



Offshore wind in the North Sea

An outlook

Or: Where are we heading?

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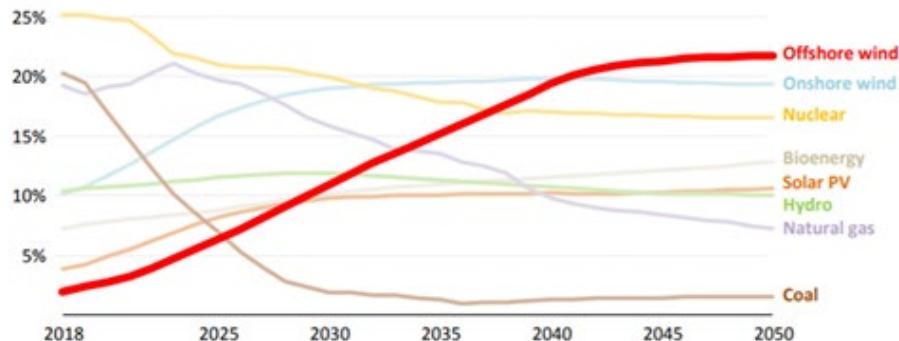
“The Times They Are A-Changin”



- EU's Green Deal
- Europe 2050: 400 GW +
- Norway 2040: 30 GW
- Energy Security
- Price of energy
- EU, 20 October:

... **fast-tracking of the simplification of permitting procedures** to accelerate the rollout of renewables and related grids

Shares of electricity generation by technology in the European Union, Sustainable Development Scenario

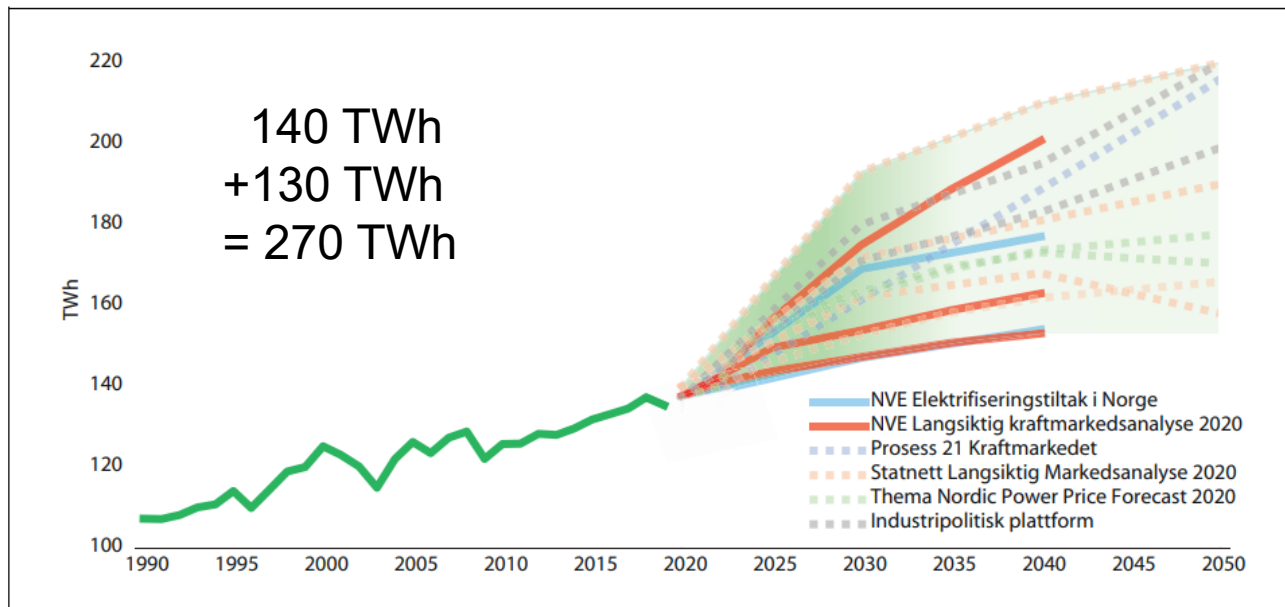


Source: IEA 2019

Need for speed and volume!



How to use 30 GW?

