NEPP
north european power perspectives

Results

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Wind energy will grow - but how much?

The EU renewable energy target for 2020 will increase the use of wind energy. National projections indicate a North European wind energy generation of 270 TWh by the year 2020. Of this only 40 TWh will be located in the Nordic countries. Solar energy will contribute with an additional 45 TWh, of which 95 % in Germany. The Nordic countries however contribute with the dominating part of North European hydro power. The introduction of wind energy is largely influenced by the development of a number of factors. Support schemes play here an important role. Depending on the chosen support regime electricity generation will be of varying importance for meeting the renewable energy target. One factor that however is more or less without influence for wind energy expansion within the next ten year is a phase-out of German nuclear power.

Two major trends in the European electricity system are:

- Further integration of the EU electricity market
- Growing share of renewable electricity generation

More renewables indicates more intermittent electricity generation, above all wind energy, and as a consequence of this more volatile electricity prices. When this issue is studied it is important to have a realistic idea about the magnitude of the future wind energy expansion and where this wind energy generation will be located.

Here we present and discuss a number of projections of future wind energy generation in the Nordic countries, in Northern Europe and in EU-27 (see also the synthesis sheet ” *Increase in Nordic electricity export towards 2030*”). We have considered both short term (2020) and medium long term (2030) perspectives.

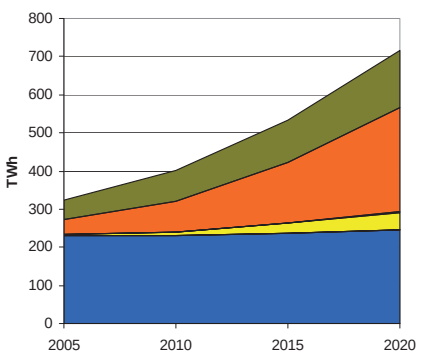
North European wind energy mainly expands outside the Nordic countries

In 2010 all EU Member States submitted their National Renewable Energy Action Plans to the European Commission. They indicate that the EU-27 will meet the 20 % target for renewable energy in 2020.

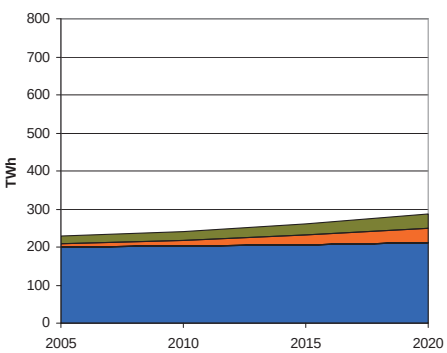
The NEPP project has analysed projections included in the National Renewable Energy Action Plans in detail, with special focus on Northern Europe, including the Nordic countries. We have included the following countries in the survey: Sweden, Denmark, Norway, Finland, Germany, Poland, Lithuania, Latvia, Estonia, Netherlands and United Kingdom. The first four countries constitute the Nordic countries while the remaining countries are grouped as “Northern Europe except the Nordic countries”.

In the three figures below we present the indicated development of renewable electricity generation region by region.

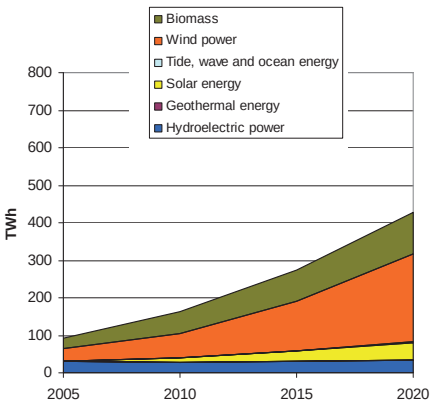
The figures show clearly that wind energy generation in Northern Europe will mainly take place outside the Nordic countries, while the balancing and regulating generation resources in the form of hydro power is concentrated to the Nordic countries. In the short term perspective (2020) the Action Plans indicate a North European wind energy generation of 270 TWh. Of this 40 TWh is located in the Nordic countries. The Swedish contribution amounts to 13 TWh. In order to reach these projected levels large volumes of wind energy must be added in ten years time.



Renewable electricity generation - Northern Europe (shows the sum of the two diagrams to the right)



Renewable electricity generation - Nordic countries



Renewable electricity generation - Northern Europe except the Nordic countries

The increase from today (2010) amounts to 190 TWh for Northern Europe of which 24 TWh will be found in the Nordic countries, where Sweden contributes with 8 TWh growth.

