Gas to Power Journal
Peakload Power and Energy Storage

Focus on gas supply and LNG contracts with 'break clauses'

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India's plan to stop building new coal power plants will boost gas-burn

The Indian government plans to change its National Electricity Policy (NEP) to stop building new coal-fired power plants apart from those already under development, in a shift to gas and renewables. But to operate some 12.5 GW of existing gas generating capacity as peaking plants, the government would have to revise its gas allocation plan to end fuel shortages.

These days, a total of 31 gas-fired power station with a combined 24.9 GW capacity are either stranded or run at sub-optimal levels due to an acute lack of fuel. According to the Institute for Energy Economics and Financial Analysis (IEEFA), these plants were built at a cost of nearly 650 billion Indian Rupies (US$8.2 billion), with some Rs500 billion being debt-financed.

To avoid blackouts during a crunch period from mid-April to the end of May, India's power ministry recently procured 4 GW of electricity from gas-fired power stations through a tender. The tender and reverse auction is part of the ministry's strategy to handle India's rising electricity demand which is forecast to reach at 229 GW in April and rise between 6% and 7% by fiscal year 2024.

RIL to tap new gas fields

Low dispatch of gas-fired power generators is mainly due to dwindling domestic gas production from the KG-D6 basin. Moreover, starting from 2013 the government no longer prioritised the power sector for domestic gas allocation but favoured city gas distributors instead. Since then, gas-fired plants barely received any gas from the KG-D6 basis and had to rely on more expensive LNG imports instead which made them uncompetitive compared to coal-fired units.

Reliance Industries Ltd (RIL) recently announced plans to explore three new fields – MJ, R-Cluster and Satellite Cluster – that could raise production to 30 million cubic meters per day (mcm/d) by 2023, or 30% of India's domestic natural gas production. IEEFA analysts reckon that with India's recently revised domestic gas prices of US$8.57/MMBtu from regular fields, utilising domestic gas

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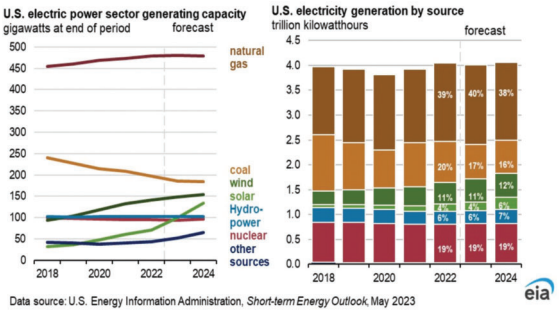
EIA forecasts second-highest gas-burn in the US on record this summer

The US Energy Information Administration (EIA) expects the second highest gas consumption in the power sector this summer at around 38 billion cubic feet per day (bcf/d) as climate change results in more cooling degree day and higher electricity use for air conditioning. Compared with last month's forecast, the EIA increased gas-burn for power generation by 2% this year and 3% for 2024.

Starting with the May 2023 Short-Term Energy Outlook (STEO), the EIA combines a 30-year trendline and the National Oceanic and Atmospheric Administration's forecast to create its owns weather model. This methodology change results in warmer forecast weather both in the winter and summer season, analysts noted. The amount of heating degree days will hence fall by 1% this year and by 4% in 2024, while cooling degree days in summer will rise by 8% this year and by 12% in 2024.



Data source: U.S. Energy Information Administration, *Short-term Energy Outlook*, May 2023

Comparatively low gas prices, rising contribution of renewable energy and coal plant retirement will see the share of coal in the power sector plunge 13% year-on-year. However, due to the need for more electricity output this summer, the dispatch of coal-fired units could be slightly higher than anticipated earlier.

When power demand will peak this July and

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would still be economical for supplying electricity during peak hours or grid imbalance with power tariffs at around Rs 6.2/kWh.

Bundling gas and solar power

Operating 12.5GW of gas-based capacity could be useful to meet maximum peak demand until 2030, complemented with battery energy storage systems.

Analysts hence encourage the government revive a scheme proposed in 2019 to bundle gas-based power with solar power. At the time, GAIL had indicated LNG would cost US$6/MMBtu at a delivery price of US$8/MMBtu for power generation at Rs4/kWh with proposed waivers. This was to be blended with solar power, which was about Rs2.75/kWh then, and the power ministry was hopeful of finding enough buyers for the scheme.

