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UK Gas Supply and Demand, and the Role of Gas in Current Energy Supply and the Energy Transition

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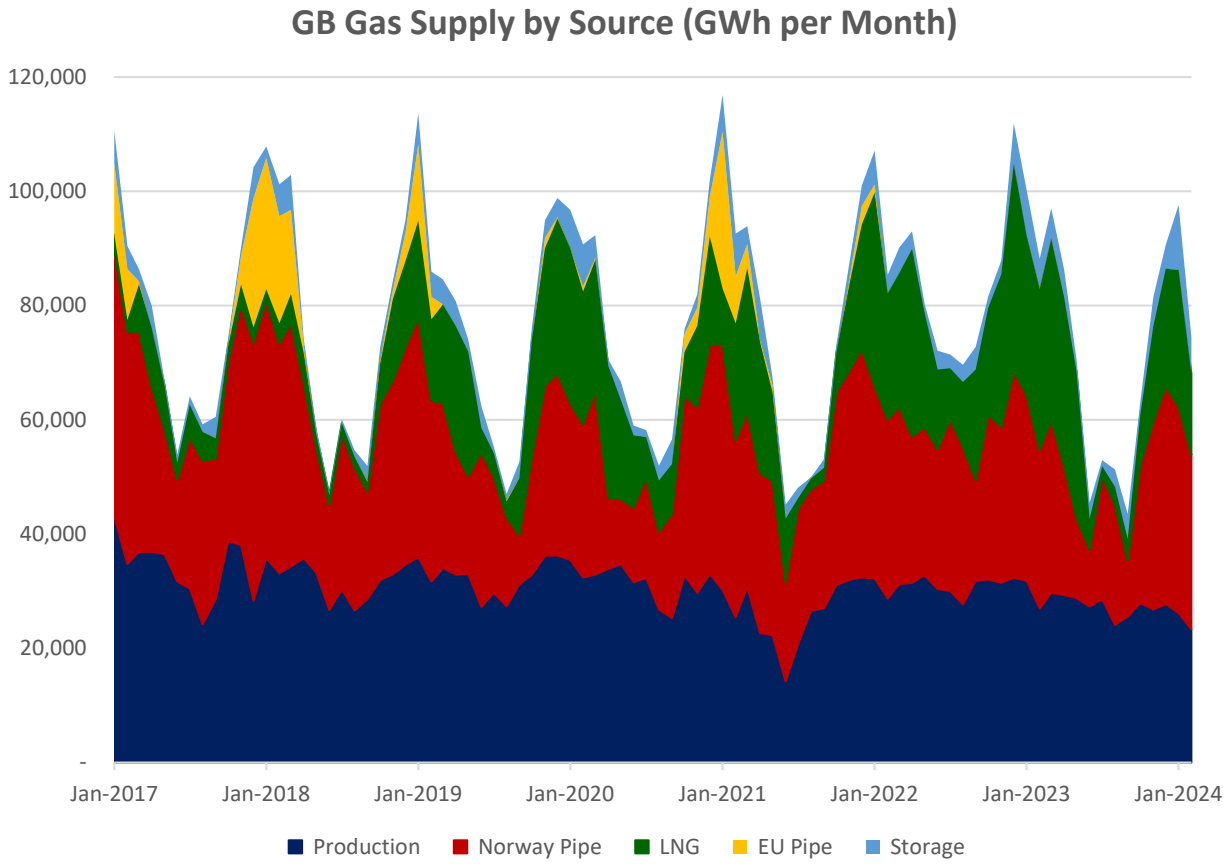
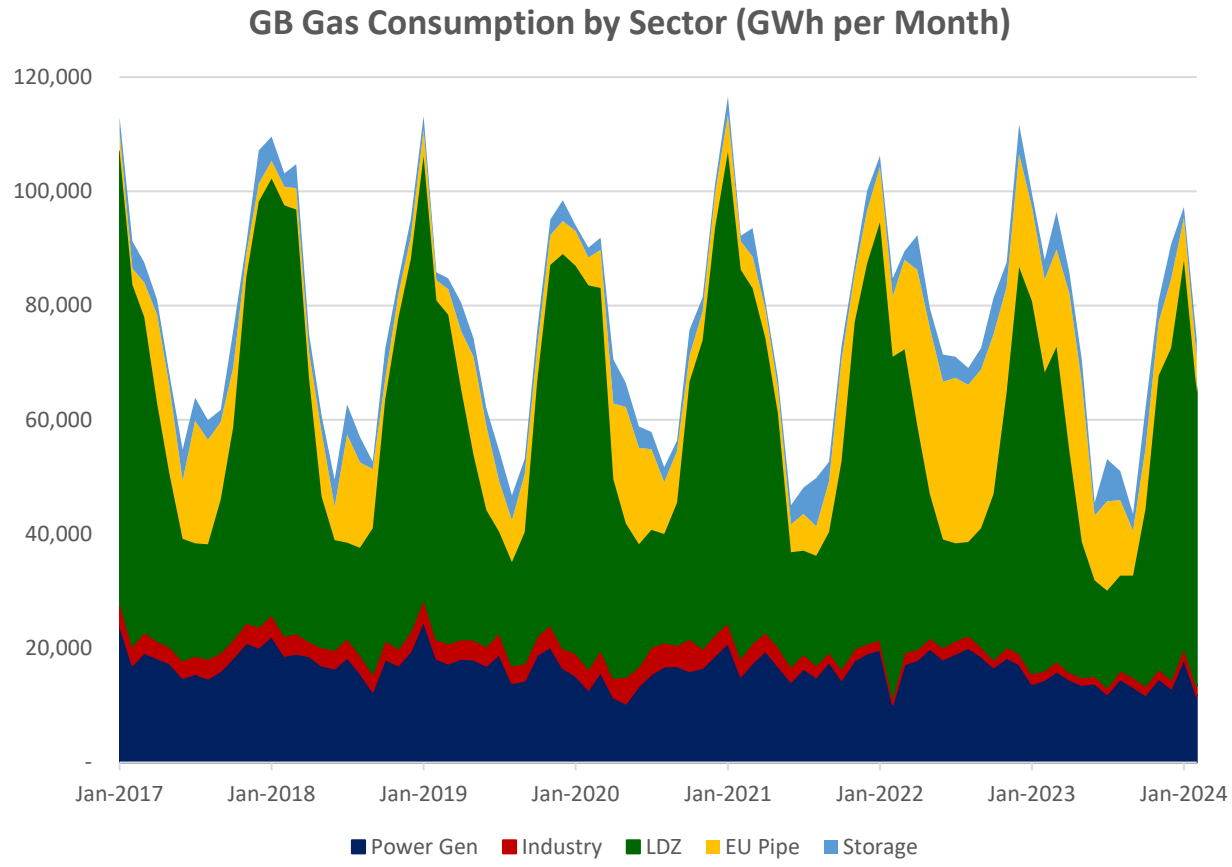
GB Gas Supply and Demand: The Long Run

