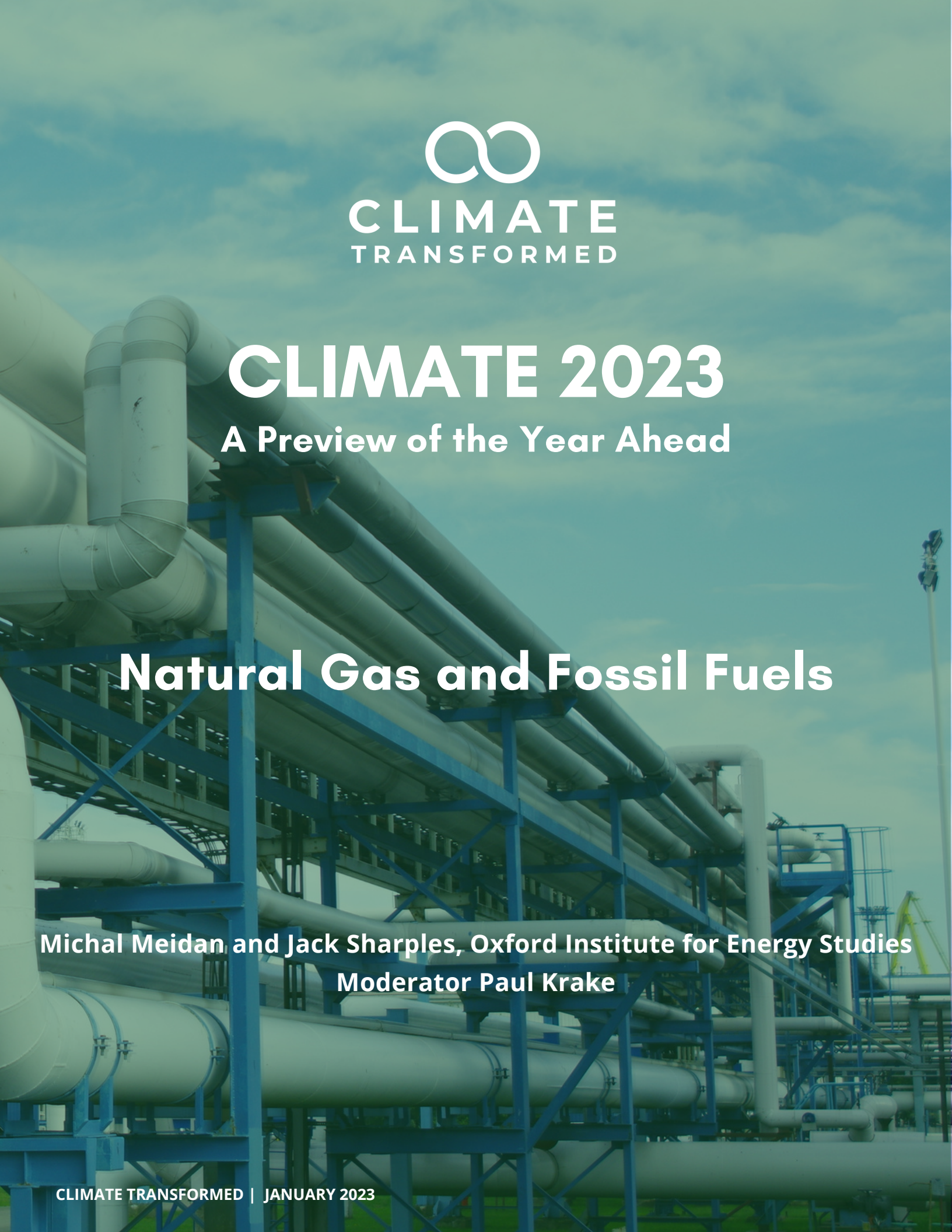


CLIMATE TRANSFORMED

# CLIMATE 2023

## A Preview of the Year Ahead

# Natural Gas and Fossil Fuels

Michal Meidan and Jack Sharples, Oxford Institute for Energy Studies
Moderator Paul Krake

# Natural Gas and Fossil Fuels

**Dr. Michal Meidan** is the Director of the Gas Research Programme and the China Energy Programme at the Oxford Institute for Energy Studies.

