

# Never Too Early to Prepare for Next Winter: Europe's Gas Balance for 2023-2024

International  
Energy Agency

# INTERNATIONAL ENERGY AGENCY

The IEA examines the full spectrum of energy issues including oil, gas and coal supply and demand, renewable energy technologies, electricity markets, energy efficiency, access to energy, demand side management and much more. Through its work, the IEA advocates policies that will enhance the reliability, affordability and sustainability of energy in its 31 member countries, 11 association countries and beyond.

This publication and any map included herein are without prejudice to the status of or sovereignty over any territory, to the delimitation of international frontiers and boundaries and to the name of any territory, city or area.

## IEA member countries:

Australia  
Austria  
Belgium  
Canada  
Czech Republic  
Denmark  
Estonia  
Finland  
France  
Germany  
Greece  
Hungary  
Ireland  
Italy  
Japan  
Korea  
Lithuania  
Luxembourg  
Mexico  
Netherlands  
New Zealand  
Norway  
Poland  
Portugal  
Slovak Republic  
Spain  
Sweden  
Switzerland  
Republic of Türkiye  
United Kingdom  
United States

The European Commission also participates in the work of the IEA

## IEA association countries:

Argentina  
Brazil  
China  
Egypt  
India  
Indonesia  
Morocco  
Singapore  
South Africa  
Thailand  
Ukraine

