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MARKET OUTLOOK - TRENDS IN POWER AND GAS



**The world as we have created
it is a process of our thinking.
It cannot be changed without
changing our thinking.”**

— Albert Einstein

It is a time of radical change, disruption and uncertainty in the power and gas industry, as the clash of government regulations and policies, consumer behavior, environmental groups and technologies help drive a rapid transition from traditional fossil fuels to renewables. A raft of environmental concerns, including the link between CO₂ and climate change, have reached a fever pitch and now impact the entire industry. As a result, we do see the potential for increased risks in both the shorter and medium term as fluctuations in both supply and pricing create market volatility and opportunity.

Renewables for power generation have exploded as coal, and fossil fuels in general, along with nuclear, have

been targeted as CO₂ emitters, or in the case of nuclear, as unsafe. The same environmental pressures face the broader fossil fuel extraction industries and techniques like fracking are increasingly challenged by the same forces. In some instances, oil and gas companies are hurrying to redefine themselves as the “green utilities” of the future as shareholders and consumers react to the political landscape and messaging. The utilities are also trying to define their role in the future of power and gas. It is all change in the industry as a result, with a great deal of uncertainty and risk now in play.



What will this mean for trading gas and power?

The rapidly shifting power and gas industries need to become smarter about every aspect of their businesses in order to react, optimize and manage. Technology systems will need to handle much more data, deploy artificial intelligence (AI) and machine learning, run closer to real-time and be more responsive. Clients will need more focus to manage market volatility, risks and exposures in a rapidly changing world. The challenge for technology suppliers is to ensure fully integrated platforms have the flexibility and scale to support their clients' increased requirements for agility, speed and risk management. Everything is shifting and changing from types of assets employed, where generation occurs (prosumers and aggregation), how the grid is managed as it becomes smarter and bidirectional, what role traditional utilities will play in the future and much, much, more.

Natural gas is another significant piece of the energy equation and as abundant cheap gas is increasingly used in addition to renewables for power generation, the two are becoming increasingly and inextricably linked along with carbon. Supply of gas is now abundant¹, and prices have fallen considerably, making natural gas generation an ideal and reliable source for power generation. In the United States (US), both gas consumption and production have shot up and gas has also become a fuel of choice for power generation there. Excess gas supply has also translated into a flurry of liquified natural gas (LNG) facilities, as the US seeks overseas markets for its natural gas production.

In some markets like North America, power trading has become increasingly operational. A similar trend is now occurring in Europe and elsewhere, so that it becomes more about optimizing assets, supply and delivery rather than speculative trading for profit. This means that firms will increasingly require integrated systems to manage automated and intraday trading through to longer-term cross-border trading, market communications, asset optimization and forecasting. At the same time, with an increased emphasis on the supply chain, operational risks increase dramatically in importance as well and managing risk effectively may mean the difference between profit and loss. The ability to automate business processes, get closer to real-time and to alert key users to important activities while tracking activities and decisions in audit trails, are all critical requirements in these changing markets.

The inexorable rise of renewables

According to international policy network - REN21², renewables are now a mainstream power generation option more or less globally *"with over 90 countries deploying more than 1GW of renewable power capability and 30 countries with more than 10GW installed."* Renewable power capacity grew 8 percent in 2018 led by wind and solar, it says, and more renewable power capacity was installed that year than fossil fuel or nuclear combined; it claims that renewables now account for fully one-third of global power capacity. The International Energy Agency (IEA) suggest a lower amount at 24 percent of global power capacity in 2017 reaching 30 percent by 2023³. It is still rapid progress. In the US, the International Energy Agency (IEA) forecasts



renewables to reach around 31 percent of power generation capacity by 2050 while the EU is already above that 30 percent figure. Notably, however, the IEA does forecast slower growth ahead in Europe due to weaker electricity demand, overcapacity, and limited visibility on forthcoming auction capacity volumes in some markets⁴.

