

# Natural gas ready to meet the world's energy challenges



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Rising oil prices, the ongoing turmoil in the Middle East, and Japan's continuing nuclear fallout, are helping to strengthen the case for natural gas. While natural gas has, in the past, played the role of the bridesmaid and has always been regarded as the discarded twin of oil, these recent events – along with the commodity's inherent qualities – drive home the point that natural gas has what it takes to help the world address its energy and environmental challenges.

The natural gas industry is a phenomenal success story. Its beginnings can be traced back to more than two millennia ago when around 500 BC the Chinese used natural gas to boil sea water, separating the salt and making the water drinkable. However, it was only until the 1800s that the world began to realise the potential uses for natural gas, for lighting, cooking and heating. Over the centuries, what began as a fuel to provide mere lighting for homes and streets, has evolved into a powerful resource which would help countries across the globe meet their rising energy demand. Today, natural gas provides nearly a quarter of the world's energy demand.

In the power sector, natural gas now accounts for 22 per cent of the world's generation capacity and this share is poised to rise further due to the overall aging of power plants and the need for replacement worldwide. Natural gas is also expected to be the fastest growing major fuel through 2030. According to the International Energy Agency, global gas demand is projected to grow by an average of 1.5 per cent per annum through 2030. While demand is expected to rise across all regions of the world, growth will be strongest in non-OECD countries, particularly in China.

By 2030, China's demand for natural gas is forecast to grow to six times more than the level in 2005, driven by the residential/commercial and industrial sectors where distribution lines are being expanded and the price of gas is competitive against other major fuels. In India, more than half the projected growth in gas demand is expected to come from the industrial sector, where gas provides the energy to produce steel and other products. Natural gas is also being used as raw material to produce paint, fertiliser and petrochemicals. In the Middle East, demand has been growing rapidly in both the power generation and industrial sectors.

However, despite being one of the world's most important energy resources, in recent years, natural gas has been grouped together with the other fossil fuels, namely

coal and oil, and they are viewed together as contributing to the world's climate change problem. Today, climate change is considered one of mankind's biggest challenges, and all efforts are being directed towards achieving a low-carbon energy mix. Climate researchers believe the only way to limit the rise in global temperatures by 2°C is to halve global emissions of greenhouse gases in the long term. Natural gas can play a key role in helping to meet this objective.

With its low carbon emissions compared to other fossil fuels, natural gas is a solution to some of the world's economic and environmental challenges. Cleaner than coal and oil, and more efficient and reliable than renewable energy, energy experts have rightly pointed out that natural gas should not be viewed as a bridge fuel, but is actually an answer to the world's energy and environmental challenges.

While nuclear energy has long been regarded as the best choice for emerging economies like China and the Middle East, Japan's nuclear fallout following the March 11 earthquake has spurred debate over the safety of nuclear power plants. China has announced that it is reviewing plans to add 27 reactors to the 13 it now has, while Japan, with 10 per cent of its nuclear power knocked out, will need to invest billions in new power generation capacity.

## Green credentials

These developments serve to emphasise why natural gas should be the fuel of choice in a low carbon economy. When burned to heat homes or for industrial uses, it releases 25-30 per cent less CO<sub>2</sub> than oil and 40-50 per cent less than coal per unit of energy produced. When used to generate electricity, natural gas can reduce CO<sub>2</sub> emissions by up to 60 per cent compared to coal. Natural gas also produces little nitrogen oxide, sulphur oxide or particulates.

Other comparative environmental advantages include the fact that ten times more water is needed to produce the equivalent amount of energy from coal, while ethanol production can require as much as a thousand times more water to yield the same amount of energy.

Natural gas is also efficient - modern combined cycle gas turbine power plants are 40 per cent more efficient than coal plants, and also require only half the construction time needed to build a coal plant and less than a third of the time needed to build a nuclear plant. Apart from being quicker to construct, gas-fired power plants are also relatively easy to get regulatory approval for.



The Inter-governmental Panel on Climate Change has recognised that increasing gas use in power generation can have an immediate impact on emissions. In the US, for example, doubling utilisation rates at existing gas-fired power plants could displace enough coal to cut coal-related emissions by 20 per cent. And since coal-fired power generation accounts for 33 per cent of all US emissions, a reduction of that size is certainly no small matter.

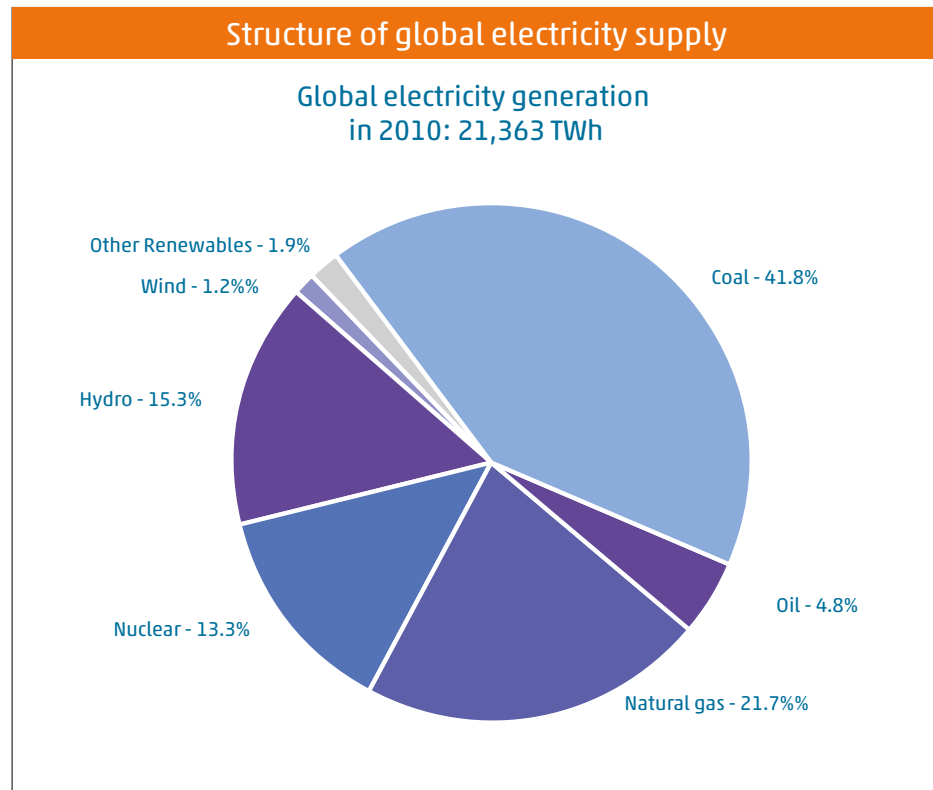
Natural gas also supports the growth of renewable energy. Since gas turbines can be turned on and off relatively quickly, natural gas serves as a flexible partner for intermittent energy sources, such as wind and solar, in power generation.

