Chapter 4

Policy Recommendations

The case study shown in Chapter 3 has given insight into Thailand's resilience against LNG import disruptions, which is applicable to a number of other emerging EAS countries introducing LNG. Emerging EAS countries introducing LNG are recommended to consider risks associated with LNG import disruption and their countermeasures. Similar case studies are recommended for respective EAS emerging countries to discuss country-specific energy policy. While each country has its own energy policy suitable for its energy system, some common recommendations can be derived to enhance the resilience against LNG import disruptions.

4.1 Identify critical risk sources for LNG import disruption

Unexpected disruption of LNG import may occur at any process in the LNG supply chain, such as gas production, liquefaction, LNG transport, and LNG receiving and regasifying, either due to political, commercial, technical, or environmental reasons. This should be carefully examined. Since the LNG market is expanding globally, risk sources associated with LNG trade are rather common for LNG importing countries. One critical risk is the disruption of export, either politically or physically. It becomes most critical if the export disruption is from the largest long-term contract. The impact could be even more extreme for countries that have just started importing LNG, because those countries are more likely to rely on a single long-term LNG contract, or if any a few, for most of their LNG procurement.

Another critical risk is related to failure of an LNG receiving terminal, either technically or by natural disaster. LNG receiving could be a bottleneck of the entire LNG supply chain, if a country has just one receiving terminal. Disruption of LNG export and failure of LNG receiving terminals could be the two most critical risk sources for countries that have just introduced LNG import. The severity of such critical situations could be eased through increasing LNG imports, thereby allowing these bottlenecks to be diversified. A set of LNG import disruption scenarios should be formulated, where the amount and duration of disruption are specified. It should be stressed that disruption scenarios must include unprecedented worst-case scenarios, which individual energy industry players may not be able to solve, but which the government should deal with as a matter of national energy security.

4.2 Evaluate the impact of LNG import disruption on energy supply system and identify countermeasures

The impact of an LNG import disruption could spread to a country's entire energy system. Detailed information on a country's energy system is essential to investigate the impact and relevant countermeasures. Information on an energy system should include not only 'actual flow' but also 'available capacity' of each element in the energy system that could be utilised as back-ups for countermeasures. Necessary information on available capacity includes:

- Indigenous production of gas, oil and coal if any
- Gas process facilities and oil refineries including flexibility of the process
- Power generation by fuel type including fuel switch capability
- Transmission of electricity grid and gas pipelines, domestic and/or interconnected.
- Energy demand portfolio, usage-wise with peak and average demand.

For the demand side, values for peak as well as average demand for electricity and gas are needed to secure energy supply during the peak demand period. Information related to sale and purchase agreements among power producers, grid operators, retailers and consumers would also help in identifying and prioritising viable countermeasures. An energy flow analysis in the event of an LNG import disruption should then be conducted to investigate whether the entire energy supply in a country could be secured. Necessary countermeasures should be identified, which are either viable or to be planned in future energy policy.

The case study for Thailand shows that detailed information on the country's energy supply system greatly helps evaluate viable countermeasures. With its in-depth information and systematic analysis, the case study shows that in the present situation Thailand is reasonably resilient against LNG import disruptions. Thailand has its own indigenous gas resources, of which production can be increased to some extent to supplement the shortage of LNG. Furthermore, the country has plenty of bi-fuel power generation capacity, ready to be switched from gas to oil. Thailand also has a redundant transmission system for both electricity and gas, which could allow it to manage supply of electricity and gas. The results show that unless the LNG import disruption is large and lasts for a long period, Thailand could successfully secure its country's energy supply.

4.3 Generate long-term energy supply plan that incorporates countermeasures for import disruption of LNG and other energy sources

The case study for Thailand is based on current LNG imports to Thailand, which constitutes 21% of total natural gas supply at maximum. Thailand's indigenous natural gas production is much larger than the amount of imported LNG in the current LNG-introduction phase, allowing Thailand to supplement disrupted LNG by increasing indigenous gas production. On top of this, Thailand's total energy consumption is far larger than imported LNG, and primary energy sources are well diversified at present. This gives Thailand a certain flexibility to switch fuels to manage

an LNG import disruption. In 10 years, however, Thailand's LNG import is projected to constitute over two-thirds of the country's natural gas supply. As LNG import increases to become more significant among the primary energy sources in the future, more efforts will be necessary to identify viable countermeasures.

