

International workshop on Renewable  
Energy and Hydrogen Export – Global  
perspectives & Norwegian  
opportunities

Trondheim, 24 March 2015

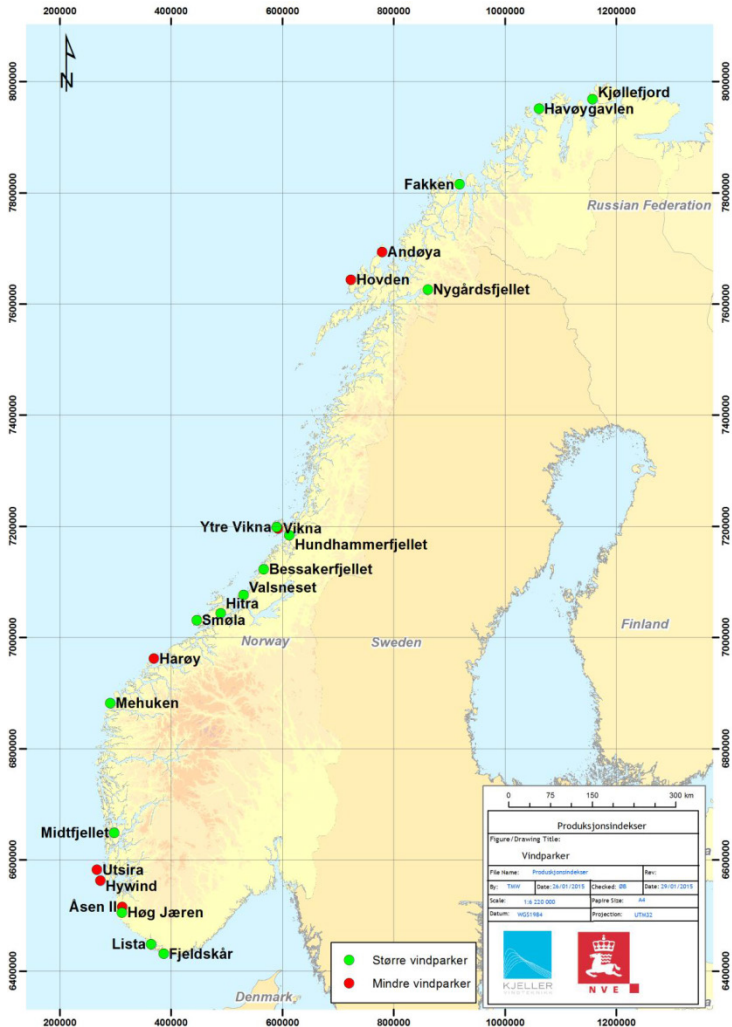
# Status and potential for wind power

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# Wind power in Norway