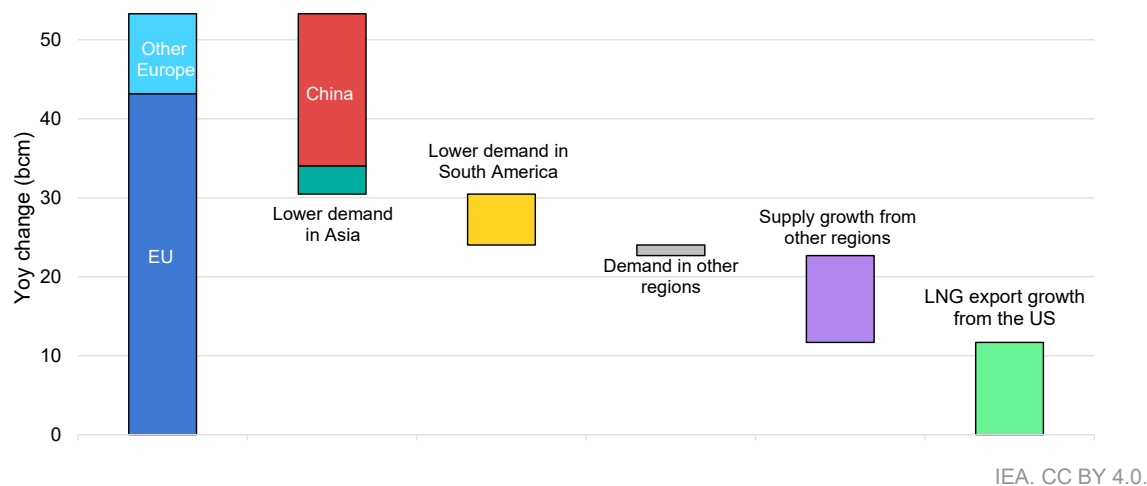
## Summary

- **Russia's natural gas deliveries to the European Union by pipeline halved** in the first ten months of 2022 compared with the same period in 2021, a drop of 60 billion cubic metres (bcm). For the full year, Russia's pipeline supplies are expected to decline by over 55%, a drop of 80 bcm, putting unprecedented pressure on both European and global gas markets.
- **EU gas storage sites are now 95% full** – putting them 5%, or 5 bcm, above their 5-year average.
- **The process of filling EU storages over the summer of 2022 benefitted from two factors that might not be repeated in 2023:** 30 bcm of Russian gas supplied to the EU via pipeline, and lower LNG imports by China due to its economic slowdown and Covid-induced lockdowns.
- **The cushion provided by the current mild temperatures, lower gas prices and high storage levels should not lead to overly optimistic predictions about the future.** The combination of lower-than-normal gas demand in October and persistently strong LNG inflows has put strong downward pressure on day-ahead prices, which fell below USD 10/MMBtu by the end of October –against an all-time high of USD 100/MMBtu at the end of August. However, Europe is not out of the woods yet, and our analysis identifies some significant risks ahead in 2023 and 2024.
- **Global LNG supply is expected to increase by only 20 bcm in 2023, much less than the likely additional reduction in Russian pipeline deliveries.** Russian pipeline gas deliveries to the EU in 2022 are set to reach around 60 bcm. But in 2023, they will in all probability drop to less than half that amount – and could cease completely.
- **China's LNG imports could rebound next year to close to their 2021 levels** as economic growth recovers after Covid-related lockdowns. This **would capture over 85% of the expected increase in global LNG supply**, much of which has in any case already been contracted to China, thereby limiting the amount of LNG cargoes available to the European market in 2023.
- **If Russian pipeline gas supplies to the EU cease completely and Chinese LNG imports recover to 2021 levels, Europe could face a supply-demand gap of 30 bcm during the key summer period for refilling gas storage in 2023.** This gap could represent **almost half the gas required to fill storage sites to 95% capacity** by the start of the 2023-24 heating season.
- **More rapid deployment of energy efficiency measures, renewables and heat pumps is needed to reduce the risk of a worsening energy and gas crisis.** This will require immediate action from governments. A further push to accelerate structural changes and reduce gas consumption is essential not only for Europe's clean energy transitions but also for its energy security and the wellbeing of its citizens and industries.
- **The IEA will present a roadmap for securing Europe's gas balance for next winter** showing what is needed to ensure storage sites are filled to 95% capacity by the beginning of the 2023-24 heating season and to structurally reduce gas consumption during the winter.

*As winter approaches, a combination of favourable LNG market dynamics, robust pipeline deliveries from non-Russian suppliers, lower demand, and policy actions has given Europe a chance to sidestep some of the worst immediate impacts of Russia's steep cuts to natural gas deliveries*

- Russia's pipeline gas deliveries to the European Union halved in the first ten months of 2022 compared with last year's levels. The decline in absolute terms was 60 bcm, the equivalent of over 10% of the global LNG trade. The steep decline in Russian gas supplies coincided with multi-year lows in European hydro and nuclear power output (down by 20% and 16% year-on-year, respectively), putting huge pressure on European gas markets.
- Gas prices on the Dutch Title Transfer Facility (TTF) – a leading European gas hub – averaged over EUR 130/MWh (USD 40/MMBtu) year-to-date, almost eight times the 5-year average between 2016 and 2020. The all-time high prices attracted record LNG inflows to the European Union and the United Kingdom, rising by 65% or over 50 bcm year-on-year in the first ten months of 2022.
- Gas demand in the European Union and the United Kingdom in the first 10 months of 2022 was down by an estimated 10%, or over 40 bcm, compared with the same period a year earlier. This was mainly the result of lower consumption across the residential, commercial and industrial sectors, but it also includes some efficiency gains and behavioural responses to higher prices. It also reflects demand destruction, particularly in gas-intensive industries.
- Non-Russian pipeline supplies to Europe increased substantially. Pipeline deliveries from Norway rose by 5% (5 bcm) and flows from Azerbaijan via the Trans Adriatic Pipeline surged by close to 50% (3 bcm) year-on-year in the first ten months of 2022. In both cases, export infrastructure is running close to nameplate capacity. Algeria increased its pipeline supplies to Europe by over 10% (or 3 bcm) on available export routes in the first ten months of the year, and has some limited upside

## Year-on-year changes in global LNG exports and imports by key regions, January – October 2022



- Strong European demand for LNG led to a reconfiguration of global LNG flows as increases in LNG supply (23 bcm) were not sufficient to meet Europe's rapidly rising LNG imports. Higher LNG flows towards Europe were enabled in part by China's LNG imports falling by 20% (or 19 bcm) year-to-date as it drastically reduced spot procurements. Europe's thirst for LNG also disrupted gas and electricity supply in more price-sensitive markets, including in South Asia.