**Dr. Jack Sharples** is a Research Fellow at OIES with expertise in the political economy of natural gas in Europe and Russia, and the supply-demand dynamics on the European gas market and the global LNG market.

**Summary**

It is impossible to discuss the outlook for 2023 without a full assessment of the Ukrainian war and whether supply concerns in the EU are not an issue of winter 2023, but that of winter 2024. **Watch the full session here**.

**Key takeaways**

- Europe's Russian pipeline gas currently receives about 65 million cubic meters daily. This time last year, it was closer to 345 million.
- The winter of 2023 could have been much worse for Europe, with storage at 95% as we enter 2023. Fast-tracked new Liquefied Natural Gas (LNG) infrastructure, a mild October and November, and lost demand due to a pending recession all aided restocking efforts.
- The trouble is that most gas suppliers need long-term contracts to underpin new supplies, offtake, and investment decisions, with 15-year agreements being the consensus. This could leave the EU saddled with long-term contracts and enormous quantities of surplus gas in the 2030s
- When China eventually reopens and demand returns, this will have global consequences.
- In 2022, 30% of the European gas supply has arrived in the form of LNG, up from 18% last year and 9.5% in 2018. Therefore, Europe is more exposed to the global LNG spot market.
- Pipeline supplies from Norway, Azerbaijan, and Algeria are already maxed out. The global LNG market will remain tight for a few years until we get the next big wave of Qatari supply or until North American export projects reach the final investment decision (FID) in the next 12 to 18 months, which would then come to fruition in 4 or 5 years from now. So, the global market is set to remain tight, and Europe remains exposed.
- Storage for winter 2024 is the issue. Restocking will be much more difficult and much more expensive in 2023. Europe’s exposure to spot prices could lead to global price surges.

# Paul's observations

The number one threat to the global economy in 2023 is a repeat and deterioration in the EU energy crisis. As Michal and Jack pointed out, Europe got somewhat lucky regarding its restocking efforts going into the winter of 2023. However, with no ability to rely on Russian gas and the absence of long-term agreements forcing European governments to buy natural gas in the spot market, the chances for an unruly spike in natural gas prices coupled with an inability to restock supplies for winter 2024 have grown exponentially.

The flaws in European energy policy will threaten European economic health for years to come. Brussels believes that renewable energy will relegate natural gas within 10 years to nothing more than an afterthought. Natural gas producers such as Qatar will require 15-year agreements to build the essential infrastructure to ensure that Europe has a smooth flowing of LNG until this transition to renewables is completed. Naturally, there is concern that the EU will be stuck with long-term agreements for natural gas that it doesn't need. This does not help us now and does nothing to alleviate the potential for ongoing volatility in energy markets that will harm the stability of the European industrial base and the economy as a whole.

There is no good near-term solution. Both hydrogen and nuclear expansion are narratives for the 2030s, which leaves the EU overly reliant on coal as the swing fuel to bridge the gap between the intermittent nature of renewables and the unreliability of spot natural gas purchases. If China's economic reopening after COVID is more robust than people expect, then the chances of global supply shortages for gas rise dramatically. This will exacerbate the pending EU recession, and as we have stated time and time again, a successful economic transition away from fossil fuels requires a strong global economy.

***"The flaws in European energy policy will threaten European economic health for years to come."***

## Assessment of the natural gas balance of the EU in case of total cut-off of Russian flows and limited LNG availability in 2023


*Source: International Energy Agency*

# Questions & Answers

**Consequences of the Ukraine War**

*Michal Meidan:*

The Russian invasion of Ukraine tightened supply, accelerated market volatility, and dramatically increased prices, but it is important to note that markets were tightening well before this because of lower flows from Russia and years of slowing investments into new projects. This was always going to be a tight period, but it was amplified due to the war. The EU's demand for spot LNG created global distortions. This year, we have been quite fortunate that some markets have had alternatives to gas, and with weak demand from China, the competition for gas has been limited.
Without Russian gas, Europe needs a bridge for the next 5 to 10 years as the transition to fully renewable/clean sources of energy evolves. The trouble is that most gas suppliers need long-term contracts to underpin new supplies, offtake, and investment decisions, with 15-year agreements being the consensus. This could leave the EU saddled with long-term contracts and enormous quantities of surplus gas in the 2030s. Furthermore, Chinese demand will return in 2023, which could well create further global tightness. Tight supply could see a continuation of the resurgence of coal to cover this energy deficit, with parts of the emerging world potentially facing energy poverty, a questionable growth outlook, and concerns about political stability.
Lost Russian supply has opened Pandora's box of questions about market construct, geopolitical divides within Europe, between Europe and the US, and China.