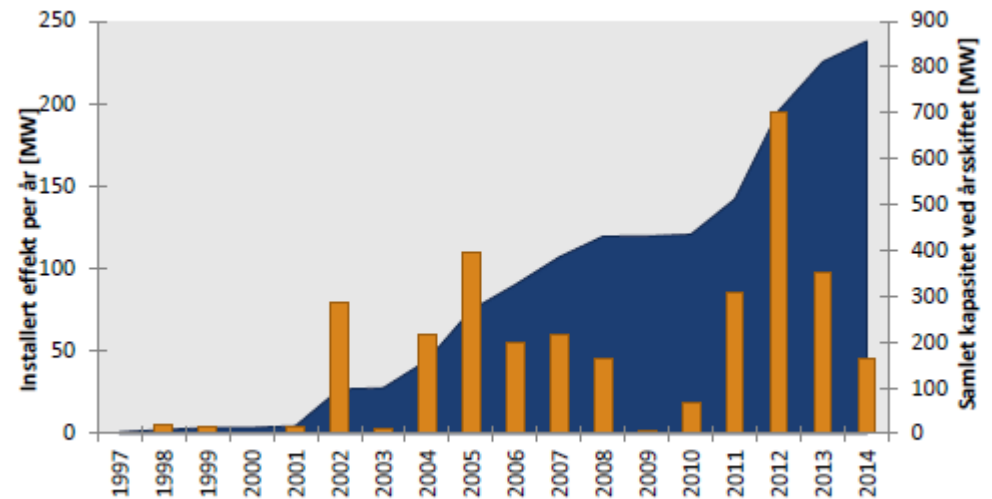


856 MW (31 Dec 2014)

371 turbines

2.2 TWh (2014) = 1.2% of electricity production

Capacity factor = 31 %



# Offshore wind

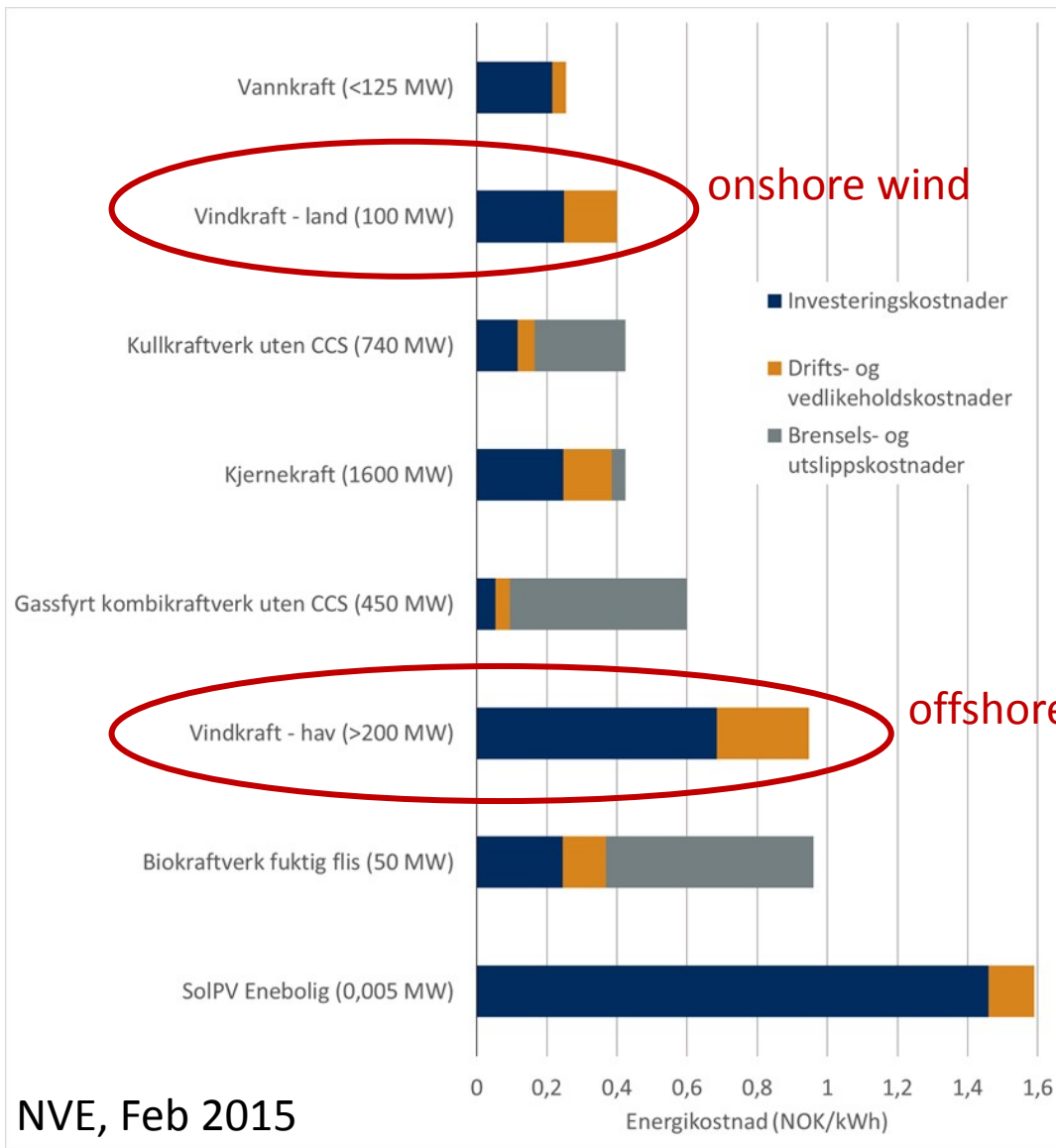
## Statoil and Statkraft – UK offshore wind farms