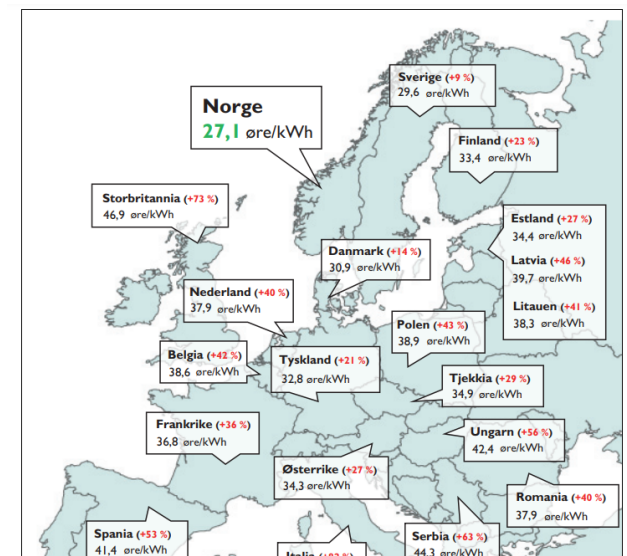


Figur 3.11 Historisk temperaturkorrigert forbruk og anslag for norsk kraftforbruk mot 2040, fra utvalgte rapporter og innspill. Anslag med lik farge er ulike scenarier fra samme analysemiljø.

Kilde: NVE (2021), NVE (2020), Prosess21 (2020), Statnett (2020), Thema (2020), Industripolitisk plattform (2020).

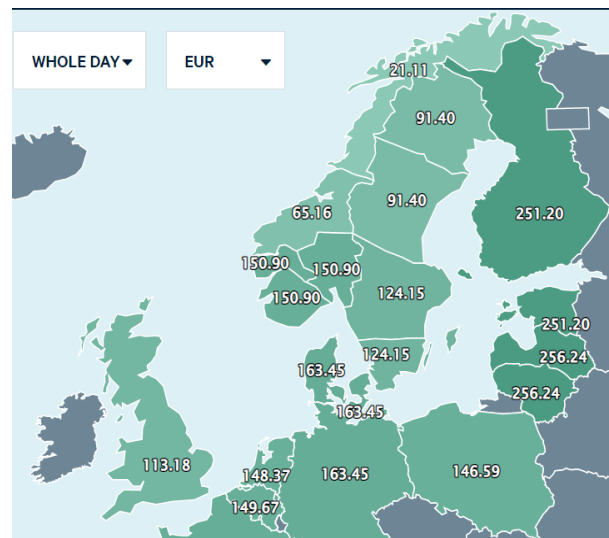


Power price in Europe – What is the new normal?



Average power price (NOK/kWh) 2011 – 2020.

Source: St.meld. 36, 2021. “Energi til Arbeid”



Day- ahead power price (EUR/MWh)

21.10.2022

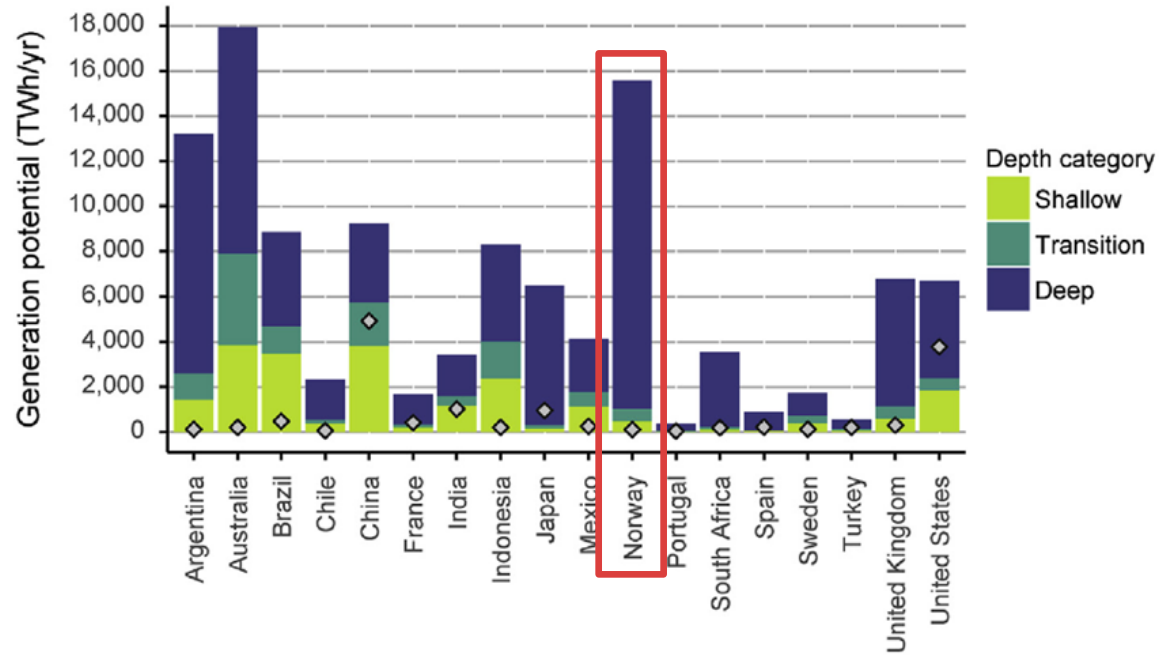
Source: NorPool.



