



Keeping the lights on: Technical solutions

NON-STOP POWER

SECURING GRIDS WITHOUT COAL IN GERMANY

Germany's experience proves that economic growth, energy security, and grid expansion can go hand in hand.

In 2021, Germany's federal parliament adopted a climate protection law committing the country to becoming climate neutral by 2045. Central pillars for achieving this goal are government plans to phase out coal-fired power generation, ideally by 2030, and to reach a share of at least 80% renewable electricity by 2030 on the way to a decarbonised power sector. The energy transition represents a massive social, economic and technical transformation of the entire country where capacity to generate power from renewable sources will have to expand by more than 30GW annually on average in the coming years.

Security of supply has always been a top priority for the government. Despite the expansion of renewables over the last two decades which provide almost half of Germany's electricity today, households have seen electricity supply disruptions halve to only ten minutes a year, with the country boasting the most reliable grid of all industrialised nations.

As Robert Habeck, Federal Minister of Economic Affairs and Climate Action has stated, "Grid expansion is the prerequisite for the energy transition to work." The Federal Network Agency (Bundesnetzagentur) is responsible for keeping the grid – and grid expansion plans – under constant review. More than 11,500km of power lines are to be modernised or newly built in the coming decades. Of these, about 2,600km have been completed or are nearing completion, while about half (5,500km) are in the approval and planning stage. For the remaining 3,400km, the need for work has been identified but no further action has been taken. Work is ongoing to strengthen lines between wind farms in the north and industrial centres with high electricity demand in the south.

Rather than building new power lines, it is almost always cheaper to make better use of existing lines or to upgrade them. In Germany, 220kV overhead lines are often increased to a capacity of 380kV so that they can transport more electricity. In addition, it is important to digitalise grids and to equip them with sensors that enable continuous monitoring so that grid operators can set the temperature of overhead lines and increase the amount of electricity they can carry by up to 30% in colder months. Interconnections with neighbouring countries like Norway, Denmark and Belgium are also being expanded to combine resources and balance grids more efficiently. In 2021, Germany exported 57TWh and imported almost 40TWh, equal to about 11% and 8% of its net electricity production, respectively.

Besides targeting a more efficient use of energy, the government is also looking to increase the flexibility of electricity demand and to expand battery and other forms of storage to reduce the need for grid expansion. Finally, Germany maintains a reserve capacity (additional power generating plant to be used when necessary) that will be expanded over time and converted to fully utilise green hydrogen as an additional source of flexibility. Together, all these measures will help maintain the high reliability of the German grid while continuing to decarbonise it.