

The background is a solid blue color. It features several faint, light blue geometric shapes, including rectangles and lines, some of which are overlapping. There are also several small, light blue arrows pointing upwards and to the right, scattered across the background.

Impacts of the 2020 directive proposals on the Nordic area - challenges and opportunities

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Nordic Energy Scenarios, Helsinki 14.5.2008



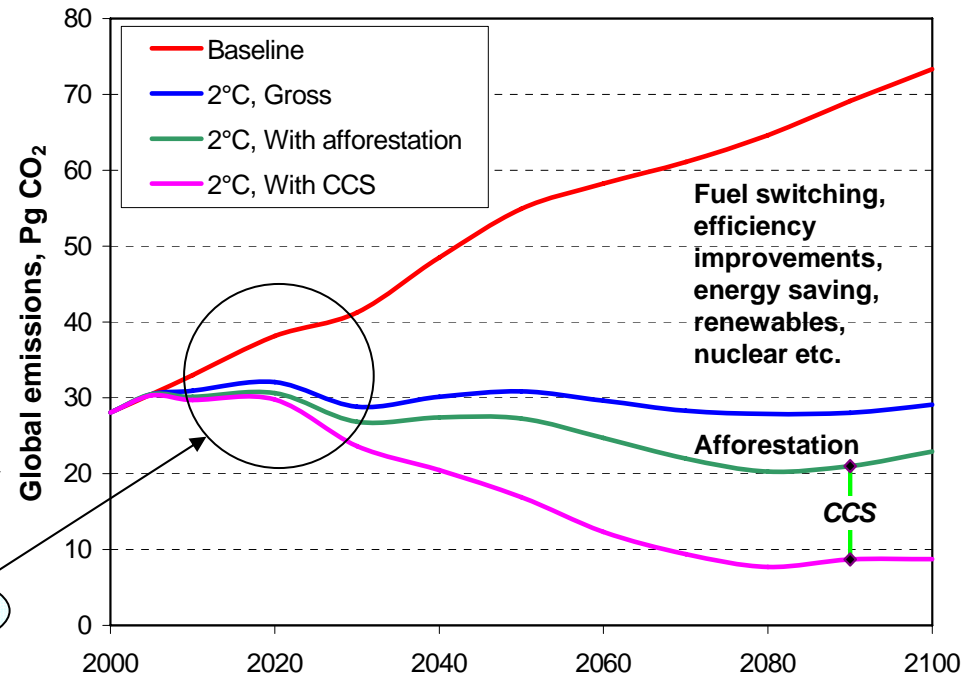
Business from technology

EU'S STRATEGIC TARGET

Limiting Global Climate Change to 2 degrees Celsius

Kaya: "If you don't want to decrease welfare, you need to increase energy intensity and/or to decrease carbon intensity"

$$CO_2 \text{ Emissions} = Pop. \times GDP/Pop.) \times (Energy/GDP) \times (CO_2 /Energy)$$



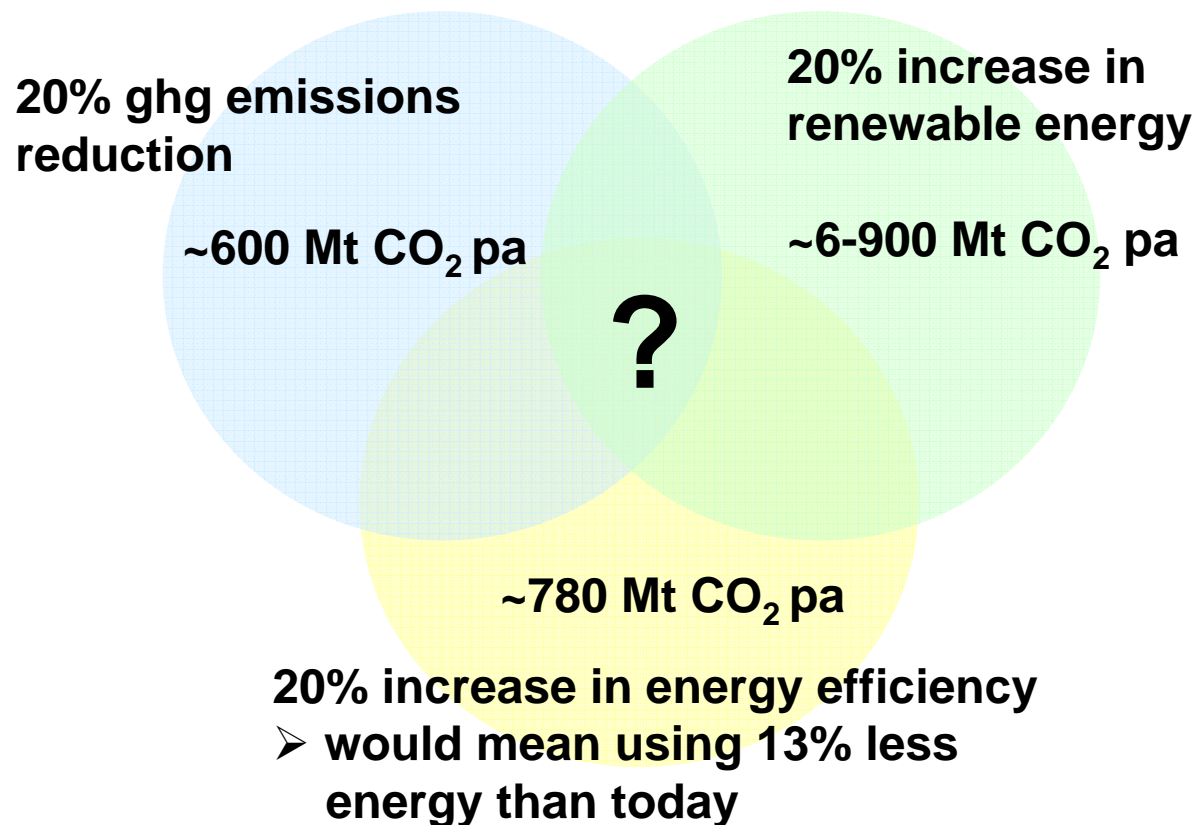
Source: VTT scenarios with Global TIAM model