Data source: National Gas Transmission

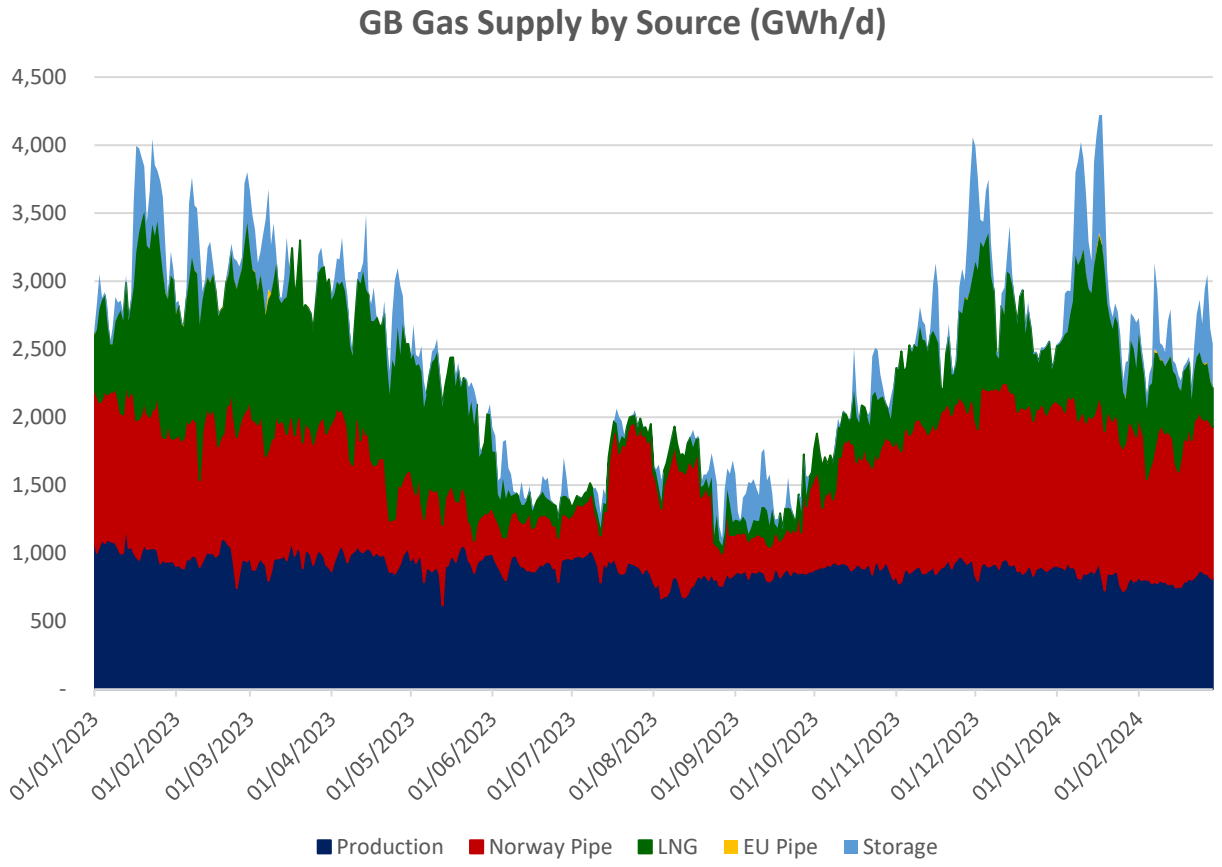


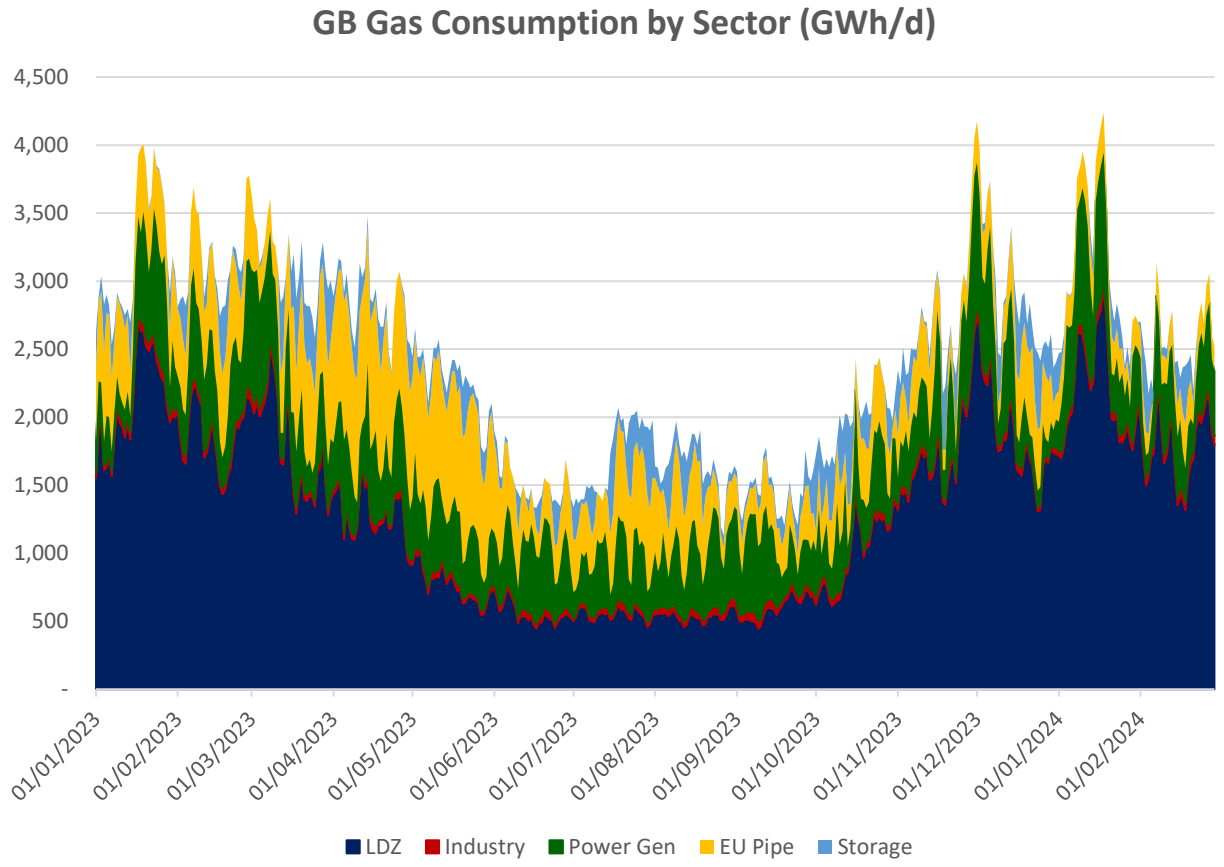


- The main sources of UK supply have been domestic production and pipeline imports from Norway, while substantial pipe imports from the EU have ceased
- LNG adds supply during winter, to compensate for the lack of large-scale, seasonal gas storage (summer 2022 saw volumes re-exported to EU by pipeline)
- As supply from domestic production and Norway declines from late 2020s, LNG will play an increasingly important role in supply
- Gas demand is highly seasonal, especially for Local Distribution Zones (LDZ) serving residential, commercial, and public administration buildings

