Gas Market Report, Q2-2022

including Global Gas Review 2021

INTERNATIONAL ENERGY AGENCY

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Abstract

Russia's invasion of Ukraine has triggered a major energy supply and security crisis that has sent commodity prices to new highs, with wider implications for the global economy.

The conflict has put further considerable pressure on natural gas markets and raised uncertainty in the context of an already tight market. Europe has been at the epicentre of market tensions since the beginning of the heating season, resulting from the combination of lower than average underground storage inventory – principally from sites partly owned or controlled by Gazprom – and a sharp year-on-year drop in Russian pipeline supplies. Lower Russian supplies have largely been compensated by LNG, turning Europe into the premium market and drawing cargoes away from Asia Pacific and other regions. The resulting tight supply, high prices, and heightened market uncertainty have led to a downward revision in global gas consumption growth, which as a result is expected to turn negative for 2022.

This new issue of the quarterly Gas Market Report features a detailed review of 2021's gas supply and demand fundamentals, an analysis of recent developments in global gas markets during the northern hemisphere's heating season, and an updated near-term outlook for 2022.

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In the fog of war

Besides the human tragedy it is causing, the invasion of Ukraine by Russia on 24 February has triggered a major energy crisis. This has wider repercussions for the global economy that will negatively affect economic growth and support rising inflation through higher commodity prices.

The conflict has added further pressure and uncertainty to an already tight natural gas market. Europe's natural gas supply has been a topic of concern since mid-2021 as storage inventory levels have remained well below average – especially in sites directly or indirectly controlled by Gazprom. The continent's storage opened the heating season 17% below its five-year average, and 22% below the previous year's level. The close to 25% year-on-year (y-o-y) drop in Russian pipeline flows during the 2021/22 heating season further exacerbated market uncertainty.

European short-term prices have reached all-time record highs since the beginning of the conflict as Europe became the premium market this past winter and attracted massive LNG flows to compensate for the sharp decline in Russian pipeline deliveries. LNG diversions to Europe were key to balancing winter consumption. The competition for flexible LNG cargoes pushed Asian spot prices to a record high and led to further curtailment in price-sensitive importing markets, particularly in emerging Asia. Price volatility also reached record levels as a result of unprecedented uncertainty.

Russia is Europe's largest natural gas supplier, meeting 33% of the region's demand in 2021 after constant growth over the past decade due to the depletion of domestic production. Ukraine has remained critical to the transit of Russian natural gas to Europe despite the development of alternative transit routes, accounting for almost 7% of Russia's pipeline deliveries to Europe in 2021. Natural gas transit flows through Ukraine have so far remained unaffected by the conflict, despite Ukraine itself experiencing supply disruptions caused by the Russian invasion.

At the time of writing, there are no legally binding import restrictions on Russian natural gas in the European Union, yet there is a strong drive to reduce the bloc's exposure to Russian energy imports, as established in the European Commission's REPowerEU outline plan issued on 8 March. This echoes the IEA's publication of a 10-Point Plan on 3 March, outlining a suite of measures to reduce the volume of Russian gas imports into Europe by over a third within a year. The observed drop in Russian pipeline deliveries to Europe (and absence of spot traded volumes since the beginning of the heating season), combined with the European Union's objective of reducing its supply dependency on Russia, has led to a downward revision of Russian pipeline deliveries to Europe for 2022 in this forecast. This in turn necessitates higher LNG imports in order to balance consumption needs and ensure the filling of European underground storage sites, with a minimum 80% filling target by

1 November (and 90% from 2023) as part of a European Commission legislative proposal issued in late March.

Higher LNG import needs in Europe are putting pressure on an already tight global LNG market balance in 2022. The prospect of additional supply appears limited as incremental export capacity relies on a limited number of projects, while several exporters are still hampered by 2021's extended capacity outages. The resulting supply tensions and high short-term prices are likely to have a negative impact on natural gas consumption in price-sensitive emerging markets, which will also be affected by the rising cost of their oil-indexed long-term LNG supply contracts.

Natural gas demand is also likely to be affected by the conflict's wider repercussions on the global economy – including rising commodity prices (food, energy, industrial raw materials) pushing up inflation further and reducing the value of incomes, lower investment due to greater uncertainty and downgraded business confidence, and difficulties accessing financing. The current gas supply tensions and high prices also have strong negative impact on the non-energy uses of natural gas, especially for fertilisers. Natural gas accounts for 70% of global ammonia production, which is the starting point for all mineral nitrogen fertilisers. The price of urea more than doubled in between September 2021 and March 2022. China and Russia, two major exporters of urea, have restricted exports in late 2021 in order to maintain supply and food security for their domestic markets, and sanctions on Russia have put further tension on fertiliser availability and future crop yields.

Gas demand growth turns negative for 2022

This report revises global natural gas consumption growth for 2022 from a previous 1% to slightly below zero, which is equivalent to a negative demand revision of 50 bcm compared to the previous quarterly report's forecast.

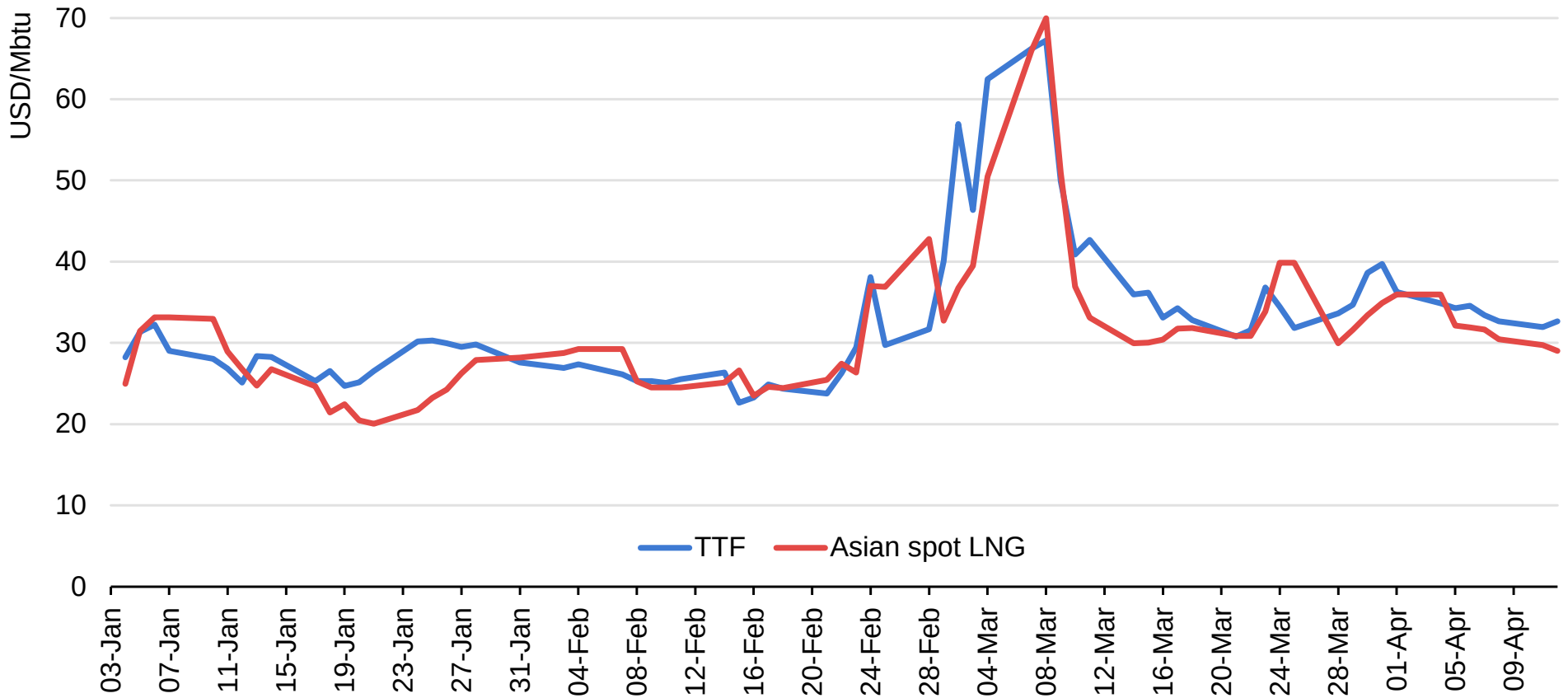
Almost all regions have been revised downwards, with a large share of the impact in the Asia Pacific region, on a combination of a downgraded economic outlook from high commodity prices and the risk of physical limitations on access to LNG – especially for price-sensitive buyers with a higher exposure to short-term LNG procurement.

Natural gas consumption in Europe and Eurasia, which was already expected to decline in 2022 after strong contributions from weather-related demand in 2021, has been further revised downwards. Consumption in these regions during 2022 is anticipated to fall by close to 6% and 5% y-o-y, respectively. Other regions are so far expected to be less directly affected by international gas trade tensions as they principally rely on domestic production. They would nonetheless be affected by the indirect macroeconomic consequences of the conflict on their domestic economies and gas markets.

The outlook remains highly uncertain, and further downsides can be expected, especially in emerging gas importing markets, as a result of lasting supply tensions, high prices and volatility.

The Russian invasion of Ukraine created unprecedented uncertainty and volatility for both European and Asian gas markets

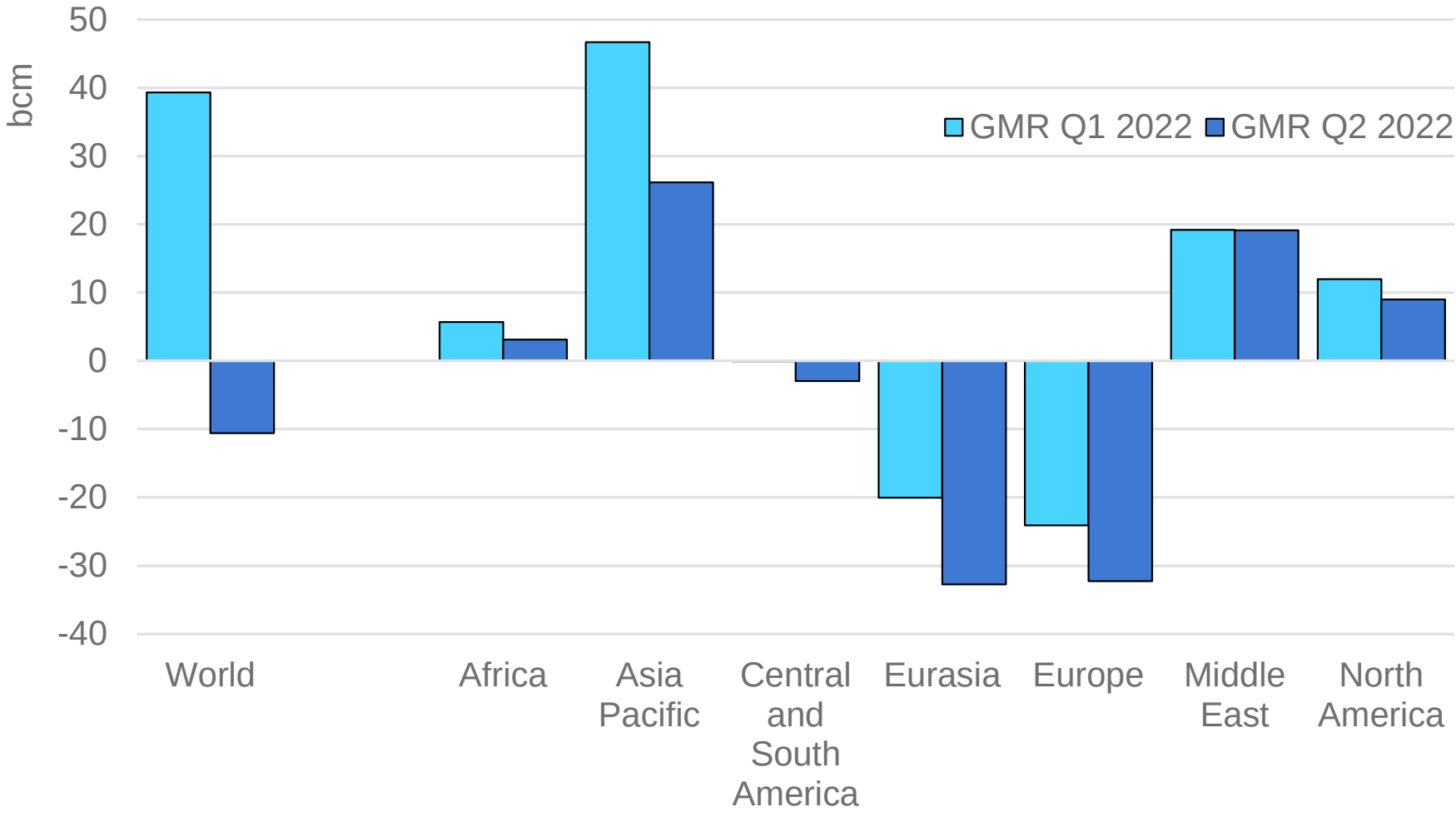
Daily European month-ahead and Asian spot LNG prices, January - April 2022



Sources: IEA analysis based on ICIS (2022), ICIS LNG Edge.

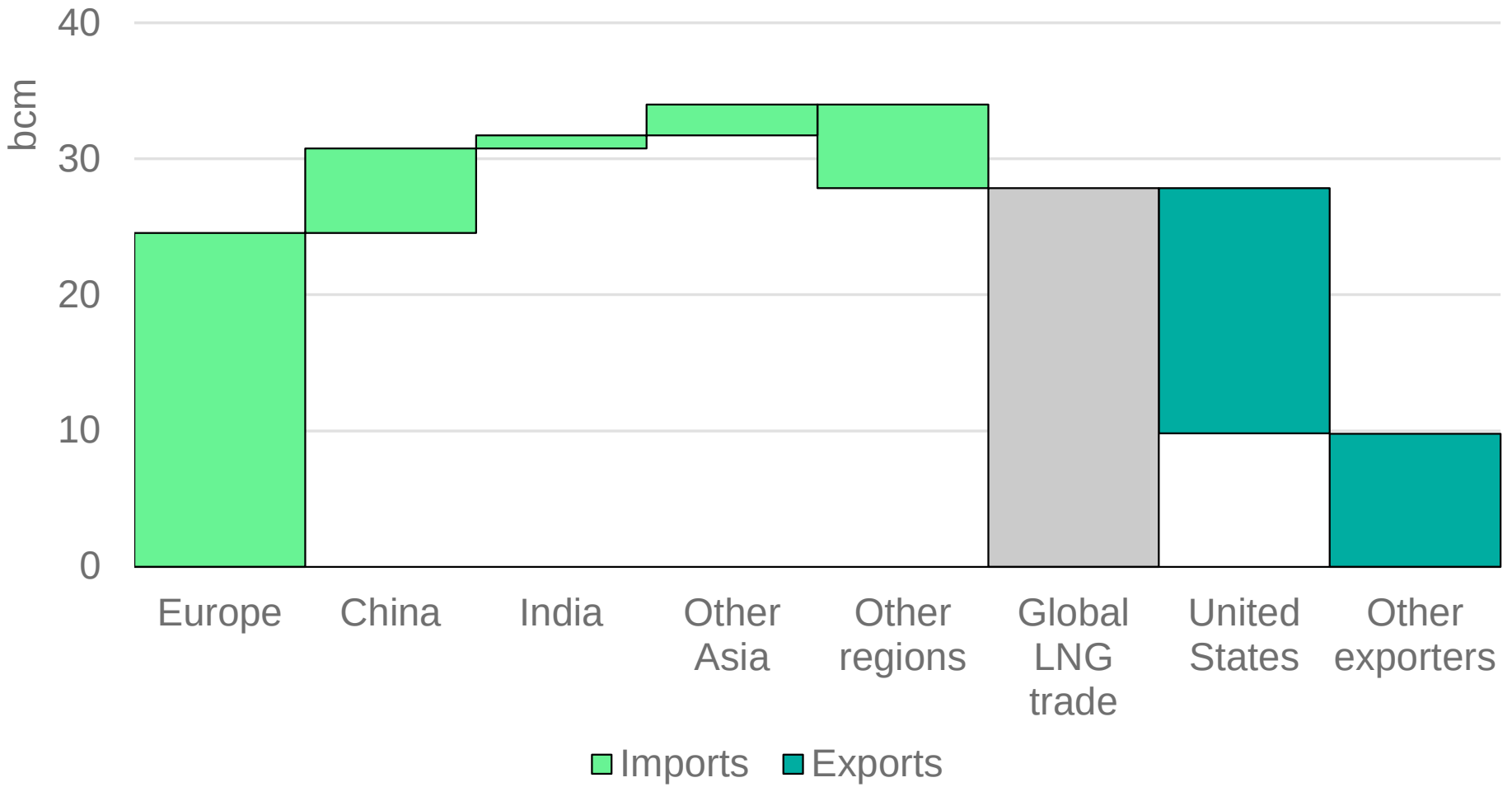
Revised consumption growth is around 50 bcm lower, resulting in negative gas growth for 2022

Comparison of natural gas consumption growth for 2022 in the two latest issues of the Gas Market Report



Europe’s incremental supply needs drive LNG market growth and tightness in 2022

Global LNG balance, y-o-y change, 2021-2022



Global Gas Review 2021

Natural gas demand experienced strong growth in 2021, despite a challenging end of year

Global natural gas consumption showed a strong recovery in 2021, with an estimated 4.5% y-o-y increase. This is more than twice the equivalent of the decline experienced in 2020 and the third strongest year since 2000, after 2010 and 2018 (which grew by 7.8% and 5.2% respectively).

This strong growth resulted from the combination of a rebound in economic activity after the lockdowns of 2020, boosting consumption in the industrial and power generation sectors, and a succession of extreme weather events that led to higher than expected heating and power generation needs. Growth slowed significantly in the second half of 2021 due to a challenging price environment and softening of the economic recovery.

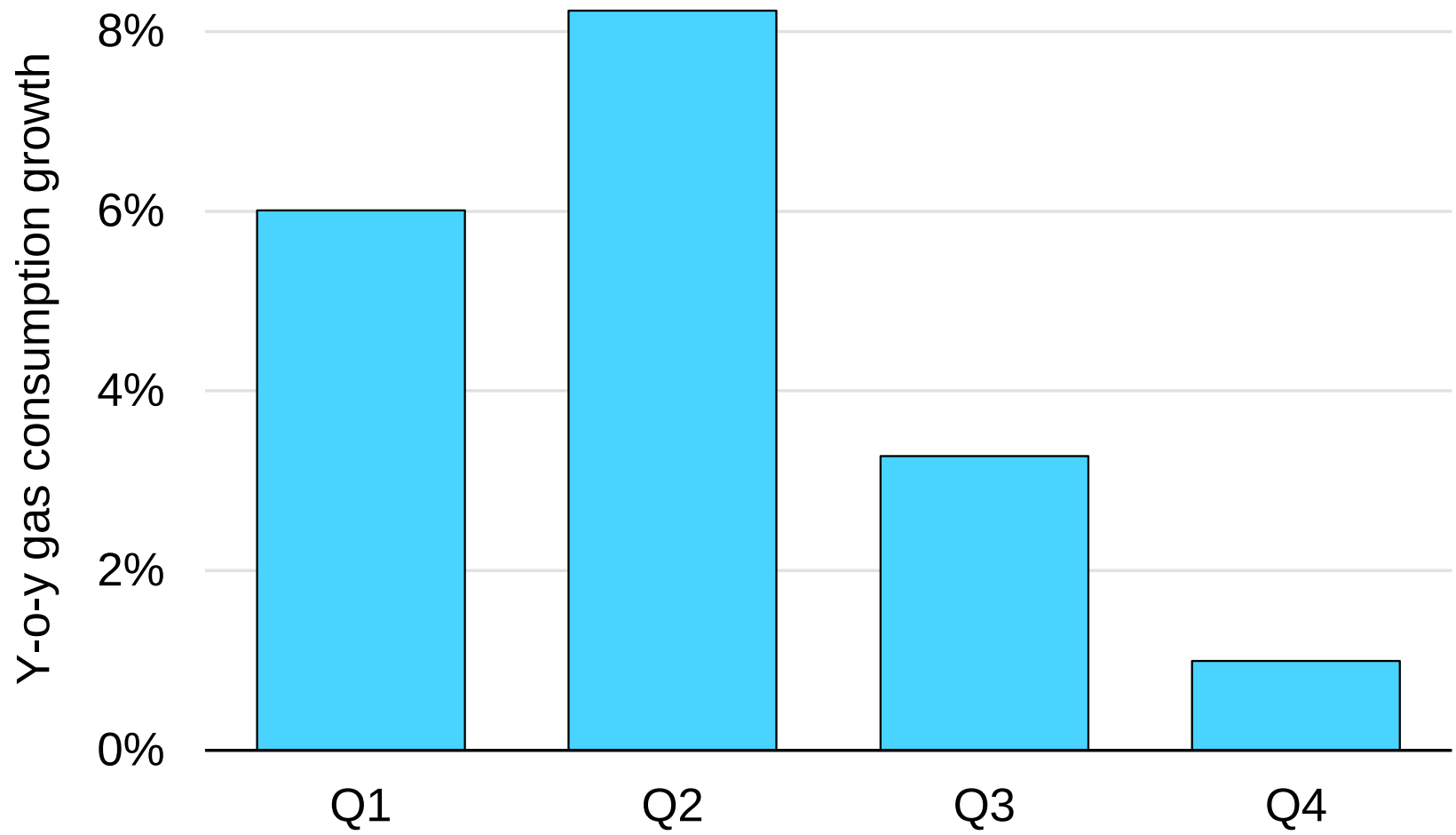
A year of two halves

Natural gas consumption experienced high growth rates in the first half of the year. In the first quarter it increased by an estimated 6% y-o-y globally. Weather-related factors played a strong role, as early 2021 was colder than the exceptionally mild winter of 2019/20 in the northern hemisphere. A rebound in economic activity also had some impact in Q1 2021, especially in China, which was hit by the pandemic in the first quarter of 2020. The bulk of the effect of economic recovery was visible in Q2 2021, with an estimated quarterly rise in gas consumption of above 8%, a year on from the greatest impacts of Covid-induced lockdown measures in 2020. While all regions benefited from this rebound, Europe was particularly affected because of the severe drop in consumption observed in Q2 2020, leading to a 23% y-o-y increase in the second quarter of 2021. The recovery coincided with weather-related factors, including a colder spring in Europe and record droughts in South America, which prompted a surge in gas consumption for power generation in Brazil to compensate for the lack of hydro capacity.

