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UK to set emissions limit to force coal phase-out

The UK government has introduced an emissions limit for power producers that it hopes will see coal phased out of the country's energy mix by 2025.

THE UK GOVERNMENT announced plans in the first week of 2018 to set an emissions limit of 450 grams of carbon dioxide per kWh of electricity produced.

Details of the plan, intended to ensure the closure of high-polluting coal-fired power plants by 2025, were revealed by the Department for Business, Energy and Industrial Strategy (BEIS). It follows the department's November 2015 consultation on phasing out coal-fired plants that do not use carbon capture and storage (CCS) technology.

The consultation sought views on the relative benefits and risks of two options for phasing out coal-fired emissions. These were to either force existing coal plants to use CCS technology, as is already required for new coal power plants, or to apply a concentration-based limit on CO₂ emissions from coal units.

The government chose to opt for an emissions cap because it allowed generators more flexibility in deciding how to meet the 450 gCO₂/kWh limit. The government judged that the cost of retrofitting power stations with CCS technology would be prohibitive and also might take longer to implement than the cap.

The new limit is tougher than the UK's Emissions Performance Standard (EPS), which sets an annual limit on CO₂ emissions from fossil fuel generators based on their capacity and an assumed 85% annual load factor. The 450 gCO₂/kWh limit, which is broadly in line with the emissions intensity of generating power from gas, is a maximum that cannot be exceeded at any point, rather than an annual limit. This will effectively rule out temporarily burning coal to meet peakload electricity demand.

The UK still has around 6 GW of coal-fired power capacity in use, but generation from coal-fired plants has nosedived since the country implemented a carbon tax in 2013. The BEIS said it expects coal generation capacity to drop to just 1.5 GW by 2025, as other forms of generation feed into the power mix.

The BEIS said coal's share in the energy mix fell to 9% in 2016, down from 22% in 2015. Coal fell to a record low of 2% in Q2 2017, while low-carbon generation sources supplied more than 53%. In April 2017 the UK experienced its first 24-hour period without coal on the system since the first coal power station opened in 1882 – although it managed this only by importing electricity from the Continent.

Ensuring power supply security is a priority for the UK government, but its plans for a capacity market to ensure this have been widely criticised. Many of the country's nuclear power plants are set to close in the late 2020s, and few new plants are due to be built. The government initiated auctions under the capacity market, which pays plants to make back-up electricity available at short notice, in late 2016. The next capacity market



Source: PA

auction, for delivery in 2021/2022, will be held in February.

Despite its professed confidence in the capacity mechanism, the government has said it will put an emergency provision in place that allows the emissions limit to be rescinded in particular circumstances, similar to that set for the EPS through the Energy Act 2013. The provision would be used only as a last resort in crisis situations, for a maximum of 90 days at a time, when there was a significant risk of a shortfall in electricity generation.

The policies outlined in the BEIS document relate to England, Wales and Scotland, and no mention is made of the potential impact of Brexit on UK energy supplies.

The BEIS said compliance with the emissions-intensity limit will be on a net CO₂ basis – which allows emissions from other fuels co-fired with solid fossil fuels to be included in the calculations. The net CO₂ emissions from coal units co-firing with biomass will be calculated as the sum of the emissions from the coal element of the fuel diet, plus net lifecycle CO₂ emissions attributable to the biomass.

The emissions intensity limit will apply from 1 October 2025 to align with the start of the 2025/2026 capacity market delivery year. The government said it would not try to put interim hurdles in place to phase out coal, as most plants would close down anyway in the early 2020s because of steps that have already been taken.