GB Gas Supply and Demand: The Past 12 Months

Data source: National Gas Transmission



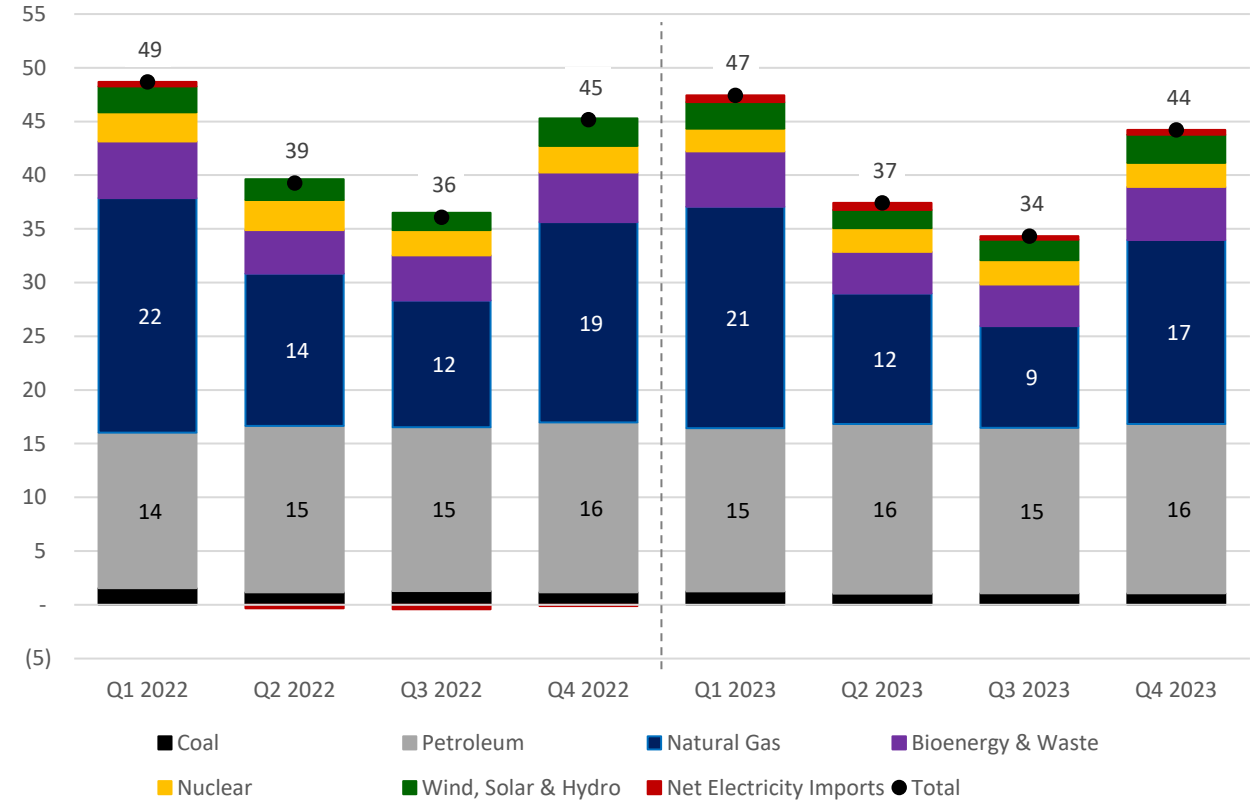


- UK gas production shows limited seasonal swing, while supply from Norway and LNG sendout ramps up in winter
- Surge in supply from Norway in July-August 2023 was re-exported to the EU or injected into storage
- Peaks in demand are usually short-lived, as seen in early Dec 2023 and mid-Jan 2024, but demand can still rise rapidly in times of cold weather
- LNG is the marginal source of UK supply, meaning that UK prices are influenced by European and global LNG market developments

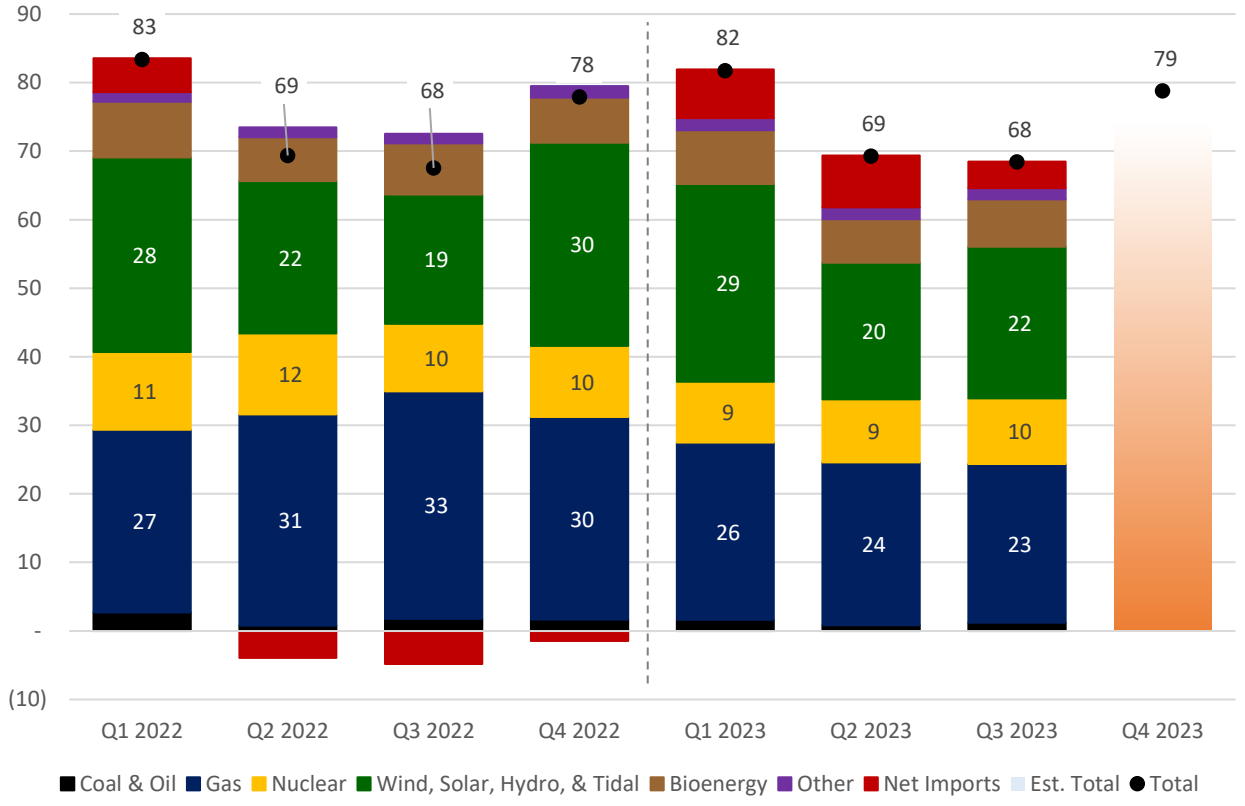
UK Quarterly Primary Energy Supply and Electricity Supply

