

Box 2

THE EU ECONOMIES' NATURAL GAS INVENTORIES IN 2022 AND 2023 UNDER TWO HYPOTHETICAL SCENARIOS

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Since the start of the war in Ukraine, Russian gas supplies to the European Union (EU) – which in 2021 accounted for 40% of all EU gas imports – have fallen by almost 80%. This has posed a considerable challenge for the European economies, which have had to contend with an extraordinary surge in gas prices – even though they have declined in recent months (see Chart 1) – and to roll out a wide range of measures that seek to quickly reduce the bloc's dependence on Russian natural gas imports, which greatly varies from country to country (see Chart 2).

In recent months EU countries have broadly demonstrated a relatively high capacity to reduce their dependence on Russian gas imports, which has allowed them to increase the level of their gas inventories to multi-year highs (see Chart 3). This has essentially been possible through two channels. First, by increasing pipeline gas imports (mainly from Norway, North Africa and Azerbaijan) and making greater use of liquefied natural gas (LNG), imported primarily from the United States, Qatar and Nigeria. Second, by reducing gas consumption. Indeed, since the start of the war in Ukraine, gas consumption has fallen by 11% in the EU as a whole relative to the average of the past few years, although this reduction has been remarkably uneven across countries, agents and sectors (see Chart 4).

Although the European economies' responsiveness to the energy crisis has been admirable so far, considerable uncertainty persists as to whether gas supplies to the EU will be fully assured, not only during the winter of 2022-2023 but also in the winter of 2023-2024.¹ Among other factors, this will depend on how European demand for energy adapts in the coming quarters, the ability to tap into new supply sources, the weather and the degree of solidarity between the different EU countries.

In this respect it should be noted that, although the current energy crisis constitutes a common shock for the entire EU, it is having vastly asymmetrical impacts on the individual Member States. Moreover, the ability to mitigate these asymmetries in the short term is relatively limited, considering the few existing interconnections between the different European energy markets at present. For example, given the current level of energy interconnections, countries such as Spain, which have a considerable regasification capacity and little exposure to Russian gas flows, have very limited scope to export gas to other central European countries such as Germany, which is highly exposed to Russian gas and has little regasification capacity in the short term.

In this setting, this box seeks to assess the risk of a potential gas shortage for the various EU economies in the coming quarters. To this end, two hypothetical scenarios are considered, which assume a total cut-off of gas flows from Russia.² Both scenarios also factor in the solidarity agreements between certain European economies, whereby they commit to share their surplus gas. Consequently, for the purpose of this exercise, these economies are considered to be a single geographical area.³

A benign scenario assumes that Europe's demand for natural gas decreases, thanks to favourable weather and the fulfilment of the EU's consumption reduction targets,⁴ and that the supply diversification plans announced by the Member States are realised.⁵ Meanwhile, under an adverse scenario, it is assumed that the winters of 2022-2023 and 2023-2024 are colder than usual, entailing higher demand for gas.⁶ At the same time, this scenario considers that only half of the gas consumption reduction observed in

- 1 This box considers a broad definition of "winter" that includes the period of peak gas consumption, which runs from November to April each year.
- 2 Both scenarios simulate the degree of gas market resilience for each EU economy up to May 2024, taking into account: (i) its level of inventories and storage capacity; (ii) the potential to import natural gas from sources other than Russia, which in turn calls for considering the extent of cross-border interconnections, the volume of gas imports and the capacity of the regasification plants; and (iii) its domestic gas production. Other assumptions considered in the exercise relate to the EU countries' access to LNG (regardless of price) and the stability of gas re-export patterns.
- 3 See Haas, Kozluk and Sarcina (2022), "Emergency plans and solidarity: Protecting Europe against a natural gas shortage" for details of the six existing bilateral solidarity agreements, which define three areas of solidarity: (i) Austria, Denmark and Germany; (ii) Estonia, Finland, Latvia and Lithuania; and (iii) Italy and Slovenia. Under these bilateral agreements, if one country has difficulties in securing gas supplies despite having already reduced consumption in its non-essential sectors, the other signatory economy commits to sharing its inventories, even if this means reducing gas consumption in its non-essential sectors.
- 4 It is assumed that consumption is reduced in accordance with the European Commission's targets (which include the application of varying country-specific exemptions and derogations) compared to the average consumption of the past five years.
- 5 The new LNG projects announced could raise the EU's supply capacity by 12.5% and 20% of its annual natural gas consumption by the end of 2023 and 2024, respectively. See Sgaravati, Tagliapietra and Trasi (2022), "National energy policy responses to the energy crisis".
- 6 In particular, it is assumed that the increase in gas consumption in November-April of 2022-2023 and 2023-2024 is equivalent to the maximum increase in consumption over that same period in the last five years.