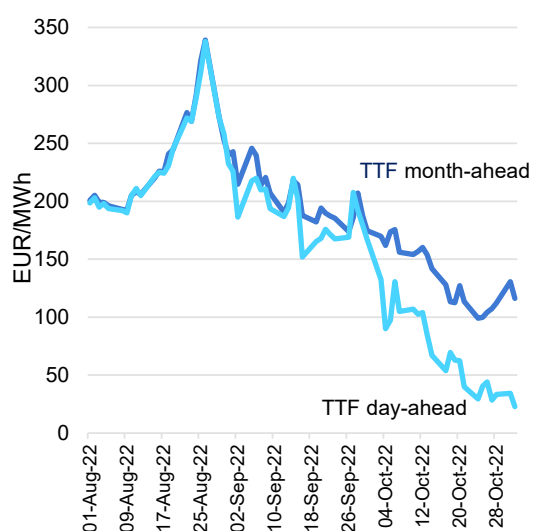
### *Mild weather, healthy storage levels and strong LNG supply have led to a significant fall in some natural gas price markers*

- The combination of higher non-Russian gas imports and lower demand was instrumental for Europe to offset Russia's gas supply cuts and enable a near-record build-up of storage levels. Storage injections were 22%, or 13 bcm, above their 5-year average in 2022. At the beginning of November, EU storage sites were close to 95% full – well above the European Union's 80% target and well-aligned with the IEA's 10-Point Plan to Reduce the European Union's Reliance on Russian Natural Gas.
- Unseasonably mild weather in October reduced gas demand from distribution networks (concentrated in the commercial and residential sectors) by over 30% year-on-year and effectively delayed the start of the heating season in most European markets. This steep decline in demand coincided with a persistently strong influx of LNG cargoes, which have limited immediate flexibility to change destination, as deliveries are typically scheduled several weeks in advance.
- Lower-than-expected demand, together with high LNG inflow and healthy storage levels, pushed down European gas prices. Month-ahead prices on TTF fell to just

below EUR 100/MWh (USD 30/MMBtu) by the end of October. This was less than one-third of the all-time high at the end of August but still more than five times the 5-year average during the 2016-20 period. Day-ahead prices – which are more reflective of short-term supply-demand factors – fell below USD 10/MMBtu at the end of October, while next-hour prices dropped into negative territory for a short period on 24 October amid infrastructure constraints in the TTF market zone.

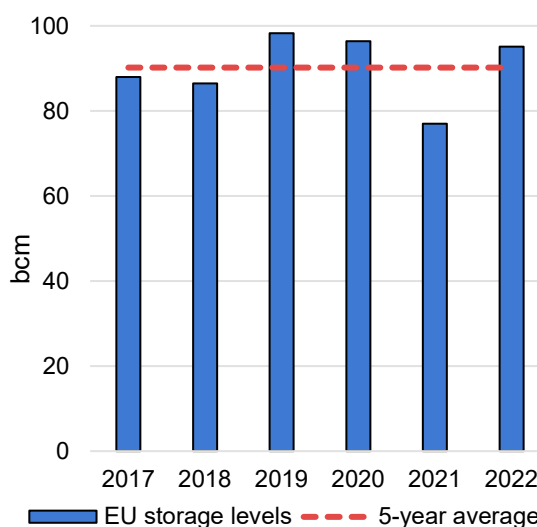
### Day-ahead and month-ahead TTF prices

(August – October 2022)



### EU gas storage levels

(1 November 2022)



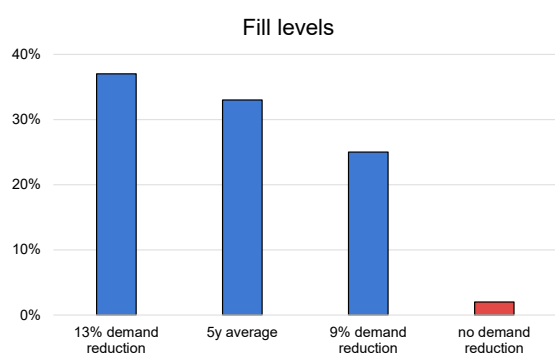
IEA. CC BY 4.0.

