

Gas Market Report, Q3-2024



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Abstract

Natural gas markets moved to more pronounced growth in the first half of 2024, with initial estimates indicating that global gas demand increased at a rate well above its historical average during this period. Demand growth is primarily supported by higher gas use in industry and is increasingly concentrated in Asia, where both China and India returned to double-digit growth rates in the first half of 2024.

Despite this strong growth, the outlook for gas demand remains fragile. Global LNG production underperformed in the second quarter of 2024, while geopolitical tensions are fuelling price volatility. Natural gas prices increased across all key markets in the second quarter of 2024, reflecting tighter market fundamentals. For the full year of 2024, natural gas demand is forecast to increase by 2.5% in 2024, primarily driven by fast-growing Asian markets.

Geopolitical instability represents the greatest risk to the short-term outlook. LNG trade has practically halted across the Red Sea since the start of the year, while Russia is increasingly targeting energy infrastructure in Ukraine, including underground gas storage facilities. In this context, security of supply for natural gas remains a key aspect of energy policy making and the risks related to our outlook highlight the need to strengthen international co-operation, including in assessing and implementing flexibility options along gas and LNG value chains.

This edition of the quarterly *Gas Market Report* by the International Energy Agency (IEA) provides a thorough review of market developments over the first half of 2024 and a short-term outlook for the remainder of 2024. As part of the IEA's *Low-Emissions Gases Work Programme*, the report includes a section dedicated to the medium-term outlook for biomethane, low-emissions hydrogen and e-methane.

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Executive summary

Global gas markets returned to growth in the first half of 2024, but outlook remains fragile

Following the natural gas supply shock of 2022 and a gradual rebalancing in 2023, gas markets moved to more pronounced growth in the first half of 2024. Initial estimates indicate that global gas demand increased by 3% year-on-year (y-o-y) during this period, well above the historical 2% average growth rate between 2010 and 2020. Despite this strong growth, the recovery remains fragile. Global LNG production underperformed in the second quarter, while geopolitical tensions are fuelling price volatility. During the first quarter of 2024, gas prices dropped to levels last seen before the global energy crisis, however prices have increased across all key markets in recent months, reflecting tighter supply-demand fundamentals. Gas demand growth is expected to moderate in the second half of 2024. For the full year of 2024, global gas demand is forecast to increase by 2.5%, primarily driven by fast-growing Asian markets.

Asia was the driving force behind global gas demand growth in the first half of 2024

Preliminary data suggest that global natural gas demand increased by 3% in the first half of 2024. However, 70% of this demand growth was concentrated in the first quarter. LNG supply declined year-on-year in the second quarter, creating upward pressure on gas prices across key import markets, which in turn weighed on demand growth.

Asia accounted for around 60% of the increase in global gas demand in the first half of 2024, with demand in both China and India increasing by just over 10% y-o-y. Higher gas use in industry contributed to almost 65% of global demand growth in the first half of 2024. This was primarily supported by the economic expansion of fast-growing Asian markets. Gas use in the power sector grew by a more moderate 2% y-o-y, as the strong gains in North America, fast-growing Asian markets and Eurasia were partially offset by lower gas-fired power generation in Europe. Gas demand in the residential and commercial sectors grew by 1% y-o-y amid unseasonably warm temperatures in the first quarter.

Global LNG supply decreased in the second quarter – its first contraction since the Covid lockdowns in 2020

Global LNG supply growth remained lacklustre in the first half of 2024, increasing by a mere 2%, or around 6 bcm, year-on-year. This growth was entirely concentrated in the first quarter as LNG production rose by a robust 4.5% (or 6.5 bcm). By contrast, LNG output fell by 0.5%, or 0.5 bcm, y-o-y in the second quarter of 2024. This represents the first y-o-y quarterly decline since 2020, when Covid-induced lockdowns drastically reduced LNG demand and led to widespread cargo cancellations. In the second quarter of 2024, the decline in LNG production was largely driven by a combination of feed gas supply issues and unexpected outages.

Year-on-year growth in LNG supply is expected to accelerate during the second half of 2024, with new liquefaction capacity coming online. The United States is set to provide the lion's share of new export capacity this year as existing plants expand and new plants start operating. This includes the expansion of Freeport LNG, the ramp-up of Plaquemines LNG Phase 1 over the summer, and the expected start-up of Corpus Christi Stage 3 near the end of 2024. The Tortue FLNG plant off the coast of West Africa is due to come online in the fourth quarter.

Natural gas prices increased across all key markets in the second quarter

The contraction in LNG supply combined with strong Asian demand growth tightened the global gas balance in the second quarter. Moreover, uncertainties re-emerged around Russian piped gas supplies to Europe, which fuelled additional price volatility. Consequently, gas prices rose across key Asian and European markets, rising above their 2023 levels by June 2024. In the United States, Henry Hub prices recovered from their multi-decade lows, rising by almost 70% between March and June. Production cuts by upstream players, a strong increase in gas-fired power generation and higher gas exports all provided upward support to gas prices.

Natural gas demand growth is expected to slow in the second half of 2024

Global gas demand growth is expected to fall below 2% y-o-y in the second half of 2024. In part, the easing reflects the gradual

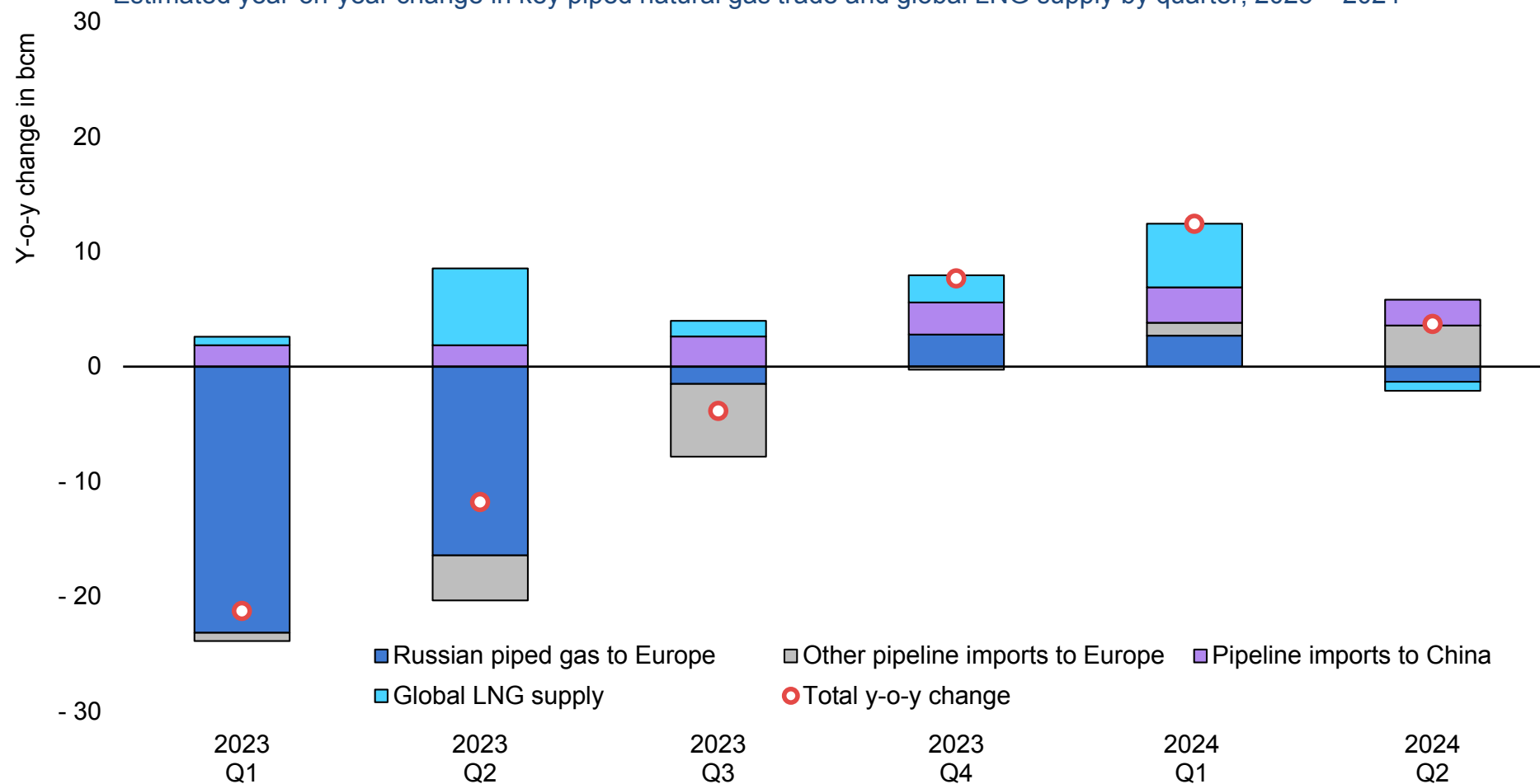
recovery in demand, which was already underway in the second half of 2023. For the full year of 2024, global gas demand is forecast to grow by 2.5%, or just over 100 bcm. We expect the limited increase in global LNG supply to restrain growth in import markets. Industry emerges as the most important driving force behind global demand, as gas use in the power sector is forecast to increase only marginally. This is because growth in fast-growing Asian markets and in gas-rich countries in Africa, the Middle East and North America is expected to be partially offset by declines in Europe.

Low-emissions gas supply is expected to more than double by 2027

The deployment of low-emissions gases is expected to accelerate over the medium term. Our current forecast sees the supply of low-emissions gases more than doubling by 2027, translating into an increase of almost 16 bcm in absolute terms. This represents a significant upward revision compared with our medium-term outlook last year and reflects growing policy support for low-emissions gases. Europe and North America are set to drive this expansion, contributing over 70% of the overall growth. Nevertheless, further efforts are required to unleash the full potential of low-emissions gases and reach the ambitious targets set by governments. Besides Europe and North America, a number of emerging low-emissions gas producers are expected to scale up their output, including Brazil, China and India.

Global gas trade growth tightened in Q2 2024 amid lower LNG supply availability

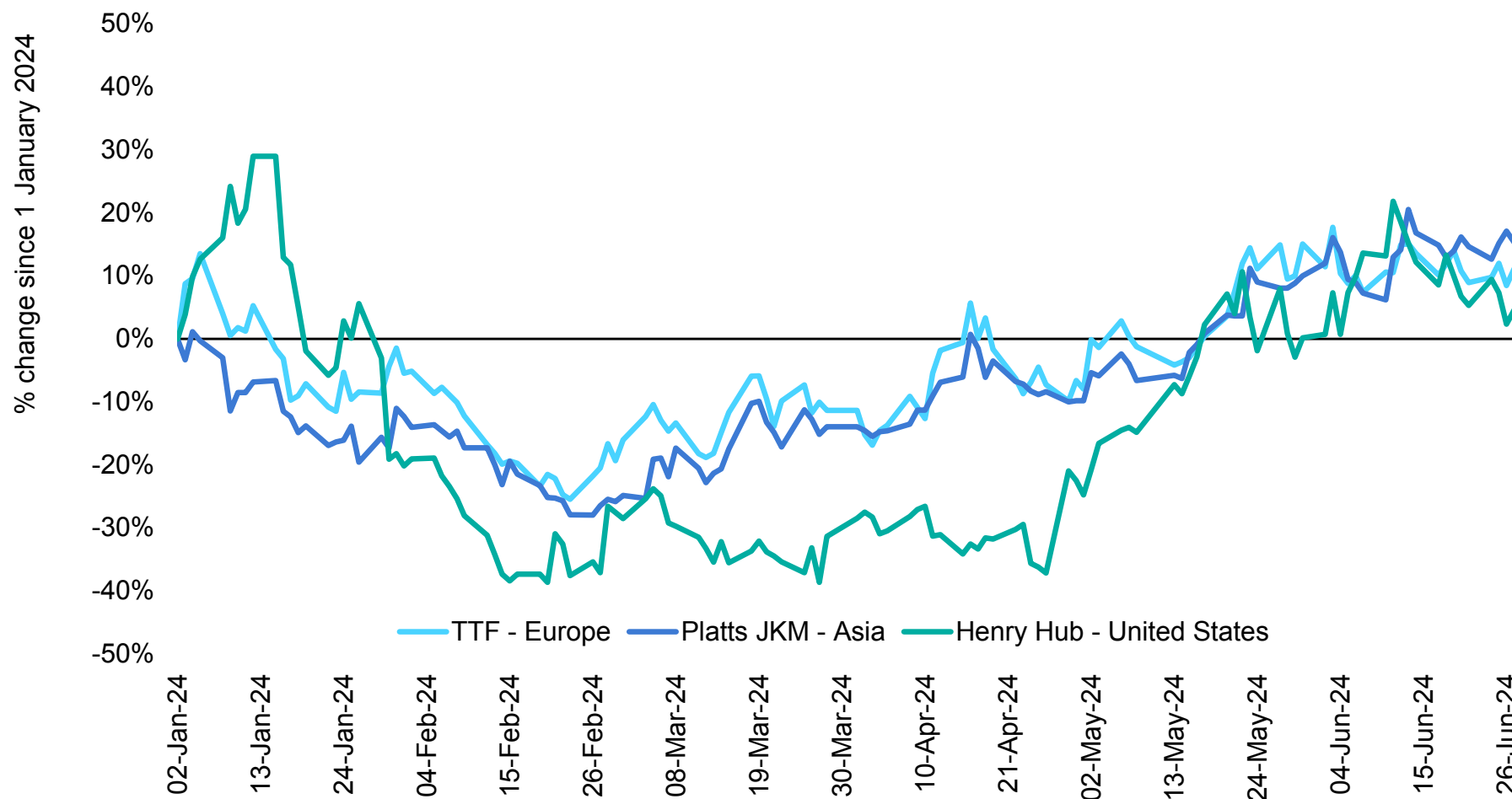
Estimated year-on-year change in key piped natural gas trade and global LNG supply by quarter, 2023 – 2024



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Natural gas prices strengthened across all key markets in Q2 2024

Evolution of key regional natural gas prices since 1 January 2024

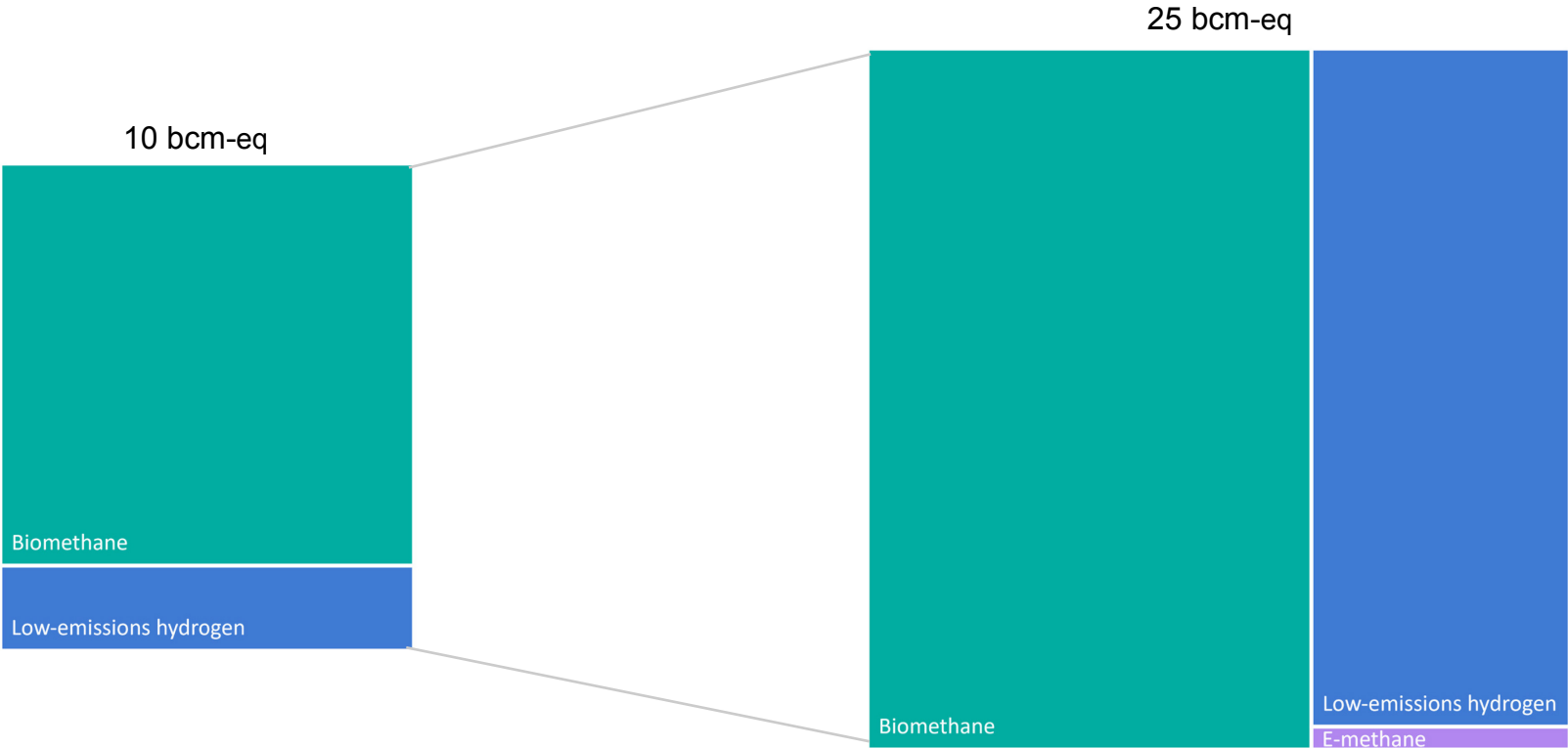


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The supply of low-emissions gases is expected to more than double by 2027

Estimated supply of low-emissions gases by type, in 2023

Forecast supply of low-emissions gases by type, in 2027



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Gas market update

Global gas demand returned to more pronounced growth in H1 2024

Following the contraction in 2022 and a gradual rebalancing in 2023, **global gas markets returned to more pronounced growth in H1 2024** amid a lower price environment and improving supply fundamentals. Around 70% of this demand growth was concentrated in Q1. The slowing of LNG supply growth in Q2 provided upward pressure on gas prices across key import markets, which in turn weighed on gas demand growth rates.

Preliminary data suggest that **natural gas demand increased by 3%** (or 50 bcm) in H1 2024 in the markets covered by this IEA gas market update.¹ Asia alone accounted for around 60% of incremental gas demand, primarily driven by the People's Republic of China (hereafter "China") and India. Demand growth was largely supported by **higher gas use in industry**, contributing almost 65% of the demand growth in H1 2024. Combined industrial gas consumption in China, Europe, India and the United States –accounting for around half of the global amount – increased by an impressive 6% (or near 20 bcm) y-o-y. **Gas-to-power demand** grew by a more moderate 2% y-o-y, as the strong gains in North America, the fast-growing Asian markets and Eurasia were partially offset by lower gas-fired power generation in Europe. Gas demand in the **residential and commercial** sectors grew by a mere 1% y-o-y as an **unseasonably**

warm Q1 weighed on space heating requirements in Europe and North America.

In **North America** natural gas demand rose by an estimated 2% (or 10 bcm) y-o-y in H1 2024. While residential and commercial demand declined amid unseasonably mild weather conditions in Q1, these losses were more than offset by robust growth in gas-fired power generation across all markets of the region. Faced with multi-decade low gas prices during the February–April period, US upstream players optimised their dry gas output to balance the market, which led to a 1.5% y-o-y decline in US gas production in Q2 2024. Lower dry gas output combined with strong gas-fired power generation and higher exports supported a recovery in natural gas prices in Q2. In **Central and South America** gas demand grew by an estimated 3% y-o-y, supported by higher gas use in the power and industrial sectors. This relatively strong demand growth increased the region's net LNG imports by close to 25% (or 1.3 bcm) y-o-y in H1 2024.