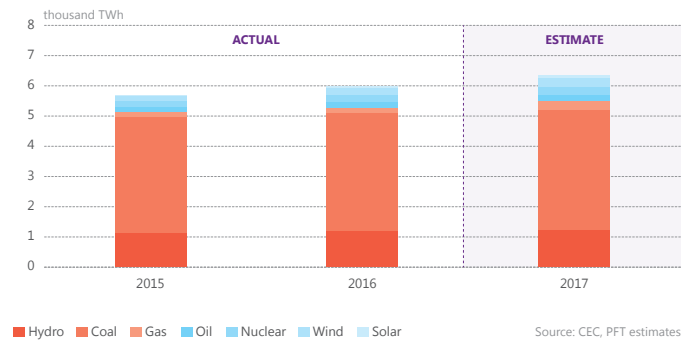
These steps include the Industrial Emissions Directive, which sets an operational limit of 1,500 hours per year for most remaining coal units from July 2020. Since the consultation, the government has published its Clean Growth Strategy and Industrial Strategy white paper. The Clean Growth Strategy commits to maintain carbon pricing levels to help reduce emissions in the power sector.

The UK has a legally binding target to cut CO₂ emissions to 80% below 1990 levels by 2050, as part of its commitment to counter climate change. The emissions intensity limit will supplement other measures planned by the government, which include a Clean Air Strategy due to be outlined later in 2018. The UK was among more than 20 countries that launched the Powering Past Coal Alliance at the UN Climate Change conference in Bonn, last November.

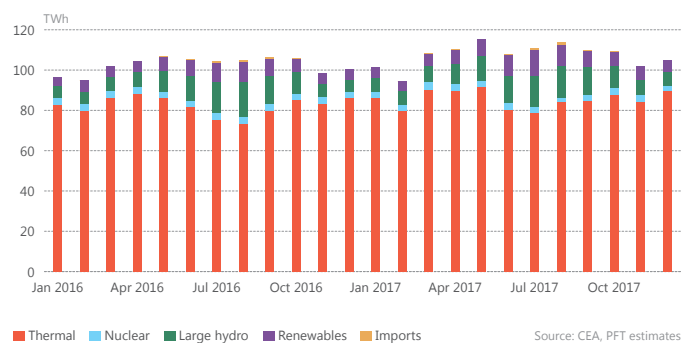
Asia Pacific

- Chinese electricity demand** is estimated to have risen by around 6% on an annual basis in 2017 to reach 6,350 TWh. Strong increases in gas-fired and renewable generation helped to support the demand growth, a trend that is expected to continue in 2018.
- Gas-fired power generation in China** is expected to expand significantly in early 2018, but regional gas shortages could limit growth in some parts of the country at the peak of winter. Greater use of gas by the heating sector and severe cold snaps have driven up demand in some northern markets.
- China's coal demand** could see support from heating requirements through the peak of winter at the start of 2018, but year-on-year declines are expected during the year overall. Although the government's gasification plans have hit hurdles, coal consumption in power and heating is still expected to be hit by policies for gas switching. A potential increase in production could be seen this year, which will also limit requirements for coal imports.
- Newcastle coal front-month prices** averaged around \$99/t in December, up by 2% from the average for November and up by around 15% year on year. Further gains have been seen at the start of 2018, with the average front-month price over the start of January around \$105/t.
- Total electricity demand in Japan** was broadly flat year on year in 2017 at around 893 TWh, according to national data and PFT estimates.
- Japan is set to bring two more nuclear** reactors online before the end of Q1 2018, boosting the number of operational reactors in the country to seven. Kansai Electric's Ohi reactors 3 and 4 received approval for restarts in late November and are now scheduled to come back online in January and March respectively. However, the plant's two older units, reactors 1 and 2, are now set to be decommissioned. This brings the number of total reactors to have been scrapped to 14. Although further restarts are expected before the end of the year, the pace of approvals is unlikely to speed up. Consequently, the rate of reactor restarts this year and next will be moderate.
- Total power generation in South Korea** rose by around 2% on an annual basis in 2017 compared with 2016 to reach 551 TWh. Moderate growth is anticipated for the start of 2018.
- In South Korea, bituminous coal demand** from the power sector rose by roughly 10% year on year in 2017, according to PFT estimates. The startup of new coal-fired power stations boosted demand for coal for power generation and helped to drive up overall demand for the fuel. Total coal consumption in South Korea is estimated to have risen by roughly 2% on an annual basis in 2017 following a year-on-year decline of 4% in 2016. The rise in coal demand in late 2017 supported increased imports into South Korea. Electricity demand looks likely to grow year on year at the start of 2018, and this could

