

Global gas outlook to 2050

Summary report

February 2021

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Executive summary

2020 was an unprecedented year for gas and liquefied-natural-gas (LNG) markets. Gas demand declined by 3 percent. LNG demand was more resilient and managed to grow 1 percent. However, the year saw high levels of LNG market volatility with both extreme oversupply and extreme tightness during the course of the year.

Gas will be the strongest-growing fossil fuel and will increase by 0.9 percent from 2020 to 2035. It is the only fossil fuel expected to grow beyond 2030, peaking in 2037. From 2035 to 2050, gas demand will decline by 0.4 percent. This relatively moderate decline is due to hard-to-replace gas use in the chemical and industrial sectors, which limits the impact of an accelerating decline in gas used for power.

Meanwhile, LNG is set for stronger growth, as domestic supply in key gas markets will not keep up with demand growth. Demand is expected to grow 3.4 percent per annum to 2035, with some 100 million metric tons of additional capacity required to meet both demand growth and decline from existing projects. LNG demand growth will slow markedly but will still grow by 0.5 percent from 2035 to 2050, with more than 200 million metric tons of new capacity required by 2050.

McKinsey's accelerated transition scenario shows resilient gas and LNG demand. Gas demand is just 5 percent less than our reference case, and LNG demand 3 percent less, by 2050. However, the regional drivers of this growth will change, as an accelerated energy transition more rapidly reduces gas use in more-developed markets while leading to higher demand in developing markets as they more rapidly move away from coal use.

The emission intensity of LNG is a critical question for the industry. Global emission regulations are set to grow in geography and scope. For example, the four largest global LNG markets—China, the European Union, Japan, and South Korea—all introduced carbon-neutrality aspirations in 2020. Meanwhile, McKinsey's LNG Buyers Survey revealed that 33 percent of respondents anticipate that emission-intensity clauses will become more common in contracts. These changing expectations will reshape the industry, potentially restricting opportunities to supply LNG for higher-emission projects and reordering the cost curve if carbon pricing spreads more widely in key LNG-importing markets.

5 key findings

1

2020 saw both extreme market oversupply and extreme tightness

The price volatility seen in late 2020 and early 2021 is likely to remain for the medium term. A tight balance between supply and demand to 2025 will create fluctuating prices as unpredictable events flip the market between tightness and excess supply.

2

2020 market demand was driven by China and India growing a combined 9.5 metric tons (MT)

Asia will continue to drive global LNG demand growth. However, China becomes less important as a driver for LNG demand beyond 2035 and will see demand peak around 2040. South and Southeast Asia will take over as key demand drivers.

3

LNG demand is resilient

LNG demand grew by 1% in 2020, while global gas demand declined. Longer term, the share of LNG in the global gas supply will increase from today's 13% to 23% by 2050 as it meets demand growth and replaces declining pipeline and domestic gas.

4

Approximately 100MT of additional liquefaction capacity is needed by 2035 and more than 200 MT by 2050

A majority of this will likely come from US projects representing the long-run marginal LNG-supply capacity and will need to differentiate either commercially or by emission intensity. 138 MT of LNG capacity is currently under construction

5

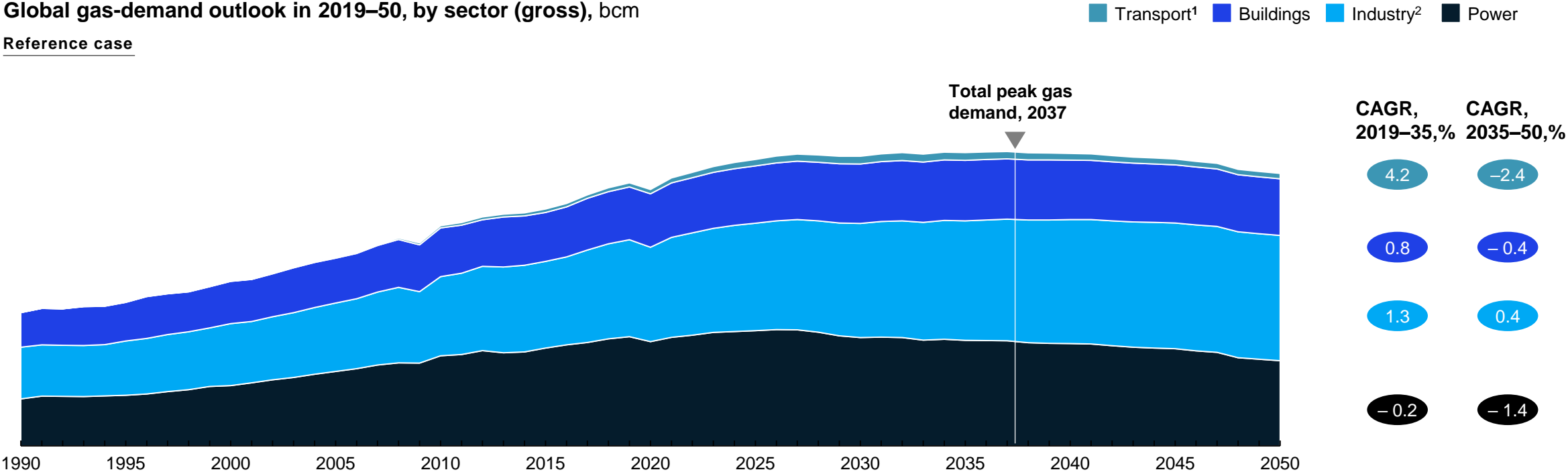
The energy transition will reshape gas-demand use

