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SPECIAL REPORT

Global Natural Gas Demand: When Will Global Natural Gas Demand Peak?

The Al-Attiyah Foundation

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Natural gas, long heralded as the "bridge fuel" of the energy transition, finds itself at a pivotal juncture in global energy policy and market dynamics. Once primarily discussed in the context of supply scarcity, today's discourse on "peak gas" has shifted decisively toward demand. In a world grappling with climate imperatives, technology disruption, and evolving regional priorities, understanding when and how global natural gas consumption may reach its zenith has never been more pressing. This paper will analyse the forces impacting the timing of the gas production/consumption peak. What is peak gas? When will the world hit peak gas demand? How are policy and climate constraints affecting gas demand?

SPECIAL REPORT

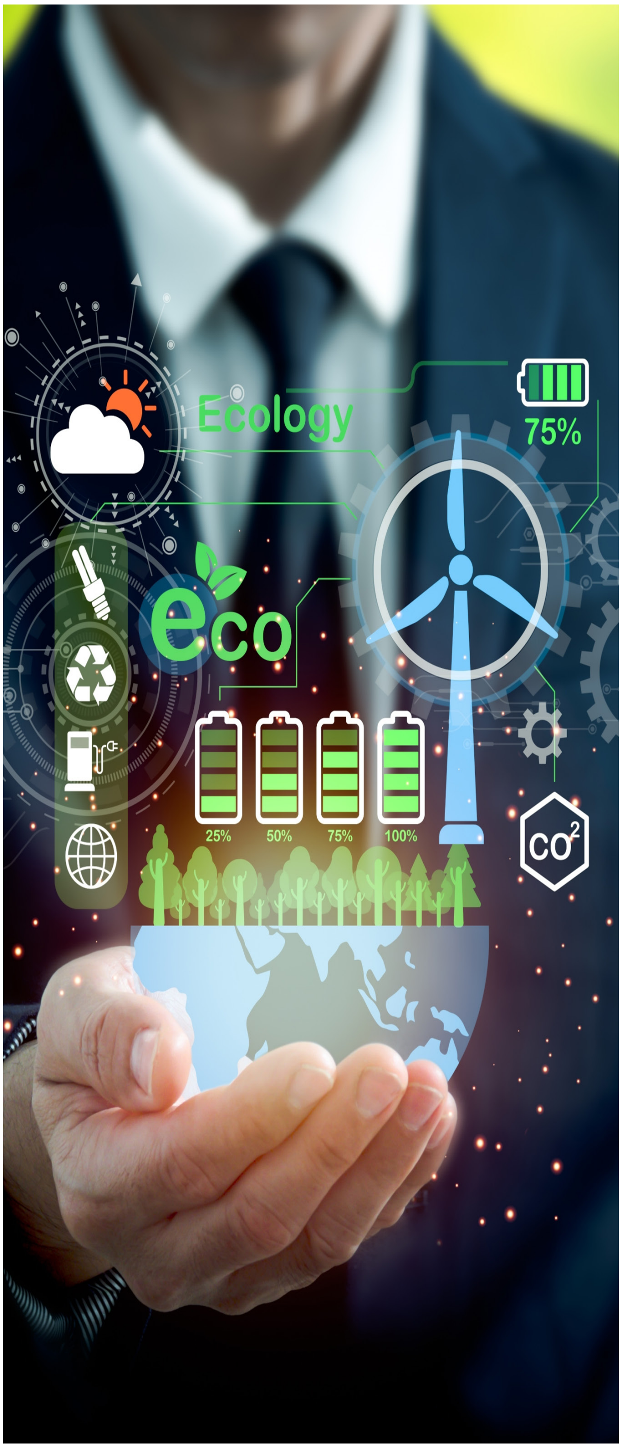
This research paper is a Special Report published by the Al-Attiyah Foundation. Each Special Report focuses on a prevalent current affairs topic that has ramifications for the energy industry and wider community. The papers are distributed in hard copy to members, partners, and universities, as well as made available online to all Foundation members.

- Uncertain timing of peak gas demand: As a finite resource, natural gas will run out if consumption continues. Its consumption and production will also peak[1]— although energy analysts present widely diverging forecasts on when. Some scenario analysis indicate a plateau or peak in the 2030s (as climate policies tighten), whereas others anticipate continued growth with no clear peak before 2050. This range reflects high uncertainty in long-term demand trajectories under different policies and technology futures.
- Diverging regional trends: The mature markets versus emerging economies show contrasting gas demand paths. Declines or stagnation in Europe and North America are increasingly offset by robust growth in Asia Pacific, Africa, and the Middle East. These emerging regions' rising energy needs and coal-to-gas switching are expected to pull global demand upward, potentially delaying a peak. The timing of peak gas thus depends greatly on Asia's trajectory – rapid renewables shift in Asia would bring an earlier peak, while sustained growth in Asian gas use could push the peak back [2,3].
- Policy drivers and climate constraints: Government policies are pivotal in shaping gas demand. Air quality and energy access initiatives in developing economies (e.g. policies promoting gas over coal) are bolstering gas consumption, alongside traditional drivers like industrialisation and population growth. Concurrently, climate policies and decarbonisation goals are

beginning to impose constraints on gas use. The net effect is that gas currently enjoys policy support as a cleaner alternative to coal and oil, but stronger climate action could cap demand growth sooner than industry projections assume.

- Technological shifts affecting gas's role: Advances in clean energy technologies are intensifying competition for natural gas, while innovations are also emerging to reduce gas' carbon footprint. Rapid cost declines in renewables and improved battery storage are gradually reducing reliance on gas for power generation, and electrification (e.g. electrification in industry, residential sectors, heat pumps for heating, electric vehicles) threatens portions of gas demand. Conversely, new technologies like carbon capture, utilisation and storage (CCUS) and "blue hydrogen" (hydrogen from natural gas with carbon capture) are being developed to keep gas viable in a low-carbon future. Widespread deployment of methane emission controls and carbon capture could enhance gas's environmental credentials, allowing it to remain a "bridge fuel" even under stricter climate regimes.

- Strategic implications for industry and policymakers: The wide scenario spread for [1] peak gas demand underscores the need for robust, flexible strategies. Energy companies and governments are advised to adopt scenario-based planning and stress-test investments against low-demand cases. Long-lived infrastructure projects (pipelines and liquefied natural gas terminals) carry the risk of underutilisation or stranded assets if an early demand peak occurs. Mitigating this risk may involve designing infrastructure with modularity or retrofit options (e.g. LNG import terminals convertible for ammonia/hydrogen use) to ensure assets remain useful in a carbon-constrained future. Preparing for multiple outcomes will be critical to navigating the transition while avoiding over-investment in assets that climate policies might render obsolete.



05 BACKGROUND

Analysts and policymakers have recently renewed attention to the concept of 'peak gas [1]. While historically rooted in concerns about supply exhaustion, particularly in the U.S. context during the 1970s and early 2000s, the modern discourse on peak gas is now firmly centered on demand. In contrast to Hubbert's[1] original peak theory, which focused on finite geological limits, the peak in global natural gas consumption—if it materialises—will now likely be the result of structural shifts in energy systems, including the deployment of low-carbon technologies, policy interventions, and market competition from renewables.

Global gas demand has continued to grow over the past decade, with 2024 marking a new all-time high to date. Many stakeholders perceive natural gas as a 'transition fuel' due to its lower carbon intensity compared to coal and oil, its flexibility in balancing variable renewable energy, and its role in improving urban air quality. Yet, natural gas also faces increasing scrutiny due to its methane emissions and the need for deep decarbonisation in line with net-zero goals. There remains a view that gas could act as a 'destination fuel,' maintaining a long-term role due to its flexibility and dispatchability. Uses in generation for rolling reserves and ancillary services will require the rapid responses associated with gas turbine powered generation.

