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Argus White Paper:

Turkey power sector coal demand outlook strengthens in 2020

Domestic plant suspensions may boost Turkish coal-fired power generation in 2020, while a new Russian export port in the Black Sea has the potential to shift utilities' buying preferences in the seaborne market

Coal demand outlook boosted by domestic outages

Turkish coal-fired power generation fell by around 200MW on the year to 69GW in 2019 and reduced the power sector's NAR 5,700 kcal/kg-equivalent coal consumption to 22.24mn t from 22.85mn t in 2018, according to Argus calculations. The year-on-year decline in coal-fired generation was a result of record-high hydropower output, which gained by 3.3GW on the year to 10.1GW last year.

Renewable capacity will continue to grow in 2020, but the outlook for coal-fired generation has strengthened as restrictions at plants that run on domestic thermal coal and lignite will likely boost the reliance on other thermal units. Coal is likely to benefit more than gas from the suspensions, as seaborne coal continues to hold a cost advantage over natural gas.

Colombia has historically catered to the majority of Turkish import demand, but Russian exporters may begin to compete more strongly in the region when the new Taman port in the Black Sea starts handling Capesize vessels.

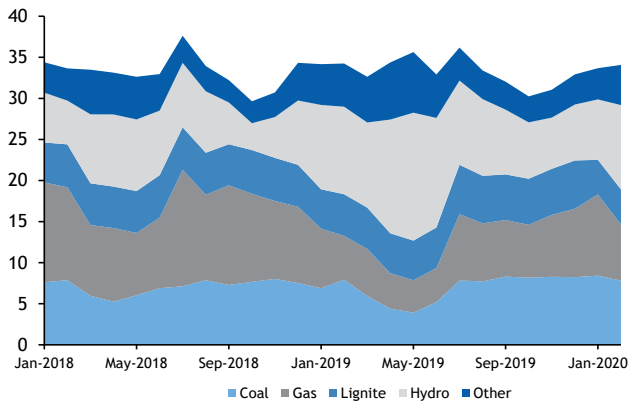
Coal to remain ahead of gas in 2020

Coal-fired generation moved ahead of gas in the merit order in Turkey in August 2018, when state-owned gas distribution company Botas amended its domestic pricing scheme to reflect the increase in its import costs.

Coal-fired utilities have maintained a price advantage against gas-fired units since that date.

Turkey does not have an emissions tax mechanism, but coal-fired generators are required to pay an import tax when coal prices fall below certain levels. The tax effectively fixes fuel costs for coal-fired utilities at around $70/t, equivalent to around $10/MWh.

Turkey power mix *GW*

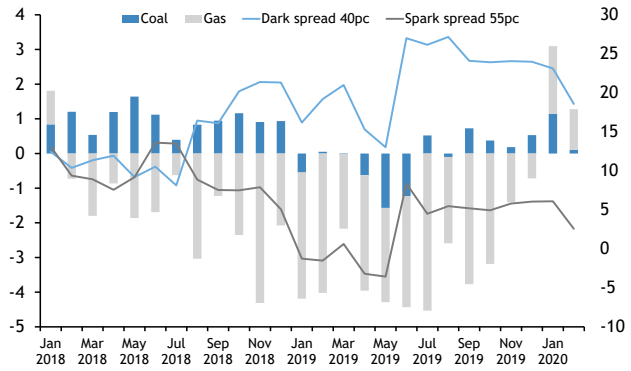


Turkey coal import tax

Turkey imposed a conditional levy on coal imports for power generation in 2016. The tax is triggered only when the Ice Rotterdam balance-of-the month coal futures contract settles below $70/t on the last working day of the week prior to the coal's clearing date from the customs. When the contract settles below $70/t, the importer pays $70/t minus the value of swap contract in additional duties, in addition to the cost of the coal cargo.

Coal
illuminating the markets

Y-o-Y coal, gas output vs margins *TWh, $/MWh*



This caps the outright margins available to coal-fired units when seaborne prices fall below $70/t, as in 2019, but returns for coal-fired generation remain attractive and more competitive than for gas.

