



SHELL LNG OUTLOOK 2017

OVERVIEW

- Demand for liquefied natural gas (LNG) in 2016 kept pace with a planned strong increase in new supplies; with greater than expected growth in demand from Asia and the Middle East absorbing the rise in supply from Australia
- By 2020, the size of global LNG trade is projected to grow by 50% compared to volumes in 2014
- Global demand for gas is expected to increase by 2% a year between 2015 and 2030; LNG is set to rise at twice that rate at 4 to 5%
- Future LNG demand growth will be driven by: policy, floating storage regasification units (FSRUs), replacing declining domestic gas production, small scale LNG and transport
- LNG trade is changing to meet the evolving needs of buyers, including shorter-term and lower-volume contracts

Global energy transition

Global energy demand, driven by a growing population and rising living standards, is expected to increase by around 30% between 2016 and 2040, according to the International Energy Agency.

More energy from today's mix – 80% of which is oil, gas and coal – means more carbon dioxide (CO₂), which in turn leads to climate change.

At the United Nations climate conference in Paris in December 2015, world leaders agreed to work towards keeping the global rise in temperature from pre-industrial times to well below 2°C.

Making a transition to a low-carbon energy future while meeting rising global demand is an achievable

ambition for society. As well, millions living in major urban areas around the world today struggle with poor or worsening air quality conditions.

It is, however, also an unprecedented technical, economic and social challenge: how to produce much more energy while avoiding the more serious effects of climate change and local air pollution.

Role of gas

Natural gas is fundamental to this transition. It is the cleanest-burning hydrocarbon, producing around half the greenhouse gas emissions and less than one-tenth of the air pollutants that coal does when burnt to produce electricity. LNG – even after

liquefying, transporting and turning it back into gas – emits around 40% less greenhouse gas emissions than coal when burnt to generate electricity.

As such, it will continue to have an important role in the power sector, by replacing coal and backing-up intermittent renewable energy sources.

Gas is one of the few energy sources that can be used economically across most energy applications – from electricity to heating to transport fuels – and its uses are diversifying, including as an alternative to diesel in trucks and heavy fuel oil in shipping.

Modern gas-fired power plants take less than a third of the time a coal plant needs to ramp up to full operation. This flexibility offers significant advantages

Policies driving increased gas demand

for using gas as a partner to renewable sources of energy, such as solar and wind power, which require adequate back-up supply to ensure reliability. New and existing pipeline and gas storage infrastructure allows natural gas to be easily moved from production regions to consumer markets. The expansion of the use of FSRUs provides access to gas through LNG to a range of emerging countries as well.

Today's renewables chiefly produce electricity, which only meets 18% of global energy demand. However, not all energy demand can be electrified. For example, electricity will struggle to replace hydrocarbons at a practical scale in processes that require extremely high temperatures, such as the manufacture of materials such as iron, steel and cement. This means gas will complement renewables by playing a core role in industry and construction for many years to come.

Increasingly, governments are recognising the benefits of gas and its role in delivering the key policy objectives of secure and affordable supplies of energy, to reduce the impact on climate change, and manage air quality. For example, the 13th Five Year Plan in China, adopted in January 2017, identified 45 billion cubic metres (bcm) of additional gas demand – more than total gas demand in The Netherlands – to improve air quality in cities.

In China in January 2017, the National Energy Administration announced the cancellation or suspension of more than 100 coal-fired power plants that were in planning or under construction. If they had gone ahead, these projects would have a combined capacity of more than 100 gigawatts – more than double Germany's installed coal and lignite capacity.

In Europe in 2016, coal-fired power generation fell by 94 terawatt-hours (TWh), while gas-fired power increased by 101 TWh. This shift is in part due to recent policies, such as the UK government's carbon price floor of £18 a tonne of CO₂. The growth of gas in place of coal led to a 4.5% drop in CO₂ emissions from Europe's power sector compared to 2015, according to analysis by the think tanks Sandbag and Agora Energiewende.