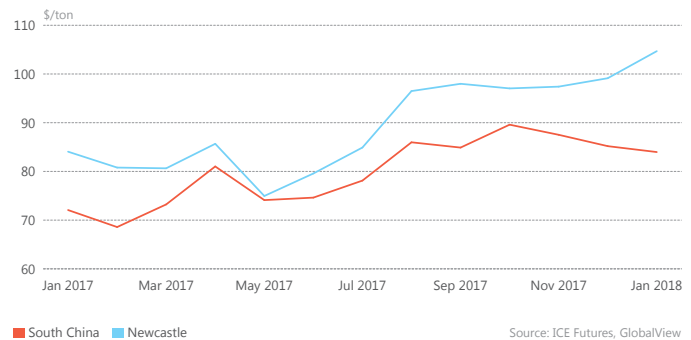
CHINESE ELECTRICITY PRODUCTION BY SOURCE



INDIAN POWER GENERATION



ASIA COAL FUTURES – FRONT MONTH PRICES



support further increases in coal demand from the power sector and in requirements for coal imports.

- Total power generation in India** is estimated to have risen by around 5% on an annual basis in 2017 to reach 1,295 TWh. Strong levels of electricity demand growth are expected at the start of 2018 as the government pushes through electrification plans. Growth in wind and solar is expected to be robust in 2018 as new capacity is due online.
- Indian solar power** output boomed in 2017 and is expected to see further gains in 2018. Power generation from solar is estimated to have reached roughly 21.7 TWh in 2017, accounting for roughly 2% of total output, and representing an increase of approximately 87% year on year. New solar capacity was installed in late 2017, and further new capacity is planned for 2018.

Europe & Russia

■ **Power demand in northwest Europe** is expected to remain largely weather-driven in the coming weeks. European front-month prices pointed to limited upside in the first week of January due to mild weather. On 8 January, comfortable wind and thermal generation in Germany reined in prices amid lacklustre demand, while lower temperatures in France gave relative impetus to prices.

■ **German baseload power prices** dropped to negative levels in December – as low as minus €5/MWh on average at the close of business on 25 December – as strong winds in northwest Europe boosted wind power output, causing an oversupply of electricity. Renewable energy – including wind, solar and geothermal energy – accounted for 21.2% of Germany’s installed power capacity between January and September 2017.

■ **Italian power prices rose in December** in the aftermath of an explosion and fire at Austria’s Baumgarten gas hub on 12 December that killed one person and injured 18 others. Italy declared a state of emergency after the incident, which disrupted Russian gas supplies via Austria that Italy is heavily reliant on. But supply concerns were soon dispelled as operation at Baumgarten resumed the following day. The Italian front-month baseload power price averaged €67.85/MWh in December, up by around 30% year on year, before settling to around €62/MWh in early January, at a premium to other European prices. The front-month peak price rose to around €81.5/MWh in December, up by around 31% on an annual basis. Italian power supplies are estimated to have increased by around 3% in 2017, from around 312 TWh in 2016.