Data sources: UK Government – Energy Trends

UK Primary Energy Supply by Source (mtoe)



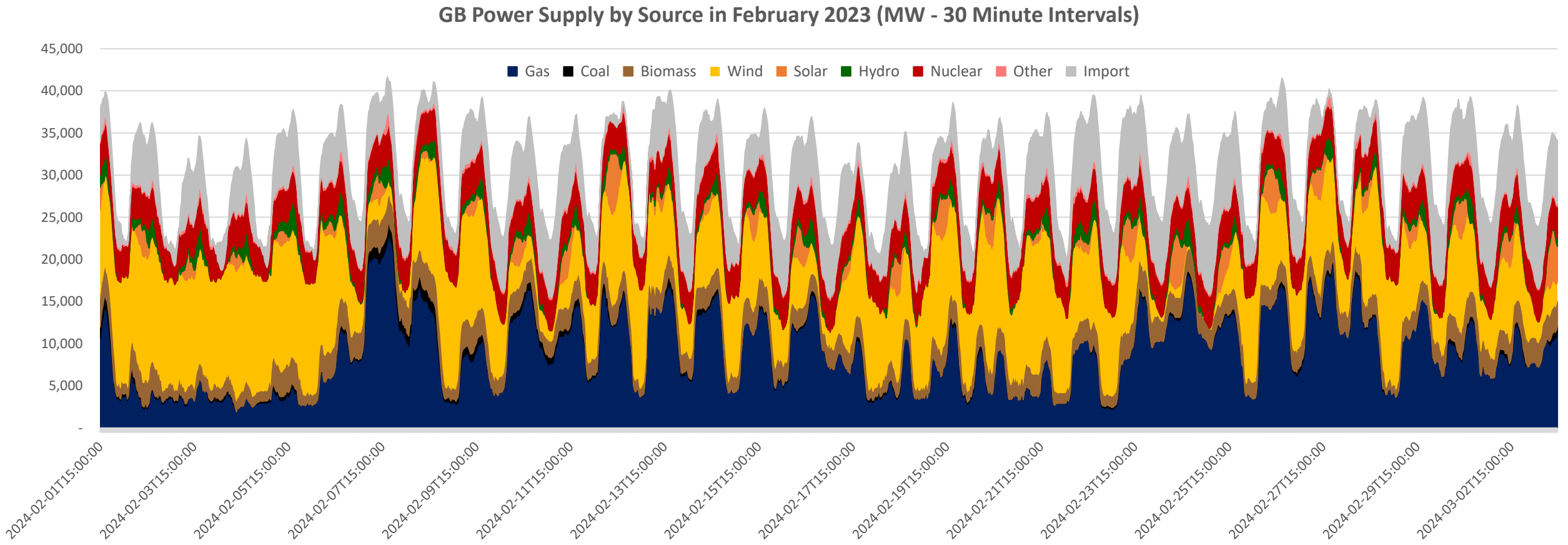
UK Electricity Supply by Source (TWh)



- Total UK primary energy consumption is highly seasonal, with natural gas providing much of the seasonal flexibility in supply
- UK electricity consumption is also seasonal, with variability in supply from renewables balanced by gas and imports/exports
- Gas provides 33-45% of quarterly power generation (38% in 2023 as a whole), thus playing a ‘baseload’ role
- The particular value of gas is the ability to fill the gaps between total demand and variable supply from other sources on a half-hourly basis

