

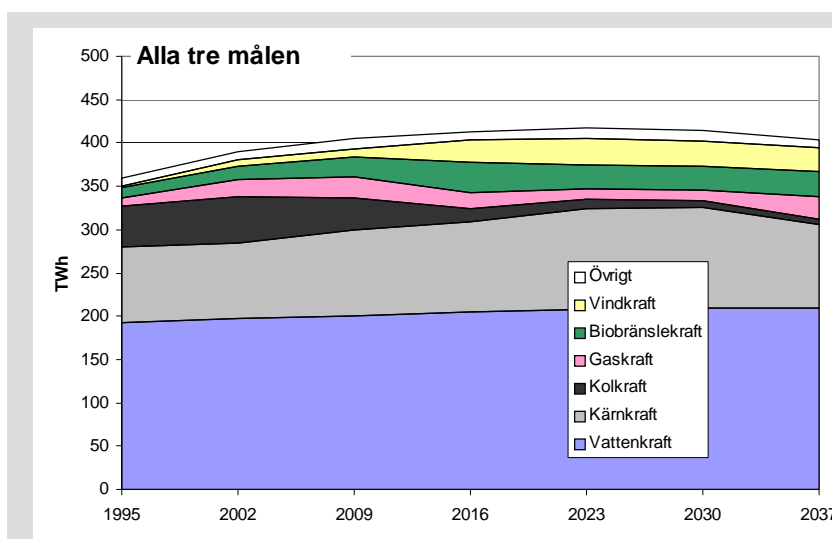
Nordic electricity almost free from CO₂-emissions already by the year 2020

All new capacity that will be built in the Nordic countries is renewable or nuclear.

EU's three 20 % goals regarding increased use of renewable energy, increased energy efficiency and reduced emissions of greenhouse gases will have a large impact on the development of the Nordic electricity system. The coal and natural gas based generation will be reduced to a minimum until the year 2020 and all new generation capacity in the Nordic countries will be based on renewable energy sources or nuclear energy. In addition to this the increase in electricity consumption comes to an end.

EU's three 20% goals influence the development of the Nordic energy system in a number of ways. According to the MARKAL model calculations

electricity generation based on coal and natural gas will decrease significantly. During normal years (from a hydrological point of view) coal and gas are only used for CHP generation, the condensing plants are not used at all. Wind power and bio fuel based CHP generation expands instead. In Norway some new hydro power is also built. Nuclear power also increases, both due to capacity increases in existing Swedish plants and the introduction of a fifth and sixth reactor in Finland. After the year 2030 nuclear power instead decreases as a result of the assumed phase-out of Swedish nuclear power after 60 years of operation. Electricity labelled as "other" in the figure to the right mainly refers to waste incineration.



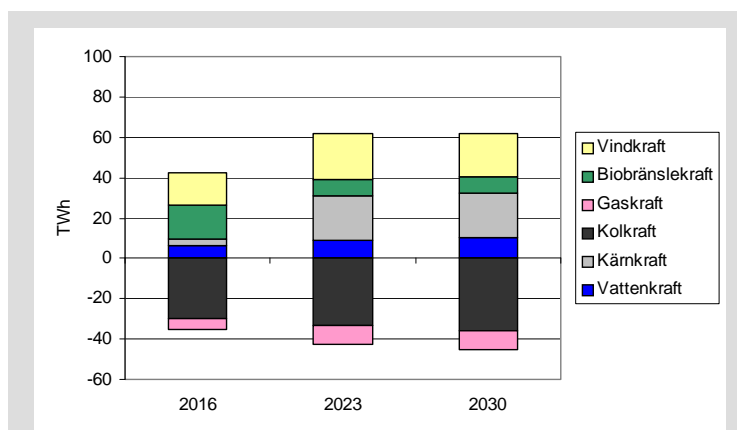
EU's three 20 % goals have a large impact on the development of the Nordic electricity generation system. All new generation capacity which will be built in the Nordic countries will be based on renewable energy sources or nuclear energy. In addition to this the increase in electricity consumption comes to an end.