Displacing coal

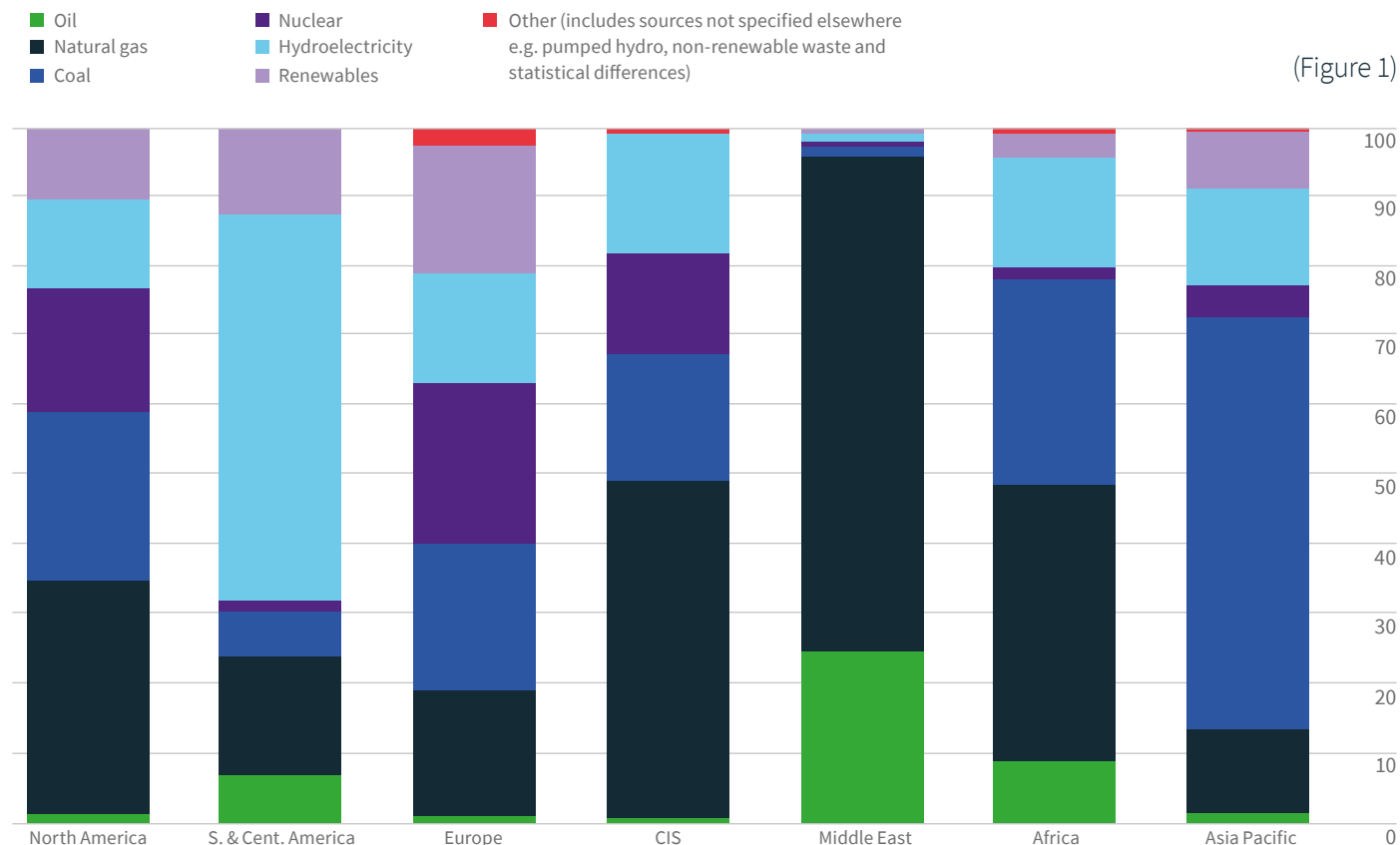
A primary casualty of the move to renewables and increasing environmental concerns is coal. The United Kingdom (UK) is among the leaders in abandoning coal for power generation with a policy to close all coal-powered generation by 2025. Germany has vowed to do the same by 2038. In the US, coal use for generation is also in decline, though this has as much to do with the abundance of cheap cleaner natural gas as it does with renewables. The IEA forecasts that coal generation will supply 18 percent of power by 2050 in the US. In Europe, the price of carbon is also a significant factor as prices on