Long-term and short-term energy security should be considered along with resilience against LNG import disruptions. This is more important as a country's reliance on LNG import increases.

4.5 Expected policies for the resilience against LNG import disruption

The following three categories of policies are expected to incorporate countermeasures for import disruption of LNG and other energy sources in the long-term energy supply plan.

- **Energy policy**

A diversified energy supply portfolio, in terms of fuel type and resource origin, is clearly recommended. If a country has indigenous energy resources, a balance between imported and indigenous resources should be also respected. Indigenous energy sources are in fact very reliable and indispensable, particularly when import of fuel is disrupted. Indigenous energy development should be strategically pursued. A reasonably redundant energy supply network is recommended. Transmission or transport capacity of electricity, oil, and gas should be carefully examined and designed to be redundant enough to prevent them from becoming bottlenecks in case of a disruption. As for power generation, the capability of switching fuels between oil and gas should be considered; part of power generation units should be installed to be fuel-switch ready.

Another aspect is energy efficiency. Energy efficiency should be always pursued, for which reducing peak demand for electricity and gas is particularly important.

Reform of the energy industry should take into consideration attracting investment from a variety of players. A liberalised energy market, if properly designed and implemented, would be the most resilient against energy import disruptions while reducing energy import/supply cost. An energy market with a variety of players could act in the most flexible manner in case of an energy supply disruption.

- **LNG import and natural gas supply policy**

Careful consideration of LNG procurement is recommended. When starting to import LNG, countries should diversify projects or exporting countries so as not to rely on a single country for the majority of the LNG supply. A balance between long-term procurement and spot purchases should be carefully examined.

LNG receiving terminals could be the most serious bottleneck for the entire LNG supply chain. Preferably, a country should have multiple LNG entry points or receiving terminals that are geographically diversified as well. Thailand, for example, is studying the feasibility of constructing two new LNG receiving terminals. Both terminals are along the Gulf of Thailand near the existing terminal to supply gas to the greater Bangkok area. While economically less preferable, a new terminal could be recommended along the west coast of Thailand, rather than having all the terminals concentrated along the Gulf of Thailand.

A nationwide natural gas supply network, which connects LNG receiving terminals as well, is needed to ensure a flexible and reliable supply of gas. Along with the gas pipeline network, the storage capacity of gas and/or LNG should be carefully designed.

- **Regional cooperation**

It may take a while before the global LNG market becomes as mature as the oil market. This offers possibilities for LNG importing EAS countries to cooperate in LNG procurement. Resale of LNG among importing countries could help manage disruption of LNG import. For some emerging EAS countries that are introducing LNG, working with mature LNG- importers such as Japan, the Republic of Korea, and Taiwan may be a good option. With far more LNG procurement and storage capacity, they have enough flexibility to supplement LNG shortages for emerging EAS countries in case of a supply disruption.

Unlike Europe, which has a well-established regional energy network, the EAS region has virtually no energy network. The few cross-boundary interconnections available for electricity and gas are mainly for fixed trade purposes. Although idealistic, an energy supply network across all EAS countries should be considered, including particularly the Indochina Peninsula and its surroundings. Having a regional energy network would make it easier to counteract LNG import disruptions. A regional energy network, including one on natural gas, could also help establish resilient energy system more economically with lower investment and operating costs.

A regional power/electricity transmission network is of primary importance, because the majority of LNG is currently used for power generation in emerging EAS countries. Most LNG receiving terminals in the region are built for power generation.

With economic growth, demand will increase for natural gas for industrial and other purposes. In Thailand, for example, while approximately 60% of natural gas supply is used for power generation, the rest is used for industrial, petrochemical, and transportation (NGV) purposes. More use of natural gas in commercial and residential sectors is expected to follow. With the realisation of a regional gas network, the locations and capacity of LNG terminals could be optimised in view of economics as well as resilience against LNG disruption. Total costs including capital expenditure (capex) and operations and maintenance (O&M) could be much lower, while maintaining the same level of resilience or supply security for each country.