Gas demand in the transport sector is set to grow by 50 billion cubic meters by 2035 with a compound annual growth rate of 2.2%. Gas for power will decline in Europe, Japan, and North America. Industrial and chemical gas demand will grow past 2035.

In the 2021 Global Energy Perspective reference case, gas demand peaks in 2037 but will decline slowly afterward.

Global gas-demand outlook in 2019–50, by sector (gross), bcm

Reference case



CAGR, %



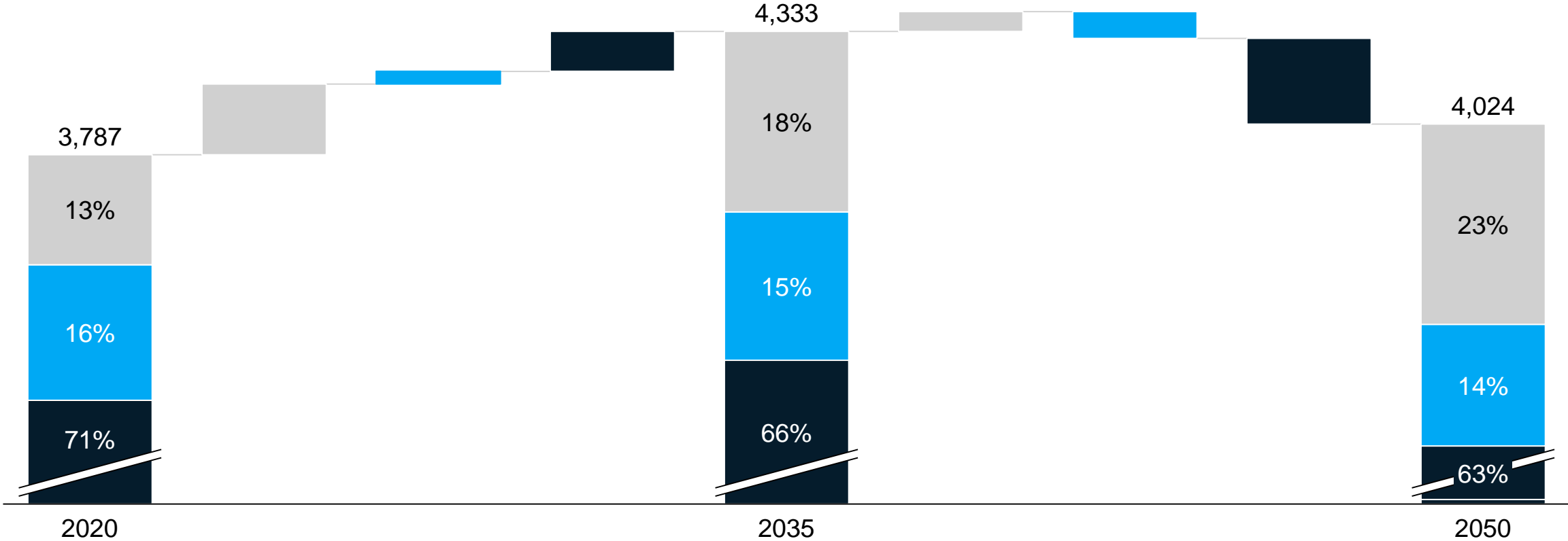
1. Does not include gas use for pipeline transport (approximately 75 bcm in 2019).
 2. Includes “other” energy sector.

The share of LNG in the global gas supply will increase consistently, as it meets demand growth and replaces declining pipeline and domestic gas.

