Gas Explosion: What Caused the 2021 UK Energy Crisis?

One of the most interesting tidbits of recent news to impact the markets has been the squeeze of natural gas prices on the wholesale markets in the United Kingdom. While comparisons can be drawn to historical events to rank its severity, the chart below does a better job speaking for itself:

It may be tempting to discount natural gas as yet another meme stock or as a casualty of supply shocks resulting from the COVID-19 pandemic, the truth of the meteoric rise is significantly more complex. Regardless of opinion, unless you were an ill-positioned short fund, Gamestop presented for most no more than a news curio, while the impact of the natural gas surge has already had significant negative impacts not only on the energy and foodstuffs industries, but on the end consumer and the broader economy.

To limit consumer exposure to natural gas market price instability in the United Kingdom, Ofgem, the Office of Gas and Energy Markets, has capped prices for both fixed-rate (since 2017) and variable rate (since 2019) energy plans, adjusting prices biannually. This cap means that during price squeezes, insufficiently hedged energy suppliers bear the brunt of wholesale price increases and must provide gas to end customers at a loss. Despite increasing the cap over 10% on October 1st for end customers, this has done little to alleviate the suffering of United
Kingdom natural gas suppliers. In September alone, nine suppliers representing nearly two million domestic customers in the United Kingdom became insolvent, requiring Ofgem to arrange service continuation strategies to reduce consumer impact.

Worse yet, most predict the situation to increase in severity as winter arrives, given the intuitive correlation of energy usage and ambient temperatures.

As a rule of thumb, we expect heating needs to increase as temperature drops and vice versa. This has led many to ask—how much worse can it get? Current Ofgem policy for handling supplier failures is dictated by the Supplier of Last Resort process, where healthy energy suppliers agree to assume customers from a failing provider, with an agreement to not raise prices on its customers past the price caps instituted by Ofgem. This implies an almost domino-like effect; we expect that defaults will compound, as better positioned suppliers struggle to absorb customers from newly deceased rivals.

For this study, we synthesize public information sources, data from Moody’s Analytics Orbis database and the Moody’s Analytics private company Expected Default Frequency (EDF) model (RiskCalc) to determine which suppliers are at highest continued risk from the squeeze. We observe that while all suppliers buy some fraction of their natural gas requirements from the same wholesale markets, individual firms’ vulnerability to high wholesale prices varies significantly. Firm exposure to high natural gas prices is not trivial to analyze directly, largely due to the specifics of supply hedging and the characteristics and proportion of fixed to variable rate customer populations. Despite this, we find the most significant factor in understanding firm risk is determining its ability to continue serving debt obligations, implied largely by leverage ratio and profitability. Much like diving off a cliff does not imply certain immediate death, the assumption of high leverage to fund aggressive capital expenditure was not lethal in a cooperative and quiet wholesale market regime. However, in a steadily worsening market situation with rapidly declining profitability, leverage becomes one of the most reliable and predictive measures of insolvency.

Through analysis of company financials, we observe a massive asymmetry in risk drivers between small (less than £50 million in total assets) and large energy suppliers. Pre-2021, wholesale prices for natural gas were substantially lower, allowing smaller and newer suppliers to undercut pricing and assume market share from larger rivals, who were often locked into long-term contracts with both consumers and producers. This was
often done at the expense of increased debt and operating losses, making them significantly more sensitive to price changes than large firms. This is partially explanatory of recent defaults; we find via RiskCalc a significant differential between the EDFs of defaulted energy suppliers and non-defaulted energy suppliers. Based on the impact and continued drivers of the natural gas price increase (especially given winter seasonality), we anticipate smaller energy suppliers to be at the highest risk, along with the most unprofitable and highly indebted large suppliers. However, due to the Supplier of Last Resort system, the collapse of suppliers will likely negatively impact the solvency of large, low-risk suppliers, due to the spillover effect of absorbing unprofitable customer accounts.