Natural gas demand in **Asia** increased by an estimated 8% y-o-y (or over 30 bcm) in H1 2024. **China** continues to drive the region's gas demand growth, with the country's gas consumption rising by 11% (or 17 bcm) y-o-y amid higher gas use across all end-use sectors. Lower natural gas prices continued to stimulate gas demand in **India**, with gas use in industry rising by over 20% y-o-y in the first

¹ Asia Pacific, Central and South America, Eurasia, Europe and North America.

five months of 2024. Combined natural gas demand increased by an estimated 3% y-o-y in **Japan and Korea** in the first four months of 2024.

Natural gas consumption in **OECD Europe** fell by 3.5% (or 9 bcm) y-o-y in H1 2024. The power sector remained the most important driver behind lower gas demand, as the strong expansion of renewables together with improving nuclear availability reduced the call on gas-fired power plants. Mild winter weather limited gas demand in the residential and commercial sectors in Q1. Conversely, gas use in the industrial sector continued to recover, supported by the lower price environment, albeit remaining well below its pre-crisis levels. In **Eurasia** natural gas demand rose by an estimated 5% y-o-y in H1 2024. A colder winter supported higher space heating requirements, while lower nuclear availability in the **Russian Federation** (hereafter “Russia”) increased the call on gas-fired power plants. Russia’s natural gas production increased by near 8% (or 22 bcm) y-o-y in the first five months of 2024. This growth was partly driven by stronger piped gas exports, including to China, Europe and Central Asia, as well as higher LNG production and rising domestic demand. Natural gas production displayed varying patterns in Central Asia. First estimates indicate that the region increased its piped gas deliveries to China, primarily driven by higher output in **Turkmenistan**. In **Azerbaijan** sales gas production grew by 4% (or 0.6 bcm) y-o-y in the first five months of 2024, supported both by higher domestic demand and stronger exports.

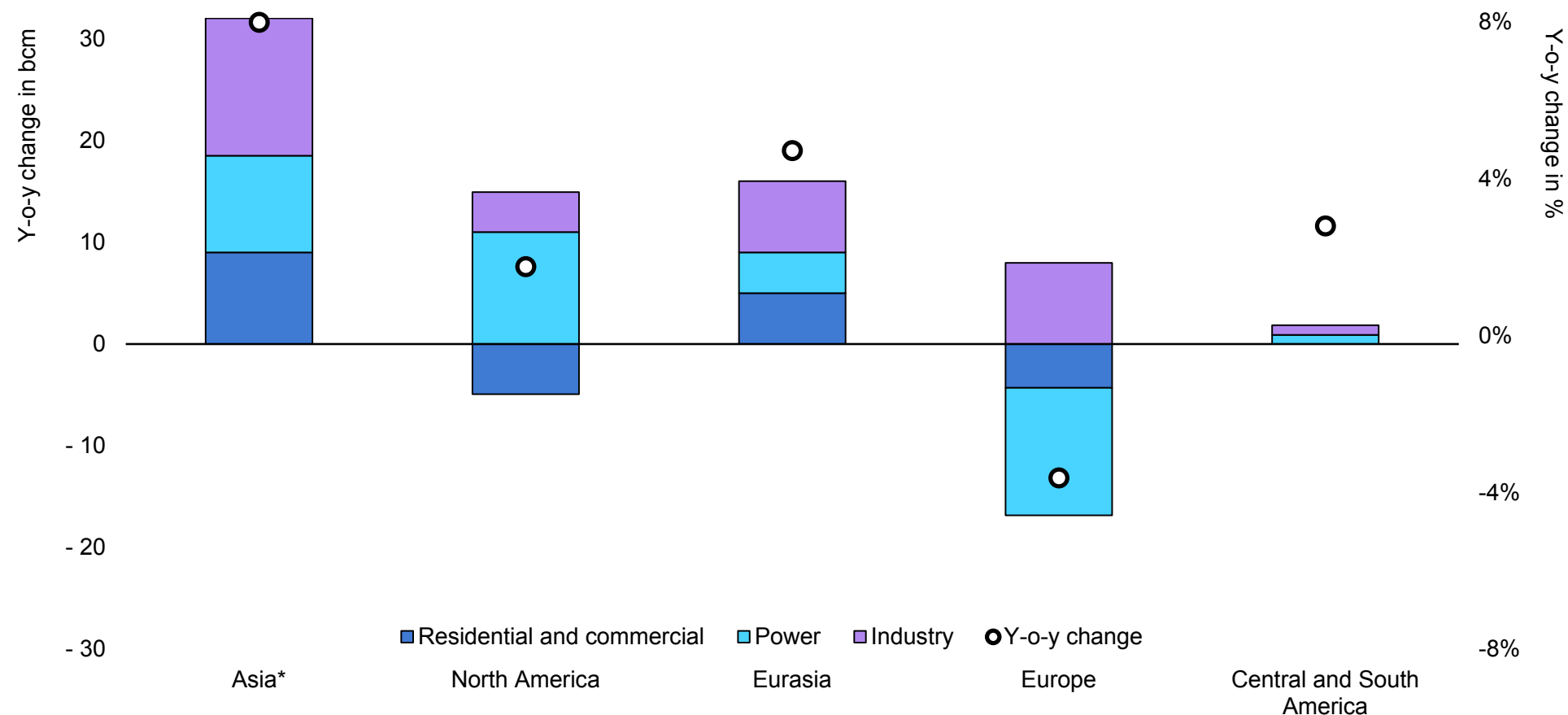
Global gas demand is forecast to grow by 2.5% (or just over 100 bcm) in 2024. We anticipate growth to be capped in import

markets by the limited increase in global LNG supply, which is expected to expand by a mere 3% (or 15 bcm). **Industry and energy own use** is expected to account for over 55% of incremental gas demand in 2024. This is partly supported by continued economic expansion in fast-growing Asian markets, as well as recovery in Europe’s industrial gas demand. Following an unseasonably mild northern hemisphere winter, natural gas demand in the **residential and commercial sectors** is expected to increase by 2.4% in 2024, assuming average weather conditions in Q4. **Gas-to-power** demand is forecast to increase only marginally, as higher gas burn in the fast-growing Asian markets, and the gas-rich countries of Africa, the Middle East and North America, is partially offset by the projected declines in Europe.

Gas demand in the **Asia Pacific region** is expected to expand by close to 5% in 2024 compared with 2023 and account for nearly 45% of incremental gas demand. Growth in Asia is largely supported by industrial activity and higher gas use in the power sector. Gas demand is forecast to increase by 1% in **North America** and by 2% in **Central and South America**. In **Europe** natural gas demand is forecast to remain broadly flat, standing 20% below its 2021 levels. While Europe’s gas use in industry and for space heating is projected to recover, gas-fired generation is set to decline further. Combined gas demand in the gas-rich markets of **Africa and the Middle East** is forecast to increase by 3%. Similarly, **Eurasian** gas demand is projected to grow by 3% amid higher demand in industry and the residential and commercial sectors.

Asia accounted for around 60% of incremental gas demand in H1 2024

Estimated y-o-y change in natural gas demand in key regions, H1 2024 vs H1 2023

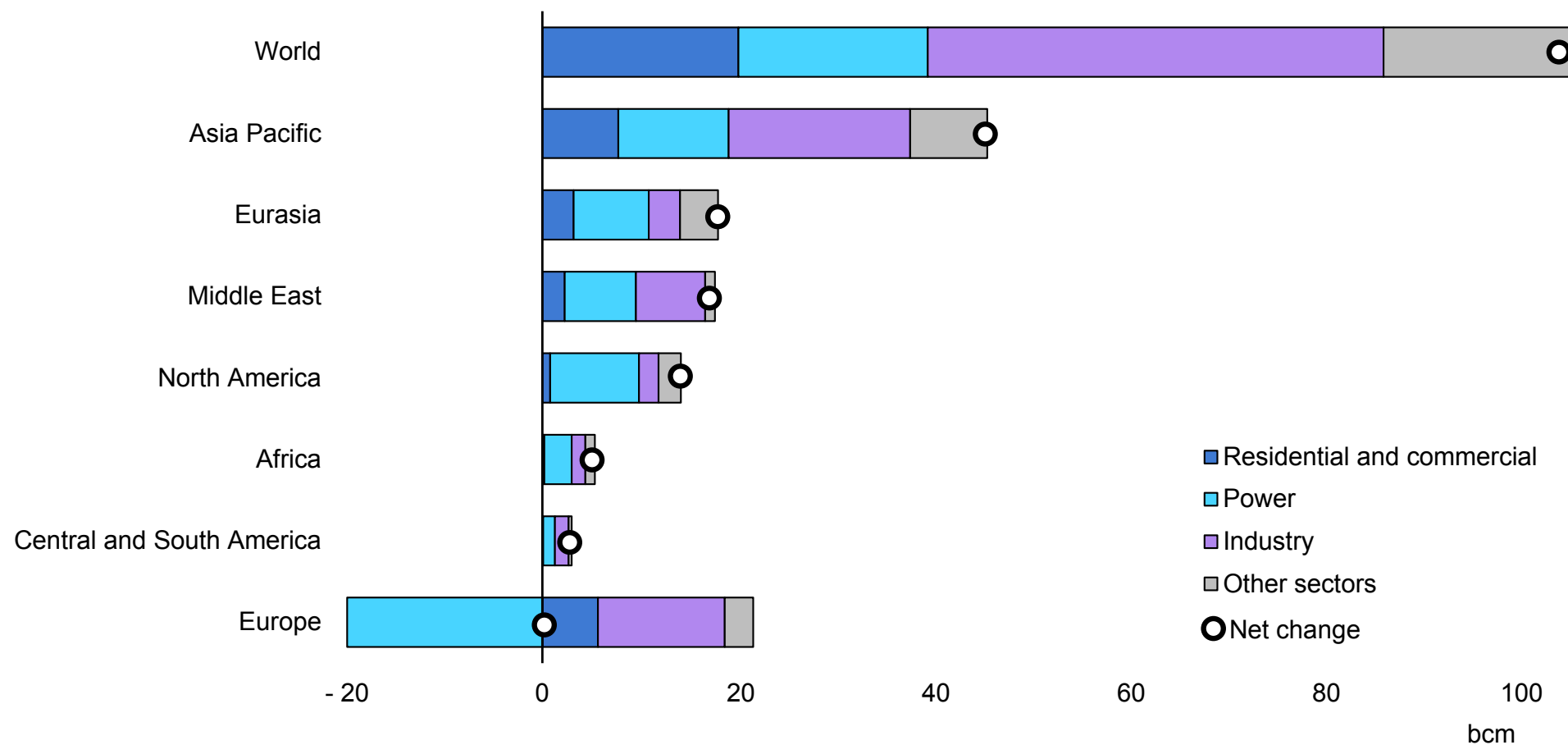


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* Bangladesh, China, India, Indonesia, Japan, Korea, Malaysia, Pakistan, Philippines, Singapore and Thailand.

Strong growth in industry drives incremental gas demand in 2024

Forecast change in natural gas consumption by region and sector, 2024 vs 2023



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North American gas demand increased by an estimated 2% in the first half of 2024...

Natural gas consumption in North America rose by an estimated 2% (or 10 bcm) y-o-y in the first half of 2024. While residential and commercial demand continued to decline amid unseasonably mild weather conditions in Q1 both in Canada and the United States, these losses were more than offset by robust growth in gas-fired power generation across all markets of the region.

In the **United States** natural gas consumption increased by an estimated 1.5% (or 7 bcm) y-o-y in H1 2024, with growth primarily driven by the power sector. Natural gas demand in the residential and commercial sectors fell by around 2.5% (or 3 bcm) y-o-y during the same period. While Storm Heather boosted space heating demand in January, milder weather conditions during February-May moderated gas use in the residential and commercial sectors. Overall, heating degree days were down by 2% y-o-y during the first five months of 2024, which naturally weighed on space heating requirements. In addition, heating intensity in the residential and commercial sectors marginally declined, which suggests that non-weather related factors (including energy efficiency and electrification of heat) might have also contributed to the lower gas use in buildings.

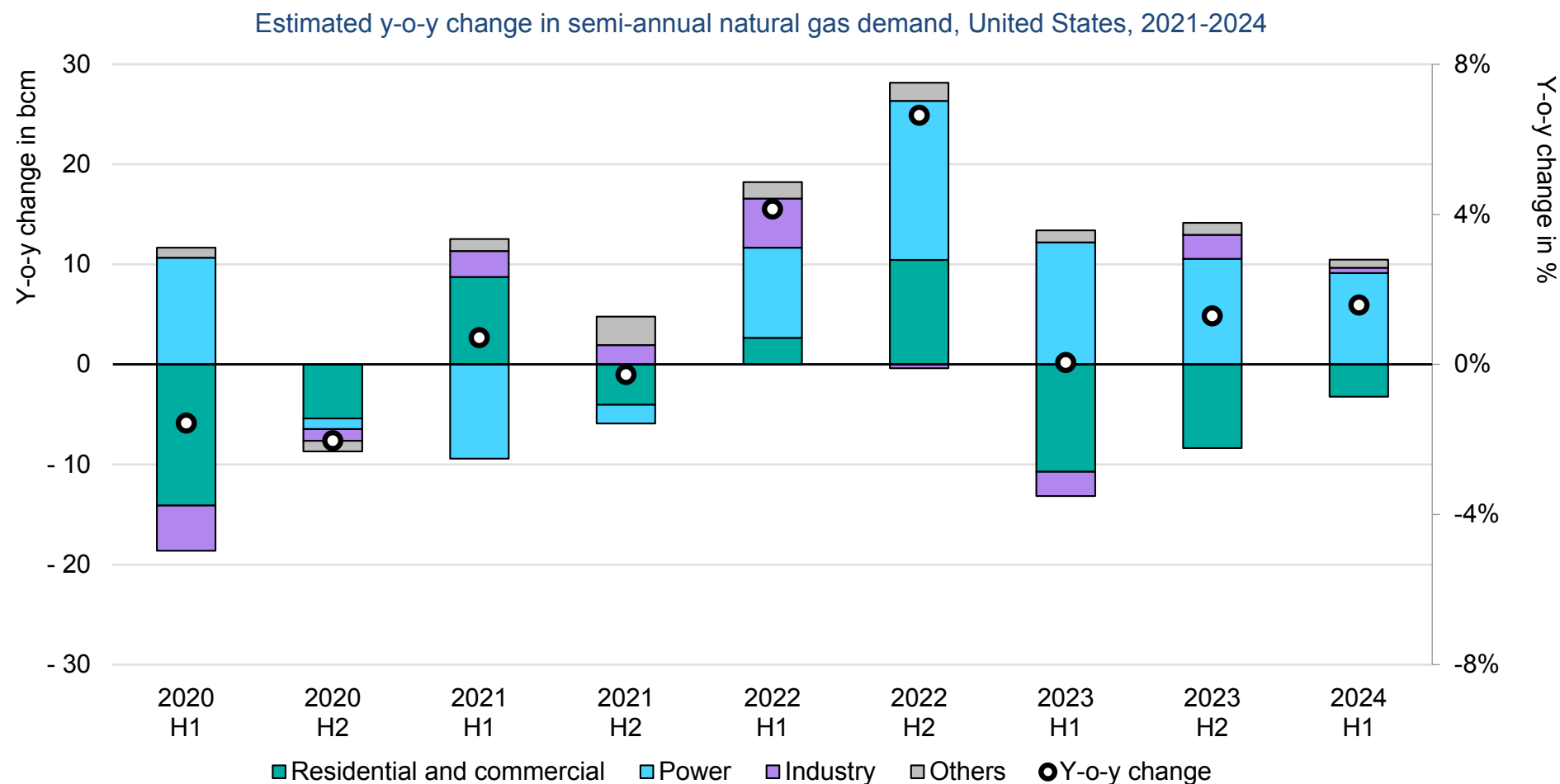
In contrast, gas burn in the **power sector** continued its robust expansion and rose by 6% (or 9 bcm) y-o-y in H1 2024. This strong growth was primarily supported by higher electricity consumption, which grew by an estimated 4% y-o-y. Higher cooling degree days

contributed to stronger electricity demand, especially during the May-June period. The continued increase in gas-fired power generation provided upward pressure on gas prices, with Henry Hub averaging 17% above its 2023 levels in June. Natural gas demand in **industry** increased by an estimated 0.5% (or 0.6 bcm) y-o-y in H1 2024, albeit remaining below its 2022 levels.

In **Canada** natural gas consumption increased by an estimated 4% (or 3 bcm) y-o-y in H1 2024. Similarly to the United States, unseasonably mild weather conditions weighed on gas use in the residential and commercial sectors, which declined by 10% y-o-y in the first four months of 2024. Combined gas demand in the industrial and power sectors rose by a strong 12% y-o-y during the same period, largely supported by stronger gas-fired generation at the expense of coal-fired power output. In **Mexico** natural gas consumption grew by an estimated 2% (or 1 bcm) y-o-y in H1 2024, amid the continued expansion of gas-fired power generation. Higher gas demand in Mexico supported stronger piped gas imports from the United States (up by almost 10% y-o-y in H1 2024).

Following a mild Q1, **natural gas demand in North America is forecast to increase by 1% in 2024**. The power sector is expected to drive this growth, amid higher electricity demand. Gas demand in industry is expected to remain broadly flat amid a weak macro-economic environment.

...primarily fuelled by strong gas burn in the US power sector



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Sources: IEA analysis based on EIA (2024), [Natural Gas Consumption](#); [Natural Gas Weekly Update](#).

Strong gas-fired power generation drives demand growth in Central and South America...

Following a decline of 1% in 2022, natural gas consumption in **Central and South America** remained broadly flat in 2023. Preliminary data for H1 2024 indicate that the region's natural gas consumption increased by 3% y-o-y, primarily supported by higher gas use in the power and industrial sectors. This relatively strong demand growth increased the region's net LNG imports by around 25% (or 1.3 bcm) y-o-y in the first half of 2024.

In **Argentina** – the region's largest gas market – natural gas consumption increased by 5.5% (or 0.65 bcm) y-o-y in the first four months of 2024, primarily supported by stronger gas burn in the power sector. Natural gas use in **industry** fell by 2% (or 0.1 bcm) y-o-y. In contrast, **gas-to-power** demand increased by a strong 13% (or 0.6 bcm), while natural gas consumption in the **residential and commercial sectors** rose by 7.5% (or 0.15 bcm) y-o-y in the first four months of 2024. Higher natural gas demand was met by the robust growth in the country's **shale gas production**, which increased by 17% (or 1.4 bcm) y-o-y in the first five months of the year, primarily driven by higher output from the Vaca Muerta deposits. In contrast, natural gas output from conventional fields continued to decline and dropped by 11% (or 1 bcm) y-o-y during the same period of 2024.

