Winter is Coming

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The global auto industry faces significant risk exposure from the looming European energy crunch

By Calum MacRae, Director, Supply Chain & Technology, S&P Global Mobility

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With energy prices in Europe skyrocketing, placing business bottom lines in triage mode, a harsh winter could place certain automotive sectors at risk of being unable to keep their production lines running.

The combined black swan events of the COVID-19 pandemic and the Russian invasion of Ukraine have already stretched the automotive supply line – especially in regard to semiconductors. Now, some OEMs and suppliers with energy-intensive manufacturing processes may face extensive pressure in terms of energy costs in the coming months.

As a result, potential manufacturing losses from Europe-based OEM final-assembly plants could reach more than 1 million units per quarter, starting in the fourth quarter of 2022 through the entirety of 2023, according to forecasts by S&P Global Mobility and S&P Commodity Insights.

Starting in the fourth quarter of 2022 through 2023, quarterly production from Europe-based auto manufacturing plants was forecast to be in the 4–4.5-million-unit range per quarter – predicting moderate growth. However, with potential utility restrictions, that OEM output could be reduced to as low as 2.75–3 million units per quarter.

As seen with past regional events – Ukraine-sourced neon shortages hampering semiconductor deliveries, and the 2011 Japan earthquake and tsunami crippling supplies for microcontrollers, mass-airflow sensors, and Xirallic paint pigments – losing one crucial piece in the global supply chain can bring the automotive manufacturing industry to a crunching halt.

The consensus forecasts for a cold, wet European La Niña winter, combined with energy shortages, could have a similar effect. The recent leaks in the subsea Russian pipelines to Europe adds to risk and the likelihood that our model is directionally correct.

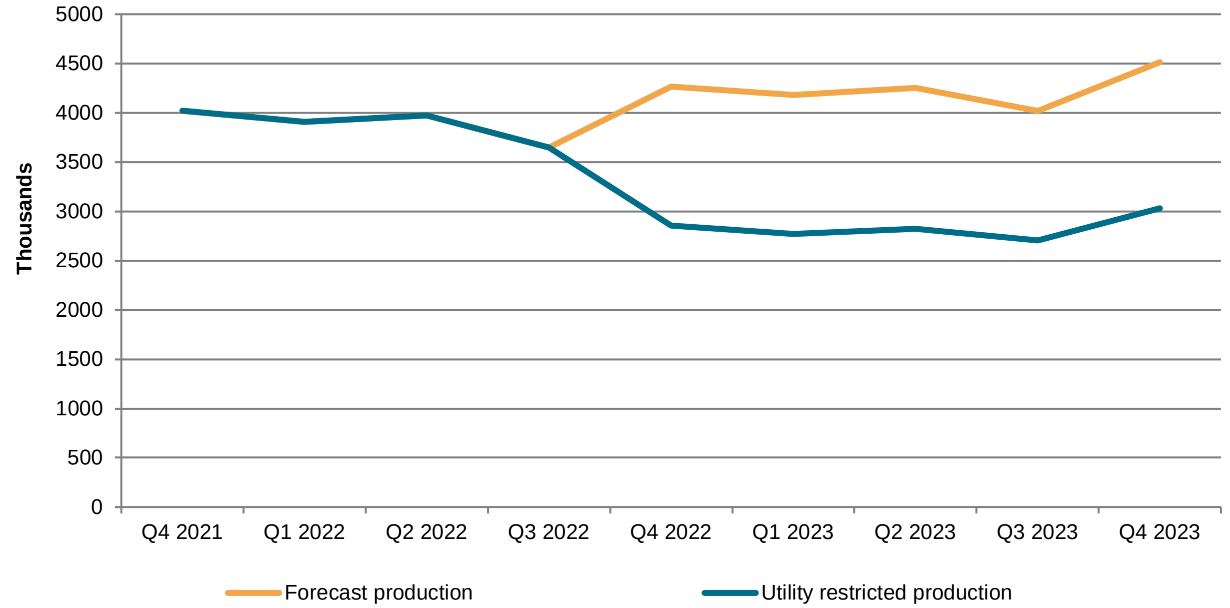
S&P Global Mobility is forecasting significant supply chain disruption from November through spring. We also anticipate disruption of the traditional just-in-time supply model due to some suppliers implementing a schedule of working fractional-months on a 24/7 setup – which can be more energy-efficient than traditional weekly shifts due to the latter's higher start-up and shut-down energy costs.