Growth in gas consumption slowed significantly in the second half of 2021, at about 3% in Q3 and down to 1% in Q4. This resulted from the diminishing immediate impact of recovery and a tightening global gas market that prompted a steep rise in spot gas prices in Europe and Asia. This challenging environment led to slower consumption growth, fuel switching away from natural gas and in some cases demand destruction. The industrial sector provides a good illustration of this trend, with monthly consumption data from major markets clearly emphasising at first a jump in gas consumption compared to 2020 in the first half of 2021, then slower growth in Q3, and finally negative growth in the closing months of 2021 on a combination of lower economic activity, periodic gas supply constraints and soaring fuel prices.

Gas growth suffered from high prices after a strong recovery in H1 2021

Change in quarterly global natural gas consumption, 2020-2021



North America experienced muted growth in natural gas consumption in 2021

Gas consumption stagnated in North America in 2021 with an estimated 0.3% y-o-y increase, an exception compared to demand rebounds in other regions. Consumption was hampered by higher gas prices that triggered gas-to-coal switching in US power generation, while Canada and Mexico only had modest consumption increases compared to strong rebounds in other mature markets in 2021.

Total natural gas demand in the **United States**, including exports, increased by an estimated 3% y-o-y in 2021, as growing needs from LNG and pipeline exports counterbalanced the absence of growth in domestic consumption. LNG exports ramped up during 2021, recording a 50% y-o-y increase, while pipeline flows to Mexico grew by 9%. This is in strong contrast to a stagnating domestic market, where the power sector – which accounts for close to 40% of gas use – experienced a 2.7% decline in gas-fired generation. This decline was compensated by a 1.4% increase in consumption from the residential and commercial sectors, helped by colder winter temperatures, and a modest 0.9% increase from the industrial sector. Consumption in other sectors increased by 1.7%.

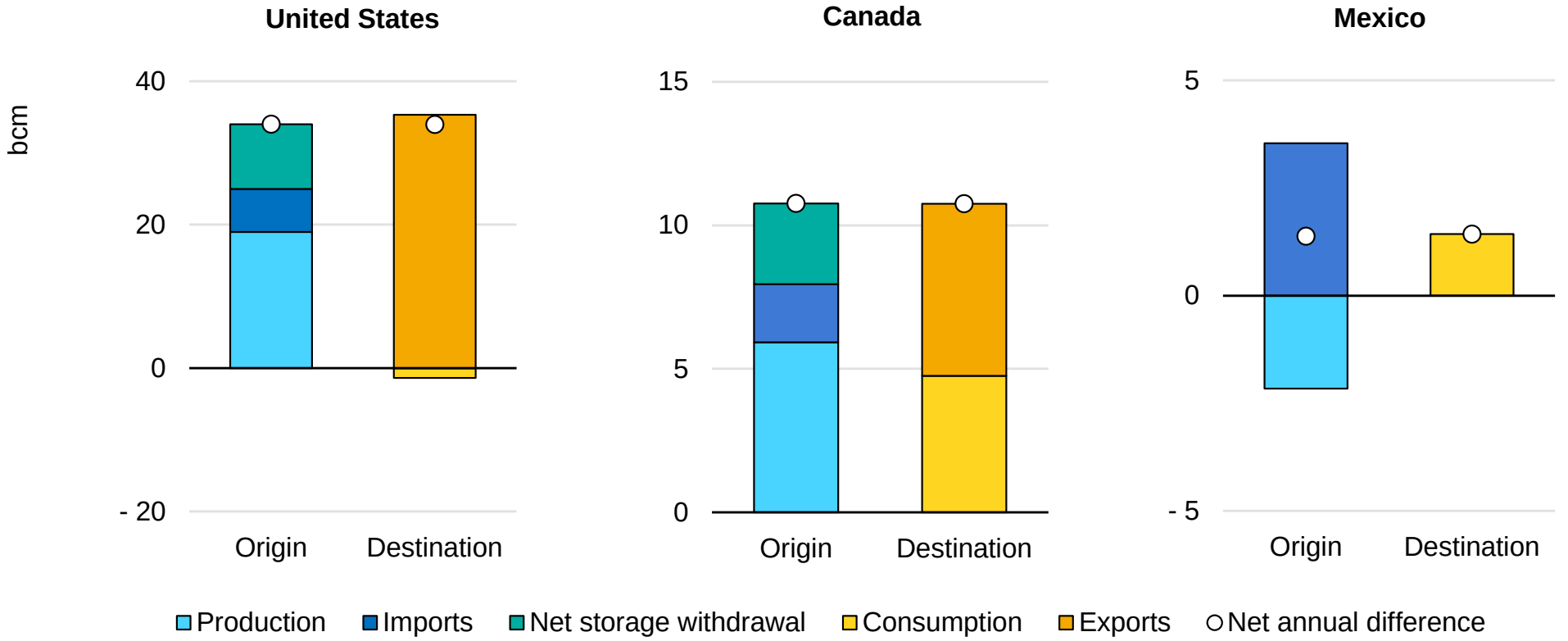
US production increased throughout the year and reached new monthly records in December 2021, growing by 2% for the year as a whole despite conservative upstream spending and capacity outages during the cold spells in February and the hurricanes in late August. This was not sufficient to balance additional needs from export markets, leading to higher pipeline imports from Canada (with a close to 11% y-o-y increase) and net withdrawals from underground storage, after two years of net inventory build-up.

Canada's estimated growth in natural gas consumption was close to 4%, principally driven by demand from industrial and other large consumers (including power generation), which increased by over 6%. Meanwhile, retail consumers saw their consumption decline by about 3% in spite of colder weather in the first quarter of 2021. Canadian natural gas production increased by close to 4% compared to its 2020 level, but was not enough to meet the growth in domestic and pipeline export needs. This led to a net reduction in underground storage inventory.

Mexico's natural gas production reportedly declined by 8% y-o-y, while LNG and pipeline imports (which account for about two-thirds of the country's gas supply) increased by 5%, leading to estimated growth in apparent consumption of close to 2% y-o-y. This increase in gas demand remained principally driven by power generation needs, with an estimated 6% increase in electricity demand.

North American gas growth was driven by trade rather than by domestic demand in 2021

Natural gas balance y-o-y differentials for North American markets, 2020-2021



Sources: IEA analysis based on EIA (2022), Natural Gas Data, Natural Gas Weekly Update; IEA (2022), Monthly Gas Data Service; ICIS (2022), ICIS LNG Edge; SENER (2022), Dry Gas Distribution, Statistical Record 2021; Statistics Canada (2022), Canadian Monthly Natural Gas Distribution, Canadian monthly natural gas transmission, Canadian natural gas storage.

Asia Pacific gas demand grew twice as fast in 2021 as the average rate in 2015-2020

The **Asia Pacific region** saw its gas demand increase by an estimated 6% in 2021, twice the average rate in the 2015-2020 period. Consumption was boosted by weather-related factors as well as by a strong post-Covid recovery. Production was up by 3%, principally driven by China and India. Net imports rose by 15% (or 33 bcm), with two-thirds of the incremental growth coming from higher net LNG imports and one-third from higher pipeline gas imports to China.

Japan's gas consumption was flat in 2021. Cold winter weather boosted demand by 12% y-o-y in Q1 and strong growth in the industrial sector supported an overall expansion of gas demand until the end of August. However, a sharp decrease in the last four months of 2021 offset all the growth in the first eight months. This reversal was driven by a series of nuclear restarts, which doubled nuclear electricity output y-o-y, and to a lesser extent by fuel switching from gas to coal and oil in power generation as LNG prices soared towards the end of 2021.

Korea's gas consumption increased by 10% in 2021. Cold temperatures in early 2021 and a strong post-Covid economic recovery led to a sharp rise in gas use in Q1-Q3. However, growth decelerated to zero in Q4 due to high prices and increased coal-fired and nuclear power generation. The vast majority (nearly 75%) of the gas demand increase in 2021 came from the power sector.

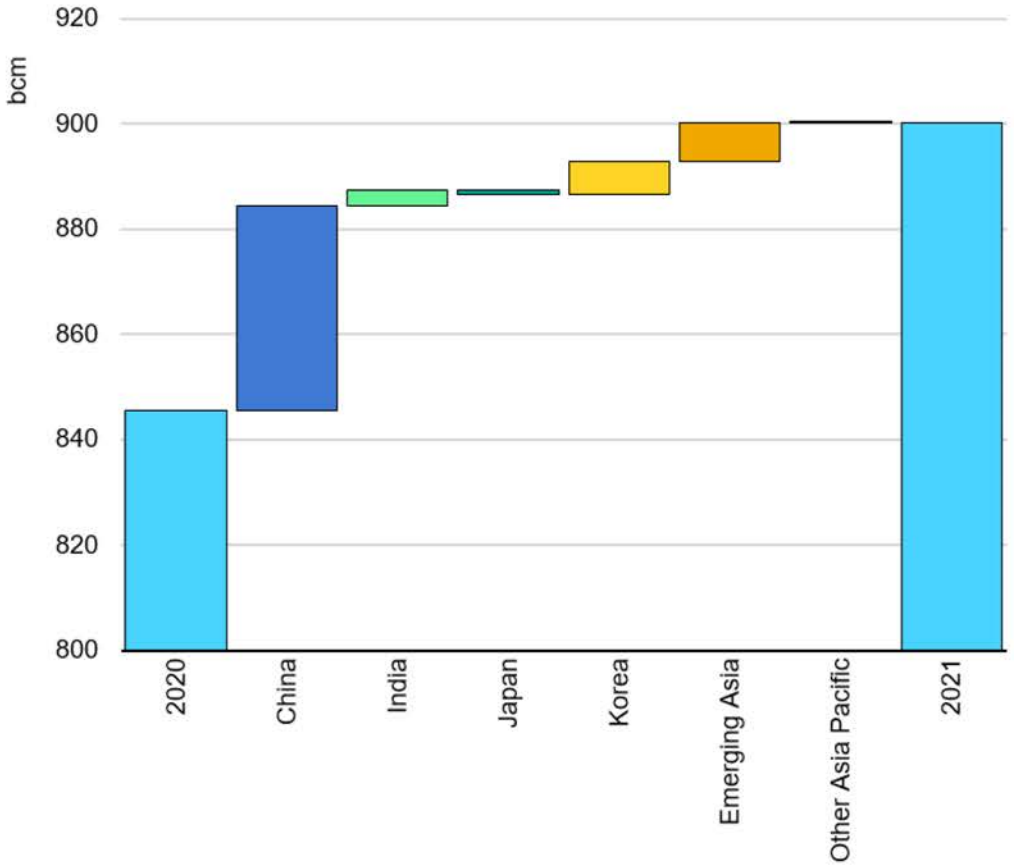
China's gas consumption rose by 12% in 2021. This relatively strong expansion was fuelled by weather-related factors – including a cold spell in Q1, low hydro availability in the spring, and a hotter than average summer – and a strong rebound in economic activity in H1 2021. Demand growth was subsequently tempered by high prices, provincial energy consumption caps and slowing economic growth in the second half of the year. Gas production increased by almost 9% to reach 205 bcm in 2021. Natural gas imports jumped by nearly 20% thanks to strong growth in both pipeline gas trade (up 23%) and LNG imports (up 17%).

India's gas demand was up by 5% in 2021 thanks to sustained growth in the city gas and fertiliser sectors, even as high imported LNG prices cut gas use in power generation, refining and the petrochemicals sector. Domestic production jumped by 17% due to the start-up of two major deepwater projects, one in December 2020 and another in April 2021. LNG imports saw a sharp 11% drop – the first annual decline since 2013 – as high spot LNG prices and surging domestic production dented India's LNG demand in 2021.

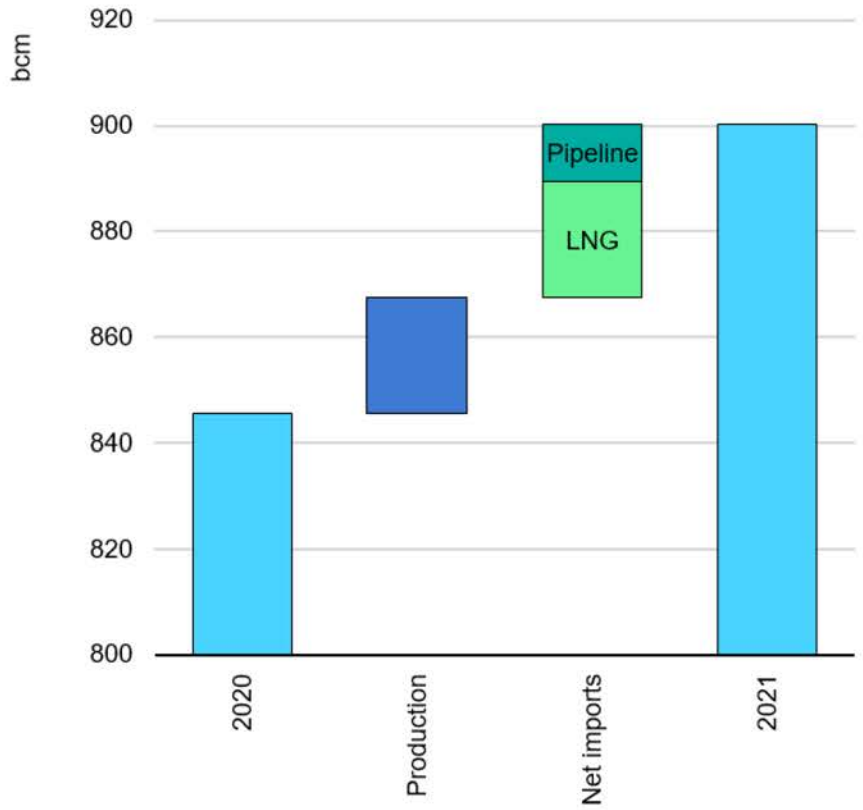
Emerging Asia's gas demand increased by a modest 3% in 2021, as high LNG prices and resurgent waves of Covid-19 put the brakes on demand. However, LNG imports saw a sharp 14% rise to fill the region's widening supply gap amid declining indigenous production.

Asia Pacific demand growth was fuelled by China; production contributed meaningfully to supply growth in 2021

Natural gas consumption in Asia Pacific



Natural gas supply in Asia Pacific



Sources: IEA analysis based on General Administration of Customs of People's Republic of China (2022), Customs Statistics; ICIS (2022), ICIS LNG Edge.

Eurasia's natural gas production rose by a record amount in 2021…

Eurasian natural gas production rose by an estimated 10% (or over 90 bcm) in 2021 – its largest annual increase in our records. The region alone accounted for almost half of the world's incremental gas supply last year. This strong growth was primarily driven by a sharp increase in deliveries to the domestic market, up by 11% (around 70 bcm), and extra-regional pipeline exports rising by close to 10% (or over 20 bcm).

Russian Federation (hereafter "Russia") alone accounted for over 75% of the region's total supply growth, supported by the country's large swing fields, including Zapolyarnoe and Bovanenkovo. Russia's gas production hit 763 bcm (of which 101bcm was associated petroleum gas) – its highest gas output since the fall of the Soviet Union. Domestic demand rose by close to 9% (or almost 50 bcm). This was largely driven by the power sector, with gas-fired power generation rising by an estimated 13%. Space heating demand was supported by a cold Q1 and Q2, as well as below average temperatures during December. Industrial gas demand was driven by the strong growth in gas- and energy-intensive industries, such as fertilisers and steel, which rose by 5.6% and 4.4% respectively. Russia's extra-regional pipeline exports grew by close to 8% (or 13 bcm) in 2021, almost split equally between Europe and China. Russian gas supplies to Europe recovered by a mere 4% (or 6.5 bcm) and remained well below their 2019 levels. In contrast, exports to China via the Power of Siberia pipeline more than doubled to reach 10.4 bcm. Russia's LNG exports fell by a mere 1%, mainly due to lower output at the Sakhalin-II LNG plant.

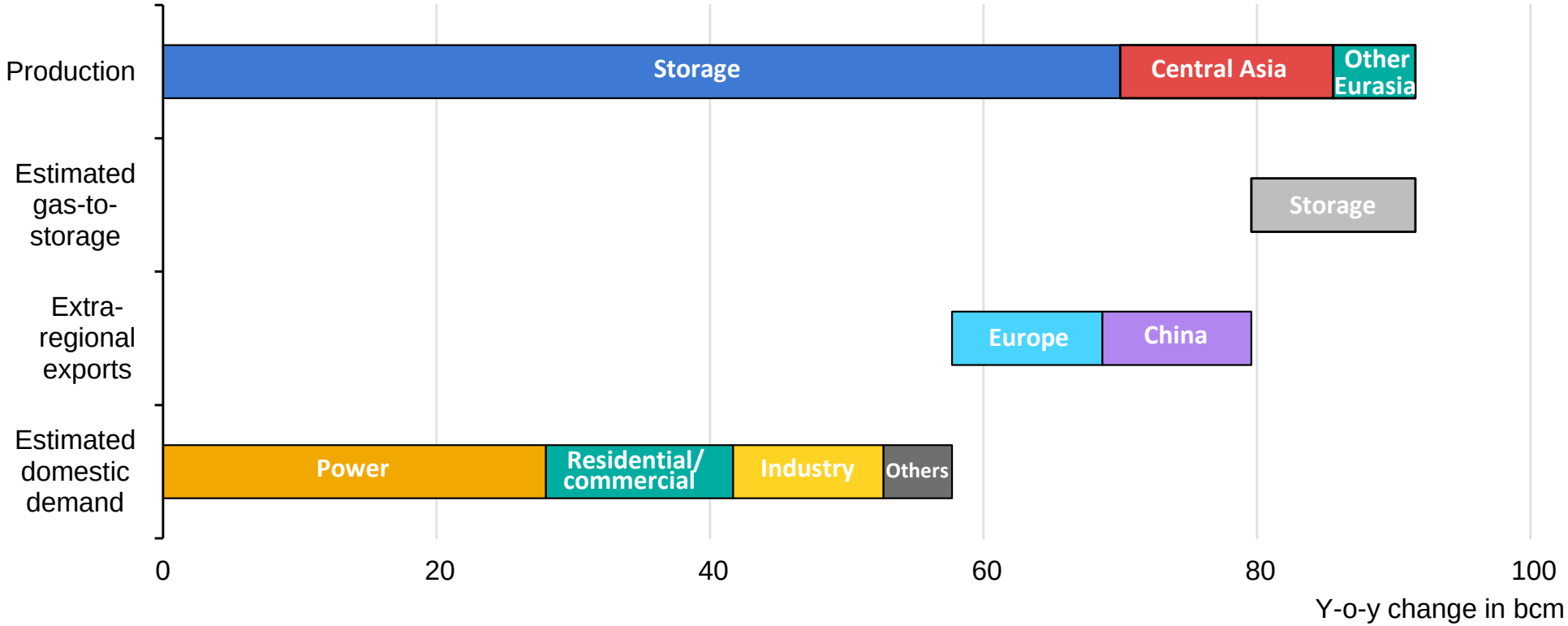
Central Asian gas production rose by over 10%, largely driven by Turkmenistan – where production reached an historic record of over 83 bcm – and Uzbekistan, which saw production up by 8% compared to 2020. In Kazakhstan gas production contracted by an estimated 3% y-o-y. The region's pipeline exports to China recovered by close to 12% (or 4.6 bcm), entirely driven by Turkmenistan and Uzbekistan. Growth in domestic consumption was largely supported by the strong recovery in electricity supply, as well as higher space heating demand.

In **Azerbaijan** gas production rose by 25% (or 6.5 bcm) in 2021. The country's gas exports to Europe rose by 40% (or 4.5 bcm), including via the Trans Adriatic Pipeline (TAP), which shipped over 8 bcm of gas to the European Union. Domestic demand was largely driven by the power sector, with gas burn increasing by over 15% y-o-y.

In **Ukraine** gas production fell by 2%, whilst gas demand declined by 6.6%. This was primarily due to lower gas burn in the power sector (down 24%) and in industry (down 3%), whilst gas deliveries to residential consumers rose by 5%.

…largely driven by domestic demand growth and extra-regional exports

Estimated y-o-y change in Eurasia's natural gas balance
(2020-2021)



Sources: IEA analysis based on : IEA analysis based on Bureau of National Statistics of Kazakhstan (2022), Statistics of Industry; ENTSOG (2022), Transparency Platform; Eurostat (2022), Imports of Natural Gas by Partner Country – Monthly Data; Gas Transmission System Operator of Ukraine (2022), Transparency Platform; General Administration of Customs of People's Republic of China (2022), Customs Statistics; ICIS (2022), ICIS LNG Edge; JODI (2022), Gas World Database; State Committee of the Republic of Uzbekistan on Statistics (2022), Press Releases; various media reports.

European gas consumption grew by 6% in 2021…

European natural gas consumption grew by a strong 6% (or 32 bcm) in 2021, outpacing the growth in primary gas supply (domestic production and imports combined), leading to storage levels well below their five-year average by the end of the year.