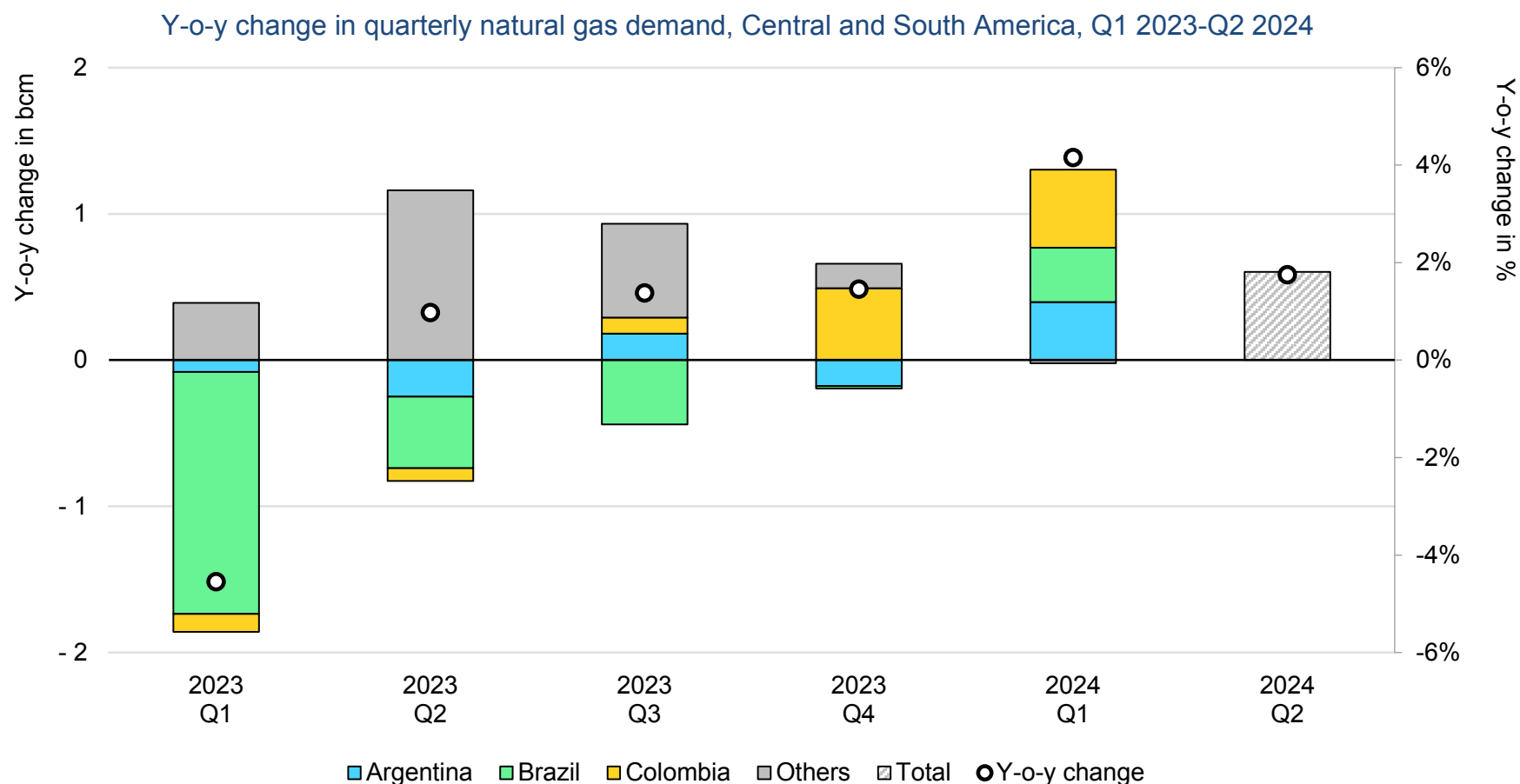
Natural gas consumption in **Brazil** increased by an estimated 2% (or 0.3 bcm) in the first half of 2024. Sizzling heatwaves increased cooling demand, which in turn supported a strong increase in

electricity consumption, up by an estimated 6% y-o-y in H1 2024. This strong demand growth was only partly met by higher hydro, wind and solar power output, with the remaining gap bridged by gas-fired power plants. Gas-to-power demand surged by an estimated 6% y-o-y in H1 2024. In the wake of stronger gas demand, Brazil's LNG inflows almost tripled compared to H1 2023, rising to near 1.5 bcm. In contrast, piped gas imports from Bolivia dropped by 4% (or 0.1 bcm) y-o-y.

In **Trinidad and Tobago** natural gas consumption rose by an estimated 1% y-o-y in Q1 2024, while in **Venezuela** observed natural gas consumption grew by 13% (or 0.65 bcm) y-o-y in the first four months of 2024. In **Colombia** natural gas consumption rose by 17% (or 0.8 bcm) y-o-y in H1 2024, almost entirely driven by the power sector. Lower hydro availability and sizzling heatwaves led to a surge in gas-to-power demand, which increased by an impressive 97% (or 0.8 bcm). Colombia's LNG imports increased more than fivefold compared with H1 2023. Natural gas use continued to expand in **Central America** and the markets of the Caribbean Sea. Their combined LNG imports rose by more than 6% y-o-y in H1 2024.

This **forecast** expects natural gas demand in Central and South America to increase by 2% in 2024. A hot and dry summer supporting stronger gas-fired power generation and higher usage in the industrial sector are expected to support gas demand growth.

...with the region's gas consumption rising by an estimated 3% in H1 2024



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Sources: IEA analysis based on ANP (2024), [Boletim Mensal da Produção de Petróleo e Gás Natural](#); BMC (2024), [Informes Mensuales](#); Central Bank of Trinidad and Tobago (2024), [Statistics](#); CNE (2024), [Generación bruta SEN](#); ENARGAS (2024), [Datos Abiertos](#); ICIS (2024), [ICIS LNG Edge](#); IEA (2024), [Monthly Gas Data Service](#); JODI (2024), [Gas Database](#); MME (2024), [Boletim Mensal de Acompanhamento da Indústria de Gás Natural](#); OSINERG (2024), [Reporte diario de la operación de los sistemas de transporte de gas natural](#).

Asia's natural gas demand grew by an estimated 8% in H1 2024

Following the contraction in 2022, Asia's natural gas demand returned to growth in 2023. This trend continued into H1 2024, with preliminary data suggesting that the region's natural gas consumption rose by an impressive 8% (or over 30 bcm) y-o-y and accounted for around 60% of global incremental gas demand over this period. This strong growth was primarily supported by China and India, both of which displayed double-digit growth rates. Economic expansion continued to drive strong growth in industrial gas demand, which alone accounted for over 40% of the region's incremental gas demand in H1 2024. Sizzling heatwaves drove up cooling demand in Q2, which in turn increased the call on gas-fired power plants. Asia's strong demand growth supported higher LNG imports, which rose by 12% (or 20 bcm) y-o-y in H1 2024.

The Chinese economy emerged from the 2023/24 winter on a more bullish trajectory than previously expected, buoying gas demand to double-digit growth over the initial months of the year and setting full-year 2024 gas demand on track to grow faster than in 2023.

Total Chinese natural gas consumption in Q1 2024 was up by approximately 11% y-o-y, driven by both fundamental and weather-related factors. In early 2023 Chinese gas demand was still partially emerging from the lingering effects of Covid-related lockdowns. Although industrial activity was on a recovery path, related gas consumption remained broadly flat compared to the previous year's levels. One year later, with the recovery effect well under way and

fundamental growth adding to demand dynamics, industrial sector gas demand in Q1 2024 was up by about 8% y-o-y.

The city gas sector also contributed significantly to early 2024 gas demand growth. Heating demand remained relatively strong through to the end of winter, reflecting both slightly colder weather in key provinces and greater penetration of gas heating in China. Road transport also supported the city gas segment, helped by the steep expansion of LNG truck sales in 2023 that has extended into 2024. With more LNG-powered trucks on the road and improving price differentials between trucked LNG and diesel after the peak winter period, LNG demand in road transport was strong and growing in the early months of 2024.

Overall thermal power generation was up year-on-year in early 2024 as electricity demand grew across all sectors – again aided in part by the recovery effect – and hydro production remained well below average levels as a result of drought conditions during 2023. Although coal reaped a large part of these thermal power gains, gas-fired power generation was up by nearly 18% y-o-y in Q1. However, spring rains in the south of the country (where most hydro generation is concentrated) started early and were above average, helping boost hydro reservoirs and production levels in Q2. Combined with a renewables boost from record capacity additions in 2023, this could partially ease thermal generation growth during the summer months.

Chinese gas supply has kept up the pace on all fronts since the start of the year. Domestic production growth over the first five months of the year, although slightly lower than in previous years, remained high at around 5% y-o-y. Total pipeline gas imports grew by around 17% over the same period, as imports from Central Asia were back to normal levels after a weak Q1 2023, and imports from Russia stepped up to levels consistent with an annual contractual level of 30 bcm in 2024 (up from slightly less than 23 bcm delivered in 2023). Chinese LNG imports were up by a striking 18% (or 8 bcm) y-o-y in H1 2024, with growth reaching above 25% y-o-y in certain months. While the low spot LNG price environment favoured a degree of increased spot purchases, most of this upside was enabled by new long-term contracts coming into effect this year. Looking ahead, China is set to import a record amount of LNG in 2024, surpassing its 2021 high point.

Strong growth in early 2024 and upward revisions to full-year economic forecasts suggest that Chinese gas demand growth could reach 8% in 2024, about 1 percentage point higher than in 2023 – up from previous expectations of a 1 percentage point decline in growth. Industry remains a key driver in the outlook, although conflicting manufacturing activity indicators in Q2 and uncertain expectations for the construction sector and overall industrial activity growth remain potential downside risks to the outlook. Residential and commercial gas demand growth is expected to remain on par with the 2023 trajectory at around 8%, while power

sector gas burn is likely to keep growing at over 6%, benefiting from power demand growth.

Japan's gas demand in the first four months of 2024 increased by 1% compared with the same period in 2023. Gas consumption was lower in January than the same period in 2023 due to mild weather. Conversely, gas demand saw an increase in March, particularly in the residential and commercial sectors, due to cold weather. Compared with 2023, total residential and commercial demand in March 2024 was 5% higher. While nuclear power generation increased by 16% y-o-y in the first three months of 2024, gas-fired power generation increased by 4% y-o-y. In March gas-fired power generation increased by around 20% y-o-y.

For the full year 2024, Japan's natural gas demand is expected to decrease by 1%, driven by the power generation sector given increasing nuclear availability and renewable power generation. Further nuclear power plants are in the process of restarting, such as Onawaga 2, which is projected to restart in 2024. Industrial demand is assumed to be marginally lower than in 2023. While showing a temporary upward trend in March, residential and commercial demand is assumed to remain broadly flat for the full year.

Korea's gas demand increased by 6% year-on-year in Q1 2024. Cold weather in March was one of the factors increasing gas demand, although mild temperatures in January and February reduced gas demand in the residential and commercial sectors. A

new nuclear power plant, Shin Hanul 2, started commercial operation in April, potentially reducing gas demand in the power generation sector.

Total natural gas demand in Korea is projected to decrease by 2% year-on-year in 2024. The main reason is the decline in the power generation sector. It is assumed that additional nuclear and renewable power generation will reduce gas-fired power generation. Conversely, industrial demand is expected to increase compared to last year. Residential and commercial demand is assumed to remain at the same low level as in 2023. The increase in industrial demand is not expected to offset the decline in the power generation sector and total gas consumption is assumed to decrease.

According to the Petroleum Planning & Analysis Cell, **India's** primary gas supply (including net domestic production and LNG imports) rose by an estimated 10% y-o-y during the first five months of 2024, continuing the recovery trend that began in 2023 (with a 7% increase for 2023 as a whole). This increase in supply was supported by an estimated 8% growth in domestic production, and above all thanks to an estimated 11% surge in LNG imports for the first five months of 2024.

Over the first five months of 2024, the fertiliser sector maintained its dominant share of 28% of Indian demand, followed by city gas (20%), power generation (14%) and refining (9%). Gas demand increased by 21% y-o-y over this period. In absolute terms, the

sectors that contributed most to the increase were refineries, the power sector and city gas distribution.

As with other countries in South Asia, India experienced extreme heat and record temperatures in April and May, resulting in increased electricity consumption for cooling and placing a considerable stress on the power supply infrastructure. Although the proportion of natural gas in the Indian electricity mix is relatively low (2-3%), the country's gas-fired power generation has increased significantly in recent months. According to data from Grid India, the amount of gas-fired power generated in April and May was more than double that of the same period last year. In addition to the high demand for cooling during the heatwave, this was also partly due to the invocation of an emergency clause to force the operation of idle gas-fired power plants. The objective of this clause was to avoid power cuts during the 43-day federal elections that ended on 28 May.

India's LNG imports reached a new record of 3.3 bcm in May, up 23% m-o-m, with equivalent contributions from spot and contract purchases. While India's LNG imports have largely been met by Qatar (representing 45% of total LNG imports in the five first months of 2024), the y-o-y supply increase originated mainly from Angola and the United States.

Current LNG import facilities in India have a combined capacity of about 65 bcm per year. India's eighth LNG import facility, the Chhara LNG terminal, has been built by Hindustan Petroleum

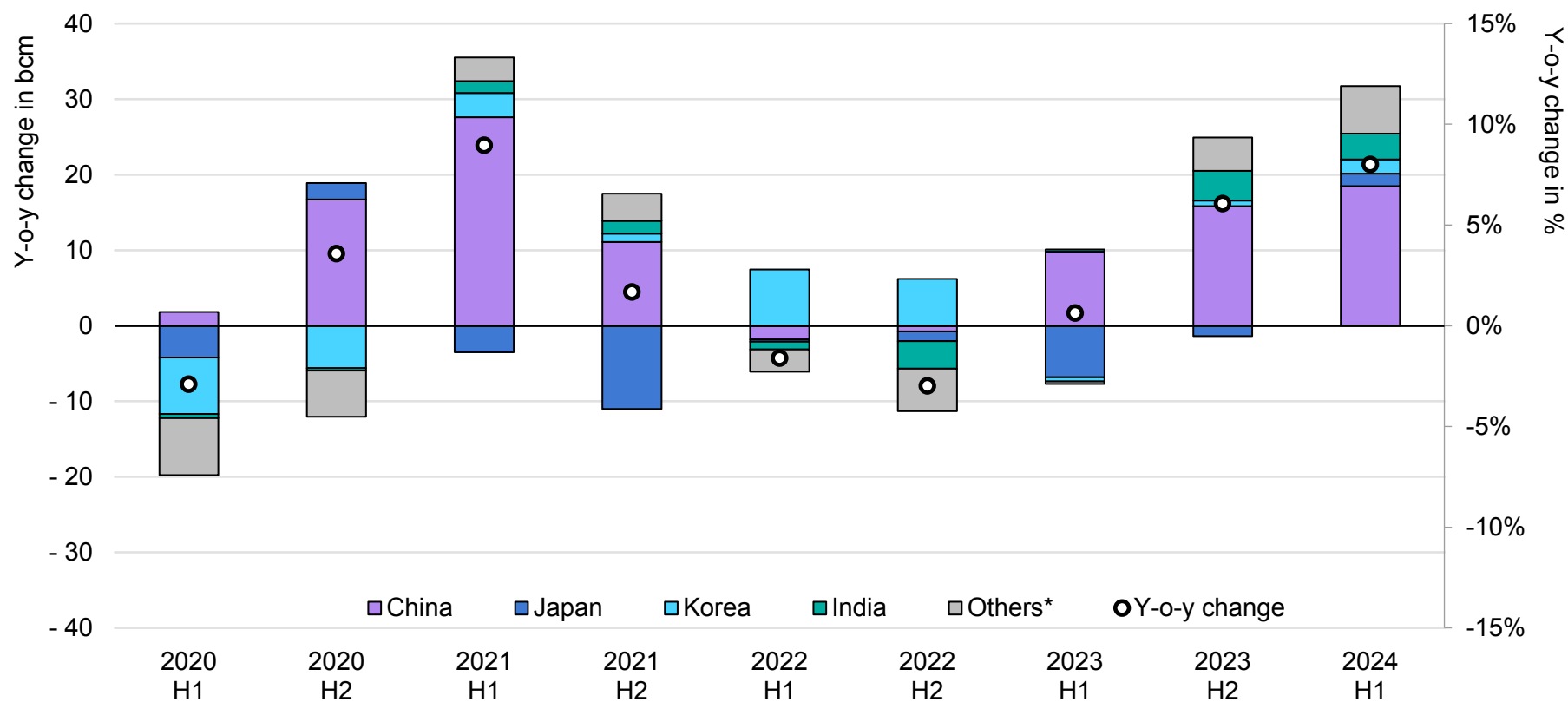
Corporation Limited, a unit of state-owned ONGC, and will add another 7 bcm per year to the country's regasification capacity. The terminal's commissioning has been postponed until the fourth quarter of 2024 due to delays in the completion of the pipeline and the onset of the monsoon season. For the full year of 2024, India's natural gas demand is expected to increase by 8.5%, primarily driven by higher gas use in the power sector and in industry. LNG imports into India are expected to increase by 17% in 2024.

Emerging Asia's gas consumption increased by an estimated 6% y-o-y in H1 2024, as lower LNG prices continued to support demand growth in the region's price-sensitive end-use sectors. Natural gas consumption in **Thailand** grew by an impressive 9% (or 1.2 bcm) y-o-y in the first four months of 2024. This was primarily driven by soaring gas-to-power demand, which rose by over 15% (or 1.2 bcm) y-o-y during the same period. Industrial gas demand remained broadly flat, while gas use in the transport sector declined by 15% (or 0.1 bcm) y-o-y. Combined natural gas demand in **Bangladesh** and **Pakistan** increased by an estimated 1% y-o-y in H1 2024. The strong increase in LNG imports (up by 14% y-o-y) was sufficient to offset the decline in domestic production and met demand growth primarily in the industrial sector. **Indonesia's** gas demand grew by near 5% (or 0.6 bcm) y-o-y in the first four months of 2024, primarily driven by the power and industrial sectors. In **Malaysia** natural gas demand increased by an estimated 14% (or 1.8 bcm) y-o-y in the first four months of 2024, supported by strong y-o-y growth of 10% in domestic production during this period. Natural gas demand in

emerging Asia is forecast to increase by close to 4% in 2024, primarily driven by the power and industrial sectors.

China and India drove Asia's gas demand growth in H1 2024

Estimated y-o-y change in semi-annual natural gas demand, Asia, 2021-2024



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* Others comprise Bangladesh, Indonesia, Malaysia, Pakistan, the Philippines, Singapore and Thailand.

Sources: IEA analysis based on ICIS (2024), [ICIS LNG Edge](#); CQPGX (2024), [Nanbin Observation](#); JODI (2024), [Gas World Database](#); PPAC (2024), [Gas Consumption](#); EPPO (2024), [Energy Statistics](#); Korea Energy Economics Institute (2024), [Monthly Energy Statistics](#); Ministry of Economy, Trade and Industry of Japan (2024), [METI Statistics](#).

European natural gas demand continued to decline in H1 2024...

Natural gas consumption in OECD Europe fell by 3.5% (or 9 bcm) y-o-y in H1 2024. The power sector remained the most important driver behind lower gas demand, as the strong expansion of renewables together with improving nuclear availability reduced the call on gas-fired power plants both in Q1 and Q2. Mild winter weather limited gas demand in the residential and commercial sectors in Q1. In contrast, gas use in the industrial sector continued to recover, supported by the lower price environment.

Distribution network-related demand fell by an estimated 4% (or 4 bcm) y-o-y in H1 2024, with 70% of the decline concentrated in Q1. Heating degree days declined by 8% y-o-y in Q1 2024, which naturally weighed on space heating requirements in buildings. Preliminary data suggest that heating intensity (gas use per heating degree day) increased marginally compared with 2023. This potentially indicates that the gas-saving measures undertaken in the previous two years are gradually wearing off and highlights the importance of doubling down on energy efficiency efforts.

