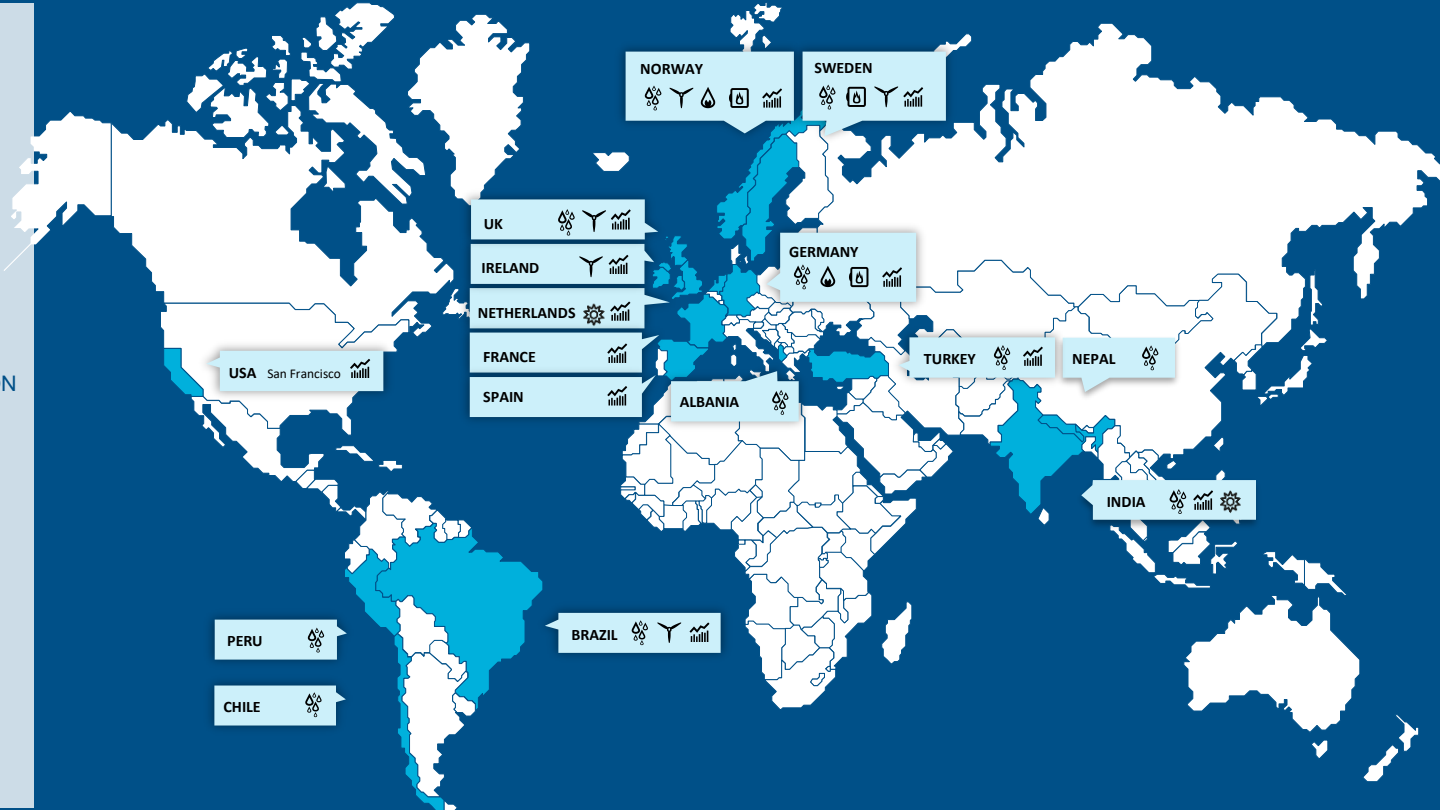
22 000 MW

EMPLOYEES

3 600

NET PROFIT

13.4 NOK billion



Powering a green future

**OPTIMISING HYDRO-
POWER PORTFOLIO**