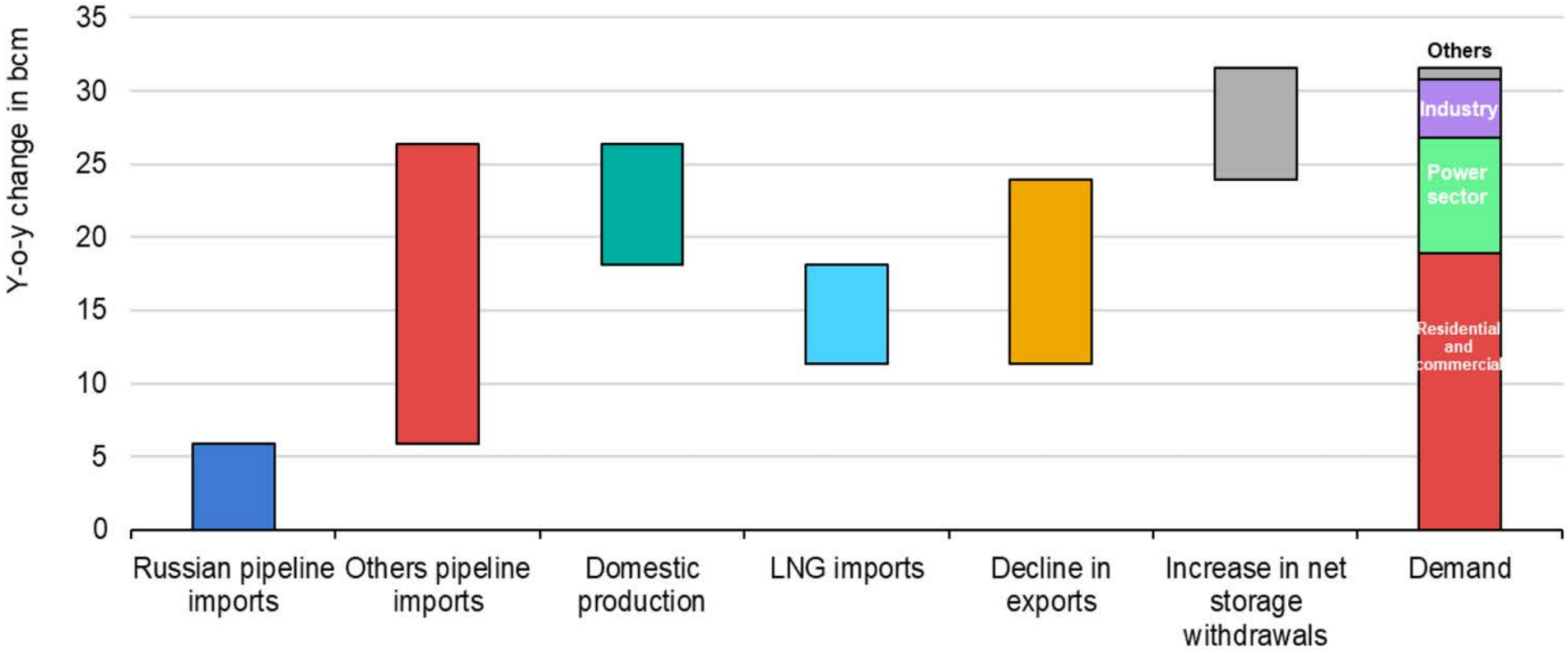
The growth in demand was **concentrated in the first half of the year**, when it rose by close to 15% on a combination of a cold and prolonged heating season, lower wind output and post-lockdown economic recovery. The increase in gas prices seen in Q3 weighed on natural gas demand, which declined by 3% y-o-y in that quarter. Despite the record high gas prices in Q4, European gas consumption remained resilient, as gas demand via the distribution network benefited from a colder October and several cold spells in December. Altogether, **distribution network-related demand** rose by 9% in 2021 to account for over 60% of incremental gas consumption in 2021. In the **power sector**, low hydropower output (especially in southern European markets) supported gas-to-power demand, which rose by 4% in 2021. **Gas demand in industry** rose by an estimated 3% in 2021. Higher growth rates were reversed in Q4, where record high gas prices led to production curtailments in industry.

Despite the strong growth in demand, **primary gas supply** only rose by just over 2% (or 12 bcm). Non-Norwegian **domestic production** fell by 10% (or 9.5 bcm), with the Netherlands and the United Kingdom accounting for over 80% of the decline. Despite unusually heavy summer maintenance, **Norwegian gas** production rose by 2% (or 2 bcm) in 2021. Europe's total pipeline imports rose by 13% (or 27 bcm), largely supported by the strong growth in **North African and Azeri flows**, which altogether accounted for over 60% of incremental pipeline supplies to Europe. In contrast, **Russian pipeline deliveries** rose by a mere 4% (or 6.5 bcm), most of them directed to Turkey (up by 63% y-o-y), whilst supplies to the European Union dropped by 3% compared to 2020. The decline was even more pronounced in Q4, when Russia's pipeline deliveries to Europe fell by close to 25% y-o-y, contributing to the market tightness and high gas price environment. **LNG imports** into Europe fell by 6% in 2021 due to the strong competition for flexible volumes of LNG in Asian and South American markets.

Demand growth outpacing primary gas supply was compensated by **storage movements,** with net withdrawals rising by almost 60% (7.5 bcm). As a result of lower opening stocks in 2021 and higher withdrawals during the year, European storage levels stood 29% (or over 20 bcm) below their 2020 levels at the end of 2021. Low storage levels put further upward pressure on gas prices and exacerbated their price volatility. Europe **did not export any LNG** in 2021 due to the ongoing outage at the Snøhvit LNG plant, and **physical export flows to Ukraine** dropped to just 0.29 bcm.

…a higher rate than primary gas supply, leading to a storage deficit and tight winter market

Y-o-y change in Europe's natural gas balance, 2020-2021



Sources: IEA analysis based on IEA analysis based on ENTSOG (2022), Transparency Platform; Eurostat (2022), Energy Statistics; Gas Transmission System Operator of Ukraine (2022), Transparency Platform; GIE (2022), AGSI+ Database; ICIS (2022), ICIS LNG Edge; JODI (2022), Gas World Database.

Middle Eastern gas production rose by 3% in 2021…

Natural gas production in the Middle East rose by an estimated 3% in 2021 (or 20 bcm) y-o-y. Recovery in economic activity, together with higher electricity demand and lower hydropower output, provided upward support to domestic gas demand, which increased by 2.5% y-o-y. Extra-regional pipeline exports and LNG supplies to the global market rose by 6% compared to 2020.

In **Iran** natural gas production rose by close to 5% y-o-y, driven by higher domestic demand and recovering extra-regional pipeline exports. The country's domestic consumption rose by an estimated 3%, largely supported by the power sector. The country faced severe droughts, which weighed on hydropower generation and in turn boosted gas burn in power sector, increasing by over 10% y-o-y. Iran's extra-regional pipeline supplies to Turkey soared by 77% (or 4 bcm) to reach 9.4 bcm – their highest level on record.

Qatar's natural gas production remained flat in 2021. Domestic demand was largely supported by the recovery in power generation (up by 5% y-o-y), most of which is gas-based. Pipeline exports to Oman and the United Arab Emirates through the Dolphin pipeline remained broadly flat. LNG exports grew by less than 1% compared to 2021, although with a pronounced change in destination: while deliveries to Europe fell by 24%, supplies to the Asia Pacific region rose by over 6%.

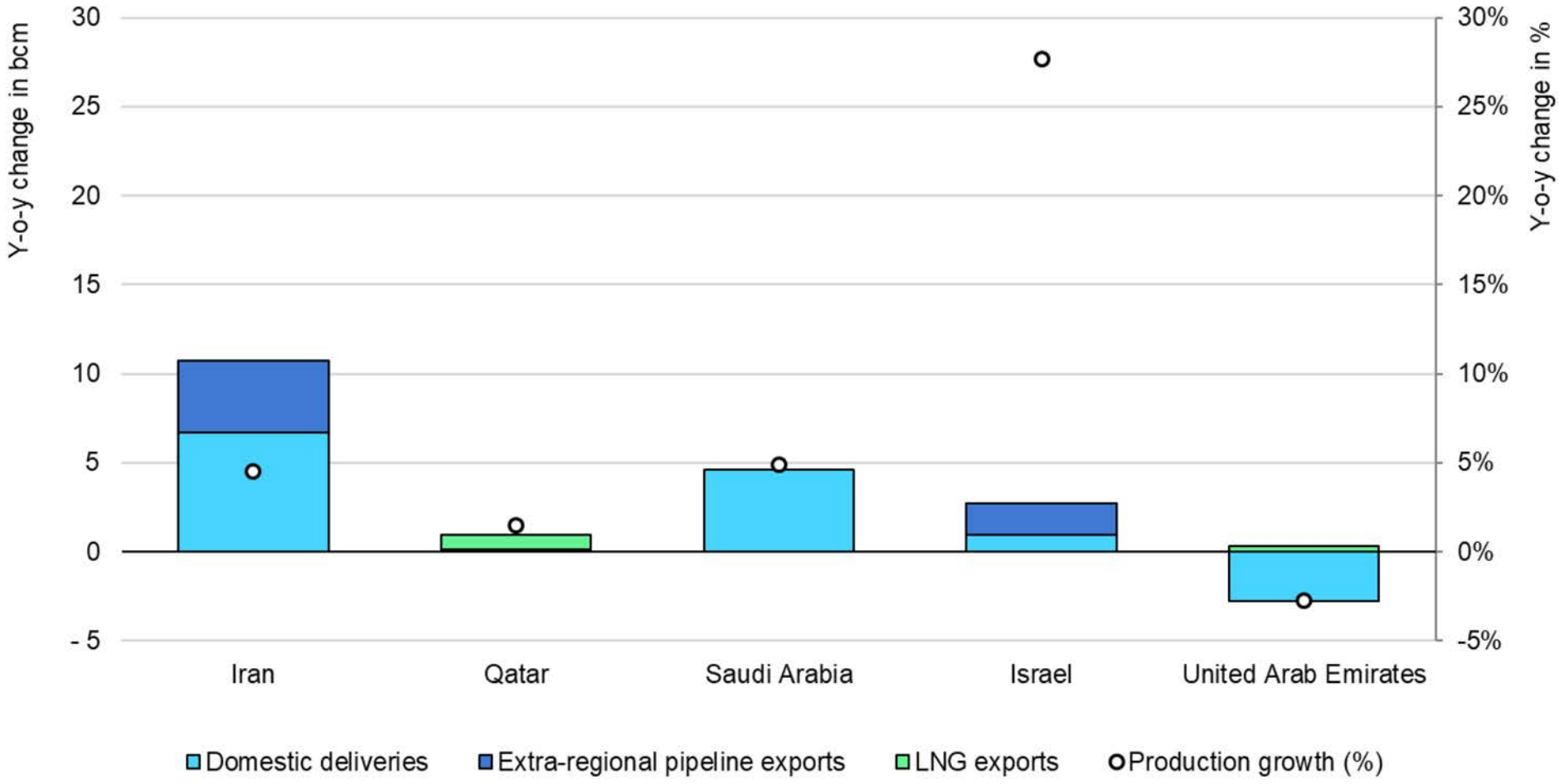
Saudi Arabia, which has no cross-border gas trade, increased its domestic consumption and production of gas by nearly 5% in 2021. The bulk of the consumption growth occurred in the power sector, where a nearly 7% rise in electricity demand boosted gas-fired generation in particular (while oil burning in power plants increased only modestly at less than 1%). Incremental supply came from the 26 bcm Fadhili gas processing plant (which completed its final phase in mid-2020 and had its first year of full-scale operation in 2021) and from growing associated gas production as the OPEC+ oil production cuts were progressively lifted in the second half of 2021.

Israel's gas demand increased by an estimated 8% in 2021, mainly driven by growing gas use for power generation. Gas production was up by almost 30% due to the continued ramp up of the giant Leviathan gas field. LNG imports dropped to just 0.2 bcm in 2021 (from 0.8 bcm in 2020), while pipeline gas exports increased by more than 70% as deliveries to both Jordan and Egypt rose sharply.

The **United Arab Emirates** saw a 4% decline in gas consumption in 2021. This was driven by the power sector, where the ongoing ramp up of renewable, nuclear and coal-fired generation led to a 10% decrease in gas use. Production was down by an estimated 3%. Imports via the Dolphin pipeline from Qatar were stable, while net LNG exports increased by 12% in 2021.

…supported by a combination of demand growth and recovery in extra-regional exports

Estimated change in natural gas consumption and exports in a selection of Middle East countries, 2020-2021



Sources: IEA analysis based on ICIS (2022), ICIS LNG Edge; JODI (2022), Gas World Database; Middle East Economic Survey (2022), MEES Archives; SolutiEns (2022).

Natural gas consumption in Africa grew by 5% y-o-y in 2021 after a limited decline in 2020

Gas production in Africa increased by close to 10% y-o-y in 2021 thanks to the support of both domestic and export markets. The region's natural gas consumption grew by an estimated 5% y-o-y in 2021, principally driven by growth in Egypt and Nigeria, while demand in Algeria remained relatively stable. Pipeline exports from North Africa to Europe jumped by 60%, while LNG exports increased by 5%.

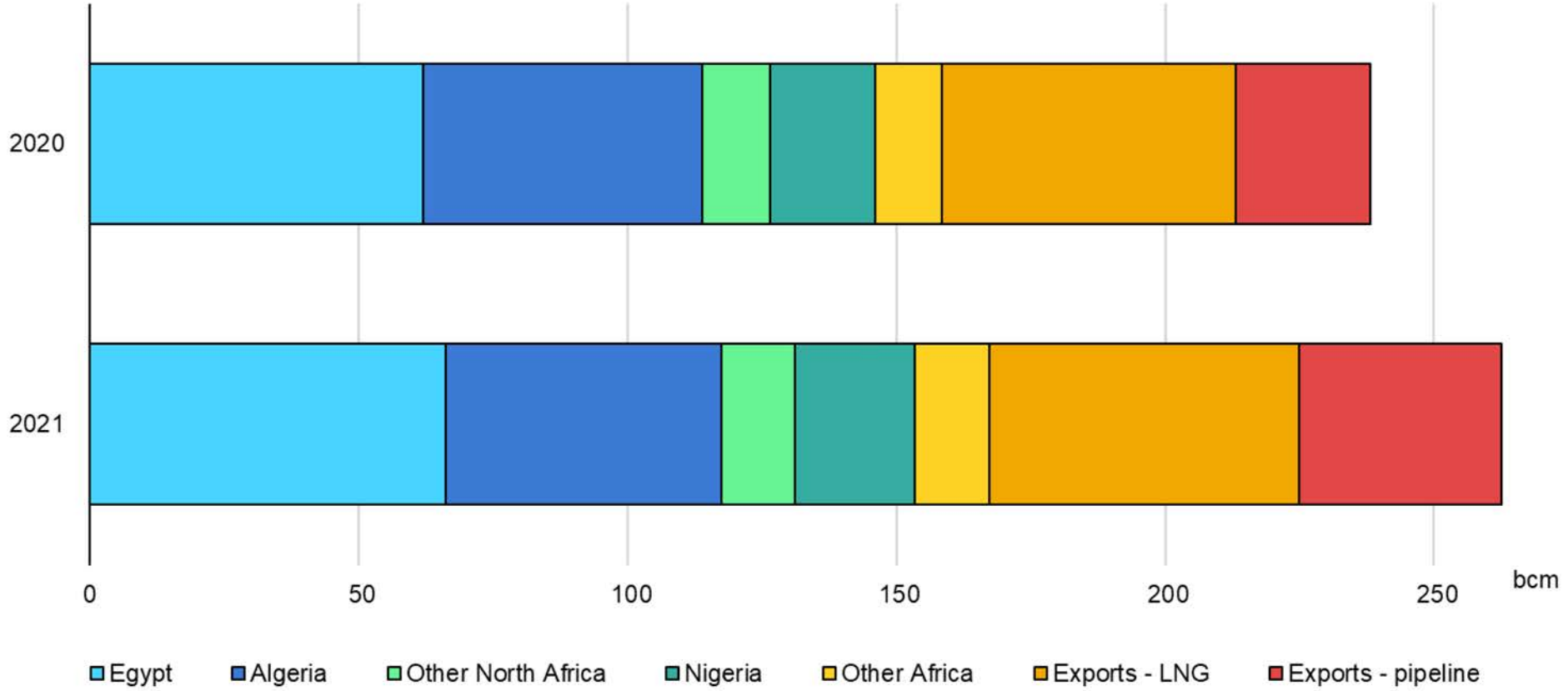
Natural gas consumption in **Egypt** grew by an estimated 6%, driven by strong power generation needs. The electricity sector, which accounts for about 60% of the country's gas needs, experienced record demand during the summer months and saw its output increase by an estimated 9% in 2021. Domestic gas production was also on the rise, with a record average of close to 7 Bcf/d (or above 70 bcm for the whole year) thanks to further offshore production growth at the giant Zohr field as well as new production capacity with the commissioning of the Raven field. Egypt's LNG exports increased fourfold to 9 bcm in 2021, jumping in the final months of the year on high international spot prices.

Algeria's natural gas exports increased by close to 45% y-o-y in 2021 after two years at their lowest levels since the mid-1990s. The upswing was driven by a surge in pipeline exports to Spain and Italy, and despite a reduction in capacity following the closure of the Maghreb–Europe pipeline at the end of October. According to preliminary figures, domestic gas consumption stagnated in spite of an increase in electricity demand (which is almost exclusively produced by gas-fired plants). Marketed gas production is therefore understood to have increased by about 17% and close to the 100 bcm annual mark. This growth stems from the commissioning of new projects, including the Booster III project in the legacy Hassi R'Mel complex, with three new compressor stations installed to maintain output at a target daily rate of 180 mcm and recover up to another 400 bcm of reserves. Other North African markets sent more mixed signals during 2021. **Tunisia**'s gas consumption reportedly grew by 5%, while in **Morocco** demand from the power sector, the country's main driver of gas demand, increased by an estimated 3%. **Libya**'s pipeline exports continued to decline in 2021, down 28% y-o-y in spite of the high price environment.

Domestic consumption continued growing in **Nigeria** in 2021, reporting a 14% y-o-y increase for the first nine months, while LNG exports declined by 17% for the whole year. The country saw an estimated 5% drop in marketed production. The new Petroleum Industry Act introduces new regulations to incentivise private investment and develop competition, as well as additional penalties for gas flaring. Nigeria stressed at COP26 the importance of gas in its transition to net zero emissions by 2060. Other developments in West Africa include the delivery of two regasification vessels in **Ghana** and **Senegal** to help reduce oil use in power generation.

Africa’s gas production growth was supported by both domestic and export markets in 2021

Natural gas production in Africa by domestic and export market destination, 2020-2021



Sources: IEA analysis based on ENTSOG (2022), Transparency Platform; ICIS (2022), ICIS LNG Edge; JODI (2022), Gas Database; Ministry of Industry, Energy and Mines of Tunisia (2022), Monthly Energy Market Note; MEES (2022), MEES, Morocco Energy Observatory (2022), Electricity Sales; OPEC (2021), Annual Statistical Bulletin; Radio Algérie (2021), Hassi R’Mel development, Sonatrach communiqué.

Weather events pushed gas consumption in Central and South America close to its 2019 levels

Natural gas consumption in Central and South America grew by an estimated 8% y-o-y in 2021, almost offsetting the decline in 2020. Brazil was the main source of demand growth, spurred by historically low levels of hydropower generation.

Natural gas consumption in **Argentina** grew by less than 1% y-o-y in 2021, far from recovering from its 5% decline in 2020. The power generation sector, which accounts for over a third of gas consumption, was the main driver of growth, reporting an 11% increase in 2021. This stems from a 5% y-o-y rebound in electricity demand and lower availability of hydroelectricity (down 17%) in 2021, yet tight gas supply during the southern winter months also led to some growth in diesel, fuel oil and coal use. This increase was almost completely offset by a further decline in gas consumption from the industrial and energy sectors (down 9%), while residential demand remained flat y-o-y. Argentina's natural gas production was on a positive growth trend throughout the second half of 2021 thanks to the supportive policy measures introduced in the 4th Gas Plan (or Plan Gas.Ar) in late 2020. This aims to ensure sufficient domestic supply by introducing new tenders to provide domestic natural gas to distributors and power generators. The country's seasonal winter needs were only partly covered, which led to a 50% increase in LNG imports.

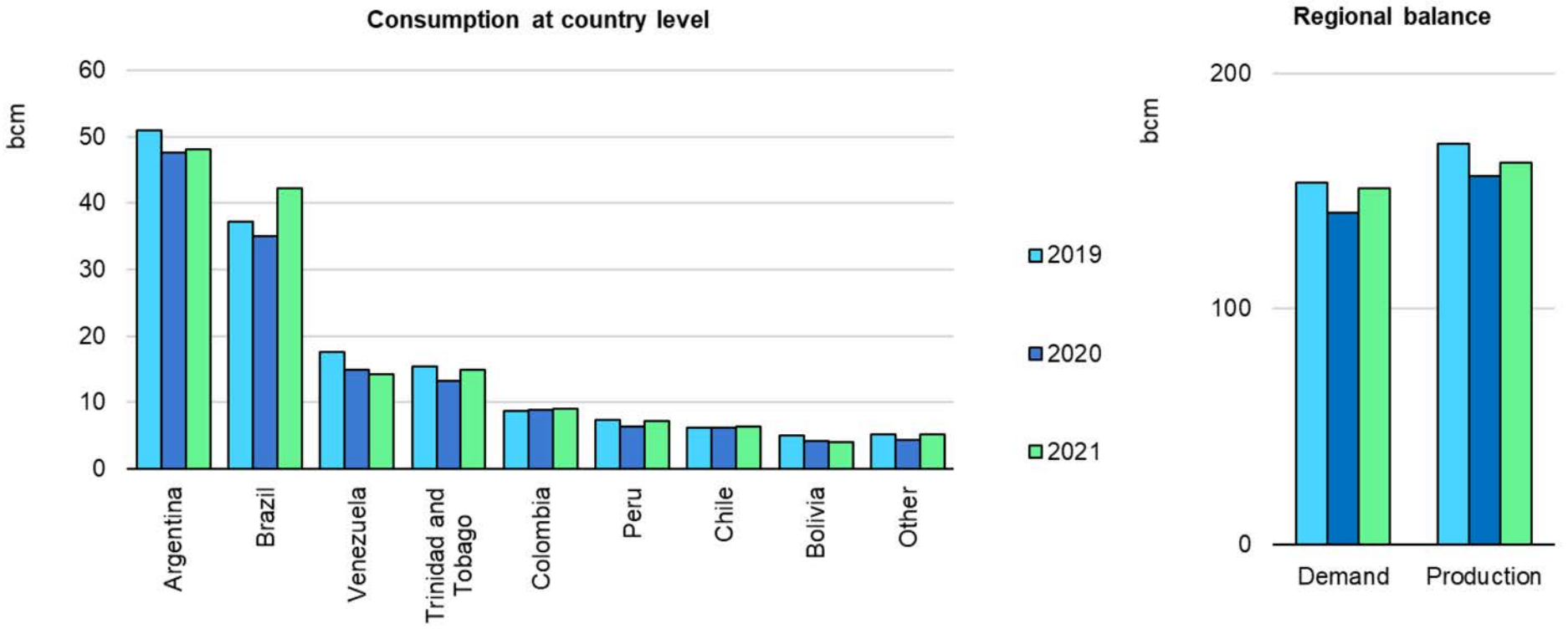
Brazil's gas consumption jumped by 20% y-o-y in 2021, led by the power generation sector, which saw its gas use increase by close to 60% y-o-y as the country faced the most severe droughts on record, pushing thermal generation to compensate for historically low hydropower availability. The economic recovery also prompted a close to 18% rebound in gas demand from the industrial sector and a 7% increase from the residential and commercial sectors. Gas use in the energy sector declined despite an increase in oil and gas production. Gross domestic gas supply was up by 5%, insufficient to meet strong needs, which were balanced by a tripling of LNG imports in 2021.

Venezuela reported a 5% y-o-y drop in gas consumption during 2021 – a lower decline than in previous years and especially 2020. The country's gas production is mostly associated with oil output, which increased from 0.53 mb/d in 2020 to 0.61 mb/d in 2021.