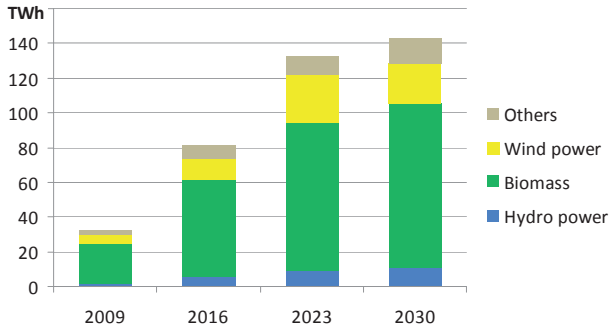
Another source for renewable electricity generation that can also be seen as intermittent is solar energy. The Action Plans indicate a large increase also for solar energy. By 2020 North European solar electricity generation is projected to have increased to 45 TWh (95 % located in Germany).

Wind energy expansion is not influenced by a German nuclear power phase-out

Recent NEPP calculations of the consequences of the German nuclear power phase-out on the European electricity generation system show that wind energy expansion in principle is completely decoupled from the future of German nuclear power. The wind energy expansion is more or less identical with or without nuclear power phase-out. The reason for this is that the introduction of wind energy, at least during the period to 2020, is a consequence of the EU renewable energy target and national support schemes, e.g. feed-in tariffs or the electricity certificate system. Although the nuclear power phase-out increases the electricity price somewhat the support systems still create the same incentive for wind energy investments. (If the nuclear phase-out is combined with increased incentives for renewable electricity production larger volumes of wind energy could be expected.)

The renewable energy target can be reached in different ways

The Nordic Energy Perspectives project, finalized during 2010, has made model calculations of the future use of all renewable energy, not only electricity, in order to fulfil the EU renewable energy target. The calculations indicate less wind energy then suggested above, slightly more than 30 TWh (24 - 26 TWh increase and 8 TWh existing) for the years 2023 and 2030. The reason for less wind energy expansion is that a larger share of the target is met through measures outside the electricity system.



Increase of energy technologies in the Nordic region relative to 2005, when measures for the EU renewable energy target are applied (also keeping current emission-rights trade and national policy instruments)

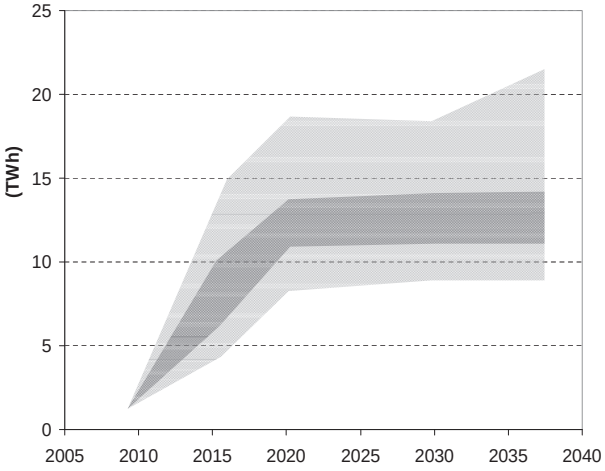
One third of EU electricity demand will be supplied from renewables by 2020

The European Wind Energy Association (EWEA) have also analysed all Action Plans and presents a number of facts about the envisaged development:

- 20.7 % of the 2020 energy consumption will be renewable
- One third (34 %) of EU electricity demand will be supplied from renewables by 2020
- 15 Member States plan to exceed their national target and only two Member States indicate that they will use cooperation mechanisms to meet their national targets
- The 34 % of EU electricity demand met by renewables in 2020 is made up of 14 % wind energy (10 % onshore and 4 % offshore), 10 % hydro, 7 % biomass and 3 % solar.
- Wind energy generation for all EU-27 Member States amounts to 495 TWh in 2020.

Wind energy expansion is closely related to input data

Other studies have indicated that the volume of wind energy expansion is very dependent on the assumptions regarding input data. Profu has recently made calculations regarding the increased target for the Swedish electricity certificate system, including a thorough sensitivity study where a large number of input data have been varied. The figure shows that Swedish wind energy generation could be expected to be between 8 and 18 TWh/yr during the period 2020 to 2030. Most scenarios indicate wind energy generation between 11 and 14 TWh/yr. Although these results only refer to Sweden, they are a strong indication of the difficulties in predicting future wind energy generation also in other regions. Similar trends could be expected if the electricity certificate system is expanded to a Swedish-Norwegian system.



Wind energy generation in Sweden for all calculated cases. The dark grey area indicates the results for the majority of the cases.

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