Gas-to-power demand plummeted by 19% (or near 13 bcm) y-o-y in H1 2024. In the European Union the share of natural gas in total power generation fell to 12% in April 2024 – its lowest share in at least eight years. The steep decline in gas-fired power output was primarily driven by a strong increase in renewable electricity generation, which grew by more than 15% (or 105 TWh) y-o-y in H1 2024 on the back of higher wind, solar and hydropower output. In

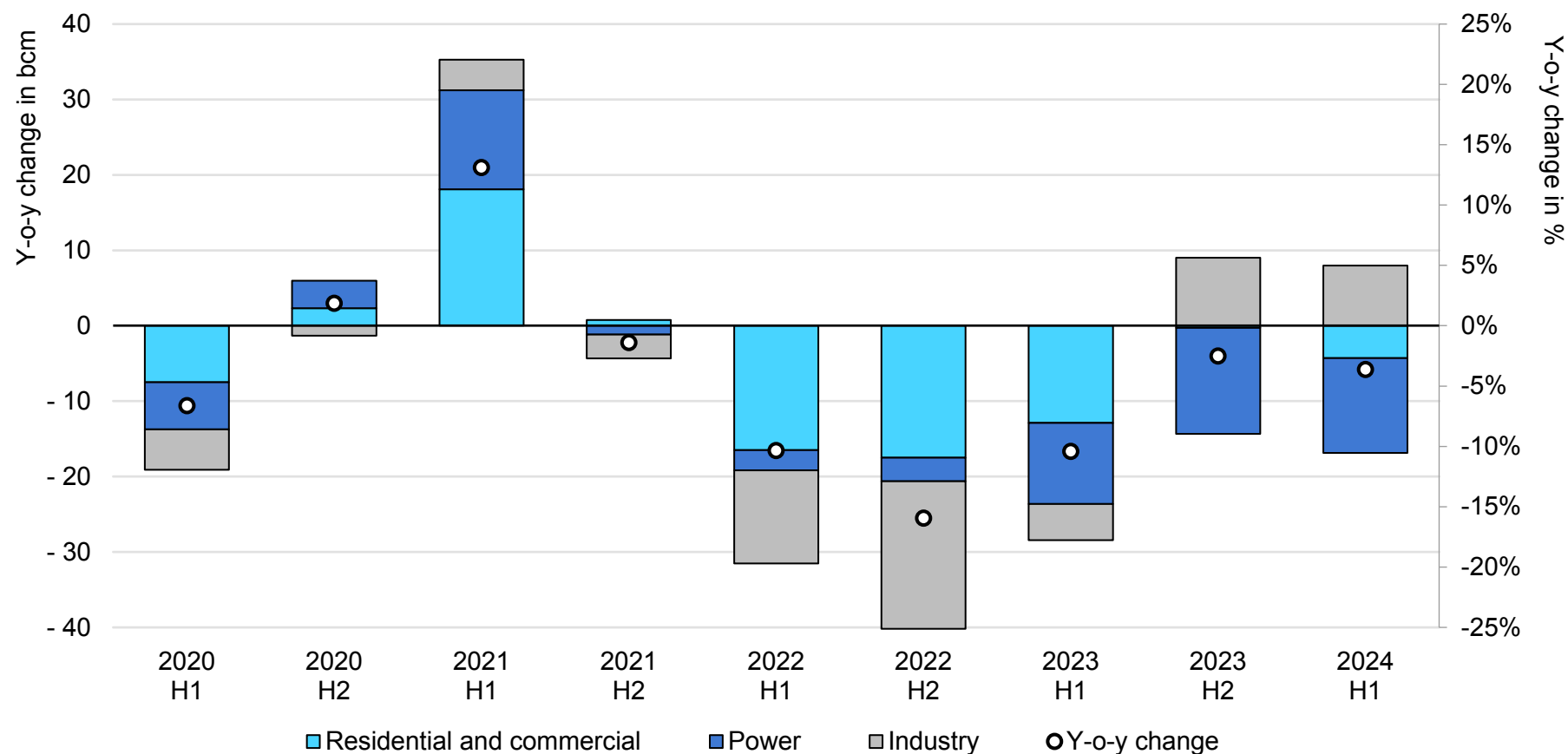
addition, improving nuclear availability (up by 2%) further weighed on overall fossil-fuelled power generation, which declined by close to 19% y-o-y in H1 2024. Without the strong increase in renewable power output, Europe's gas balance would have been significantly tighter in H1 2024 and could have fuelled more price volatility across European gas hubs.

Natural gas consumption in **industry** continued to recover in H1 2024, benefiting from the lower price environment. Preliminary data indicate that gas use in industry increased by around 10% (or 8 bcm) y-o-y in H1 2024, albeit remaining 10% below its 2021 levels. Estimated industrial gas consumption increased by 18% in the Netherlands, 12% y-o-y in Belgium, 4% in Spain and 1.5% in Italy in H1 2024.

This **forecast** expects natural gas demand in OECD Europe to remain close to last year's levels in 2024, as higher gas use in buildings and industry is almost entirely offset by lower gas-fired power generation. Gas burn in the power sector is forecast to drop by more than 10% amid the rapid expansion of renewables and improving nuclear availability in France. Gas demand in the residential and commercial sectors is expected to increase marginally compared with 2023 following a mild Q1. Gas use in industry is forecast to continue its recovery, although it is largely dependent on the evolution of prices and remains well below its pre-crisis levels.

...primarily driven by plummeting gas burn in the power sector

Estimated y-o-y change in semi-annual natural gas demand, OECD Europe, 2021-2024



IEA. CC BY 4.0.

Sources: IEA analysis based on Enagas (2024), [Natural Gas Demand](#); ENTSG (2024), [Transparency Platform](#); EPIAS (2024), [Transparency Platform](#); Trading Hub Europe (2024), [Aggregated consumption](#).

US production lifted by associated gas in H1 2024, but the rest of 2024 is set for slight decline

US dry natural gas production dynamics during H1 2024 went hand-in-hand with significant gas price variations, rounding out a transition from continuous growth to more stable output levels. This trend is set to continue for the rest of 2024 as upstream players adjust to the pricing context and the US market sets itself up for the next cycle of LNG export growth in the second half of the decade.

In early 2024 dry gas production slipped considerably from the peak monthly levels reached in late 2023, responding to weaker market fundamentals – namely modest weather-related domestic demand and month-on-month declines in LNG exports due to key plant outages – and the resulting steep price slide. As Henry Hub spot prices fell from an average of nearly USD 3.20/MBtu in January 2024 to under USD 1.50/MBtu in March 2024, upstream activity eased as some producers announced CAPEX cuts.

Although down by 2.5% from Q4 2023 levels, Q1 2024 dry gas production was still approximately 2.9% higher y-o-y, notably thanks to much stronger February production following shorter-lived weather-induced production outages than in recent years. Robust oil production also kept associated gas production up, notably in the Permian Basin where gas production growth was close to 15% y-o-y in Q1, compensating for most of the losses in other shale plays.

In May 2024 Henry Hub spot prices rose steeply, gaining around 30% in just one month. Nevertheless, overall Q2 2024 gas production fell quarter-on-quarter and year-on-year as upstream

activity took time to react given remaining bearish market factors. Above-average storage fill levels, the closing of the heating season, and a 16% y-o-y drop in May's US LNG exports (following outages at key plants) contributed to keeping demand-side pressures at bay through the spring months.

Taken together, these elements helped keep production gains in check over the first half of the year. Total production growth in H1 2024 reached just 1% y-o-y, far lower than the ~5-6% growth rates experienced over the same period in the previous two years.

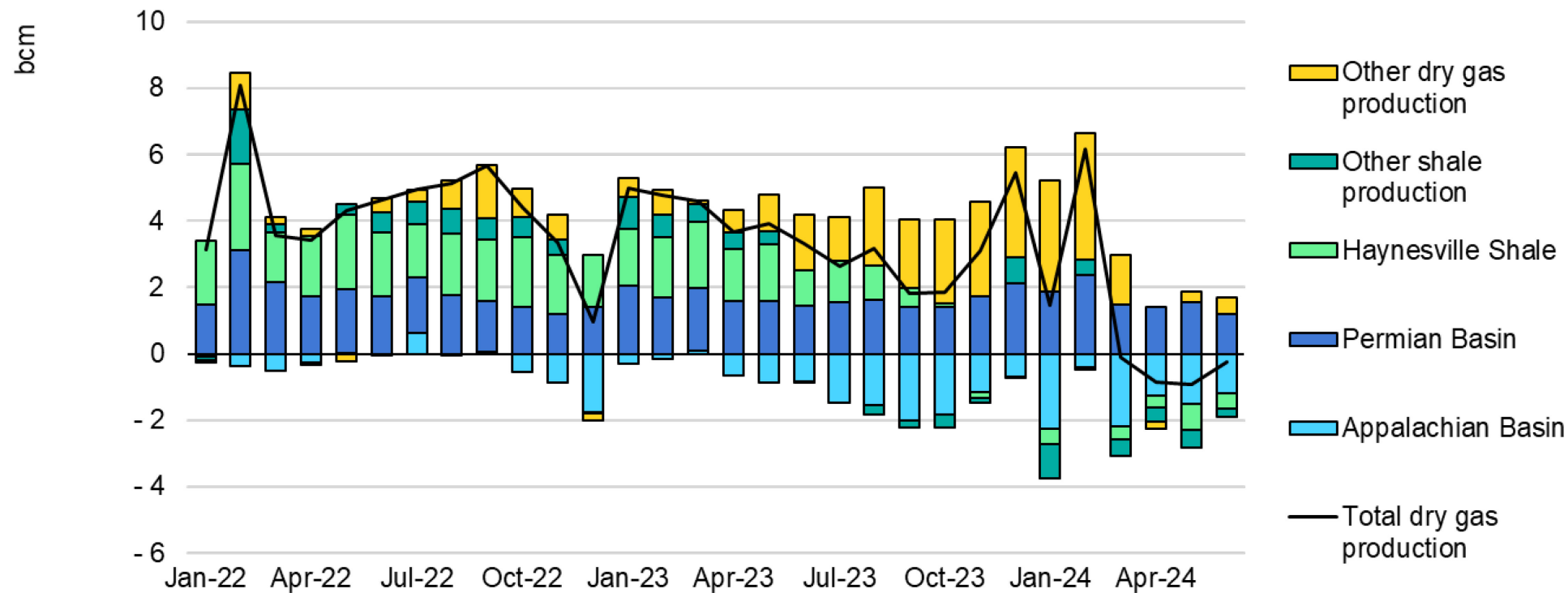
In H2 2024 we expect US gas production dynamics to face an inflection point. While production trended down from early Q1 to late Q2, output is set to slightly recover over H2 2024, while staying down year-on-year over the period.

Although associated gas production in the Permian Basin is likely to continue driving the upward trend over H2 2024, a more favourable domestic gas price environment should also support non-associated production. Domestic demand growth – although modest – and LNG project start-ups in H2 2024 are expected to support the transition to a more dynamic market environment.

Nevertheless, gas production over the second half of the year is set to remain approximately 1% down from record H2 2023 levels, leaving the full-year 2024 gas production outlook broadly flat on 2023 levels.

US dry gas production growth turned negative in Q2 2024

Y-o-y change in monthly dry gas production, United States, 2022-2024



IEA. CC BY 4.0.

Note: June includes estimated data.

Sources: IEA analysis based on EIA (2024), [Natural Gas Data](#), [Natural Gas Weekly Update](#).

Eurasian natural gas production is set to increase in 2024

Eurasia's natural gas production declined by an estimated 13% (or 130 bcm) between 2021 and 2023. This steep decline was primarily driven by Russia and its collapsing piped gas deliveries to Europe, and to a lesser extent by deteriorating upstream deliverability in Uzbekistan. Preliminary data indicate that **the region's gas output started to recover** in H1 2024, increasing by 6% (or 25 bcm) y-o-y, supported by a combination of stronger domestic demand and higher exports.

Russia's natural gas production plummeted by 15% (or 125 bcm) between 2021 and 2023. Lower piped gas exports to Europe accounted for around 95% of this steep decline. Gazprom, as Russia's monopoly pipeline exporter, bore the brunt of this steep reduction in output. The company's gas production fell by 30% (or 155 bcm) between 2021 and 2023, while both Novatek and Rosneft increased their production levels. First data suggest that Russia's natural gas production grew by over 7% y-o-y in H1 2024. Almost 40% of this growth was supported by **stronger exports**, both via pipeline and in the form of LNG. Russia's piped gas exports to **China** via Power of Siberia grew by an estimated 35% y-o-y in H1 2024, with total deliveries for the full year expected to reach over 30 bcm. Piped supplies to **Europe** rose by over 5% y-o-y in H1 2024, supported by higher deliveries both to the European Union and to Türkiye. In addition, Russia increased its piped gas exports to **Uzbekistan**, supplying the country with around 9 mcm/d starting

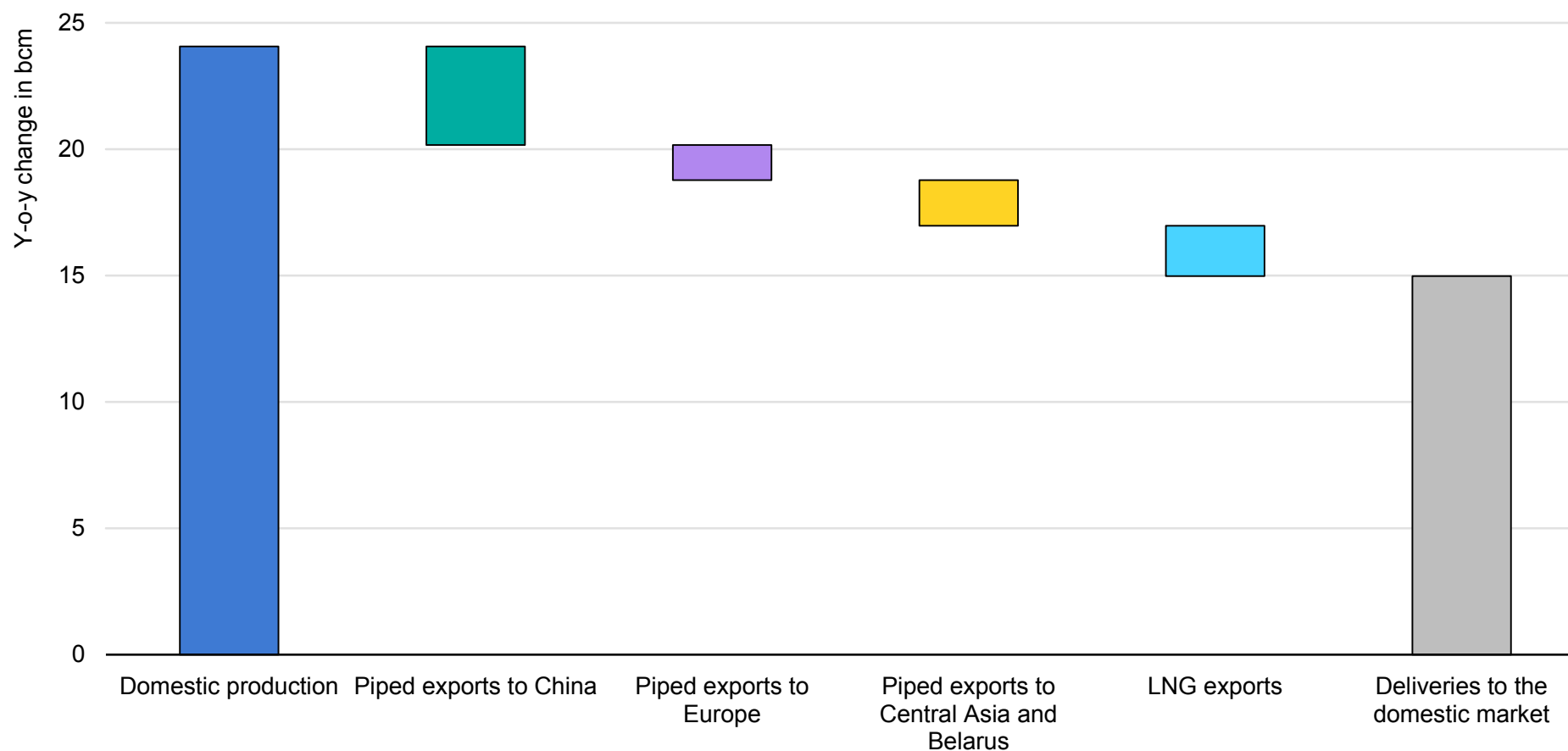
from 1 October 2023. Russia's **LNG** output increased by close to 10% (or 2 bcm) y-o-y in H1 2024, with Asia accounting for almost half of total Russian LNG exports. Gas **deliveries to the domestic market** increased by an estimated 5.5% (or near 15 bcm) y-o-y. This was partly supported by a colder-than-average Q1, which drove up space heating requirements, and stronger thermal power generation (up by 2% y-o-y in the first five months of 2024).

Natural gas production displayed varying patterns across **Central Asian** countries. First estimates indicate that the region increased its piped gas deliveries to China, primarily driven by higher output in **Turkmenistan**. In contrast, natural gas production in **Uzbekistan** declined by 5% (or 1 bcm) y-o-y in the first five months of 2024, reflecting the deteriorating upstream deliverability in the country. This trend is expected to increase the country's reliance on imports (including from Russia) in the future. In **Kazakhstan** estimated sales gas production grew by 4% (or 0.5 bcm) y-o-y during January-May 2024. In **Azerbaijan** sales gas production grew by 4% (or 0.6 bcm) y-o-y in the first five months of 2024. This was partly supported by higher deliveries to Europe, which increased by 4% (0.4 bcm) y-o-y during the same period of the year.

This **forecast** expects Eurasia's gas production to increase by 4% in 2024, albeit remaining 10% below its 2021 levels. Russia is projected to account for the bulk of growth in 2024, with higher gas production supported both by domestic demand and exports.

Russia's natural gas production grew by an estimated 7% in H1 2024, driven both by stronger exports and higher domestic demand

Estimated y-o-y change in natural gas production, exports and deliveries to the domestic market, Russia, H1 2024 vs H1 2023



IEA. CC BY 4.0.

Sources: IEA analysis based on various sources, including ENTSG (2024), [Transparency Platform](#); Eurostat (2024), [Energy Statistics](#); ICIS (2024), [LNG Edge](#).

Europe's primary natural gas supply tightened in H1 2024...

OECD Europe's primary natural gas supply fell by an estimated 6% (or almost 15 bcm) y-o-y in H1 2024, as lower gas demand and high storage levels reduced the call on LNG imports while the region's domestic production continued to decline.

Europe's **LNG imports** declined by nearly 20% (or just over 17 bcm) y-o-y in H1 2024. The continued decline in demand, together with high inventory levels and stronger piped gas deliveries, kept European hub prices below Asian spot LNG prices in H1 2024. Platts JKM averaged almost USD 1/MBtu above TTF in the first half of the year, which incentivised flexible LNG cargoes to flow towards Asia instead of Europe. Consequently, the share of LNG in Europe's total primary gas supply fell from 39% in H1 2023 to 33% during the same period of 2024. Nevertheless, LNG retained its position as Europe's dominant source of primary gas supply and continued to **act as a baseload**. LNG flows from the United States declined less steeply (down by 15% y-o-y) than from other sources. This further reinforced the position of **the United States as Europe's largest LNG supplier**, accounting for nearly half of Europe's LNG imports in H1 2024. **Russian LNG** inflows rose by 9% y-o-y and remain highly concentrated. Belgium, France and Spain accounted for more than 85% of Europe's total LNG imports from Russia in H1 2024.

