

CAN LNG PAVE THE ROAD TO PARIS?

How can natural gas help the world reach the Paris agreement

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Overview

Global environmental issues have deep and interconnective impact on every individual and every economy on the planet, as all countries share the one planet and one climate.

In 2017, US announced to withdrawal from Paris Agreement. As US contributes about 15% to global emission of carbon and one of the largest economy in the world, its exit places additional challenge for participating countries under Paris Agreement. There are two main aspects of opportunities and risks for rest of the world:

- Shift to renewables in fast rising new markets: Unlike the failure of Kyoto agreement without US's participation, the world is a very different place: back in 1997, when the Kyoto Protocol was adopted, the US accounted for 19% of global Greenhouse Gas (GHG) emissions and 20% of the world economy, whereas China accounted for only 12% and 7% respectively. By 2015, when the Paris Agreement was adopted, China had grown to become the largest emitter (29%) and the largest economy (17%), with the USA accounting for a proportionately lower share of global emissions (15%), and a smaller share of the world economy (16%). India another fast-rising power had nearly doubled its relative economic weight over this period (from 4% to 7% of the world economy). Both China and India are now seizing the future, working to bend their emissions pathways while growing their economies and creating thousands of green jobs through massive investments in renewable energy and plans to move towards electric vehicles by the end of the next decade.
- Tough and long road to part from Coal: a significant risk that will be exacerbated by the US withdrawal relates to the large global pipeline of coal-plant proposals, which – if built and operated – would curtail any chance of holding warming well below 2°C and limiting to 1.5°C. Coal is projected to grow rapidly in India, Southeast Asia, Turkey, parts of the Middle East and Africa.

This paper investigates a robust scenario for the world to achieve the Paris Agreement: a converging global natural gas market could be a key factor to an economically sustainable and greener future, keeping the balance between lowering coal consumption and ramping up renewable portfolio in an economically sustainable way.

Second, even without government commitment, the energy industry in the US has the capability and incentive to continue contributing to the course of helping the world lower its carbon footprint through a range of other avenues, due to the integrated nature of the global market. This paper goes further to evaluate the contribution of US natural gas in helping the world reaching the emission target.

Methods

Designing the scenarios and projecting the possible outcomes for such a complex question requires a sophisticated modelling system. G2M2® is a market equilibrium modelling system used to analyse and forecast the future of global gas integration, and it allows users to run a wide variety of scenarios under assumptions of their own choosing.

G2M2® has a comprehensive database covers supply, demand and infrastructure (LNG and Pipelines) and is designed to capture the market dynamics of a variety of natural gas markets around the globe, some of which are competitive like the US and Canada, some of which are liberalizing like Europe, and many in which the government and its national companies are decidedly non-competitive.

G2M2® is a data-driven system allowing approximation models using highly aggregated geographical representations as well as precision models with highly granular geography. Thus, the author's development team

has acquired sufficient information to model 131 countries, of which 14, due to the size of their supply and/or demand sectors, have been sub-divided into multiple geo-political units: Australia, Canada, China, India, Indonesia, Malaysia, Mexico, Russia, and the United States, as well as the North Sea countries: Denmark, Germany, the Netherlands, Norway, and the UK.

The North American sub-model within G2M2® is generated from RBAC's highly granular industry-standard GPCM® Natural Gas Market Modelling System. The result is a Census Division level model of North America within G2M2®.

Results

The paper and presentation will discuss and highlight key implications for the international natural gas space given a scenario that the world reaching its emission target under Paris Agreement:

- In order to stay on course for reaching the target under Paris Agreement, continuously aggressive measure to curtail coal consumption will encourage short to medium term natural gas consumption, especially in emerging markets. How much additional natural gas imports will China, India, and other major participating countries under Paris Agreement need in the next 5-10 years in order to meet the emission standard? What would be the impact of flow pattern of LNG and price of natural gas in global market in the next decade?
- Will Europe get sufficient LNG to fill the gap of its decreasing domestic production, serving as a secondary source to pipeline gas from Russia?
- How much more LNG is needed for emerging markets with increasing energy demand in the long term? In the scenario where China succeeds in its emission goal, can it set an example for other developing countries like India, Indonesia, Thailand and in Africa to move towards a low-carbon economy? These new emerging markets may also play significant roles in the future global LNG.
- An alternative scenario where US LNG exports are severely restricted is also developed to measure the incremental impact of US LNG as a supply source, by comparing the change of global gas flow pattern, and cost structures for the whole world as well as domestic US market.

Conclusions

Conclusions will include a preliminary estimate for realistic levels of global LNG trade and competition between major players, the evolution of market prices in the increasingly integrated global market, and assessment of major opportunities and challenges for market participants and policy makers.