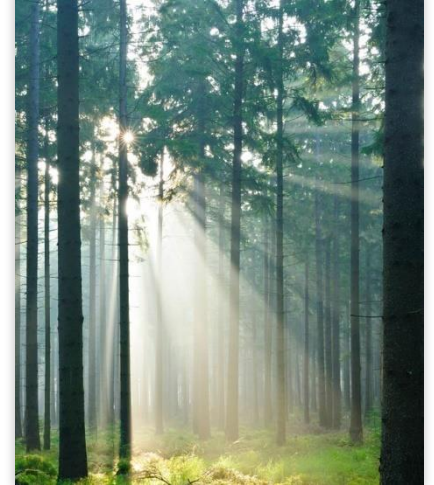
**RAMPING UP
WIND AND SOLAR
DEVELOPMENT**



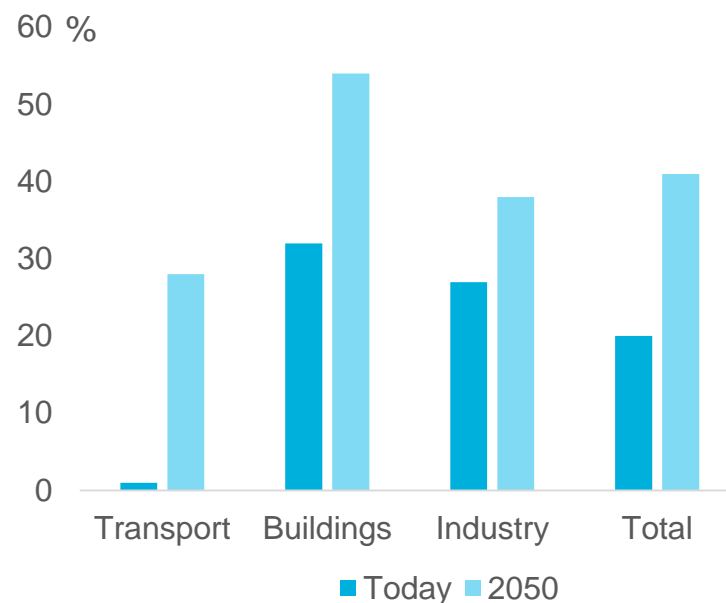
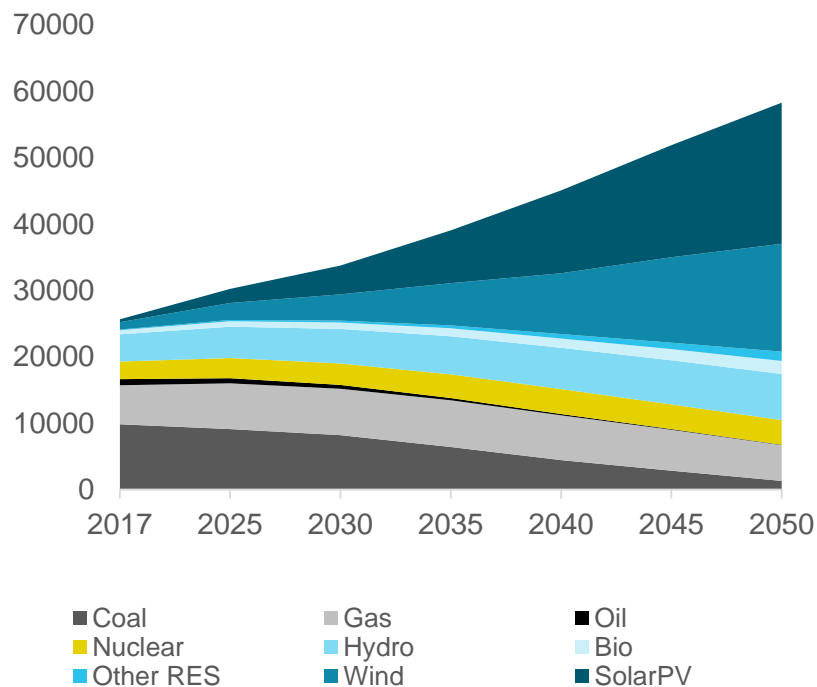
**GROWING THE
CUSTOMER BUSINESS**