Norway's piped gas deliveries to the rest of Europe increased by nearly 10% (or 5 bcm) y-o-y compared to H1 2023 amid lower

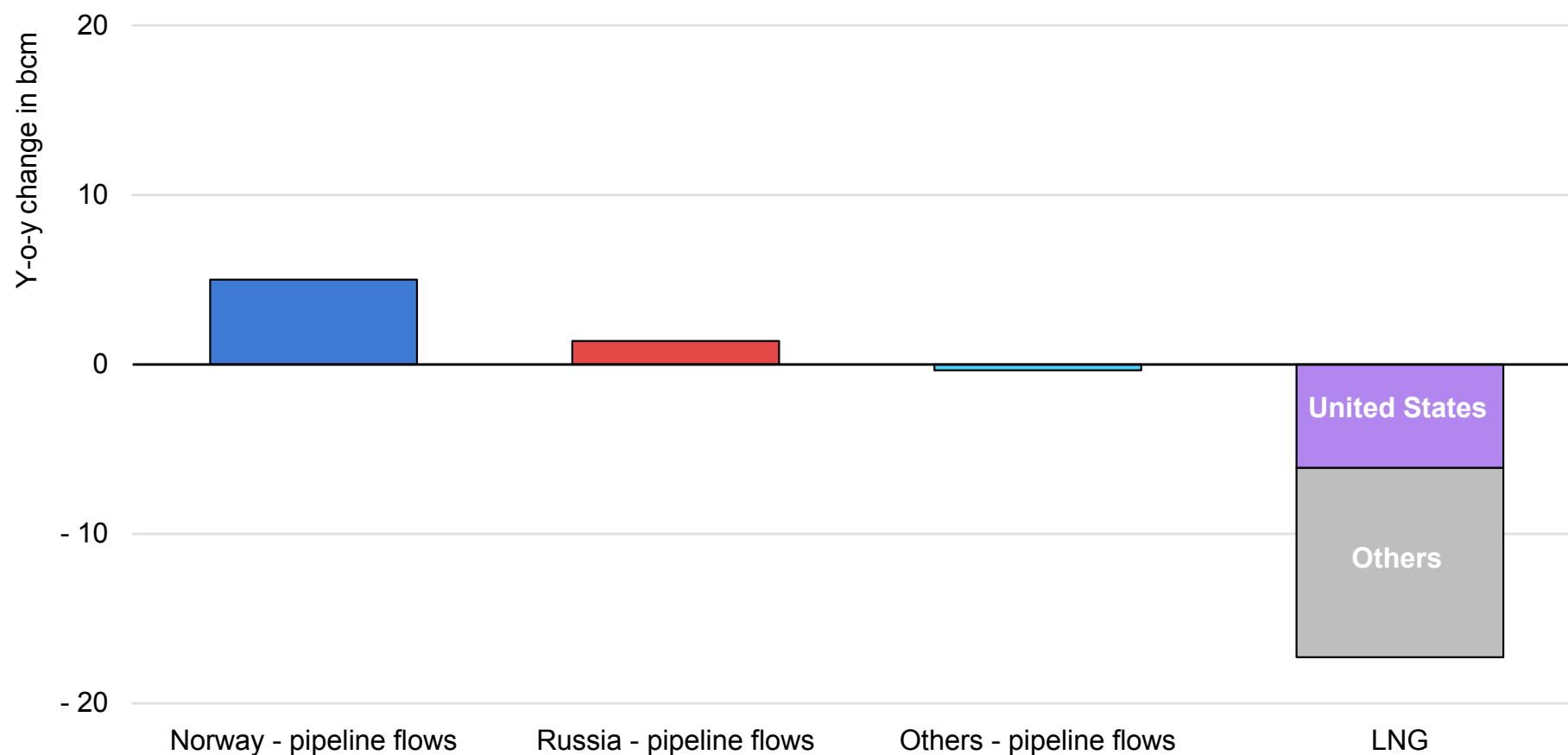
maintenance works. **Non-Norwegian domestic production** fell by around 6.5% (or 2 bcm) y-o-y in the first five months of 2024. This decline was primarily driven by **Netherlands** and the **United Kingdom**, as the closure of the Groningen field and the continued fall in output from ageing North Sea gas fields weighed on production levels. In Denmark the **Tyra gas field** started to flow first gas at the end of Q1 2024, and is expected to ramp up to full production in Q4. In Türkiye natural gas production rose by 290% (or 0.55 bcm) y-o-y in the first five months of 2024, primarily supported by the gradual ramp-up of the **Sakarya gas field**.

Russia's piped gas supplies to Europe increased by an estimated 7% (or 1.5 bcm) y-o-y in H1 2024, albeit remaining 75% below their 2021 levels. Deliveries to the European Union increased by over 10% (or more than 1 bcm). Exports to Türkiye rose by 2.5% y-o-y in the first five months of 2024. Despite this increase, the share of Russian piped gas in Europe's gas demand remained below 10% in H1 2024. Pipeline gas deliveries from **North Africa** and **Azerbaijan** remained close to last year's levels in H1 2024.

This **forecast** foresees Russian piped gas supplies to OECD Europe increasing by more than 5% in 2024 compared with 2023, although their profile remains a major uncertainty. LNG imports are expected to decline by almost 10% amid high inventory levels, weak demand and stronger piped gas deliveries.

...with the region's LNG imports plummeting by nearly 20%

Y-o-y change in natural gas imports and deliveries from Norway, OECD Europe, H1 2024 vs H1 2023



IEA. CC BY 4.0.

Sources: IEA analysis based on ENTSOG (2024), [Transparency Platform](#); Eurostat (2024), [Energy Statistics](#); Gas Transmission System Operator of Ukraine (2024), [Transparency Platform](#); [ICIS LNG Edge](#); JODI (2024), [Gas World Database](#).

LNG supply growth was hit by outages in H1 2024, but is set to accelerate in H2 2024

LNG market dynamics in H1 2024 demonstrated the uncertainty underlying the global gas balance in the run-up to the next wave of liquefaction capacity expected in the second half of the decade. While LNG supply grew by about 4.5% in Q1 2024, Q2 supply fell marginally y-o-y – the first quarterly drop since the Covid period – as a result of targeted underperformance, reducing H1 2024 growth to 2.3%. Demand-side trends, however, proved to be more constant than supply-side movements, as Europe's pull on LNG continued to ease in Q2 2024 and Asia confirmed its import growth path.

The Asia Pacific region was the largest contributor to year-on-year LNG export growth during H1 2024, with incremental volumes spread across nearly all exporting markets in the region. Brunei and Malaysia – two markets facing a degree of uncertainty around feedgas availability – both increased their exports year-on-year during the period. Indonesian exports returned to growth in Q2, after falling by 11% y-o-y in Q1 due to planned and unplanned works at Tangguh LNG (the country's largest liquefaction project). This led to 8% growth for the whole of H1 2024. In total, APAC exports grew by 2.6% (or 2.4 bcm) over the first half of the year.

At the individual market scale, two countries delivered the largest incremental gains in H1 2024, together accounting for nearly 70% of net y-o-y incremental LNG supply: the United States and Russia. US LNG supply leaped in Q1 – notably with the return of Freeport LNG – but then declined by nearly 3% year-on-year in Q2 as

operational issues continued to plague the Freeport facility on top of planned debottlenecking works. US LNG exports in May fell by 16% as a result of this underperformance, before returning to growth in June. Despite these outages, US LNG supply was up 4% (or 2.4 bcm) y-o-y in H1 2024.

Russian LNG exports were up 9% (or 2 bcm) y-o-y in H1 2024 and broadly on a par with recent monthly maximum levels for the period (except at the tail end of Q2 as Sakhalin 2 maintenance kept the plant's output below 2023 levels). The country's largest facility – Yamal LNG – was the primary growth driver, although small-scale projects also contributed to export gains.

Middle Eastern LNG supply was up by 1.8% (or 1.2 bcm), thanks primarily to a boost in exports from the United Arab Emirates, the region's smallest producer.

At a regional scale, Africa was the only continent to see a decline in exports, hinging on a drastic fall in Egyptian supply. Declining gas production and relatively robust domestic demand led to load-shedding, industrial curtailments and, ultimately, a steep cutback in LNG exports, even as pipeline gas imports from Israel improved substantially in Q1. In H1 2024 Egypt's LNG exports fell by 75% (or 3 bcm) y-o-y as the country loaded fewer than 10 cargoes. Simultaneously, Egypt also turned to LNG imports through the Aqaba FLNG terminal in Jordan – made available to Egypt thanks to a 2023 bilateral agreement – taking in four cargoes in Q2 2024.

However, bearish dynamics in Egypt were partially offset, notably by export growth in H1 from Mozambique (up by 48% y-o-y), with the ramp-up from Coral South FLNG, and Algeria (up by 5% y-o-y), as output from new upstream projects helped support stronger exports and lower LNG spot prices led to increased buying interest from European players. Upside from Nigeria (up by 3% y-o-y) was more modest as June exports fell significantly, undoing the effects of positive feedgas dynamics earlier in the year. In total, African LNG exports fell by about 6% y-o-y (or 2 bcm) in H1 2024.

On the import side, regional dynamics were somewhat more stable and clear-cut, with the continuation of high-level trends that had been in place during much of 2023. European LNG imports fell by 19% y-o-y (or 17 bcm) in H1 2024, with the downward trend accelerating in the spring months. The United Kingdom, Spain and Türkiye were the largest downside markets, taking in 58%, 23% and 30% less LNG year-on-year, respectively. In the United Kingdom alone, this meant 8 bcm less imports during H1 2024, as high electricity imports and wind generation squeezed power sector gas burn. The reduction in LNG imports was less pronounced in the European Union, reaching only around 9% in H1. As with Spain, a number of Mediterranean and Northwest European markets took in less LNG. Northern Europe was the only sub-region to take in slightly more LNG. This was largely due to a six-month shutdown of the damaged Balticconnector pipeline (early October 2023 to late April 2024) leading Finland to grow its LNG imports, as well as to a Q1 y-o-y jump in German imports.

Conversely, Asia Pacific pulled in the vast majority of released and new volumes, accounting for 90% of the gross upside at a regional level. All Asian markets netted LNG import growth in H1 2024, including Japan and Korea. China remained the single largest growth market globally, with an 18% (or 8 bcm) y-o-y increase in H1 2024, setting the country on a trajectory to noticeably surpass its 2021 annual LNG import record. India, the second-largest upside market globally, proved reactive to the low LNG spot price environment in H1 2024, taking in 31% (or 4 bcm) more LNG y-o-y. Favourable prices also boosted spot buying in a number of smaller emerging Asian importers. Imports into Thailand and Singapore both grew by over 1 bcm y-o-y, with imports into the Philippines and Pakistan each growing by just under 1 bcm – significant y-o-y proportional increments. In total, small and emerging Asian market LNG imports grew by about 26% (or 4 bcm) y-o-y. In Korea milder weather – particularly in February – pulled LNG imports down in Q1. However, a subsequent y-o-y increase in imports in Q2 saw H1 2024 imports grow by about 2.5% y-o-y. Similar dynamics were at play in Japan, with lower Q1 imports being offset by y-o-y growth in Q2 as warm weather drove power sector gas burn. As a result, in H1 2024 its LNG imports were up by 1.4% (or about 0.6 bcm).

Outside Asia, Colombia and Brazil were high growth markets as drought conditions worsened hydro output and drove up power sector gas burn. Together, these two markets took in an extra 2 bcm of LNG, equating to nearly 300% growth year-on-year.

Year-on-year LNG market growth is expected to accelerate slightly during the second half of 2024, thanks to a combination of new capacity coming online and stable operations in a number of smaller and medium-size exporting markets. On the demand side, Asia's pull on the market is set to remain strong, but with less potential for some markets in the region to realise the same double-digit growth as in the first half of the year. Likewise, bearish dynamics in Europe are likely to be less severe than in H1 2024, as low benchmark summer demand and normal weather assumptions later in the year limit the LNG import downside potential.

The United States is set to provide the lion's share of new export capacity this year, with a mix of expansions at existing plants and new plants coming online. Part of the extended outages at Freeport LNG in Q2 2024 were linked to debottlenecking works, aiming to increase liquefaction capacity by about 10%. The results should be felt over the second half of the year as the project returns to normal utilisation rates. In late April 2024 Venture Global announced that LNG production at its ~18 bcm Plaquemines LNG Phase 1 project would start in mid-2024 as part of its commissioning process, ahead of previous market expectations for later in the year. Similarly, the Stage 3 expansion at Corpus Christi is now expected to achieve first gas by the end of the year, also ahead of schedule.

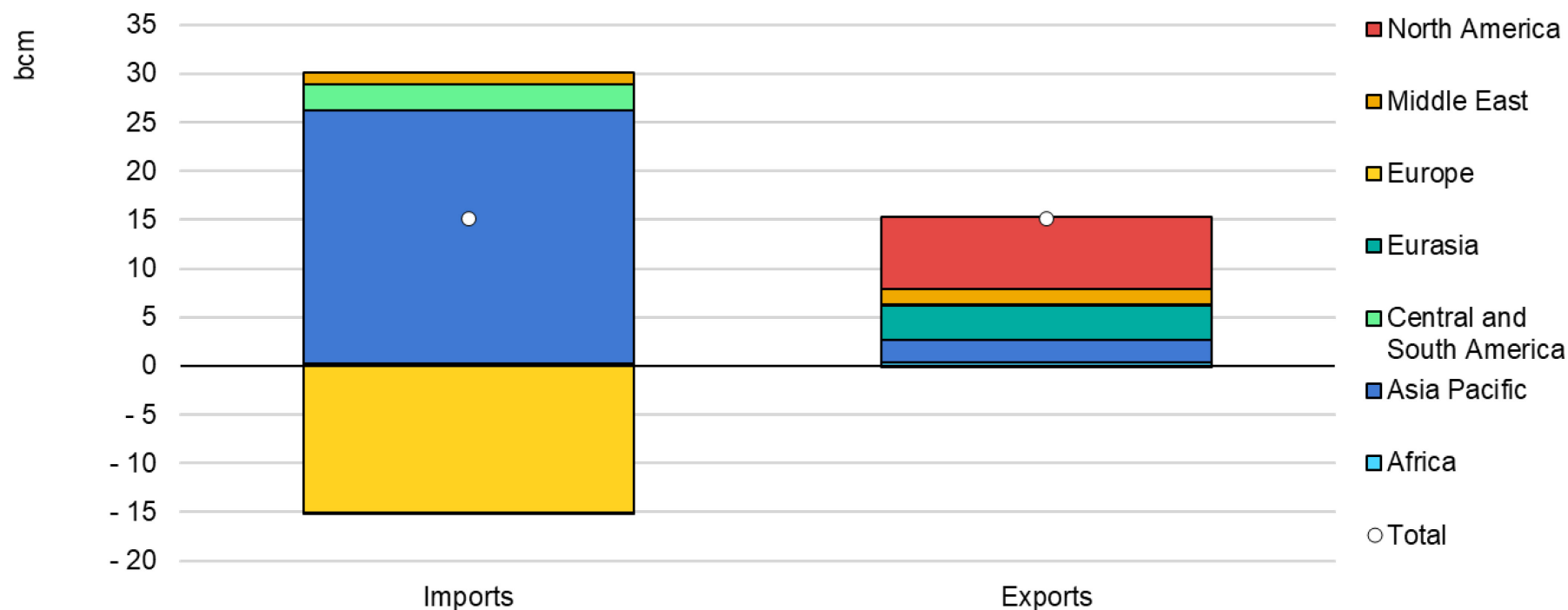
Outside the United States, the Tortue FLNG plant off the coast of Senegal and Mauritania is expected to come online in Q4 2024, later than originally planned. Tango FLNG, while of much smaller

scale, is also expected to ramp up over the second half of the year, having started operations in Q1 2024. A number of existing projects will also support the supply side, including in **Nigeria**, where utilisation rates are expected to remain higher year-on-year; in **Mozambique**, where Coral South production is expected to stabilise after a ramp-up period in 2023; and **Indonesia**, with the ramp-up of Tangguh Train 3.

In Asia, **China** continues to drive y-o-y global import growth, but this is likely to be at lower rates than in H1 2024. Still, full-year Chinese LNG imports are set to surpass their 2021 high point, reaching around 109 bcm in 2024. Accompanying this growth, the country is expected to add an impressive 45 bcm/yr of regasification capacity in 2024, an increase of about 30% y-o-y. In **India** continued spot buying during the rest of the year is set to push 2024 imports to within striking distance of the 2020 record high of approximately 37 bcm. Smaller Asian markets, including **Bangladesh**, **Pakistan**, **Singapore** and **Thailand**, are set for double-digit import growth this year. In total, emerging Asian gas markets are set to grow by around 17% y-o-y, adding over 8 bcm of LNG demand. Europe, in contrast, is expected to pare back its LNG imports by close to 10% y-o-y, although the vast majority of this decline has already happened in the first half of the year. Globally, we expect the LNG market to grow by just under 3% y-o-y, or about 15 bcm, representing a notable acceleration on 2023 dynamics.

Europe continues to reduce its LNG intake as Asia absorbs both relinquished and new volumes

Y-o-y change in LNG imports and exports by region, 2024 vs 2023



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Sources: IEA analysis based on ICIS (2024), [ICIS LNG Edge](#).

Qatar's LNG fleet expansion programme saw major deals in H1 2024

Since 2022 Qatar has signed a series of time charter party (TCP) agreements for the long-term charter and operation of LNG carriers. These agreements form part of a historic LNG fleet expansion programme designed to support the planned expansion of LNG production capacity from the North Field in Qatar and Golden Pass in the United States, while also meeting long-term fleet replacement requirements. This ambitious undertaking represents the largest shipbuilding and leasing initiative in the history of the LNG industry. The first half of 2024 witnessed the conclusion of significant agreements.

In March 2024 Qatar signed long-term TCP agreements with four international shipowners for the operation of 19 new, ultra-modern conventional-sized LNG vessels. These 19 LNG vessels will be built by South Korean shipyards and will have a capacity of 174 000 m³ of LNG each, equipped with the latest LNG propulsion and shipping technologies to achieve optimal fuel efficiency, boil-off gas management and low carbon emissions. This marked the conclusion of the conventional-sized vessels portion of the expansion programme, bringing the total number of conventional LNG vessels for which Qatar has signed TCP agreements for the forthcoming years to 104.

In April 2024 Qatar and China State Shipbuilding Corporation placed an order for 18 of the world's largest LNG carriers, QC-Max

class LNG vessels with a capacity of 271 000 m³ of LNG in five tanks, for a total value of nearly USD 6 billion. This is possibly the largest single LNG vessel order and one of the largest ever placed in the LNG shipbuilding industry. Eight of these 18 QC-Max size LNG vessels are due to be delivered in 2028 and 2029, while the other ten are to be delivered in 2030 and 2031.