It is essential to understand the factors affecting peak gas and its aftermath to plan effectively for planning for future supplies and demands. These factors are scrutinised in the following pages of this report.

Table 1: World Gas Production & Table 2: Proven Reserves [3,4]

Table 1: World Gas Production

BCF/Day	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
USA	68	72	70	72	81	90	89	91	96	100	100
Middle East	56	58	60	61	62	64	64	66	68	70	71
Asia Pacific	53	55	57	60	62	64	63	66	67	67	68
Russia	57	57	57	61	65	66	62	68	60	57	61
Rest of World	99	98	99	102	103	100	95	101	101	99	98
World	333	340	343	356	373	384	373	392	392	393	398

Table 2: Proven Reserves

TCF	2014	2015	2016	2017	2018	2019	2020	P R* 2020 Years
USA	353	283	318	424	459	459	459	16
Middle East	2755	2719	2755	2649	2684	2684	2684	127
Asia Pacific	494	530	530	565	565	600	600	29
Russia	1236	1236	1236	1342	1342	1342	1307	64
Rest of World	1624	1624	1660	1660	1624	1624	1589	51
World	6463	6392	6498	6639	6674	6710	6639	54

•Production Reserve Ratio in Years. Some countries create uncertainty by declining to fully declare their reserves. Shale and tight gas production and their reserve definitions also add to uncertainty.

Long-term projections diverge substantially. Some scenarios, particularly those aligned with stringent climate targets, project a peak in global gas demand around the mid-2030s. Others, notably those published by producer-aligned institutions, foresee sustained demand growth through 2050, driven by industrialisation, energy access imperatives, and fuel switching in Asia, Africa, and the Middle East. In this context, the timing and shape of a potential peak gas trajectory will be determined by the interplay between energy security, affordability, and climate ambition.

At regional level, the Asia Pacific stands out as the key driver of global gas demand. Countries such as China, India, and members of Association of Southeast Asian Nations(ASEAN) are actively expanding their gas infrastructure to support coal-to-gas switching and meet rising electricity and industrial needs. These developments are likely to offset demand declines in mature markets such as Europe and North America.

Globally, energy choices, particularly how far it integrates CCS technologies, develops blue hydrogen, and balances gas with renewables, will heavily influence whether the global gas market experiences a structural peak or merely a temporary plateau.

Against this backdrop, natural gas has often been termed the "last fossil fuel standing." Compared to oil and coal, gas enjoys a cleaner reputation and a versatile role – it not only provides baseload and peaking power but also serves in heating, industry, and as a chemical feedstock. Abundant supply and the ability to partner with intermittent renewables (by ramping up quickly when solar or wind output dips) have positioned gas as a key transition fuel. Consequently, many baseline projections show continued growth in global gas demand well into mid-century.

07 UNDERSTANDING THE PEAK CONCEPT AND SCENARIO-BASED PROJECTIONS FOR FOSSIL FUELS

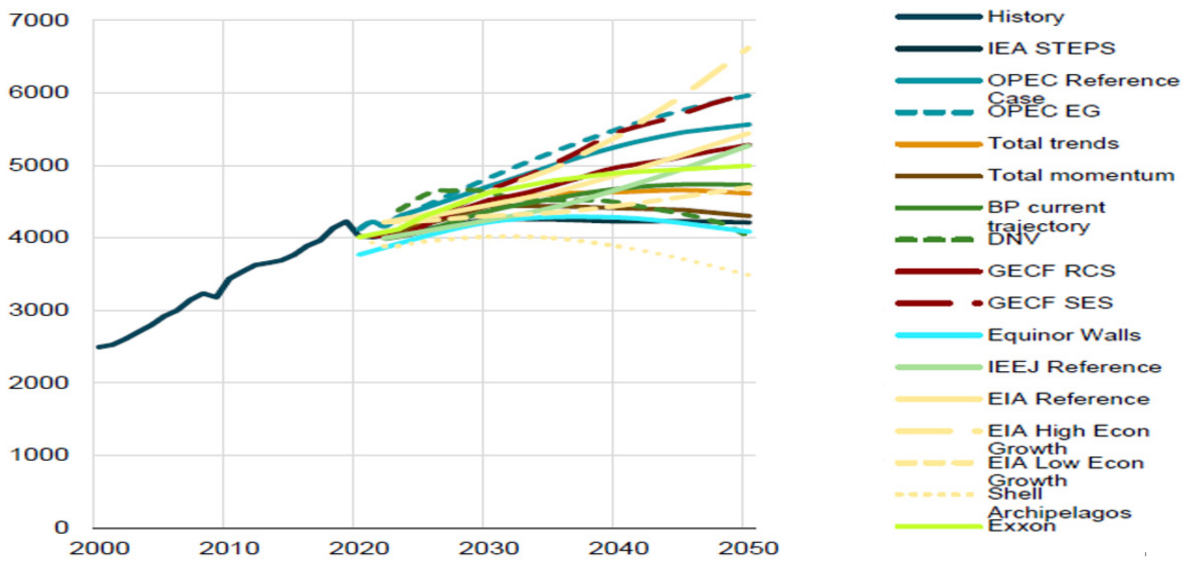
Peak gas refers to the point in time when global natural gas consumption reaches its highest level, after which it enters a decline. The term is drawn from Hubbert 's [1] peak theory (originally applied to oil), which posited that production of a finite resource follows a bell-curve – rising, peaking, then falling as reserves deplete. In practice, for gas, the peak is expected to be driven not by outright resource exhaustion, as natural gas reserves remain abundant, but by peak demand: a structural decline in consumption due to competing energy sources and policy constraints. Historically, concerns about U.S. gas supply in the 1970s and 2000s led to discussions of "peak gas production," but technological advances (e.g. shale fracking) postponed any supply-driven peak. Today, the focus has shifted to demand-side peak gas as the world attempts to transition away from fossil fuels. At the same time, there are important similarities and differences between peak gas and the peak of oil or coal. All refer to a maximum usage point, but the drivers differ.

Natural gas is one of the global enablers meaning it could reduce emissions by replacing carbon-intensive fuels, such as coal and back up intermittent renewables on a continual basis. While natural gas is cleaner than other hydrocarbons, recent technological advancements and larger deployment of decarbonisation options are further reducing its environmental impact. CCUS and methane abatement technologies are helping to minimise emissions across the natural gas value chain. In addition, blue hydrogen emerges as an effective tool for decarbonising sectors that rely on high-temperature processes. Together, these technologies are expected to enhance the role of natural gas as a cleaner energy source, helping to establish a leading position of this energy source in the long term. There have been a diverse set of scenarios produced by many agencies. These are illustrated below in Figure 1.

Driven by multiple factors — strong policies to improve air quality and cut greenhouse gas (GHG) emissions, continued switching from oil and coal to gas, flexibility and backup support for solar, wind, and hydropower during droughts, universal access to clean cooking, and traditional drivers such as population growth, industrial development, and rising electricity demand — natural gas demand is expected to grow. Well-positioned to support just, equitable, and cost-effective energy transitions, its flexibility and lower carbon intensity make it a valuable partner in building a resilient and sustainable energy future.

