

Gas and Coal in Asia's Energy Mix: Interactions and Uncertainties

In looking at the overall energy needs of Asia for the next 25 years, it is clear that coal and natural gas will both play a key role in the region's fuel mix. There are three simple reasons for this, what I like to call the "three As:" *abundance*, *affordability* and *availability*.

Both gas and coal are *abundant*, and gas is becoming even more so thanks to new technologies such as hydraulic fracturing (and more recently high pressure fracturing and re-fracturing), which has significantly increased natural gas production in the U.S. As an example, the production of gas and associated liquids has tripled from 2011 to 2014 with the same number of rigs.

This abundance also makes gas and coal *affordable*. Gas prices have fallen drastically in the recent years because of increased supply, and coal prices have fallen, too, because more gas is replacing coal for electricity generation in the US.

And they are both *available*, meaning that their supplies are easily accessible in response to demand and largely secure. This guarantee of secure supply is an important objective for all the countries. Moreover both gas and coal are instrumental as the "base load" source of energy required to support renewable energy development.

The big picture: evolution of gas and coal in Asia

Let's take a moment to look at how the future for each of these fuels is likely to evolve in Asia.

Asian gas demand is forecast to grow at a compounded annual growth rate of 3.2 percent, driven by its flexibility and government policy objectives such as climate change. As a consequence Asia will become the largest gas import market, surpassing Europe.

Meanwhile, coal will continue to play a relevant role in meeting Asia's energy demands – comprising the biggest share of the region's energy mix through 2040 – despite concerns about carbon emissions. Asia will accentuate its status as the largest coal import region, with continued intra-regional flows.

From an economic point of view, based on current average prices, coal is the region's most economical fuel for new power plants, excluding any subsidies for wind power. However, the situation varies greatly from country to country because the economics can be very different, especially for countries with domestic gas resources. Looking at the average power generation costs for coal- and gas-fired power plants, including capital and operating expenses, coal is more advantageous in countries such as Japan, China, India, Thailand and South Korea. Gas, on the other hand, is more advantageous in countries such as Indonesia, Malaysia and Vietnam. Interestingly, Bangladesh, which traditionally had depended on domestic gas, is now eyeing liquefied natural gas (LNG) imports and the reintroduction of coal into its fuel mix.

The impactful role of regulation: COP21

Cost, however, is only one factor in assessing the overall role that gas and coal will play in Asia's energy development. Government policies will affect the advantages of both of these fuels, as well as other energy technologies, through import tariffs, carbon prices and tax credits – all of which can be used to affect energy choices. For example, subsidies can make certain technologies cost effective and can result in over-installation when compared with economically viable alternatives. Subsidies for oil and domestic natural gas in the Middle East and the Strategic Energy Plan supporting nuclear power in Japan are examples of this.

Network tariffs and positive cross subsidies also can encourage too much installation of less cost efficient technologies. On the other hand, negative cross-subsidies, such as assigning price to externalities such as carbon, can have the opposite effect. A change in the price structure can make the technology *more* cost effective, as we've seen with the development of stand-alone photovoltaic solar in Australia.

The 21st session of the Conference of Parties, or COP 21, in Paris in early December could have a significant effect on the global order of energy economics. COP 21 represents the first opportunity for a renewed carbon protocol and could result in significant increases in official commitments that favor investment in gas over coal.

The COP 21 objectives are more stringent than the 1997 Kyoto Protocol. For example, Kyoto set a goal of reducing carbon by 30 percent below 1990 levels by 2020. COP 21 sets an emission target of staying below the “two degrees” scenario – lowering carbon output to keep global temperatures from rising by more than two degrees.

While Kyoto sought quantitative reductions in carbon emissions by setting targets agreed to among a wide range of countries, COP 21 seeks to define national emission contributions for each country, taking into account its national circumstances. COP 21 also offers no support for emission reduction projects, rather than the possibility that existed under Kyoto of generating profits through emission reduction projects. Kyoto focused more broadly on fighting global climate change and proposed strategies based on mitigation, while COP 21 seeks to fight climate change locally as well as globally, and proposes strategies based on mitigation *and* adaptation.

This means that to the three A's of attractive energy options – *abundance*, *availability* and *affordability* – we must now add a fourth: *acceptability*. Quite simply, gas is greener than coal, and as a result, it is likely to be favored by governments seeking to reduce carbon emissions.