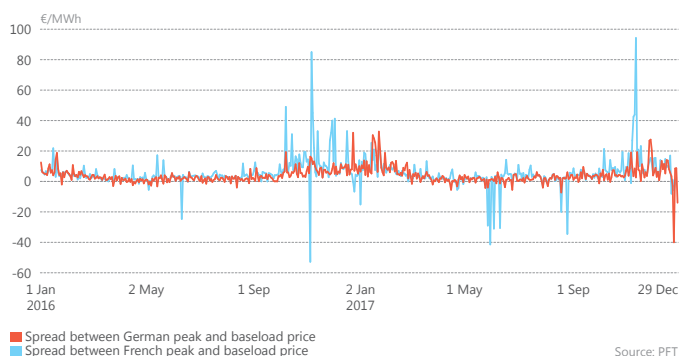
■ **The incident highlighted Italy’s strong reliance on gas** for its power generation. It also stressed the need to boost investment in renewables, which accounted for around 18% of the country’s generation capacity in the first nine months of 2017 (including wind, solar and geothermal energy). Gas represented around half of Italy’s electricity generation in early 2017, with coal and hydro accounting for around 15% each. Italy imported around 12% of its power in the first nine months of 2017.

■ **France’s power consumption** is estimated to have risen by 0.2% on an annual basis in 2017. Weather-corrected demand reached 428.9 TWh in the first 11 months of the year.

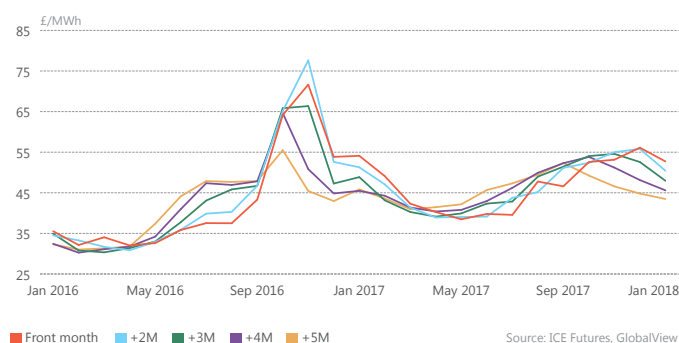
■ **French power generation** rose by 3.5% year on year in Q3 2017, to 114.1 TWh. This was a result of increased nuclear output compared with 2016, when up to 20 reactors had been shut down, mostly because of safety issues. Greater nuclear availability supported an estimated increase in overall domestic power production of 0.2% in 2017 compared with around 532 TWh in 2016. Power imports rose by 7.4% annually between January and September 2017.

■ **Nuclear power generation** was either reduced or halted at five of France’s 58 reactors on 4 January, compared with 14 in mid-November. This took 3.4 GW of the country’s installed

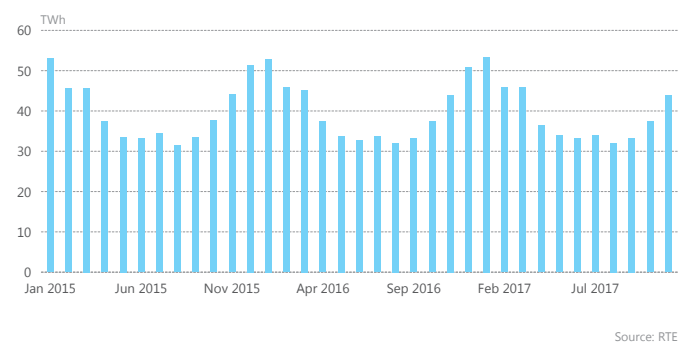
GERMAN AND FRENCH ELECTRICITY PRICES



UK FUTURES POWER PRICES



FRENCH WEATHER CORRECTED CONSUMPTION

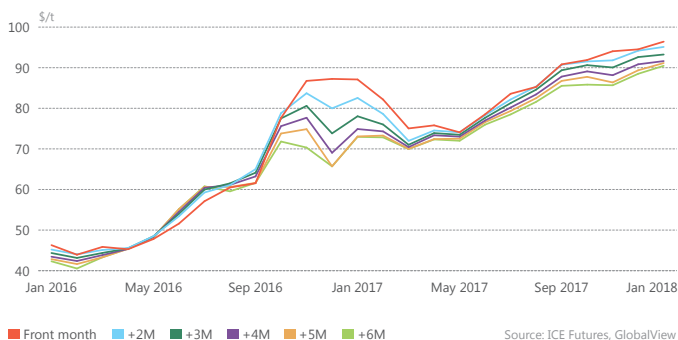


nuclear capacity of approximately 63 GW offline. Improved nuclear availability should keep a lid on prices in the event of a cold snap in January.