## Statoil floating turbine – Hywind

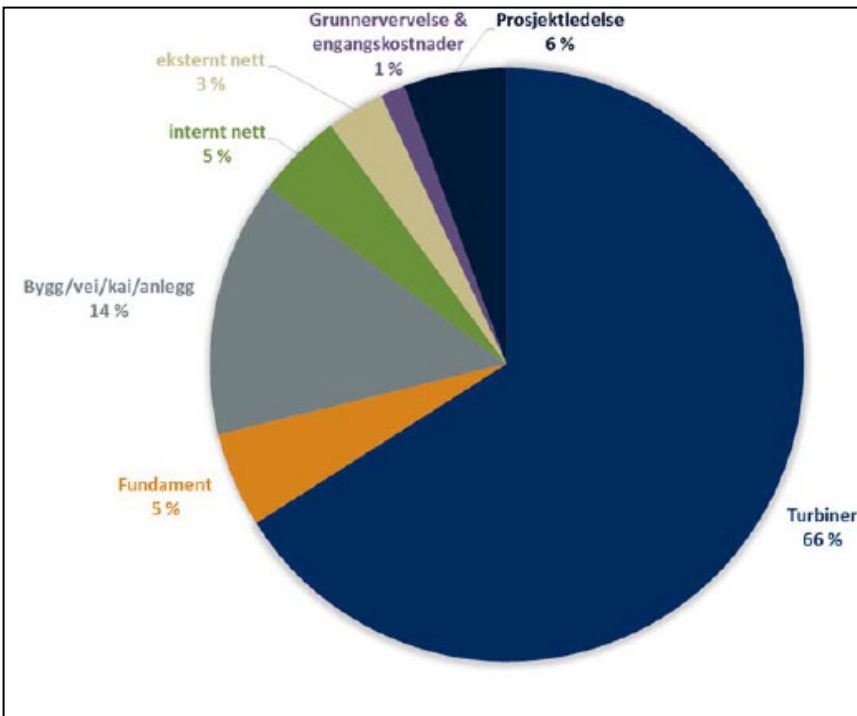


# Cost of Energy

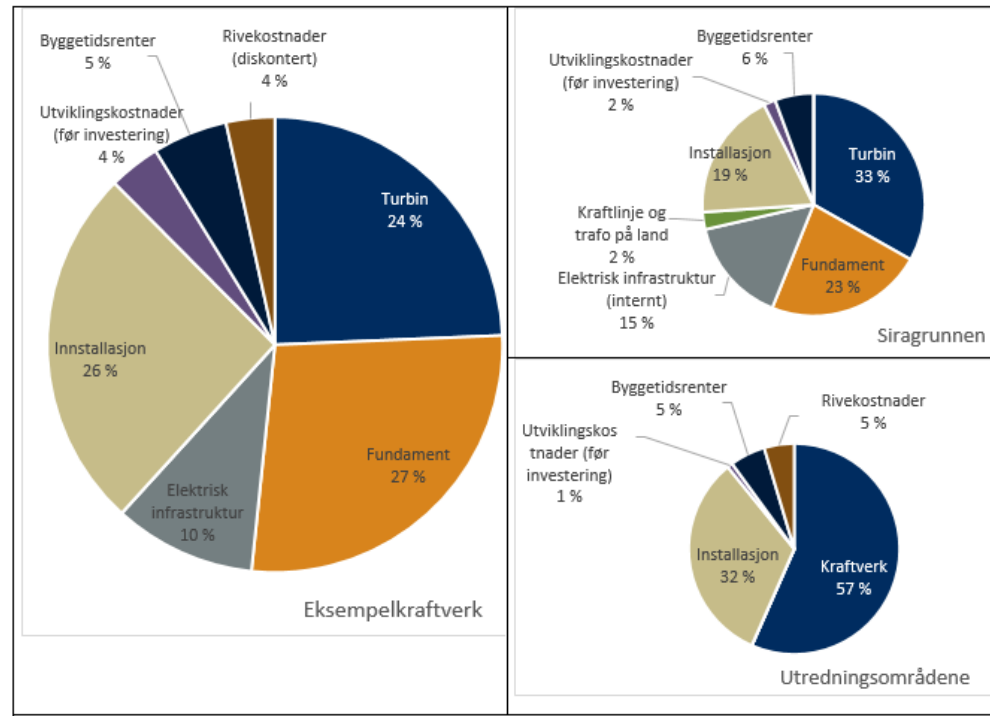


# Wind power – investment costs

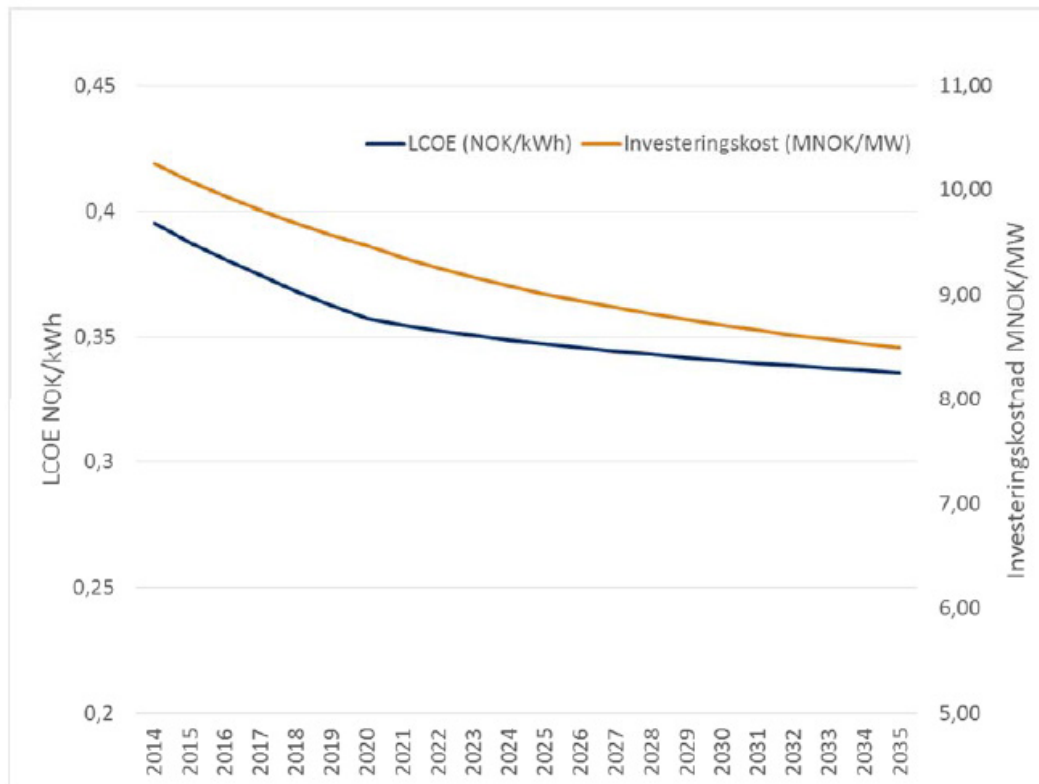