the EU Emissions Trading System (ETS) have rebounded in the last few years and are widely anticipated to go higher in the future. The price of carbon is also helping to make coal uneconomic as a generation source, and in Germany, lignite plants have already been impacted with coal and lignite power generation dropping 20 percent in the first half of 2019⁵.

Despite this, in other parts of the world, coal use is accelerating and it remains a very important fuel for generation globally. Increased use in the Asia-Pacific region moved global coal consumption upward about 0.5 percent in 2017 and 1.4 percent in 2018, and the demand for coal has led to significant increases in coal prices (which helped make coal less economic in Europe along with those higher carbon prices). Coal remains the largest fuel for power generation globally at 38 percent but along with crude oil, it does appear to be the casualty of the rise in renewables. However, globally, renewables have only made a small dent on the power generation mix (Figure 1).

Regional electricity generation by fuel 2018

Percentage



(Figure 1)

Natural gas is the dominant fuel for power generation in North America followed by coal. In South & Central America, hydro accounts for more than half of power generation. In Europe nuclear, coal, renewables and gas all have a prominent role. CIS and the Middle East, natural gas is by far the most important fuel for power generation. In Africa, natural gas and coal account for almost 70% of the electricity generated. Coal remains the most important fuel in Asia Pacific.

Nuclear power

It is clear that there remains considerable debate regarding nuclear energy and there also appears to be a dichotomy when it comes to how different regions perceive it. Germany shut down eight nuclear generators in the days following the Fukushima Daiichi nuclear disaster in Japan, resulting in an immediate 10-15 percent rise in German wholesale power prices in the weeks following the announcement. Subsequently, the decision was taken to keep those eight facilities shuttered permanently and to close all other nuclear generation plants by 2022. However, according to the IEA 2017 report⁷, interest in nuclear power remains particularly strong in the developing world. Over the short term, the low price of natural gas, the impact of renewable energy sources on electricity prices and national nuclear policies in several countries – following the accident at Fukushima in 2011 – are expected to slightly negatively affect nuclear growth prospects. There seems to be a growing movement of support for nuclear generation, but the planning, construction and commissioning cycle is lengthy enough to push out any increased nuclear generation well into the future.

Constraints to renewables

The growth of renewables looks unassailable, yet there are issues arising that could slow their growth and there are emerging signs of a growing pushback. While advocates of renewables are convinced that a 100 percent renewables future is not just necessary but also feasible, others disagree. Furthermore, many in the industry still express a degree of concern and caution over the speed of the transition and its impact upon grid reliability. Increasingly though, the move to renewables is legislatively compelled by national and regional government via the use of subsidies and penalties. There do appear to be a number of potential issues facing renewables. These include:

- Increasing evidence that renewables are making electricity more expensive particularly as subsidies expire
- Projects are increasingly blocked by wildlife conservationists and local communities
- More investment is needed in grid infrastructure and processes to insure against the volatility of renewable power supply
- The speed at which the transition in some locations is taking place could result in security of supply issues

For example, in Germany, politicians have been driving the “energy transition” and this has aided the remarkable rapid increase in renewable power generation as well as the loss of significant coal and nuclear generation. In fact, Germany will lose some 12.5 gigawatts (GW) of coal generation capacity and the last remaining 10 GW of nuclear capacity by 2022, leaving it with below 80 GW of conventional capacity, according to a government-commissioned panel in January 2019. With peak energy demand running close to 82 GW, the government is certain that there will be nearly enough reliable capacity to meet peak demand. The transmission system operators on the other hand estimate around a 5.5 GW shortfall between peak power demand and reliable capacity in 2021, before even factoring in the coal plant closures, and they disagree, while industrials remain concerned about rolling blackouts and power cuts.