***"Without Russian gas, Europe needs a bridge for the next 5 to 10 years as the transition to fully renewable/clean sources of energy evolves."***
***– Michal Meidan***

**Could the winter of 2022 have been much worse for Europe?**

*Michal Meidan:*

We were lucky, as Europe's ability to pull in supplies and reduce demand has led to gas storage levels near capacity. Whether that lost demand returns remains to be seen. We have seen a drop of 10-15% in European demand in the first 10 months of 2022. The question is whether that is due to efficiencies in fuel switching or certain industries being priced out of the market. The EU implemented mandates to fill up storage and reduce demand. We had aggressive stockpiling while the tight market supported elevated prices due to a heightened risk premium. We are currently well stocked in Europe, but the state of storage in springtime will affect our ability to stock up in time for winter 2023 and 2024.

**The near-term outlook: Q1 2023**

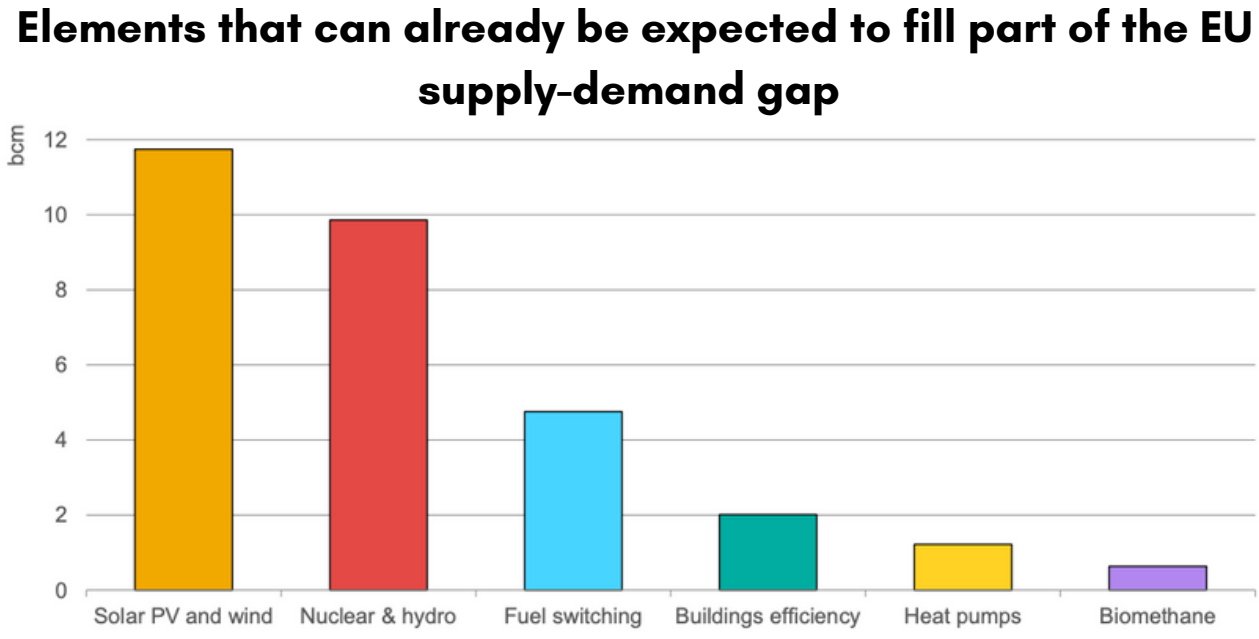
*Jack Sharples:*

From April 1 to November 1, we saw a record for net storage injections in Europe. That could only happen with the demand reductions and the unseasonably mild weather in Europe into the first half of November. As a result, we started taking small amounts of gas out of storage in the second half of November, and we are now going into December with European storage still close to 95% full. However, European gas production and pipeline imports are maxed out, except for Russia, which is capped at its present level. LNG is, therefore, the main flexibility, and storage is crucial to meet demand over the winter. The more quickly we take gas out of storage, the less we will have at the end of winter, creating a different problem for replenishing supplies next summer.

