Chapter 4

Potential Cooperation beyond ASEAN

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Chapter 4

Potential Cooperation beyond ASEAN

This chapter explores potential items for cooperation between ASEAN and non-ASEAN countries, especially IEA member countries in the Asia–Pacific region such as the US, Japan, and South Korea.

Given the globalised nature of the international economy and oil markets, cooperative activities bring large benefits to all countries in the region. Since successful cooperation meets one country's specific needs using another's resources, it is very important that countries understand one another's background, expertise, and resources in order to form meaningful cooperation in stockpiling. Based on this perspective, this chapter first briefly confirms why such cooperation is important. The chapter then explores what kind of cooperation can be considered relevant and effective between ASEAN and non-ASEAN countries and organisations, specifically the US, Japan, South Korea, Australia, and New Zealand, and the IEA.

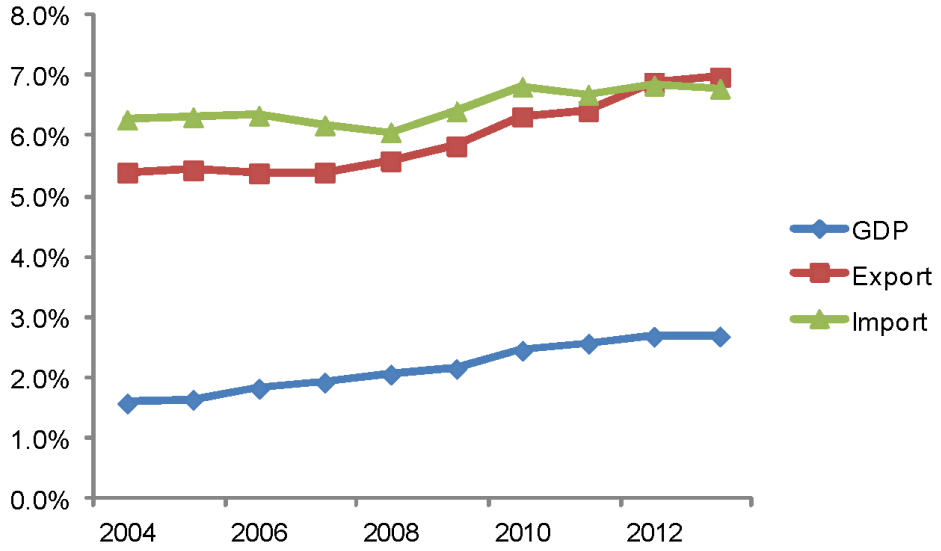
4-1.Why Cooperate?

4-1-1.Growing weight of the ASEAN in the world economy

Non-ASEAN countries have multiple reasons to build cooperative relationships with the ASEAN in terms of oil-supply security. First, as the weight of ASEAN economies in the world economy grows, a stable oil supply to the region's economies becomes more relevant and important to the economic growth of non-ASEAN economies. As shown in Figure 4-1-1, while the share of the ASEAN's economic activities in the world economy is still low at 2.7 percent as of 2013, it has been increasing steadily in the last decade. Its growing significance to the world economy is also evident in world trade. The ASEAN's share in the volume of world trade has expanded steadily over the last decade (Figure 4-1-2). Given its potential for further growth in the future, the ASEAN's importance to world trade is highly likely to continue to grow.