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recent months is structural – with the rest having been due to short-term or circumstantial factors – and that the supply diversification plans are delayed by six months.

On these assumptions, of the main European economies, only Bulgaria and Belgium would be at risk of a shortage in the winter of 2022-2023 under the

benign scenario, unless they reduced their gas consumption more than assumed. In the winter of 2023-2024, only Bulgaria would continue to be exposed to this risk, as Belgium would be able to expand its LNG import capacity in 2023 (see Table 1). Under the adverse scenario, the risk of gas shortages this winter would be more pronounced in Bulgaria and Belgium,

Chart 1
Wholesale natural gas prices in Europe



Chart 2
Dependence on Russian natural gas, 2020 (a)

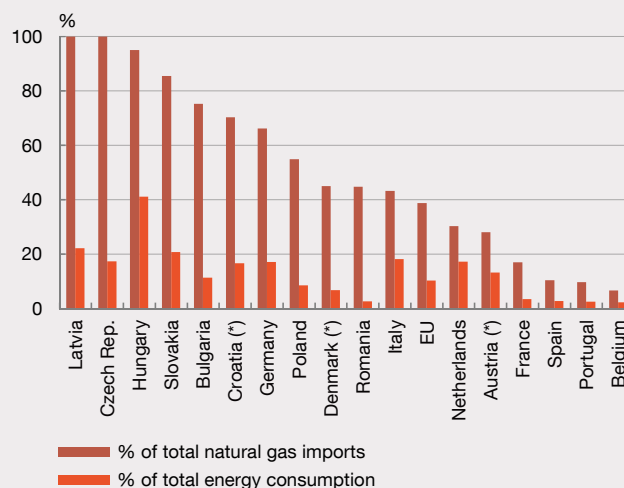


Chart 3
Natural gas inventories

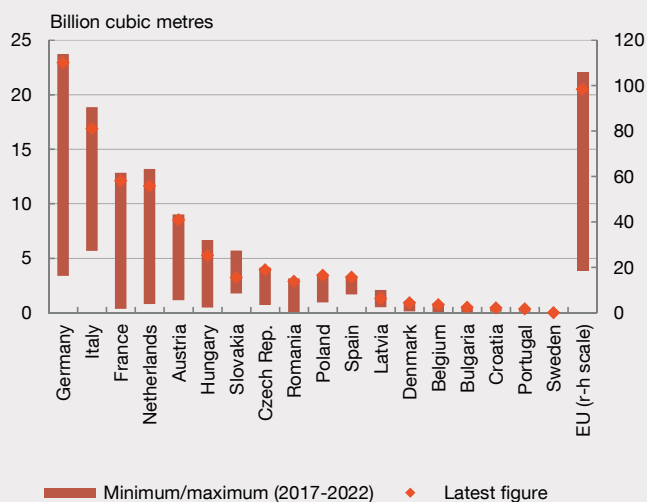
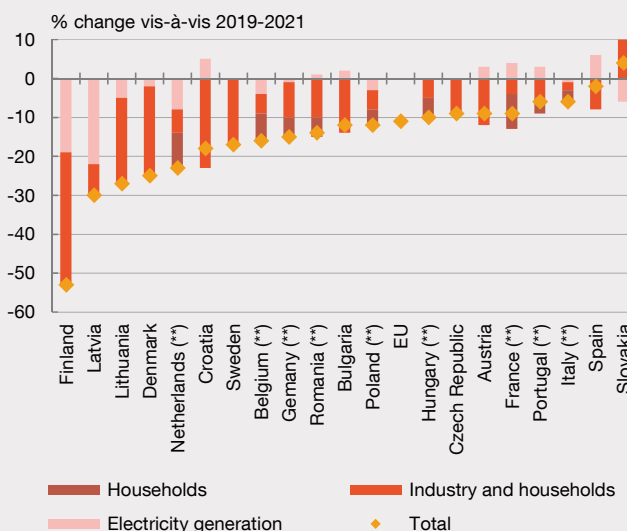


Chart 4
Natural gas consumption, 2022 (b)



SOURCES: IEA, Bruegel, Eurostat, IMF and Gas Infrastructure Europe.

- a In the economies marked with an asterisk (*), imports from Russia are imputed according to the Eurostat criteria set out in the document "Energy mix dependency imports".
- b Change with respect to the average consumption from January to November, broken down into electricity generation and households and industry using the estimates in *McWilliams and Zachmann (2022)*. In the countries marked with two asterisks (**) information is available to break down consumption between industry and households.