In the UK, a similar scenario exists as coal is being phased out and renewables are proliferating rapidly. There, a recent blackout in August 2019 brought the issue sharply into focus for many commuters and consumers across the country. Current findings suggest that the blackout was not caused by wind variability, but by low system inertia and insufficient capabilities to respond to such an event. Low system inertia, the network’s level of resistance to changes in frequency, is made worse by high levels of non-synchronous renewable generation, insufficient flexible capacity and “oversensitive plant protection mechanisms” according to Aurora Research⁸. Aurora suggests that more *“flexible capacity is needed such as batteries, reciprocating engines and demand-side response to provide synthetic inertia in the grid.”*

As renewables are deployed and as they displace other types of generation, careful attention must be paid to modification of the grid and operational processes, and while rapid technological advances in battery technologies⁹ and operational processes are occurring, it will still take time, and deployment must not come with the cost of loss of supply stability.

Meanwhile, in New York, the legislature passed the *“Climate Leadership and Community Protection Act”* with an objective of generating 70 percent of electricity from renewable sources by 2030. In a political effort to be seen as “green,” the state authority’s Department of Environmental Conservation also denied a water permit for a new natural gas pipeline despite warnings from business leaders and utilities that the decision could devastate the state’s economy and bring a gas moratorium to New York City and Long Island¹⁰. The local gas utility, National Grid, has subsequently had to deny 2,600 customers access to natural gas as it doesn’t have enough supply. Politicians

and environmental groups blame National Grid and have threatened to levy penalties and sanctions, and even consider alternative suppliers.

In Germany, both wind and solar have slowed considerably. Just 35 wind turbines were deployed so far in 2019 against a target of 1,400 per year¹¹ and the wind turbine industry has shed 25,000 jobs as a result of the slowdown. The electricity grid operator now often has to cut off electricity from industrial wind farms on windy, low-demand days, to avoid blowouts. Similar things are happening elsewhere – in California, neighboring states are paid to take excess solar power on sunny days. Subsidies are being removed as well in many areas and renewable power is expensive despite what its advocates say. *Die Welt* recently reported that offshore wind is driving up German power prices¹² and in Australia, the media¹³ warned of price spikes, as examples. An academic report from the University of Chicago also found higher prices¹⁴.

Ironically, the environmental impacts of wind and solar are also coming under question. Wind turbines are increasingly associated with massive rates of endangered bird, bat and insect species deaths and in Germany, for example, wind farm operators and developers say that endangered species protections are an “*absolute planning obstacle*” and are seeking to be exempt such rules¹⁵. Solar and other renewables like biofuels are also increasingly facing environmental resistance¹⁶ due to pollution, land use and siting concerns, and sustainability issues.



Natural gas and LNG

Natural gas is another significant piece of the energy equation. Supply is now abundant¹⁷, and prices have fallen considerably, making natural gas generation an ideal and reliable source for power generation. In the US, where long-reach lateral drilling and massive hydraulic fracturing techniques have opened huge oil and gas shale basins for exploitation, natural gas production continues to set new records and has positioned it as the largest global producer. According to the US Energy Information Agency (EIA)¹⁸, dry gas production was more than 93 billion cubic feet per day (Bcf/d) in August 2019, an increase of more than 7 Bcf/d over the same period last year. Despite relatively low prices and a slowing of drilling activity, producers in the US still have a backlog of several thousand drilled but uncompleted wells in their inventory, and new volumes can be quickly brought online should market prices firm above their current range of \$2.50 – \$2.75/mmbtu at Henry Hub.