Recent LNG supply and demand trends

Gas has been the fastest-growing hydrocarbon for the past decade, with demand increasing at around 2% a year since 2000. Global LNG demand has grown by an estimated annual average of 6% since 2000, reaching 265 million tonnes (MT) in 2016. That's enough to supply power to around 500 million homes a year.

LNG supply growth, particularly as new exports start in Australia and the USA, is expected to increase global LNG trade 50% by 2020 from 2014 levels. One-third of this additional new supply capacity is from facilities that recently commenced commercial operation. The remaining two-thirds is expected to come on-stream by 2020.

Many industry and market commentators had predicted that LNG would become "oversupplied" during 2016 as supply growth would outpace demand growth in non-liquid gas markets, particularly Asia. As a result, they anticipated that more LNG would need to be delivered to Northern Europe, which plays the role in balancing global LNG supply and demand.

One reason behind this expectation is that supply lead times are long – four to five years – which means growth in supply can be projected accurately. However, demand lead times have

2016 facts



Strong growth in LNG supply in 2016, one-third of new supply online



LNG demand growth from China, India and new entrants absorbed supply growth in 2016



Egypt, Pakistan and Jordan – all new importers – made up **three** of the **top five fastest growing** LNG importing countries in the world



Global LNG demand reached **265 MT** – enough to supply power to around **500 million** homes a **year**



Bulk of growth in LNG exports in **2016** came from Australia, where exports increased by **15 MT** to a total of **44.3 MT**

been shrinking with the advent of FSRUs and the growth of LNG demand in new importing countries where LNG is replacing declining domestic production to supply existing gas demand through existing gas infrastructure.

As it turned out, growth in supply was offset by a rise in new LNG demand.

Since 2015, Colombia, Egypt, Jamaica, Jordan, Pakistan and Poland have all begun importing LNG, bringing the total number of importing countries to 35, up from around 10 at the start of this century.

In 2016, Egypt, Pakistan and Jordan were among the top five fastest-growing LNG importing countries in the world. Due to regional shortages in gas supplies, they took advantage of the flexibility of LNG supply, importing 13.9 MT in total.

China and India were the other two fastest growing buyers, increasing their imports by 11.9 MT of LNG in 2016. This boosted China's total LNG imports to 27 MT and India's to 20 MT.

Since 2015, 8 FSRUs have been deployed off the coasts of importing countries, including newly importing countries Pakistan and Jordan. There are now 21 FSRUs in operation with six more under construction. They offer a relatively quick and commercially flexible solution to meeting energy demand. FSRUs turn LNG back into a gas offshore, then pipe it into a country's grid, mainly through existing infrastructure. It allows new LNG buyers to react quickly to fluctuations in price, or if there is a shortage in their domestic gas supply.

In 2014, LNG imports to Japan peaked at 88.5 MT. They fell to 85 MT in 2015 and 83.3 MT in 2016. This is due to energy efficiency measures in the power sector as well as increasing competition from nuclear restarts, coal and renewables.



“When Shell acquired BG Group, we identified the company's annual LNG outlook as something we wanted to continue.”

– Maarten Wetselaar,
Integrated Gas & New Energies Director

Despite this drop, Japan continues to be the world's largest importer of LNG.

In Europe, despite overall gas demand growth, countries that traditionally balance LNG supply and demand such as the UK and Belgium saw a decline, with gas instead being pulled to buyers mainly in Asia and the Middle East.

As for the countries supplying LNG, growth in 2016 was dominated by Australia, where exports increased by 15 MT to a total of 44.3 MT. It was also a significant year in the USA, after 2.9 MT was delivered from the Sabine Pass terminal in Louisiana.

Global exports increased by 3.8 MT from Qatar, Indonesia and Angola. Production in other Atlantic basin projects fell by 3.5 MT, driven by operational issues in Trinidad and Tobago, Nigeria and Algeria.