- Increase low carbon resources
- Increase energy efficiency
- Invest on new technologies

EU 2020 ENERGY PACKAGE HAS THREE INTERLINKED TARGETS

Is there a possibility for overlap or double-count?

The EU ETS price is affected by achievement of the RE and EE targets and vice versa?

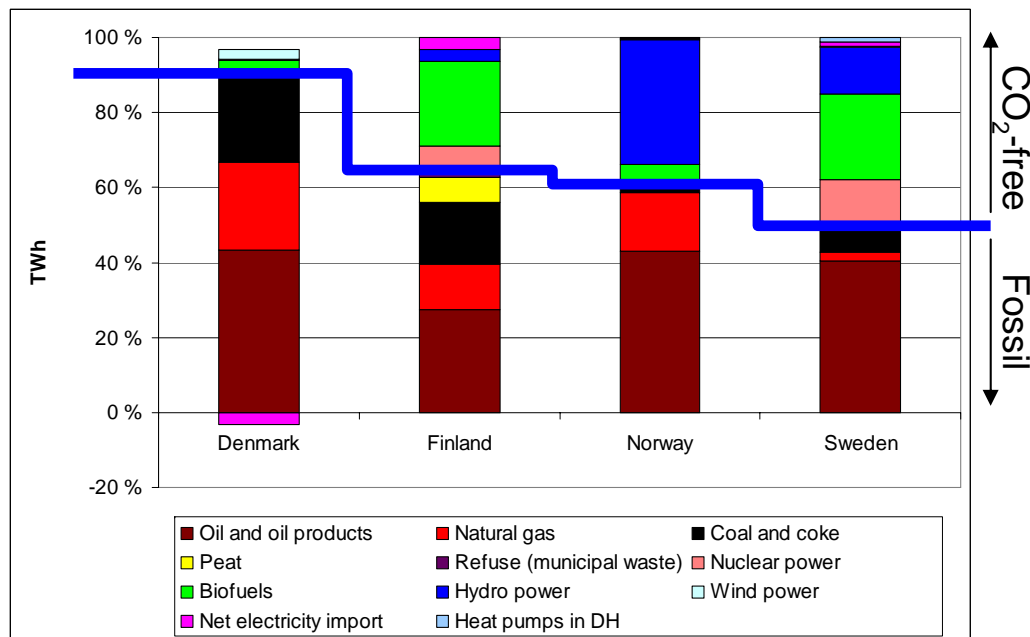


Source: The EU 2020 directive proposals & Climate Change Capital

IMPACTS OF THE 2020 DIRECTIVE PROPOSALS ON THE NORDIC AREA - CHALLENGES

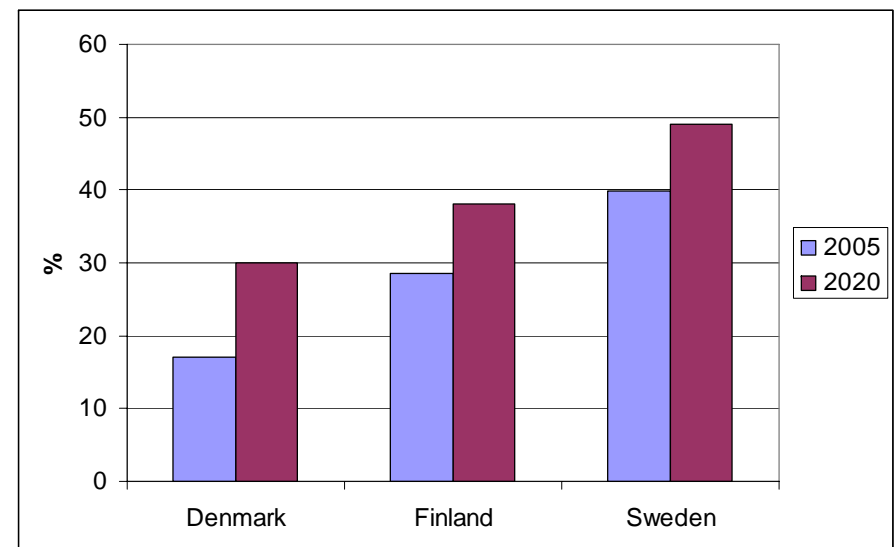
State of the art:

- ~30% renewables from primary energy
- ~80% of electricity carbon neutral



Source: Country statistics 2006