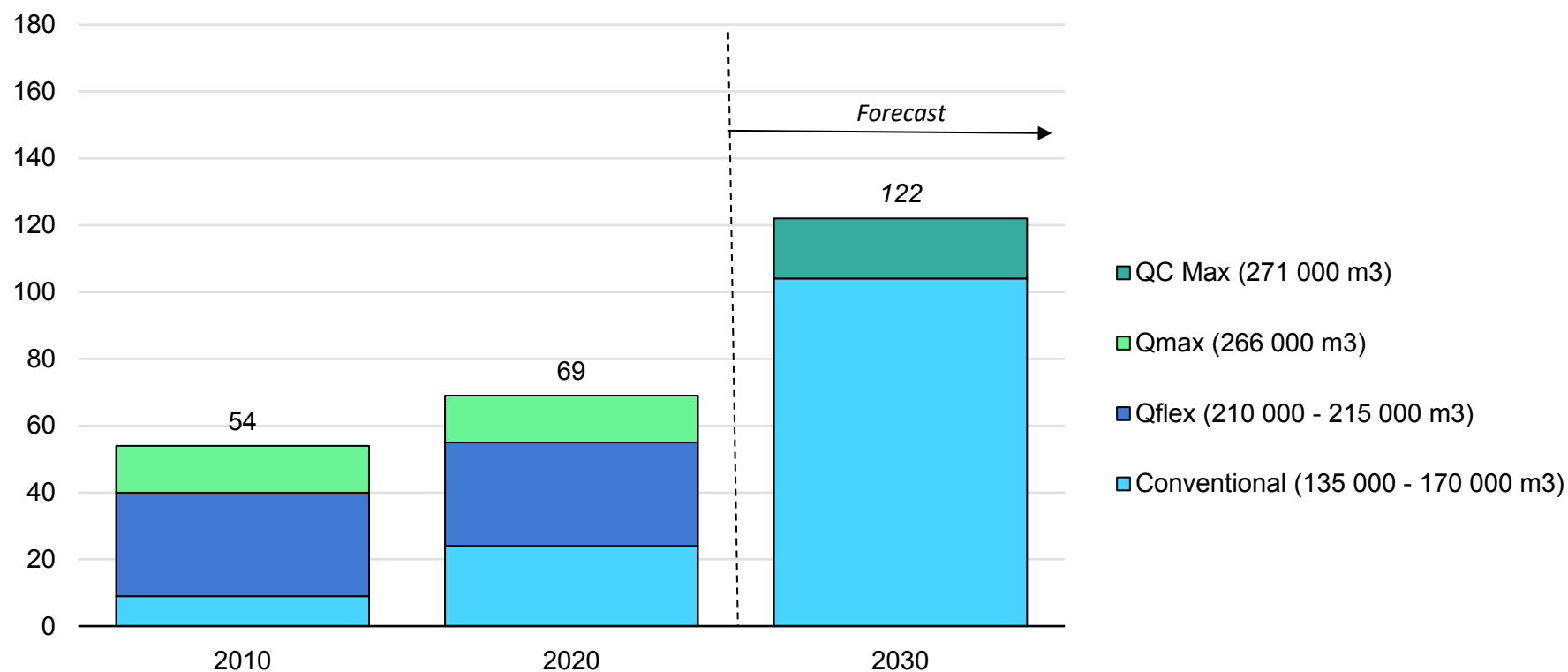
In the mid-2000s Qatar opened the door to giant LNG carriers, with the introduction of Qflex (with a capacity of 210 000 m³ of LNG) and Qmax (266 000 m³ of LNG), which were well above the standard 150 000 m³ vessels at the time. Liquefaction terminals in Qatar were specifically designed to accommodate these large carriers, with the benefit of their size being lower energy requirements due to economies of scale on engine efficiency.

Qatar has formulated a transition strategy from the deployment of large LNG vessels to that of more standardised vessels. The objective is to achieve full market coverage for LNG by 2030, with no limitations due to port compatibility constraints.

At a global level, the number of active standard-sized LNG carriers (over 30 000 m³ of LNG) at the end of 2023 was over 700, according to the latest GIIGNL 2024 report. By 2026 the global fleet of LNG carriers is forecast to grow by 40% and exceed more than 1 000 vessels, propelled by the addition of close to 300 newbuilds on order.

Qatar's LNG carrier fleet is expected to reach over 120 modern vessels by 2030

Estimated number of chartered LNG carriers in Qatar's fleet by year



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Source: IEA analysis based on Qatar's public announcements.

Natural gas prices recorded strong gains across all key markets in Q2 2024

Natural gas prices strengthened across all key markets in Q2 2024 compared to the previous quarter. Tighter supply–demand fundamentals together with geopolitical uncertainties provided upward pressure on spot prices. Lower LNG supply combined with strong Asian demand growth tightened the global gas balance, while uncertainties re-emerged around Russian piped gas supplies to Europe.

In **Europe** TTF spot prices rose by 15% on the quarter to an average of USD 10/MBtu in Q2 2024 – more than double their Q2 averages for the 2016-2020 period. Lower LNG inflows (down by almost 20% y-o-y), unplanned outages in Norway and renewed uncertainties around Russian piped gas flows all provided upward pressure on prices. On 20 May OMV notified market participants that its Russian piped gas imports could be halted for legal reasons. TTF month-ahead prices rose by near 15% to above USD 11/MBtu in the days following the announcement – their highest price level since late December 2023. Unplanned outages in Norway fuelled additional short-term price variability in early June. Historic volatility on TTF month-ahead prices averaged 53% in Q2 2024, remaining almost 50% above the Q2 average volatility displayed in the 2011-2021 period. This relatively high level of volatility reflects a still tight global gas balance and the market's nervousness amid geopolitical tensions.

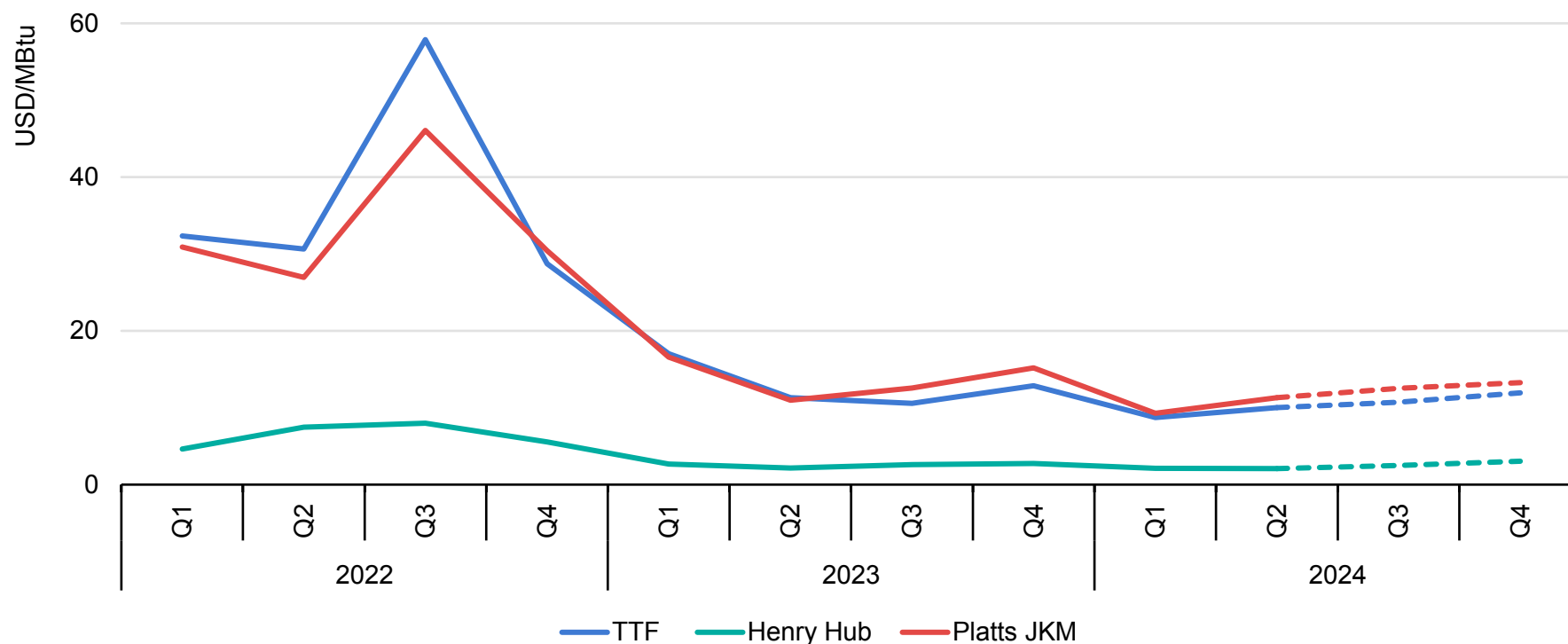
In **Asia** Platts JKM prices followed a similar trajectory and rose by 20% on the quarter to an average of USD 11/MBtu in Q2 2024 – more than double their Q2 averages in the 2016-2020 period. Strong demand growth, sizzling heatwaves and weak LNG supply growth provided upward pressure on Asian spot prices. The JKM premium over TTF more than doubled from USD 0.6/MBtu in Q1 to USD 1.3/MBtu in Q2 2024, driving LNG cargoes away from Europe. While Asia's LNG imports grew by 13% y-o-y, Europe's declined by more than 25% y-o-y in Q2 2024.

In the **United States** Henry Hub prices recovered from their multi-decade lows, rising by 70% from an average of USD 1.50/MBtu in March to USD 2.50/MBtu in June. Production cuts by upstream players combined with a strong increase in gas-fired power generation and higher exports (both piped and LNG) provided upward support to gas prices. On average, Henry Hub prices stood at USD 2.10/MBtu in Q2, close to their 2023 levels.

Forward curves as of the beginning of July 2024 suggest that TTF is set to average 20% below its 2023 levels in 2024 at around USD 10.5/MBtu. According to forward curves, Asian spot LNG prices retain their premium over European hub prices in 2024, with JKM averaging USD 1/MBtu above TTF. This should support higher LNG flows towards the Asian markets. Based on forward curves, Henry Hub prices in the United States are set to remain close to their 2023 levels and average USD 2.40/MBtu in 2024.

Asian spot LNG prices are expected to retain their premium over TTF in H2 2024

Main spot and forward natural gas prices, 2022-2024



IEA. CC BY 4.0.

Note: Future prices are based on forward curves as of the beginning of July and do not represent a price forecast.

Sources: IEA analysis based on CME Group (2024), [Henry Hub Natural Gas Futures Quotes](#), [Dutch TTF Natural Gas Month Futures Settlements](#), [LNG Japan/Korea Marker \(Platts\) Futures Settlements](#); EIA (2024), [Henry Hub Natural Gas Spot Price](#); Powernext (2024), [Spot Market Data](#); S&P Global (2024), [Platts Connect](#).

Soft demand and stable supply set storage inventories on a robust filling trajectory in 2024

Natural gas storage levels in key markets emerged from winter 2023/24 well above recent average levels, particularly in the United States and Europe where end-of-winter stocks were above the five-year historical range. Given the favourable start to the filling season, storage injections were below average in Q2 2024, and injection requirements are expected to remain below 2023 levels during the rest of the year.

EU underground gas storage levels closed the winter at a record high, approximately 45% (or 19 bcm) higher than the five-year average and 6% (or 3.5 bcm) above 2023 levels – the previous end-of-March high point. By mid-April low demand and stable supply stretched the year-on-year storage surplus to about 6 bcm. However, injections dipped as a result of a late-April cold spell, and subsequently remained below 2023 rates until the tail end of Q2. Over the entire quarter, 20 bcm was injected into storage sites, about 14% (or 3 bcm) less than in 2023. By early July EU storage levels were tracking broadly on a par with last year's levels, still 16% above the five-year average and in a robust position to reach the 90% fill target by the start of the heating season.

Ukrainian gas storage sites ended the winter with about 27% less gas in store than in 2023, although subsequent injections had reduced the gap to 15% by late May. Still, Q2 injections were lower y-o-y, leaving a 1 bcm y-o-y gap by early July. Ukraine's underground gas storage facilities could offer 10 bcm of capacity to

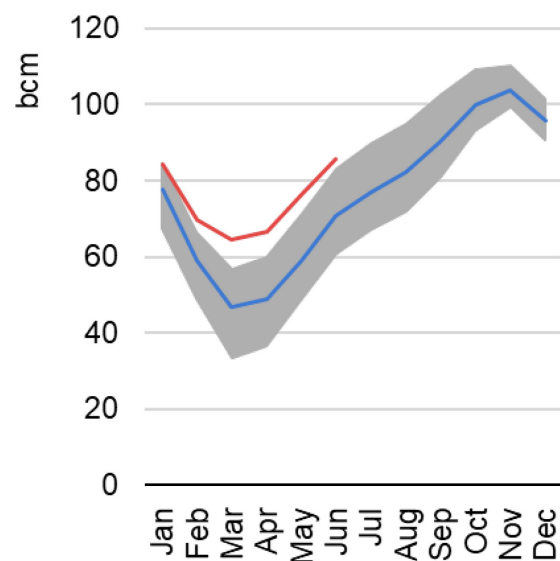
European market players over the upcoming winter. This leaves sizeable space for potential injections till the filling season's end.

In the United States storage fill also ended Q1 well above the five-year range. Volumes in store at the end of March were more than 20% above 2023 levels and 40% up on the five-year average. While Q2 injections were lower y-o-y, storage fill remained above the five-year range. With only 18 bcm of injections in the rest of the filling season – 30% less than last year – US storage would achieve the 90% fill level reached ahead of winter 2023/24. However, injection rates are likely to act as a balancing factor for the US market in case of supply- or demand-side fluctuations. In the second half of 2024, gas production is expected to taper off y-o-y and LNG project start-ups to boost LNG exports – a greater impact from either factor could act to slow injections for the rest of the filling season.

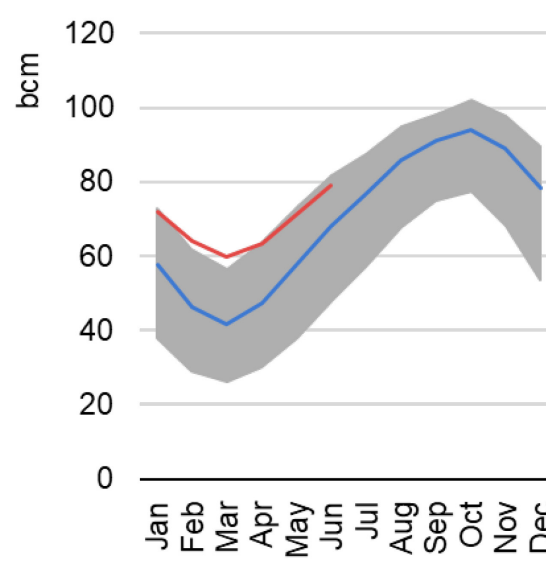
Combined LNG stocks in Japan and Korea closed 15% above the five-year average in March, but were 10% down on the 2023 multi-year end-of-winter high. Despite Korean LNG imports dropping y-o-y in Q1 2024, lower demand helped keep LNG stocks high and relatively flat over the period. In Japan LNG stocks started the year toward the top of the five-year range, but had slid to the five-year average by the end of the winter on sustained heating demand. Higher LNG imports y-o-y over the spring months helped stocks regain an upward trajectory by the start of Q2.

Storage levels have tracked above recent averages and are likely to remain so ahead of winter

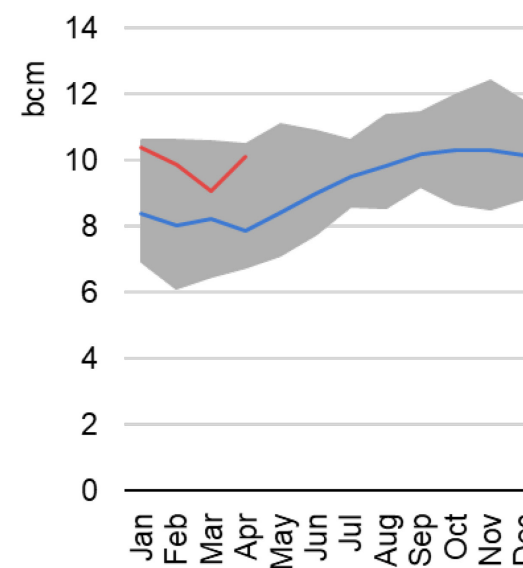
US underground storage inventories



EU underground storage inventories



Japan and Korea LNG stock



■ 5-year range

— 5-year average

— 2024

IEA. CC BY 4.0.

Sources: IEA analysis based on EIA (2024), [Weekly Working Gas in Underground Storage](#); GIE (2024), [AGSI+ Database](#); IEA (2024), [Monthly Gas Data Service](#); JODI (2024), [Gas World Database](#).

Medium-term outlook for low-emissions gases

In the fast lane: The supply of low-emissions gases is set to more than double by 2027

Low-emissions gases (including biomethane, low-emissions hydrogen² and e-methane³) can play a crucial role in decarbonising gas supply chains and the broader energy system. Recognising their growing importance, the International Energy Agency has developed a **Low-emission Gases Work Programme** to closely track market developments in this sphere and facilitate dialogue between emerging producers and consumers. This section provides a medium-term outlook for low-emissions gases.

The deployment of low-emissions gases is expected to accelerate over the medium term. The current forecast projects the supply of low-emissions gases to more than double by 2027, translating into an increase of almost 16 bcm in absolute terms. This represents a significant upward revision compared to last year's medium-term outlook and is reflective of growing policy support for low-emissions gases. Europe and North America are set to drive this expansion and to contribute over 70% of the overall growth. The development of low-emissions gases in these markets benefits from a wide range of policies, increasingly sophisticated subsidy schemes and well-developed interconnected gas networks. Nevertheless, **further efforts are required** to unleash the full potential of low-emissions gases and reach the ambitious targets

set by governments. Besides Europe and North America, a number of emerging-market low-emissions gas producers are expected to scale up their output, including Brazil, China and India.

Biomethane production is projected to double (an increase of 8 bcm) between 2023 and 2027, and to account for just over half of the total increase in low-emissions gases during this period. Europe and North America are set to remain the key drivers of this growth, scaling up their biomethane output by close to 85% (or 6.5 bcm) over the period. In addition, Brazil and India are emerging as important biomethane producers, with growth supported by subsidy schemes and demand-focused policy initiatives. **Low-emissions hydrogen** production is projected to grow at an average rate of almost 50% per year between 2023 and 2027, translating into an incremental supply of 7 bcm_{eq} by 2027. As with biomethane, Europe and North America are set to drive this growth, accounting for around 65% of the total increase. In contrast, **e-methane** developments are expected to remain limited over the medium term outlook. Given that e-methane is still in the early phase of development, international co-operation between producers and consumers is required to facilitate demonstration projects and develop viable business models.

