



New challenges and new opportunities for gas

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Andrew Brown

Upstream International Director, Royal Dutch Shell plc
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Andrew Brown has been Upstream International Director since April 2012.

Andrew joined Shell in 1984 after completing his degree in Engineering Science from Cambridge University. The following year he was posted to New Zealand, where he worked as a project engineer.

In 1988, he moved to the Netherlands to work at Aardolie Maatschappij (NAM), first as a process engineer and then as a construction manager.

Andrew joined Brunei Shell Petroleum in 1993, leading the mechanical engineering for Offshore West. In 1996 Andrew moved to Petroleum Development Oman, where he held roles in planning and oil field management.

In 2000, Andrew was appointed as Senior Advisor for the Middle East and Former Soviet Union, before becoming Private Assistant to the Executive Chairman of Shell a year later.

In 2002, he was chosen to head up the Pearl GTL project in Qatar. He became Executive Vice President for all of Shell's activities in Qatar in 2009 and joined the Upstream International Leadership Team.

Andrew was awarded an OBE in 2012 for his services to British-Qatari business relations.

Andrew and his wife, Julie, have four children. He enjoys skiing, walking, sailing and golf.

Ladies and Gentlemen, it is timely to discuss the role of natural gas in the global energy mix and, more importantly, what we as an industry can do, as well as what policy makers need to do to enable gas to take its rightful place in the European energy mix.

The case for gas is clear and compelling. The IEA in its recent report titled "the Golden Age of Gas" argues that gas will play an instrumental role in the global energy mix over many decades to come and Shell fully agrees.

At Shell, we often talk about 'the 3As' of gas:

- Gas is acceptable: New Combined Cycle Gas Turbines emit around half the CO₂ of coal fired power plants and are 40% more efficient. A combined cycle gas plant emits negligible particulates and when compared with a supercritical pulverized coal plant emits around 20 to 40 times less SO₂ and almost 10 times less NO_x.
- Gas is affordable: Gas fired power plants' cost competitiveness is compelling: coal plants are two to three times more expensive; nuclear is five times more expensive; onshore wind is seven to 10 times more expensive; and offshore wind up to 15 times more expensive.
- Finally, gas is abundant: With the shale gas revolution, the IEA estimates the world currently has 250 years of gas supply at current consumption rates and the diversity of gas supply enhances energy security.

Indeed, we can state that the gas revolution has taken off and we can see it happening all around us.

Thanks to the shale gas revolution, the United States now has abundant low cost gas which is helping to rejuvenate its economy and create much needed jobs.

Outside North America, China has significant potential as does Ukraine and South Africa, all countries in which Shell has acreage positions.

The United States has seen a dramatic improvement in its energy security due to the natural gas revolution. And this is spurring a re-emergence of its industrial base. The country is saving an estimated \$100 billion to \$200 billion a year due to lower gas prices, thanks to increased production of unconventional gas resources.

This is already having dramatic environmental benefits for the United States. Consider these numbers: IEA says that in 2011, US CO₂ emissions fell by 1.7% as low gas prices accelerated displacement of coal-fired power. The IEA notes that US carbon emissions have fallen by 7.7% since 2006, the largest reduction of all countries or regions mainly due to a substantial shift from coal to gas in the power sector.

Gas demand in Asia is also growing exponentially. China's demand at 12 billion cubic feet per day has grown by 12% over the last 7 months. We expect China's demand to increase to 20bcf/d by 2015 and 54bcf/d by 2030. Gas demand is also expected to double in both the Middle East and North Africa region as well as in other parts of Asia by 2030. These are unprecedented growth rates and will drive global gas demand.

Global LNG demand is also expected to double from its current 250 MTPA (Million tonnes per annum) to well over 500 MTPA by 2025.

But where is Europe in the gas revolution today? Europe seems to be missing out whilst the rest of the world is benefiting.

Despite the clear benefits of gas, in Europe, a different picture is emerging: conflicting regulations, public concerns over production methods of unconventional gas, and a lack of a level playing field. In effect, Europe is incentivizing less beneficial options due to an absence of appropriate policies.

Natural gas is being squeezed out of Europe's power mix by several factors including the re-emergence of coal. In Europe, gas is being displaced by coal due to inadequate CO₂ pricing and falling coal prices relative to natural gas prices.