GB Electricity Supply

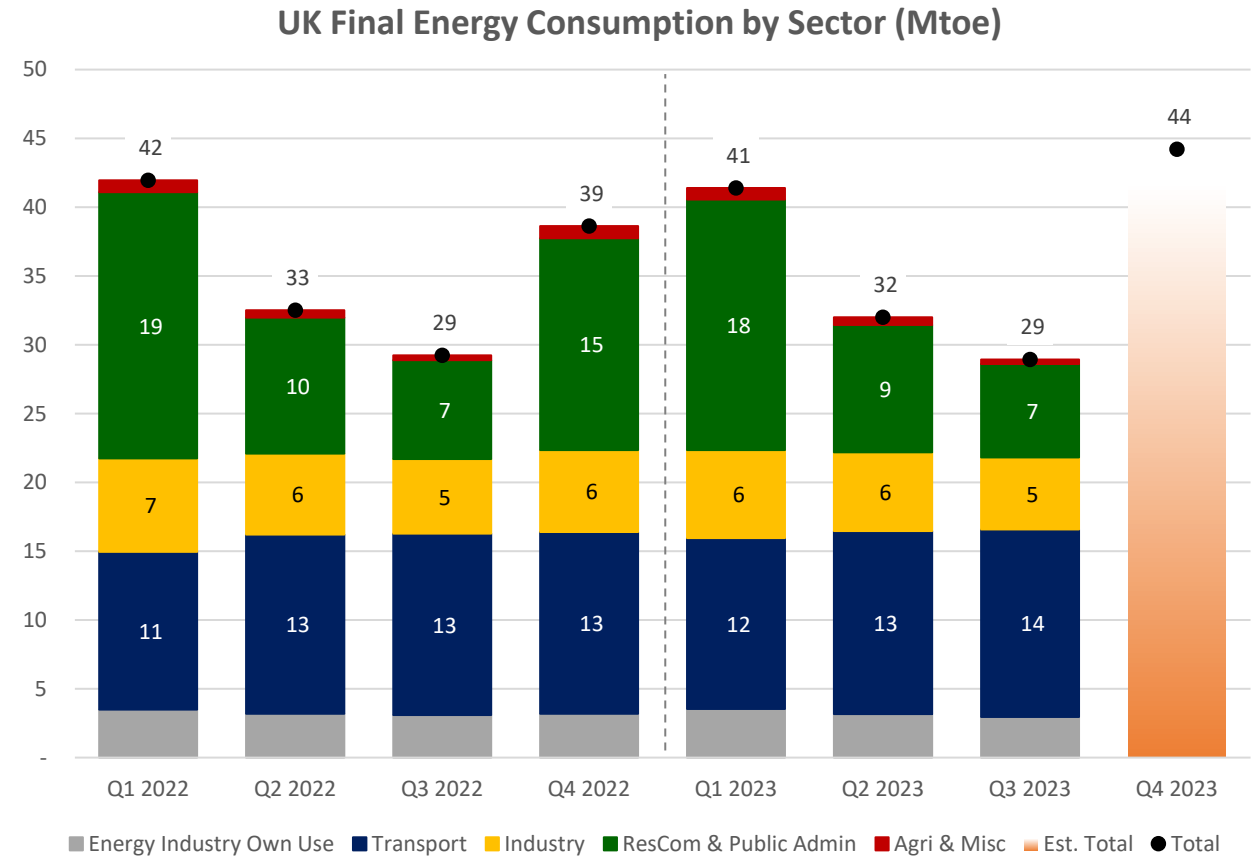
Data sources:
Elexon (https://bmrs.elexon.co.uk/generation-by-fuel-type)
University of Sheffield (https://www.solar.sheffield.ac.uk/pvlive/)
Note that negative values for exports are not included