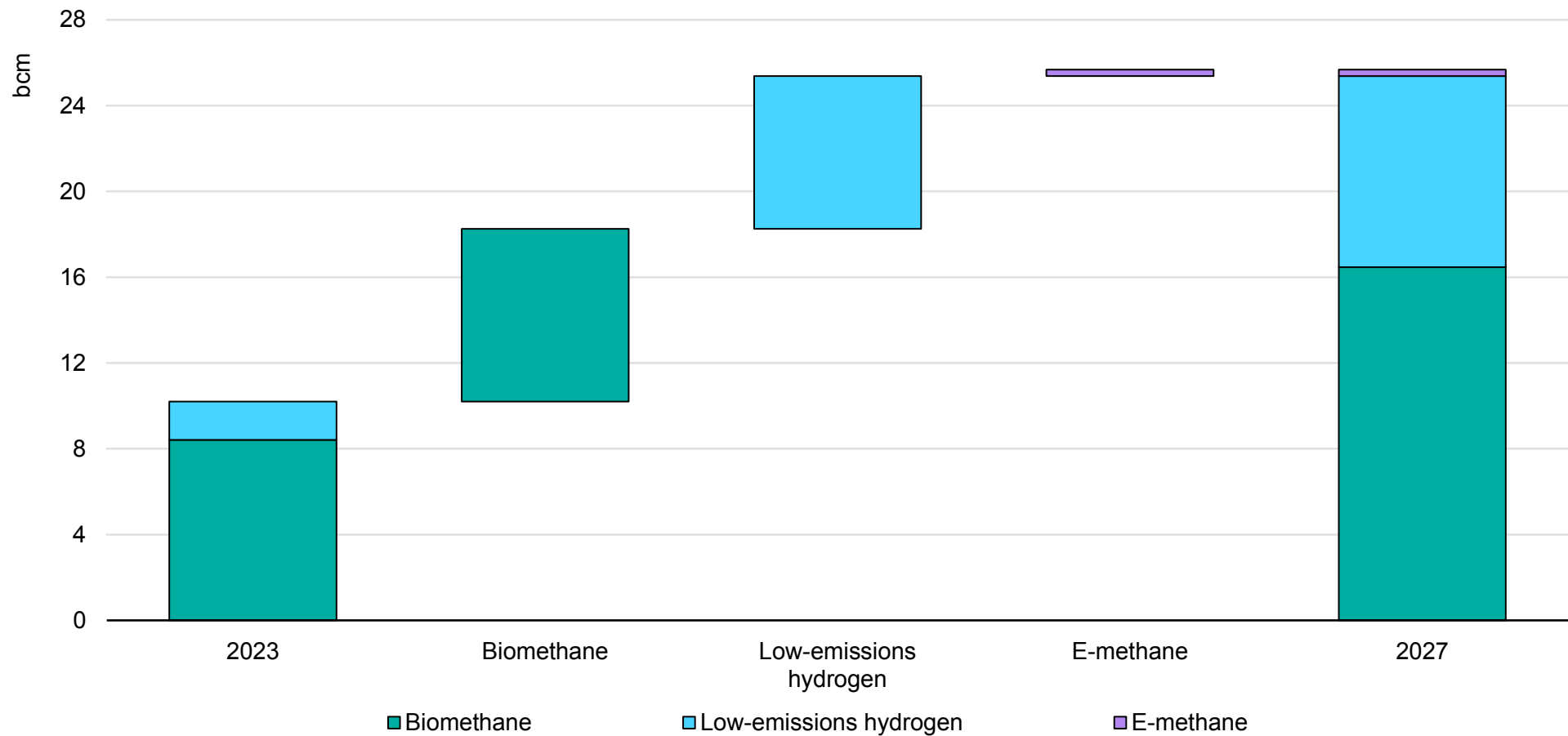
² Low-emissions hydrogen includes hydrogen produced via electrolysis where the electricity is generated from a low-emissions source (renewables or nuclear), biomass or fossil fuels with CCUS.

³ E-methane refers to synthetic methane produced from electrolytic hydrogen. The definition of low-emissions synthetic methane used by the IEA for analytical purposes in its reports considers that any carbon inputs,

e.g. from CO₂, are not from fossil fuels or process emissions. Beyond this definition, a commercial proposition for carbon-neutral e-methane could consider the use of CO₂ captured at industrial or power plants and offset through carbon credits (similar to the commercial offers of carbon-neutral LNG).

Biomethane and hydrogen drive the growth in low-emissions gases over the medium term

Estimated low-emissions gas supply in 2022 and expected increase in production to 2027



IEA. CC BY 4.0.

Biomethane is set for rapid expansion in the medium term amid growing policy support

Global biomethane⁴ production more than doubled between 2018 and 2022, reaching just over 7 bcm. This strong growth was largely driven by Europe and North America, accounting for more than 90% of incremental biomethane supply during this period. Preliminary data indicate that this rapid expansion continued in 2023, with global biomethane output rising by nearly 15% (or 1 bcm) y-o-y to over 8 bcm.

Biomethane production is projected to double between 2023 and 2027, primarily supported by projects undertaken in Europe, North America and Brazil. Global biomethane output is expected to rise to a range between 15-16 bcm by 2027. This represents a significant upward revision compared to our previous medium-term outlook and is reflective of the growing policy support behind biomethane in key growth markets.

United States

The United States became **the world's largest renewable natural gas (RNG) producer** in 2019 and has since then solidified its position. The country's biomethane output has more than doubled since 2019 and rose to over 2.5 bcm in 2023. First data indicate that this strong growth continued in the first five months of 2024, with RNG

production rising by 20% compared with the same period last year. Overall, more than 330 biomethane plants are operational in North America, 165 are under construction and another 320 are at other stages of development. **Feedstock supply** remains dominated by municipal solid waste, accounting for 72% of the feedstock mix, followed by agricultural and food waste (24%) and wastewater (5%).

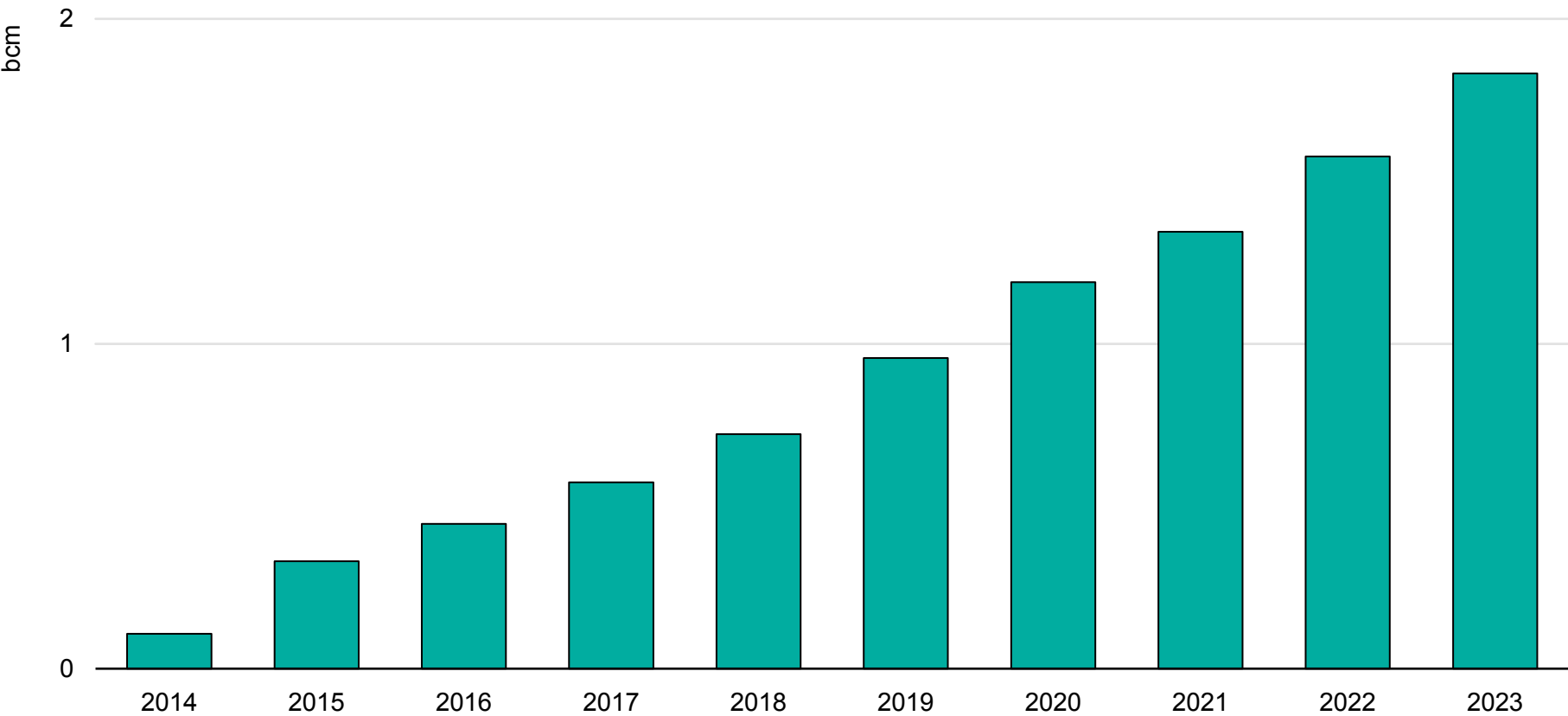
The **transport sector** remains the single most important driver behind the rapid expansion of biomethane in the United States. The use of RNG in the US transport system increased by 92% during 2019-2023. In 2023 biomethane met almost 80% of all on-road fuel used in natural gas vehicles. In turn, the transport sector accounts for nearly 90% of total biomethane use in the United States.

RNG in the United States is set to benefit from **more stringent fuel standard requirements**. In June 2023 the Environmental Protection Agency established biofuel volume requirements and standards for cellulosic biofuel (which primarily apply to biomethane) for 2023-2025 as part of the Renewable Fuel Standard program. The new rule increases volume targets for cellulosic biofuel by 25% in 2023, 29% in 2024 and 33% in 2025. RNG in the United States is also set to benefit from the **Inflation Reduction Act** and is expected to expand by 90% during 2023-2027 to over 5 bcm.

⁴ Alternatively referred to as renewable natural gas (RNG). Recognising the regional diversity of biomethane applications and quality, this analysis also includes compressed bio-gas (CBG) in the case of India and bio-natural gas (BNG) in the case of China.

The transport sector is a key driver behind biomethane growth in the United States

RNG used as a transport fuel, United States, 2014-2023



IEA. CC BY 4.0.

Source: IEA analysis based on RNG Coalition (2024), [2023 On-Road Renewable Natural Gas Use Report](#).

Europe

In Europe **biomethane production expanded almost sevenfold during 2012-2022**, reaching around 4 bcm. Preliminary data suggest that biomethane output grew by just over 10% to almost 4.5 bcm in 2023. Latest surveys indicate that around 80% of biomethane plants have grid injection capability, with close to 60% of them connected to a gas distribution grid. **Feedstock supply** is increasingly dominated by agricultural residues. Their share rose from around 20% in 2015 to account for over 40% of the feedstock mix in 2022. Meanwhile, the share of energy crops declined from 50% to 28% during the same period.

Biomethane production in **Germany** – Europe's largest biomethane producer – remained broadly flat at just over 1 bcm in 2023, while Denmark and France together contributed around 65% of the incremental biomethane supply amid effective policy support. Growth has been particularly strong in **France**, where biomethane output increased by more than 60% y-o-y and reached over 0.8 bcm. In the first half of 2024, France's biomethane output rose by 30%, solidifying its position as Europe's second-largest producer. The country's [draft Energy and Climate Strategy](#) foresees France's biomethane output reaching 44 TWh (around 4 bcm) by 2030. Considering the strong policy support, France is expected to become Europe's largest biomethane producer in 2025 and lead production growth over the medium term.

In **Denmark** biomethane output rose by an estimated 15% in 2023 to just over 0.8 bcm. Consequently, the share of biomethane in Denmark's total natural gas supply increased from 32% in 2022 to a record 38% in 2023. Initial data indicate that biomethane production growth slowed in H1 2024, rising by 5% y-o-y compared with the same period last year. Denmark has set the ambition of using [100% green gas by 2030](#) "at the latest". This indicates that Denmark's biomethane production is set to grow over the medium term, benefiting from the country's large agricultural sector.

Biomethane is gaining significant policy momentum in other European countries as well. In **Italy** the [National Recovery and Resilience Plan](#) is aiming to increase the country's biomethane production to 2.3-2.5 bcm by 2026 from only around 0.3 bcm in 2022. In August 2022 the European Commission approved a EUR 4.5 billion scheme to support biomethane projects in Italy. The scheme provides EUR 1.7 billion in grants to cover up to 40% of biomethane project construction costs. An additional EUR 2.8 billion is dedicated to paying feed-in-tariffs for producers over a period of 15 years.

In the **Netherlands** biomethane production grew by a strong 22% in 2023 to reach 0.28 bcm. The country is aiming to increase its biomethane consumption to 2 bcm by 2030. From 2025 onwards, gas suppliers will be subject to a [blending obligation](#); up to 20% of gas delivered to buildings will need to comprise biomethane by 2030. This is expected to increase domestic biomethane production to approximately 1.6 bcm/yr by 2030.

In the **Czech Republic** a scheme backed by EUR 2.4 billion will support the construction and operation of biomethane production plants. The [support scheme](#) was approved by the European Commission in October 2023 and will run until the end of 2025. It is expected to ramp up biomethane output to close to 0.34 bcm/yr. In **Ireland** the country's [Climate Action Plan](#) set a target of producing 5.7 TWh/yr (or 0.5 bcm/yr) of biomethane by 2030. **Ukraine's** first biomethane plant was connected to the gas network in April 2023. In March 2024 the Ukrainian parliament adopted changes to legislation to allow the export of domestically produced biomethane. The country plans to open 10 new facilities with a capacity of 1.5 million m³/yr in 2024-2025.

Overall, **Europe's biomethane production is expected to expand by over 85% between 2023 and 2027**, with overall output reaching 8.5 bcm by the end of the forecast period. France, Italy, Denmark and the Netherlands are expected to account for over 80% of this growth. Considering recent policy developments and new subsidy schemes, the medium-term outlook for biomethane developments in Europe has been significantly revised upwards. Nevertheless, more policy support will be required to put the European Union on track to reach its [35 bcm/yr biomethane production target](#) by 2030.

Other growth markets

Considering **Brazil's** vast agricultural sector, the country has significant biogas and biomethane production potential. Brazil's biogas output has more than doubled since 2019. In 2023 the country

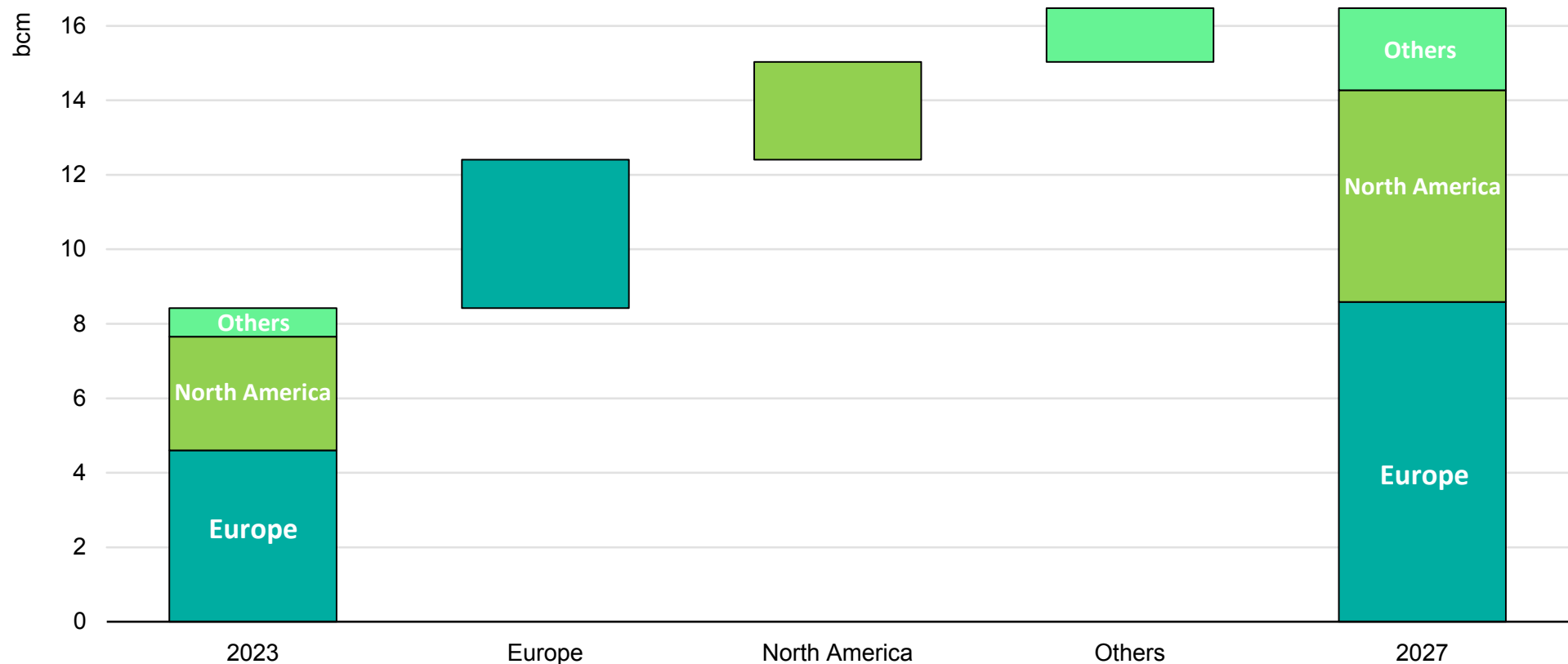
had over 1 360 biogas plants in operation with a capacity of 4.15 bcm. Over 55% of the biogas produced was used for power generation and 37% was upgraded into biomethane. According to the latest data, only six biomethane plants have been authorised to produce and inject biomethane into the country's gas network while 21 biomethane plants are in the process of seeking regulatory approval. Brazil's [Ten-Year Energy Expansion Plan 2032](#) foresees the country's biomethane production reaching 3.5 bcm by 2032. Based on projects under development, RNG output is expected to more than quadruple from its 2022 level, rising to near 1 bcm/yr by 2027 and making Brazil the sixth-largest biomethane producer in the world.

In **China** bio-natural gas (BNG) production stood at around 0.3 bcm in 2022 and is expected to continue to expand over the medium term at an impressive rate of 25% per year between 2023 and 2027, although falling short of the government's previous production target of 10 bcm by 2025.

In November 2023 the government of **India** approved [mandatory blending of compressed bio-gas \(CBG\)](#) into the domestic gas supply destined for the city gas distribution sector. The mandate has been set at 1% of total compressed natural gas and domestic piped natural gas consumption from 2025, and rises gradually to 5% from 2028/29. The new policy is expected to unlock USD 4.5 billion of investment into CBG by 2028/29 and facilitate the development of 750 projects.

Global biomethane production is expected to double between 2023 and 2027

Biomethane production by region, 2023-2027



IEA. CC BY 4.0.

Sources: IEA analysis based on Argonne National Laboratory (2024), [Renewable Natural Gas Database](#); Biogas Partner (2024), [Biogaspartner Einspeiseatlas Deutschland](#); Cedigaz (2024), [Global Biomethane Database](#); Energinet (2024), [Energi Data Service](#); ODRE (2024), [Production Quotidienne Consolidée de Biométhane sur le Réseau de Transport et de Distribution par Opérateur](#).

Low-emissions hydrogen production is set to increase fivefold in the medium term

The low-emissions hydrogen project pipeline is progressively gaining momentum, setting global supply on track to grow fivefold by 2027. However, after three years of broadly flat low-emissions hydrogen production, the gap to meet medium-term targets in certain regions remains significant.

Following near-zero y-o-y production growth in 2022, initial data show that global incremental low-emissions hydrogen supply was marginal in 2023, keeping total production below 1 Mt. At the same time, total global hydrogen production grew by approximately 3%, keeping the low-emissions share of global supply to less than 1%. Despite electrolytic hydrogen production growing by close to 40% in 2023 (from a very low base), abated fossil fuel-based hydrogen production still accounted for the vast majority of low-emissions hydrogen supply – driven by 15 large-scale hydrogen production facilities equipped with CCUS technology. Currently, North America continues to be the largest supplier of low-emissions hydrogen, making up more than 70% of the global market. Looking to the medium term, however, both the regional and technology pattern of low-emissions hydrogen production are set to evolve considerably.