## Onshore wind



## Offshore wind



# Learning curve – onshore wind

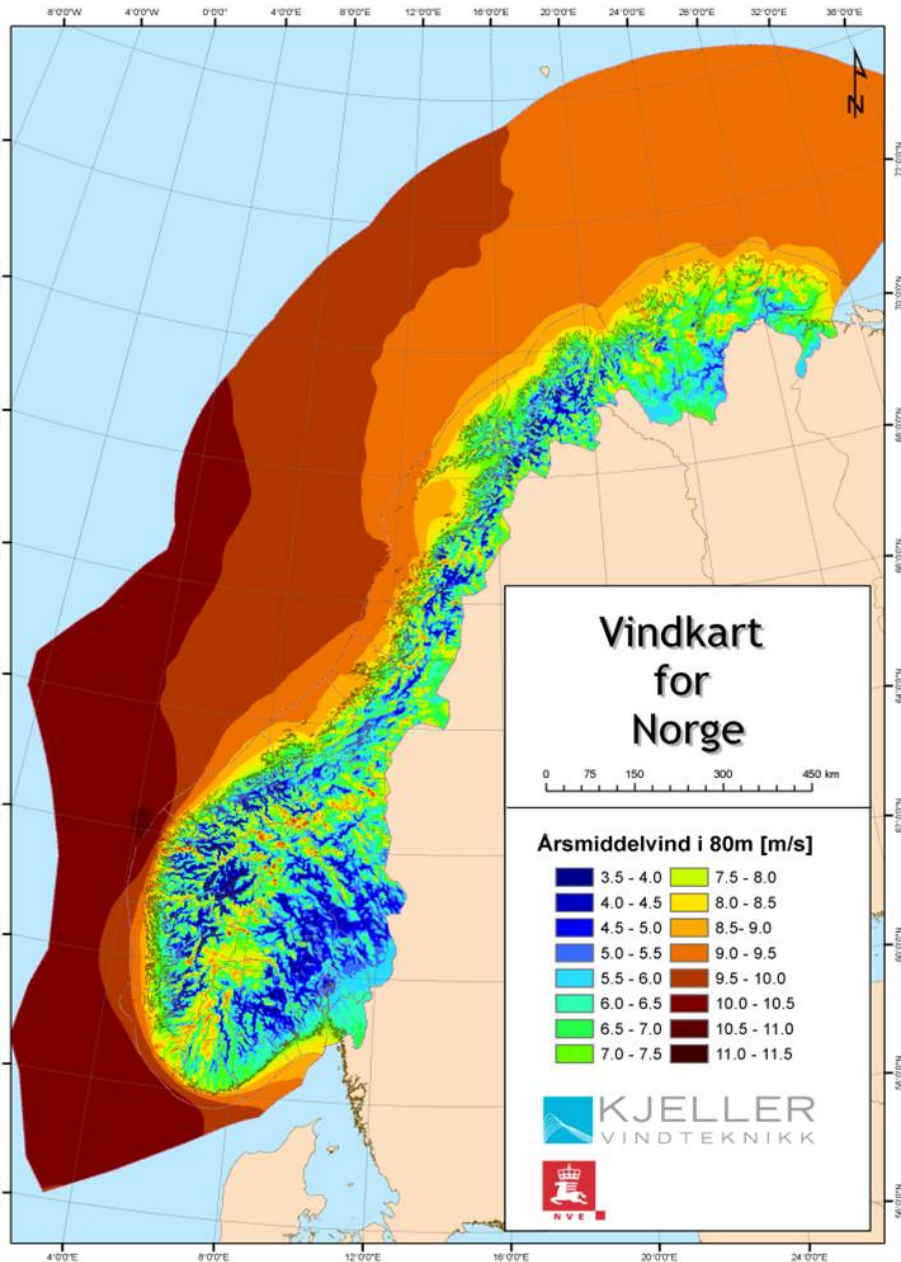


# Wind power industry

- No Norwegian wind turbine manufacturer
- Supply industry – technology development
- Small home market – North Sea region (UK, DK, DE, NL)
  
- Bigger potential for Norwegian industry to participate in offshore wind development
  - foundations, marine operations, vessels, ports, cables, floating turbines, ...
  - developers(Statoil, Statkraft)