**Background**

As an island nation, much of the United Kingdom’s electrical supply depends on natural gas, given its relative abundance in the United Kingdom Continental Shelf (the region of waters surrounding the UK for which it has mineral rights). In 2016, nearly 40% of the country’s electrical generation came from natural gas (with around the same fraction coming from oil), with an increasing percentage coming from renewables as the country embarks on ambitious decarbonization. More importantly, natural gas remains dominant in consumer markets for ambient heating, with the UK Department for Business Energy & Industrial Strategy reporting in 2021 that 77% of consumers used it as the primary method to heat their property.

Although the United Kingdom boasts large proven natural gas reserves, since 2000 the fraction of consumption from domestic production has been continually decreasing. This is in large part due to reduced discovery of new natural gas reserves and maturation of existing reserves. Since 2004, the United Kingdom has been a net importer of natural gas, with most imports coming via pipeline from Norway.

![United Kingdom Annual Dry Natural Gas Consumption vs. Production (EIA)](image)

Compounding the crisis is a lack of natural gas storage facilities. As part of strategic energy reserves, most countries have storage facilities for natural gas lasting on order of months; in the UK, storage is enough for at best a matter of weeks. In normal operation, storage facilities profit from buying excess natural gas production during times of low demand (and consequently at lower prices) and selling at times of heightened demand.
However, natural gas prices globally worldwide have remained both stable and low, leading UK facilities to run consistently at a loss.

In 2017, Centrica (one of the largest energy suppliers in the UK) closed the Rough offshore natural gas storage facility which provided nearly seventy percent of the UK’s storage capabilities, citing urgent need for maintenance and sustained operating losses due to falling demand. Despite governmental assurance that demand needs and storage will be sufficient for the coming winter months, the lack of natural gas storage markedly increases UK natural gas price sensitivity to both domestic and exporter country (Norway) weather and adverse conditions.

The root of the current increase, however, remains a supply shock caused by economic restart after the 2020 COVID-19 lockdowns and increasing regulatory mandates for “greener” sources of energy. Worldwide, this year brought notable increase in demand for natural gas by heavy industry, with major domestic demand coming from traditional exporters to Europe like Russia and industrial heavyweights like China. This is partly from increasing consumer demand and activity after COVID-19, but even more so driven by decarbonization initiatives. While not completely carbon-neutral, many view natural gas energy production as an intermediary step from “dirty” coal and oil to full renewables.

In many ways, the UK’s gas crisis is an unanticipated result of its substantial success in accomplishing its green energy transition goals. As of 2020, wind power and renewables comprising nearly forty percent of energy production. However, this environmental success came with climate-induced fragility; amid unusually low wind speeds starting August 2021, coupled with the aforementioned supply-demand imbalance, the UK had no choice but to rely more heavily on natural gas to meet energy needs.

This perfect storm has hit energy suppliers hard. Due to regulatory constraints (Ofgem-imposed tariff caps) and market structural factors (existing fixed-rate contracts with customers and prior supply contracts with natural gas producers), energy suppliers cannot pass increasing prices fully to end consumers. Even with the recent 11% increase (which many consumers will no doubt find painful) and some degree of prior price
hedging, the observed defaults hint at substantially decreasing profit margins, and in some cases, deepening losses.

**Analysis**

For this analysis, we primarily rely on datasets from Moody’s Analytics Orbis, which maintains a dataset of nearly 400 million private companies worldwide. Out of the 98 domestic natural gas suppliers listed as active by Ofgem in addition to the firms that recently defaulted, Orbis provided recent financials from December 2019 or later for 97 suppliers. We exclude from analysis firms with less than £500,000 in total assets, given their marginal market share and a lack of income filings.

After filtering the data, 71 firms remained in our sample, of which 24 qualified as large corporates, and 47 which are small. To compute Expected Default Frequency and an EDF-implied rating, we utilize the RiskCalc credit risk model for private firms, calibrated on the industry group (Utilities) and country (United Kingdom). RiskCalc provides us a private analog to the expected probability of default (EDF) derived from public equity prices (as described in the previous Gamestop post) using firm financials and firmographic data. In addition to EDF metrics, RiskCalc also provides key financial variables (leverage ratio, total assets, and net profit turnover). EDF-implied ratings are obtained from RiskCalc EDFs via an EDF-to-rating mapping, and are not equivalent to Moody’s rating agency ratings. For large UK gas suppliers, we additionally incorporate publicly available tariff and customer-level data provided by Ofgem.

