

Half-Year Report

// JULY 2020



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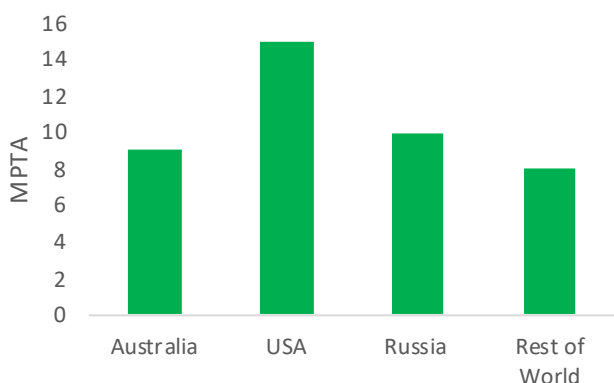
The start of 2020 won't be a time period we forget in a hurry. Set against the backdrop of a worldwide pandemic and unprecedented market activity, we welcome you to our market report covering the first half of the year. Within this report, we focus on several key market developments and influences since the beginning of 2020, split by fundamentals, ancillary services and regulation.

FUNDAMENTALS

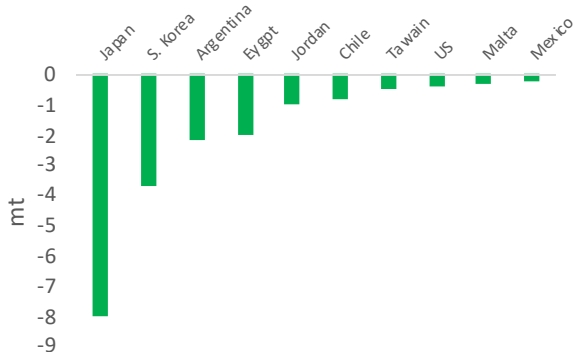
If you cast your mind back to the start of the year, there were a few factors dominating the energy sector that led to cheap gas (and subsequently lower power prices) throughout Europe:

- Healthy liquid natural gas (LNG) supply to Europe
- Strong renewable output
- High levels of European gas storage
- The beginning of lockdown for the UK
- Russia/ Ukraine transit deal agreed

LNG Supply Growth by Country 19 vs 18



LNG Demand Change by Country 19 vs 18

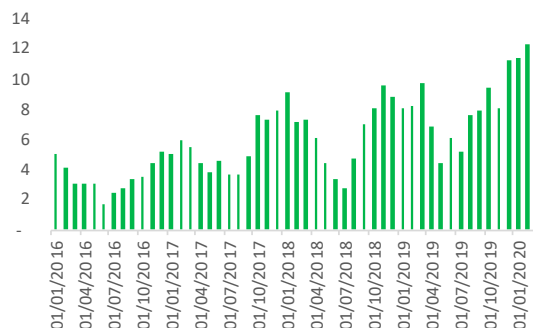


Source Shell

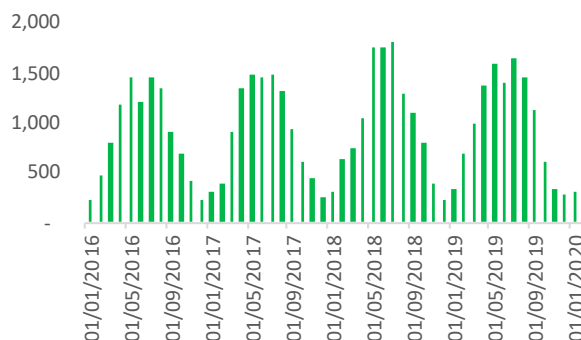
LNG supply: Significant volumes of LNG were flowing to Europe at the start of this year due to a structural oversupply in Q1, but why? We can see in the above graphs that LNG supply levels rose considerably in 2019, while demand reduced in key markets, notably Japan and South Korea. A mild winter and higher than expected nuclear output drove the weak demand in East Asia. Temperatures were roughly 1°C higher than the five-year average and Japan/ South Korea saw nuclear output increase from 5% to 7% and 23% to 26% of their respective generation mixes. Both these factors led to a decline in LNG demand in these markets and the surplus

flowed to Europe, which was able to absorb it. The reason we see cyclical swings in LNG markets (as well as gas markets in general) is due to the long lead time (circa five years) between making a Final Investment Decision (FID) and a project becoming operational. Hence the market often moves from oversupplied to under-supplied. This means parties may make an FID with a limited view of what the future will look like when the project is set to come online.

