

PHASING OUT NUCLEAR –POLICIES IN GERMANY AND EUROPE

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Overview

Over the past decade, the energy landscape in Europe especially in Germany is changing. The issue was to significantly reduce CO₂-emissions, to substitute fossil for renewable energy, phasing out of nuclear energy after the accident in Japan and to increase the efficiency of electricity generation. Connected to that, many investments were taken to primarily build plants for renewable energy generation, especially for wind, photovoltaic and biomass applications. 60 % of German nuclear power station went out of operation last 5 years. In the year 2022 the last nuclear power station will be taken out from grid. Regarding this, the presentation will highlight the European and especially German electricity market with a focus on the technical implementation of renewable energies.

Methods

In the European Union (EU), there is no comprehensive coordination between the EU-States for the further development of the power generation sector. Each EU-State has had its own federal policy and historically has made use of their available domestic renewable and non-renewable energy resources like nuclear energy. In general, electricity in Europe is mostly produced using coal, gas, nuclear resources and renewables. Great Britain instead has made large investments in wind energy on- and offshore and decided to build new nuclear power stations. France will reduce the share of nuclear produced electricity from today 75 % in next decade. Austria uses due to its topography a large amount of hydroelectric power. In Germany, electricity is mainly generated using coal, gas, renewable energy (wind, solar and biomass) and nuclear. However, the subsidies for Germany's hard coal mining will end in 2018 and a nuclear phase out will be carried out by the end of 2022. For this reasons, Germany's government undertakes multiple acts to restructure the energy system (so-called "Energiewende") with a special focus on the implementation of wind and solar electricity and phasing out of nuclear [1].

Results

In the year 2002 German government made a contract with the German electricity suppliers to face out nuclear energy until 2020, depending from the age of nuclear power stations.

The four big electricity companies who were operating the 17 nuclear power stations was not satisfied with this contract. After change of government the contract was changed in the year 2009. Last nuclear power stations had now to go out until the year 2035 at the end of the optimal technical lifetime.

The nuclear catastrophe in Japan changed anything rapidly. It started a discussion in Germany about nuclear safety and the necessity of operating nuclear power stations until the year 2035. The German government asked the German Academy of Sciences Leopoldina to make a scientific study about phasing out of nuclear energy in Germany [2]: Is it possible? When "yes" in which time? Under which conditions? The author of this paper was as member of the German Academy of Sciences one of the six scientists who made the investigation.

The result of the investigation said, it is possible until the year 2021 under certain conditions. After very intensive discussions with experts, politicians and citizens, the German parliament decided with big majority to phase out nuclear energy in Germany until the year 2022. Never has had scientific work such important influence on decisions for electricity generation in Germany like this study, maybe also in other countries worldwide.

Conclusions

Renewable energy sources in Germany accounted in 2018 for an all-time record of about 36 % of the electricity generation. The percent share of wind energy in total renewable electricity generation in 2018 was 18 %, there of biomass was 7 %, photovoltaic cells 6 %, hydroelectric power 3 % and municipal waste (also counted as renewable energy) was 1 %. The high fluctuating power generation by wind and photovoltaic power plants in Germany and the phasing out of nuclear energy result in essential additional expansion in the electricity grid – especially in north to south direction. To keep the high security of electricity supply in Germany, about 2,800 km high voltage grid should be newly build until 2024 about 800 km have been realized. Due to the fact that wind and solar energy supply fluctuates, there is a need for energy storages or back up capacity to bridge times where wind and solar resources are not available. Until now the installed capacity of storages is not enough, therefore fossil power plants have to be used as back up. For example the German government foresees the use of available Lignite Power Plants as reserve capacity. This idea is under strong discussion and it is expected the further introduction of battery technologies. In order to develop renewable energies in Europe to its full potential, it is necessary that the EU-States further integrate their energy systems by means of grid expansion and coordinated support schemes. The presentation will show how scientific work could have a big influence of

political decisions.

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