Today, with LNG prices forecast to stay above US$25/MMBtu for the rest of the year and not below US$10 MMBtu until 2027, it is uneconomic to generate electricity from LNG for the Indian markets. Instead, utilities would have to blend domestic gas-fuelled electricity and solar power to reach an average rate way under Rs5/kWh rather than buying at Rs12/kWh as capped in the spot market, the IEEFA suggested.

Launching a higher Time-of-Day Tariff would allow generators with high variable costs, notably gas-fired power plants and battery storage, serve peakload demand. Analysts support such a tariff for a transitional period until renewables combined with energy storage becomes cheaper and more widely available. ■

German industry could get subsidised electricity if it decarbonises

Energy-intensive manufacturers in Germany could receive electricity for 6 cent per kilowatt-hour for 80% of their consumption until 2030 – if they promise to decarbonise and keep operations within the country. This new proposal of the German economy and climate ministry would cost the state between €25 billion and €30 billion which is likely to irritate neighbouring EU countries.

Germany's chemical industry welcomed the proposal as "a game changer," though the beneficiaries will only be a "clearly defined circle of recipients" who agree to reach climate neutrality by 2045 and state in the country. Under the proposed mechanism, if the average annual price on the electricity exchange exceeds 6 ct/kWh, the selected companies get reimbursed the difference.

Site of German chemicals major BASF in Ludwigshafen

Industry welcomes the move

"The industrial electricity price helps us to secure production and industrial value creation and to better master the transformation to climate neutrality," the chemical industry association VCI said. A guaranteed, low industry power price would give firms the security they need to invest into decarbonising their operations, the chemical and mining union IGBCE agreed.

Looking at current future contracts for electricity, the state would incur up to €30 billion to subsidise industry's electricity prices until the end of the decade. The ministry proposed to finance this from the Economic Stabilisation fund, created in March 2020 to mitigate the impact of the pandemic.

To pre-empt criticism from EU country's that cannot support their industry in a similar way, the Germany government vowed it would "enter into a constructive exchange with the European Commission on all competition-relevant questions." One idea is to set up a 'European Bridge Electricity Price' alongside with loans and favourable buying conditions.

In the long run, Germany's energy-intensive industry is meant to receive comparatively cheap electricity from renewable sources – either though a contract-for-difference scheme, or direct power purchase agreements (PPAs) between renewable energy developers and industrial electricity consumers. ■

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August, the U.S. benchmark Henry Hub gas spot price is forecast to hover around $3.00/MMBtu, up from an average of $2.35 in May.

Renewables curtail gas-burn

A stark rise in wind and solar power is the main reason why EIA analysts do not expect natural gas consumption to reach a new record in 2023. In fact, the fast renewables build-out will make gas-burn for power generation decline by 2% and average about 37 bcf/d in summer 2024.

The share of electricity generation from renewable sources is forecast to rise from 22% in 2022 to 23% this year and to 26% in 2024. Low operating costs of wind and solar give them a competitive edge of fossil-fuelled power plants, which will run less and less as the installed capacity of renewables grows.

A significant decline in fuel costs will bolster the use of gas peaking plants this year. Natural gas's share of U.S. generation averaged 39% in 2022, and analyst expect it will average 40% in 2023 before declining to 38% in 2024 as a result of the growing availability of renewable energy generating capacity and an increase of gas prices.

While gas-burn in the power sector is in a long-term decline, industrial gas and electricity consumption hinges on economic growth. A slowdown in manufacturing is expected to lower gas and electricity sales to companies in this sector by 1% this year, while sales to the commercial sector will be almost unchanged. ■

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Latin America's gas deficit grows, net imports may double by 2035

New gas developments are progressing slowly in Latin America, so supply cannot keep up with demand which is forecast to grow 1.4% per year over the next decade to 25 billion cubic feet per day (bdf/d). With supply falling 5.6% over the same period, Wood Mackenzie says the region needs to import 7 to 12 bcf/d by 2035 to meet demand.

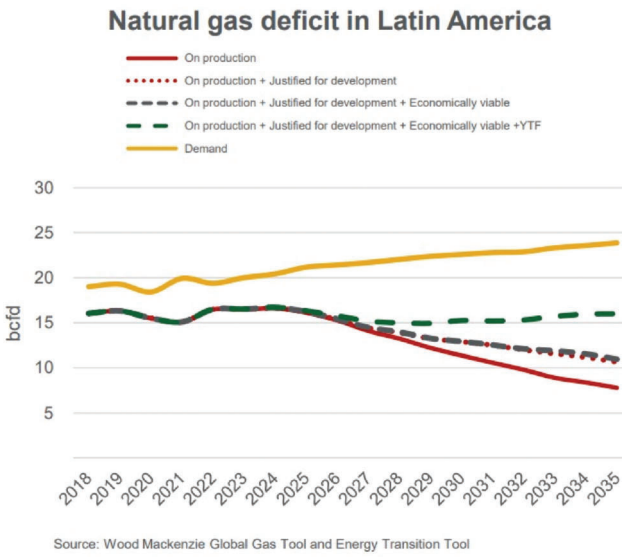
Infrastructure restrictions and unfavourable incentives limit new gas development or search for new resources, hence analysts doubt that incremental supply will meet steadily rising demand.