In 2019, the tax-adjusted month-ahead dark spread for 40pc efficient coal-fired units averaged $21.76/MWh.

Generation costs for gas-fired units were much higher in 2019, as the country secures most of its gas through long-term oil-linked supply contracts, which restricted utilities' ability to take advantage of lower spot LNG prices last year. Month-ahead spark spreads for 55pc gas-fired units stood at $2.62/MWh last year, using state-run gas utility Botas' regulated tariff for utilities.

Botas' import costs for Russia, the biggest pipeline supplier to Turkey, were around $24/MWh ($6.71/mn Btu) for the first quarter of 2020 and, even though the cost may fall further in the second quarter to around $22/MWh, gas is likely to remain uncompetitive with coal for power generation, as long as Botas' regulated tariff for utilities reflects import costs.

The recent steep drop in oil prices will not translate to a similar level of decrease in Botas' import costs of Russian gas later this year, as the long-term agreement also has clauses that soften the impact on lower oil prices fall below $50/bl.

Renewable additions in 2020

With coal-fired generation firmly embedded ahead of gas in the Turkish merit order, rising renewable capacity presents the only significant downside risk alongside the coronavirus outbreak's possible impact on power demand for coal-fired generation in the near term.

Turkish renewable capacity has grown steadily in recent years and reduced the country's reliance on thermal generation. Annual growth in renewable capacity averaged 3GW, or 8pc, in 2016-19, with the aggregate share of hydroelectric, wind and solar output in the Turkish generation mix rising by 10 percentage points to 41pc over this three-year period.

Renewable capacity growth slowed in 2018-19 but is expected to rebound sharply in 2020 as state-owned hydraulic works administration DSI is planning to bring 1.7GW of hydroelectric capacity on line this year .

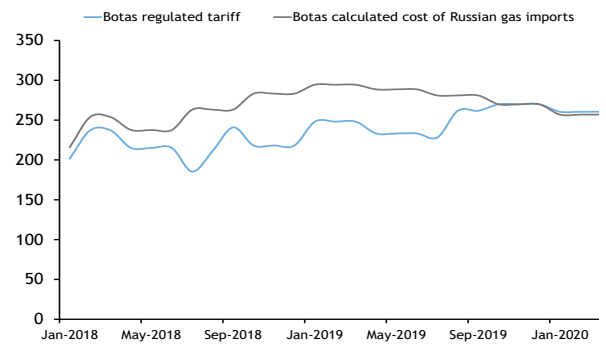
The biggest addition to the country's hydro fleet, the 1.2GW Ilisu plant, located in the hydro-rich area of Euphrates in the Tigris basin, is expected to start generating power in the second quarter of 2020. The plant has been building hydro reserves since the second half of 2019.

Generation from the 517MW Cetin dam in Siirt might also start later this year, after the facility started to build reserves in early 2020.

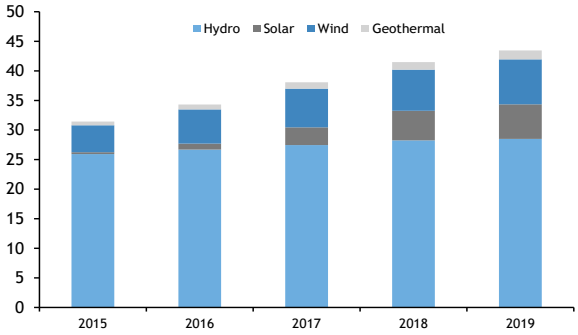
The timeline for the other projects is less certain, but they are also likely to come on line over the next two-year period. The 560MW Yusufeli dam in Artvin is 70pc complete, and the 500MW Lower Kalekoy dam achieved substantial completion in the first few weeks of 2020.