LNG spot prices – the amount paid for short-term supplies – as a proportion of oil prices in 2016 were very similar to 2015, suggesting that spot LNG maintained its relative competitive position within the energy mix and

the industry adapted quickly to new supply and rapid growth in demand from emerging importers.

Looking ahead, future LNG prices are expected to continue to be determined by everything from oil prices to prices of renewable sources of energy to the costs of new LNG projects. Future LNG prices will continue to compete with regional piped gas prices.

Industry and trading risks

In the last few years, the profile of LNG buyers has changed. New importers – from small or start-up electricity companies to intermediaries to national energy companies – are emerging as LNG trade is changing to mirror the evolving needs of buyers, including shorter-term and lower-volume contracts with greater degrees of flexibility. Some emerging LNG buyers have more challenging credit ratings than traditional buyers.

While the industry has been flexible in developing new demand, there has been a decrease in final investment decisions for new supply.

Many new buyers face uncertainties in their own gas markets related to, for example, the global economy, domestic gas exploration, and the liberalisation of electricity and gas markets. This means they increasingly favour shorter-term contracts, around five years, as opposed to traditional long-term contracts which typically run for two decades.

Companies that sell LNG will increasingly need a large enough portfolio and sufficient flexibility to supply a growing number of countries, including more developing economies.

Future outlook

Global demand for gas is expected to increase by 2% a year between 2015 and 2030. LNG is set to rise at twice that rate at 4 to 5%.

Over the next two decades, as more countries have existing infrastructure with an import terminal or FSRU, LNG will increasingly be used when there are shortages in domestic energy supply.

Between 2014 and 2020, the size of the global LNG market is expected to grow by 50%, mainly from LNG facilities already under construction or recently completed.

The LNG industry will need to make large investments to supply demand growth after 2020.

LNG use beyond the power sector is expected to continue to increase. In China, in 2015 its use as a fuel for transport was around 4 MT. In 2016, there were more than 200,000 LNG-powered vehicles in the country. Over the next decade, LNG use in the heavy duty and marine transport sector is expected to grow in the Middle East, Europe, Southeast Asia and the USA.

Growth is expected in marine as well as in road transport, with LNG as a lower emissions alternative to diesel and heavy fuel oil. Tighter emissions regulations have also played a role. The International Maritime Organization agreed to a global 0.5% sulphur cap on marine fuel that will take effect from 2020. LNG as a fuel contains virtually zero sulphur versus 3.5% specification for global marine fuel today.

The USA is expected to continue to consume more gas than any other country. Russia is set to stay second, with 2016 gas demand estimated to be 440 bcm. China’s gas demand is expected to increase significantly, reaching 450 bcm by 2030, up from around 200 bcm in 2016. This will be met by a mix of conventional and unconventional domestic production as well as pipeline and LNG imports.

The Chinese government has set a target for gas to make up 15% of the country’s energy mix by 2030, up

from 5% in 2015. An additional 100 MTPA of LNG demand from China would be equal to an increase of more than 20% in total global LNG demand in 2030.

The future outlook of LNG demand in Europe remains uncertain due to environmental policies, domestic gas production and pipeline gas imports. Gas demand increased by around 5% in 2016, driven mainly by the power sector. This was the result of more coal to gas switching in the power sector, nuclear outages in France, and a colder than usual winter in Northern Europe, particularly in the UK and Ireland.

As for Southeast Asia, countries such as Malaysia and Indonesia are among the major LNG exporters in the world. But by 2035, the region is set to become a net importer. The rise in demand is driven by economic growth in the region coupled with declining domestic gas supplies in countries such as Thailand.

Future trends



Continued LNG supply growth to **2020**



LNG **demand** is set to rise at **4 to 5%** a year to **2030**



LNG and Russian gas imports **required** to **balance** European gas demand

2020

New investments **required** to meet growing LNG **demand** after **2020**