Monthly Wind Generation (GWh)



Monthly Solar Generation (GWh)

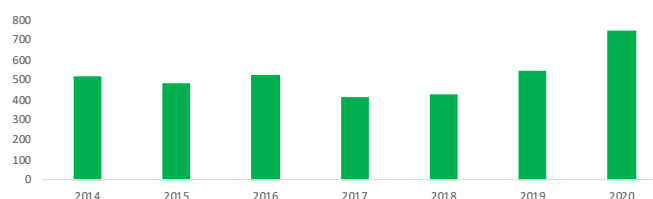


Source ELEXON, Sheffield Solar

Renewable output: We experienced high levels of renewable output during the first quarter of this year with three named storms (Ciara, Dennis, and Jorge) occurring within quick succession, leading to a record wind output in March, with over 13TWh generation (see chart above). We also saw May given the title of 'sunniest May on record' by the Met Office. There were 266 hours of sunshine vs the previous record of 265, in June 1957.

Unsurprisingly, PV output was also at a high with just shy of 2,000GWh generation (see chart above). The strong wind, high solar and healthy LNG levels combined meant that gas storage levels remained healthy throughout Europe and gas storage was not drawn down as much as usual over winter.

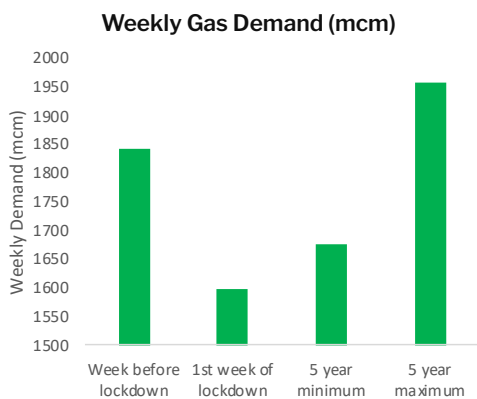
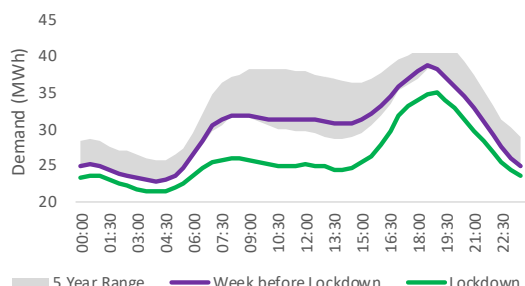
Average Q1 European Gas Storage (TWh)



Source ELEXON, National Grid

COVID-19: In February/ March we experienced what economists call a demand shock. Coronavirus has had a profound impact on the world and the commodity markets were impacted severely. One by one, countries entered lockdown to prevent the spread of the virus, and large sections of economies virtually shut. This reduced demand for commodities, with industrial and commercial load declining and a delayed morning peak altering the residential demand shape.

Average power demand throughout the day (GWh)



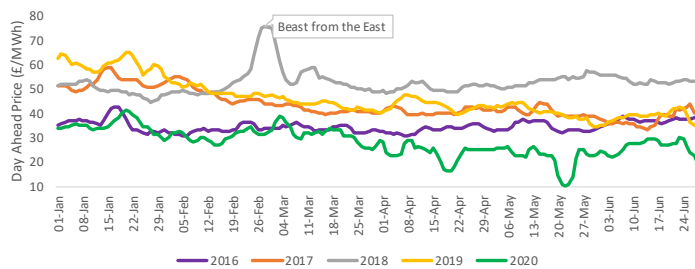
The charts above show power and gas demand the week before lockdown and the week after lockdown (and compared with the same time period's five-year range). Demand for power and gas fell 13% in the preceding week after lockdown measures were implemented. These represent the lowest levels of demand in at least the five years prior.

Russia/ Ukraine: Their transit deal was agreed at the end of 2019, which allows European access to Russian gas via Ukraine for the next five years. In due course, Russia will be able to bypass Ukraine with a new pipeline that is under construction (Nordstream 2), allowing access to Europe upon completion (current estimates are 2025); this should reduce the requirement for further transit agreements.