In the transportation sector, natural gas can also make an immediate impact to reduce greenhouse gas emissions. The use of dedicated natural gas vehicles can lead to 20-25 per cent less CO<sub>2</sub> emissions compared to petroleum fuels. It is only logical that apart from fleet vehicles like buses, more and more passenger vehicles are now running on natural gas.

Recent development in the use of LNG as fuel for ships will further help reduce emission of greenhouse gases in the maritime sector. Since switching from diesel to natural gas can result in at least a 20 per cent CO<sub>2</sub> reduction measures are being explored to make it mandatory for inland ferries and offshore supply vessels to use LNG. In addition, increased use of natural gas in transport can reduce local pollution of, for example nitrogen oxide and sulphur oxide.

While natural gas has been widely acknowledged to be a cleaner alternative to other fossil fuels, the adoption of natural gas on environmental grounds has been limited to date. Amongst the possible reasons is the issue of affordability, but this may change as countries now strive to reduce their carbon emissions. One way is via

### Structure of global electricity supply



the introduction of new environmental policies, such as carbon trading schemes.

### Game-changers for natural gas

Natural gas has the means to meet the world's growing energy needs. The world's current proven reserves of conventional gas totals 187.49 trillion cubic metres, with a reserve production ratio of more than 60 years.

In addition, exploration of the world's unconventional gas potential has provided significant boost to available reserves, extending current production life by a century or more. The US, for example, sits on a huge unconventional gas reserve, locked away in difficult-to-reach formations. While it has long been technically possible to recover unconventional natural gas – the term for gas that is not located in porous permeable reservoir rock and which includes coal bed methane, tight gas, shale gas, and methane hydrates – it has not always been economical.

Over the last five years, thanks to technological advances that have made it easier and cheaper to access these resources, more and more companies have been jumping →



→ on the unconventional gas bandwagon. Advances in drilling techniques and the hydraulic fracturing or fracking process have allowed North American shale gas players to increase production. According to a recent study from the American Clean Skies Foundation, the US now has 2,247 trillion cubic feet of proved natural gas reserves, enough to last 118 years at 2007 demand levels.

This windfall is not only confined to the US. According to Deloitte's Energy Predictions Report 2011, by 2035, shale gas could make up 62 per cent of the total gas produced in China and 50 per cent in Australia. Canada too is looking to boost its reserves. While there is also shale gas in Europe, there are also greater challenges to its development because state ownership of mineral resources gives landowners little incentive to allow development on their land and because the region also does not yet have a robust oilfield service industry to support it. But some still see the potential of European shale gas resources as sufficiently robust to alter the energy supply scenario.

Technology also plays an important role in connecting gas supplies to markets. An example of such technology is Floating LNG (FLNG) that allows liquefaction at sea instead of having to build pipelines to the coast. This will open up resources previously considered too remote or expensive to exploit. Moreover, with FLNG, the facility can be re-deployed to another gas field once production at one field has been completed.

Advances in technology are also likely to affect the

*Kawasaki's 145,000 cubic metre LNG carrier, Energy Frontier*



consumption of natural gas. There is an obvious economic incentive for energy-intensive industrial users to use energy-saving technology. But in the case of the residential sector, some form of government incentive, and probably also disincentives, may be needed to persuade households to adopt energy efficiency measures.

### Advocacy initiative

Certainly, for all its merits natural gas is not the panacea for the world's energy problems. Developing countries with abundant, low-cost coal reserves will continue to exploit and maximise those resources. And the progress of unconventional gas should not mask the challenges countries face in developing their potential shale resources. Open licensing, favourable regulations, and robust competition among many innovative firms were an integral part of the unconventional gas success story in North America, but those conditions are not yet in place in most regions.

The natural gas industry also has much work to do in convincing the public that natural gas extraction is safe and environmentally sound, and that natural gas has an important role to play in meeting energy challenges in a low carbon economy. The International Gas Union (IGU) has made natural gas advocacy one of its priorities. To that end, the IGU has developed a campaign – titled Natural gas CARES for the world – and a gas advocacy toolkit that has all the facts that support the argument for natural gas as a fuel of choice.

The IGU is also working with like-minded advocacy groups and gas associations such as the American Natural Gas Alliance (ANGA), the European Gas Advocacy Forum, and the Canadian Gas Association, to correct the perception of natural gas by policy makers, governments and the public.

In all our advocacy initiatives, the message is consistent: The natural gas industry is ready to take on a larger role in meeting global energy challenges, and it is time that policymakers and stakeholders recognised its potential and allow natural gas to step into the spotlight. ■