Fortunately for producers, much of this production increase has been taken up by power generators as natural gas continues to displace coal for baseload generation, even as renewable sources, such as solar and wind, continue to come online. Gas burned for US domestic power generation increased rapidly over the last decade, growing from 20.2 Bcf/d in 2010 to 28.8 Bcf/d in 2019. Though current forecasts anticipate demand growing more moderately going forward, with 30.3 Bcf/d expected to be burned for power generation in 2030, natural gas will continue to play a role in the US energy mix for the foreseeable future.

Additionally, with the growing demand for natural gas for power generation globally, particularly in the European and Asian markets, the massive development of LNG liquification and export facilities along the Gulf Coast of the US to service global demand will continue to drive increased exports of natural gas through the next decade. According to the latest EIA forecasts, natural gas volumes delivered for export via LNG is expected to more than double in slightly more than a decade, growing from about 6 Bcf/d in July of 2019 to more than 14 Bcf/d by 2030, as existing facilities continue to expand and new ones are brought online.

If it were left purely to economics and security of supply, use of natural gas would likely continue to increase, along with renewables, as a generation fuel. However, here too, political and environmental lobbying is having an impact in the US, adding to uncertainty. As reported by Reuters, “dozens of cities in liberal-leaning states such as California, Washington and Massachusetts are studying proposals

to ban or limit the use of natural gas in commercial and residential buildings.”¹⁹ Despite that, natural gas demand is surging along with production and many view it as a clean power generation source and fuel in comparison with other hydrocarbons.

The abundance of natural gas in producing areas has also resulted in the emergence of a global LNG business, as areas like Europe and Asia compete for LNG shipments from the US, Russia and Australia. According to BP, global LNG supplies were up 10 percent in 2017 and global production of natural gas was up 5 percent. This trend is likely to continue with significant investment in LNG terminals and vessels taking place across the world – and in the US, current EIA forecasts indicate LNG exports will double by 2025.

Other factors

Consumers in the West are now more environmentally driven and their behavior is also having a growing impact. Examples include the growing use of hybrid and EVs, which may also be subsidized and eventually mandated legislatively, which will add a greater burden to the power generation industry but might also add a demand response possibility via use of EV batteries²⁰. Consumers also desire green power and are willing to pay a small premium. This is driving a need for enhanced traceability to show that power supplied is coming from renewable sources. Smart appliances and home generation through roof solar panels and so on is also potentially driving more stable demand profiles and also the prosumer, selling excess power back into the grid. It is truly a time of change and all of these factors play into the supply-demand equation.

Looking forward

Renewable generation remains the key area of growth for the foreseeable future, rapidly displacing coal, lignite and crude oil-based generation around the world, but particularly in the West. Similarly, natural gas is cheap, relatively clean and available, and it will provide a formidable competitor to renewables in many regions, offering greater stability of supply as an additional benefit. However, outside of North America and Western Europe, fossil fuels will continue to make up the largest proportion of the generation mix for some time to come, and the clean burning coal generation technologies being deployed in China may also have the effect of postponing coal's demise and become an alternate and cleaner generation fuel in the future elsewhere.

What is readily apparent is that power and gas are now at a crossroads. Pressures around environmental concerns, technology development and deployment such as battery technologies, for example, and a rapid shift in supply and demand patterns as a result of the US' transformation into an oil and gas producer, the economic growth in Asia, and the excess of cheaper gas and LNG on the market will dictate future trends. Despite that, renewables, smarter grids, batteries and optimized operational and business processes seem to be a part of all future scenarios in which, perhaps, generation will be more closely matched to consumption locally. Key to the ability of stakeholders in the industry to adapt and change will be technology adoption led by digitalization and automation.

 **Change is the only constant in life.”**

— Heraclitus



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FIS solutions for energy and commodities help utilities and retailers, pipeline and storage operators, marketers and traders as well as integrated energy companies compete efficiently in global markets by streamlining and integrating the trading, risk management and operations of physical commodities and their associated financial instruments.

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