Peru and **Trinidad and Tobago** both saw their LNG exports drop by a third due to unplanned outages at liquefaction plants, while their domestic demand increased by 9% and 12% respectively. **Bolivia**'s domestic consumption reportedly jumped by 30% and production increased by 5%, while exports were broadly stable compared to 2020. LNG imports into **Central America** experienced a 17% y-o-y increase due to higher power generation needs.

Exceptional consumption growth in Brazil led the region's recovery in 2021

Evolution of natural gas consumption in Central and South America, 2019-2021



Sources: IEA analysis based on ANP (2022), Boletim Mensal da Produção de Petróleo e Gás Natural; CNE (2022), Generación bruta SEN; ENARGAS (2022), Datos Abiertos; ICIS (2022), ICIS LNG Edge; IEA (2022), Monthly Gas Data Service; JODI (2022), Gas Database; MME (2022), Boletim Mensal de Acompanhamento da Industria de Gás Natural; OSINERG (2022), Reporte diario de la operación de los sistemas de transporte de gas natural.

Global LNG trade saw a sharp rebound in 2021

Global LNG trade expanded by 6% in 2021, slightly below the 7% average rate in the 2015-2020 period, but much faster than the 1% increase in 2020. The Asia Pacific region saw an 8% increase in LNG imports and accounted for more than 95% of the net growth in LNG trade globally. China (up by 17%) and Korea (up by 14%) were the largest contributors in volume terms, particularly in the first three quarters of 2021, and China became the world's biggest importer of LNG last year. Emerging Asia's LNG imports rose by 14%. Japan's imports were flat, while India experienced an 11% drop in LNG imports in 2021 (the first annual decline since 2013). Central and South America was the second largest contributing region to global LNG import growth, with a 69% increase in 2021. This was mainly driven by Brazil, where the worst drought in nearly a century led to a threefold increase in LNG demand.

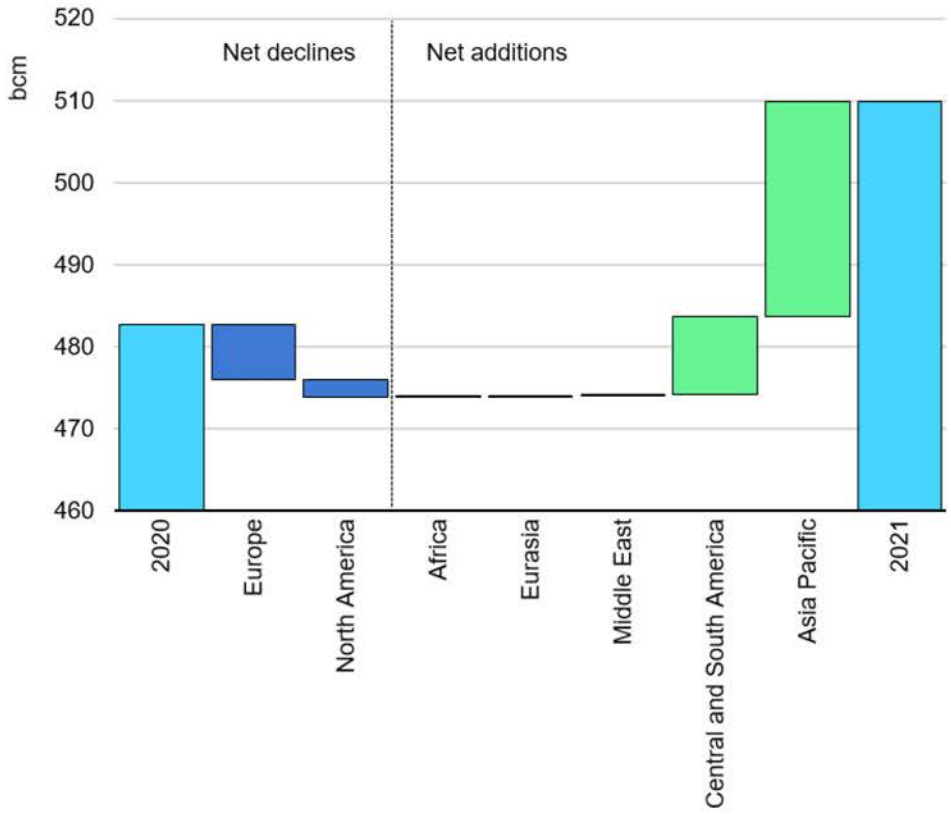
LNG imports into the Middle East registered a 2% increase in 2021, as a sizeable 36% jump in Kuwait (enabled by the country's new Al-Zour terminal) more than offset substantial declines in Israel, the United Arab Emirates and Jordan. North America's LNG intake halved in 2021 as both the United States and Mexico reduced LNG imports in favour of cheaper domestic supply and pipeline gas imports, respectively. European LNG imports declined by 6% in 2021, despite a sharp rise in Q4 when LNG arrivals soared by 38% y-o-y to offset reduced pipeline gas supplies from Russia. Croatia was the only new importer of LNG last year, recording nearly 2 bcm of inbound flows in 2021.

Global LNG export growth was dominated by the United States, which was responsible for all of the net increase in LNG supply in 2021. Australia, Qatar, the United States and Russia remained the four leading exporters of LNG, together accounting for more than two-thirds of global LNG supply last year. US LNG exports registered a remarkable 50% increase in 2021 and were up by nearly 60% y-o-y in H2 as soaring spot LNG prices pushed US terminals to operate at full capacity in the second half of the year. LNG supply from the three other large producers combined was up by 2%. Egypt recorded a more than fourfold increase in LNG exports thanks to the restart of the Damietta terminal in February 2021. Malaysia registered a 6% increase in 2021 following steep curtailments during the price collapse in 2020. Other suppliers experienced substantial declines, including Norway (down 98%), Trinidad and Tobago (down 34%) and Nigeria (down 17%).

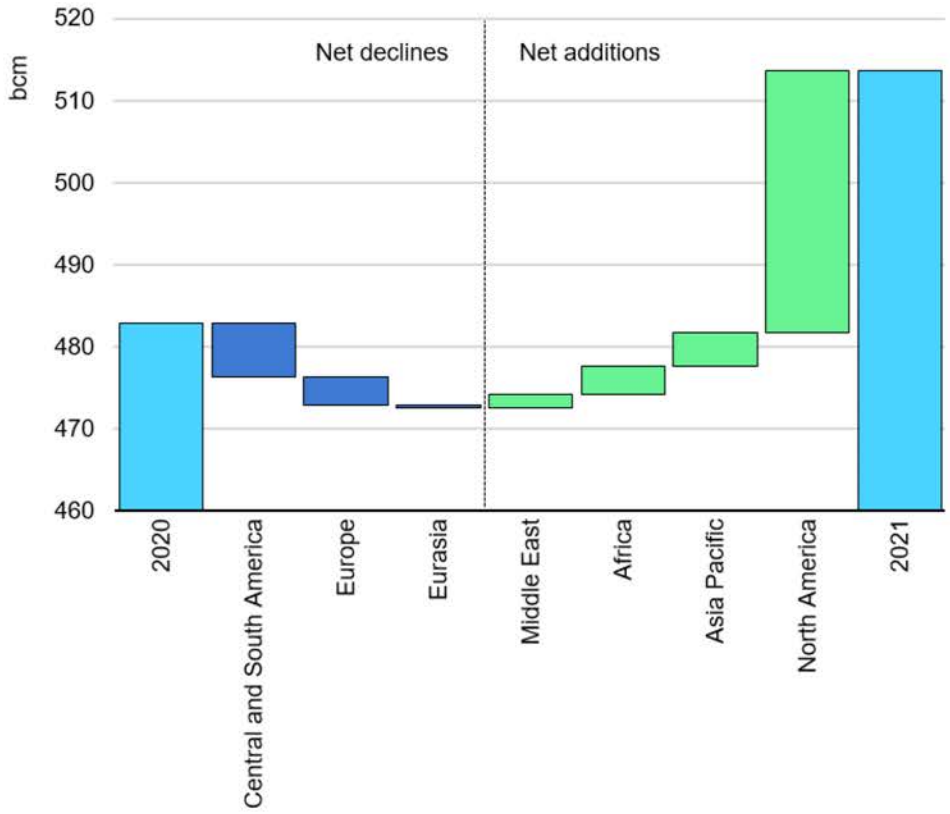
LNG volumes traded on a spot or short-term basis accounted for 37% of global LNG trade in 2021, the highest share on record. China remained the largest importer and the US the largest exporter of spot and short-term LNG volumes.

Global LNG trade growth in 2021 was fuelled by Asian demand and North American supply

LNG import growth in 2021



LNG export growth in 2021



Sources: IEA analysis based on ICIS (2022), ICIS LNG Edge.

High spot gas and oil prices drove up import prices in 2021…

Natural gas spot prices made a strong recovery in all major markets in 2021, driven by tight market fundamentals. This was exacerbated by the behaviour of Russia in reducing gas supply to Europe despite spare supply and transport capacity being available, which sustained both Asian and European spot prices.

In the United States, **Henry Hub** prices almost doubled in 2021 to an average of USD 3.9/MBtu – its highest level since 2014. In Europe, **TTF** prices rose fivefold to an all-time high of USD 15.8/MBtu. In strong competition for flexible volumes of LNG, **Asian spot LNG prices** followed a similar pattern, rising more than fourfold to over USD 18/MBtu – their highest level in our records.

Recovery in economic activity, together with the resumption of travel, exerted upward pressure on prices. **Brent prices** rose by almost 70% from their 2020 levels to reach an average of USD 70 per barrel in 2021 – their highest levels since 2018. Considering that over 50% of traded LNG is indexed to oil and oil products, higher oil prices lifted LNG prices in contracts with oil-based formulae. This impact was particularly visible in the third and fourth quarters of 2021 due to the price-setting window typically included in oil-indexed contracts.

The strong rise in gas and oil spot prices provided upward pressure on gas and LNG import prices, which rose to multi-year highs in all major markets.

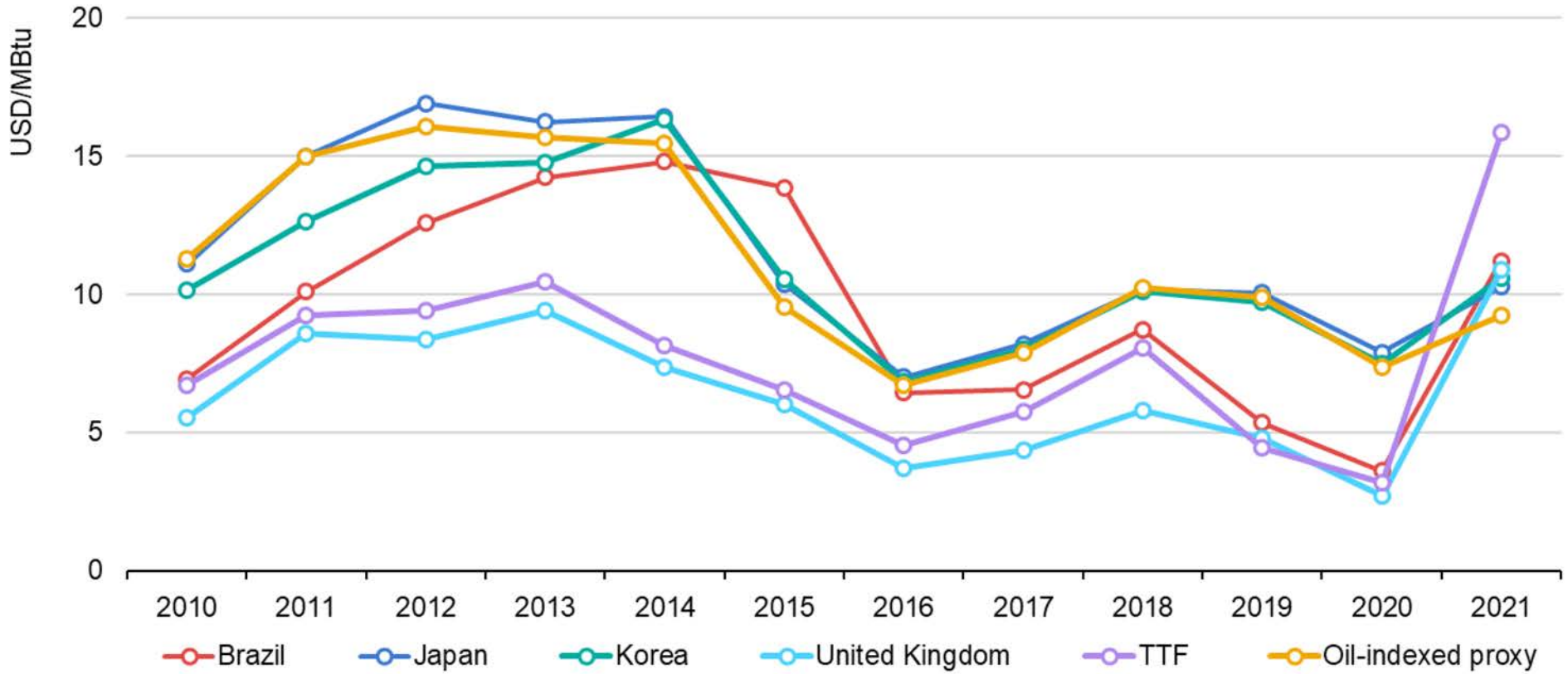
In Asia, **Japan and Korea** – which have greater exposure to oil-indexed contracts – saw LNG import prices rise to an average of USD 10.3/MBtu and USD 10.6/MBtu respectively, their highest levels since 2015. China's average LNG import price during 2021 was at similar levels. The country benefited from the relatively low spot price environment during the first half of the year and then saw its LNG import prices soar to above USD 16/MBtu in Q4.

In **Brazil**, which emerged as the third largest contributor to LNG demand growth in 2021, LNG import prices more than tripled compared with 2021, reaching an average of USD 11/MBtu. LNG import prices in December soared to an all-time high of over USD 28/MBtu, reflecting the increasingly tight market conditions on the global gas market.

In **Europe**, LNG import prices increased more significantly than in other regions. In the **European Union** during Q1 to Q3 they surged more than threefold on 2020's average price to reach an average of USD 10/MBtu. In the **United Kingdom** average LNG import prices more than quadrupled to over USD 10/MBtu, with monthly prices soaring to an all-time high of USD 27/MBtu in December 2021.

…reaching multi-year highs in all major importing markets

Key regional LNG import prices and TTF, 2010-2021



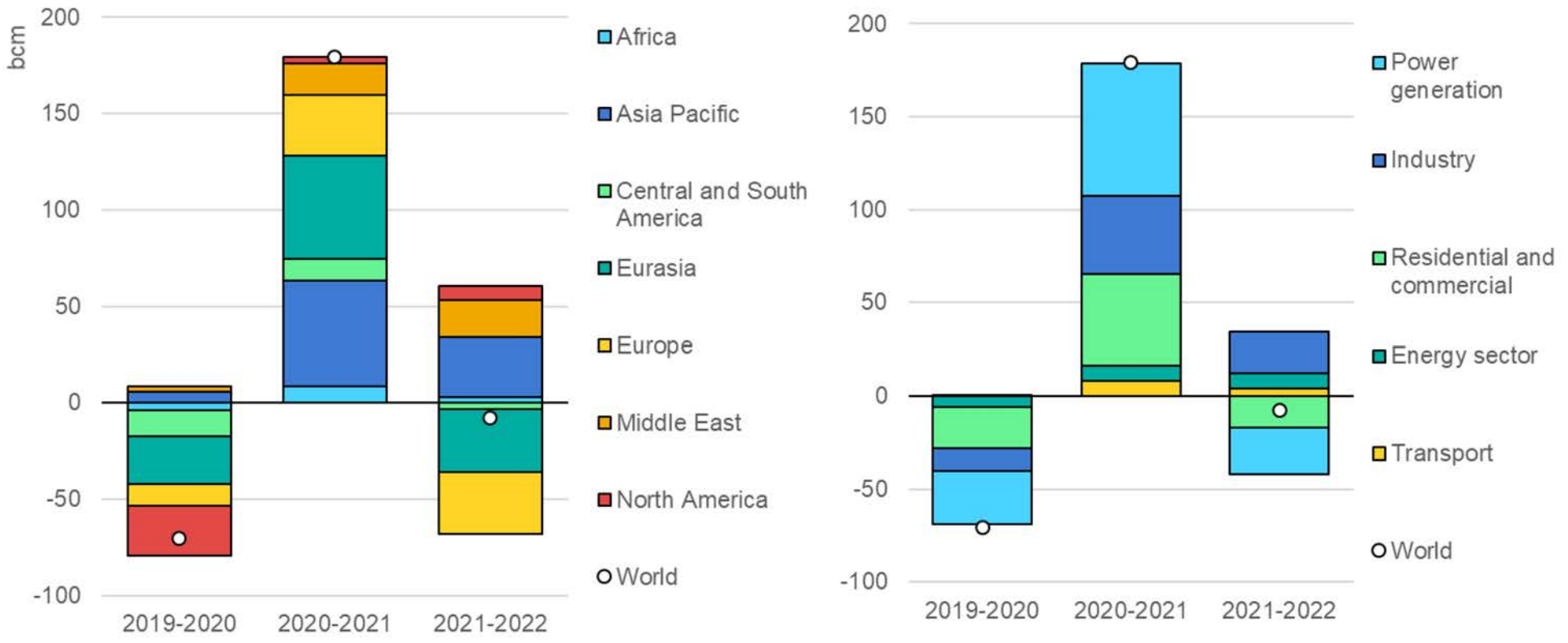
Note: The average LNG import price of the United Kingdom reflects a variety of price indices to which UK LNG imports are linked. Hence, it is different from European wholesale prices such as NBP or TTF.

Sources: IEA analysis based on ICIS (2022), ICIS LNG Edge; Korea Customs Service (2022), Trade Statistics; Ministry of Mines and Energy of Brazil (2022), Boletim Mensal de Acompanhamento da Indústria de Gás Natural; Statistics of Japan (2022), Trade Statistics; UK Trade Info (2021), Trade Statistics.

Gas market update and short-term forecast

The rate of growth in global gas demand is expected to turn negative in 2022

Natural gas demand evolution by region and sector, 2019-2022



Higher electricity demand sustained gas growth in North America during the winter, although growth is expected to remain limited and uncertain for 2022

Natural gas consumption in the **United States** increased by an estimated 1.4% y-o-y during the past gas winter season. Gas use in power generation increased by close to 6% y-o-y during the season, in contrast with an overall decline in the first nine months of 2021 on higher gas prices and switching back to coal. Gas-fired generation benefited from tightening coal supply and rising coal prices that have limited power generators' switching ability. This was particularly the case in the Midcontinent region, where the share of coal in generation fell from around 45% in late summer to below 30% in December. The increase in renewable output, particularly wind generation, limited the uptick in gas-fired generation growth.

This increase in consumption in the power sector contrasts with muted growth in demand from the industrial sector and a decline in the residential and commercial sector. The fourth quarter of 2021 was particularly mild across the whole US market, with the month of December being the warmest on record according to the National Oceanic and Atmospheric Administration. Temperatures dropped in January – the coldest since the 2014 North American polar vortex – and brought a series of storms and snowfall events across the country, which supported higher heating demand. Cold episodes lingered in late winter, with storms stretching from the Northeast to Texas in both February and March. The alternation of cold and mild episodes resulted in a 3% y-o-y decline in consumption in the residential and commercial sector over the whole winter season.

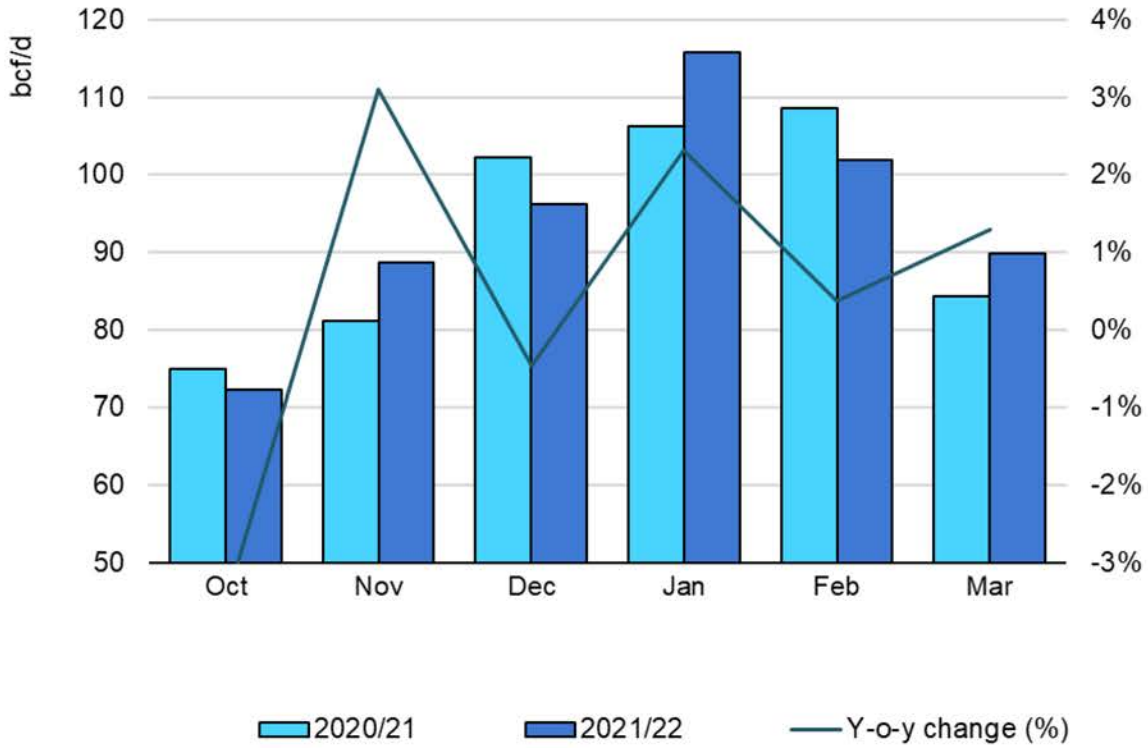
Gas use in the industrial sector was almost stable, with a close to 1% increase over the same period.

Gas consumption jumped during the winter in **Canada**, with an increase close to 7% y-o-y reported for the October to January period. This came from wholesale customers (large industry and power generation), which saw their consumption grow by 8%. The role of natural gas in power generation increased substantially throughout the year, reflecting the phasing out and conversion of coal-fired capacity in the province of Alberta. Leading producer TransAlta retired 2 260 MW of coal capacity and converted 1 456 MW to natural gas in 2021. This strong contribution was supported by a 6% increase in consumption among retail customers, which jumped by 26% y-o-y in January on colder temperatures. Strong US gas needs drove Canadian pipeline exports up by 3% y-o-y in the October to March period. **Mexico**'s apparent natural gas consumption remained stable y-o-y during the period from October 2021 to January 2022.