In aggregate, regional trends are diverging. Declines in Europe and in North America are increasingly offset by growth in Asia Pacific, Africa and the Middle East. This is why some forecasts from producer-aligned groups see no global peak by 2050 – they argue emerging markets will continue to pull demand upward.[2] For instance, the Organization of the Petroleum Exporting Countries' (OPEC) outlook expects all fuel demand (except coal) to keep rising through 2050, with natural gas growing by 20.5 mboe/d from 2023 to 2050, making it the largest absolute growth of any fuel after renewables.[2] The Gas Exporting Countries Forum (GECF) similarly forecasts 32% growth in gas demand by 2050 to reach 5,317 bcm, "with no peak in sight" with all regions, except Europe and North America increasing gas usage. By contrast, the International Energy Agency (IEA) and Western oil majors' scenarios suggest that growth in Asia will slow, and global demand will plateau by around 2040. For example, the IEA STEPS sees global gas demand flatten in the late 2020s and peaking around 2035. BP's "Current Trajectory" scenario projects continued mild growth to 2040-2045, primarily due to emerging economies. The balance of regional trends will determine which vision comes true. If Asia and others follow a high-growth path for gas, the peak is delayed. If they leapfrog to renewables, the peak can be anticipated in 2040s.

Figure 1: Scenarios for Gas Demand (BCM)



Source: IEF outlook comparison report, 2025.
Note: Reference Cases and Evolving Policies scenarios are used from IEA WEO 2024, OPEC WOO 2024, Equinor Energy Perspectives 2024, IEEJ Outlook 2024, EIA IEO 2023, Shell Energy Security Scenarios 2023, Total Energy Outlook 2024, DNV's Energy Transition Outlook 2024, BP Energy Outlook 2024, GECF Global Gas Outlook 2025, ExxonMobil Global Outlook 2024.

09 GLOBAL GAS DEMAND TRENDS AND KEY DRIVERS SUPPORTING ITS GROWING USE

Following the supply shocks of 2022 and 2023, global natural gas markets began to stabilise, returning to a trajectory of structural growth in 2024. Global gas demand reached a new all-time high, with over three-quarters of incremental consumption stemming from emerging markets and developing economies. Total global gas consumption is estimated to have increased by 2.5% (approximately 100 bcm), reaching 4,170 bcm in 2024. This marked acceleration outpaced the average annual growth rate of around 2% recorded during 2010–2019 and significantly exceeded the modest 1% average between 2019 and 2023, a period impacted by the COVID-19 pandemic and subsequent energy crisis.

The resurgence in demand was underpinned by strong economic performance in key regions, including Asia Pacific, North America, and Eurasia, which drove higher electricity consumption and an industrial rebound.

A notable decline in gas prices[5,6] from the 2022 peaks further stimulated demand across power generation, industry, and other sectors. Additionally, supportive energy policies encouraging fuel switching from coal and oil to gas, particularly in industry and power generation, contributed to demand growth. Seasonal factors also played a role, with an unusually cold 2024/2025 winter and record-high summer temperatures driving increased consumption in the residential, commercial, and electricity sectors.[3]

Natural gas is used across all sectors with power generation, industry, and residential and commercial accounting for over 85% of the total gas demand.

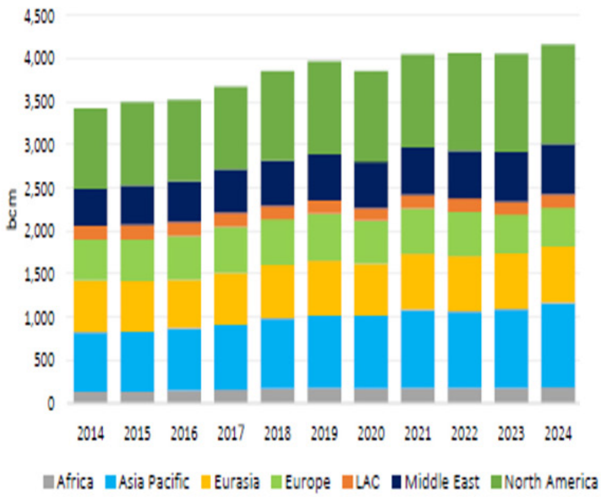
Power generation is the single largest sector for gas use globally, responsible for an estimated 40% of total gas consumption in 2024.

Roughly 22% of global electricity came from gas-fired power plants (Figure 3). The power sector has been a growth driver for gas, especially in regions aiming to retire coal, specifically Asia where coal-fired generation accounts for 57% of regional power generation mix.

Anticipated increase in gas-in-power demand is driven by rising electricity needs (expected to double by 2050 relative to 2023 levels) and policies to phase down coal-fired power generation capacity. Moreover, as renewables capture a greater share of the global power generation mix, natural gas-fired plants will play a crucial role, providing essential flexibility and backup support to solar and wind power, and to hydropower during periods of drought.

Regionally, Asia Pacific, where coal-fired generation remains dominant, and Africa, with its high levels of energy poverty, are anticipated to make the largest contributions to sectoral demand growth.

Figure 2: Global Gas Consumption by Region, 2014-2024, and by Sector In 2024 (bcm)



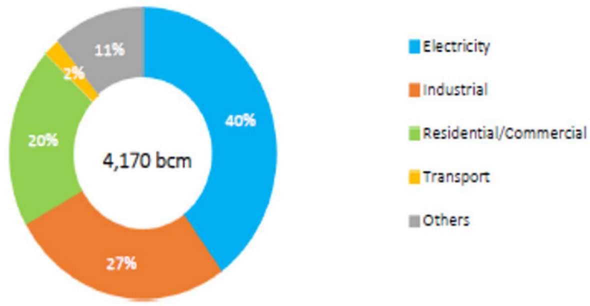
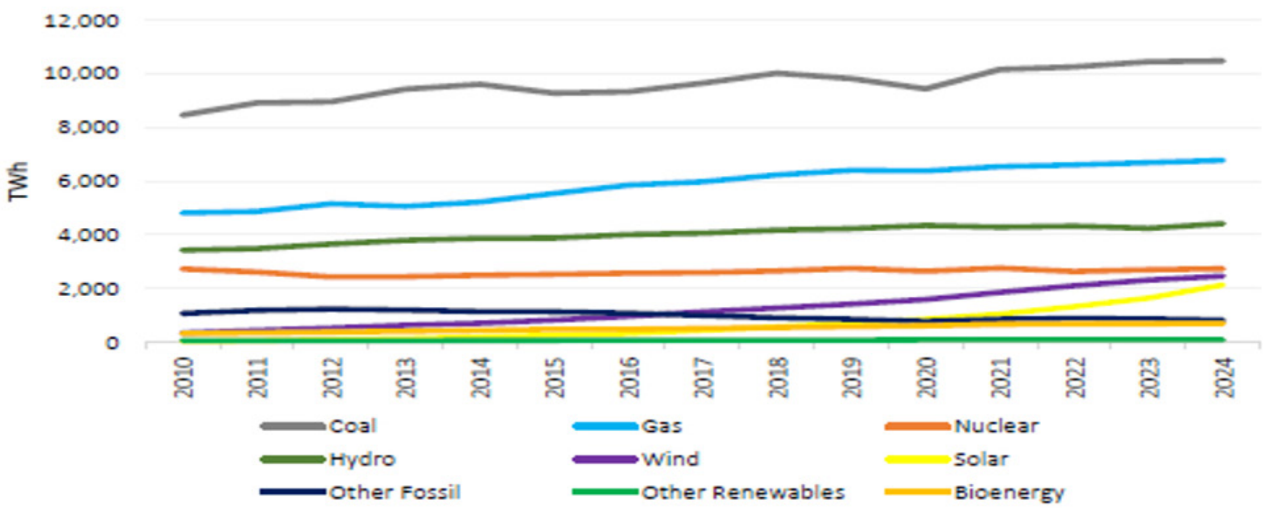


Figure 3. Global Electricity Generation by Source (2010–2024) (TWh)



Source: Ember and The Energy Institute Statistical Review of World Energy

At the same time, the role of natural gas as a flexible and dispatchable source is expected to be in demand across all regions, even as storage technologies advance. Synergies with CCUS further enhance gas-in-power demand, significantly contributing to low-emission electricity generation.