WHAT WAS THE IMPACT OF THESE FUNDAMENTALS?

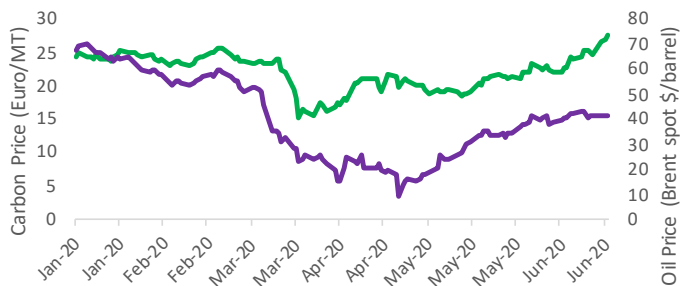
We can see that Day Ahead prices are at five-year lows. The picture is more pronounced if we take individual days with high renewable output. We saw negative Day Ahead prices for the first time at the end of 2019, and in Q1 of this year there have been multiple instances of negative prices at Day Ahead, with parties paying to generate. We investigated this phenomenon further with a case study of Monday 20th April, which can be found on [our website](#).

5-day moving average Day Ahead Price over time



Coronavirus and the subsequent lockdown also had an impact on wider commodities. The graph below charts the impact on carbon and oil. The two commodities are not strictly correlated but have moved in tandem during the first half of this year. Carbon and oil prices both moved with global macroeconomic sentiment, with many foreseeing big disruptions to economies because of coronavirus and a resulting in a decline in price. Since mid-April, both have had recoveries in prices.

Carbon and Oil prices



ANCILLARY SERVICES

Monthly and weekly FFR pricing analysis

The table below shows the volume weighted outturn prices (£/MW/h) for dynamic FFR by month, EFA block and auction type.

EFA	JAN-20		FEB-20		MAR-20		APR-20		MAY-20		JUNE-20	
	Monthly	Weekly	Monthly	Weekly	Monthly	Weekly	Monthly	Weekly	Monthly	Weekly	Monthly	Weekly
1/2	£6.61	£6.06	£6.38	£6.48	£6.09	£4.60	£6.52	£7.17	£6.38	£7.00	£6.2	£3.75
3/4	£7.28	£9.26	£7.82	£10.40	£7.25	£8.47	£7.47	£7.60	£7.15	£5.45	£7.02	£6.50
5/6	£30.18	£9.27	£28.76	£11.27	£8.88	£12.11	£8.74	£7.40	£7.83	£4.88	£7.92	£7.60

The weekly auction is a pay as clear (whereas monthly is pay as bid) and procures only 100MW, (whereas the monthly auction procures around 350MW). Because of this, the bidding behaviour of a few big units can have a significant impact on prices and that is why we are seeing more variance in the weekly auctions.

There are a few interesting trends to consider.

EFA blocks 5/6 in January and February show a large monthly-weekly variance: why? Parties were bidding into the monthly auctions at price levels to make up for lost triad avoidance revenue. At the week-ahead stage, customers had more clarity around whether a triad would be likely in the following week, so were able to bid in at lower levels (if they thought no triad would occur) or avoid a specific EFA block on one day (if they thought a triad could occur).

More recently, in June and May, the weekly price has been pressured down below the monthly price in several EFA blocks due to the bidding behaviour of several larger units bidding (presumably) below marginal costs to guarantee revenue.

FFR WEEKLY PARADOXICALLY REJECTED BIDS AND OUR NEW BIDDING STRUCTURE

Limejump is excited by the new FFR bid structures that EPEX and National Grid provide, including parent-child orders. This new bidding structure reduces the risk that the EPEX clearing algorithm will paradoxically reject the bid.

Paradoxically rejected bids are more problematic for larger units, as they have a higher probability of setting the clearing price. These type of bids are ones that the EPEX algorithm rejects due to volume constraints; as an example, if National Grid were trying to procure 100MW and they had the following bids:

- 90MW £3.50/MWh
- 20MW £4.00/MWh
- 10MW £4.25/MWh

In this case, the 20MW bid could be paradoxically rejected as National Grid only wanted to procure 100MW, and even though the bid is cheaper, it results in 110MW of the service being procured, which actually ends up costing more ($3.5 \times 90 + 4 \times 20 = £395$, vs $3.5 \times 90 + 4.25 \times 10 = £357.50$).