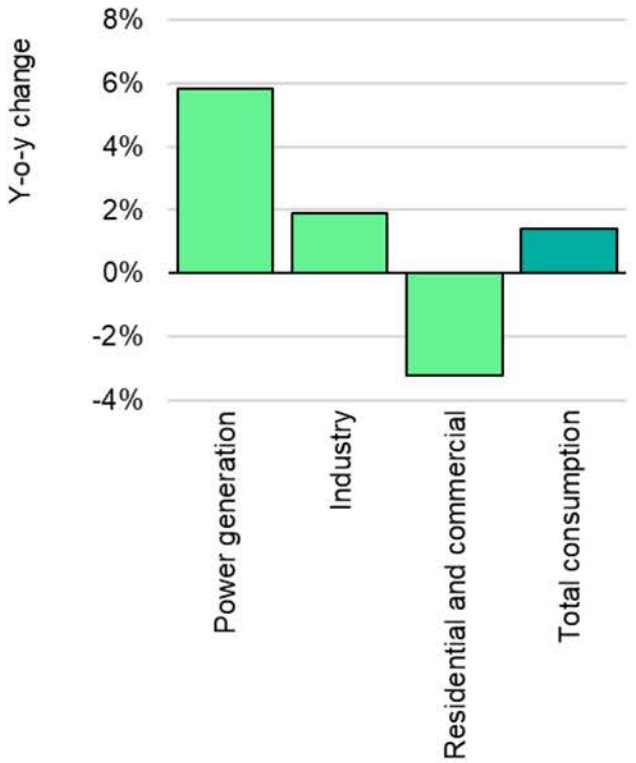
This forecast expects North American gas consumption to increase by about 0.8% in 2022. Power generation is forecast to drive most of this modest increase, with coal to gas switching in Canada and the United States, and some electricity demand growth in Mexico. Industry's contribution has been reduced compared to the previous forecast and remains tied to uncertainties surrounding commodity prices and activity.

Growth in US gas consumption during the past winter was driven by more favourable conditions in power generation and a succession of cold and mild weather episodes

Monthly natural gas consumption in the United States, winter 2020/21 and 2021/22



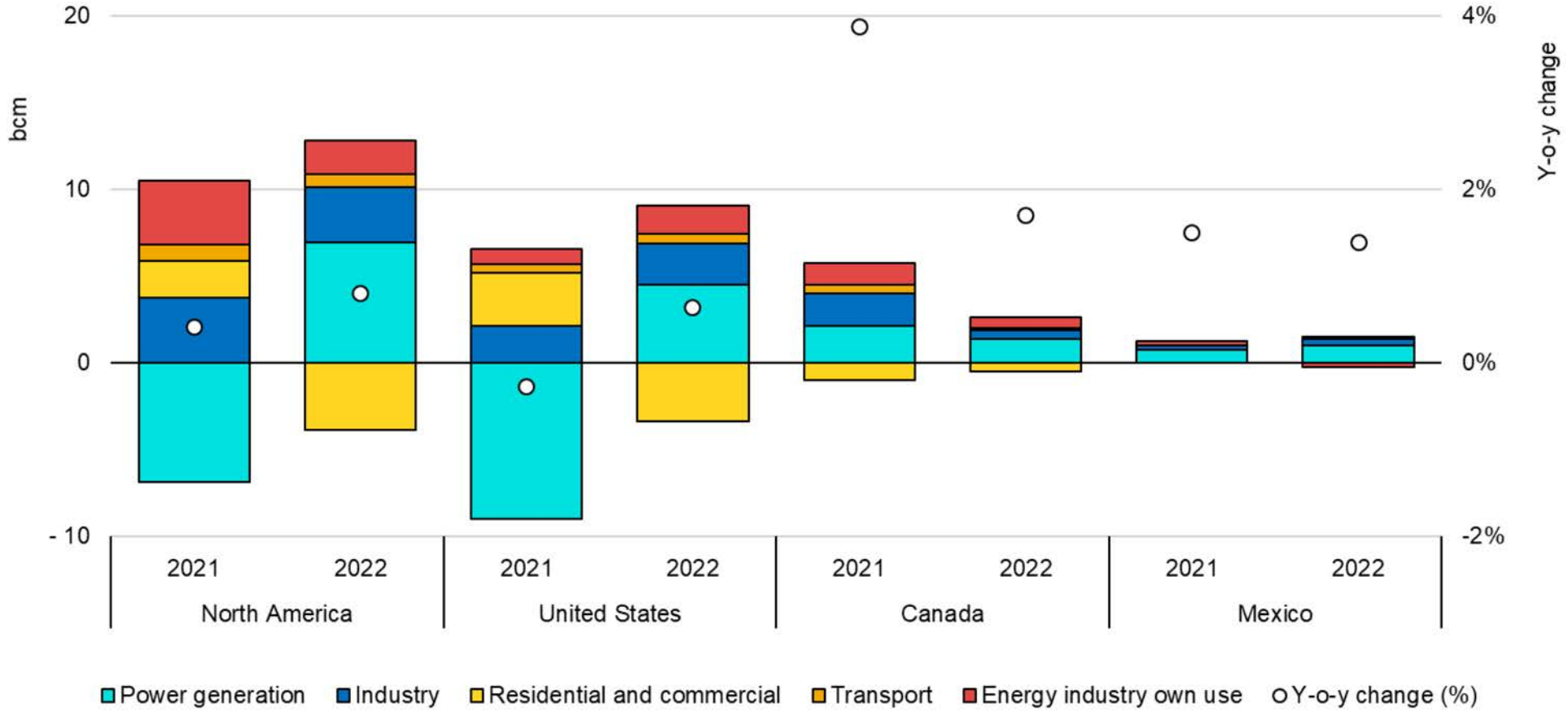
Gas consumption by sector in the United States, winter 2021/22 relative to 2020/21



Note: bcf/d = billion cubic feet per day.
Sources: IEA analysis based on EIA (2022), Natural Gas Consumption, Natural Gas Weekly Update.

North American natural gas consumption is expected to grow by less than 1% y-o-y in 2022

Change in North American gas consumption on previous year by country and sector, 2021-2022



Sources: IEA analysis based on EIA (2021), Natural Gas Data, Natural Gas Weekly Update; IEA (2021), Monthly Gas Data Service; SENER (2021), Dry Gas Distribution; Statistics Canada (2021), Canadian Monthly Natural Gas Distribution.

South American gas consumption is expected to decline by 2% after positive demand during the southern summer months

Natural gas consumption in **Brazil** increased by 8% y-o-y during the fourth quarter of 2021, mainly supported by the power generation sector. Consumption for gas-fired generation increased by 27% over the period, representing a slowdown compared to an annual increase close to 70%. Hydro availability increased in Q4 on high rainfall, thus reducing the call on thermal generation throughout Q4 compared to Q3. In addition to improving rainfall conditions, economic growth also slowed, thus further reducing demand for thermal electricity generation. Higher gas use in the industrial, residential and commercial sectors provided further support, reporting an 11% y-o-y increase in Q4, while gas consumption from the energy sector declined by 10%. Marketed domestic production grew by a modest 3% compared to Q4 2020 despite a 4% increase in gross output, due to greater reinjection and flaring. This contributed to keeping Brazil's LNG imports at a high level in Q4 despite comparatively lower needs than in Q3.

Argentina's gas demand increased by an estimated 3% y-o-y in the October to January period, supported by higher consumption among both retail and industrial customers, while gas use in the power generation system remained stable. Domestic gas production was on the rise throughout the second half of the year, reaching an average of 129 mcm/d in December 2021, its highest level for this month since 2008. This growth, supported by the implementation of the 4th Gas Plan, principally came from the Neuquén Basin's Vaca Muerta shale play, which saw its output increase by over 50% y-o-y to account for close to half of the country's gas production in December 2021. This contributed to a lower call on LNG imports during Q4 2021, which were down by 90% compared to Q3.

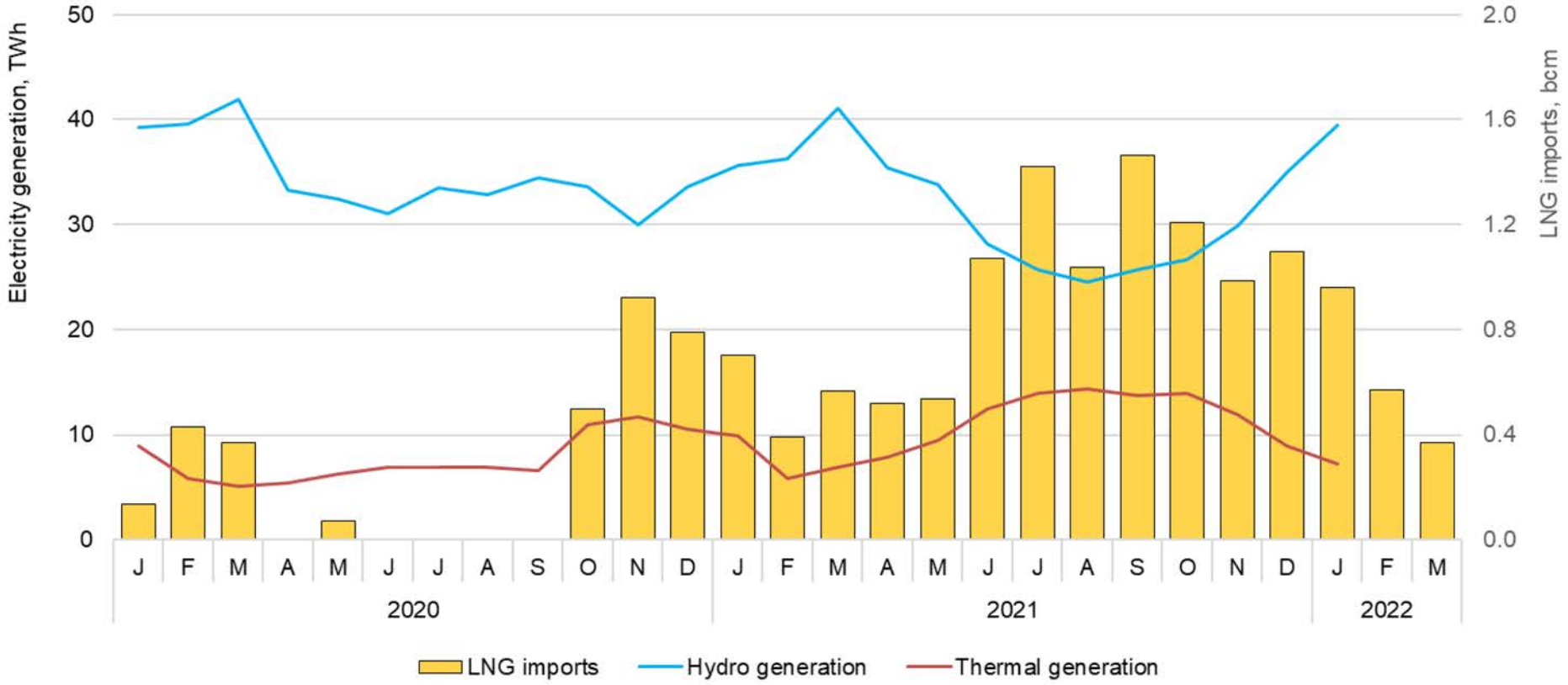
Apparent gas consumption growth turned negative in **Central America and the Caribbean** during the October to March period, as LNG imports declined by 15% y-o-y compared to an increase of 20% for 2021 as a whole. This was prompted by a sharp decline in imports in Jamaica and Panama.

According to preliminary data, **Venezuela**'s gas consumption experienced some recovery in the fourth quarter, with a reported 8% increase y-o-y compared to a 4% decline for 2021 as a whole. Consumption stagnated in **Colombia** during the October to March period, and reportedly increased by 12% in **Peru** and **Bolivia**.

This forecast expects gas demand to decline by 2% in Central and South America in 2022 on a downgraded economic environment, high gas prices and recovering hydro, after an 8% increase in 2021 fuelled by economic recovery and exceptionally low rainfall conditions.

Brazil's monthly LNG imports remained elevated in the closing months of 2021 despite lower needs for power generation

Evolution of monthly hydro and thermal electricity production and LNG imports in Brazil, 2020-2022



Sources: IEA analysis based on EPE (2022), Monthly Review of the Electricity Market; ICIS (2022), ICIS LNG Edge; ONS (2022), Power Generation.

High gas prices are set to weigh on European gas demand in 2022

European gas consumption fell by close to 4% y-o-y during the 2021/22 heating season (the period between 1 October and 31 March). Milder temperatures weighed on demand met by distribution networks, while record high gas prices depressed gas use in the power and industrial sectors.

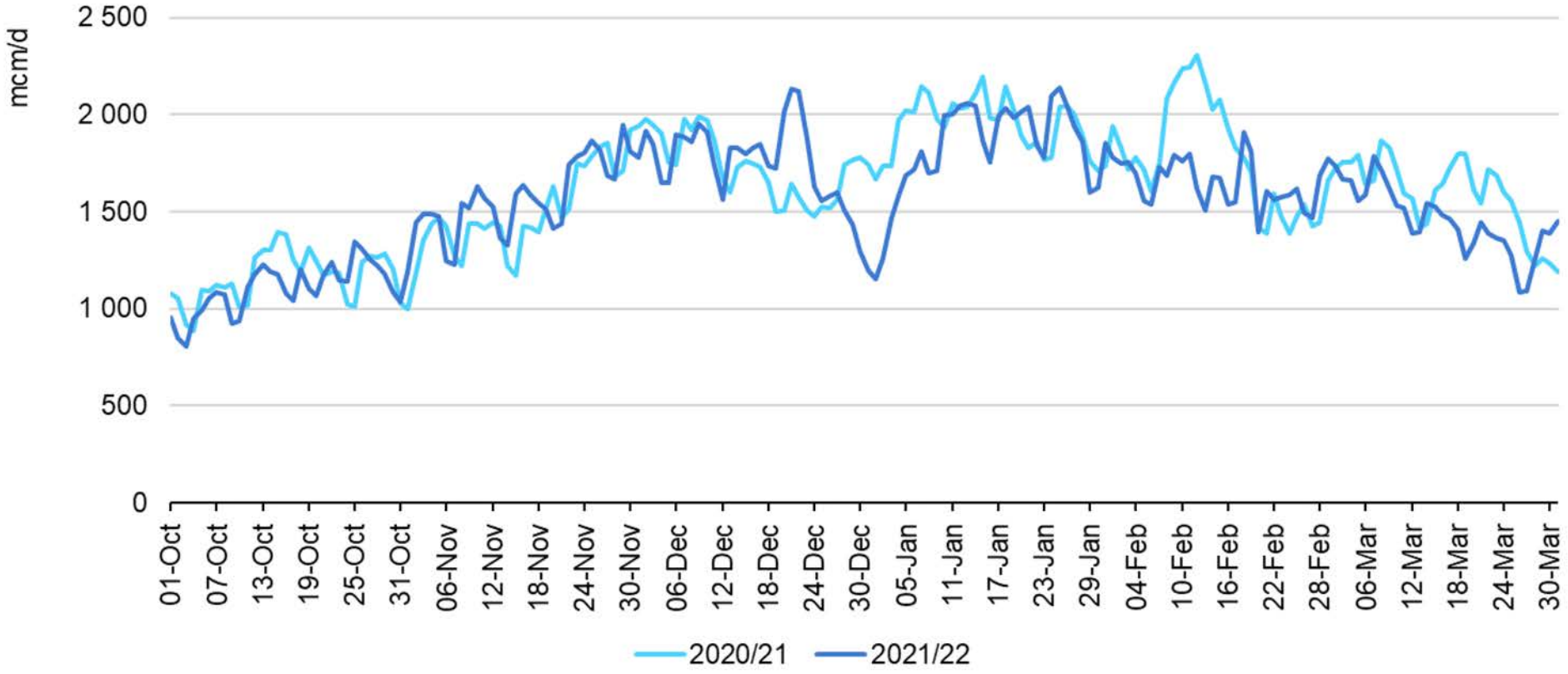
Distribution network-related demand fell by an estimated 5% y-o-y as fewer heating degree days led to lower space heating requirements in the residential and commercial sectors. Temperatures were unseasonably mild during January and March. Consequently distribution network-related demand dropped by close to 10% y-o-y in Q1 2022. **Natural gas demand in industry** fell by an estimated 6% y-o-y during the heating season, as record high gas prices led to production curtailments in energy- and gas-intensive industrial sectors.

In the **power sector** gas burn remained resilient despite the record high gas prices. Plummeting hydro and falling nuclear output, down by 21% and 3% y-o-y respectively, was only partly compensated by strong wind power output, a situation that provided additional market space both to coal- and gas-fired power generation through the heating season. Coal-fired generation rose by 9%, while output from gas-fired power plants increased by an estimated 1% y-o-y. Gas-fired generation rose primarily in the hydro-rich southern European markets with limited remaining coal-fired generation, including Spain and Italy. In Turkey gas-fired generation declined by 1% y-o-y despite the strong growth in electricity demand. Higher hydropower output (up by 6% y-o-y during the heating season), weighed both on gas-fired power generation and output from plants relying on imported coal (down 9% y-o-y). In contrast, Northwestern, Central and Eastern Europe – where considerable gas-to-coal switching potential remains – saw coal-fired generation rise by 15%, while output from gas-fired power plants declined by 7% y-o-y.

European natural gas demand is forecast to decline by close to 6% in 2022. This represents a further downward revision compared to the forecast in Q1 2022, amid the expectation of higher gas prices following Russian Federation (hereafter “Russia”)’s invasion of Ukraine. The rapid expansion of renewables is set to weigh on thermal power generation, while the continuing high gas price environment is set to put gas-fired power plants at a disadvantage vis-à-vis coal-fired plants. Gas-to-power demand is expected to decline by close to 5%. High gas prices are also set to weigh on industrial gas demand, which is expected to fall close to its 2020 levels. Assuming average weather conditions during the rest of the year, space heating requirements in the residential and commercial sectors are expected to be lower than in 2021, when Europe faced a particularly long heating season extending into April. The IEA 10-Point Plan to Reduce the European Union’s Reliance on Russian Gas identifies a number of measures, both in the power sector and on the demand side, which could further reduce Europe’s gas consumption in the short term.

European gas consumption fell by close to 4% y-o-y during the 2021/22 heating season

Estimated daily natural gas demand in Europe, 1 October-31 March
2020/21 and 2021/22



Sources: IEA analysis based on Enagás (2022), Natural Gas Demand; ENTSOG (2022), Transparency Platform; EPIAS (2022), Transparency Platform; Trading Hub Europe (2022), Aggregated consumption.

The Russian invasion has led to unprecedented stress on Ukraine's gas industry

Besides the human suffering it is causing, Russia's invasion of Ukraine has put unprecedented stress on the country's gas industry. Russian attacks have damaged local gas networks and storage sites, and reduced gas production. Deteriorating safety conditions and supply disruptions have led to a sharp decline in natural gas demand.

Ukraine's gas demand fell by 24% (or 2.8 bcm) y-o-y in Q1 2022, according to preliminary data. Consumption had already fallen by close to 20% y-o-y during the first two months of the year, primarily due to mild temperatures in February. Following the Russian invasion, **Ukraine's gas demand plummeted by 27% y-o-y in March**. Demand from **direct consumers** (primarily large industrial sites and power plants connected to the transmission system) has fallen by 80% y-o-y since the start of the Russian invasion. A number of heavy industries have suspended production due to deteriorating safety conditions and material damage caused by Russian attacks. **Distribution network**-related demand has fallen by over 20% y-o-y – despite heating degree days remaining flat compared with 2021. As of 6 April, 48 gas distribution stations have shut down due to military attacks, leaving more than 300 000 households without gas supply, inevitably weighing on gas demand.

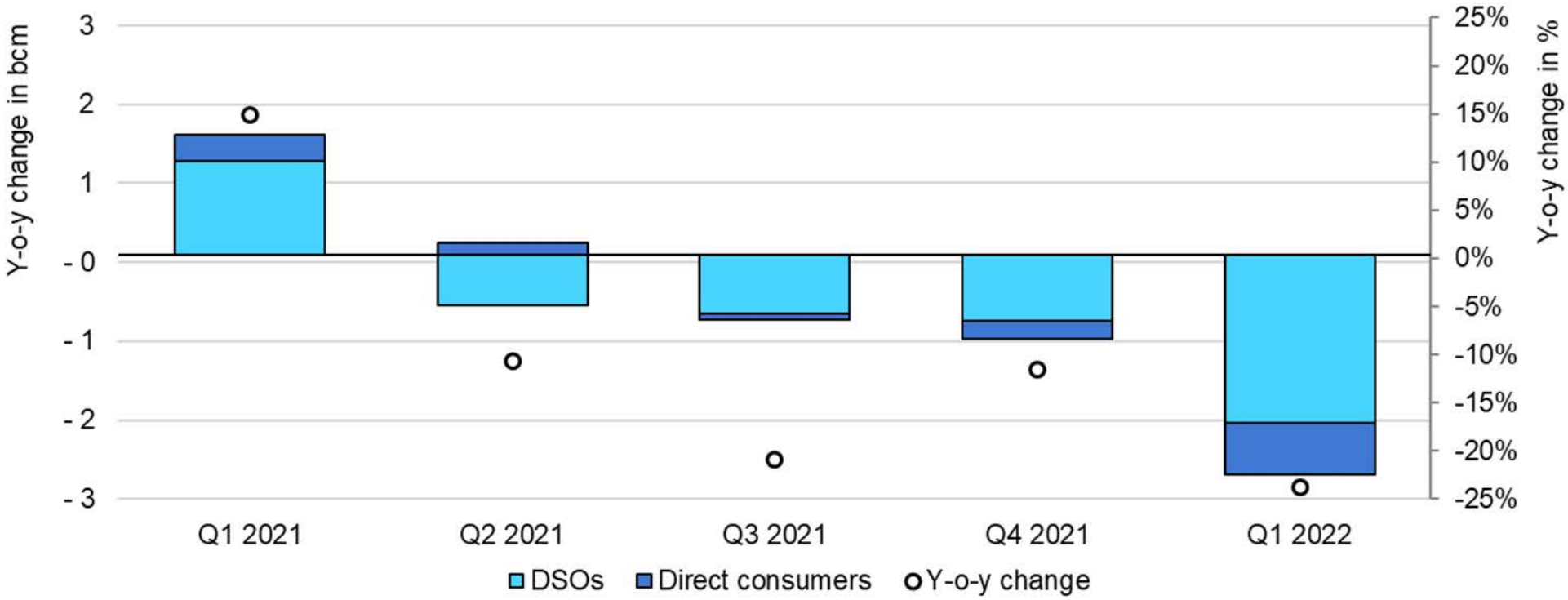
Ukraine's gas output in March fell by close to 7% compared to its January levels, with production being stopped or reduced at several fields due to the deteriorating safety conditions. In addition, several **gas storage facilities have faced operational limitations or been damaged**. These include the Mrynske and Krasnopopivsky storage sites, which were shut down due to military hostilities. The Olyshivske gas storage facility was damaged in mid-March due to shelling by the Russian army. Storage withdrawals met over half of Ukraine's gas demand during the 2021/22 heating season. Storage levels stood 40% below last year's levels by the beginning of April.