Industrial uses of gas (including fuel and feedstock) account for 27% of global gas consumption. Further gas demand expansion in this sector is underpinned by traditional drivers such as ongoing industrialisation in developing countries and population growth, while policy-driven initiatives to reduce emissions will act as a significant catalyst, favouring coal- and oil-to-gas switching. Natural gas is likely to play a growing role in providing heat and steam across energy-intensive industries, particularly in chemical and petrochemical production, non-metallic minerals, iron and steel, as well as a broad range of light manufacturing, and retain its position as a primary fuel suited for medium and high-temperature processes.

Some natural gas reliant industries plan to deploy of CCUS/CCS, influenced by carbon market developments. This evolving trend enhances the environmental credentials of natural gas and facilitates the decarbonisation of assets on a cost-competitive basis.

Over the long-term, industrial gas demand could be eroded by electrification of low-temperature heat, use of hydrogen (for high heat or as feedstock replacing gas-based hydrogen), and general efficiency improvements. However, these shifts are likely to be gradual and sector specific. Developing countries' industrialisation can still boost gas use. For example, some manufacturing sectors in Asia and Africa are adopting gas for cost and environmental reasons. So, industrial gas demand may continue growing in absolute terms in India, China, and the Middle East.

The residential and commercial sector uses gas primarily for space heating, water heating, and cooking. It represents roughly 20% of global gas consumption. Gas use in buildings varies seasonally, peaking in winter for heating in colder climates. In regions like Europe, North America, and parts of Asia, gas has been the dominant heating fuel. Many developed countries have seen flat or declining gas demand in buildings in recent years due to efficiency improvements (better insulation, more efficient boilers, etc.) and demographic trends.

Longer term, this sector may feel the strongest downward pressure because of electrification, energy efficiency improvements, and building retrofits.

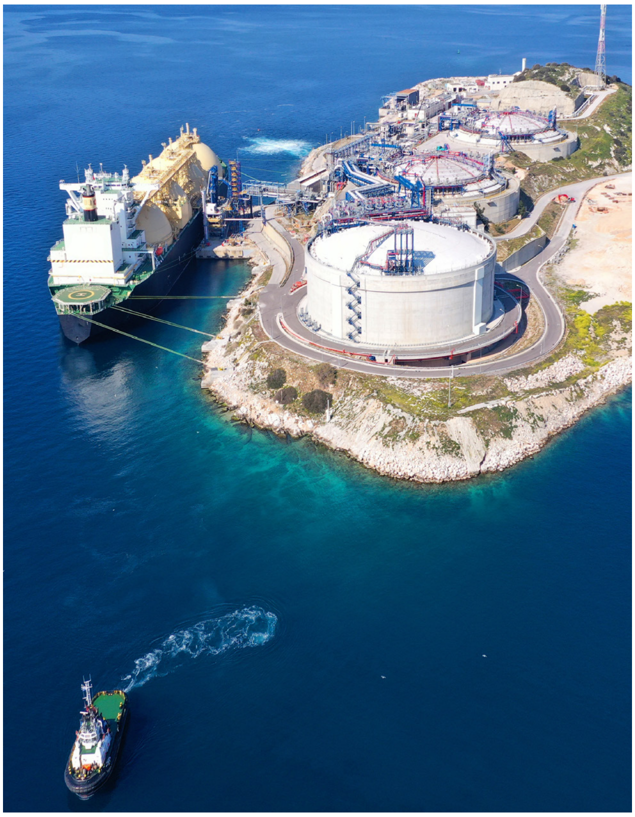
Particularly, electric heat pumps are a technology ready to replace gas boilers, and many jurisdictions (especially in Europe) are setting policies to phase out new gas heating systems by the 2030s. Alternative heating options (such as biomethane, low-carbon hydrogen or renewables) may also limit the scope for natural gas to develop.

On the other hand, in developing markets, there is a new uptake of gas in buildings (e.g. expanding urban gas distribution in China and India for cooking and heating to improve air quality versus coal/biomass). Programmes to improve access to clean cooking, particularly in sub-Saharan Africa, are expected to represent an additional area for natural gas, enabling the move away from traditional biomass use in the residential segment. However, given the momentum of electrification and the relatively easier replacement of gas in buildings (compared to industrial processes), many scenarios see buildings' gas demand peaking and declining in the long-term.

In the transportation sector, natural gas use in transport is currently small (2% of total gas demand) but it is expected to grow. Specifically, in marine transport, the International Maritime Organization's (IMO) introduction of the global cap of 0.5% sulphur content has favoured LNG to gain traction, while anticipated stricter regional regulations, such as Emission Control Area requirements (with 0.1% sulphur limit), as well as rising orders for LNG-powered vessels maintain high expectations for fuel use at a global level. Based on data from DNV, by the end of 2024, 641 LNG-powered ships were in operation. According to the orderbook, this number is expected to double by the end of the decade. However, LNG-powered ships remain a small share of the global shipping fleet.

The shipping industry is focused on meeting long-term decarbonisation targets set by the 2023 IMO GHG Strategy. However, many alternative fuels, such as hydrogen and ammonia, are in a nascent stage of development, and face commercial and technical limitations. In its turn, LNG is well-positioned to offer enhanced competitiveness due to its extensive LNG infrastructure and supply chains. It also provides significant advantages by complying with future requirements for major types of emissions, contributing to an improvement in overall air quality.

In road transport, many countries are adopting stricter environmental requirements for vehicles due to pollution linked to the use of traditional liquid fuels. In this context, mature CNG and LNG technologies may represent a bridge to sustainable and decarbonised mobility in the future.



Favourable government policies and the expansion of refueling infrastructure will drive demand, particularly due to the prospects of using LNG and CNG powered trucks, as a competitive and more environmentally friendly alternative to diesel.

The outlook here is mixed: gas as a transport fuel could see moderate growth in the 2020s and 2030s, but longer term, electric vehicles and zero-carbon fuels (like ammonia or hydrogen in shipping) could limit gas's role. Still, some scenarios (e.g. Shell, GECF) see notable LNG demand from trucking and shipping, driving part of the continued gas use growth into the 2040s[7].

Blue hydrogen generation is set to emerge as an additional avenue for increased natural gas demand, aligning with countries' efforts to scale up the deployment of low-carbon hydrogen in various sectors. Industries currently use very little gas for blue hydrogen generation, although its input is set to increase in tandem with CCS infrastructure development.

The attractiveness of blue hydrogen is due to the maturity of its technology; its lower cost compared to green hydrogen; and synergy with the existing natural gas infrastructure. Growth potential lies in the development of an internationally traded hydrogen market, akin to the current LNG market, in the anticipation of the evolution in hydrogen liquefaction and storage technologies. Countries are expected to accelerate the substituting of grey hydrogen with blue hydrogen as they pursue their climate targets.

A variety of forces are acting to temper the growth of natural gas and could lead to a plateau in demand globally. On the supply side, climate policies and technological shifts are constraining gas's role, while on the demand side, efficiency and fuel-switching are reducing gas consumption in key sectors. The major drivers include:

- **Stringent climate policies and emission targets:** The adoption of national and international climate commitments is a primary driver curbing gas demand growth. Dozens of countries have pledged to reach net-zero greenhouse gas emissions by mid-century. Achieving these targets inherently means sharply reducing fossil gas use, unless its emissions are abated. For example, the EU's "Fit for 55" package and climate law aim to cut greenhouse gas emissions by 55% by 2030 and reach net zero by 2050. More globally, the IEA calculates that to limit warming to 1.5 C, gas demand in 2030 would need to be almost 20% below 2021 levels and "peak well before 2030", then continue falling. Governments are implementing ambitious policies like carbon pricing and clean energy mandates to directly discourage gas use in favour of low-carbon alternatives, especially in power generation.