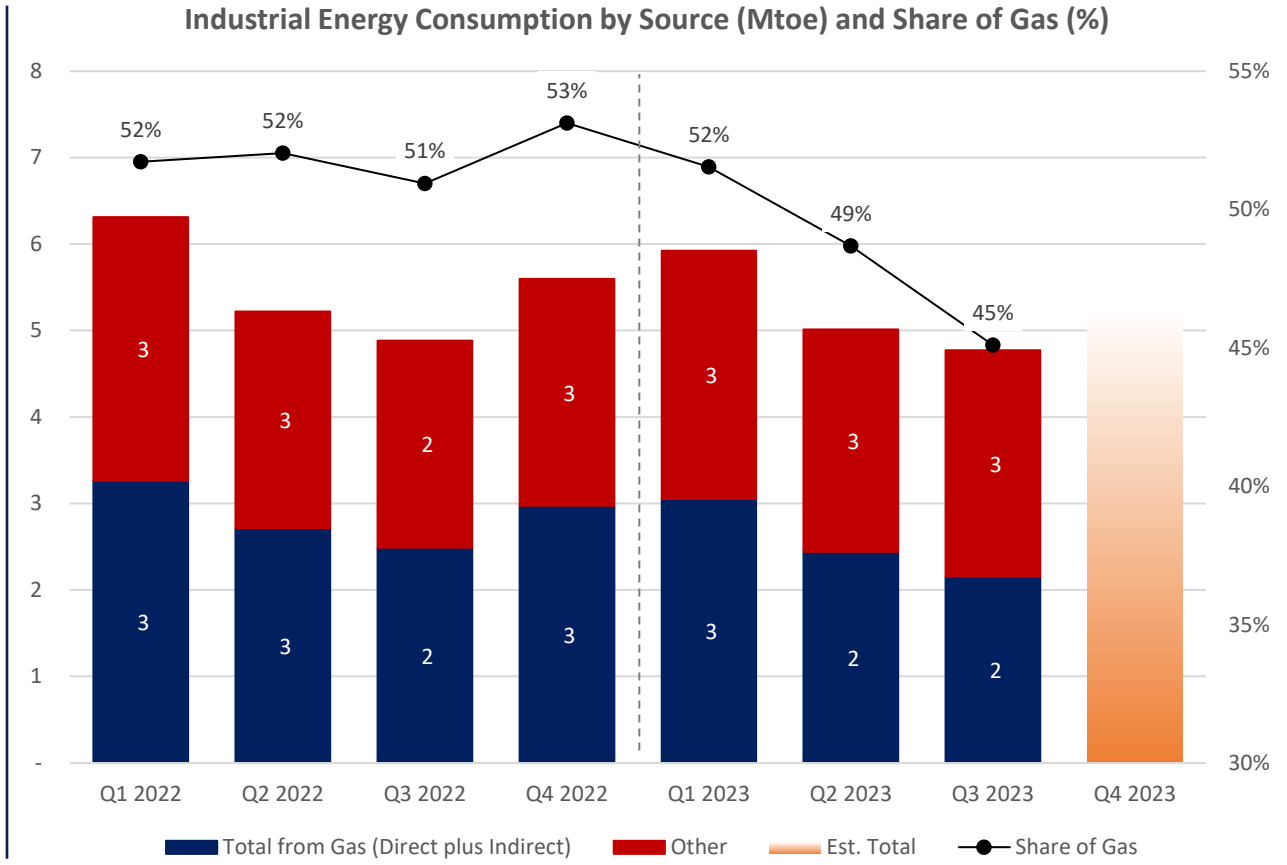


- Gas-fired power generation reconciles variability of demand and supply on an hourly basis – On several days in February, its share peaked at +50% of supply
- 8 of 9 UK nuclear reactors (4.7GW) due to close in 2026-28 and Hinkley Point C (3.3GW) due for completion 'around end of decade'
- Renewables (inc. biomass) paired with gas are likely to provide the majority of UK power in 2030s – UK govt plans nuclear to meet 25% of power gen by 2050
- Buildout of offshore wind (14.7GW operational and 11.9GW under construction) will reduce long-run dispatchable power generation and/or imports