**DEVELOPING
NEW BUSINESS**



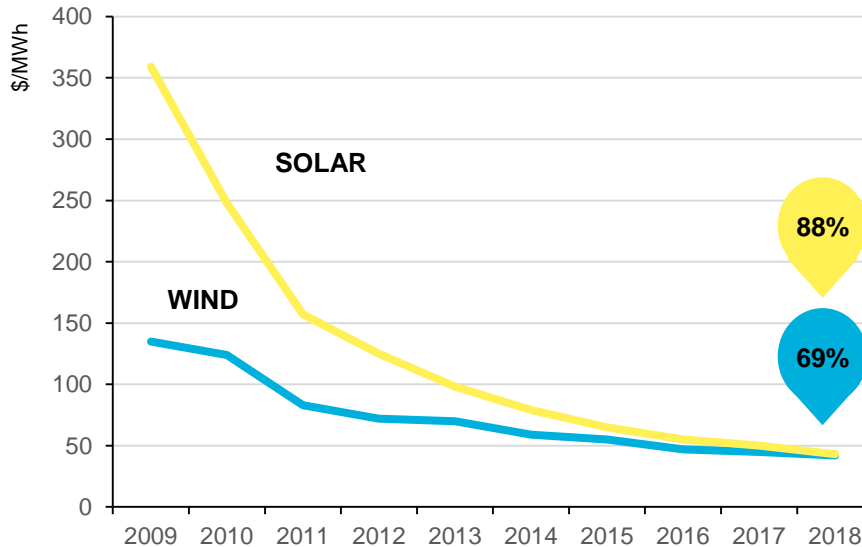
Lavutslippsscenariet: mer fornybar og økt elektrifisering



Fornybarkostnader faller - dermed også hydrogen

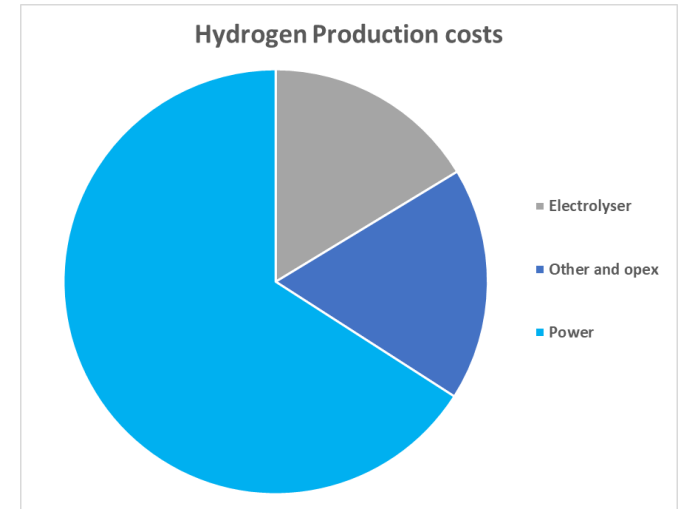
- Sol ned 88%, vind ned 69% på 10 år

Mean LCOE for wind and solar



Source: Lazard. Average of high and low LCOE for each technology.

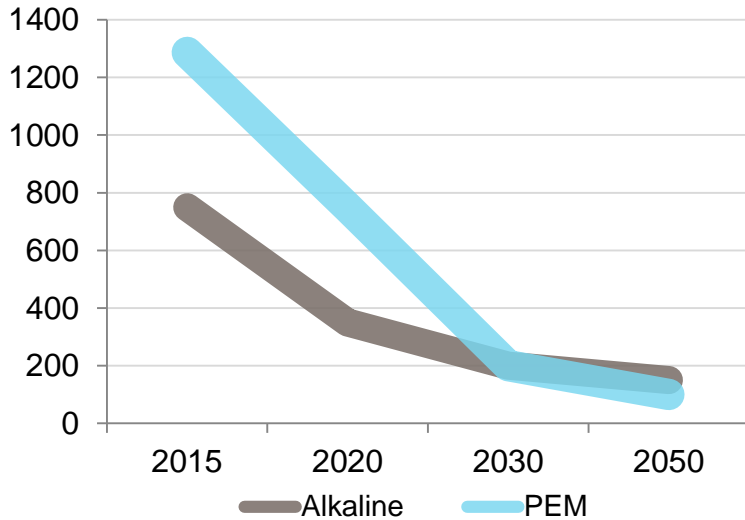
- Kraft utgjør ca 70% av produksjonskost for hydrogen