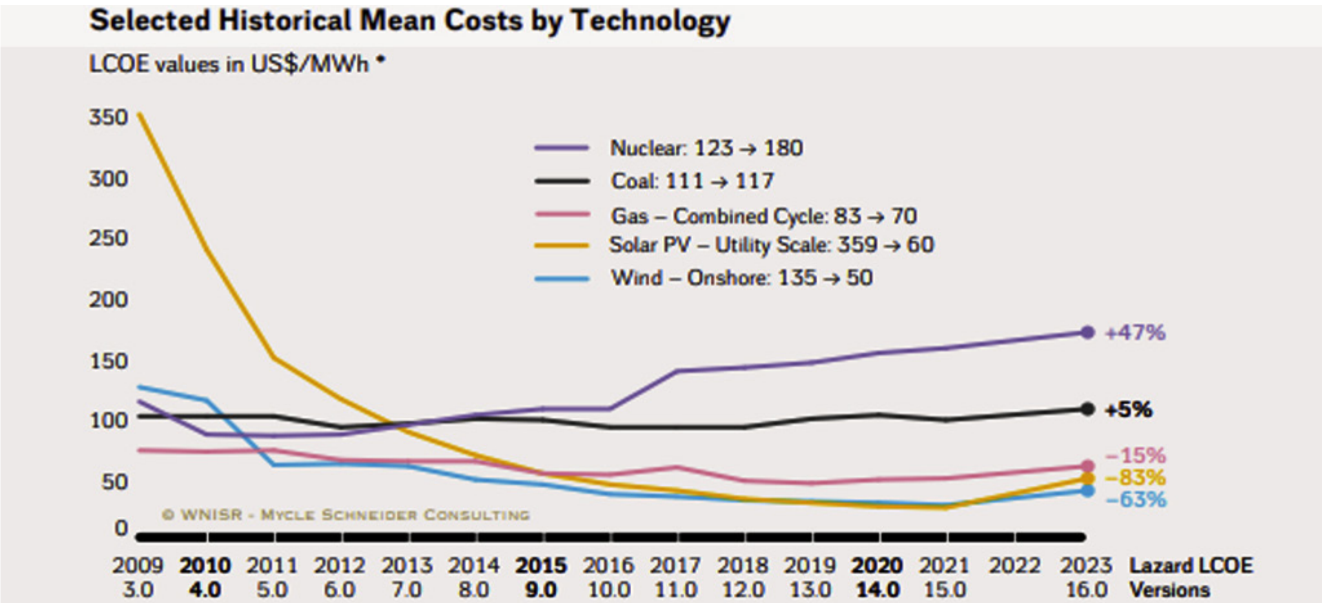
- **Methane emissions constraints and regulation:** As natural gas is primarily comprised of methane (a potent GHG), there is growing pressure to minimise methane leakage and venting across the gas supply chain. Regulations and voluntary initiatives (e.g. the Global Methane Pledge to cut methane 30% by 2030) are being implemented to plug leaks, end routine flaring, and impose stricter controls on gas production and distribution. While these measures primarily target emissions, they can also impact gas supply costs and operations. For instance, operators may choose to halt or avoid marginal gas field development if they unable to economically curb methane leaks, reducing future supply and raising gas prices. Higher costs, in turn, dampen demand growth. Moreover, if policymakers impose carbon intensity standards or import tariffs based on methane emissions (the EU is considering a methane performance standard for gas imports), high-leakage sources of gas could be priced out, effectively constraining supply to the market. In a broader sense, the social license of natural gas is eroding due to methane's role in climate change. Scientific scrutiny has revealed larger-than-reported emissions in many gas systems. This has led some governments (and investors) to question new gas infrastructure, accelerating the pivot to alternatives.

- **Renewable energy penetration:** The rapid rise of renewable energy – especially wind and solar power – is a game-changer for gas demand, particularly in the electricity sector. In 2024, global renewable power capacities increased by 585 GW, a record-breaking annual addition, to reach 4,448 GW in 2024, according to the International Renewable Energy Agency (IRENA). Most of the expansion came from new solar (+452 GW) and wind capacities (+113 GW), followed by hydropower to a lesser extent (+15 GW). A record surge in renewables spearheaded by solar power pushed clean electricity's share to 40.9% of global electricity in 2024, up from 39.4% in 2023. 2024 was the first year that low-carbon sources delivered more than 40% of global electricity.

The economics of renewable electricity have improved dramatically, making clean power not only environmentally desirable but also financially attractive. Over the last decade, the average cost of utility-scale solar PV electricity fell by about 83% (2010–2023), and onshore wind costs fell 63%. These steep declines, driven by tech innovation and economies of scale, mean that new solar and wind projects are now frequently cheaper than new fossil-fueled plants – and often competitive with existing ones.

Lazard's latest Levelized Cost of Electricity (LCOE)[6] report finds onshore wind costs around \$27–\$73 per MWh and utility-scale solar PV \$29–\$92/MWh. These ranges are wide but are well below the costs of new fossil fuel generation: for example, coal-fired power is roughly \$69–\$169/MWh (nearly double the

Figure 4. The declining costs of renewables vs. traditional power sources[6]



average cost of solar) and peaking natural gas plants range $110–$228/MWh. Nuclear power remains costly as well, with an average LCOE around $182/MWh for new plants. In short, wind and solar now beat fossil fuels on cost in most regions, even before considering carbon prices or environmental benefits. This cost advantage is a key driver of the rapid uptake of renewables.

Utility-scale battery installations are growing rapidly in countries like the US, Australia, and China. Other storage forms – pumped hydro, thermal storage, even green hydrogen production – are being pursued to provide seasonal or long-duration storage. Hydrogen is particularly noteworthy: surplus renewable power can be used to electrolyse water, producing hydrogen as a fuel for industry or backup power. While currently a small factor, many countries see "power-to-X" (hydrogen, e-fuels) as a way to absorb very high renewable output in the future and decarbonise sectors beyond electricity.

Solar PV technology continues to improve. New cell materials and designs (such as perovskite solar cells and tandem cells) promise higher efficiency panels. Manufacturing innovations (like larger silicon wafers and AI-optimised production) are cutting PV costs further. In wind, turbines are growing ever larger and more efficient – offshore wind turbines now exceed 15 MW per unit, capturing more energy with each installation. Floating offshore wind platforms are another innovation, allowing turbines to be deployed in deeper waters, vastly expanding the available windy sites. Advanced wind farm designs (using better aerodynamics and smart controls to reduce wake losses) are boosting output. Robust policy support is critical in driving the renewables boom in the power sector. Virtually every major economy has implemented frameworks to promote renewable electricity, from mandates and targets to subsidies and market mechanisms. At COP28, governments pledged to triple renewables capacity, with major economies aiming for at least a 50% increase in renewable capacity or generation by 2030. These targets are embedded in strategic plans and policy documents, including the EU's national energy and climate plans, China's 14th Five-Year Plan, India's National Electricity Plan, Japan's 7th Strategic Energy Plan, South Korea's 11th Basic Plan for Power Supply and Demand, and various U.S. state-level renewable portfolio standards, among others.