Global domestic consumption (piped and LNG gas and import projections), bcm

■ LNG¹ ■ Pipeline-import flows ■ Domestic gas

Reference case



1. Including LNG flows within country for Indonesia and Malaysia.

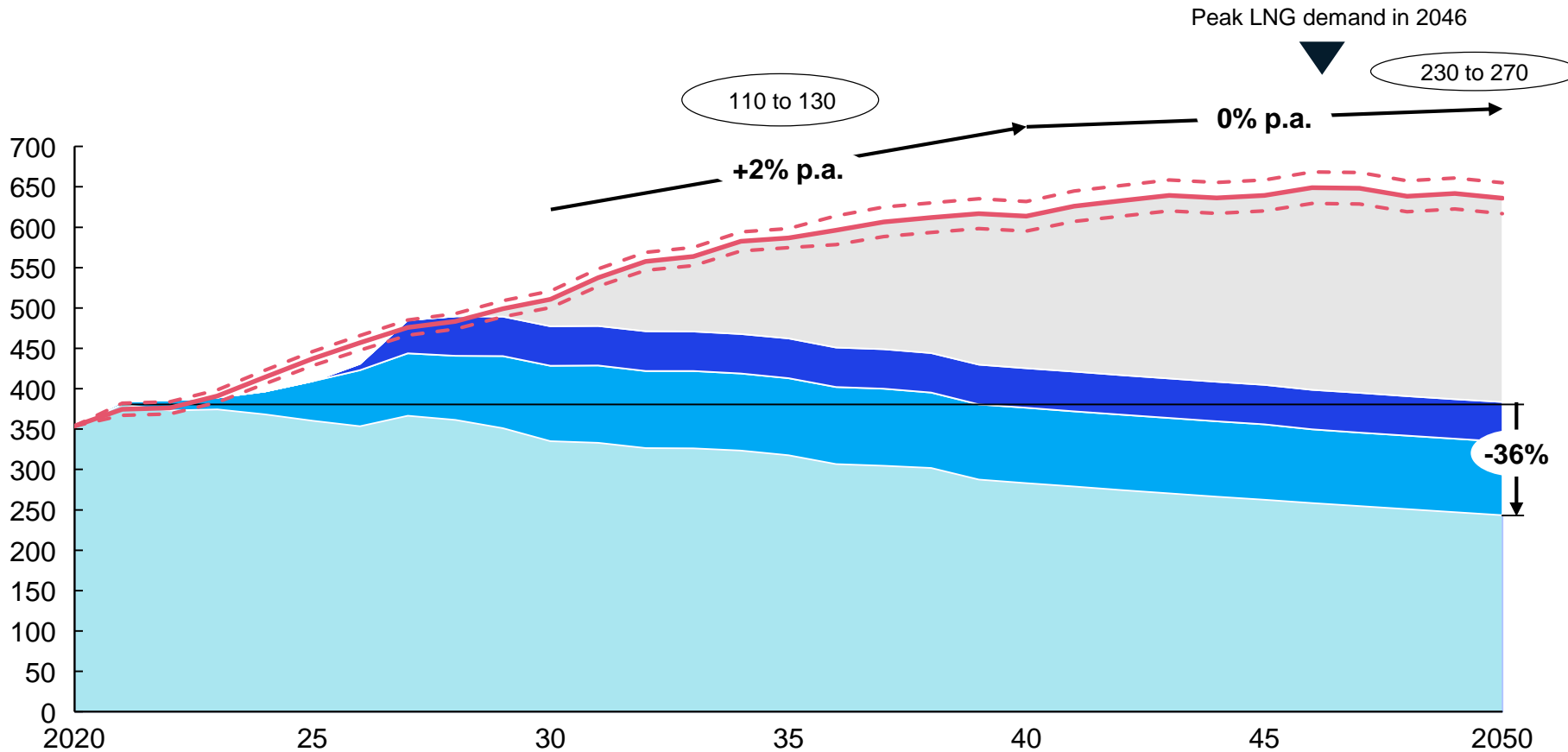
In the Reference Case, long-term LNG demand growth creates a 230-270 MTPA supply gap by 2040-2050

LNG balance, MT

Reference Case
Balanced illustration

Supply gap to meet demand
 Full Qatar expansion (6 trains)
 Under construction
 Existing

--- LNG demand range (+/- 2% to 2035, +/- 3% to 2050)
 X to Y Range of required pre-FID LNG, MT



Potential for 230 to 270 MT of new LNG capacity required by 2050

Demand growth is flat over the period from 2040 to 2050 but with new capacity required to offset declines from older legacy projects

New supply expected to be overwhelmingly concentrated from the US, with smaller contributions from Canada, Russia, East Africa and potentially the Middle East

Our gas & LNG models



Global Gas & LNG Model

Our Global Gas & LNG Model forecasts supply, demand, infrastructure, and resulting global gas flows with flexible scenarios to allow “what-if” analyses.



LNG Cost Curve

The LNG Cost Curve is a bottom-up perspective on LNG liquefaction costs, project feasibility, price structure, export capacity, and impact of emissions. The cost curve covers more than 1,100 million tonnes per annum (mtpa) of currently known LNG projects.



LNG Optimization Model

The LNG Optimization Model is a linear programming model that helps define the optimal flows between production and consumption sources, taking into account all logistics costs, physical constraints/ flexibilities of the portfolio, and Energy Insights’ price outlooks.

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