Countries in the mid-continent will be most challenged with gas integration while Argentina, with its strong reserves, may find opportunities to supply neighbouring countries, said WoodMac's upstream oil and gas analyst, Adrian Lara.

Tap undeveloped resources or import LNG

"Colombia's gas production needs to offset declines of at least 300 million cubic feet per day by 2030 or else it will require a higher level of gas imports. Venezuela has a significant amount of undeveloped gas resources in the Mariscal Sucre offshore assets, estimated at 13.6 trillion cubic feet (tcf), and some of which could be jointly developed with Trinidad and Tobago. Peru also has discovered undeveloped resources in the Camisea region accounting for approximately 3.7 tcf," he said, cautioning:

"The question remains which of these resources can become more attractive to operators, and whether the infrastructure and market restrictions can be overcome in a timely manner." Contingent resources are equal to 80 percent of remaining reserves in Latin America.



Source: Wood Mackenzie Global Gas Tool and Energy Transition Tool

Decarbonisation policies and the shift to clean energy sources will also drive demand for gas-fuelled peaking power plants to balance fluctuating renewable energy. "As many countries shift away from oil and coal in favour of gas to support the energy transition, demand will continue to grow in the next decade," said Lara. "For Latin America countries, the challenge will be meeting this [gas] demand while their own production declines." ■

Shell offers LNG supply contracts with 'break clauses' to EU buyers

With European gas buyers unwilling to agree 25-year offtake due to rapid renewables deployment, Shell started to offer contracts with 'break clauses' – albeit for a higher price – allowing changes to contract terms and destination midway through the deal. Analysts warned unless Europe sees natural gas as a destination fuel, it will pay dearly for it at spot markets.

Qatar typically wants to seal contracts with a term of 25 years or more and recently signed two mega deals with Chinese buyers over nearly 30 years. In contrast, German buyers only looking for a term of 10 to 15 years due to the country's commitment to shift to clean energy sources to reduce emissions. To resolve the issue, Qatar offered Germany LNG supply contracts with a shorter duration but a hefty price premium.

Large portfolio players like Shell are also opening up to signing supply contracts with several 'break clauses,' for example after three, five or ten years when buyers can alter offtake terms, volumes and the destination of LNG cargo deliveries. This allows smaller utility buyers to adapt their gas utilisation for power generation in the face of rapidly falling costs of wind and solar energy.

Renewable additions affect fossil fuel output

Already in 2023, the addition of renewable generation capacity is projected to outstrip the uptick in electricity demand. And from 2025, Rystad Energy expects annual renewable generation additions will start materially affecting total fossil fuel output.

Supply challenges, high prices and falling costs of renewables are undermining the economics of gas for power generation in Europe. At today's prices, it would be 10 times more expensive to keep operating gas-fired power plants than to build new solar PV capacity in Europe, Rystad Energy finds.

With TTF prices forecast at around €31 per MWh by 2030, this puts the levelized cost of energy (LCOE) of existing gas-fired power stations closer to €150/MW – three time than the LCOE of new solar PV facilities. For gas-fired plants to continue being competitive, gas prices would need to fall closer to €17 per MWh and carbon prices would need to fall to €10 per tonne, which is "currently unthinkable," explained Rystad's head of power, Carlos Torres Diaz. ■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Germany to unveil plan for nationwide 'hydrogen highways' by summer

Gas operators are working with the German government on plans for a nationwide hydrogen network that will be presented before the summer. To build the network, a hydrogen TSO with state participation may have to be founded as individual grid operators hesitate to build infrastructure for a fuel that is not yet produced in large quantities.

The new hydrogen TSO would buy and centrally manage all existing hydrogen pipelines and storages in Germany, as well as these yet to be refurbished. RWE, BP and the chemicals producer Evonik, for instance, are already building a 130-kilometre hydrogen network – dubbed GET H2 – to supply industry customers in Lower Saxony and North Rhine-Westphalia.