We consider mandatory energy rationing to be the basis for a pessimistic scenario for the region's auto producers and suppliers. For an industry already struggling with low inventories of vehicles in dealer showrooms, an additional crisis could be incapacitating on a global scale.

European suppliers send parts, components, and modules to OEMs around the world – thus impacting all automakers, not just regional ones. And U.S. retail customers could also suffer, as EU/UK manufacturing plants are currently exporting about 7,000 units per month to American shores – but shipped 213,750 vehicles in the entirety of 2019, according to Global Trade Atlas.

"If you look through the supply chain – particularly where there's any metallic structure forming through pressing, welding or extrusion – there's a tremendous amount of energy involved," said Edwin Pope, Principal Analyst, Materials & Lightweighting at S&P Global Mobility. "Total energy usage in these companies could be up to one-and-a-half times what we're seeing in vehicle assembly today. Anecdotally, we're hearing that some of this manufacturing capacity is becoming so uneconomic that companies are simply shutting up shop."

European light vehicle production as impacted by energy shortfall



Source: S&P Global Mobility light vehicle production forecast, 14 September 2022 release

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Before the energy crisis, gas and electric costs were a relatively inconsequential component of a vehicle's bill of materials, typically less than €50 per vehicle. Now with cost increases ranging from €687 to €773 per vehicle, energy costs compound an already perilous position for the sector – given the impact raw material price increases have already had on the nascent electric vehicle value chains. Both serve to undermine margins in a market where cost increases will be difficult to pass on to customers already facing food and energy inflation.

Across the European Union, energy constraints could result in nations or regions enacting emergency policies to counter this threat. OEMs also have a certain level of countervailing power with the regional utility companies and via governmental lobbying operations.

"However, the pressure on the automotive supply chain will be intense, especially the more one moves upstream from vehicle manufacturing," Pope said. "Upstream supplier parts production constraints could impact OEM volumes. As a result, we see a risk of OEMs halting shipments of completed vehicles due to shortages of single components, which are not necessarily coupled to country-level energy policies."

How countries will be able to react

S&P Global Mobility has modeled the impact of the looming energy crunch on 11 European countries – each a significant vehicle production location – to assess which countries' automotive segments are best positioned to withstand the severe energy headwinds this winter.

The model borrows from macroeconomic aggregate demand frameworks in assessing consumption, investment, and government expenditure to which an assessment of energy mix and gas storage is added. Based on a quantitative assessment of available information, six dimensions are scored on a relative basis between 1 and 5, with 5 being the best score.

Europe: expected relative impact on country performance of the energy crisis

Country	% GDP support to economy	Govt debt to GDP	Budget deficit	Energy self-sufficiency	Electricity generated from gas	Gas storage per capita and utilization	Overall ranking
Czech Republic	2	5	3	4	5	3	72
Germany	3	4	4	2	4	3	65
Poland	1	5	4	4	5	2	64
Austria	2	3	3	2	4	4	61
UK	5	3	1	4	2	1	58
Slovakia	1	4	2	2	4	4	57
France	1	2	2	3	5	2	53
Netherlands	1	5	4	4	1	4	52
Spain	3	2	2	1	3	2	47
Italy	3	1	1	1	1	3	38
Belgium	1	2	3	1	3	2	38

Notes: Scores 1-5 where 5 is best; weighting for columns left to right in order are 25%, 10%, 5%, 15%, 25%, 20%

Source: S&P Global Mobility

The effect the energy crisis could have on a country's economic performance and societal wellbeing can also be connected to a country's industrial footprint. The most energy intensive industrial sectors are aviation and shipping, but their energy consumption is tied almost exclusively to oil, where price increases have not been of the magnitude seen in gas and electricity. Industrial sectors that see high usage of gas and electricity include chemicals and metallic products, both of which are intrinsically tied to automotive manufacturing.

Individual countries' policy responses in addressing energy imbalances will also impact comparative economic performance. Such policies will determine how a country's energy mix impacts the comparative advantage of vehicle build locations in Europe.

That impact is shown by some counterintuitive results in the S&P Global Mobility analysis. Germany has relied on Russia for its gas supplies and is phasing out nuclear power, both of which would seem to place that nation in a precarious energy situation. However, Germany benefits from its government's famous fiscal rectitude, which gives it relatively more budgetary headroom to ride out the energy storm. Further, the country benefits from a relatively low reliance on electricity generation derived from gas and from being in a decent position from a gas storage perspective.