As a result, it is expected to see more rapid growth in gas demand from China, India, Southeast Asia and the Middle East. If we analyze the dynamics by country or region, China is forecast to grow by 5.1 percent per annum through 2040 reaching 603 billion cubic meters (bcm); India by 4.6 percent, reaching 202 bcm; Southeast Asia by 2.4 percent and the Middle East by 2 percent, reaching 706 bcm.

At the same time, gas demand growth will be limited in Japan as nuclear regains market share and the country focuses on energy efficiency programs. Eurasia, where gas already constitutes a large share of the energy mix, will continue to rely on large Caspian oil and gas reserves and

depend on gas for energy security, but it is not likely to increase its already sizable market share. By 2040 we expect a demand of around 304 bcm. Meanwhile, in OECD Asia (Australia, New Zealand and South Korea), gas is the only fossil fuel for which demand is rising, but the gains are slight (0.5 percent per annum) because of a heightened emphasis on renewables and nuclear power.

Increased demand for coal will come primarily from China, India and Southeast Asian countries. In China, coal demand will peak in about 2030 at 3,033 million tons of coal equivalent (Mtce) because of the slowdown in economic growth and policies to reduce carbon emissions. Rising electricity needs will drive coal demand in India, where the current per capita consumption is very low – about 900 kilowatt hours. We expect India to add 500 million tons of coal equivalent – almost doubling the current demand – by 2020. In Southeast Asia, reduction in gas subsidies in Malaysia and recent disruptions in the gas supply in Thailand will push up coal demand in those countries by about 4.8 per annum through 2040.

The resulting implication for Asian governments

Having said all that, there are clear implications for the governments in the region and several questions open to discussion: *How do consuming nations in Asia develop a long-term gas supply security strategy? In particular, what is the right balance between supply of pipeline gas from Central Asia and Russia and LNG imports? Can imports of electricity (rather than coal or gas) become a significant factor, given environmental concerns of China? Is coal supply security a challenge as well? Could the reductions in demand in Europe and the U.S. impact the liquidity of the global coal market and create a need for bilateral contracts? Could technology changes reopen a global growth opportunity for coal? Are sustainability challenges likely to drive regulation revision and change relative merits of coal vs. gas vs. other energy sources?*

Consuming nations in Asia must develop long-term gas supply security strategies. The current gas environment looks favorable for buyers in the short term, but the long term outlook is less certain. Buyers, having multiple supply options and hence the ability to influence strongly contract terms, will probably push to move from oil indexations to Henry Hub to regional indices such as JKT or FOB Singapore and include price caps. But the limited appetite for new long-term contracts may result in projects being postponed, limiting liquidity post 2020. This risk is probably one all parties should keep in mind as they define their strategies.

Finally, it's worth noting that the long-term and spot markets have pros and cons for producers and consumers depending on what criteria are considered -- price, security, ability to plan ahead, and so forth.

What is better for both producers and consumers is a combination of on the one hand long-term contracts enabling continued resource development for producers and supply security for the buyers, and on the other hand traded markets enabling efficient adjustment of supply and demand for both producers and consumers.

For coal, supply security is less of an issue. The relative abundance of coal will help to protect the supplies for Asian countries, although it underscores the need to maintain safe and efficient infrastructures. Also, the reductions in demand in Europe and the U.S. could affect the liquidity of the global coal market. European and American participants have been the driving forces in creating the liquidity and price transparency that have benefited Asian economies. This will reinforce the need to develop long-term sourcing strategies, efficient regional coal trading platforms, bilateral contracts, and the reconsideration of vertical integration to ensure long-term supply and reinforce financial stability of the mines.

Unlike gas, technology is less likely to reopen a global growth opportunity for coal. Technology has always been a disruptive force in the energy industry, but the lack of current investment and progress in carbon capture and storage currently limits the role of coal going forward. Sustainability challenges are likely to drive regulation revision and change relative merits of coal versus gas versus other energy sources. Political and social momentum seems to favor further constraints on coal, as suggested by recent government declarations. Coal will nevertheless likely remain a more economical fuel for power generation, even with more significant carbon pricing, which will support growing demand in Asia.

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