Shell believes gas is a more environmentally sound option and should be the most economically robust option. According to a McKinsey study commissioned by the European Gas Advocacy Forum, Europe could save as much as €500 billion and create 25 million jobs by adopting a gas based strategy between now and 2030.

This is clearly important for Europe – a continent that needs to create jobs and save money. European policy makers need to recognize the opportunity that gas brings to the overall economy and environment.

Instead, what has happened in practice is coal has been replacing gas in the European power sector.

Coal has been driven out of the United States by low gas prices, leading to a reduction in the country's CO₂ footprint. As a result, US coal exports to Europe have increased fivefold since January 2010 and coal prices have tumbled dramatically by over 20% in Europe between January 2011 and October 2012.

As a result of low coal prices relative to natural gas, in the UK, we now have significantly less gas in power generation than in the last decade. Last year, Shell estimates that Europe dropped 23bcm in gas demand.

But this is clearly not what was intended. The European Emissions Trading Scheme (ETS) was set up to reduce carbon intensive energy consumption. However, the CO₂ price has been too weak to prevent coal fired power, despite its much heavier CO₂ emissions, from displacing gas.

At a CO₂ price of \$40/tonne in Germany and the UK you would see power generators switch back to gas from coal. To avoid that same tonne of CO₂ with offshore wind would have required subsidies well over \$100. So the lack of an effective CO₂ market is costing Europe more.

So what can we, the industry, do about this situation?

We need to work hard to reassure some European nations and other countries that have banned shale gas production due to fracking. I think the IEA Golden Rules for the Golden Age of Gas are very useful in demonstrating how the industry can exploit these resources in a very efficient but also environmentally sustainable manner. In Shell we have the 5 Principles for Unconventional Gas Development which preceded the IEA guidance.

We also must recognize the natural partnership between natural gas and renewables. Gas is the best partner to the intermittency of renewable power sources like solar and wind. When the sun does not shine and the wind does not blow – on the coldest day in Europe - someone has to keep the lights on and someone has to keep our houses warm.

So working with renewable companies and keeping gas as a backbone is an important step. We have been working with a number of renewables companies including Dong, First Solar, Alpine and GE

in this regard. As a coalition, we recently held our first meeting with the European Union to create what we called the Energy Partnership.

The use of gas in other applications such as the transport sector also should be promoted. At Shell we are currently doing so here in Europe and elsewhere across the world.

For example, Shell is supplying LNG for trucks along a major route in Canada – the Green Corridor. With our recent acquisition of a company in Norway, Gasnor, we moved into the supply of LNG as a fuel for shipping and we have signed up to a planned new terminal for the supply of LNG to shipping. It will be built by Gasunie and Vopak in Rotterdam, the Netherlands, and will be operational in 2014. We have also chartered the first two inland barges in Europe to run on LNG – they're sailing up the Rhine as I speak, laden with Shell products.

Over the longer term, we will have to make Carbon Capture and Storage technology (CCS) work.

The IEA estimates that about one-fifth of the abatement on CO₂ by 2050 will come from CCS.

I think there will be long term questions about the sustainability of gas as a destination fuel in the absence of CCS, so at Shell we are building up our expertise by developing a number of CCS projects. We recently took a final investment decision on our Quest CCS project in Canada - the first CCS project to be applied to oil sands, with support from provincial and state governments. From 2015 it will capture over 1 million tonnes per annum from our oil sands upgrader there.

We are also involved in the Gorgon project in Australia – where CO₂ in the feed gas will be sequestered.

In Scotland we have made proposals to the British Government for a project at the Peterhead gas fired power station to capture the CO₂ and sequester it utilizing a depleted offshore field, called Goldeneye.

I believe that if we can put these things together, we will put gas right back in the centre of the energy mix where it rightly belongs and take full advantage of the abundance of gas supply that we now enjoy.

So let me summarize.

Gas will play an increasingly important role in the energy system and can help to reduce CO₂ emissions. But Europe needs to take action to get its energy policy right to take advantage of the benefits of gas – as currently enjoyed by the United States.

A level playing field for gas is critical. Gas combined with renewables offers Europe the lowest-cost option to

move toward a more sustainable, low-carbon energy system.

European policy-makers need to grasp this opportunity or we risk missing out on a generational chance to benefit from the global gas revolution.

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