**The state of Europe's LNG infrastructure: What are the bottlenecks for LNG?**

*Jack Sharples:*

LNG infrastructure in Europe has subregional markets that could be better interconnected. For example, the Iberian Peninsula has plenty of available capacity for importing LNG. Still, the onward connections to France are a bottleneck, so even if you get more LNG into Spain, you cannot share it with the rest of Europe. By contrast, northern France, Belgium, and the Netherlands suffer from congestion. As a result, gas terminals have been operating close to their maximum capacity for much of the year. That is being eased with the new LNG import terminal in Germany, and soon there will be three new floating storage and regasification units in northern Germany and three more by the end of 2023.
The UK has plenty of LNG import capacity, but the pipeline connections between the UK and continental Europe constrain our ability to share that with our neighbors. The two pipelines from the UK to Belgium and from the UK to the Netherlands have been operating at full capacity.




*Source: International Energy Agency*

**The consequences of long-term LNG contracts with Qatar**

*Michal Meidan:*

It could become difficult to secure long-term supply because only some European countries will be willing to sign 15 to 20-year contracts, which is what many suppliers need to finance the CapEx cost. Stranded assets may result from long-term contracts that require the building of LNG import terminals and other infrastructure that could become unwanted before the end of the supply contract. There is also a risk of Europe not having enough LNG or paying very high spot LNG prices, which could have knock-on effects on consumers and industry. To tackle this, gas contracts to Europe could have specific clauses that allow it to be reexported and used as a portfolio gas supply when it is no longer needed in Europe. Demand-side efforts can be made to reduce gas demand by using substitutes, including renewables, but it all takes time. The fear is that we get caught in the middle, with Europe unable to sign these long-term contracts but not doing enough to accelerate the energy transition, and then we get stuck with high-priced spot LNG or even scarcity.

**The return of Chinese demand**

*Michal Meidan:*

The demand is significantly affected by China's zero-COVID policy. There will be global consequences when China eventually reopens and demand returns. Economically, The 4.0-4.5% Chinese growth forecast for 2023 looks optimistic without a massive stimulus. We have seen many attempts at stimulus, and they have not worked, partly because of logistical issues.
Politically, we have had the reappointment of Xi Jinping, but we are waiting for the government transition in March. The new list of bureaucrats running the country will affect policies and, therefore, gas demand. The question is whether the new Chinese leadership is as good as it has been in the past regarding course correction when it needs to manage the economy nimbly.
Assuming consumer demand and industrial activity rebound, we could see 10 billion cubic meters (bcm) to 15 bcm demand growth in China. Some of that demand could be met by Chinese production, but some will be from global LNG markets, including Russia via the Power of Siberia pipeline, which delivered 10 bcm last year. However, domestic production has been growing in China at surprising volumes, so China's need for LNG from elsewhere is slightly reduced.
There may also be gas demand in the Chinese power sector, where gas is relatively small at only 6% of installed capacity, which is still 50 bcm. If that doubles over the next 5 years, it could significantly impact the global gas supply. China will likely continue to use coal as a flexible capacity to support intermittent renewables.

***"There is also a risk of Europe not having enough LNG or paying very high spot LNG prices, which could have knock-on effects on consumers and industry." – Michal Meidan***

**US LNG exports to China**

*Michal Meidan:*

In 2022, Chinese buyers sourced Russian LNG at high prices and diverted their volumes into Europe, so some US volumes have gone into Europe. That being said, a small amount of US LNG goes to China, and more significant volumes are likely in the future.