*The temporary comfort provided by today's market conditions should not lead to overly optimistic conclusions about the future: a cold spell could quickly change sentiment and Europe's gas balance faces even tougher tests in 2023*

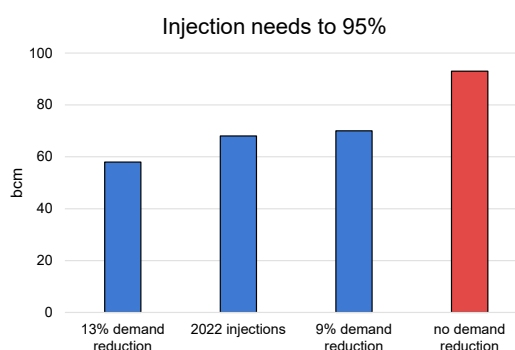
- While EU gas inventories are standing 5%, or 5 bcm, above their 5-year average, this additional storage cushion could be quickly erased: 5 bcm is just two days of EU gas demand during a cold spell.
- There is a wide range of possible outcomes for EU gas storage at the end of this winter heating season. Assuming no or very low Russian gas deliveries to the European Union this winter, and average levels of LNG imports (around 13 bcm per month), then gas storage levels could be anywhere between 5% and 35% by the end of the heating season, depending on demand trajectories over the coming months.
- Variable demand trajectories, which can be influenced by policies as well as prices and weather, translate into a variety of future scenarios for gas injection needs during the summer of 2023. These vary between 60 bcm and 90 bcm in order to reach 95% storage levels by the beginning of the 2023-24 heating season.

- Considering current market trends, our assessment today is that the storage injection needs of the European Union and the United Kingdom will be 68 bcm (including 1.68 bcm of injections to the Rough storage in the United Kingdom). This is based on the assumption that European gas demand during this November-March period is 11% below its 5-year average. A colder-than-average winter could deplete European storage levels faster, resulting in injection needs in the range of 80-90 bcm.

### Potential EU and UK storage levels by end March 2023



### Resulting injection needs in summer 2023 to reach 95% fill level



IEA. CC BY 4.0.

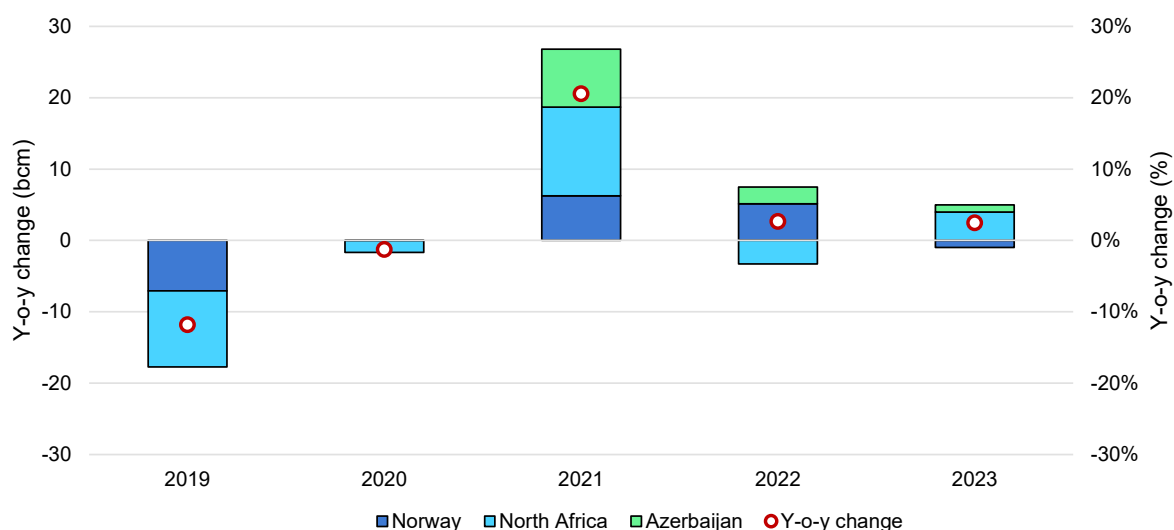
Note: assuming no Russian piped gas to the European Union from 1<sup>st</sup> of January and average (13 bcm/month) LNG imports into the European Union and the United Kingdom.