UK Final Energy Consumption by Sector

Data sources: UK Government – Energy Trends



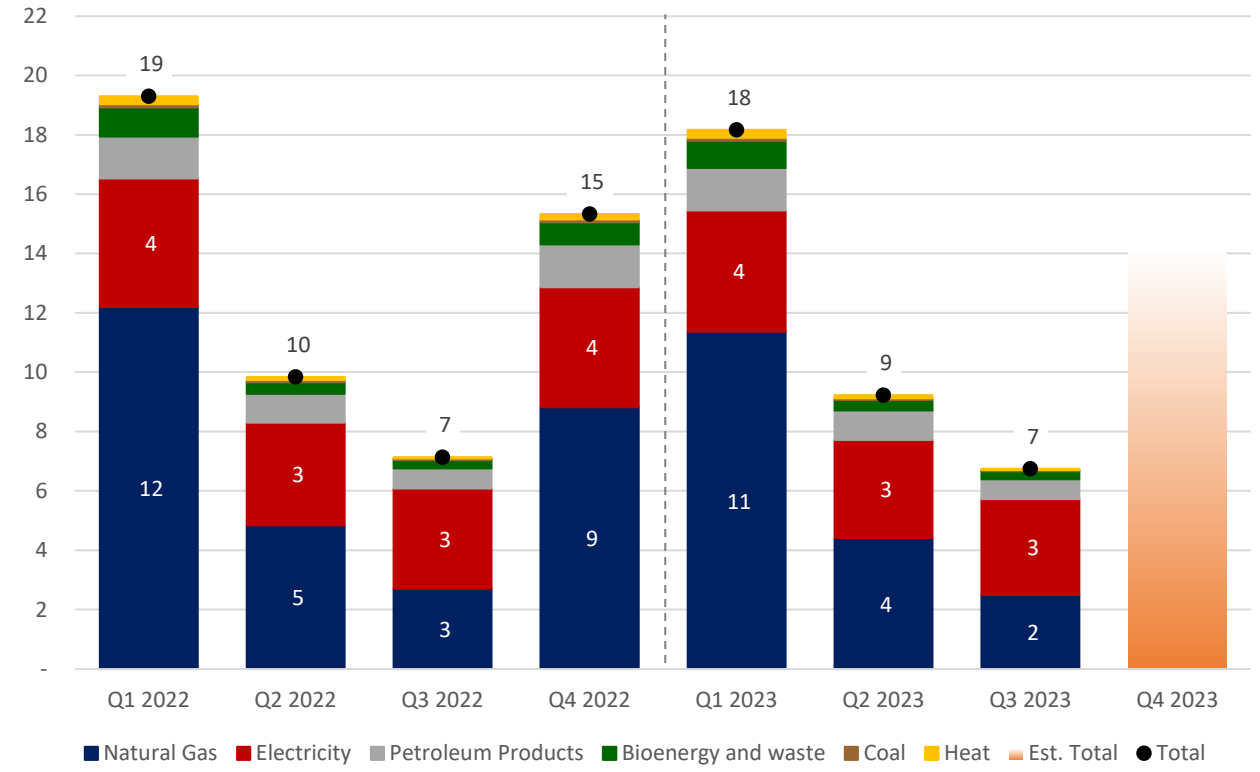


- 94% of transport sector energy demand is oil products. Gas (38%) and electricity (34%) provided 72% of industrial energy consumption in Q1-2022 to Q3-2023
- Direct gas consumption plus consumption of electricity generated from gas accounts for around 50% of industrial energy consumption
- Decarbonisation of industry will be through a combination of industrial-scale heat pumps, electrification, and decarbonised gases (biogas and hydrogen)

