wintershall dea

INFORMATION

INCENTIVE-ANALYSIS

THE ROAD TO EU CARBON NEUTRALITY

Energy is the most important driving force in humanity's economic and social development. It is part of everyday life, whether in industry or in private households. But for a sustainable and climate-friendly development in the 21st century, it is crucial to reduce the energy sector's carbon footprint. Therefore, it is a necessary step towards global CO_2 neutrality, the European Union (EU) has set itself the ambitious goal of becoming the first climate-neutral continent by 2050.

In the green transition of the energy system there are at least three big challenges: maintaining electricity security of supply, phase-out of coal-fired power plants and transforming industrial energy consumption.

In order to get a better understanding of the tasks ahead, Wintershall Dea commissioned a meta-study which brings together estimates or results of well-known think tanks or consultancies with the goal to evaluate how natural gas and its existing infrastructure can support "THE ROAD TO EU CARBON NEUTRALITY".

Main findings in brief

1. Maintaining electricity security of supply: Today, gas-fired power plants are used to meet fluctuations in demand. An increasing share of solar and wind electricity production adds volatility to the electricity system. In the long run, a combination of batteries and hydrogen-fired power plants may be a solution. But in the short run, gas-fired power plants deliver production flexibility necessary to balance the system.

2. Phase-out of coal-fired power plants: Most countries in the EU have plans for phasing out the coal-fired power plants. However, these plans may not be fast enough to meet the Paris Agreement as coal-fired power production in the EU, in 2019, still accounted for 17% of the power production. The IEA* estimates that it is possible to cost-effectively save 147 Mt CO_2 by switching from coal to gas-fired power production. In the short run, CO_2 emissions reductions may be achieved by making sure that gas-fired power plants are competitive relative to coal-fired power plants.

3. Fundamental changes in industrial energy consumption: Industrial energy consumption accounts for more than a third of EU energy consumption. Three elements can help the decarbonisation of hard- to-abate industries: hydrogen-based technologies, fuel switching from coal to natural gas and later to hydrogen, and carbon-capture technologies.

*International Energy Agency

What is to do

1. Use natural gas as part of the transition: Natural gas can work as an accelerator and stepping stone in the green transition. In many sectors, the long-term carbon-neutral solution may be switching to electricity and hydrogen. However, in the short term, technologies may be unavailable, and a reduction in CO_2 emissions could be achieved in the short term by shifting to natural gas.

2. Higher CO_2 prices will aid the transition: Higher CO_2 prices will ensure that gas-fired power plants are more attractive than coal-fired power plants and thereby incentivise the market to shift from coal to gas in the short run.

3. Support R&D in clean energy and secure supply of electricity: Electricity produced with renewable sources and hydrogen are essential parts of a greener future. Therefore, it is crucial to support the R&D in hydrogen to drive prices down. When electricity is produced with inflexible sources as solar and wind, it is also important to ensure security of electricity supply with power plants and storage capacity.

Role of electricity production types in Northwestern Europe

Carbon footprint	Today	Short-term future	Long-term future
Solar and wind			
Wind	Made up 17% of Northwestern Europe's production in 2020. Gradually increasing.	Main production sources, but dependent on other types during kalte Dunkelflaute and peak demand.	With high-capacity batteries, renewables can increasingly produce energy to accommodate peak demand.
Solar	Still a minor production type, but gradually increasing.		
Fossil fuels and hydrogen			
Gas	Made up 14% of Northwestern Europe's production in 2020.	Produced in periods when renewables cannot cover demand.	Phased out.
Oil	Almost no production today.	Phase out as quickly as possible.	Phased out.
Coal	Gradual phase-out.		
Hydrogen	–	–	May replace gas as the production type ensuring that peak demand is met.

Low – High

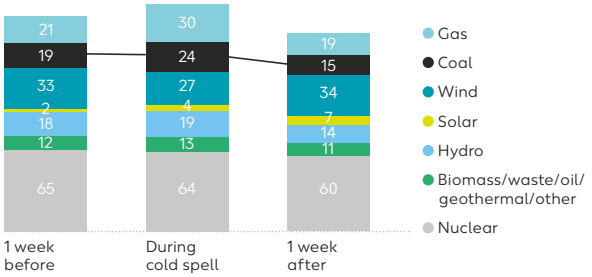
Exkursus

Security of Supply in times of cold spells: Periods of very cold weather occur around once per year on average. Those periods often constitute peak energy demand because of additional need for heating. Cold spells often occur simultaneously with: (1) Low windspeeds, as temperature and wind speed are inversely related, (2) little sunshine, as they mostly occur during winter. Germans refer to these periods with coldness, darkness and little wind as "kalte Dunkelflaute". Like energy demand, production from solar and wind power depend on the weather. Traditionally, electricity systems have been designed with flexible power plant production capacity to meet fluctuations in demand. Solar and wind electricity production adds a new element of volatility to the electricity system that must be handled to avoid electricity shortages.

A cold spell struck Northwestern Europe[1] in February 2021
Lowest daily temperature measured in Munich, 2021

Source: weather.com

During cold spells, gas and coal ensure that the energy demand is satisfied
Energy production (GW) in Northwestern Europe[1] around the cold spell in February 2021



Source: entsoeeu, 1 week before: February 4th to 8th. 1 week after: February 18th to 22nd.

[1] Northwestern Europe is defined as: Denmark, Germany, Austria, Switzerland, France, Belgium and the Netherlands

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Please, follow the link to the analysis „The road to EU carbon neutrality".

Questions?
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