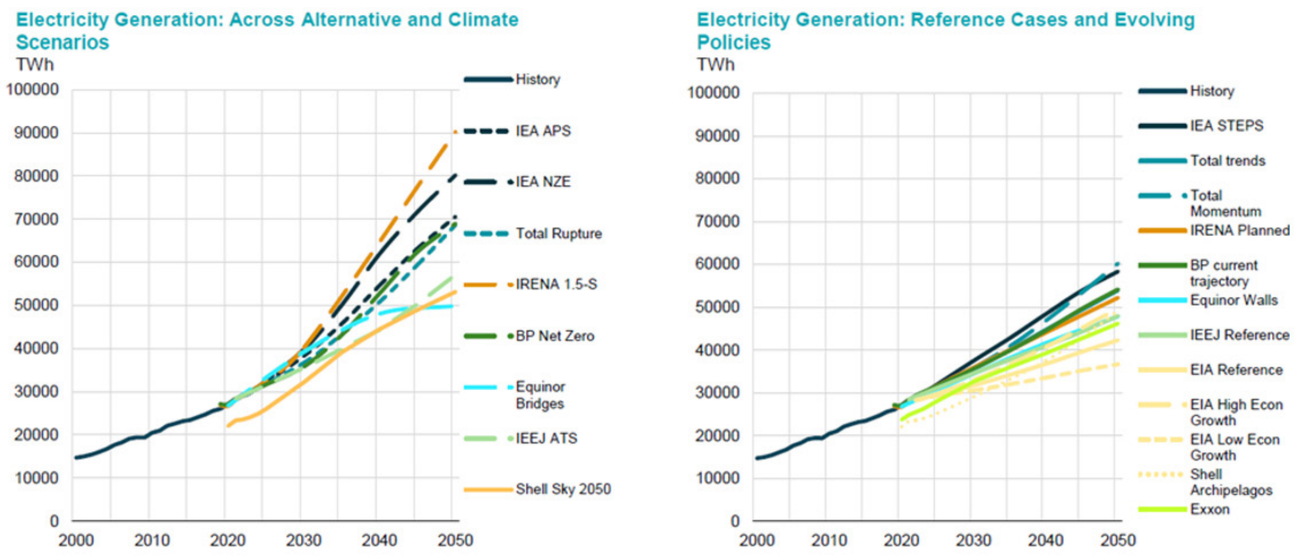
Importantly, the improvements in energy storage (batteries) and grid management mean renewables can cover more of peak load and baseload requirements than were traditionally met by gas. While the focus is on new technologies, existing dispatchable power plants can continue to play a supporting role in renewable integration. Natural gas plants are generally more flexible and can ramp up or down quickly to adjust to the fluctuating supply from renewables like wind and solar. This quick response time makes natural gas a suitable choice for balancing the intermittency of renewable sources. However, ongoing innovation in long-duration energy storage, sector coupling (e.g., converting excess electricity into heat or hydrogen), and smart grid technologies offer promising pathways to address these issues.

Coal currently dominates global electricity generation fuels. It is argued by some that coal could be poised for a steep decline over long term. However, some Asian countries, especially China and India, have announced the construction of new coal-fired power plants as they have large and cheap domestic coal supplies. The decline in coal is dependent on how strongly commitments to climate change targets are followed. The commitments appear to be price sensitive to fossil fuel prices!

Gas-fired power generation is expected to maintain its current share of 22% over this decade, before declining in subsequent years. Meanwhile, natural gas can play a crucial role as a reliable and flexible energy source, particularly in complementing the increasing share of intermittent renewables in power systems.

Analysts expect hydropower to experience annual fluctuations due to varying precipitation and air temperatures, but the overall trend points toward gradual growth. Similarly, nuclear power is projected to increase steadily, driven by policy support and new constructions. However, while both hydropower and nuclear energy are

Figure 5: The outlook for global electricity generation7



Source: IEF outlook comparison report, 2025.7 anticipated to see gains in absolute output, their shares in the global power generation mix are projected to decline.

Renewables, led by solar PV and wind, are set to play a much larger role over the next decade. However, as electricity demand is also rapidly increasing, their share of the generation fuel mix is not increasing so rapidly as many expected. Again, this varies considerably which scenario one adopts! At the same time, integrating solar and wind at scale requires significant grid modernisation and enhanced power system flexibility, including through the development of backup generation and energy storage technologies.

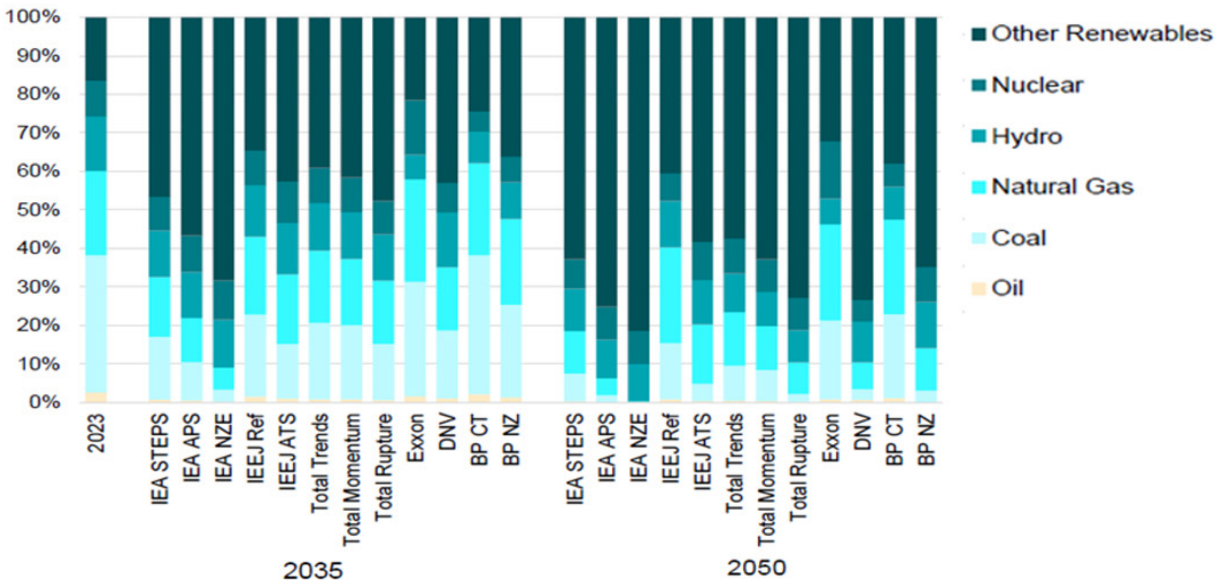
By 2050, longer-term scenario analyses shows renewables becoming a major source of electricity globally. In many pathways consistent with the Paris Agreement, renewables (mostly wind and solar) supply 50–80% of global electricity by mid-century, with most of the remainder from nuclear, hydropower, and a small fraction of fossil fuels.

Gas-fired power generation is set to maintain its current share of 22% over this decade but decreasing thereafter in a range of scenarios. Meanwhile, natural gas can continue to play a crucial role as a reliable and flexible energy source, particularly in complementing the increasing share of intermittent renewables in power systems.

Hydropower is expected to experience annual fluctuations due to varying precipitation and air temperatures, but the overall trend points toward gradual growth. Similarly, nuclear power is projected to increase steadily, driven by policy support and new constructions. However, while both hydropower and nuclear energy are anticipated to see gains in absolute output, their shares in the global power generation mix are projected to decline.

Reference and evolving policy scenarios still see more than 40% of electricity generated sourced from fossil fuel by 2050. Implying that without much stronger policies, renewables growth might mainly add to the new supply rather than displace gas-fired generation.