Despite damage caused by the Russian invasion, gas transit to Europe remained stable in Q1. Transit flows via Ukraine to the European Union increased by over 80% in March compared to the January-February period (although remaining 20% below last year's levels).

According to the International Monetary Fund's initial estimates, the damage caused by the Russian invasion could decrease Ukraine's GDP by 10% in 2022, although the downside risk is significant depending on the length of the invasion. **The current forecast for Ukraine is subject to unusually large uncertainty.** It assumes a decline in gas demand in the range of 15-20% for 2022, primarily due to the demand destruction caused by the invasion, high gas prices and a mild Q1.

Ukraine’s natural gas demand fell by close to 25% y-o-y in Q1 2022

Y-o-y change in Ukraine’s natural gas demand, 2021-2022

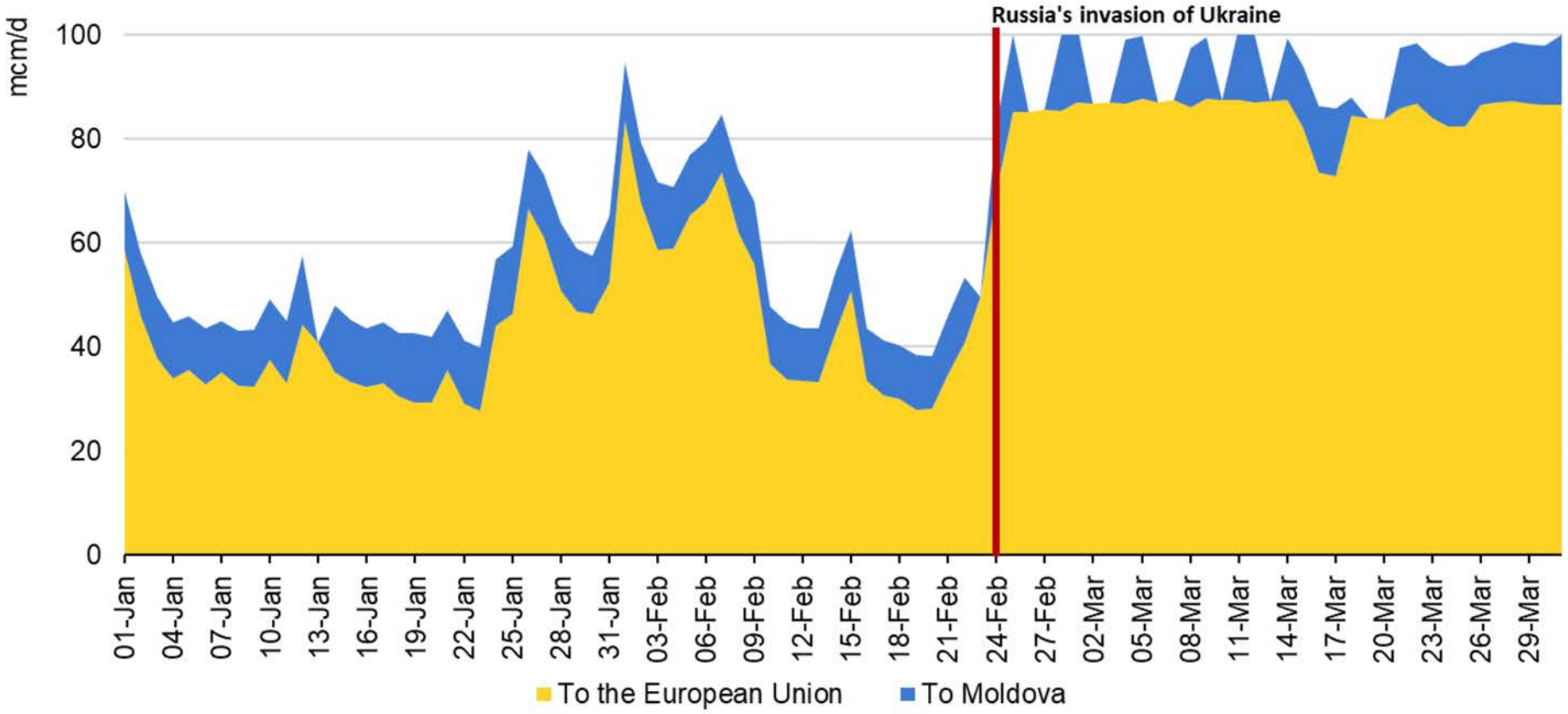


Note: DSOs = distribution system operators.

Source: IEA analysis based on Gas Transmission System Operator of Ukraine (2022), Transparency Platform.

Gas transit via Ukraine to the rest of Europe remained stable in Q1 2022

Daily natural gas flows from Ukraine to the European Union and to Moldova, 1 January-31-March 2022



Source: IEA analysis based on ENTSOG (2022), Transparency Platform.

Asia's gas demand is set to experience slowing growth in 2022 as high prices and supply tensions hurt price-sensitive markets

Asia's recovery in gas demand remained highly uneven and tentative during the 2021/22 winter. In 2021 as a whole, Northeast Asia – especially China and Korea – drove the region's demand recovery, but y-o-y growth rates dropped to near zero (or turned negative) in most of the region's major gas-consuming countries in Q4 2021 in the face of extremely high spot LNG price levels and volatility. In 2022 total consumption is expected to rise by 3% in Asia (down from a previous expectation of 5% and compared with 7% in 2021). China alone accounts for virtually all of the region's net demand growth. India and emerging Asia grow more modestly, while Japan and Korea are projected to see substantial declines.

China's gas demand growth experienced a marked slowdown from the start of the heating season, with total consumption expanding at only 3% y-o-y in Q4 2021 (vs 16% in Q1-Q3 2021). This was due to slowing economic growth, price-driven demand destruction (especially in the industrial sector) and relatively mild winter temperatures in late 2021. The first quarter of 2022 saw a similarly modest 4% y-o-y growth, as the Beijing Winter Olympics in February (which prompted temporary factory shutdowns to reduce air pollution), Covid-related lockdowns in March and mild temperatures throughout Q1 weakened demand. In 2022 total gas consumption is projected to increase by 7% (down from last year's 12%) on continuing expansion of gas infrastructure. The industrial sector remains the main driver of growth, accounting for nearly 48% of China's demand expansion due to growing industrial activity. Power generation adds another 17% of the market's total growth in 2022, driven by the continuing expansion of the gas-fired generation fleet. Residential and commercial users and the transport sector together contribute a further 27% of the total growth in 2022, driven by new grid connections and growing natural gas vehicle fleets, respectively.

India's gas consumption expanded by less than 3% y-o-y in Q4 2021, a marked deceleration from the 6% y-o-y growth rate during the first three quarters of the year. Surging LNG prices towards the end of 2021 suppressed gas use in the power generation, refining and petrochemical sectors in particular, while growth remained resilient in the city gas and fertiliser sectors, where new grid connections boosted demand. LNG imports saw a sharp 20% y-o-y drop in Q4 2021 (compared with a 7% y-o-y decline in Q1-Q3 2021), as rising domestic production and high import prices hit LNG demand especially hard. The same trends were even more pronounced in early 2022. Gas consumption increased by less than 3% y-o-y in the first two months (driven down by steep falls in the power and refining sectors in particular), while LNG imports dropped 23% y-o-y in the first quarter of 2022. In 2022 total consumption is projected to increase by 2%, supported by

expanding infrastructure and rising domestic production (which comes at a lower cost than imported LNG). However, high and volatile LNG prices present a clear downside risk to this forecast as short-term procurement accounted for more than half of India's LNG imports in the 2015-2020 period

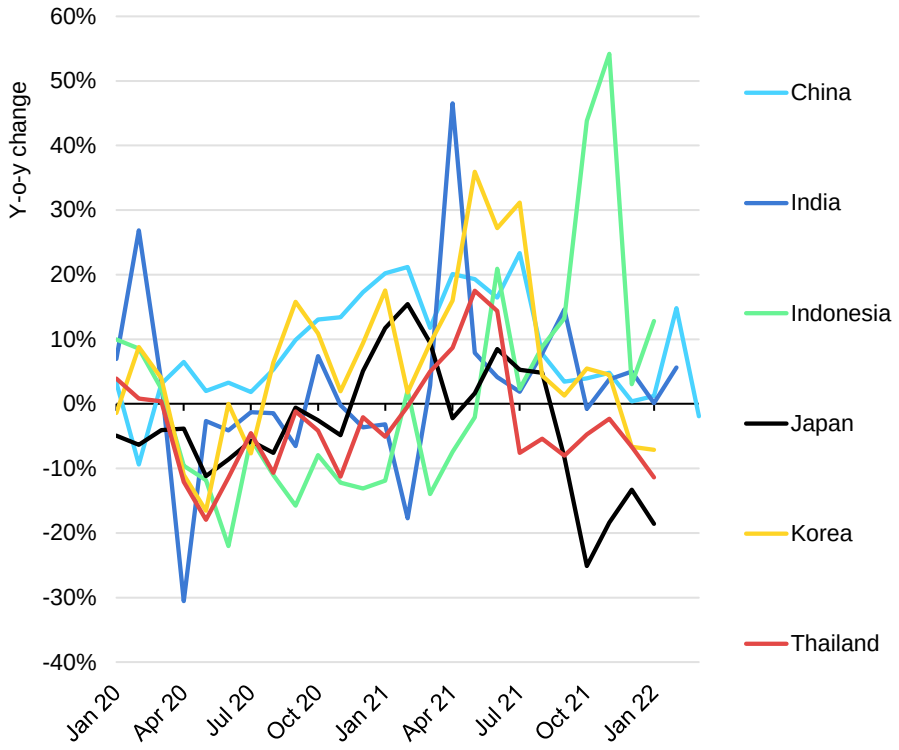
Japan's gas consumption decreased by 19% y-o-y in Q4 2021, mainly due to a series of nuclear restarts. This is a mirror image of the previous heating season's trend, when gas use and LNG imports spiked amid cold winter temperatures, which coincided with low nuclear and solar availability. Demand declines continued in January 2022 and LNG imports dropped by 10% y-o-y in the first quarter. Japan's total consumption is set to decrease by 2% in 2022. This decline is driven by the power sector, as growing nuclear, renewable and coal-fired generation reduce the need for gas-fired electricity. Nuclear generation, which increased by 42% in 2021, is expected to remain flat in 2022, and the planned start-up of several new coal-fired units could squeeze gas demand even further. The industrial and commercial sectors continue to see increasing gas demand in 2022 thanks to the ongoing economic recovery from Covid-19, but this will not be sufficient to offset the decline in gas use for power generation, and recent concerns about the health of the economy could present additional headwinds to gas consumption in the quarters ahead.

Korea's gas demand saw a rapid 14% y-o-y expansion in the first three quarters of 2021, but the pace of growth slowed to near zero in Q4 2021 due to high gas prices, the start-up of new coal-fired plants and the increase in nuclear generation. The slowing trend is set to continue this year, and total consumption is projected to decrease by close to 8% in 2022. Gas use faces headwinds in the power generation sector in particular, with the start-up of a 1.4 GW nuclear unit in Q3 and 1.04 GW of new coal-fired capacity in September. LNG imports dropped by 4% y-o-y in Q1 2022, indicating that the decline in gas use was already underway in early 2022.

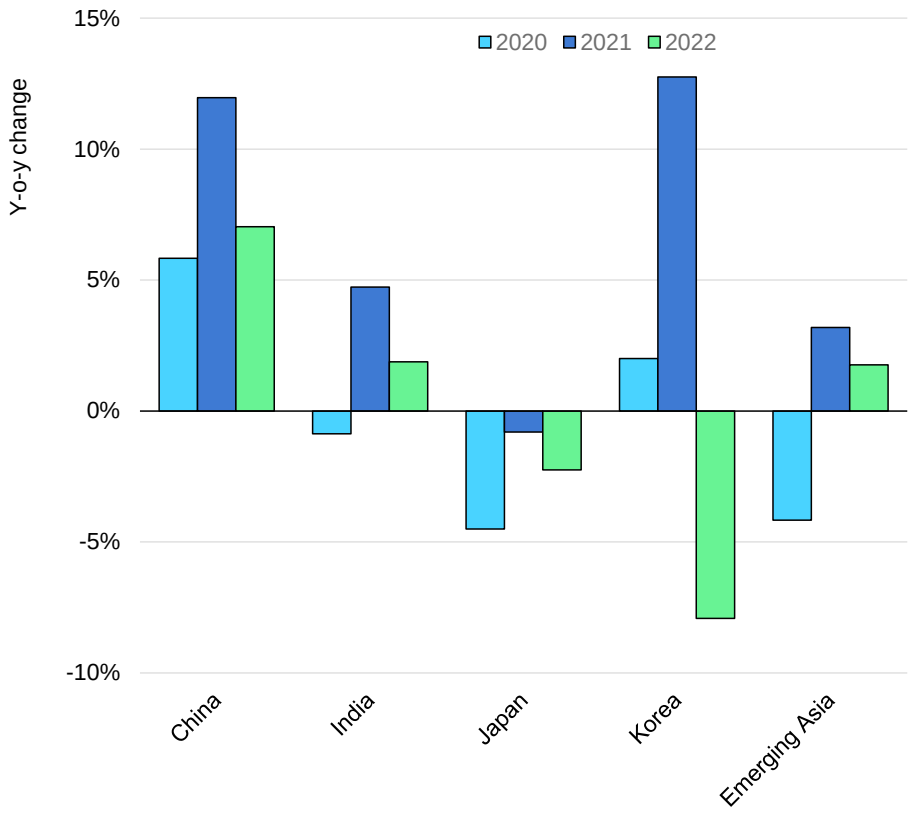
Emerging Asia's gas demand recovery showed a mixed picture in Q4 2021. Indonesia, the biggest gas consumer in the region, saw a robust 34% y-o-y increase as a stronger than expected economic recovery and coal shortages in Q4 2021 boosted gas demand. Thailand, the second largest gas market in emerging Asia, registered a 5% y-o-y decline in Q4 2021 as high LNG prices cut consumption. Pakistan and Bangladesh experienced widespread fuel switching away from gas, especially in the power generation sector, which continued into early 2022. In addition, Pakistan's textile industry was forced to shut down for weeks in December 2021 due to the lack of affordable gas supply, while Bangladesh had to restrict gas flows to CNG stations and other end users in Q4 to cope with an extended outage at the one of the country's two FSRU terminals. Gas consumption in emerging Asia is projected to increase by less than 2% in 2022 (vs 3% in 2021) as tight LNG supply and high prices temper demand.

Asia’s uneven recovery in gas demand continued in Q4 2021 and into 2022

Monthly gas demand in selected Asian countries, 2020-2022



Gas demand in selected Asian countries, 2020-2022



Sources: IEA analysis based on ICIS (2022), ICIS LNG Edge; CQPGX (2022), Nanbin Observation; JODI (2022), Gas World Database; PPAC (2022), Gas Consumption; EPPO (2022), Energy Statistics.

US gas production growth is supported by LNG exports in a tight global LNG market

US natural gas production jumped to new records in December 2021, with daily average dry gas production above 97 mcm. This resulted from increases in all the main shale producing basins and some recovery in conventional offshore in the Gulf of Mexico, with infrastructure returning to full production after Hurricane Ida. This is meeting increasing needs from export markets, as the United States became the world's largest LNG exporter for the first time in December 2021. LNG exports are expected to keep growing throughout 2022 with the start-up of new liquefaction capacity at Sabine Pass (with a sixth liquefaction train completed in early February) and the ramping up of the new Calcasieu Pass LNG plant, which produced its first commissioning cargo in February.

Dry gas production returned to an estimated average of 95 mcm/d during the first quarter of 2022, still showing a 5% y-o-y increase compared to Q1 2021. New year production decline, which is fairly common in January, was further emphasised by freeze-off episodes in early February. This drop in domestic production was compensated by higher pipeline imports from Canada, which increased by 15% in the first quarter of 2022 compared to Q4 2021.

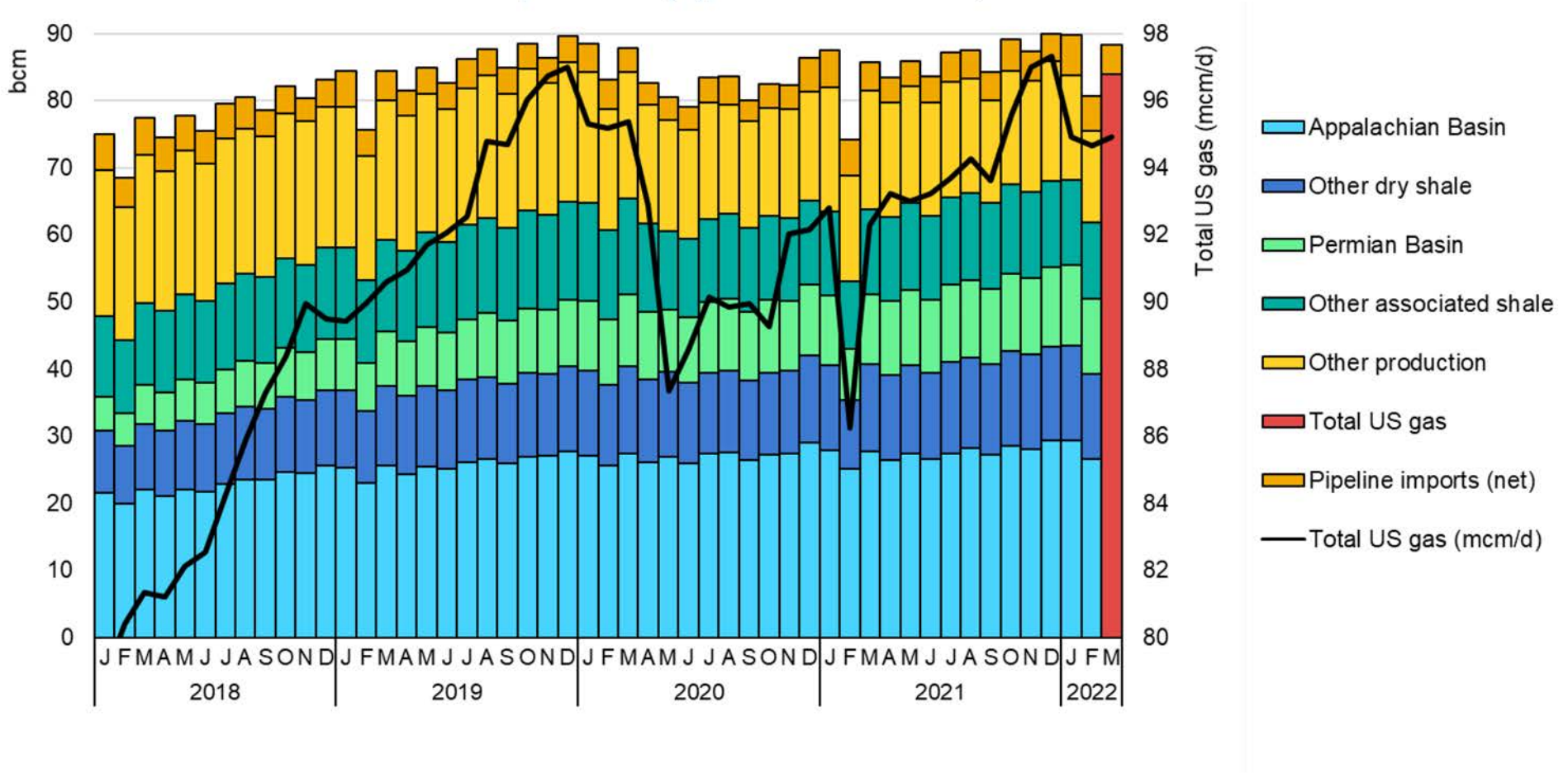
Drilling activity continues to recover, with the number of active natural gas drilling rigs reaching 137 units as of end of March, up by 26% compared with early January and 49% y-o-y. Drilling activity in the Haynesville Basin, which accounts for close to 55% of the gas rig count, remains the principal driver with an increase of over 50% y-o-y, whereas drilling in the Appalachian Basin grew by a more modest 15% over the same period. Drilling activity also keeps growing in oil-driven shale plays, such as the Bakken where the rig count reached close to pre-Covid levels in Q1 2022, while the recent addition of new processing capacity led to an all-time low level of flaring and sustains local dry gas production.

This recovery in drilling also highlights announcements of higher spending by upstream companies after robust Q4 2021 financial results. Most of the large listed exploration and production companies announced double-digit increases in capex budget for 2022, while maintaining prudent guidance overall and a limited appetite for new investment. Inflation (especially in drilling costs) also partly explains such capex increases. Merger and acquisition activity in the US shale oil and gas industry was strong in 2021, recording transactions estimated at close to USD 60 billion; 2022 started on a similar trend with several deals announced including the USD 6 billion Oasis/Whiting merger in early March.

This forecast expects a slight acceleration in US natural gas production growth in 2022, with a 2.5% increase (compared with 2% in 2021). This is expected to be driven primarily by associated production in tight oil basins (in the Permian and others), and to a lesser extent by the Appalachian Basin.

