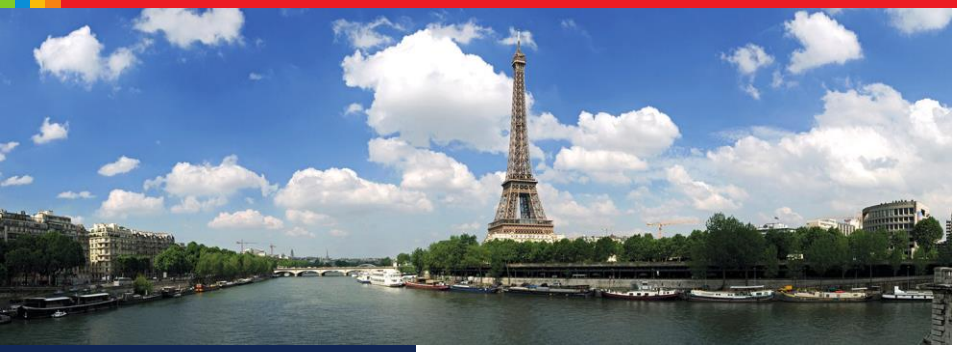
2012-2015 Triennium Work Reports



THE ROLE OF GAS IN THE FUTURE ELECTRICITY MIX

Base-load vs intermittent

Program Committee “C”, Study Group 1

June 2015

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The Role of Gas in the future Electricity Mix

Baseload vs intermittent

The report investigates development, challenges and potential role of natural gas in electricity generation in several geographies

Produced by:
International Gas Union

After years of steady growth in the share of gas use in electricity generation, the last few years has seen changes to fundamentals, technology, relative prices and policies that collectively bring uncertainty for the future. Electricity generators are very price elastic, both in investment decisions and running decisions. This was earlier a reason to use natural gas more than other fossil fuels. Now this elasticity has led to several generators choosing other fuels, such as coal and renewables.

There are, of course, large regional differences here, and this report includes a collection of studies on very different markets, submitted by members from those markets.

Doubts on natural gas' future in electricity generation are more prevalent now. Whilst some analysts call gas the main fuel for power generation, others treat it as a back-up fuel for peak or super-peak periods only. "Who is right?" is an eternal question, but new questions are arising and should be answered as fully as possible. The main one is probably "What is best for the electricity producers and why?"

These considerations led the working group to set rather challenging objectives for this report:

- First of all, it has been agreed that the target group of the report will not only be natural gas industry professionals, but also representatives of (a) adjacent industries, such as coal, nuclear, oil and renewable energy industries; (b) governmental bodies responsible for energy strategies and regulation; and (c) governmental bodies and international organizations responsible for sustainable development and the eradication of energy poverty.
- It has also been agreed that the ultimate objective of the report is to make a fair and diligent assessment of the role of natural gas in the electricity mix, which is to be perceived as non-biased, detailed and professional.

Demand growth and base load potential in developing countries, but demand fall, over capacity and high competition in developed countries

Relative fuel prices and costs matter:

- In Europe, coal and renewables replace gas and demand stagnates or falls
- In the US gas (and renewables) replace coal

Environmental policies

- Great variations between countries here
- Some focus mostly on climate gases, others on local pollution
- Some are for, others against nuclear
- Renewables grow everywhere – seen as domestic and popular with voters

In this work we have analyzed a number of different markets. Every one of them has its own features and challenges defining its further development. These features are very different in nature and vary significantly from market to market.

The European electricity market is very interesting for the authors because of the major changes related to policies and also for a massive switching from gas to coal in electricity generation over several years. In the work we acknowledge different factors defining the role of gas separately in base and peak load regimes. We also analyze different challenges for rapidly changing electricity systems and share our view on possible role of gas in the electricity systems with high share of renewable energy sources.

The role of gas in the MENA region is growing, especially in the gas producing countries largely driven by the power sector and stimulated by relatively low gas and electricity prices. The effect of this on the regional supply demand balance and thus on the potential gas exports is an important issue.