Capacity additions from other renewable sources were moderated last year amid uncertainty about the future of the country's renewable support scheme, Yekdem, and growth is not expected to recover significantly in 2020. Overall additions of wind, solar and geothermal capacity fell to 1.7GW last year, compared with 2.38GW in 2018, according to data from grid

Botas gas tariff vs import costs *$/'000 m³*



Turkey renewable capacity by year *GW*



operator Teias. New installations of solar plants, which made up majority of the renewable additions under the Yekdem scheme, fell to 924MW from 1.64GW in 2018.

The Yekdem scheme offers renewable energy investors state-backed power purchase guarantees for 10 years, but is set to expire at the end of 2020. Renewable plants completed after this date will therefore not be able to benefit from the favourable rates offered to investors through the scheme.

Details about a new scheme to replace Yekdem have not been announced yet, but the government is working on a draft law to extend the mechanism with a lower guaranteed purchase price than in the current scheme.

The government also initiated the Yeka scheme as an alternative to Yekdem, which was meant to boost renewable capacity by holding tenders for larger scale projects. A 1GW tender was awarded in 2017, and despite facing some initial delays, the project is expected to be completed by 2021.

The government is now planning to widen the scope of the Yeka scheme by including smaller scale projects to attract more investors. An auction for 10-50MW solar units in about 40 cities with strong irradiance potential is expected to be held in the second quarter of this year.

But the Turkish government is planning to introduce lira-based price guarantees as part of the Yeka reverse auction mechanism, which might also deter investors' interest in the scheme.

2020 coal burn outlook

The increase in renewable capacity might pressure imported coal-fired generation during the peak-hydro months of April-June, but this is likely to be offset by capacity restrictions on domestic coal-fired plants this year.

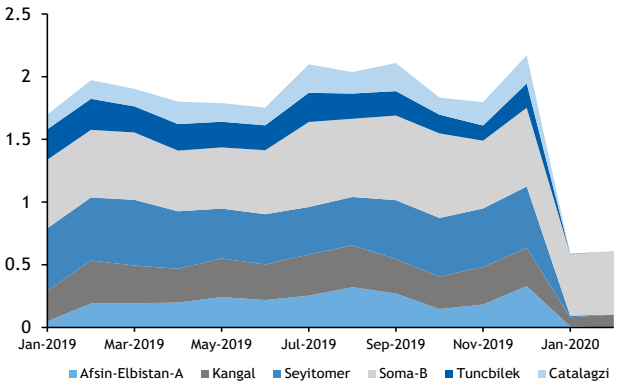
Over the last four years, the utilisation rate of Turkish hydropower units moved in a 25-35pc range. This implies hydropower output could average 7.4-10.3GW this year, when the Ilisu and Cetin dams are factored in, compared with average output of 10.1GW in 2019.

Hydropower output could potentially displace around 260MW of thermal generation from the base load on a year-on-year basis, assuming a 35pc utilisation rate for 2020 and flat overall power demand.

And the utilisation rate of solar capacity was around 20pc last year, which implies that 1GW of solar additions in 2020 could displace a further 200MW of thermal generation from the power mix.

But coal burn is likely to remain firm despite higher renewable output, as the suspension of domestic coal and lignite-fired

Output at restricted domestic coal units *GW*



plants may offset the growth in hydroelectric and solar generation. The government has suspended the operating licenses of around 3.4GW of domestic thermal coal and lignite-fired plants that failed to meet the required environmental standards. But the majority of the Turkish lignite-fired units run with low load factors in the country, which implies the drop in lignite generation is likely to be smaller than the restricted capacity.

Output from the 1.3GW Afsin Elbistan A unit — the plant with the highest capacity among the shut down units — was only 217MW last year, implying an utilisation rate of 16pc, and the country's lignite-fired fleet generation stood at 5.3GW in 2019, implying an utilisation rate of 53pc.

Output has been fully suspended at five plants, with one facing partial closures (*see table*).

Average output from the six plants with restricted capacity fell to 587MW and 607MW in January and February, from 1.9GW and 1.7GW a year earlier.