■ **In early January, French nuclear plants** Tricastin 2 and Gravelines 2 were partially running and scheduled to return to full capacity before 8 January, along with Tricastin 1, which was closed because of technical problems. Cruas 2 and Fessenheim 2 are shut and scheduled to come back online on 15 and 30 March respectively. Cruas 2 has been closed since 2 December because of a 10-year periodic maintenance, while Fessenheim has been shut down since 13 June 2016 following a decision by Nuclear Safety Authority (ASN) over safety issues. The restart may be delayed depending on investigations carried out by the ASN. EDF revised its 2017 nuclear output target in December, and said production would be lower than its goal of 383-387 TWh.

Europe & Russia

ARA COAL FUTURES



■ **Coal consumption for power generation** in France rose by around 44% on an annual basis in the first 11 months of 2017, to 650,000 tons, making up for reduced hydro generation over the summer. The power sector only accounts for around 19% of the country's coal consumption, with the majority used by the steel industry. With coal futures prices in backwardation,

coal could remain a cheap alternative for fuel arbitrage for power producers. The Rotterdam coal front-month contract has averaged \$96.5 per ton since the start of January, and is priced at \$95.4/t for March and \$93.4/t for April.

- **In the UK, the front-month baseload power contract** softened to around £53/MWh in early January, which is broadly flat year on year and down from its average of £56.12/MWh in December. The front-month peak contract has averaged around £58/MWh since the start of January, compared with around £62/MWh in December.
- **In the Netherlands, the front-month power baseload contract** has averaged around €47.5/MWh since the start of January, down from €48.64/MWh in December. The peak-load contract has averaged around €60/MWh since the start of the year, down from around €61/MWh in December. The market pricing is lower in the coming months as a result of weather forecasts.

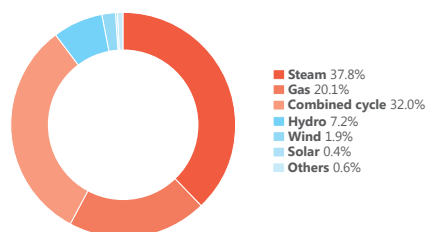
Middle East & Africa

■ **Egypt's use of fuel oil for power generation** is expected to decline significantly in 2018 because of growing gas supplies in the country – notably from the giant Zohr gas field, which started production in December 2017. Production at the field is expected to ramp up to 28.6 million cubic metres per day by mid-2018. Egypt's fuel oil consumption dropped from 200,000 barrels per day at the beginning of 2017 to 170,000 b/d in recent months, according to the International Energy Agency. Gas is the dominant fuel in the country's power mix, accounting for around 72% of those used. The remaining share is split between heavy fuel oil (90%) and light fuel oil (10%).

■ **Kuwait is expected to raise its renewable energy capacity** in Q1 2018 with the planned startup of the Al Shagaya 60 MW concentrated solar power (CSP) plant, the country's first utility-scale solar project. The plant was expected to start operations by the end of 2017. State-owned Kuwait National Petroleum Co. is also planning to launch a tender for the 1 GW Dibdibah solar power project in Q1 2018. Kuwait's installed renewable capacity of 41 MW mainly consists of small-scale solar photovoltaic (PV) and wind schemes, installed on buildings owned by the government and other entities.