Renewables in 2005 and 2020 RE targets set by EU

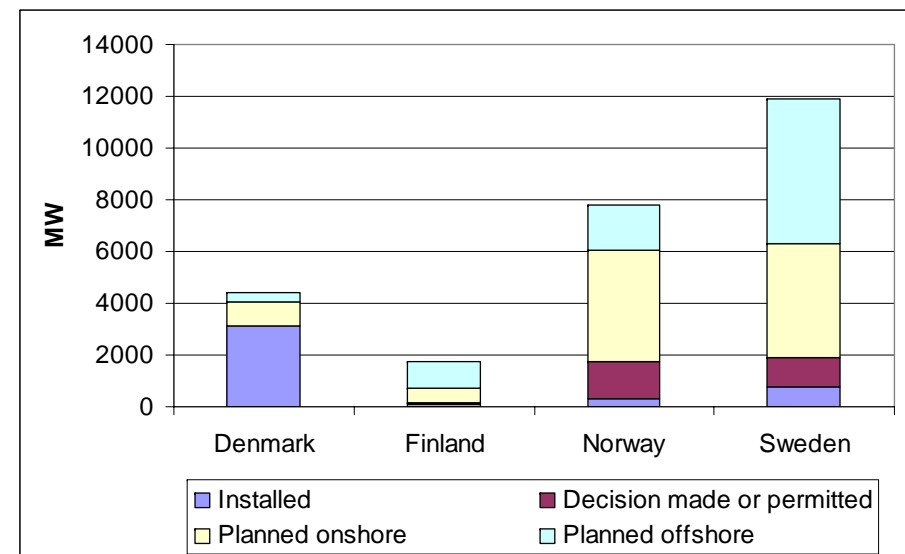


=> more than 100 TWh new renewable energy needed

RENEWABLE POTENTIALS ON THE NORDIC AREA

Dependent on the price levels, legislation, among other things

- Biomass
 - Ability to pay at home and abroad (incl. supporting schemes)
 - Sustainability criteria
 - Production of forest industry (production of side products)
 - Availability land and crop yields
- Wind
 - Legislation and permitting procedures
 - Price of market electricity (incl. supporting schemes)
- Hydro
 - Legislation
 - Price of market electricity