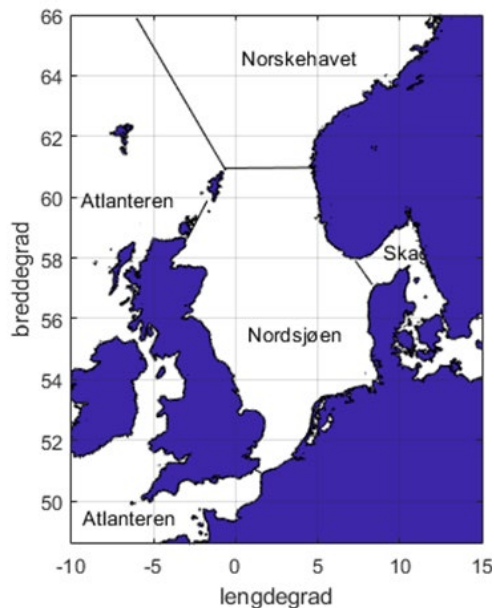
Norway: World leading wind resources



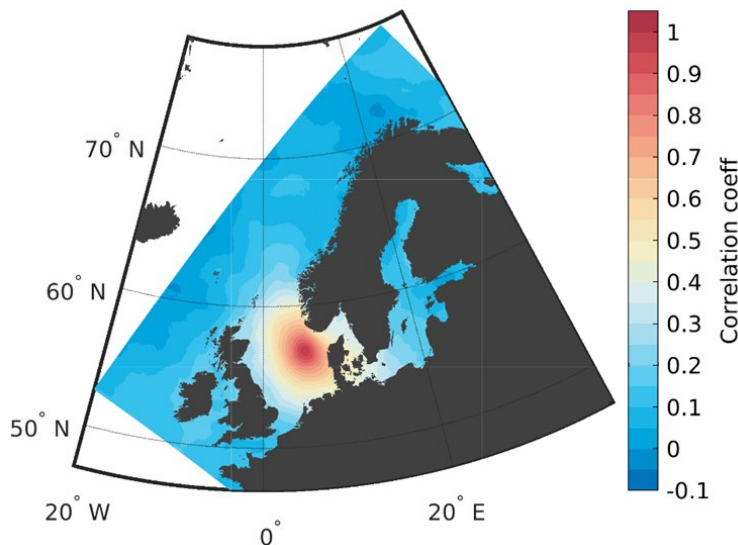
J. Bosch et al. / Energy 163 (2018) 766–781



Norwegian Offshore wind - Beyond the North Sea



Source: SNL, Knut Barthel



Courtesy Ida M. Solbrekke, UiB



An intermittent energy resource -

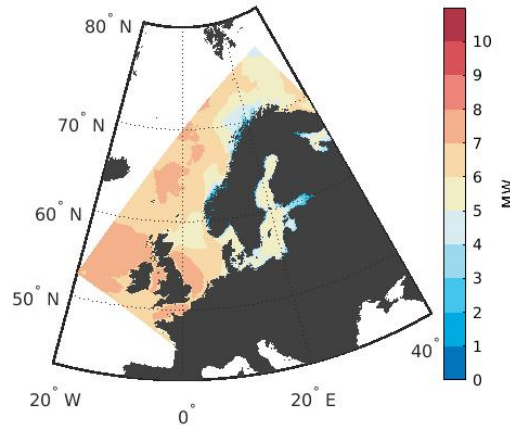


But:

- Offshore wind more persistent than onshore
- Seasonal variations fits the consumption
- May utilize low correlated areas
- Combine with hydropower

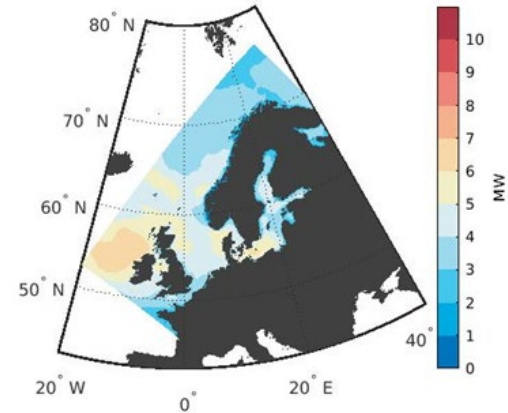
January 2004

Average
power



June 2004

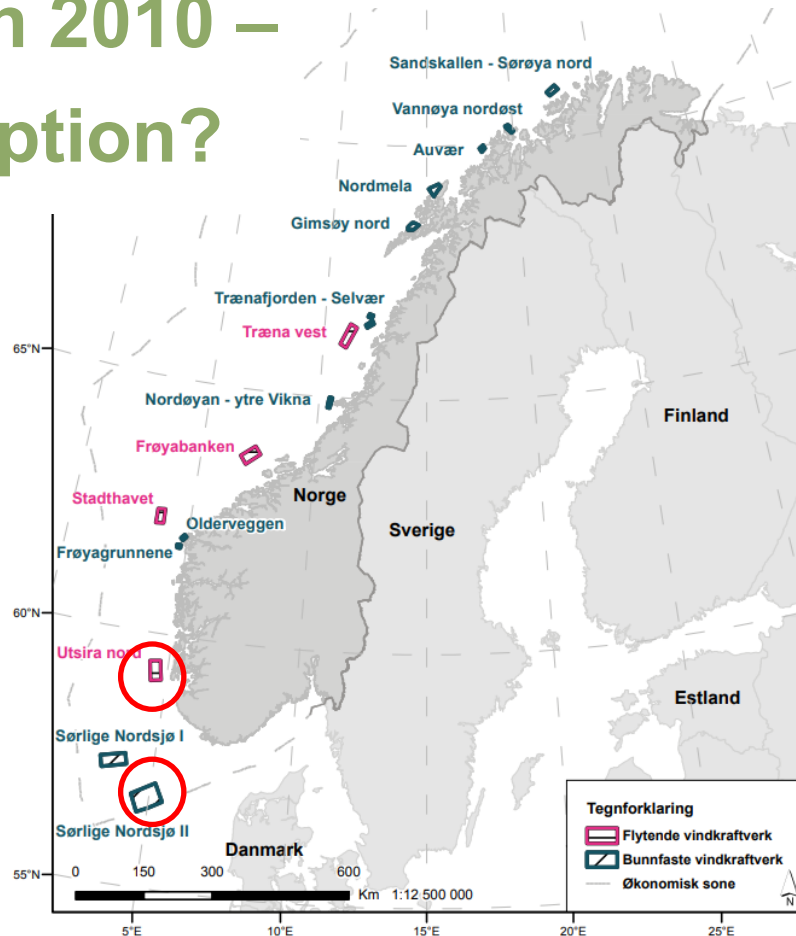
Average
power



Courtesy Ida M. Solbrekke, UiB



Areas considered in 2010 – Deep water a real option?



Source: NVE 2010, Havvind,
Forslag til utredningsområder.