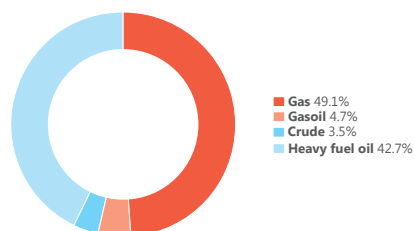
■ **Kuwait's ambitious targets** to produce 5% of its electricity from renewables by 2020 and 15% by 2030 – compared with only 2% now – look difficult to achieve. More projects need to be sanctioned if the country is to reach at least the 2020 target. Kuwait wants to install 5.7 GW of CSP capacity, 4.6 GW of solar PV and 700 MW of wind energy by 2030. However, this plan could change if Kuwait includes appropriate back-up solutions for intermittency issues. CSP with storage is being

EGYPTIAN INSTALLED CAPACITY BY PLANT TYPE, 2016



Source: Arab Union of Electricity

KUWAITI POWER FUEL BREAKDOWN, 2016



Source: Ministry of Electricity and Water

promoted in neighbouring countries such as the UAE to add firm back-up capacity. However the technology relies on direct solar irradiation, which in Kuwait is heavily affected by dust and moisture. Other challenges that will likely hamper and delay the development of the projects include lengthy contract awards, heavy bureaucracy and internal political risks.

Americas

■ **With the US** expecting one of its coldest winters on record this year, electricity demand between December 2017 and February 2018 is forecast to rise by 4% year on year, to an average of 10.78 TWh/d, according to the Energy Information Administration. Consumption in 2018 as a whole is projected to grow by 1.5% year on year, to an estimated average of 10.62 TWh/d.

■ **Record-breaking winter temperatures** across the United States sent electricity prices to new highs in late December and early January. This winter is forecast to be 13% colder than winter 2016-2017. Any severe cold snap is most likely to affect the residential and commercial sectors first, as together they account for more than 70% of the country's power demand – industry represents around 25%.

■ **Gas prices** shot up in states where the fuel is a growing source of power generation – such as those in New England – amid pipeline constraints and lower stock levels compared with a year ago.

■ **Higher gas prices** caused power producers to switch to oil products and coal to address a supply crunch and optimise cost-competitiveness. Using more fuel oil and coal highlights the renewed need for greater gas pipeline capacity especially in the northeastern US. However, greater use of oil and coal for electricity generation, which causes more pollution, is only a short-term trend. Gas will remain a dominant fuel in the country's power mix and is expected to account for 32% of generation in 2018.

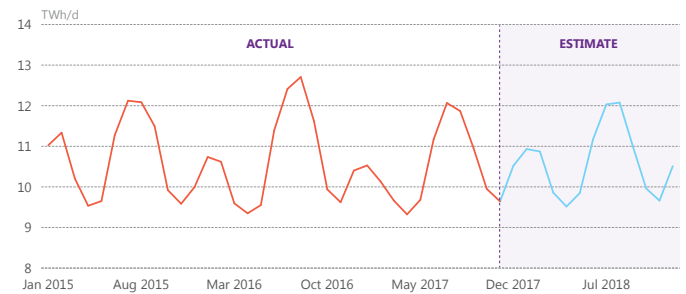
■ **Domestic demand for coal in the US** is forecast to tick up by 0.6% on an annual basis in 2018, to 728.6 mt, as exports fall. Meanwhile, coal demand from the power sector is forecast to rise by 0.8%, to around 677 mt – or approximately 93% of the country's demand for the fuel.

■ **Coal production in the US** is projected to decline by 2.5% in 2018 from a year earlier, to 771 mt, reflecting an expected drop in demand for exports, mainly from China. Global futures prices are generally expected to stay stable at best in the coming months, or remain in backwardation depending on the region. South China's front-month price was at a discount to most other benchmarks in early January, at around \$85/t.

■ **Chile's solar energy expansion** is expected to continue this year after driving down costs. The country achieved the record-low cost for solar photovoltaic generation of \$17.90/MWh in an auction in November 2017, beating the United Arab Emirates' previous best of \$24.20/MWh. Chile's installed solar capacity has more than tripled since 2015, reaching an estimated 2.1 GW at the end of 2017. PFT expects its solar capacity to rise to around 2.3 GW in 2018. Another 1.5 GW was approved for development at the end of summer 2017 and around 8 GW is under review for approval by local government.