- Measures to limit short-term demand and storage depletion, alongside more structural measures to bring down gas demand, are absolutely essential to position Europe for next year. The drive to refill Europe's gas storages for the 2023-24 winter heating season has to begin now.

*Some of the factors that helped Europe in 2022 are unlikely to be as favourable in 2023: in particular, Russian deliveries are likely to be considerably lower and competition from China for available LNG cargoes considerably higher*

- Although Russian gas deliveries to Europe were cut sharply during 2022, they were close to 'normal' levels for much of the first half of the year. Total pipeline supply from Russia in 2022 is likely to amount to around 60 bcm. It is highly unlikely that Russia will deliver another 60 bcm of piped gas in 2023. If supply remains at current levels, then Russian pipeline supply would be around 25 bcm in 2023. It is also entirely possible that Russian deliveries could fall further – or cease entirely.
- Non-Russian pipeline suppliers have limited upside potential, with both Azerbaijan and Norway supplying close to their nameplate capacity in 2022. In the case of Algeria, some limited upside is expected with the development of gas fields in the Berkine South basin.

## Change in non-Russian pipeline gas deliveries to Europe



IEA. CC BY 4.0.

- Global LNG supply is expected to increase by 20 bcm in 2023, supported mainly by the ramp-up of the Calcasieu Pass LNG facility in the United States and the Coral South LNG facility in Mozambique, as well as the return of the Freeport LNG facility in the United States. However, this increased LNG supply will not be sufficient to offset the likely decline in Russia's pipeline deliveries to the European Union.
- Domestic gas production in the European Union is set to decline in 2023. In the Netherlands, production at the Groningen field was capped at 2.8 bcm for the 2022-23 Gas Year<sup>1</sup>, down from 4.5 bcm in the 2021-22 Gas Year. Production from small fields in the Netherlands also continues to decline. In Denmark, the restart of the Tyra field was postponed to the 2023-24 winter –meaning that it will not contribute to the refilling of gas storages during summer 2023. In the United Kingdom, gas production recovered strongly in 2022 and the potential for further short-term growth is limited.
- Even more significantly, China's LNG imports could rebound next year. China's lower LNG imports in the first ten months of 2022 were a key enabler of higher LNG availability to Europe. A return to stronger Chinese economic growth and some easing of lockdowns could bring 2023 LNG imports back to their 2021 levels (108 bcm), which would capture over 85% of next year's expected increase in global LNG supply and limit the amount of LNG available to the European market.
- China has pursued a strong LNG contracting strategy in recent years. As a result, China's reliance on destination-fixed LNG contracts is set to increase from 88 bcm per year in 2022 to 100 bcm per year in 2023. This effectively means that China