A parent-child bid structure reduces the risk of having volume rejected in the auction, because they allow National Grid to partially clear volume. National Grid must accept the parent and the child can be partially accepted. To take the above example, if National Grid again wanted 100MW and they had the following bids:

- 90MW £3.50/MWh
- 8MW parent (20 MW unit) £4.00/MWh
- 12MW child (20 MW unit) £4.00/MWh
- 10MW £4.25/MWh

National Grid could accept the first two orders and partially accept 2MW of the third order; hence this unit secures some volume in the auction unlike in the previous example.

FFR PORTFOLIOS AND MARKETS THAT OUR COMPETITORS ACCESS

Below we present an objective view of our competitors' FFR portfolios and the markets they can access. Note that we focus on other aggregators who have significant battery portfolios. To calculate the assets under management, we took the latest FFR tender round results and combined them with results from long-term tenders.

COMPANY	BATTERY ASSETS UNDER MANAGEMENT*	ACCESS TO THE BALANCING MECHANISM **	ACCESS TO EPEX INTRADAY MARKETS ***	ACCESS TO DAY AHEAD AUCTIONS**	SYSTEM PRICE CHASING
LIMEJUMP	83	X	X	X	X
HABITAT	74		X		X
EDF	68	X	X	X	X
KIWI POWER	31				X
FLEXITRICITY	26	X			X

*Source monthly FFR auctions | **Source [ELEXON](#) | ***Source [EPEX](#)

Note it is possible for parties to access these markets through intermediaries which we have not captured here

NEW NATIONAL GRID OPTIONAL DOWNWARD FLEXIBILITY MANAGEMENT PRODUCT RELEASED

In early May National Grid released a new product to cope with low national demand as a result of Covid-19 called Optional Downward Flexibility Management (ODFM). The new product allows National Grid to switch off embedded generators, in times of high renewable generation and low demand that they previously were not able to access. Limejump are thrilled to have been part of the ODFM product since the very first auction, and provided some of the first embedded solar turn down ever for National Grid. More information can be found in our blog posts [here](#).

CAPACITY MARKET

The Government reinstated the Capacity Market in Q4-19. This removed significant uncertainty around our customers' revenues.

The Capacity Market ensures security of electricity supply by providing a payment for reliable sources of capacity and is for delivery at various different timeframes (e.g. T-1 is capacity for delivery in one year).

The latest round of auctions took place on 30th January with the T-3 (for capacity delivery in 2022/23), followed by the T-1 (2020/21) on 6th February and finally the T-4 (2023/24) on 5th March.

The T-1 is a 'top-up' auction depending on what volume was purchased for that year in the previous T-4 auction. For this T-1, the required volume was very low, and the auction was significantly oversubscribed, leading to an outturn price of just £1.00/KW/pa. The majority of the 1GW of volume awarded went to the NEMO interconnector (820MW).

As shown in the table below, the multi-year auctions had both the lowest contract price of £6.44/Kw/year for the T-3 and the highest since the 2016 Prequalification at £15.97/Kw/year for the T-4. The main reason for the difference was less existing generation winning contracts in the T-4 (77.7%) compared to the T-3 (81.9%). Across both auctions, we saw some CCGTs and nuclear sites fail to win a contract. Similarly, less volume was won by coal plants as they meet their phased close down by 2025.

New build contracts that won contracts included the new interconnectors: ElecLink and IFA2. This was also the first series of auctions that non-subsidised solar and wind assets could enter the capacity market, albeit with low de-rating factors reflecting their reliability. The T-3 auction saw five such sites win a contract and three in the T-4 auction.