US natural gas production reached a new record in December 2021

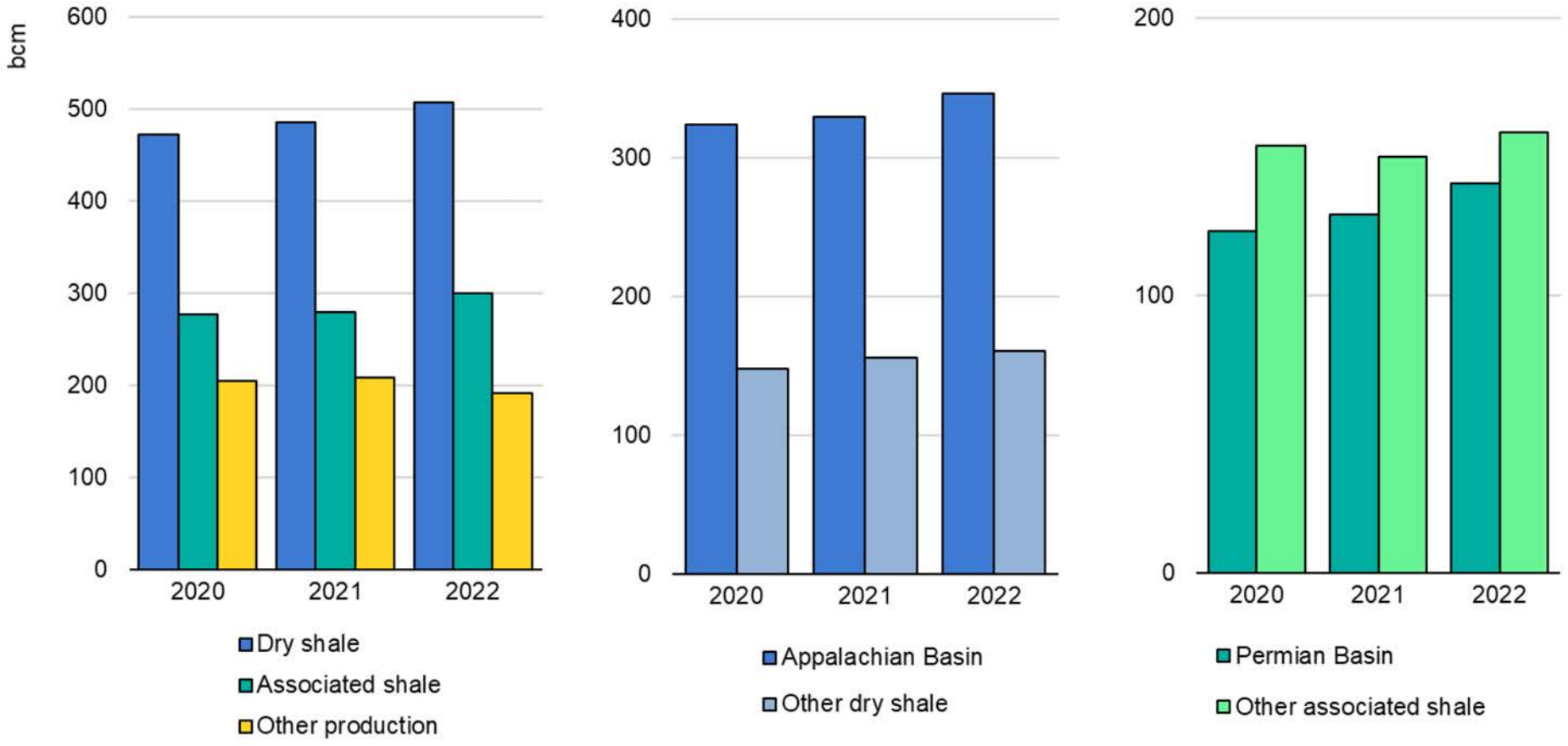
Gas production by type in the United States, 2018-2022



Sources: IEA analysis based on EIA (2022), Natural Gas Data, Natural Gas Weekly Update.

US gas production is expected to grow by 2.5% in 2022

Dry gas production by main source in the United States, 2020-2022



Sources: IEA analysis based on EIA (2022), Natural Gas Data, Natural Gas Weekly Update.

Eurasia's gas supply is set to decline on lower demand and a worsening export outlook in 2022

Following a strong increase in the first nine months of 2021 (up by 12% y-o-y), **Eurasia's gas production growth slowed** to an estimated 3.5% y-o-y during the 2021/22 heating season. This was driven both by slower domestic demand growth and a decline in extra-regional exports to Europe.

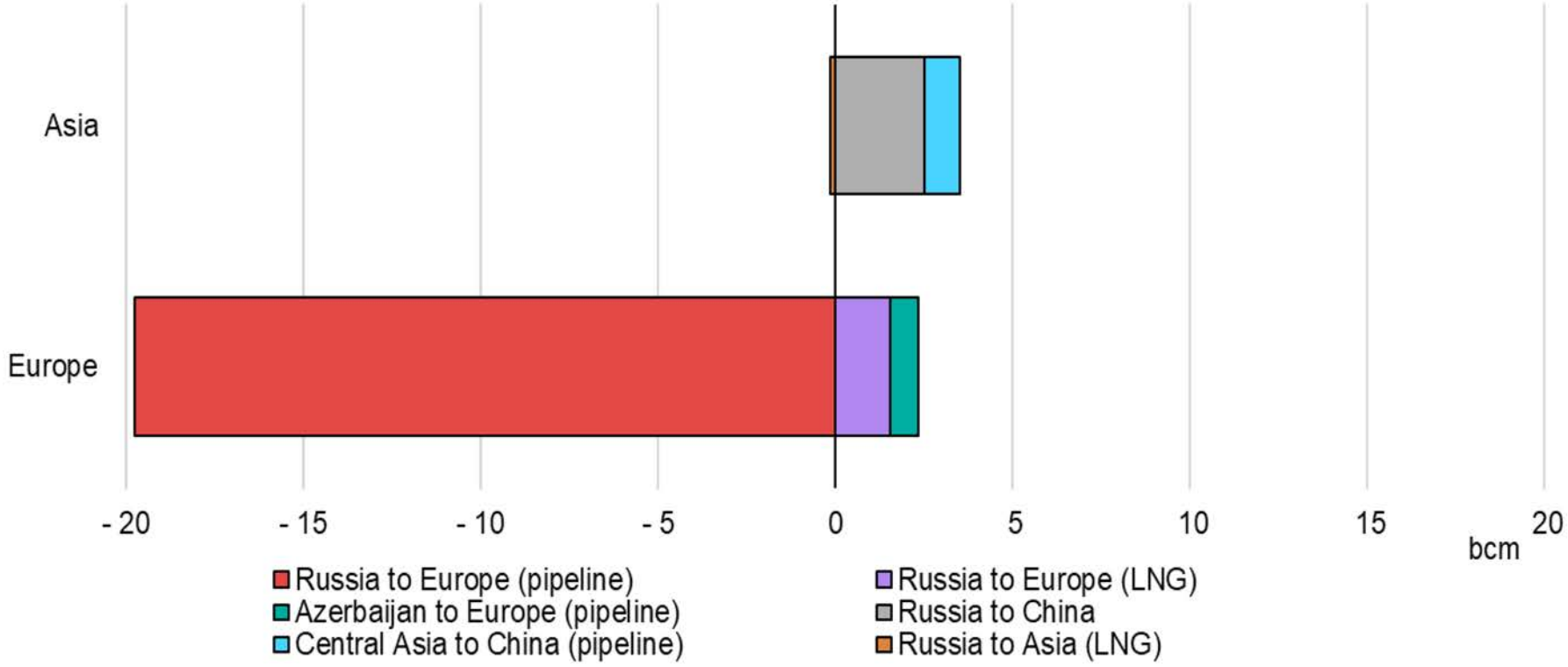
Russia's gas production increased by 2.3% (or 9 bcm) during the 2021/22 heating season. This was primarily driven by higher domestic consumption, which rose by an estimated 2% primarily in support of thermal generation. The country's overall extra-regional exports declined by 15% y-o-y. Russia's exports to Europe fell by close to 25% (or over 20 bcm), principally due to lower transit flows via Ukraine and Belarus, which declined by almost 40% and 70% y-o-y respectively. In contrast, pipeline supplies to China rose by an estimated 75% (or over 2.5 bcm bcm) y-o-y through the Power of Siberia pipeline. Russia's LNG export flows rose by 8%, largely driven by higher deliveries to Europe.

Central Asian gas production rose by an estimated 7% y-o-y during the period October 2021 to February 2022, largely supported by higher output from Turkmenistan. The region's pipeline exports to China rose by an estimated 6% y-o-y, almost entirely driven by Turkmenistan. In November 2021 Islamic Republic of Iran (hereafter "Iran"), Turkmenistan and Azerbaijan signed a swap deal under which Turkmenistan will supply 2 bcm/y to Iran and Iran will deliver the same amount to Azerbaijan. Natural gas production in **Azerbaijan** rose by over 28% (or 3.4 bcm) y-o-y during the October-February period, allowing gas supplies to the European Union to increase by 3.35 bcm through the TAP. In **Ukraine** gas production declined by 0.5% y-o-y during the 2021/22 heating season, when the country's gas demand fell by close to 20% y-o-y. The drop in demand was even more pronounced in March, when pipeline damage caused by military hostilities resulted in domestic supply disruptions.

Eurasia's gas supply is expected to decline by close to 5% in 2022, representing a strong downward revision from the 1% y-o-y increase in the Q1 2022 forecast. The Russian invasion of Ukraine and the consequent sanctions on Russia are set to lead to a sharp decline in economic activity in both Ukraine and Russia, weighing on gas demand in the industrial and power sectors. The assumed return to average weather conditions during 2022 is set to weigh on gas demand in the power and heat sectors, compared to the cold and long heating seasons of 2021. Russia's net pipeline exports to Europe are foreseen to fall by 17% based on booked capacities, while Central Asian pipeline deliveries to China are set to rise to over 45 bcm. Russian exports via the Power of Siberia pipeline are set to ramp up to 15 bcm, while Azeri flows to Europe via the TAP are expected to reach 10 bcm. Russia's LNG exports are foreseen to increase by 5% on the commissioning of Portavaya LNG.

Eurasia’s gas export growth is increasingly oriented towards Asia

Y-o-y change in extra-regional Eurasian gas exports by origin and destination, winter 2020/21-winter 2021/22



Note: The winter season runs from 1 October to 28 February.

Sources: IEA analysis based on ENTSOG (2022), Transparency Platform; Eurostat (2022), Imports of Natural Gas by Partner Country – Monthly Data; General Administration of Customs of People’s Republic of China (2022), Customs Statistics; ICIS (2022), ICIS LNG Edge.

A moment of artificial tightness: European gas supply during the 2021/22 heating season

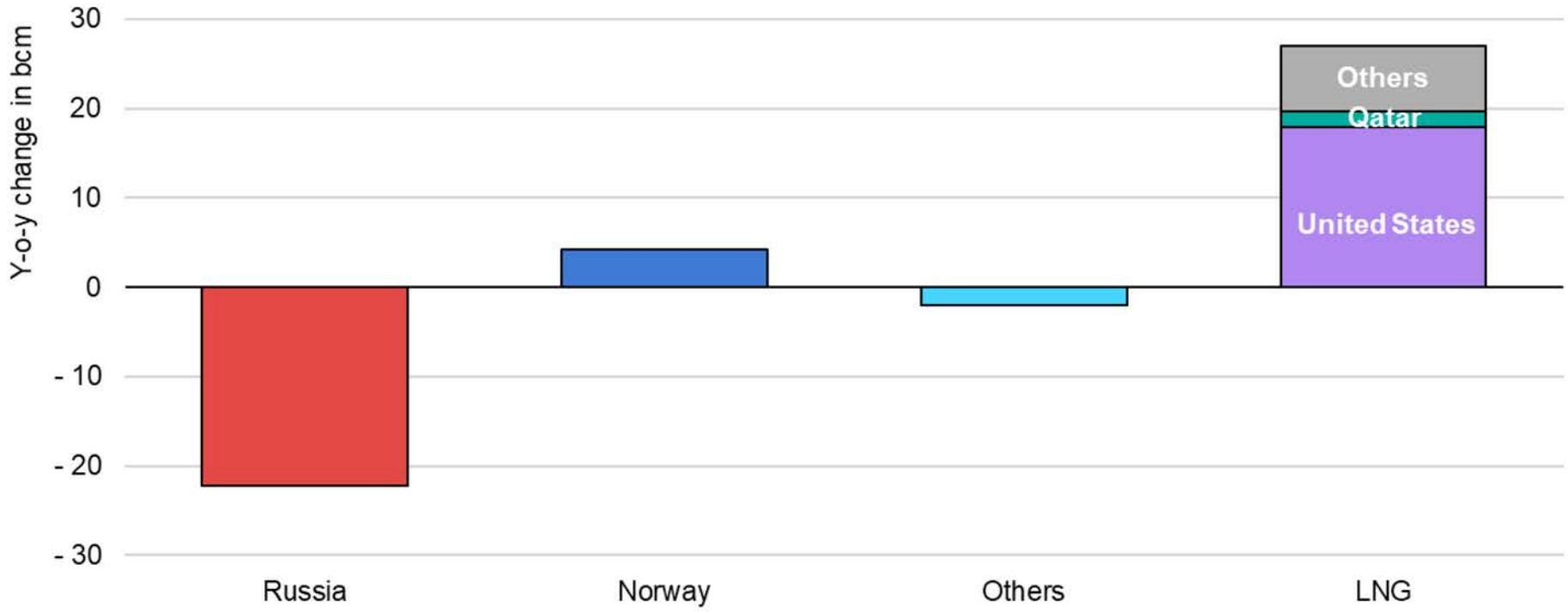
The European 2021/22 heating season was characterised by conditions of artificial market tightness. Despite available supply and transport capacity and high revenue potential in export markets, **Russia reduced its piped gas supplies to Europe** by close to 25% y-o-y during the 2021/22 heating season. This further exacerbated market tightness, drove up European hub prices to record highs and fuelled price volatility. Russian piped flows via the Ukrainian transit corridor fell by almost 40% y-o-y and by 70% via the Yamal pipeline to Poland and Germany. Whilst Gazprom has reportedly met its long-term supply commitments, the company has drastically reduced its short-term sales and ceased gas auctions via its Electronic Sales Platform since October 2021. Gas deliveries to Turkey decreased by over 15% y-o-y during the October-February period. In addition to lower Russian piped gas supplies, **non-Norwegian domestic production continued to decline** throughout the 2021/22 heating season and fell by over 7% (or 2.5 bcm) y-o-y between October and January. The Netherlands alone accounted for 60% of this decline, primarily due to lower output from the Groningen field (down by 55% y-o-y).

Lower Russian piped flows and falling domestic production have been compensated by a combination of ramping up alternative pipeline supplies and increasing LNG inflow. **Norwegian deliveries** to the rest of the continent rose by over 7% y-o-y in Q1, while Algeria increased its exports to Europe on the commercially available pipelines (Medgaz and Transmed) by over 9% y-o-y. Overall **North African supplies** decreased by 13% y-o-y due to the unavailability of the Maghreb–Europe pipeline and lower Libyan flows. **Azeri gas deliveries** to the European Union via the TAP rose by close to 4 bcm y-o-y during the heating season. **LNG inflow into Europe** surged by 55% y-o-y to reach over 75 bcm – an all-time high for this period of the year. Almost 67% of the incremental LNG was supplied by the United States, which reinforced its position as Europe's largest LNG supplier, meeting over 40% of the continent's total LNG imports.

Europe's domestic gas production is expected to increase by 3% in 2020, driven by higher output in Norway and the United Kingdom. Despite domestic demand being foreseen to fall by almost 6%, **gas import requirements are set to remain close to their 2021 levels**, supported by higher storage injections. Considering booked and available capacities, Russian piped gas flows are expected to fall by over 17% y-o-y in 2022, largely compensated by higher LNG inflows, up by almost 25%. In the aftermath of the Russian invasion of Ukraine, the IEA developed a 10-Point Plan on how the European Union could reduce its reliance on Russian gas supplies at an even faster pace, by over one-third within a year. The European Commission's REPowerEU communication aims to phase out dependency on Russian fossil fuels well before 2030.

Lower Russian piped gas flows were largely compensated by record levels of LNG inflow

Y-o-y change in European natural gas imports and deliveries from Norway during the heating season, 2020/21-2021/22



Note: The heating season runs from 1 October to 31 March.

Sources: IEA analysis based on ENTSOG (2022), Transparency Platform; Eurostat (2022), Energy Statistics; Gas Transmission System Operator of Ukraine (2022), Transparency Platform; ICIS LNG Edge; JODI (2022), Gas World Database.

Global LNG trade flows are set to be reconfigured in 2022 as Europe becomes the premium market for LNG

In Q1 2022 global LNG trade (net of re-exports) expanded by an estimated 7% y-o-y. Europe's net LNG imports rose by a remarkable 70% (or 18 bcm) in that quarter, as the continent compensated for the drop in Russian pipeline gas supplies mainly by increasing its LNG imports. The surge in European LNG inflows was especially sharp in January when net imports were up by a staggering 174% y-o-y. Rising LNG inflows to Europe were mainly drawn away from the Asia Pacific region, which saw an 8% y-o-y decline in net LNG imports in Q1 2022. The biggest y-o-y declines in volume terms occurred in China (down by 13%), Japan (down by 10%), India (down by 23%) and Korea (down by 4%) during the first quarter. The Americas experienced modest demand declines in absolute terms while the Middle East, Africa and Eurasia registered small increases. Global LNG exports were up by 5% y-o-y in Q1 2022. This was almost entirely driven by the United States, which saw a 27% y-o-y rise in its LNG output.

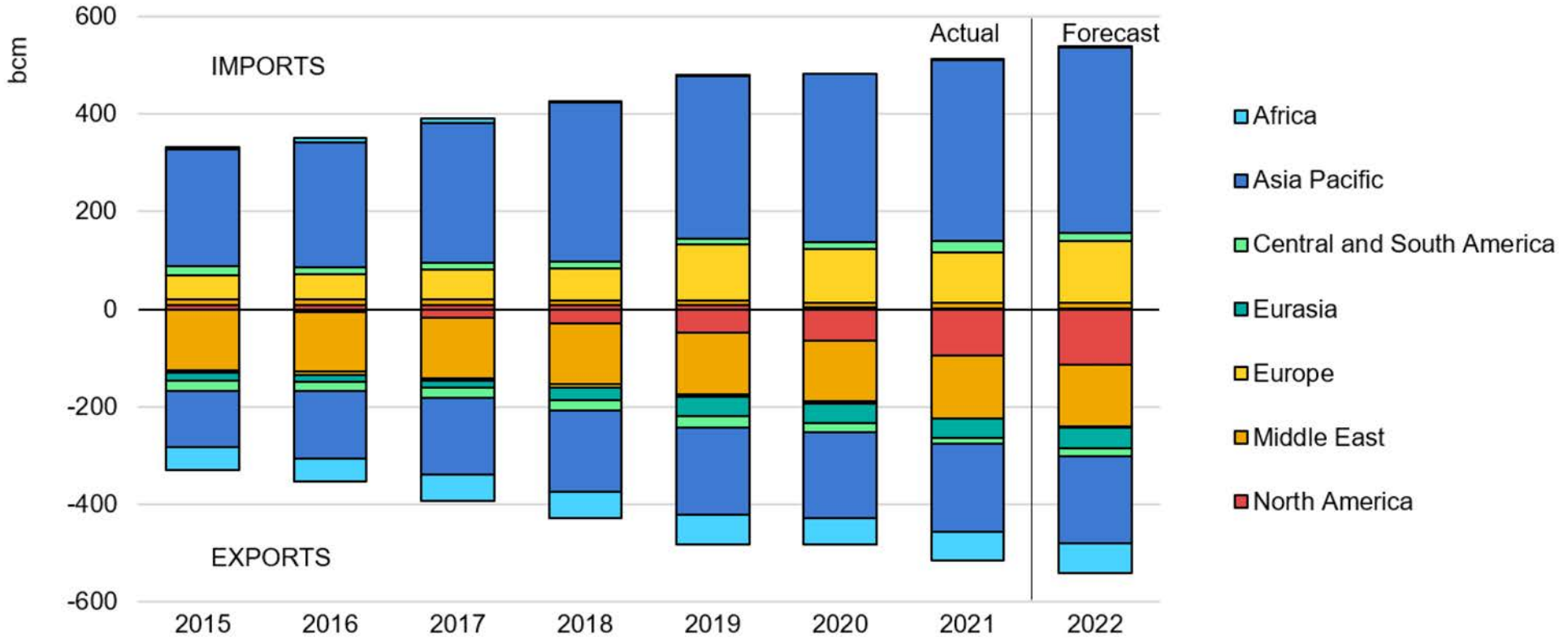
In 2022 as a whole, global LNG trade is projected to increase by 5%, a slight deceleration from the 2021 growth rate (at nearly 6%). In a marked change from the previous two years, Europe – not the Asia Pacific region – dominates LNG import growth in 2022. Forward curves at the end of March 2022 indicate a sustained TTF premium over Asian LNG spot prices (averaging in the USD 2-3/MBtu range in Q2-Q4 2022), which supports strong LNG inflows to Europe for the rest of the year. This would lead to the continent becoming the premium market for LNG for much of 2022.

Annual LNG imports into Europe are projected to increase by nearly a quarter (or 25 bcm) in 2022 to their highest level on record. The Asia Pacific region – led by China – is expected to see a modest 3% (or 9 bcm) increase in LNG demand as some price-sensitive volumes are redirected to Europe. Central and South America is set to experience a 33% (or 8 bcm) decline in LNG inflows as hydro reservoir levels in Brazil recover following last year's historic droughts. The balance of small changes in the rest of the world is close to zero.

North America remains the main engine of LNG export growth globally, accounting for 65% of the net increase in LNG output in 2022. LNG exports from the United States are expected to grow by 19%, driven by the start-up of new liquefaction capacity at Sabine Pass Train 6 and the Calcasieu Pass terminal in Louisiana, and higher utilisation of existing facilities in response to very attractive export economics. Africa, Europe, Central and South America and Eurasia make smaller contributions to global LNG supply growth in 2022, while the Asia Pacific region and the Middle East register small declines.

Global LNG trade is set to increase by 5% in 2022, fuelled by European demand and US supply

LNG imports and exports by region, 2015-2022



Source: IEA analysis based on ICIS (2022), ICIS LNG Edge.

The Russian invasion of Ukraine drove European gas prices to record highs in Q1 2022

Tight supply–demand fundamentals, low storage levels and an increasingly uncertain supply outlook in Europe drove up Asian and European spot gas prices to record highs during the 2021/22 heating season.

In **Europe**, TTF prices averaged at a record of USD 32/MBtu – more than five times their five-year average during the preceding heating seasons. The strong increase in gas prices occurred despite relatively mild winter temperatures (moderating space heating requirements) and was largely driven by the supply side. Europe started the heating season with storage levels 17% below their five-year average, which exerted upward pressure on winter contracts. In addition, gas pipeline deliveries from Russia fell by close to 25% y-o-y during the heating season, as Gazprom drastically reduced its short-term sales. Russia's invasion of Ukraine at the end of February 2022 created a moment of unprecedented market uncertainty, fuelling volatility and driving up European gas prices to record levels. Intraday gas prices on TTF soared to an all-time high of EUR 345/MWh (or USD 110/MBtu) on 7 March 2022.