The model also reveals how crucial government intervention in household and industry support has been for the UK. In the past few weeks, the UK government has announced measures adding up to some GBP200 billion for consumers and industry – accounting for nearly 7% of the country's GDP and more than double the level of its nearest rival Italy. Without such support, the UK would be near the bottom of the table, in a position similar to that of Italy – which suffers doubly owing to its debt and budget deficit position as well as its low energy self-sufficiency and reliance on gas power for electricity generation.

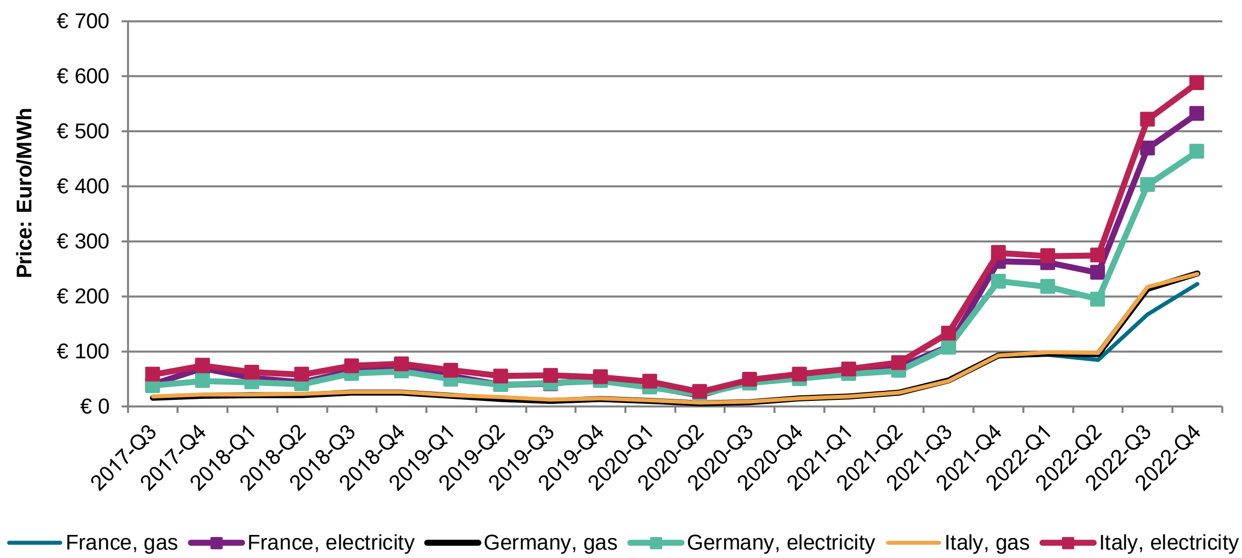
The chart also brings into focus the relative position of a country's macroeconomic position vis-à-vis energy and macroeconomic policies. Italy is one of the more vulnerable economies, and this weakness will be further compounded by the relative cost disadvantage its manufacturing base faces.

Not all countries will be impacted equally by the energy market imbalances roiling markets in Europe. That said, it is clear that an era of abundant, and cheap, energy is over – and this has shocked policymakers into varying degrees of response.

The impact of energy prices

Since first quarter 2020, energy prices in Europe have soared. According to S&P Global Mobility data for four key markets – Italy, Germany, France and the UK – gas prices have increased by an average of 2,183%, a factor of nearly 23. The wholesale electricity price increased by an average of 1,230% or a factor of more than 13.