	T-3	T-1	T-4
AUCTION DATE	30 th Jan 2020	6 th Feb 2020	5 th March 2020
DELIVERY YEAR	2022/2023	2020/2021	2023/2024
AUCTION VOLUME	45.09GW	1.02GW	43.75GW
AUCTION PRICE	£6.44/kw/pa	£1.00/kw/pa	£15.97/kw/pa

As a result of COVID-19, the Government is proposing to extend some of the capacity market deadlines. At this stage they are still planning that the 2020 Prequalification for delivery in year 2021/22, and 2024/25 will take place this summer. **If this is something you would like to participate in, please [contact us](#).**

REGULATION UPDATE

Dynamic containment delayed

Delays were a feature of the front half of 2020 and pressing global issues took priority over BAU. National Grid have delayed their release of the new Dynamic Containment product. This post fault service is one in a suite of products designed to replace dynamic Firm Frequency Response. We provided more information on Dynamic Containment in the [Q4-19 blog](#).

National Grid had planned to roll out the service from June 2020, but owing to COVID-19 and the rapid change in transmission system needs, they have decided to delay the release indefinitely. We are working closely with National Grid and will look to participate in the new product when more details are released.

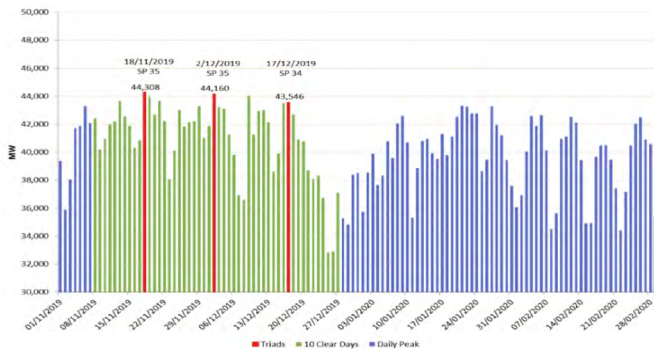
BSUoS payments capped

Ofgem approved an urgent modification to cap BSUoS payments at £15/MWh and defer those costs above that level to 2021/22. This modification is live from 25th June until 30th August. This modification was raised by the industry as National Grid were incurring higher than average costs to balance the system; this was owing to unusually low demand as a result of COVID-19.

Triad dates published

Triads are the three half-hour settlement periods of highest demand on the GB electricity transmission system between November and February inclusively and must be separated by at least 10 days.

As can be seen in the graph, all three triads occurred before Christmas, for the first time since the system began in 1990. This can be largely attributed to a mild winter.



Source National Grid

Triad-based charges are set to be replaced by fixed charges from April 2022, following Ofgem's Targeted Charging Review. This change has been delayed from the original date of April 2021 due to the complexity in setting up the new methodology which will be a charge per day, per site, depending on each consumer's region, connection voltage and maximum import capacity or annual consumption.

Virtual Lead Party live

Virtual Lead Party is a new route to participate in the Balancing Mechanism for those not holding a Supplier License. It officially opened in December but the first participant started in April. As Limejump holds a Supplier License and was the first aggregator to participate in the Balancing Mechanism, it already has access to this market via the Supplier route.

We also note that for an efficient settlement process, the VLP requires modification P375 to be passed. This would allow settlement to be based on meters behind the boundary meter which is not currently scheduled to go live before Q1 2022.

TERRE delayed

The Trans European Replacement Reserve Exchange (TERRE), the European balancing product required by European legislation, has been delayed until October 2020 at the earliest. TERRE is managed by member Transmission System Operators (TSOs) from across Europe and allows participants from member countries to take part in hourly auctions for four 15-minute blocks.

The GB participation in TERRE had previously been delayed due to technical issues with the French TSO upon which our participation relies. While National Grid confirmed its preparation was on track for delivery by the 30th June deadline, it has now taken the decision to delay due to COVID-19.

Last year's 9th August blackout

On 3rd January Ofgem published its findings on its investigation into last year's 9th August blackout. In parallel, the Energy Emergencies Executive Committee (E3C) also published its final report. As a result of the findings, fines of £10.5m were charged.

Since the announcement of the findings, National Grid has started modifications to address these issues which are likely to lead to additional volume or product requirements. We will, of course, update you as this progresses.

COVID-19

In order to prioritise industry deliverables, Ofgem published guidance on 8th April for Suppliers and System Operators in which they de-prioritised all non-essential work. Similarly, they reviewed their projects more broadly in mid-April and have pushed back non-essential work programmes by a few months e.g. BSUoS task force, review of code harmonisation review, etc.

If you have any questions or comments about the information mentioned in our half-year report, or general questions about Limejump's work, we would be very pleased to hear from you.