Floating wind turbines

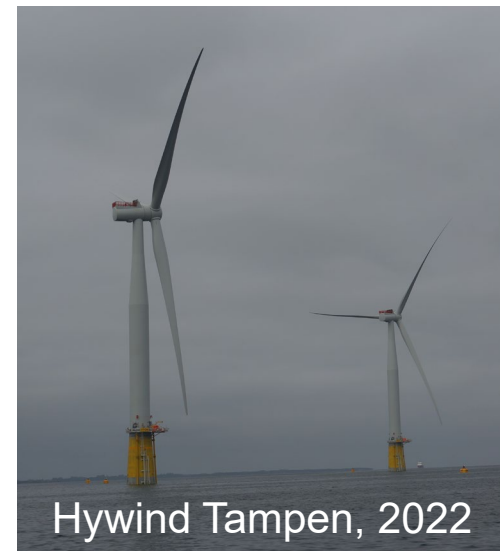
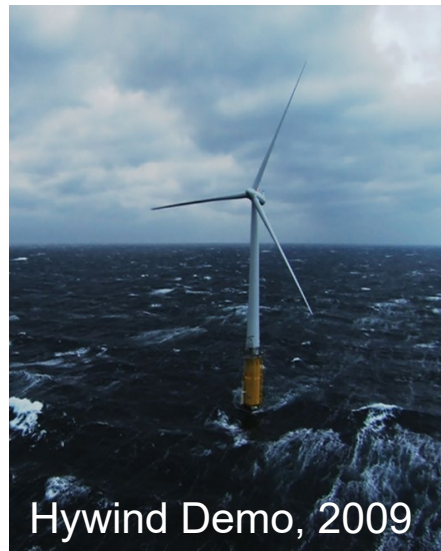
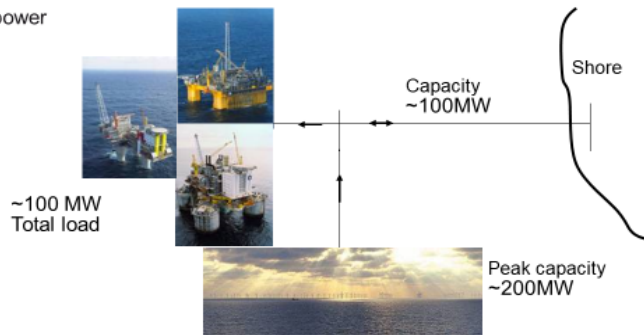


“You crazy, rich Norwegians”

Vision: 2005 (Norsk Hydro):

Vision

- Share infrastructure; Power to shore and platforms.
- Reduce emission to air
- New clean power



Size of wind turbines



Empire State Building
443 m

State of art turbine
15 MW – 270 m
Rotor: 240 m

World's first full scale floating turbine, 2009
2.3 MW – 107 m
Rotor: 82 m



Where are we heading?



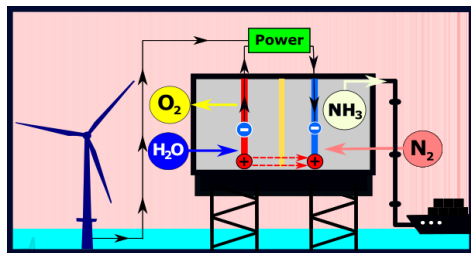
- Our role in Europe's carbon neutral energy system?
- What should we deliver?
- Role of the traditional Norwegian power demanding industry?
- Are we ready for the competition?
- 1.5 GW installed per year, 2 - 3 turbines per week
- About 1000 billion NOK



What is our vision in 2022?

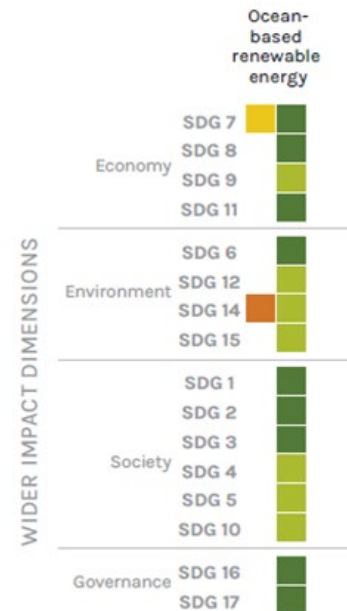


- Norwegian Wind: Europe's clean energy provider.
 - Electricity, hydrogen, ammonia, energy rich products, ...
- Sustainable development
- From co-existence to cooperation
- Connect and reduce storage need.
- Our wealth comes from oil and gas – use it for new solutions!
- **Brave ideas and persistence!**



Source: [Marine and Hydrokinetic Technologies Program](#), U.S. Department of Energy, Energy Efficiency and Renewable Energy (public domain)

Source: UiB.no / Havbyen Bergen





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