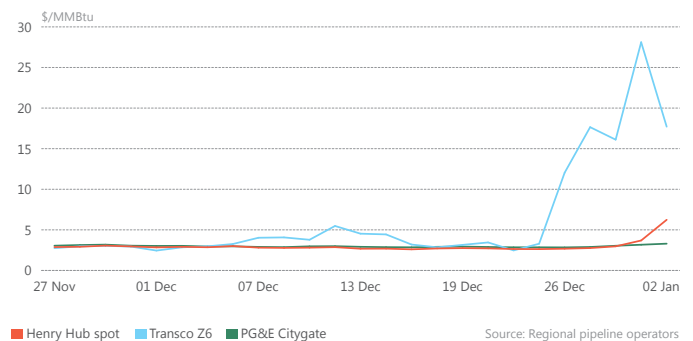
■ **The growth in Chile's solar capacity** supported a 65.2%

ELECTRICITY CONSUMPTION IN THE UNITED STATES



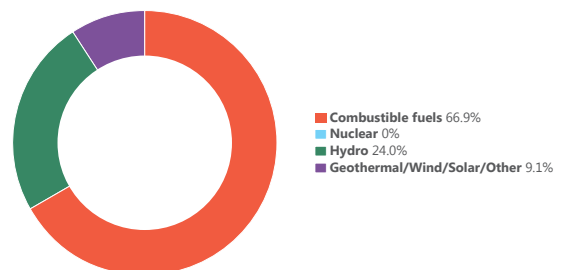
Source: EIA

US REGIONAL GAS PRICES



Source: Regional pipeline operators

CHILEAN ELECTRICITY PRODUCTION BY PLANT TYPE



Source: IEA

increase in overall renewable energy production in September 2017 from a year earlier, to 678 GWh (excluding hydro generation), or 11.2% of total generation. Oil, gas, coal and hydro provided the remaining 88.8%.

■ **Hydro energy** accounted for around 72% of Chile's renewable production in the first nine months of 2017, while solar, wind and other sources, such as geothermal energy, provided the remaining 28% - up from around 20% for the whole of 2016.

■ **Argentina's government** is set to increase its solar PV capacity in coming years, having allocated five projects with a combined generation capacity of 259.5 MW under its RenovAr programme in January. Hydro generation accounts for the majority of renewable generation – PFT expects other renewables technologies to account for 2% of power production in 2019.

German power's emission challenge

Germany is under pressure to move forward with its coal policy and get on track to meet its emission reduction targets. **By Catriona Scott**

GERMANY IS TARGETING a 40% reduction in its emissions from 1990 levels by 2020, but it is expected to miss this target. Although it has pushed the increase of renewable generation and led Europe in new wind capacity in recent years, continued coal burning and the planned nuclear phase-out mean Germany is not on track to reduce emissions from power generation as planned.

In contrast to other major power markets in Europe, Germany has yet to set a date for closing its coal-fired power stations. Italy and the UK have stated they will close their coal-fired power capacity by 2025, while France has set a date of 2023. Coal accounted for around 44% of Germany's power generation in 2017, but the government has not confirmed its plans for phasing out the fuel.

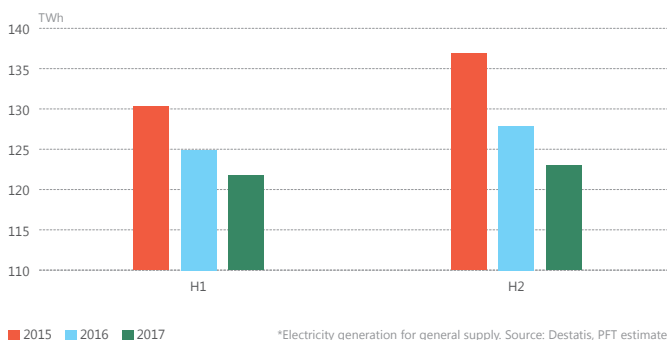
Nevertheless, output from Germany's coal-fired power stations has fallen in recent years and is estimated to have declined in 2017 by around 3% compared with 2016 and by 8% compared with 2015. This decline has occurred while electricity consumption in Germany has grown. The country's electricity demand is estimated to have risen by around 1% on an annual basis in 2017. Although new coal-fired capacity is expected to start up this year, some older capacity was taken offline in 2017 and further shut-downs will be seen this year. With newer, more efficient power stations accounting for an increasing share of Germany's coal-fired capacity, emissions from power generation using coal should decline.