**Why don't global gas markets correlate?**

*Michal Meidan:*

A few years ago, we saw increased flexibility, spot LNG markets, and more volumes coming to the market, so you would have expected to see price convergence between the Henry Hub and European hubs like JKM (Japan Korea Maker), TTF (Title Transfer Facility), and NBP (National Balancing Point), and in the Asian JKM. However, in reality, the oil market is less fungible than the gas market is. There are fewer trading tools and less liquidity in the various hubs. There are a lot of oil-indexed contracts in Asia, so prices in Asia are related to JKM rather than the Platts hub, which needs more liquidity. A lot of prices are oil-indexed in Europe too.
Supply bottlenecks affect price differentials across European hubs, and in the US, the Henry Hub is a world of its own due to US dynamics regarding US consumption and availability.
In the first half of 2022, with the Russian invasion of Ukraine and high prices, Chinese buyers wanted to secure long-term contracts. They received attractive prices that were Henry Hub linked, plus the tolling fee.
We will see a gradual convergence of those gas markets as more contracts come online, but the hubs are still very different, and trading is limited.

**Assumptions for Russian gas in 2023: Is there a concern about power markets in the winter of 2024?**

*Jack Sharples:*

Europe has experienced a supply shock through the loss of Russian gas. Europe is likely to have received more US LNG in 2022 than it received from Russia by pipeline. Europe's Russian pipeline gas currently receives about 65 million cubic meters daily. Around December 2021, it was closer to 345 million.
Many European suppliers and holders of long-term contracts with Gazprom were asked to pay in rubles instead of euros or dollars. They refused, and their deliveries were suspended. So, I don't see any scope for more Russian gas. We will feel the year-on-year loss in Q2 2023 when we start replenishing European gas storage because we will have a lot less from Russia in Q2 2023 than we did in Q2 2022.
The pipeline supplies from Norway, Azerbaijan, and Algeria are already maxed out. In Algeria, domestic demand is growing faster than production, so they have little room for expansion. The global LNG market will remain tight for a few years until we get the next big wave of Qatari supply or until North American export projects reach the final investment decision (FID) in the next 12 to 18 months, which would then come to fruition in 4 or 5 years from now. So, the global market is set to remain tight, and Europe

remains exposed.
In 2022, 30% of the European gas supply has arrived in the form of LNG, up from 18% last year and 9.5% in 2018. Therefore, Europe is more exposed to the global LNG spot market. We also need to factor in lower-than-expected levels of hydroelectric generation in the summer and the French nuclear fleet restarting slower than expected. The industry has been flexible in reducing demand, and that demand will rebound as gas availability improves.
There are many questions about balancing the European market in the summer, and we will be monitoring those very closely to prepare for the winter of 2023 and 2024.

**What are the plans for additional infrastructure? Will we end up with stranded assets that may go prematurely out of service in 5 or 10 years?**

*Jack Sharples:*

The infrastructure we need now will take too long to implement, especially considering how long we will likely need it.
Germany's recent floating storage and regasification unit (FSRU) terminal used an expedited permitting process. The Dutch also moved very quickly, converting LNG tankers to safely bring LNG from its liquid state at –161ºC to an ambient temperature to turn it back into gas to inject into the grid.
The beauty of FSRUs is that once you no longer need them, you can sell them and sail them away. Pipelines take longer to build and have a longer permitting process. However, over the last 12 to 18 months, some new pipeline projects have come to fruition in Europe, including the interconnector between Poland and Lithuania and another between Greece and Bulgaria. These were designed before the present crisis to address bottlenecks, but no pipelines in progress would help Europe reorient gas supply away from Russia.

*Michal Meidan:*

Some Transition System Operators (TSO) talk about making existing pipelines hydrogen or future-ready, but that has been the direction of travel for a while, and a body of regulatory work and thinking is already in progress. A slightly different question is whether it would be blue or green hydrogen and what incentives governments put in place to ensure the infrastructure is ready.