Gas and electricity consumer price* key European markets 2017Q3–2022Q4

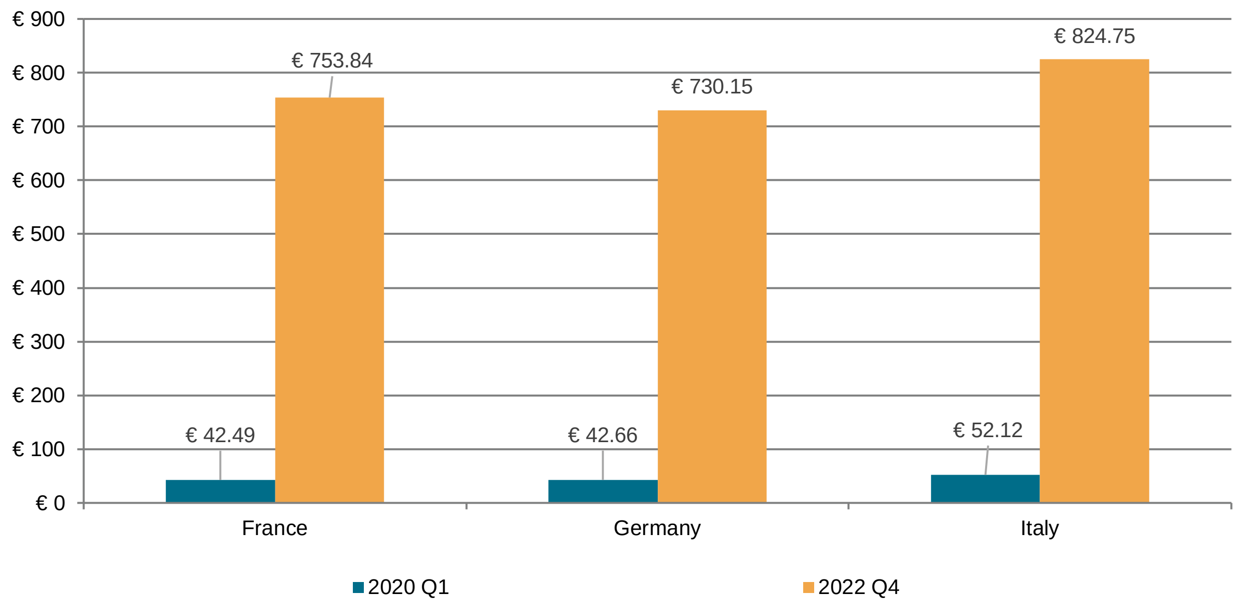


Note: *France: gas price is Peg Nord; Germany gas price is GASPOOL, Italy gas price is PSV, UK gas price is National Balancing Point.
All electricity prices are spot prices for peak wholesale electricity. Q3 and Q4 forecasts
Source: S&P Global Mobility

The impact of the surge in prices is shown starkly in the subsequent chart. Applying energy prices from the start of 2020 and comparing with the current situation permits a view of the additional cost that has been borne by OEMs. The subsequent chart shows the gas and electricity cost increase for a typical reference vehicle across France, Germany, and Italy.

For high-energy intensity sectors like automotive manufacturing, S&P Global Mobility has developed a methodology, leveraging proprietary data assets, to estimate the impact on vehicle manufacturing's bottom line due to escalating energy costs.

Total gas and electric cost per manufacture of reference vehicle



Source: S&P Global Mobility, Argonne National Laboratory

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To allow for an apples-to-apples comparison in examining typical energy usage in each stage of final assembly, the single reference vehicle used was a Volkswagen Golf MKVIII, tipping the scales at a shade under 1,370 kg, and considering local energy mix.

Energy consumption at each vehicle assembly stage

	Vehicle Assembly Stages						
Energy use: mmBtu per vehicle	Paint production	Painting	Lighting	Heating	Material handling	Welding	Compressed air
Natural gas	-	2.301	-	2.982	-	-	-
Electricity	0.287	0.458	0.990	-	0.205	0.273	0.409

Source: S&P Global Mobility, Argonne National Laboratory

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There are some caveats to this methodology. Carmakers sometimes source their energy with different mixes than the country where they operate, while we assume identical energy sourcing in our model. Automakers also tend to lock gas and electricity prices with utilities and use different financial instruments to reduce their exposure – to the point they often end up reporting significant windfalls from these hedging bets, as seen recently with the likes of Volkswagen and Daimler. In our model, we assume they are paying wholesale spot prices.

Ominous signs for the supplier tiers

Despite these warning signs, some OEMs protect their supplier base by indexing the price of key commodities monthly for their suppliers, which means that some suppliers are not locked into contracts at an inelastic price point through the length of the contract. However, this practice is not completely widespread.

“As you go further upstream, the sheltering the OEM provides becomes less,” Pope said. “Additionally, smaller companies in Tiers 2 and 3 of the supply chain are likely to neither have the resources nor the operational sophistication required for hedging instruments, forward contracts and the like.”

The situation Europe faces may be only transient. Much will depend on how the Russia-Ukraine conflict unfolds. However, a longer-term transformation of the energy picture could result in structural consequences for the industry. This would see production schedules, manufacturing footprints and sourcing strategies being discarded and replaced with a shift to locations where the energy cost burden is least. While Europe faces a winter of discontent now, more disruption could follow. This will bring fundamental upheaval to the region's auto sector and beyond.

In the way that labor cost used to be a key determinant of manufacturing location, energy mix and self-sufficiency could become key elements of future sourcing decisions.