Figure 6. Global electricity generation forecast to 2050 across scenarios (TWh)[8]



- **Energy efficiency improvements:** Better efficiency in energy use means less fuel needed for the same output. This is a quieter but potent driver. For gas, efficiency gains are happening in multiple areas: more efficient power plants, improved insulation and heating system efficiency in buildings, and more efficient industrial processes. Building efficiency is especially impactful for space heating demand. Retrofits in Europe or North America, adoption of smart thermostats, etc., have been flattening heating demand even before electrification takes over. Industrial processes are also being optimised to use less energy (often motivated by cost). More efficient industrial processes, high-performance buildings, and efficient appliances mean less gas is required to deliver the same energy services.

- **Fuel switching to green hydrogen and renewables in end-uses:** Green hydrogen is emerging as a potential substitute for natural gas in various applications, from heating to industrial feedstock. Green hydrogen (produced via electrolysis using renewable electricity) can replace natural gas-derived hydrogen in refineries and fertiliser plants, cutting gas demand. It can also be used in steelmaking, reducing the need for natural gas in direct reduction processes. Some countries plan to inject hydrogen into gas grids or convert gas pipelines to carry pure hydrogen, envisioning a long-term transition of the gas network to zero-carbon molecules. If green hydrogen scales up in the 2030s and 2040s, it could directly displace some volumes of natural gas that is currently combusted for heat or used as feedstock. Additionally, biogas and biomethane (captured from waste) can replace fossil gas in pipelines and power plants, albeit resource potential is limited.

Overall, the above-mentioned factors can create a strong headwind for natural gas. They contribute to global energy scenarios in which gas demand is peaking at about 2035-2040. In more accelerated transition cases, gas demand starts to shrink after a plateau, reflecting many of the above drivers kicking in mid-century.

Meanwhile, continued global gas demand growth is plausible under scenarios where developing regions prioritise affordable energy and incremental environmental gains (replacing coal, biomass, etc.) over deep decarbonisation in the near term. Under such conditions, gas serves as a vital fuel for raising living standards and complementing renewables. Incremental demand growth from emerging markets in Asia, particularly India and Southeast Asia, Africa, and the Middle East could offset declines in mature markets. The tension between this development-centric growth and the need for climate mitigation defines the uncertainty in gas's future.

The Asia Pacific region holds potential for burgeoning energy demand growth, given the compounded effects of dynamic economic and population drivers. The region's GDP is expected to more than double in size and its population will increase by 10% to 4.76 billion people by 2050. It is estimated that 954 million additional people will be living in the urban areas of Asia Pacific.

At the same time, the main trait that unites countries in Asia Pacific is a strong policy push to improve air quality. The focus is thus on cutting coal dependence: coal at present accounts for around 47% of the regional energy mix. These priorities may pave the way for a substantial increase in natural gas use, supporting Asia's energy transition journey.

Natural gas use is anticipated to increase across all sectors in the region and the key drivers of this shift are electrification, policy measures encouraging coal- and oil-to-gas switching, and significant investments in gas infrastructure. This encompasses the development of new regasification capacity, the expansion of transmission and distribution networks, and other initiatives. In the long-term, net-zero carbon commitments around the region will require an increasing role for carbon capture and hydrogen if natural gas is to continue growing its markets.

On a country level, China, India and Southeast Asia are set to be the primary growth centres in Asia Pacific. Meanwhile, Japan and South Korea are projected to be the only countries to witness declines in natural gas demand due to nuclear restarts and growing renewable capacity. However, the reliance on LNG will continue to be a key component of their decarbonisation strategy and energy security.

In China, natural gas is set to play a crucial role in country's low-carbon transition, diversifying China's coal-dominated energy mix (coal accounted for 59% in 2023) and supporting efforts to improve air quality. On top of this, China's pledge to become a carbon-neutral economy by 2060 as well as its goal to peak emissions before 2030 provide significant boost for natural gas demand to expand in the coming decades.

China is the single most influential country for Asia Pacific gas demand outlook, and forecasts universally see China's gas consumption rising through at least two coming decades, though with varying long-term outcomes. Many reference scenarios anticipate significant further growth. For example, the GECF outlook[3] highlights China gas demand to rise from 367 bcm in 2023 to 662 bcm by 2050, reaching a plateau in the mid-2040s. This trend is underpinned by economic expansion, urbanisation, wealthier households, coal-to-gas conversions, infrastructure buildout, and ongoing market reforms. Power generation will be the main driver for growth due to policy-driven expansion and the need for a flexible power source to facilitate renewables' deployment. Residential and commercial sectors as well as industry will also represent strong components of gas demand growth in China, but trends will stabilise after 2040 amid higher penetration of alternative clean energy options.

In all scenarios, China remains the largest Asian gas consumer by far, and even a plateau by 2040 would mean China's 2050 gas demand stays at high absolute levels. To meet its needs, China is investing in both pipeline gas (e.g. new import pipelines from Russia and Central Asia) and LNG infrastructure. By 2050, China's policy choices – balancing climate goals versus economic and energy security priorities – will heavily influence whether Asia-Pacific gas demand continues rising or hits an early peak. Most forecasts assume China will maintain a significant role for gas in its energy mix to support reliable power and industrial growth, underpinning at least moderate demand growth through 2050.

In India, gas demand will benefit from drivers similar to China. Air quality has become high in the priority list of policymakers. The country has strengthened its climate ambitions and pledged to achieve carbon neutrality by 2070. The recently adopted Long-Term Low Emission Development Strategy is a significant milestone, which is expected to speed up the transition and to be detrimental to the prospects of coal, limiting its rise in the future.

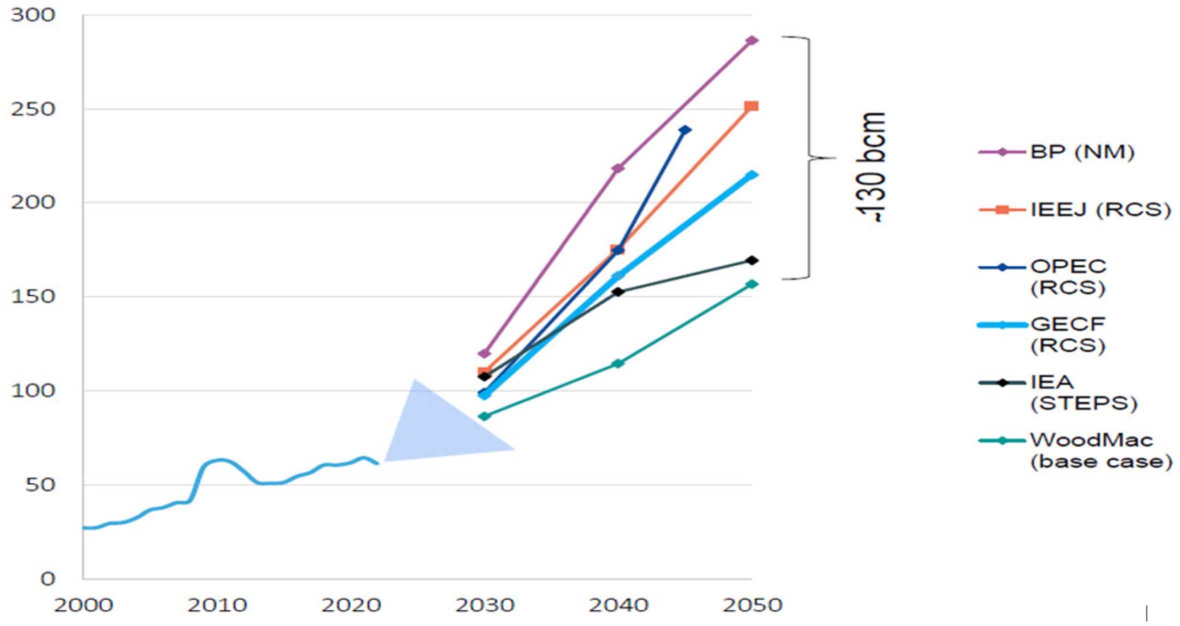
The government's vision to raise gas's share in the primary energy mix to 15% by 2030 also remains in place, with air quality improvement objectives adding momentum to the transition from oil and coal to gas.