All new capacity is based on renewables and nuclear

Wind power, hydro power, bio fuel based CHP generation and nuclear power expand in the Nordic countries if EU's three 20 % goals are applied.

Compared to a reference case (assuming the present policy instruments) the building of new capacity is influenced by the EU goals in a way that:

- The expansion of wind power will be of significant size, and the expansion of CHP based on bio fuels comes to an end.
- Capacity based on coal and peat for condensing generation is phased out.
- The expansion of gas power is halted.
- Some coal/gas CHP generation remains.



Electricity production in the Nordic countries with EU's three 20 % goals, compared to the production in 2005.

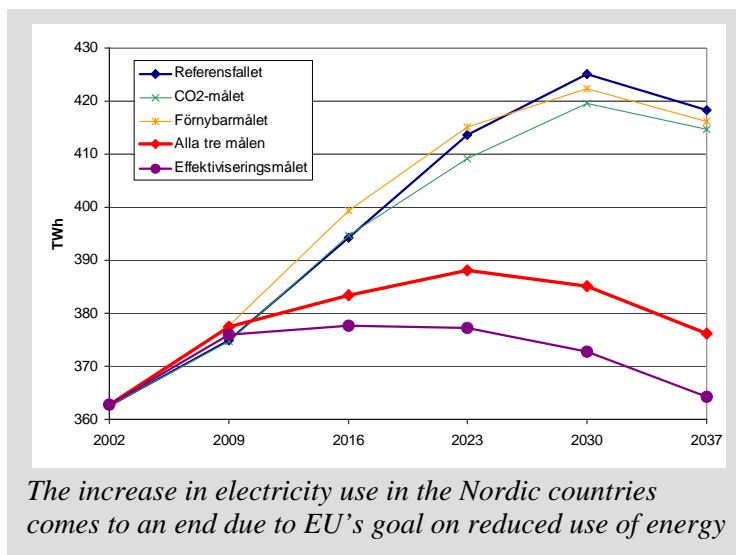


The increase in the use of electricity in the Nordic countries comes to an end

The energy-efficiency goal has a large impact on the electricity consumption

The total cost for reaching EU's three 20% goals in the stationary energy sector in the Nordic countries (excl. transportation) has been calculated by means of NEP's energy models. The climate goal is the least expensive, while the other goals are considerably more expensive.

The goal on reduced use of energy through efficiency measures will have a large impact on the use of electricity in the Nordic countries. As shown in the figure neither the greenhouse-gas goal nor the renewable goal will have any significant impact on the use of electricity (compared to the reference case). The electricity use is, however, reduced by 35 – 40 TWh due to the energy-efficiency goal by the model year 2023. When all three 20 % goals are assumed, the electricity use decreases by 25 – 30 TWh by the same year.



Primary energy weighting is of decisive importance

If a strict primary weighting is applied a nuclear phase-out would be “the most favourable” efficiency measure.

EU's energy-efficiency goal refers to primary energy consumption. The choice of primary energy weighting for different energy sources is of decisive importance in order to create synergies between this goal and the two other 20 % goals. If a strict primary energy weighting according to the proposed directive is applied a nuclear phase-out would be “the most favourable” efficiency measure. However, such a measure would, at the same time, most likely increase the emissions of CO₂ instead of reducing them. In our analyses with the MARKAL model within the NEP project we have therefore assigned nuclear power with the primary energy weighting 1 instead of 3. Consequently, a nuclear phase-out is no longer used as the preferred measure by the model to reduce primary energy use.

The reference case

It is obvious that capacity increases in both nuclear power and renewable generation (hydro power, wind power and bio fuel based CHP production) is economically attractive already in a reference case with present policy instruments and at present price levels. The EU ETS contributes to a reduction in coal based electricity generation. However, the use of electricity continues to grow and it is not until after the year 2030 that this increase comes to an end.