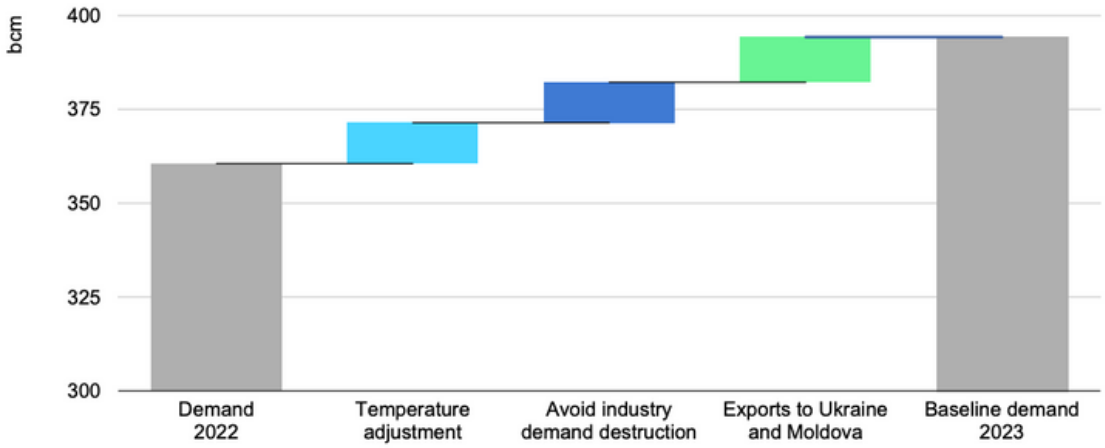
**How does the hydrogen narrative sit here?**

*Jack Sharples:*

One of the fundamental issues is that the energy content of hydrogen is significantly lower than that of fossil methane, so aside from any cost considerations, you cannot use it as you would use natural gas. From hydrogen, you get 12 to 13 megajoules per standard cubic meter in a volumetric term, whereas gas is between 38-40 megajoules per typical cubic meter. So, if you are going to replace fossil methane with hydrogen—for example, in residential heating—you would need a more extensive grid because the calorific density of hydrogen is lower. The hydrogen future is for high-value niche products like sustainable aviation fuel.

The notion of green hydrogen is to install lots of renewable energy generation. Then, at times of low electricity demand, the excess marginal-cost electricity can be used to power electrolysis to make hydrogen, using hydrogen to store that energy. Blue hydrogen could be made by steam reformation of methane, but carbon capture and storage would be required to meet climate targets.

**Additional levels of EU gas demand in 2023 above demand in 2022**




*Source: International Energy Agency*

**Positive and negative surprises for 2023?**

*Michal Meidan:*

A positive surprise for the global gas market will be to keep Russian flows intact if China's demand returns less strongly. Furthermore, a more nuanced discussion—with an understanding of price mechanisms, markets, and the role of gas in the energy transition, not just in Europe but globally—would be a very positive surprise.
Prices going sky-high in Europe would be a negative surprise and a big hit to European industry. Moreover, it could lead to political divisions within Europe about solidarity mechanisms and who gets gas and who does not. Or, a similar rift with the US could occur because it has cheap gas.

**What are the best-case and worst-case scenarios for Europe?**

*Jack Sharples:*

The Rosy Scenario: An unexpectedly mild winter, with robust supply and muted LNG demand in China. A further improvement would be for the French nuclear fleet to come back online with no further delays. Europeans could get the message that we have to be more energy efficient this winter, and knock the thermostat down one or two degrees, so we take less gas out of storage over winter.
We could end winter with more storage than we expected and begin to restock over the summer to get to November 2023 with full gas storage.

The Negative Scenario: A very cold winter in Europe and northeast Asia, with the Chinese government opening up the economy, causing Chinese LNG demand to rebound. As a result, competition for spot cargoes would intensify, with fewer Asian buyers willing to resell long-term contracts in Europe. In addition, an incident like the blockage of the Suez Canal or the snowstorms in the Gulf of Mexico would constrain supply. This would all be compounded if demand were higher than we would like it to be in Europe or if the French nuclear fleet remains offline for longer than we expect.
By the summer of 2023, there would be no reasonable prospect of refilling storage by winter, so prices would start to spike.

The Baseline Scenario (somewhere in the middle): An averagely cold winter that causes us to where we would take a bit more out of storage than we would like. This would mean that in summer 2023, we would need interventions of the kind we had this summer to help Europe restock gas stores at any price, with the acceptance that storage for winter is now strategic. However, in this baseline scenario, we would get storage stocks back to a reasonable level and make it through another 12 months, inching closer to a time when the global LNG market returns to a better balance around 2026.

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