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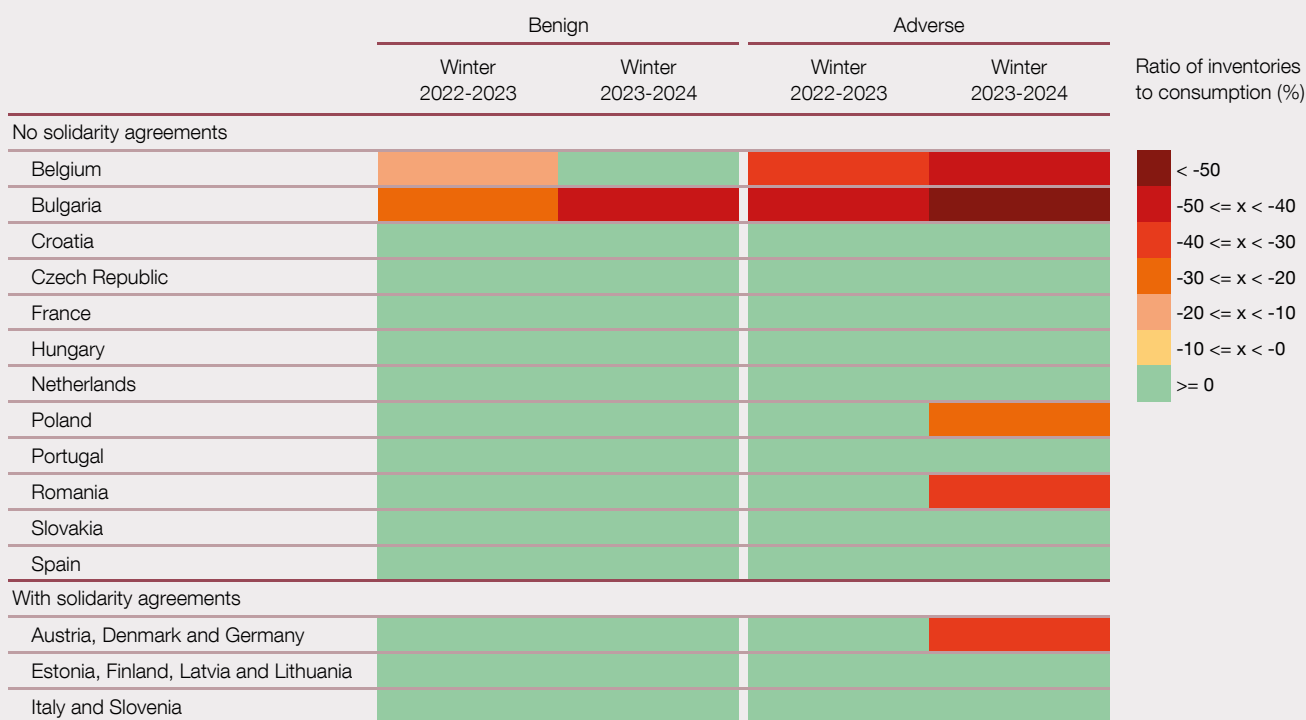
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but no other economies would be affected. However, in the winter of 2023-2024, the risk of shortages would also spread to Romania, Poland and the area comprising Austria, Denmark and Germany. Spain would not be exposed to the risk of gas shortages under either of the hypothetical scenarios considered.

Against a backdrop of extraordinary uncertainty, it is essential that the simulations set out in this box be interpreted with due caution, as they only represent an initial tentative approximation of the possible future developments in gas supply and demand in the various EU economies, based on assumptions whose likelihood of materialisation is highly uncertain. In this respect, the

various recently published studies that have assessed the risk of possible future gas shortages in the EU do not offer a wholly uniform picture. For instance, in line with the findings presented in this box, the International Energy Agency notes that it would be very difficult to refill storages in the summer of 2023, which would lead to shortage risk scenarios in the winter of 2023-2024. Conversely, other organisations, including the OECD, suggest that a cold winter could lead to supply problems arising as early as in the winter of 2022-2023.⁷ None of these studies covering the risks of shortages factors in the heterogeneity across EU countries. In the light of such differences, it is worth reiterating the need for due caution when interpreting the findings presented in this box.

Table 1
Risk scenarios envisaging shortages in the EU during the winters of 2022-2023 and 2023-2024



SOURCE: Banco de España calculations.

NOTE: The data depicted in the risk map correspond to the minimum ratio of inventories to monthly consumption, as a percentage, in the winter months (November to April). The benign scenario assumes that demand for natural gas is contained, thanks to favourable weather conditions and the fulfilment of the European Commission's targets, and that the regasification and production projects announced are realised. Under the adverse scenario, consumption is higher owing to both winters being cold and to the fall in consumption being half that observed to date. Under this scenario, the supply-side projects are delayed by six months. Countries with signed solidarity agreements, committing to share their surplus gas, are grouped together. Those countries for which insufficient data are available are omitted.

⁷ See International Energy Agency (2022), "Never Too Early to Prepare for Next Winter: Europe's Gas Balance for 2023-2024" and OECD (2022), "Paying the Price of War. OECD Economic Outlook, Interim Report September 2022".