From the provided sample and most recent financials, we observe a median EDF across gas suppliers of 1.5%, in line with the typical level observed across UK corporates. This implies (at least in 2019 and 2020) the energy supplier industry itself was not a significant risk factor in predicting likelihood of default (however, this did not account for the recent price squeeze). Conversely, when we compare EDF between small and large energy suppliers in our sample, we observe that median EDF was markedly worse for small suppliers compared to large firms (2.1% vs 0.9%). This is largely consistent with overall population observations; small firms with limited market share tend to be credit-riskier.

In comparing EDF for recently defaulted firms to all other firms in our sample, we see a massive differential in median values – 2.5% compared to 1.1% for non-defaulted firms. As a caveat, the provided default probabilities are based on the most recent financials available which predate the current squeeze. Given these financials reflect much less stressed market conditions, we anticipate significantly higher default rates to materialize in the sector in the near future.

As hypothesized, smaller suppliers—which largely represent newer entrants with much less market share—in general have substantially more solvency risk than large suppliers, as represented by leverage ratio and profitability. Utilities tend to have high leverage ratios globally compared to other sectors, given the high capital expenditure needed to maintain infrastructure at periodic intervals. The observed UK firms are no exception; the median firm in our sample has a leverage at the 97th percentile of all corporates, meaning total liabilities exceeded total assets by about 5%. However, this was noticeably differentiated on firm size—the median small supplier had liabilities exceeding assets by 11%, compared to large firms having assets exceed liabilities by 7%.

Similarly, profitability suffers in smaller firms. Of the large firms studied, the median firm roughly broke even (which is itself a risky position). Comparatively, the median small firm (only half of our small-firm sample provided income statements) operated at a net loss of 2%. Both financial ratios lend substantial credence to the view that smaller energy suppliers, even pre-supply and climate shock, were inordinately sensitive to market risk due to capital structuring and competitor price undercutting.

For the largest firms, Ofgem provides near-term (as of April/July 2021) data giving us a better snapshot into customer segmentation and costs. As previously mentioned, nearly all large suppliers offer customers two
types of payment strategies—fixed-term (with the normal term length being one year) tariffs, where price per unit is fixed for the term, and standard variable tariffs (which fluctuate up to Ofgem-provided cap prices based on wholesale prices). Given the recency of natural gas price increases, it is likely that for many (if not all) fixed-rate tariff accounts, suppliers are operating at a marginal loss to provide natural gas. This may be assuaged by hedging and accurate demand forecasting, but that data was not accessible for the reference sample. We observe that most firms provide tariff prices close to Ofgem price caps as-is, limiting their ability to pass wholesale natural gas price increases onto end consumers. This implies at current, many if not all, are operating at deepening losses.

**Largest UK Domestic Gas Suppliers – Key Figures.**

<table>
<thead>
<tr>
<th>Supplier</th>
<th>RiskCalc EDI</th>
<th>EDF-implied rating</th>
<th>Leverage²</th>
<th>Profitability³</th>
<th>Average SVT (cap)⁴</th>
<th>Cheapest tariff (cap)⁵</th>
<th>Share of fixed tariff⁶</th>
<th>Number of accounts⁷</th>
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<tbody>
<tr>
<td>Octopus Energy</td>
<td>3.56%</td>
<td>B1</td>
<td>117%</td>
<td>-3.9%</td>
<td>91.8%</td>
<td>91.6%</td>
<td>65%</td>
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<td>Bulb</td>
<td>3.08%</td>
<td>B1</td>
<td>175%</td>
<td>-4.1%</td>
<td>92.6%</td>
<td>92.6%</td>
<td>0%</td>
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<td>Avro Energy</td>
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<td>Baa1</td>
<td>139%</td>
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<td>89.5%</td>
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<td>84%</td>
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<td>EDF</td>
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<td>95.1%</td>
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<td>Shell</td>
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<td>90%</td>
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<td>100.0%</td>
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<td>Scottish Power</td>
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<td>96%</td>
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<td>96.2%</td>
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<td>British Gas</td>
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<td>91.8%</td>
<td>11%</td>
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¹ Leverage = Liabilities/Equity, ² Profitability = Net Income/Turnover, ³ Average standard variable tariff pricing, as % of Ofgem cap, ⁴ Average cheapest tariff pricing, as % of Ofgem cap, ⁵ Share of accounts fixed tariff in all domestic gas customer accounts, ⁶ Total number of domestic gas customer accounts