The development of the National Gas Grid is crucial to improve gas accessibility. A huge investment programme for the expansion of pipelines and distribution grids is underway. To connect LNG terminals and domestic gas fields with demand centres and to remove existing infrastructure bottlenecks, India aims to add over 10,000 km of transmission pipelines within the framework of the national programme "One Nation, One Gas Grid". The expansion of the city gas distribution network is also set to accelerate following the 12th Bidding Round, which will bring additional natural gas for road transport, residential cooking, and a wide range of commercial users.

In this context, broad policy support, accompanied by the overall projections for India's economy and urban population, will translate into rapid growth of natural gas demand. By 2050, reference scenarios foresee India's gas use at several times current levels. The GECF[3], for instance, projects that India's consumption will rise from 66 bcm in 2023 to about 220 bcm by 2050, driven by extensive policy support and gas infrastructure development. This aligns with the narrative in OPEC and IEEJ outlooks that see India as a major source of incremental gas demand in the long run (Figure 9). Even the IEA STEPS (which is cautious on Asia as a whole) shows India's gas demand rising steadily through the 2040s under current policy settings, reflecting the country's enormous development needs and policy support for gas.

In the meantime, a more optimistic forecast will greatly depend on the pace of implementation of infrastructure projects, including new LNG regasification facilities, as LNG supplies will take the bulk of the strain to cater for rising demand.

Figure 7. Scenarios' Comparison for Natural Gas Demand in India (bcm)



Southeast Asia is widely seen as the third major demand center for gas in Asia Pacific, after China and India. The region's 10 ASEAN countries collectively consumed around 160 bcm in 2023, and most outlooks predict continued growth to 2050, fueled by power sector and industrial needs. In the IEA's STEPS scenario, Southeast Asian gas demand rises to 265 bcm by 2050, while the GECF assumes the growth to 350 bcm by 2050.

Nonetheless, the consensus reference view is that Southeast Asia's gas demand will grow through 2050, likely reaching 250–300 bcm or more, and that the region will shift from being a net gas exporter to a sizable net importer. Southeast Asia is expected to shift to a net gas importer around 2029–2030, as domestic gas production in countries either declines or grows more slowly than demand. This brings LNG imports to the forefront, driving an expansion of regasification capacity throughout the region. Enhanced interconnectivity and the development of LNG-to-power supply chains, including the development of small-scale LNG solutions, are projected to be crucial factors in supporting this shift.

All major LNG exporters and project developers are eyeing Southeast Asia as a key growth market. The region's governments, for their part, are balancing the affordability and security of gas supply versus alternatives. If LNG prices remain competitive and infrastructure is built out, Southeast Asia is poised to be a vibrant source of demand growth for the global gas industry in the coming decades, reinforcing Asia Pacific's overall prominence in the gas market.

Overall, robust long-term natural gas demand estimates in Asia Pacific are underpinned by policies aimed at improving air quality and reducing coal reliance in power generation and industry. Greater potential for coal-to-gas switching exists if gas-based infrastructure affordability grows and more favourable policy measures are undertaken. In the long-term, equipping industries and power generation with CCS technologies and advancing the use of blue hydrogen and its derivatives will be essential for maintaining the critical role of natural gas in Asia's journey toward a sustainable future.

The analysis of global gas demand trajectories reveals a complex, regionally differentiated outlook shaped by a mix of growth drivers and structural constraints. Natural gas continues to benefit from its position as a low cost relatively low-carbon fossil fuel, offering a cleaner alternative to coal in power generation and industrial heat applications. This points to a gas peak in the 2050's

Its flexibility and ability to complement intermittent renewable sources further reinforce its role as a balancing fuel in decarbonising power systems. However, if this becomes the principal use of gas rather than as a base load supplier, then volumes demanded will be reduced.

In emerging and developing economies, particularly across Asia Pacific, gas is essential for improving energy access, air quality, and industrial competitiveness. This is a reason why global gas demand may continue rising, despite climate concerns.

At the same time, significant headwinds are mounting. Climate commitments, particularly those targeting net-zero by mid-century, inherently require substantial reductions in unabated fossil fuel use. Methane emissions regulations, carbon pricing, building electrification, and the accelerating cost declines in renewables and storage technologies all erode the long-term competitiveness of gas. Moreover, new fuels such as green hydrogen and advanced electrification technologies may threaten to displace gas in sectors like heating, transport, and industrial feedstock over time if economies of scale can be captured. Under such conditions, global gas demand could plateau in the 2030s, particularly if supported by stronger policy action.

These diverging trends highlight that stakeholders need to implement scenario-based planning, preparing for multiple outcomes. Planners must evaluate infrastructure decisions – whether related to pipelines, LNG terminals, or gas-fired generation –not only against expected demand, but also under more conservative or disruptive pathways. Investing in CCS, methane mitigation, and hydrogen-compatible systems can make future-proof gas assets and align them with climate-compatible trajectories. Strategic flexibility, such as modular LNG import facilities or hydrogen-ready turbines, will be essential to avoid stranded assets and ensure long-term system resilience.

The Asia Pacific region remains the linchpin of global gas demand. Its energy choices – how rapidly it expands renewable energy, how effectively it integrates decarbonisation technologies with gas, and whether it prioritises affordability or climate goals – will largely determine the shape of global gas trajectories. Even if gas remains essential in the short-to-medium term, its long-term viability depends on the sector's ability to decarbonise rapidly and competitively.

Ultimately, whether global gas demand peaks in the 2030s or continues to rise towards 2050 will depend on a fragile balance between development needs and decarbonisation imperatives. The future of natural gas is not fixed—it will be decided by policies, technologies, and regional strategies enacted today. As such, continuous monitoring, adaptive investment planning, and cross-border collaboration will be crucial to navigating the uncertain road ahead. However, given the long lead times for gas infrastructure, strategic decisions must consider a timeline extending well beyond 2050.

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April – 2025

EU Regulation 2024/1787 on the Reduction of Methane Emissions and Its Impact on LNG Imports

On 27 May 2024, the member states of the European Union (EU) approved a law to impose methane emissions limits on oil and gas production and imports into Europe, set to take effect in 2030. This measure aims to increase pressure on both EU producers and international suppliers to curb methane leaks.

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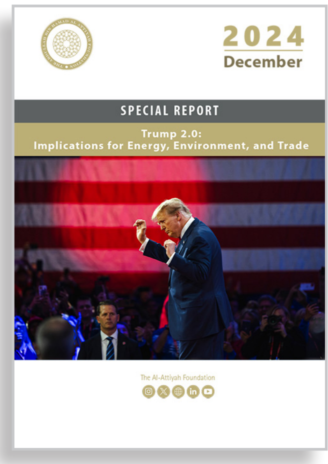
March – 2025

Competition on Emissions: Coal Vs LNG

In January 2024, U.S. President Joe Biden issued a moratorium on the expansion of liquefied natural gas (LNG) exports, citing the need for a comprehensive assessment of the environmental, economic, and geopolitical impacts.

(QRCO.DE)



December – 2024

Trump 2.0: Implications for Energy, Environment, and Trade

The return of Donald Trump to the White House promises major changes in the United States' energy and environmental policies and in broader areas that affect energy, including trade and international politics.

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