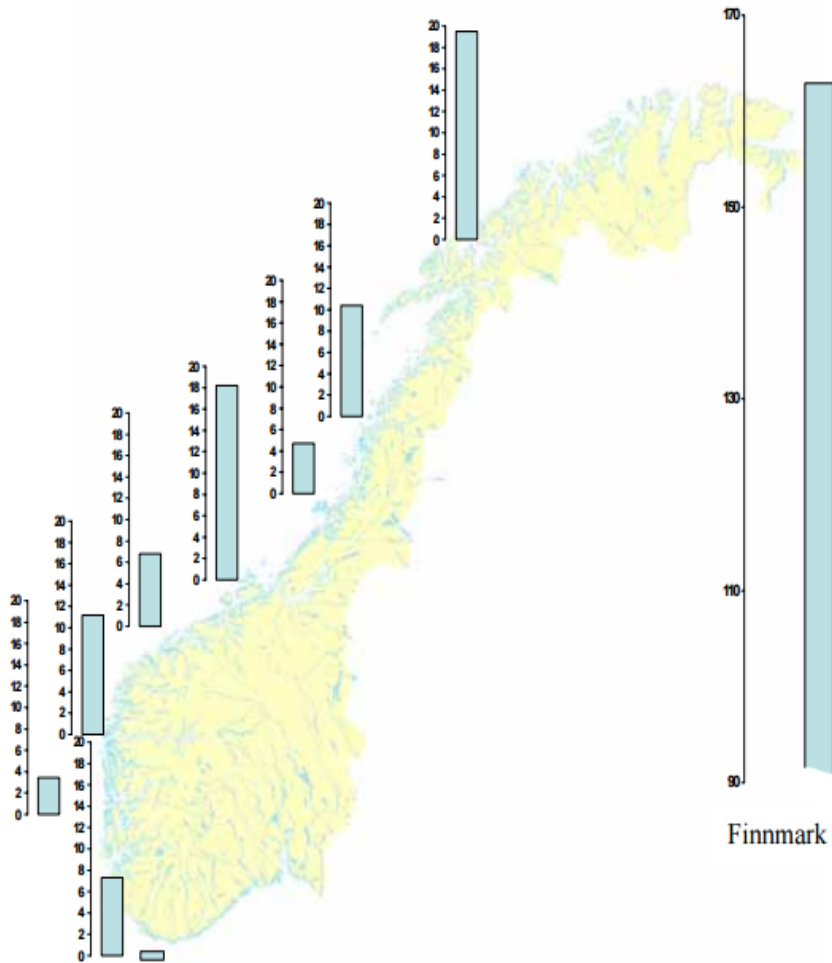
# Potential

Good wind power potential both onshore and offshore





# Potential



Finmark

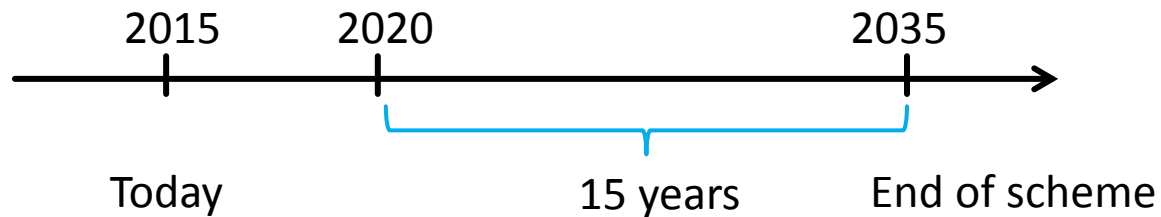
Economic potential (TWh)