In the table above, by the risk factors discussed (EDF, leverage, profitability, and share of fixed to variable tariff customers), the three riskiest large suppliers are Octopus Energy, Bulb, and Avro, all with an EDF of close to or above 2%, implying rating-equivalents of Ba3 or B1. It is again important to caveat these implied ratings are modeled (with different methodology) and are not equivalent to Moody’s Investors Service obligor ratings. All have substantially greater liabilities than assets in their last published financial statements (Bulb the most at 175% leverage), and all report losses upward of 2.3% of sales (Avro the highest at 7.2% of sales).

With Avro already out of business, the two greatest remaining concerns are Bulb and Octopus Energy. Bulb, for example, is already reported to be seeking funding options, a dramatic sign that its solvency is at increasing risk. Octopus Energy similarly has received new investment in recent days from investment managers like Generation Investment Management, potentially increasing its runway and staving off default fears. Similarly, both manage over a million accounts each and sell gas cheap at over 7% below the cap on average. While Bulb does not offer fixed rate tariffs, nearly 65% of Octopus Energy’s customer base is locked into fixed tariff contracts as of last report.

Conversely, of the large suppliers, Telecom Plus stands out as the safest with an EDF-implied rating of A1, underscored by both the lowest leverage and highest profitability in the peer group. Its share of fixed rate contracts is also low at 11%. While they offer one of the cheapest tariffs at 91.8% of the cap, their average standard variable rate price is close to the cap. In the middle range, E.ON, Ovo, British Gas, and Scottish Power retain EDFs between 40 and 66 basis points, giving implied ratings between Baa2 and Baa3. Ovo and British Gas maintain leverage below 76% and, importantly, reported (relatively low) profitability. Similarly, E.ON has substantial international exposure to broader European energy markets, reducing the singular impact of British domestic concerns. With higher leverage and net losses recorded, the assessment of E.ON and Scottish Power is boosted by their low interest payments.
Conclusion

To conclude, while many aspects of this recent historic squeeze and crisis were unpredictable—including the severity of COVID-19 lockdowns and the unusual confluence of low wind and cold temperatures—the impact on the UK energy industry unfortunately is not. The years-long quiescence and low prices in wholesale natural gas led many suppliers into financial complacency, assuming leverage ratios and profit margins which were highly sensitive to rapid price increases. This sensitivity was compounded by the United Kingdom’s regulatory and market structure, as the proliferation of fixed term tariffs and Ofgem-set price caps meant suppliers could not pass through increasing wholesale costs to consumers. This essentially has created a death spiral for the industry, as prices increase, insolvency risk will impact a greater and greater fraction of firms, starting with the smaller and indebted firms. However, without changes to the existing Supplier of Last Resort system, this will secondarily impact even financially prudent larger firms, as continued defaults will require them to assume unprofitable customer contracts from recently defaulted rivals.

It’s unclear in many ways what the end of this crisis will bring to the industry. Most anticipate prices to increase for the short-term, driven by increasing demand worldwide due to dropping wintry temperatures and economic restarts. While so far the UK government has taken a hardline stance, with Business Secretary Kwasi Kwarteng announcing on September 21st, “I don’t want to prop up failing companies”, the government has walked back its stance slightly, providing subsidies for food industry-critical carbon dioxide providers to cope with rising natural gas prices. What is clear to us from this analysis is the current situation will, in the absence of government or private intervention, rapidly worsen. The outcome on the consumer will be reduced choice and more energy supplier consolidation, with unclear long-term repercussions.
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