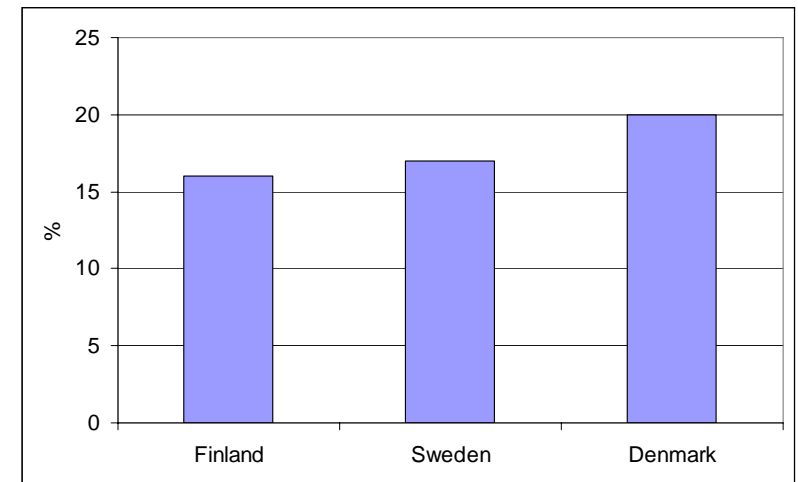


Example: Installed wind power and projects considered

GREENHOUSE GAS REDUCTION IN THE NORDIC AREA

EU's proposal to revise the EU ETS for 2013-2020 sets the guidelines

- **Goal: To strengthen, expand and improve the functioning of the ETS**
 1. One EU-wide cap instead of 27 NAPs
 2. Most of the allowances will be auctioned
 3. Part of the allowances will be redistributed from high income/cap to low income/cap MS
 4. New industries and gases
 5. Opt-out of small installations allowed



Greenhouse gas reduction targets for non-ETS sector

The number of allowances is not known
Balance between national policies for non-ETS sectors and EU policies for ETS sectors?

GREENHOUSE GAS REDUCTION IN THE NORDIC AREA

Directive proposal on the early demonstration of sustainable power production from fossil fuels

- **The directive examines the implications of making CCS mandatory**

- The new build power plants should be "capture ready"
- Framework to manage environmental risks and remove barriers in existing legislation
- According to the IEA GHG: feasibility studies, space, roads to storage site
- CCS plants part of the ETS after 2013
 - Permit allowed if no significant risk of leakage
- Several proposals for demonstration
 - Vattenfall in Germany
 - Fortum in Finland
 - EON in Denmark, Sweden, Germany and UK

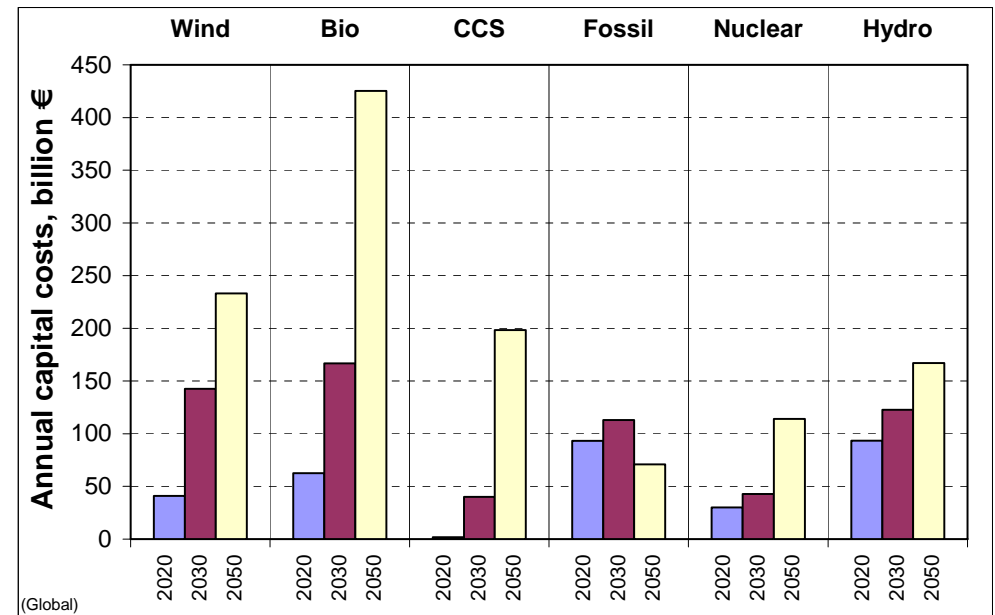


Proposed 'capture ready' power plant at Tilbury

Courtesy RWE Npower

IMPACTS OF THE 2020 DIRECTIVE PROPOSALS ON THE NORDIC AREA - OPPORTUNITIES

- New or increased export
 - Renewable electricity to Central Europe
 - Biomass products (pellets and biofuels)
 - Export of technologies and know-how to global markets
 - Bioenergy plants
 - Wind power plants
 - Fossil plants with carbon capture
 - Fuel cells
 - CO₂ tankers
 - Etc.



Example: Annual capital expenditure for power and heat production. Source: VTT scenario calculations with Global TIAM model

CONCLUSIONS

- High uncertainties exist for the renewable potentials and investments
 - Supporting systems would be needed
- The greatest impact of the EU 2020 package would be on energy intensive industry but also on other energy services
 - Increased share of renewables would push market prices of electricity down but due to supporting schemes consumer prices would most obviously increase, anyway
 - The number of free allowances for energy intensive industry?
- Higher uncertainties of future CO₂ allowance prices due to interlinked targets