The IEA [Hydrogen Projects Database](#) collates announced projects worldwide, highlighting the growing drive behind low-emissions hydrogen supply. Tallying existing projects across different stages of development – from concept phase to operational status – global low-emissions hydrogen production could reach nearly 16 Mt

(53 bcm_{eq}) per year by 2027. However, less than one-fifth of this potential production is linked to projects that are operational, under construction or have taken FID. Global low-emissions hydrogen supply is expected to reach just over 3 Mt (9 bcm_{eq}) per year by 2027, still representing a fivefold increase on current levels.

North America's share of total production is set to slide to 45% as production grows significantly in both China and Europe. Together, these three geographical blocks are set to account for about 85% of global low-emissions hydrogen supply.

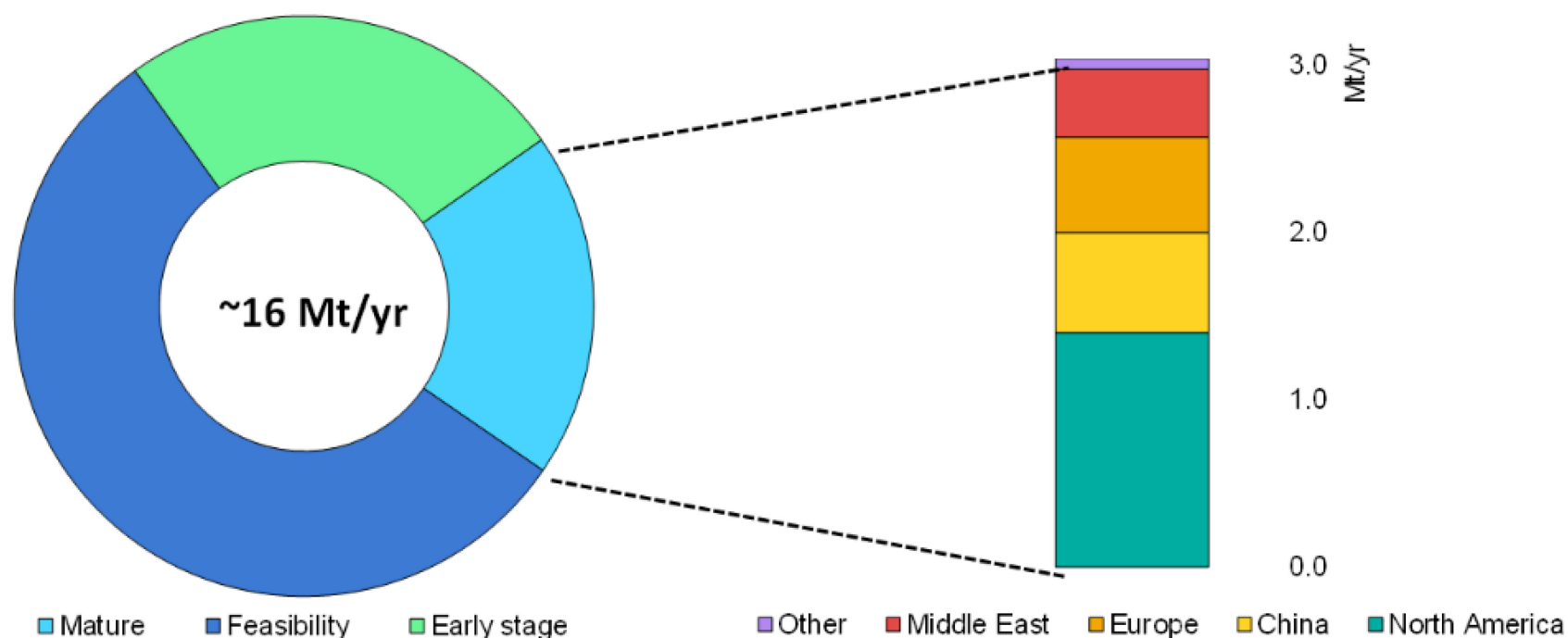
Accelerated electrolyser capacity growth and a wider geographical base than for abated fossil-based hydrogen help electrolytic hydrogen reach new heights in the medium term. By 2027 water electrolysis is expected to account for about 90% and 65% of low-emissions hydrogen production in China and Europe, respectively (compared to only 10% in North America). With an increasing share of hydrogen production based outside North America – which has access to a deep natural gas resource base and is developing CCS infrastructure and hubs – the share of electrolysis in global low-emissions hydrogen supply is expected to surpass 40% by 2027.

Despite a growing project pipeline, a production target gap persists, notably in the European Union, where electrolysis-based production of 0.3 Mt in 2027 trails the Fit for 55 ambition of 5.4Mt/yr for 2030. Still, further projects are expected to be announced and to come online by 2030.

Despite a growing project pipeline, only a small share of projects are at mature planning stages

Potential low-emissions hydrogen production by current project status, 2027

Expected low-emissions hydrogen production by region and market, 2027



IEA. CC BY 4.0.

Notes: “Mature” comprises projects that are operating, under construction, or that have reached FID; “Early stage” comprises projects that remain in the very early planning phases, such as those for which only a co-operation agreement among stakeholders has been announced; and “Feasibility” comprises projects between these two categories. The IEA [Global Hydrogen Review](#) (publication of the 2024 report is expected in October 2024) will provide final 2023 data and an update on the low-emissions hydrogen project pipeline.

Source: IEA (2024), [Hydrogen Production and Infrastructure Projects](#) (database).

Some e-methane projects aim to start operating or take FID within the next three years

E-methane is produced by combining low-emissions hydrogen with carbon resources. It has the potential to contribute to the decarbonisation of gas networks without the need to retrofit existing gas infrastructure such as LNG receiving terminals, LNG tankers, gas pipelines and consumer gas equipment. E-methane could contribute to a smooth transition to carbon neutrality and limit the social costs associated with its introduction.

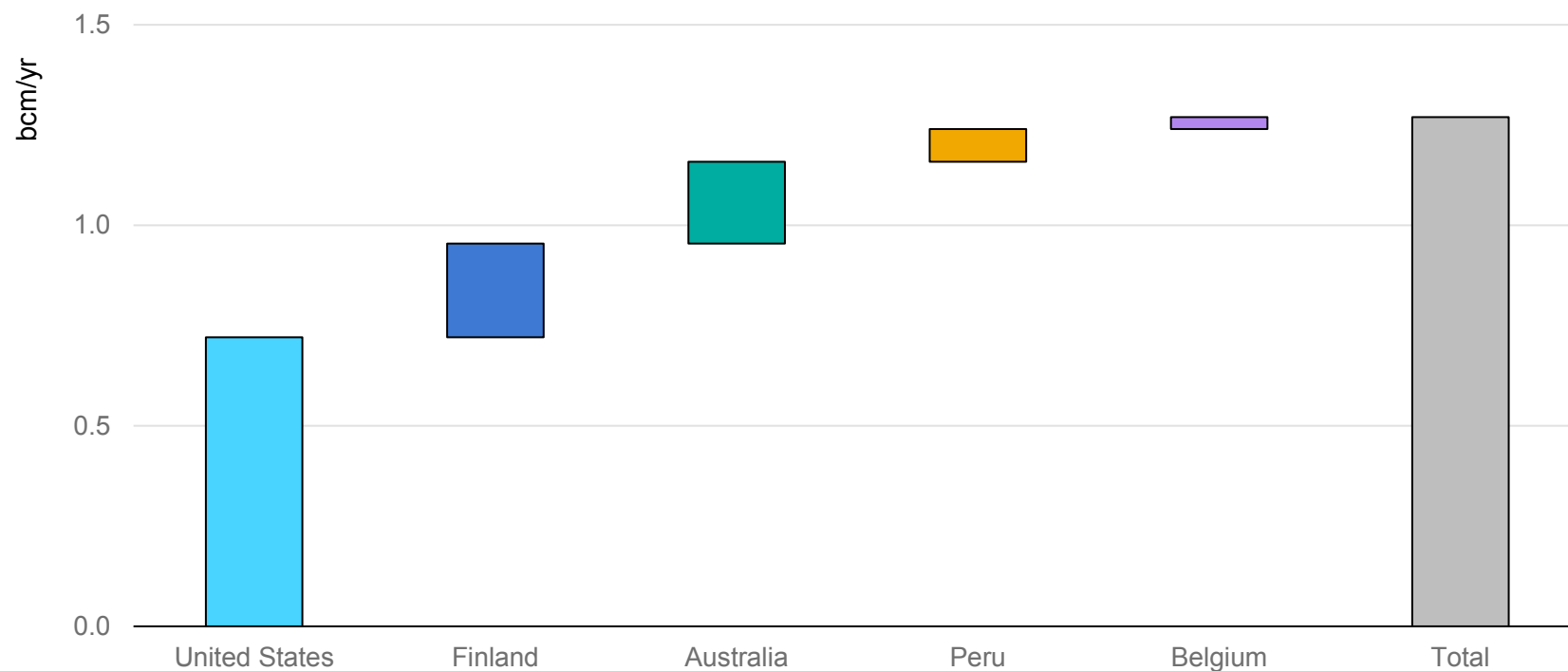
Projects to produce e-methane are planned in the United States, Europe, Australia and other countries around the world. Japan has a target for e-methane to comprise 1% of the gas supply in existing networks by 2030, increasing to 90% by 2050, and Japanese companies are collaborating with global companies to progress production plans. Several e-methane production projects aim to start operating or take investment decisions within the next three years. TotalEnergies and Tree Energy Solutions are planning to produce 100 000-200 000 tonnes of e-methane annually in the United States and aim to reach FID in 2024. The e-methane is to be produced using hydrogen from a 1 GW electrolyser powered by wind and solar energy, and biogenic CO₂. Tokyo Gas, Osaka Gas, Toho Gas, Mitsubishi Corporation and Semptra Infrastructure have a plan to produce e-methane in the United States, aiming to reach FID in 2025 and start to export to Japan in 2030. In Wallonia, Belgium, the Columbus project aims to produce e-methane by using the CO₂ released during the

lime production process and combining it with hydrogen produced using a 100 MW electrolysis unit powered by renewable electricity. In Finland, Nordic Ren-Gas has six planned plants in its portfolio, the construction of the first plant in Tampere targeted to start in 2024, with the production of e-methane in 2027. Santos aims to produce e-methane in Australia with Japanese companies and start to export it in 2030. In addition, Osaka Gas, Marubeni and PERU LNG announced a joint study agreement to commence preliminary front-end engineering design for a project to produce e-methane in Peru by 2030.

The establishment of CO₂ accounting rules is key to accelerating the global deployment of e-methane. When a country imports e-methane from another country, international CO₂ accounting rules are important. In August 2023 the US-Japan CCUS/Carbon Recycling Working Group noted the importance of encouraging consensus building among the public and private sectors so that international transactions of carbon recycled fuels (e-fuel, e-methane, etc.) can be treated as carbon neutral. The outcome document of the Japan-US Clean Energy and Energy Security Initiative in March 2024 mentioned that for e-methane, Japanese companies have signed letters of intent with US companies to avoid CO₂ double counting.

Global e-methane output could potentially grow by 2030

Potential output volumes of the key planned e-methane projects by country of production



IEA. CC BY 4.0.

Notes: This graph represents the potential e-methane production volumes of the key planned projects, including the volumes of pre-FID projects.

Source: IEA analysis based on various public announcements.

Annex

Summary table

World natural gas consumption and production by region and key country (bcm)

	Consumption					Production				
	2020	2021	2022	2023	2024	2020	2021	2022	2023	2024
Africa	161	169	170	176	181	240	260	251	253	255
Asia Pacific	834	891	877	902	948	622	648	660	670	686
<i>of which China</i>	325	367	364	391	422	189	205	216	230	242
Central and South America	142	153	150	149	152	150	148	151	149	150
Eurasia	585	649	622	631	650	866	960	865	830	864
<i>of which Russia</i>	461	516	487	495	510	692	762	672	638	675
Europe	576	609	524	488	487	230	222	230	215	220
Middle East	546	562	580	592	610	670	692	715	725	750
North America	1 079	1 091	1 144	1 157	1 172	1 145	1 172	1 240	1 285	1 275
<i>of which United States</i>	868	874	919	928	937	954	984	1 021	1 061	1 060
World	3 923	4 124	4 067	4 095	4 199	3 923	4 105	4 112	4 127	4 200

Regional and country groupings

Africa	Algeria, Angola, Benin, Botswana, Cameroon, Congo, Democratic Republic of the Congo, Côte d'Ivoire, Egypt, Eritrea, Ethiopia, Gabon, Ghana, Kenya, Libya, Morocco, Mozambique, Namibia, Nigeria, Senegal, South Africa, Sudan, United Republic of Tanzania, Togo, Tunisia, Zambia, Zimbabwe and other countries and territories. ¹
Asia Pacific	Australia, Bangladesh, Brunei Darussalam, Cambodia, Chinese Taipei, India, Indonesia, Japan, Korea, the Democratic People's Republic of Korea, Malaysia, Mongolia, Myanmar, Nepal, New Zealand, Pakistan, the People's Republic of China, ² the Philippines, Singapore, Sri Lanka, Thailand, Viet Nam and other countries and territories. ³
Central and South America	Argentina, Bolivia, Brazil, Chile, Colombia, Costa Rica, Cuba, the Dominican Republic, Ecuador, El Salvador, Guatemala, Haiti, Honduras, Jamaica, Netherlands Antilles, Nicaragua, Panama, Paraguay, Peru, Trinidad and Tobago, Uruguay, Venezuela and other countries and territories. ⁴
Eurasia	Armenia, Azerbaijan, Georgia, Kazakhstan, Kyrgyzstan, the Russian Federation, Tajikistan, Turkmenistan and Uzbekistan.
Europe	Albania, Austria, Belarus, Belgium, Bosnia and Herzegovina, Bulgaria, Croatia, Cyprus, ^{5,6} the Czech Republic, Denmark, Estonia, Finland, the Former Yugoslav Republic of North Macedonia, France, Germany, Gibraltar, Greece, Hungary, Iceland, Ireland, Italy, Kosovo, ⁷ Latvia, Lithuania, Luxembourg, Malta, the Republic of Moldova, Montenegro, the Netherlands, Norway, Poland, Portugal, Romania, Serbia, the Slovak Republic, Slovenia, Spain, Sweden, Switzerland, Republic of Türkiye, Ukraine and the United Kingdom.
European Union	Austria, Belgium, Bulgaria, Croatia, Cyprus, ^{5,6} the Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania,

Luxembourg, Malta, the Netherlands, Poland, Portugal, Romania, the Slovak Republic, Slovenia, Spain and Sweden.

Middle East Bahrain, the Islamic Republic of Iran, Iraq, Israel,⁸ Jordan, Kuwait, Lebanon, Oman, Qatar, Saudi Arabia, the Syrian Arab Republic, the United Arab Emirates and Yemen.

North Africa Algeria, Egypt, Libya, Morocco and Tunisia.

North America Canada, Mexico and the United States.

¹ Individual data are not available and are estimated in aggregate for: Burkina Faso, Burundi, Cape Verde, the Central African Republic, Chad, Comoros, Djibouti, Equatorial Guinea, Gambia, Guinea, Guinea-Bissau, Lesotho, Liberia, Madagascar, Malawi, Mali, Mauritania, Mauritius, Niger, Reunion, Rwanda, Sao Tome and Principe, Seychelles, Sierra Leone, Somalia, Swaziland and Uganda.

² Including Hong Kong.

³ Individual data are not available and are estimated in aggregate for: Afghanistan, Bhutan, Cook Islands, Fiji, French Polynesia, Kiribati, the Lao People's Democratic Republic, Macau (China), Maldives, New Caledonia, Palau, Papua New Guinea, Samoa, Solomon Islands, Timor-Leste, Tonga and Vanuatu.

⁴ Individual data are not available and are estimated in aggregate for: Antigua and Barbuda, Aruba, Bahamas, Barbados, Belize, Bermuda, British Virgin Islands, Cayman Islands, Dominica, Falkland Islands (Malvinas), French Guyana, Grenada, Guadeloupe, Guyana, Martinique, Montserrat, St Kitts and Nevis, St Lucia, St Vincent and the Grenadines, Suriname and Turks and Caicos Islands.

⁵ Note by the Republic of Türkiye.

The information in this document with reference to "Cyprus" relates to the southern part of the Island. There is no single authority representing both Turkish and Greek Cypriot people on the Island. The Republic of Türkiye recognises the Turkish Republic of Northern Cyprus (TRNC). Until a lasting and equitable solution is found within the context of the United Nations, The Republic of Türkiye shall preserve its position concerning the "Cyprus issue".

⁶ Note by all the European Union Member States of the OECD and the European Union. The Republic of Cyprus is recognised by all members of the United Nations with the exception of Türkiye. The information in this document relates to the area under the effective control of the Government of the Republic of Cyprus.

⁷ The designation is without prejudice to positions on status, and is in line with the United Nations Security Council Resolution 1244/99 and the Advisory Opinion of the International Court of Justice on Kosovo's declaration of Independence.

⁸ The statistical data for Israel are supplied by and under the responsibility of the relevant Israeli authorities. The use of such data by the OECD and/or the IEA is without prejudice to the status of the Golan Heights, East Jerusalem and Israeli settlements in the West Bank under the terms of international law.

Abbreviations and acronyms

ANP	National Petroleum Agency (Brazil)	IEA	International Energy Agency
BMC	Colombian Mercantile Exchange (Colombia)	JKM	Japan Korea Marker
CAPEX	capital expenditure	JODI	Joint Oil Data Initiative
CBG	compressed biogas	JPY	Japanese yen
CCUS	Carbon Capture, Utilisation and Storage	LEGWP	Low-Emission Gases Work Programme
CME	Chicago Mercantile Exchange (United States)	LNG	liquefied natural gas
CNE	National Energy Commission (Chile)	METI	Ministry of Economy, Trade and Industry (Japan)
CO ₂	carbon dioxide	MoU	Memorandum of Understanding
CQPGX	Chongqing Petroleum Exchange (the People's Republic of China)	MME	Ministry of Mines and Energy (Brazil)
EIA	Energy Information Administration (United States)	NBP	National Balancing Point (United Kingdom)
ENARGAS	National Gas Regulatory Entity (Argentina)	NDRC	National Development and Reform Commission (the People's Republic of China)
ENTSO-G	European Network of Transmission System Operators for Gas	OECD	Organisation for Economic Co-operation and Development
EPIAS	Energy Markets Operations Inc. (Republic of Türkiye)	ONS	National Electric System Operator (Brazil)
EPPO	Energy Policy and Planning Office (Thailand)	OSINERG	Energy Regulatory Commission (Peru)
EU	European Union	PPAC	Petroleum Planning and Analysis Cell (India)
EUR	Euro	RNG	renewable natural gas
FID	final investment decision	TCP	time charter party
FSRU	floating storage and regasification unit	SMR	steam methane reforming
GHGs	greenhouse gases	SPA	Sales and Purchase Agreement
GIE	Gas Infrastructure Europe	TFFS	Task Force on Gas and Clean Fuels Market Monitoring and Supply and Security
HH	Henry Hub	TTF	Title Transfer Facility (the Netherlands)
HoA	Head of Agreement	USD	United States dollar
IEA	International Energy Agency	y-o-y	year-on-year
ICE	Intercontinental Exchange		
ICIS	Independent Chemical Information Services		

Units of measure

bcf	billion cubic feet
bcf/d	billion cubic feet per day
bcm	billion cubic metres
bcm _{eq}	billion cubic metre equivalent
bcm/yr	billion cubic metres per year
GJ	gigajoule
GW	gigawatt
kWh	kilowatt hour
MBtu	million British thermal units
Mt	million tonnes
Mt/yr	million tonnes per year
m ³ /hr	cubic metres per hour
TWh	terawatt hour
t/yr	tonnes per year

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