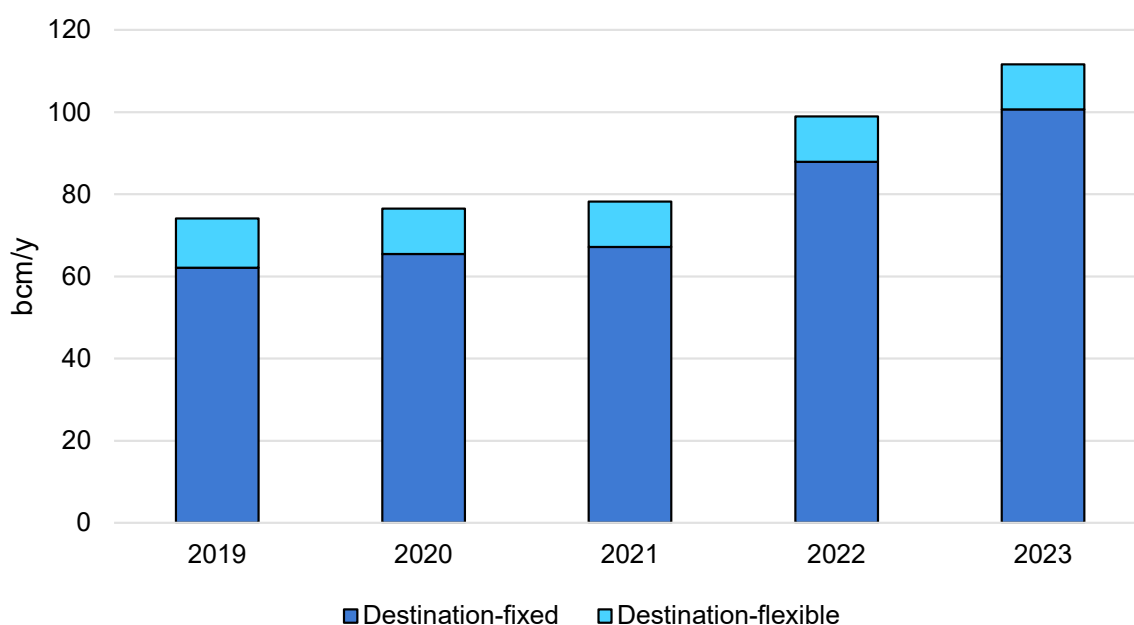
<sup>1</sup> A Gas Year starts on 1 October and ends on 30 September.



will have the right-of-first-refusal on an additional 12 bcm of LNG – well over half of the expected increase in global LNG supply in 2023.

- In mid-October, it was widely reported that China's National Development and Reform Commission had asked state-owned gas importers to stop reselling LNG to buyers in Europe and Asia to ensure stable gas supply ahead of winter.

### Structure of China's LNG import contracts



IEA. CC BY 4.0.

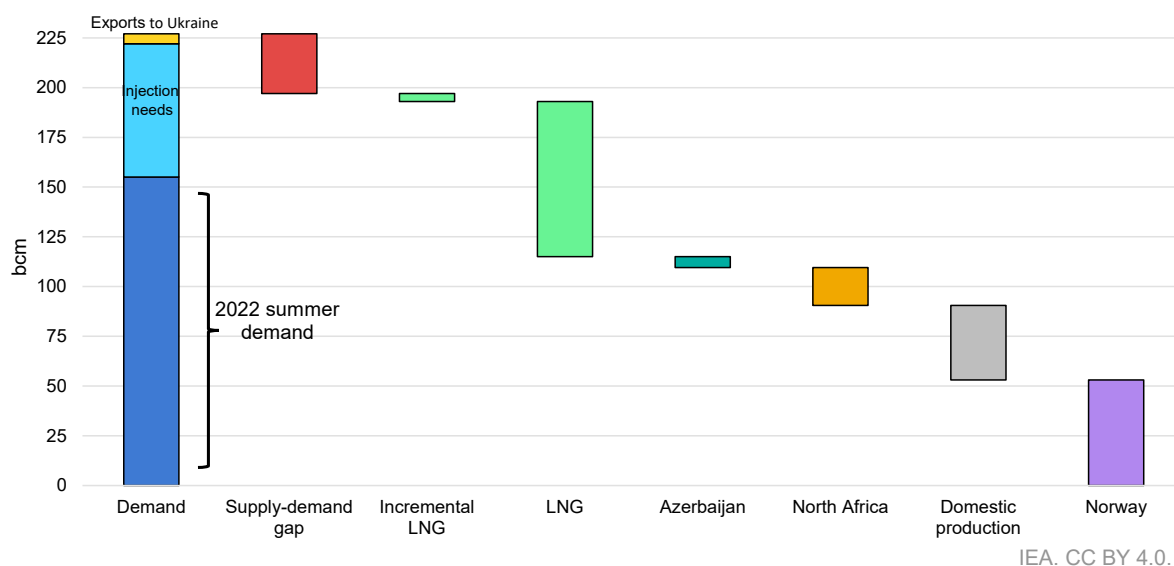
- EU gas exports to Ukraine are set to rise. Ukraine started the 2022-23 heating season with storage levels at just 14 bcm – well below their historic average. Even assuming a 25% reduction in the country's winter gas consumption, storage sites are expected to be severely depleted by the end of March 2023. Our analysis indicates that Ukraine would require at least 5 bcm of gas imports from the European Union during the summer of 2023 to replenish its storage levels to 14 bcm by the start of the 2023-24 heating season.