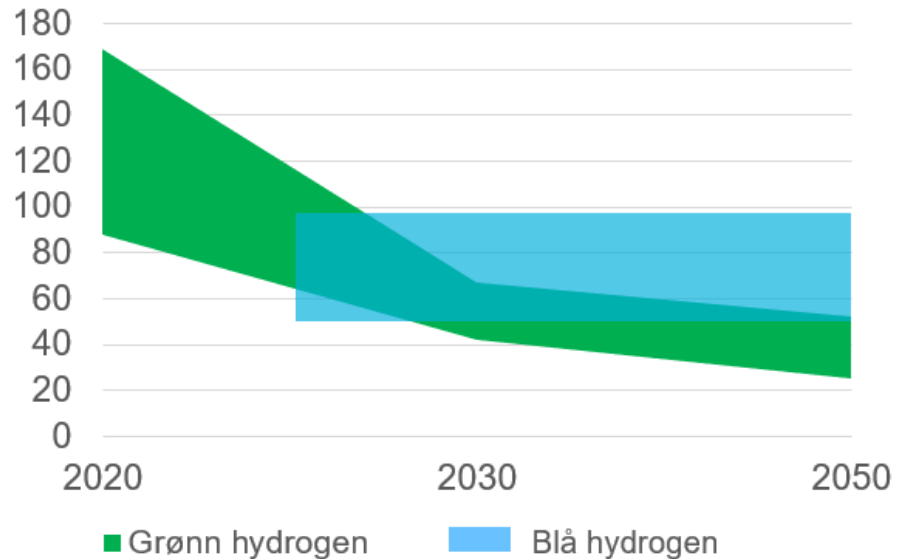
Sources: Statkraft analysis

Kostnad på elektrolysører faller, grønn konkurrerer med blå

Electrolyser capex costs (100 MW, EUR/kW)



Total costs for green and blue hydrogen (EUR/MWh)



Kilder: Bloomberg New Energy Finance, IHS, eksterne kilder, Statkraft analyse

6 Grønn hydrogen: Sol, landbasert og havvind i Europa

Blå hydrogen: Gas SMR med 90% CO2 fangst

Hydrogen til grønn industri og transport

Hydrogenløsninger kan **erstatte fossilt drivstoff** til ferjer, langveis marine transport, tungtransport og anleggsplasser



Med betydelig større **lagringskapasitet** enn batterier kan hydrogen spille en nøkkelrolle i framtidige energisystemer

Innenfor industri kan hydrogen erstatte karbon og produsere **e-drivstoff** og **grønne kjemikalier**

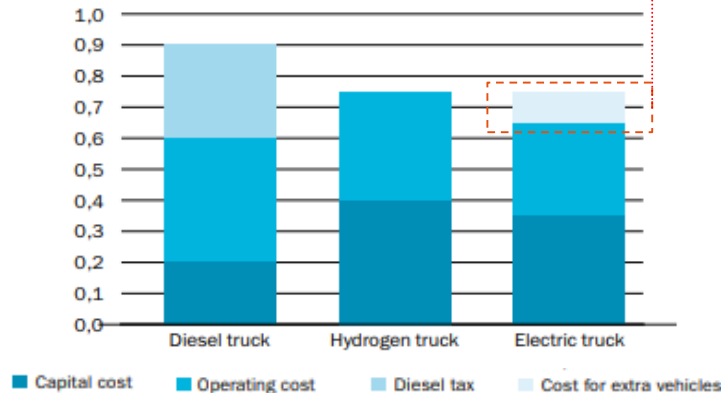


Heavy duty fuel cell trucks competitiveness

TCO for heavy duty trucks by 2030

- ▶ TCO for hydrogen trucks competitive with diesel by 2030 (however diesel not alternative to reduce emissions)
- ▶ Batteries alternative for short haul