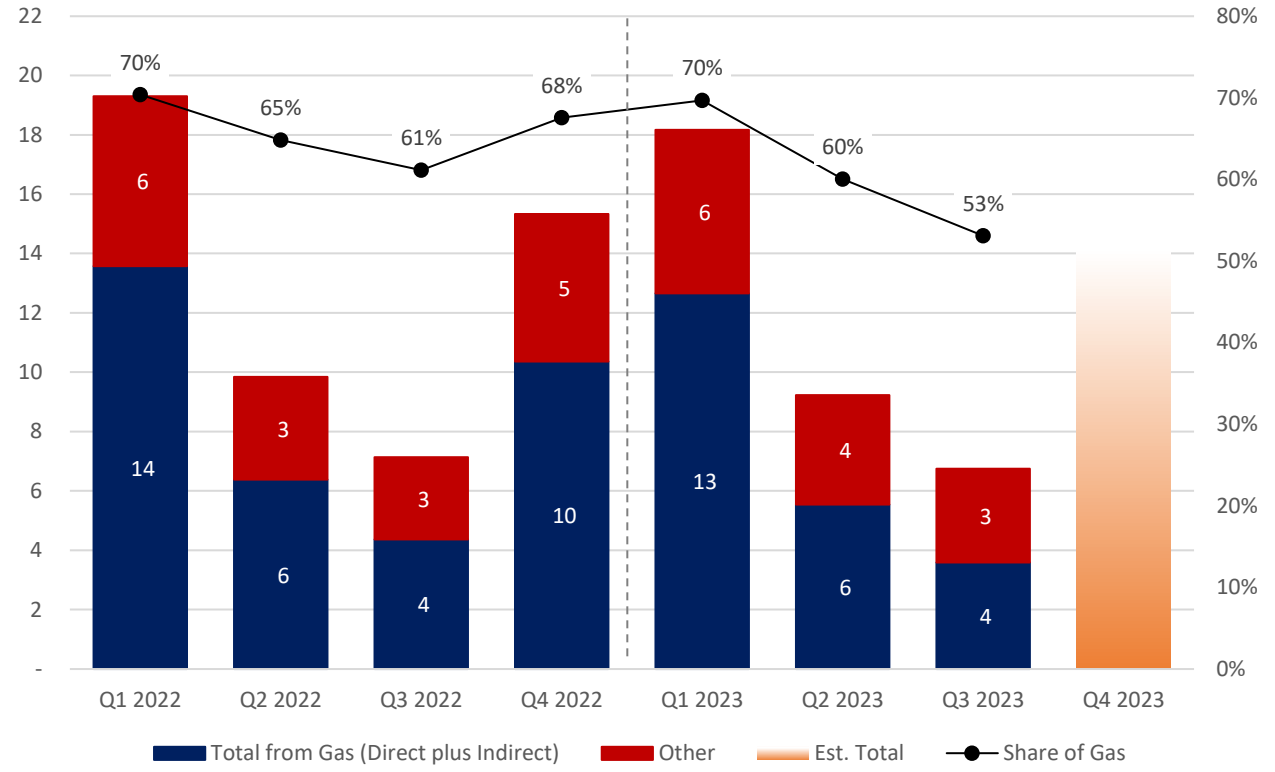
Residential, Commercial, and Public Administration Sector

Data sources: UK Government – Energy Trends

Residential, Commercial, and Public Administration Energy Consumption by Source (Mtoe)



Residential, Commercial, and Public Administration Energy Consumption by Source (Mtoe) and Share of Gas (%)



- Gas alone provides 38-63% of quarterly energy consumption in residential, commercial, and public admin, but on cold days this can be much higher
- Direct gas consumption plus consumption of electricity generated from gas accounts for around 53-70% of energy consumption in the Residential, Commercial, and Public Administration sector, with energy consumption in that sector exhibiting strong seasonality
- Decarbonisation of space heating in this sector is possible in the long-term through a mix of through electrification, heat pumps, and district heating

Role of Gas in the UK Energy Transition

- Power generation:
  - Natural gas currently plays a key role in balancing the variability of both renewable supply and demand
  - The UK has made good process in decarbonizing power generation, with Carbon Price Floor and growing renewable power generation pushing coal out of the mix. Ongoing development of offshore wind is positive. But UK nuclear power generation capacity in early 2030s will likely be lower than today, with more nuclear capacity a '2050 target'. In the medium-term, this likely means 'gas plus renewables'
- Industry:
  - Energy consumption in industry: high & low-temperature process heat, heating of industrial spaces, and mechanical power
  - Low-temperature process heat can be obtained from industrial-scale heat pumps
  - High-temperature process heat is more challenging, and possibly requires hydrogen, biogas, or natural gas with CCS
- Space heating:
  - Natural gas will continue to provide the majority of UK residential heating until alternatives are in place
  - Hydrogen is limited by cost, lower energy density (12.7 MJ/m3) compared to methane (39.8 MJ per m3), and need for retrofitting of both boilers and components aside from polyethylene pipelines (e.g., compressors, valves)
  - The future of space heating is electrification and heat pumps – but it will take time to retrofit existing buildings
- **UK gas demand is likely to be sustained (or decline only slowly) in 2020s & 2030s due to challenges on the decarbonisation pathway. Declining UK gas production means more imports, most likely in the form of LNG**

Thank You!

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