Increased renewable capacity is key to Germany's plans for emission reductions. Wind accounts for around 17% of German power generation, while solar provides roughly 9%. The country added around 5.4 GW of new wind capacity in 2016, accounting for roughly 42% of the EU28's new wind capacity additions for the year. The extra turbines brought Germany's installed wind capacity up to 50 GW, accounting for approximately a third of the EU28's wind capacity. However, while capacity grew in 2016 compared with 2015, wind output did not. Nevertheless, there was an increase in wind output in 2017, and further increases are expected to be seen this year.

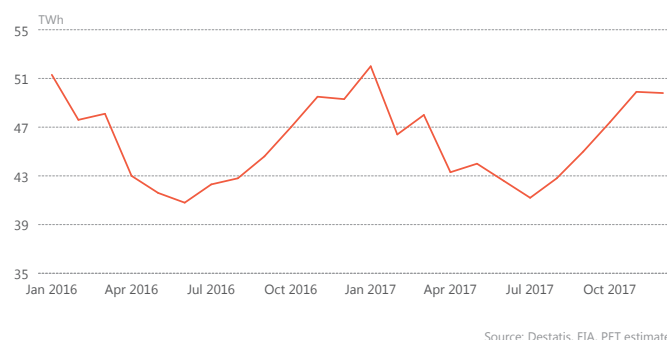
Gains for gas in the power mix are also anticipated in 2018. The share of gas in Germany's power supply increased in 2016 and rose again in 2017. Output from gas-fired power generation increased by around 24% year on year in 2017, according to national data and PFT estimates. Lower gas prices supported the economics of gas-fired generation and the increased offtake from the power sector. Policy support for gas-fired power generation could boost gas output as it remains a less-polluting alternative to coal.

Electricity supply from nuclear power has declined in recent years, and the government is moving to shut the country's nuclear reactors. Nuclear power accounted for around 13% of Germany's electricity generation in 2017 – a material drop from the start of the decade when it provided roughly 25% of the country's power supply. Germany's eight nuclear reactors are currently scheduled to be shut down by the end of 2022.

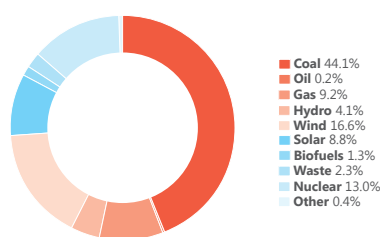
COAL-FIRED POWER OUTPUT



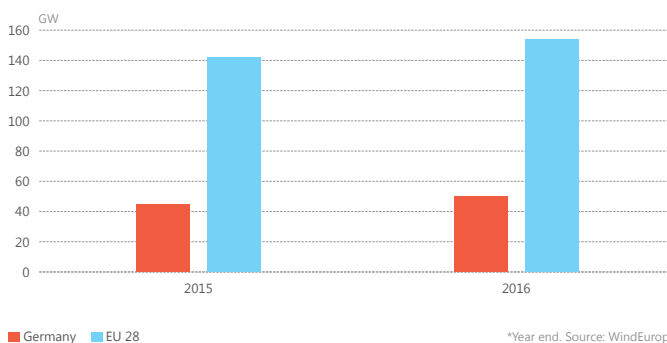
ELECTRICITY CONSUMPTION



GENERATION POWER MIX



GERMANY AND EU INSTALLED WIND CAPACITY*



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