NVE 17/2005

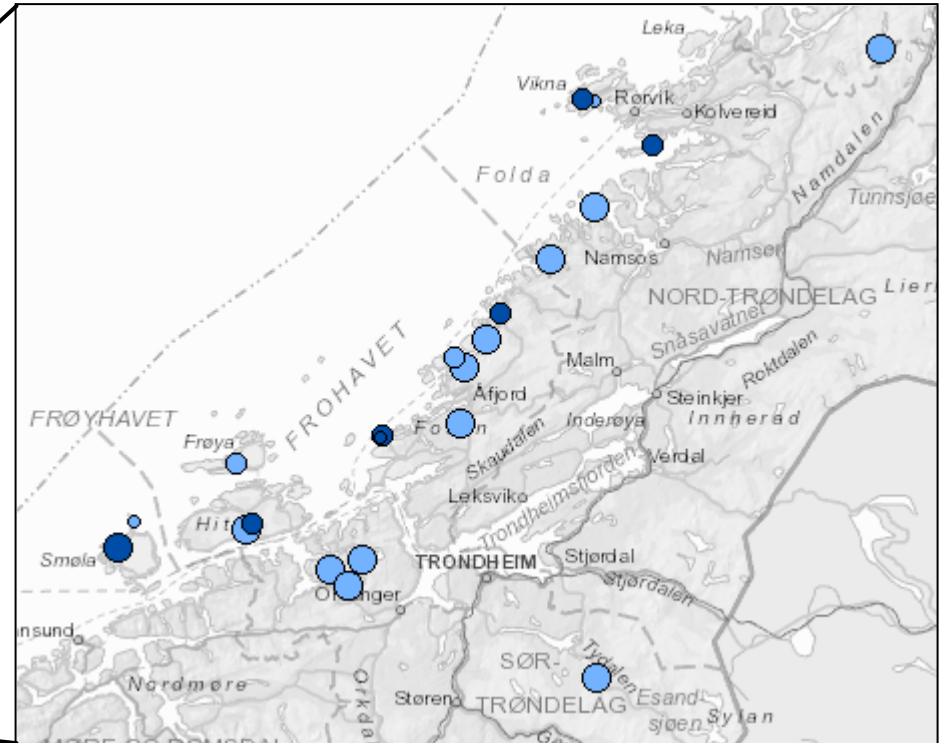
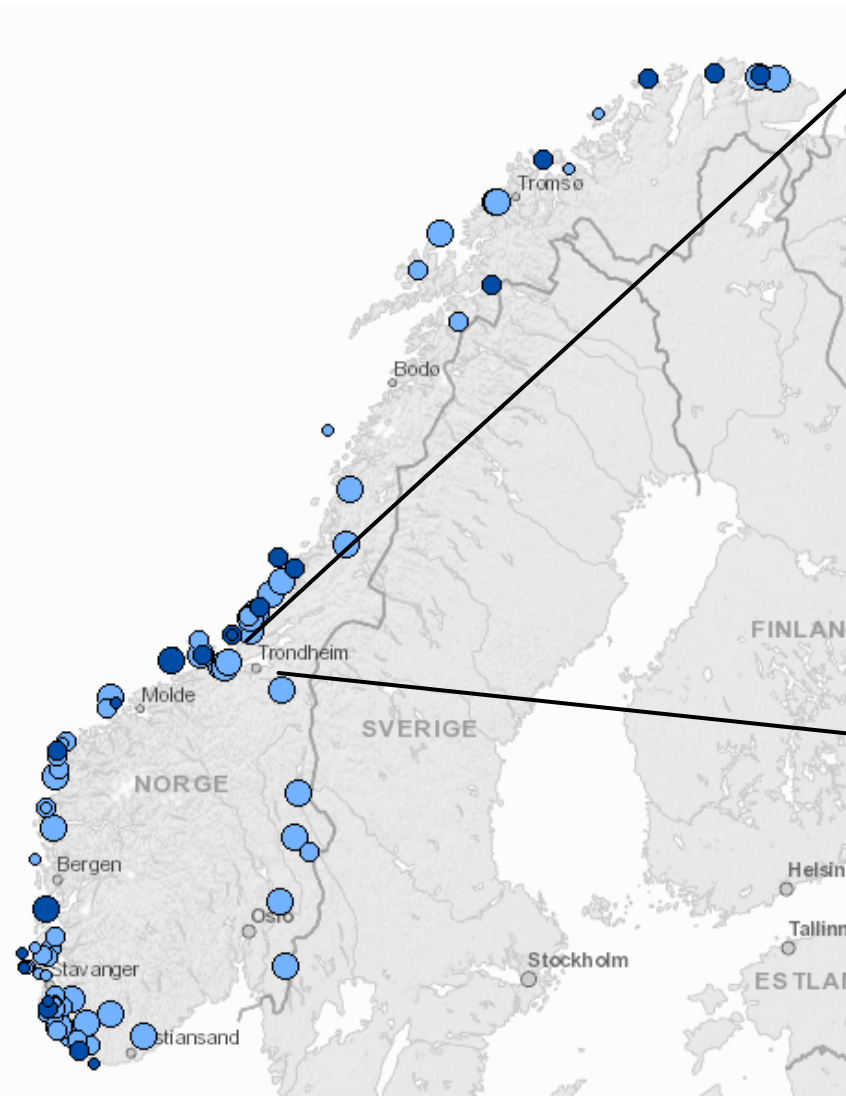
	MW	GWh
Middelvind > 7 m/s	81 600	245 500
Middelvind > 8 m/s	39 600	123 000