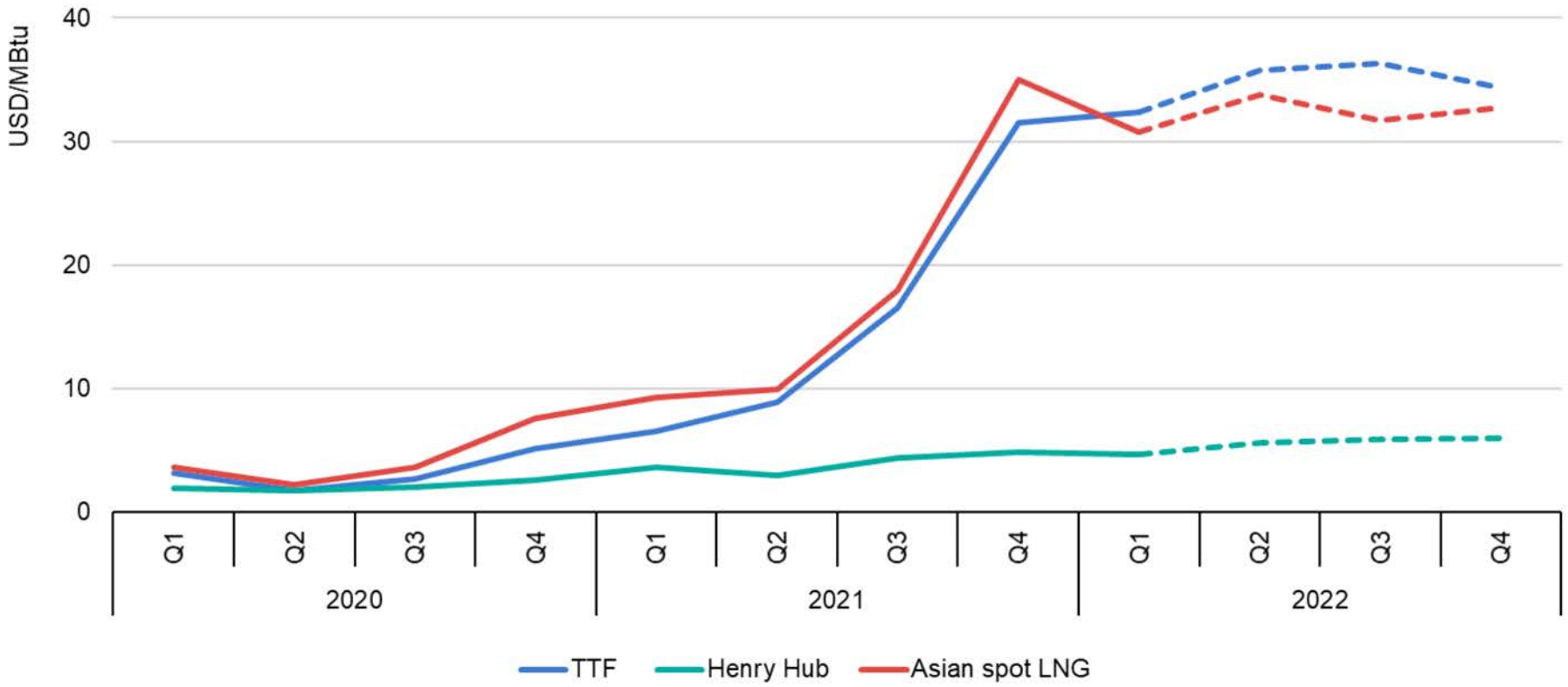
Asian spot LNG prices followed a similar trajectory, averaging a record of USD 33/MBtu during the 2021/22 heating season – more than four times their five-year average during the preceding heating seasons. Spot LNG prices rose to an all-time high of USD 84/MBtu, following the price spike on TTF. In addition to the strong competition for flexible LNG with Europe, regional LNG production outages provided further upward pressure on LNG spot prices. Oil-indexed LNG contracts averaged at an estimated USD 12/MBtu – an increase of almost 70% y-o-y.

In the **United States**, Henry Hub prices rose by more than 50% y-o-y to an average of USD 4.7/MBtu, their highest level for the October-March period since 2010. Higher domestic consumption together with the continued expansion of LNG exports (up by almost 25% y-o-y) outpaced growth in domestic production. This in turn led to tighter supply–demand fundamentals and provided upward pressure on gas prices.

The high gas price environment is set to linger through the rest of 2022. Forward curves as of the end of March 2022 indicate that TTF is set to average at USD 35/MBtu, Asian spot LNG at USD 32/MBtu and Henry Hub at USD 5.5/MBtu in 2022. Uncertainties surrounding Russian gas supply and high restocking needs in all key gas regions are set to provide strong support to gas prices in 2022. TTF is expected to trade at a premium of USD 2-3/MBtu above Asian spot LNG, enabling higher LNG inflow into Europe. Oil-indexed LNG contracts are expected to average at around USD 15/MBtu, reflecting the surge in oil prices during Q1 2022.

Record high gas prices in Asia and Europe are set to linger through the rest of 2022

Main spot and forward natural gas prices, 2020-2022



Sources: IEA analysis based on CME (2022), Henry Hub Natural Gas Futures Quotes, Dutch TTF Natural Gas Month Futures Settlements; CME Group (2022), LNG Japan/Korea Marker (Platts) Futures Settlements; EIA (2022), Henry Hub Natural Gas Spot Price; ICIS (2021), ICIS LNG Edge; Powernext (2022), Spot Market Data.

Storage sites in Europe and the United States closed the heating season at a low point…

Natural gas storage played a crucial role in meeting seasonal swings in gas demand across all key gas regions during the 2021/22 heating season. Gas storage levels both in Europe and the United States stood well below their five-year average levels at the end of the heating season, indicating strong restocking needs in the forthcoming gas summer (Q2-3 2022).

In the **European Union**, gas storage sites stood 17% (or 15 bcm) below their five-year average levels on 1 October, the start of the European heating season. Storage sites partly owned or controlled by Gazprom (accounting for 10% of total EU storage capacity) were filled to just 25% of their working storage capacity, contributing to approximately half of the European Union's storage deficit. Storage withdrawals met approximately 20% of EU gas demand during the heating season. Milder winter temperatures reduced gas demand for space heating, which together with the strong LNG inflow (up 60% y-o-y) lessened storage withdrawals, which fell by 13% below their five-year average. This in turn moderated the EU storage deficit to 8 bcm below its five-year average by the end of the heating season. Inventory levels stood at 26% of their working storage capacity by the end of March 2022. Without the strong increase in LNG inflow, EU storage levels would have stood below 10% of their working storage capacity, leaving the bloc in a much more vulnerable situation vis-à-vis late cold spells and/or supply disruptions. The European Commission has proposed a target to fill EU gas storage to at least 80% of capacity by 1 November, necessitating storage injections 13% (or 6 bcm) above last year's levels.

In the **United States**, gas storage levels stood 2.7% (or 2.9 bcm) below their five-year average at the very end of October 2021. Storage withdrawals met approximately 15% of US domestic consumption during the period between November and March. A rebound in domestic consumption, together with the strong expansion in LNG exports, tightened the US gas market and increased the call on gas storage in November-March. Storage withdrawals were 7% (or 4 bcm) higher compared to their five-year average during this period. Consequently, storage levels by the beginning of April 2022 stood 17% (or 8 bcm) below their five-year average. Storage withdrawals in the Midwest and East gas regions – both of which faced below-average temperatures – accounted for over 60% of total net storage withdrawals during the November-March period.

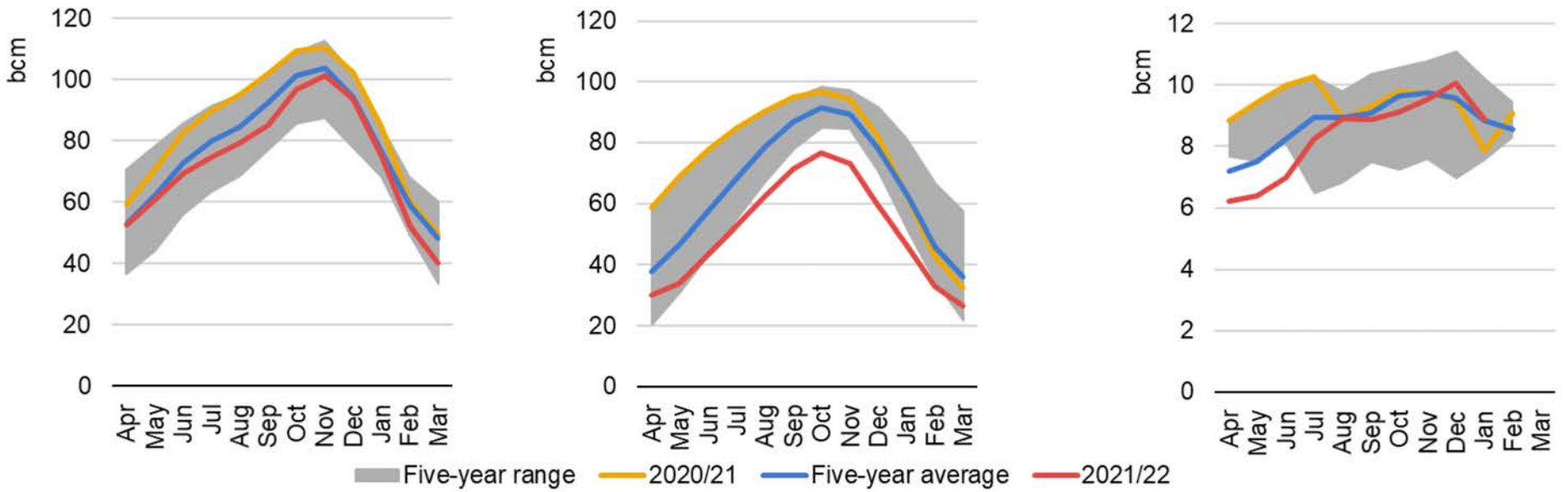
In **Japan** and **Korea**, LNG closing stocks stood near their five-year average in January 2022. The LNG stocks of Japan's largest power generation companies stood at 1.66 Mt (or 2.25 bcm) at the end of March 2022, 24% below their four-year average.

…with inventory levels standing well below their five-year average

US underground storage inventory

EU underground storage inventory

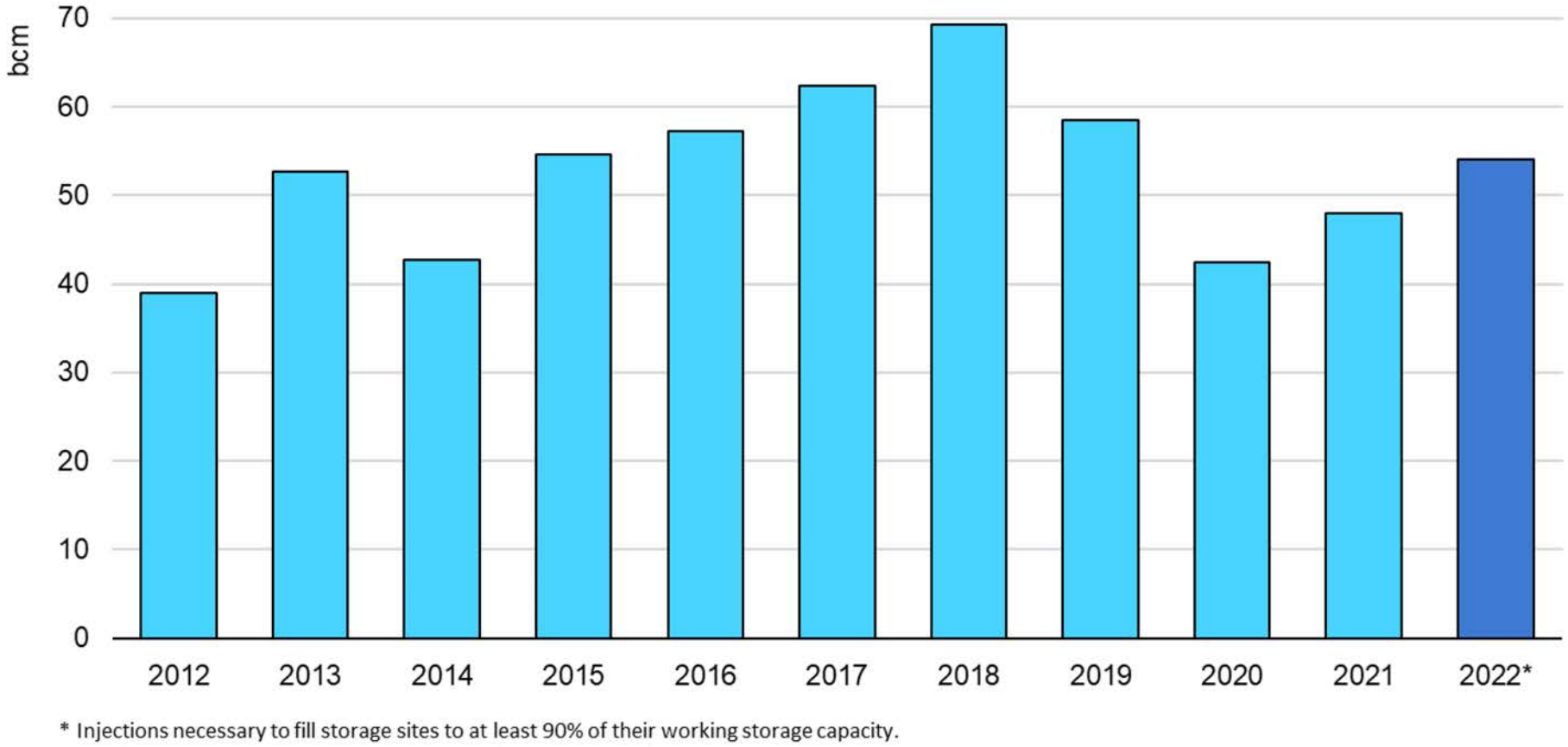
Japan and Korea LNG stock inventory



Sources: IEA analysis based on EIA (2022), Weekly Working Gas In Underground Storage; GIE (2022), AGSI+ Database; IEA (2022), Monthly Gas Data Service.

EU storage injections during summer 2022 are expected to increase compared to last year to reach the European Commission's fill target of 80% by 1 November 2022

Gas storage injections in the European Union, 2012-2022



Source: IEA analysis based on GIE (2022), AGSI+ Database.

Annex

Summary table

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

	Demand					Production				
	2018	2019	2020	2021	2022	2018	2019	2020	2021	2022
Africa	158	162	158	167	170	248	252	241	262	268
Asia Pacific	815	840	846	900	926	612	641	634	656	666
of which China	*283*	*307*	*325*	*364*	*390*	*160*	*174*	*189*	*205*	*214*
Central and South America	159	152	138	150	147	173	170	156	162	165
Eurasia	668	658	633	688	656	932	941	886	975	925
of which Russia	*493*	*482*	*460*	*510*	*483*	*726*	*738*	*692*	*762*	*710*
Europe	536	537	525	557	524	246	227	211	204	209
Middle East	542	545	548	561	580	665	670	671	692	710
North America	1 059	1 097	1 071	1 075	1 084	1 073	1 152	1 144	1 168	1 189
of which United States	*859*	*888*	*869*	*867*	*873*	*877*	*968*	*954*	*973*	*998*
World	**3 935**	**3 990**	**3 919**	**4 097**	**4 086**	**3 949**	**4 053**	**3 943**	**4 118**	**4 132**

Note: Demand does not include net storage injections.

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, Belarus, Georgia, Kazakhstan, Kyrgyzstan, the Republic of Moldova, Russian Federation, Tajikistan, Turkmenistan, Ukraine and Uzbekistan.

Europe – Albania, Austria, Belgium, Bosnia and Herzegovina, Bulgaria, Croatia, Cyprus,[5,6] 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, Montenegro, Netherlands, Norway, Poland, Portugal, Romania, Serbia, Slovak Republic, Slovenia, Spain, Sweden, Switzerland, Turkey and United Kingdom.

European Union – Austria, Belgium, Bulgaria, Croatia, Cyprus,[5,6] Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, 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, 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 Turkey: 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. Turkey recognises the Turkish Republic of Northern Cyprus (TRNC). Until a lasting and equitable solution is found within the context of United Nations, Turkey 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 Turkey. 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)
CNE	National Energy Commission (Chile)
CQPGX	Chongqing Petroleum Exchange (China)
EIA	Energy Information Administration (United States)
ENARGAS	National Gas Regulatory Entity (Argentina)
ENTSOG	European Network of Transmission System Operators for Gas
EPPO	Energy Policy and Planning Office (Thailand)
GIE	Gas Infrastructure Europe
IEA	International Energy Agency
ICIS	Independent Chemical Information Services
JODI	Joint Oil Data Initiative
LNG	liquefied natural gas
MME	Ministry of Mines and Eergy (Brazil)
m-o-m	month-on-month
NBP	National Balancing Point (United Kingdom)
OPEC	Organisation of the Petroleum Exporting Countries
OSINERG	Energy Regulatory Commission (Peru)
PPAC	Petroleum Planning and Analysis Cell (India)
SENER	Secretariat of Energy (Mexico)
TAP	Trans Adriatic Pipeline
TTF	Title Transfer Facility (the Netherlands)
USD	United States dollar
w-o-w	week-on-week
y-o-y	year-on-year

Units of measure

bcf/d	billion cubic feet per day
bcm	billion cubic metres
bcm/m	billion cubic metres per month
bcm/y	billion cubic metres per year
GW	gigawatt
mb/d	million barrels per day
MBtu	million British thermal units
mcm	million cubic metres
mcm/d	million cubic metres per day
MW	megawatt
TWh	terawatt hour

Acknowledgements, contributors and credits

This publication has been prepared by the Gas, Coal and Power Markets Division (GCP) of the International Energy Agency (IEA). The analysis was led and co-ordinated by Jean-Baptiste Dubreuil, Senior Natural Gas Analyst. Jean-Baptiste Dubreuil, Tetsuro Hattori, Akos Losz, Gergely Molnár and Jinseok Rho are the main authors, with contributions from Louis Chambeau and Javier Sesma Montolar. Keisuke Sadamori, Director of the IEA Energy Markets and Security (EMS) Directorate, provided expert guidance and advice.

Timely and comprehensive data from the Energy Data Centre were fundamental to the report.

The IEA Communication and Digital Office (CDO) provided production and launch support. Particular thanks to Jad Mouawad and his team: Astrid Dumond, Merve Erdem, Jethro Mullen, Taline Shahinian, Rob Stone and Therese Walsh.

Justin French-Brooks edited the report.

The report was made possible by assistance from Enagás, SK E&S and Tokyo Gas.

The individuals and organisations that contributed to this report are not responsible for any opinion or judgement it contains. Any error or omission is the sole responsibility of the IEA.

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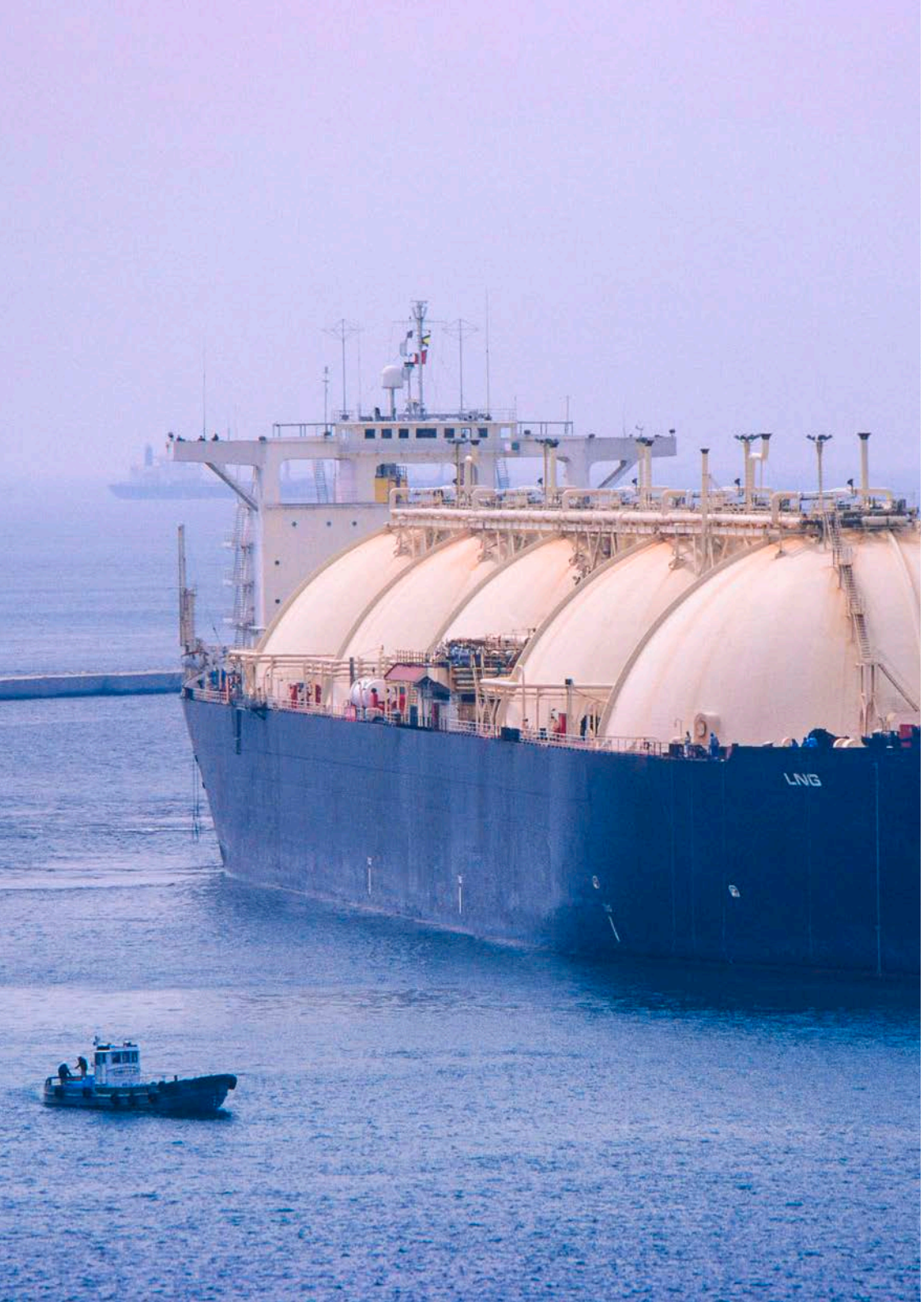
Typeset in France by IEA – April 2022

Cover design: IEA

Photo credits: © Getty Images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