Editor's Note: This report is from S&P Global Mobility, and not S&P Global Ratings, which is a separately managed division of S&P Global. Of note, the team from S&P Global Ratings has done additional topical analysis on this subject from a different perspective. Our teams are continuing to follow the situation closely and may be in position to share updates as the situation evolves. For commentary now and in the future on this topic, please reach out to us.

EUROPEAN ENERGY CRISIS INTERVENTION TRACKER

Updated
October 6, 2022

● Gas ● Power ● Liquid fuels ● Coal

Germany

- **29-Sep:** Eur200 billion support agreed for gas price brake, gas levy scrapped
- **27 Sep:** nuclear reserve details agreed, availability of two reactors extended into 2023
- **21 Sep:** Uniper nationalized via Eur29 billion rescue package. Further stabilization for VNG. Gas importers brought under state control
- **04-Sep:** Coalition agrees Eur65 billion relief package with power price brake using windfall profits from non gas generators
- **24-Aug:** Government approves energy-saving regulations to help reduce gas consumption by 20%
- **18-Aug:** Government cuts VAT on natural gas from 19% to 7% to offset cost of gas levy from October. Consumers to receive Eur300 energy bill allowance
- **21-Jul:** Imposes stricter gas storage targets as part of a new package of energy security measures
- **08-Jul:** Bundesrat approves replacement power law allowing 10-GW of coal, lignite, fuel oil plant to return
- **23-Jun:** Approves loan of Eur15 billion to gas market manager Trading Hub Europe to buy gas for storage
- **05-May:** State charters four floating LNG import terminals to be deployed across northern Germany

France

- **02-Aug:** Public authorities approve floating LNG import terminal at Le Havre, boosting import capacity by 45 TWh/yr
- **27-Jul:** National Assembly approves Eur230 million support for households using oil for heating, increases rebate for road fuels
- **23-Jun:** Extends 4% increase cap on regulated power tariff to end-2022. This and gas tariff freeze costed at Eur38 billion

Italy

- **07-Sep:** Government sets out raft of measures to reduce gas consumption by 15% or 8.2 billion cu m
- **05-Aug:** Eur17 billion cost of living aid package in August comes on top of Eur35 billion support on energy and fuel bills since the start of 2022
- **30-Jun:** Q3 2022 retail gas and power tariff increases limited to 0.4% as support measures rolled over for fifth quarter
- **01-Feb:** Government introduces clawback tax on renewable generators to run to end-2022

United Kingdom

- **21-Sep:** GBP31 billion business energy bill relief scheme aimed at halving winter energy costs
- **08-Sep:** two-year cap on household bills at GBP2,500/yr. Business rates capped for six months. Energy Markets Financing Scheme established
- **08-Sep:** ban on gas fracking lifted, new oil and gas licensing round imminent
- **30-Aug:** Centrica's Rough storage facility cleared to reopen
- **17-Aug:** Winter contracts for 1.5 GW of coal plant to cost up to GBP420 million
- **29-Jul:** Households to receive GBP400 non-repayable discounts on energy bills, low income households to receive GBP1,200
- **18-Jul:** Review of the Electricity Market Arrangements seeks to reduce gas impacts on power price formation

Spain

- **21-Sep:** Gas-for-power price cap extended to CHP, VAT on gas cut from 21% to 5% to end-2022
- **02-Aug:** Spain ratifies energy-saving package, regulating cooling and heating in public buildings, aimed at 7% demand reduction
- **01-Aug:** Government passes decree to reduce gas demand by 7% via reduced state, business heating and cooling
- **14-Jun:** Spain and Portugal's gas cap mechanism limits price of gas for power generation at Eur40/MWh

EU

- **30-Sep:** Energy ministers agree 5% peak hour power demand cut, Eur180/MWh inframarginal generator market revenue cap, windfall tax on oil, gas, coal firms
- **29-Aug:** European Commission prepares emergency intervention in wholesale power market to reduce impact of gas price
- **29-Jul:** EU energy ministers agree voluntary gas demand reductions of 15% this winter with potential exemptions
- **27-Jun:** EU Council approves minimum gas storage filling target, member states required to fill sites to 80% by Nov. 1, 2022
- **18-May:** The EU's REPowerEU program lifts the 2030 target for renewables' share in final energy demand from 40% to 45%

DUTCH GAS MONTH AHEAD

UK POWER MONTH AHEAD

COAL CIF ARA SPOT

S&P Global
Commodity Insights

Source: S&P Global Commodity Insights

Developed by Henry Edwardes-Evans, designed by Amelie Yergeau

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