# Support scheme – green certificates

- 1 Jan 2012 – 2035
- Common with Sweden, technology neutral
- Ambition: 26.4 TWh in 2020 (new renewable energy in SE+NO)
- Certificates given to renewable energy producers for 15 years
  - Need to be operational by 2020 to benefit fully from this scheme.



# New licences granted



Sør-Trøndelag: 1772 MW  
Nord-Trøndelag: 797 MW

<http://www.nve.no/no/Konsesjoner/Konsesjonsaker/Vindkraft/>

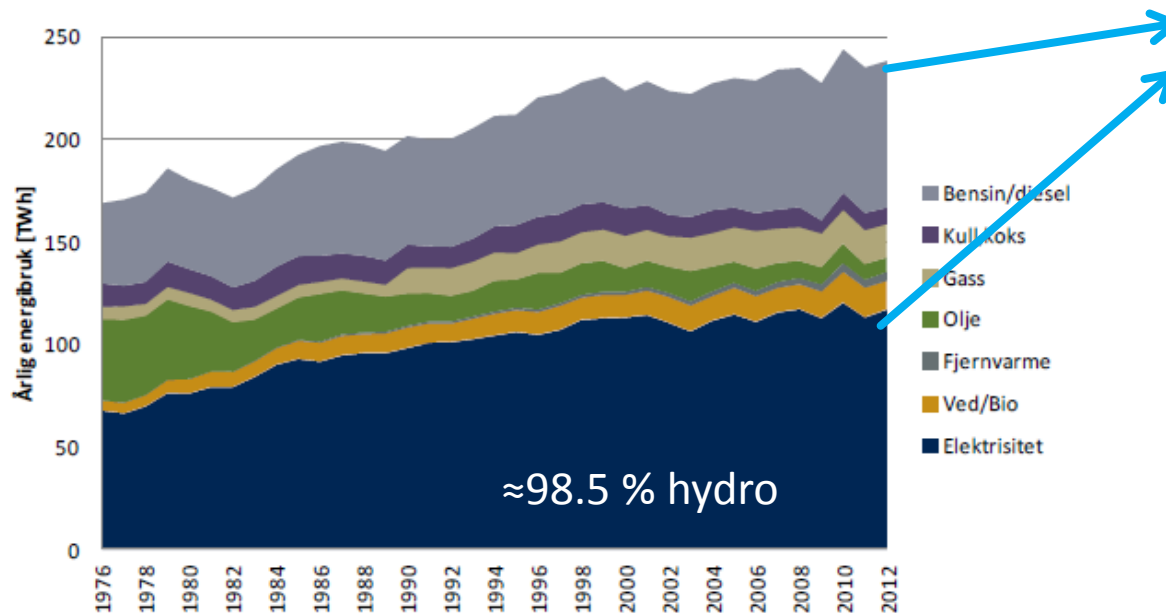
# Offshore wind



- Deep seas
- More expensive than onshore,
- More energy and
- Bigger part of the cake for Norwegian industry
- Less environmental concerns

# What to do with the wind power?

- Increase electricity demand
  - Electrification of offshore oil/gas platforms (20 TWh) and transport (10 TWh)
  - More power hungry industry (e.g. aluminium)
- Power export to Europe?
- Hydrogen production?



# Research and development

- Two research centres funded from 2008-2016 (combined budgets = 70 Mill NOK/year)
- Focus on offshore wind and deep sea
  - lowering cost of energy

[www.nowitech.no](http://www.nowitech.no)

[www.norcowe.no](http://www.norcowe.no)



Thank you for the attention