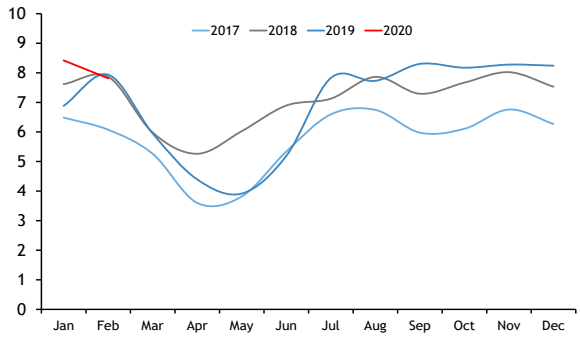
The 600MW Seyitomer lignite-fired plant, which has been off line since 2 January, is expected to complete a filter upgrade by June and could return to partial service in the second quarter. And a 300MW restriction at the 990MW Soma plant could be lifted in May, after the operator completes a filter upgrade.

On this basis, up to 1.2GW of output from domestic coal and lignite-fired plants could be lost year on year in 2020. Lower output from domestic coal-fired plants could support demand

Coal-fired plants with restricted capacity *MW*

Plant name	Capacity	Restricted capacity	*2019* output
Afsin Elbistan A	1355	1355	217
Catalagzi	300	300	171
Kangal	457	457	295
Seyitomer	600	600	453
Soma B	990	330	578
Tuncbilek	365	365	200
Total	**4,067**	**3,407**	**1913**

Monthly imported coal-fired generation *GW*



for baseload generation from plants that run on imported coal and gas, and this can boost the country's imported coal-fired generation to an all-time high this year. Coal-fired generation reached a previous record high in 2018, when output from the country's 8.8GW fleet averaged 7.1GW.

Each 100MW increase in average coal-fired output will add around 300,000t to the power sector's coal consumption, according to *Argus* calculations.

Historically, Turkey's coal-fired generation reaches its lowest in April-May, as most utilities schedule annual maintenances during this peak-hydro period.

Turkish coal-fired plants

But coal burn might be stronger than seasonal levels this spring, with some utilities planning to delay or reduce previously scheduled annual maintenance following the coronavirus pandemic, as they rely on equipment, staff and equipment parts from China for the process.

Supply dynamics might change

Turkey is one of the few key demand hubs in the wider-Mediterranean region with a stable demand profile, with annual receipts of around 30mn t since 2016. Turkish imports rose to 31.72mn t last year, from 31.49mn t in 2018.

Colombia is the biggest coal supplier to Turkey as the power sector — the biggest coal-consuming industry in the country — has shown a strong preference for Colombian coal in recent years.

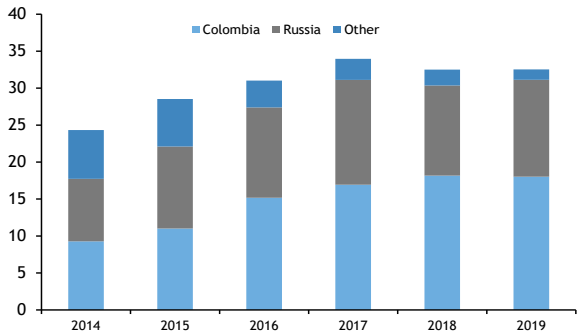
Environmental regulation in Turkey stipulates that imported coal must have a sulphur content of less than 1.2pc and a minimum calorific value of 5,800 kcal/kg, on an air dried basis, which rules out imports of Indonesian and low-grade South African coal.

Russian coal also meets the conditions stipulated in the legislation, but Russian Baltic ports are only able to load Panamax vessels, which means larger Capesize shipments from Colombia have held a competitive cost advantage into Turkey through economics of scale in recent years.

But the new Russian port of Taman, located in the Black Sea, could drive a shift in Turkish utilities' coal preferences, as the port is expected to begin handling Capesize cargoes in April. Taman will reduce the shipping times for Russian cargoes to Turkey to only a few days, compared with more than 20 days for Colombian cargoes sailing to the country on the Atlantic route (*see map*).