Many MENA countries are looking for other energy sources to cover rising electricity demand, particularly solar power generation which has a large potential in this region. The role of gas in the electricity mix is defined by internal markets as well as global natural gas and oil market conditions.

Japan and South Korea now see an interesting theme in a possible renaissance of nuclear power generation which will impact gas and electricity markets.

We have not covered China and India, as the group had no members from these countries. However, it sould be noted that sustained economic growth is leading to rapid growth in electricity demand. There is also a stronger focus on local air quality, leading to less coal (than otherwise) and more gas and renewables in the generation mix. In China, wind has especially become significant and we see more focus on solar in India. With high demand growth, this does not exclude gas, and both countries are producing and consuming more. Imports are also rising.

African countries now considering LNG exports are also planning some domestic use of natural gas. It is not impossible (contrary to traditional thinking) that delivering gas to national/local power plant could give better returns than exports to Asia. If there is a liquefaction plant built, this could also supply LNG (with storage) to complement new solar power in remote locations.

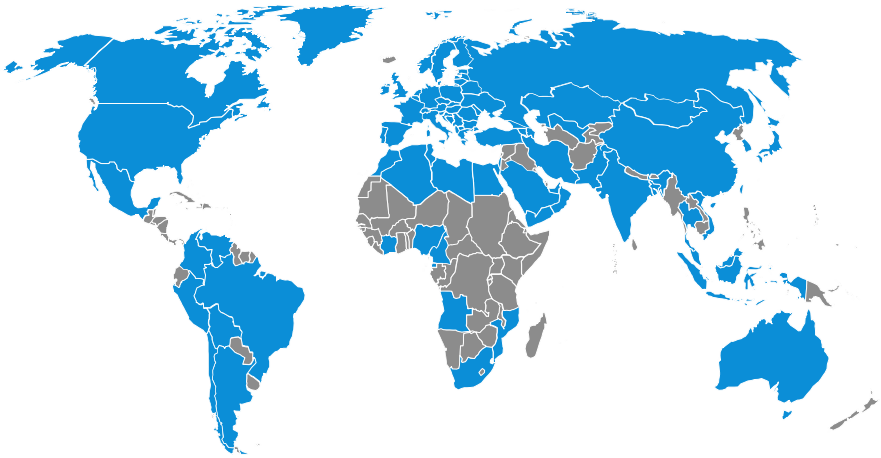
While the gas industry has started to notice a growing share of renewables in the generation mix, it is not clear how well the industry is prepared for a different future, which to some is difficult to explain:

- Coal preferred to gas in some countries, even if there is a strong will to reduce climate gases
- Renewables needing support, but still growing
- Nuclear not fading away as quickly as some believed after Fukushima

The strategy of the gas industry, especially in Europe, seems to be that gas is the “flexible friend” when the wind doesn’t blow and the sun doesn’t shine”. This is already the case in countries like Germany and the UK. Nuclear, coal and renewables run. Whether gas needs to run, depends on shortage in meeting demand, if any.

Wind, solar and even demand is now more difficult to predict, so if a day ahead price guides a gas generator to run, it could quickly be that last addition to the mix that makes too much (depending on the other factors mentioned). The result is typically more exports, if possible, and even moments of negative prices in the wholesale market (at very large losses to other generators, especially nuclear). That takes away the comfort of planning the previous day, and gas generators wanting to produce need to be nimble (ready to run or not at very short notice) and happy with little volume. Less running means higher margins needed while running, and in many cases, guaranteed margins for capacity availability. This is increasingly difficult to ensure with generally lower wholesale prices and gas prices still higher than the prices of alternatives.

For more information, see appendix with country/region chapters



The International Gas Union (IGU) was founded in 1931 and is a worldwide non-profit organisation promoting the political, technical and economic progress of the gas industry with the mission to advocate for gas as an integral part of a sustainable global energy system. The IGU has more than 142 members worldwide and represents more than 97% of the world's gas market. The members are national associations and corporations of the gas industry. The working organisation of IGU covers the complete value chain of the gas industry from upstream to downstream. For more information please visit **www.igu.org**

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