FNB Gas, the umbrella organisation of Germany's gas TSOs, suggested a hydrogen network spanning 1,200 kilometres and made from repurposed gas pipelines could be built at the "justifiable cost" of €660 million. Gas grid fees would only have to increase by less than 1% by 2031 to finance the project.

Struggling to meet growing demand

The government's initial national hydrogen strategy assumed a demand of 95 to 130 TWh of hydrogen by 2030, though these volumes might soon be revised upwards. This includes derivatives such as ammonia, methanol or synthetic fuels, of which 55 TWh would be made from natural gas (grey hydrogen) and 40 to 75 TWh with renewable electricity (green hydrogen).

By 2030, Germany wants to double installed electrolysis capacity to 10 GW to produce green hydrogen at home but initially almost 70% of these volumes would have to be covered through imports, the government conceded. Critics doubt this ambitious plan is feasible: It is "highly uncertain when the hydrogen volumes that politicians are planning on will actually be available," said Gunnar Luderer of the Potsdam Institute for Climate Impact Research (PIK).

Auction scheme for H2 imports

Keen to source firm supplies, the government has launched an €900 million auction scheme for green hydrogen imports. The idea is to procure the fuel on world markets and sell it to the highest bidder in the EU. Long-term purchase agreements are meant to be arranged by H2 Global Foundation and its subsidiary HINT.CO whereby aggregated volumes of green hydrogen and its derivatives are meant to be bought at the lowest possible prices.

H2 Global is a foundation set up by Siemens Energy, Linde, Nordex and ThyssenKrupp, among others, to help the green hydrogen market ramp-up. The first deliveries of these sustainable hydrogen derivatives to Germany and Europe are planned for the end of 2024.

The German economy minister Robert Habeck announced the government plans to make a further €3.5 billion euros available for new bidding rounds with durations up to 2036. ■

Launch of EU Energy Storage Coalition to boost grid resilience

Industry associations, together with the European Commission, have launched an Energy Storage Coalition to promote sustainable storage technologies that will increase grid resilience as the renewables build-out accelerates. The Commission estimates the need for flexibility in Europe's power system could rise to 30% of electricity demand by 2050 as the share of intermittent energy supply reaches nearly 70%.

Prior to the Ukraine conflict, dispatchable fossil power stations generated a large share of Europe's electricity demand hence the need for grid flexibility was just 19%. In the wake of the energy crisis, however, Europe is keen to rely more on domestic supplies and invests in green energy sources in an effort to reduce its reliance on fossil fuels. Last winter, wind and solar generated more electricity in the EU than coal- and gas-fired power plants.

By 2050, the Commission envisages the share of renewables in the EU's electricity system to reach 80%. But to rely more on intermittent energy sources year-round, Europe needs to store surplus renewable energy either in batteries or in the form of hydrogen.

Storing surplus renewable energy reduces prices fluctuations and lowers electricity prices during peak times. It can also alleviate current grid constraints and minimise grid extension costs.

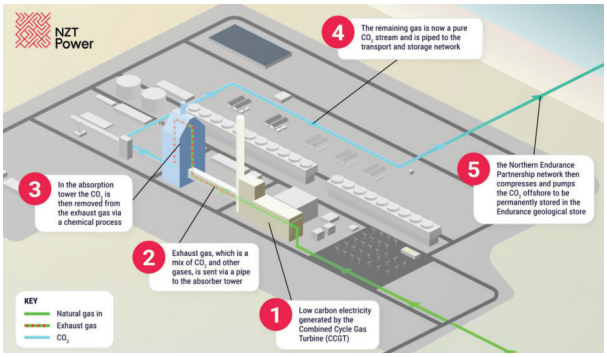
Electrification of industry helps to decarbonise hard-to-abate processes and here is where energy storage can help lower costs and contribute to further renewables' deployment, explained Patrick Clerens, secretary general of The European Association for Storage of Energy.

Earlier this year, the Commission as listed batteries and energy storage as 'strategic technologies' in the Net Zero Industry Act which is expected to ease financing. Member States are required to assess flexibility needs in the grids the next 5 years at least, the EU energy commissioner Kadri Simson explained. She urged national governments to support investment in new energy storage systems through capacity mechanisms, which pay backup power suppliers for making flexible supply available at short notice if requested by the grid operator. ■

BP to take FID on gas-fired power plant with CCS at Teeside in 2024

Final Investment Decision (FID) on BP's Net Zero Teeside gas power plant with carbon capture storage will be taken in 2024, British oil and gas major said as the government will not decide before mid-September on whether to grant a permit. The carbon captured at the plant would be injected into the Endurance storage site in the North Sea.