Turkish utilities usually settle term deals to secure supply for the majority of their planned annual consumption and procure small volumes from the spot market. The majority of term and

Turkey annual coal imports by origin *mn t*



spot purchases are agreed at a premium or discount to the API 2 index, of which *Argus*' daily cif Amsterdam-Rotterdam-Antwerp assessment accounts for 50pc.

Turkish coal-fired utilities have left more room in their annual portfolio for spot purchases this year to benefit from any optionality that the new Russian port may offer. This could help utilities reduce their costs if they can procure cheaper coal from Taman. But a greater share of spot purchases leaves utilities vulnerable to fluctuations in the Turkish premium to the API 2 index, which has in the past risen to more than $5/t, from historic norms of closer to $2/t.

And Turkish utilities are yet to conclude term or spot deals from the Taman port, with high handling costs and a lack of optionality of suppliers at the port weighing on activity, according to some market participants.

But major Colombian producers' decision to scale down coal production to contain the spread of coronavirus might increase Turkish utilities' interest for Russian coal in the second quarter, regardless of price competitiveness.

Two major Colombian coal producers — Drummond and Cerrejon — announced that they will reduce their coal production operations in late March. It remains unclear whether the decision will impact shipments to Turkey under previously settled term deals, but any disruption could prompt Turkish utilities to make up for lost volumes with Russian coal.

Coal burn potential will grow

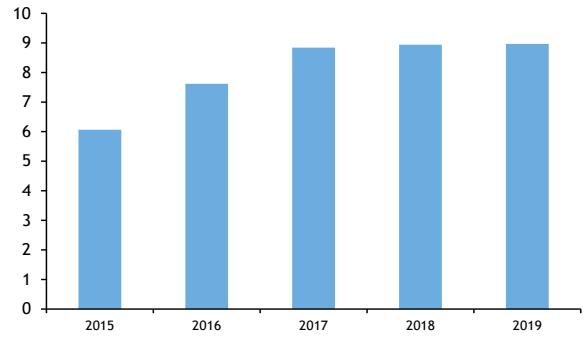
Turkey nearly doubled its coal-fired capacity in 2014-17, but additions have stopped since the 1.3GW Cenal plant came on line in 2017. The Turkish energy ministry last year announced that it will stop granting licenses for new coal and gas-fired power plant projects, but companies that already hold a license will be allowed to complete their investments.

Among the firms that hold licenses to build coal-fired power plants, only Emba Power, a subsidiary of Chinese utility Shanghai Electric Power, is going ahead with their investment. Construction of the 1.3GW imported coal-fired plant in Hunutlu started in September 2019. The plant — which would increase the country's coal-consumption potential by around 2.5mn t/year — is expected to start operations in 2021. But the project might face some delays as a result of the coronavirus outbreak.

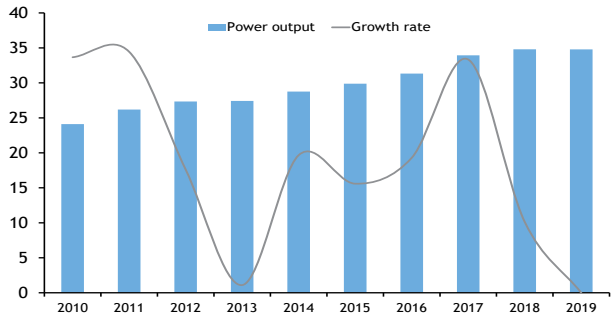
The country's plans to build nuclear power plants may weigh on its long-term coal demand. Construction began at the 4.8GW Akkuyu plant in early 2019 — the first unit is expected to come on line in 2023 with full commissioning by 2026.

The annualised growth rate of Turkey's power demand stood at around 4pc in 2015-19, compared with 4.5pc in 2010-19. The slowdown came as the growth rate fell to 2.5pc in 2018 and stood nearly flat in 2019. This implies that only a recovery in power demand growth, at a rate higher than 2pc/yr, could save thermal generation sources from being displaced by new nuclear units, if the units come on line on the planned dates.

Turkey coal-fired generation capacity *GW*



Turkey annual power generation *LHS GW, RHS %*



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