Total costs of ownership for trucks
EUR/km



Accounts for additional vehicles needed, but only applicable for selected cases

Switzerland

Consortium with Hydros spider AG (Alpiq, H2 Energy and Linde) to establish a green hydrogen ecosystem in Switzerland

Hydros spider will deliver 2 MW electrolysis for mobility opening late 2019

Gösigen hydropower plant, site of 2 MW electrolyser



Hyundai will deliver first 50 trucks in 2020, 1,600 by 2025

- ▶ Trucks with 190 kW hydrogen fuel cell system, 400 km range

Statkraft strategy within eMobility

Corporate ambition

Develop international position within EV charging by 2025 as:

- ▶ A top-two player in Norway
- ▶ A leading position in selected countries

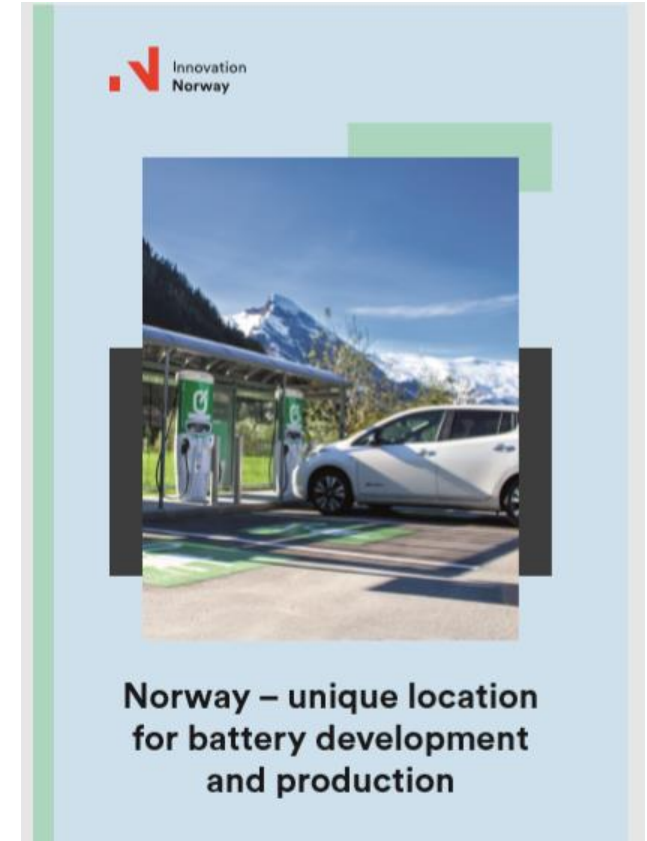


Portfolio approach

1. Support Grønn Kontakt's (47% owner) expansion in Norway and into Sweden
2. Support eeMobility's (67% owner) focus on employee car fleets in Germany
3. Support E-WALD's (100% owner) focus on fast-charging & EV sharing
4. Develop organic position in UK

Norway - unique location for battery production

- ▶ Statkraft contributed to this report
- ▶ Fossil free transport needs low emission battery production
- ▶ Norway has
 - Large amounts of green energy
 - Large and diversified metal competence
 - Large local market for batteries in marine and cars
 - Potential first large market for recirculation of lithium battery materials
 - Several good locations for battery plants



Oppsummering

- Elektrifisering gjennom brenselceller og batterier nødvendig for det grønne skiftet
- MoZEES et viktig program som bidrar til viktig utvikling for mobilitet – vil bli nødvendig for å lykkes



THANK YOU

Ulf Eriksen

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