

# AN ANALYSIS OF NATURAL GAS SECURITY IN THE APEC REGION: A QUALITATIVE AND QUANTITATIVE ASSESSMENT

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## Overview

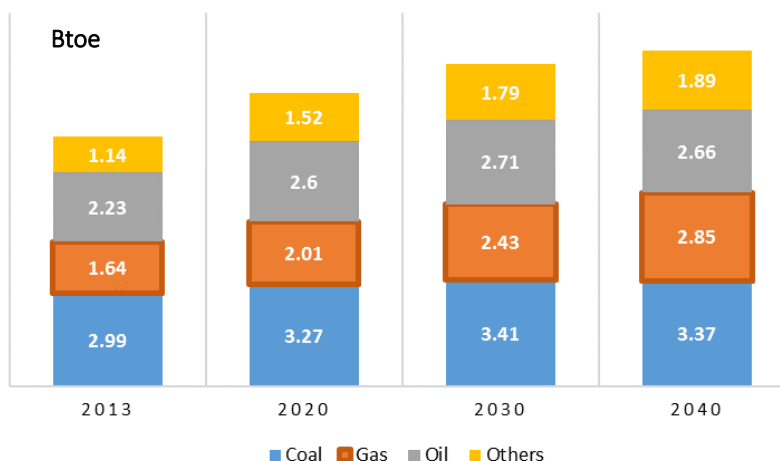
Energy security discussions have been focused on the stable supply of oil. However, the rapid growth and increasing share of natural gas in the Asia-Pacific Economic Cooperation (APEC) region necessitates to examine and assess the problems surrounding the stable supply of natural gas. Natural gas security is gaining much attention and increasingly becoming an important policy issue in APEC considering the growth in demand and expanding trade volume. As such, ensuring the stability of transportation routes is also gradually becoming a serious problem. This study assesses the current situation of natural gas security and the potential risk factors in the APEC region both on qualitative and quantitative perspectives.

## Methods

In order to have a better understanding of the growing importance of natural gas, the study looks at the current and future demand growth (Figure 1), as well as the trade volume globally and in the APEC region. Trade volume is also assessed (for both piped gas and LNG) including the occurrence of supply interruption and the slowdown in investment for upstream and even for LNG infrastructure brought about by low oil price. The increasing trade volume in the APEC region is the reason behind the growing concern on gas security.

This study presents two natural gas supply security-related incidents that caught international attention on gas security – cut of natural gas supply from Russia to Ukraine (also affecting supply to Europe), and the rapid growth in LNG demand in Japan after the Great East Japan Earthquake. The decline in investment in upstream is presented, which may lead to a supply and demand imbalance in the near future. Likewise assessed is the deferment of a number of LNG projects as the price of LNG could not cover the capital costs of putting up a new LNG plant.

Figure 1: Projected Primary Energy Supply in the APEC Region, 2013-2040



Source: APERC

Based on the current and possible future scenario on natural gas supply and demand, the study measures the vulnerability of the APEC region to potential risks using indices for the following indicators/factors: gas share to primary energy supply, gas intensity and per capita, self-sufficiency level, import source diversity, reserves-production ratio, utilization rates of pipelines and LNG terminals. External factors on supply risks are also assessed, such as chokepoints and political stability of gas exporters.

## Results

Although there are few cases of gas supply disruption, improving market liquidity, specifically on LNG, remains a concern coupled with less redundancy in the supply chain. As the trading of natural gas requires huge investment, there are many cases that natural gas is traded through long-term contracts with fixed customers, in particular for LNG, which needs greater investment than piped gas. Heavy investment is required in order to utilize gas, like the construction of LNG regasification and liquefaction facilities, and pipelines. Due to this factor, investors will only invest to meet certain demand. This means redundancy of supply capacity tends to be small, and thus even a small supply disruption can cause a significant security impact on consumers.

For APEC, the region is a host to both largest natural gas producers and importers of LNG. Overall, the region is 100% self-sufficient in natural gas, but some member economies are heavily dependent on gas imports, both piped gas and LNG. In 2015, 54% of gas imports was in LNG form and the remaining piped gas. It is important to note that having both LNG and piped gas as import sources reduce the external factor risks, specifically on chokepoints. Likewise, the import diversity significantly improved, from only 17 economies supplying gas to the region in 2000, it reached to more than 30 economies in 2015. However, the utilization rate for pipelines increased by twofolds, while LNG facilities utilization rate decreased due to additional capacity.

Most of the APEC member economies have no international or regional agreement related to gas supply security. The ASEAN Petroleum Security Agreement (APSA) may also include natural gas in the event of supply disruptions considering that one of the program areas under this regional cooperation is the Trans-ASEAN Gas Pipeline system (TAGP). Only seven APEC economies are covered by APSA. The IEA-International Energy Program (IEA-IEP), which six of the APEC economies are also members of, has yet to develop an agreement on gas security. The rest of APEC economies have not entered into any international or regional agreement on gas supply security (or even on oil security).

For total APEC, the natural gas security situation in the region could still be considered stable largely contributed by high self-sufficiency level and reserves-production ratio, as well as improvement in import diversity. Eleven of the APEC economies still maintained 100% gas self-sufficiency level (seven of which are net gas exporters), and the rest net gas importers. Although APEC's gas reserves/production ratio slightly went down (due to higher growth rate in gas production than reserves), it was one of the contributing factors preventing the overall supply security risk of the region to go up. The shale gas resources of the United States improved the region's gas reserves and decreased the import volume for the region. Based on modified Herfindahl-Hirschman Index (HHI), the region's import sources diversity improved, 0.10 HHI in 2015 (0.09 HHI in 2014) from 0.26 HHI in 2000.<sup>1</sup>

However, some economies showed increasing supply security risks resulting from growing natural gas demand and expanding imports. Those economies, which started to import gas (such as China and Malaysia), recorded increasing supply security risks (lower self-sufficiency level and higher utilisation rates of LNG regasification terminal and pipeline).

## Conclusions

The gas security policy in the APEC region should be focused on establishing a framework that can maximize the benefits of the market mechanism, including putting in place policy measures where such policy response is necessary. Improving flexibility in market trading and improving market liquidity hold the key to enhancing gas security.

As natural gas demand in the APEC is expected to increase with much higher growth rate compared with the rest of the world, promoting investment and trade must be pursued to secure a stable supply of natural gas. Increasing trade within APEC somehow reduces supply risks considering that most of the member economies have relatively stable political environment. One of the advantages of LNG producers from the APEC region is the absence of chokepoints.

Although energy security is at the forefront of energy cooperation in the APEC region, the APEC Leaders may also consider formulating a Natural Gas Security Framework (probably, together with oil in one security framework) to further strengthen regional gas supply security. A regional gas supply security agreement could lower the supply security risks, specifically for those economies with limited resources and high dependency on imports.

## Acknowledgement

Authors would like to acknowledge contributions of Mr. Yoshikazu Kobayashi, Dr. Tetsuo Morikawa and Dr. Ayako Sugino of the Institute of Energy Economic, Japan (IEEJ) as research colleagues.

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<sup>1</sup> In the diversity index (0.0 to 1.0), the lower the number the more diversified the sources of imports.