BP's partners in the Net Zero Teeside gas power plant include the Norwegian company Equinor and the French oil major TotalEnergies while Shell exited the project earlier this year. The project has been shortlisted in phase-2 of the government's CCUS cluster sequencing process. The proposed combined-cycle plant will have an output of up to 860 MW and is meant to capture up to 6 million tons of CO2 emissions per year, which will be dried and compressed before being stored offshore.



Scheme of NZT plant at Teeside

The geographically compact nature of Teeside's industrial cluster, its proximity of offshore CO2 storage sites and strong public support makes it a prime location to decarbonise power sector and industries. Another Net Zero emissions power plant at Teeside with 300 MW capacity is being developed by 8 Rivers Capital and Sembcorp. The 300 MW plant could be commissioned as early as 2025, project partners said.

Once up and running, NET Power process combusts natural gas with oxygen (O2) – rather than air – and uses supercritical CO2 as a working fluid to drive a turbine instead of steam. As a result, near all air emissions are eliminated while 'pipeline quality CO2' is meant to be captured and stored offshore. ■

Shenzen Energy to complete 2 GW combined-cycle project by 2024

The Guangming power project, a 2,000 MW combined-cycle power plant under construction in China's Guangdong province is scheduled to be commissioned in early 2024. The developer and future operator Shenzen Energy has invested an estimated $1.21 billion into the project which is meant to be expanded to 3,000 MW as the regulator encourages coal-to-gas switching.

The provincial regulator, Guangdong Development and Reform Commission (GDRC), has singled out natural gas as an important pathway for its energy transition plans. Start-up of the first phase of the Guangming CCGT alone is estimated to reduce carbon emissions by 3 million tons per year. Powered by GE H-class turbines and Harbin steam turbines and generators, it will help compensate for the retirement of the Shajiao coal-fired power plant due to go offline in 2025.

Industrial coal-to-gas switching and construction of new gas-fired power stations is meant to increase the overall gas use of China's Guangdong province by about 65% over the next five years. In consequence, Guangdong's gas consumption could rise from 29 Bcm in 2020 to 48 Bcm by 2025, with additional volumes to be sourced via a new LNG regas terminal.

Render of the Guangming CCGT

Currently, the province has six LNG regas terminals with a combined receiving capacity of 18.8 mtpa but the addition of some 23.6 mtpa of new regas capacity is envisaged over the next five years. The regulator GDRC specified it anticipates that state-owned PipeChina's Shenzhen Diefubei LNG terminal, Chaozhou Huaying LNG terminal, Guangdong Energy's Huizhou LNG terminal, and state-owned CNOOC's Zhuhai LNG terminal phase 2 projects will be completed and ready to start operations by 2025.

To ensure stable fuel supply for power generation, the regulator aims for enough gas storage capacity in each region to cover three days of demand. A 1 mtpa gas storage terminal in Guangzhou Nansha is expected to be ready by early 2023, and Guangdong Energy is building another 2.8 mtpa gas storage terminal in Yangjiang, due operational in 2024. ■

LS Power buys 2.1 GW gas assets in Texas

New York-headquartered energy investor LS Power has acquired three gas-fired power station with 2,145 MW combined capacity in the ERCOT North region of Texas from Brazos Electric for an undisclosed amount. The three assets include two baseload combined-cycle blocks in Jack County, one CCGT in Johnson County and the four RW Miller peaking units in Palo Pinto County.

The 1,297 MW Jack County baseload gas power blocks are supported by firm gas and storage arrangements. Johnson County and RW Miller, meanwhile, are dual-fuel power units with significant on-site fuel oil storage that provides fuel security at times of gas scarcity.

The transaction is expected to close in early June upon receipt of customary regulatory approvals, LS Power said without elaborating on the price of the purchase.

Nathan Hanson, President of LS Power Generation said the company is keen to acquire critical and reliable assets in ERCOT given that the market is experiencing continued load growth. "The three projects provide for considerable flexibility and operational redundancy, which are key to balancing the intermittency of renewables and supporting ERCOT's reliability requirements," he explained.

Adding the three Texas assets expands the geographic diversity of LS Powers fleets of power generation plans which includes 14,000 of gas-fired capacity and also more than 3,000 MW of wind, solar, hydro and energy storage. ■

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