*Europe could face a 30 bcm shortfall in the gas it needs to fuel its economy and sufficiently refill storage sites during the summer of 2023, jeopardising its preparations for the winter of 2023-24*

- A full cessation of Russian pipeline gas supplies to the European Union combined with a return of Chinese LNG imports to their 2021 levels would lead to a shortfall of 30 bcm of gas in Europe during the summer of 2023, the period when gas storage sites need to be refilled.
- This equates to almost half of the injections required to fill storage sites to 95% of capacity by the start of the 2023-24 heating season. This is based on the

assumption that natural gas demand in the European Union and the United Kingdom will decline by 11% compared to its 5-year average during the November 2022 – March 2023 period and that Europe's gas storage sites will be around 30% full at the end of this winter.

### Breakdown of the summer 2023 natural gas balance of the European Union and the United Kingdom in case of full cessation of Russian flows and limited LNG availability, April – September 2023



- A recovery in European hydropower generation to its 5-year average and higher nuclear power output in France (aligned with the mid-range of EDF's latest guidance) could reduce the shortfall to 22 bcm, but it would not eliminate it.
- This puts the spotlight back on natural gas demand. Shortfalls in available supply would put immense pressure on prices again, but this could be relieved by accelerated structural changes in European gas demand.

### *An even faster deployment of renewables, heat pumps and energy efficiency measures can mitigate the risks of a worsening energy and gas crisis*

- While healthy storage levels and unseasonably mild weather at the beginning of the 2022-23 winter season provide some temporary relief to gas and related energy markets in Europe, our analysis indicates that supply-demand fundamentals are set to tighten in 2023.
- A more rapid deployment of renewables, heat pumps and energy efficiency measures can mitigate the risk of a worsening energy and gas crisis. However, this would require immediate action from governments.
- **The IEA will present a roadmap for securing Europe's gas balance for next winter** showing what is needed to ensure storage sites are filled to 95% capacity

by the beginning of the 2023-24 heating season and to structurally reduce gas consumption during the winter. Key measures include:

- Speeding up investments in energy efficiency improvements.
- Faster deployment of renewables.
- Accelerated installation of heat pumps.
- Identifying remaining fuel-switching options in industry and the power sector.
- Behavioural changes.
- A further push to accelerate structural changes and reduce gas consumption is essential not only for Europe's clean energy transitions but also for its energy security and the wellbeing of its citizens and industries.
- The current market context requires greater attention to instruments and measures that could facilitate investment in methane abatement options.

International Energy Agency (IEA).

This work reflects the views of the IEA Secretariat but does not necessarily reflect those of the IEA's individual Member countries or of any particular funder or collaborator. The work does not constitute professional advice on any specific issue or situation. The IEA makes no representation or warranty, express or implied, in respect of the work's contents (including its completeness or accuracy) and shall not be responsible for any use of, or reliance on, the work.



Subject to the IEA's [Notice for CC-licensed Content](#), this work is licenced under a [Creative Commons Attribution 4.0 International Licence](#).

This document and any map included herein are without prejudice to the status of or sovereignty over any territory, to the delimitation of international frontiers and boundaries and to the name of any territory, city or area.

Unless otherwise indicated, all material presented in figures and tables is derived from IEA data and analysis.

IEA Publications  
International Energy Agency  
Website: [www.iea.org](http://www.iea.org)  
Contact information: [www.iea.org/contact](http://www.iea.org/contact)

Typeset in France by IEA - November 2022  
Cover design: IEA