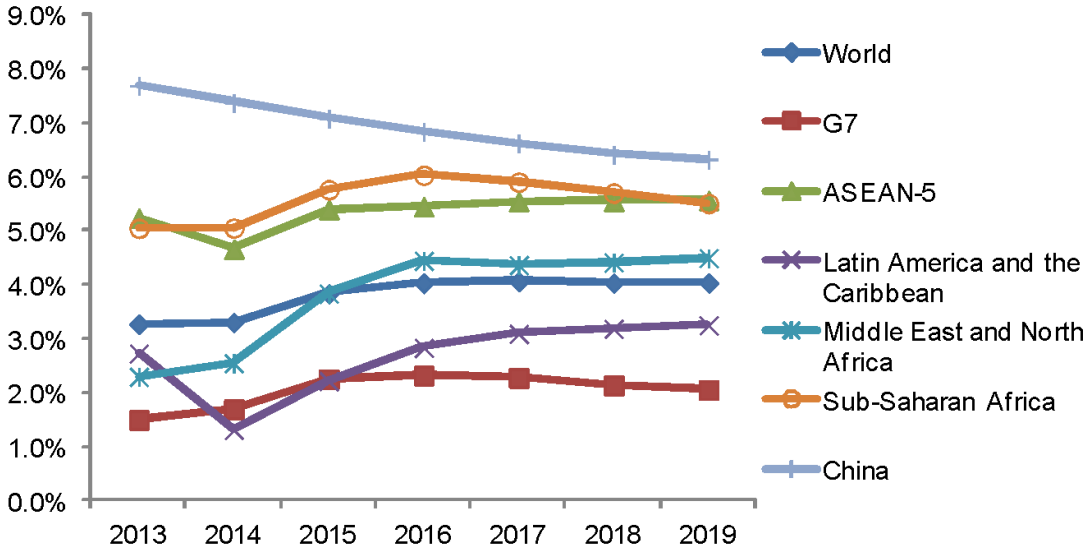
Because oil is the largest source of the region's energy mix (Figure 4-1-3), securing a stable oil supply is a cornerstone of the region's sound and stable economic growth in the future. Non-ASEAN countries cannot neglect the ASEAN's significance for their own economy and thus have high stakes in there being a stable oil supply for the ASEAN.

Figure 4-1-1. Share of ASEAN Economies in the World Economy



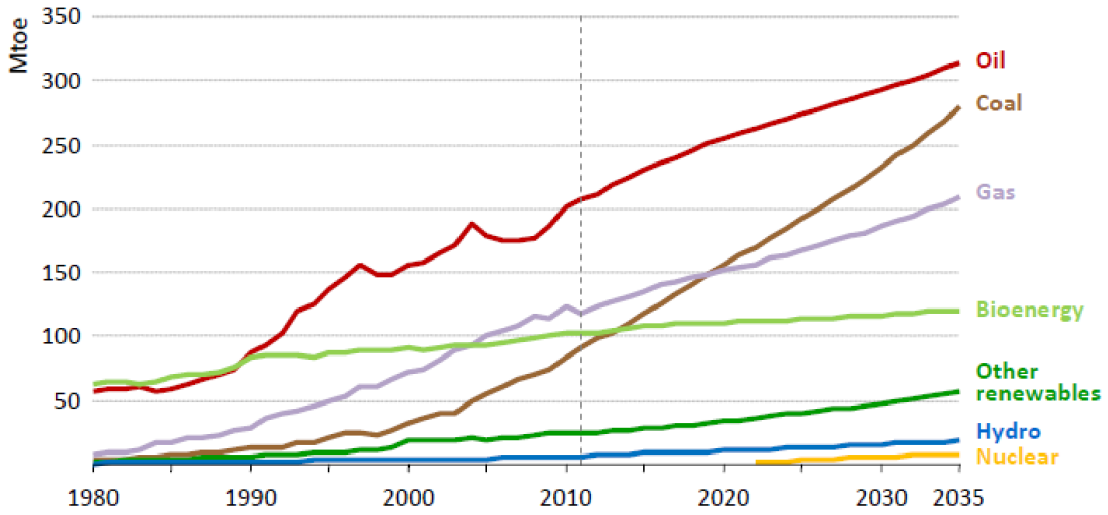
Note: The share of ASEAN's Gross Domestic Product (GDP) includes the share of ASEAN 5 countries (Philippines, Indonesia, Malaysia, Thailand, and Singapore).
Sources: International Monetary Fund (IMF), '*International Financial Statistics*' (for GDP) (2015); IMF, '*Direction of Trade Statistics*' (for export and import) (2014).

Figure 4-1-2. Outlook of GDP Growth Rate of Various Regions



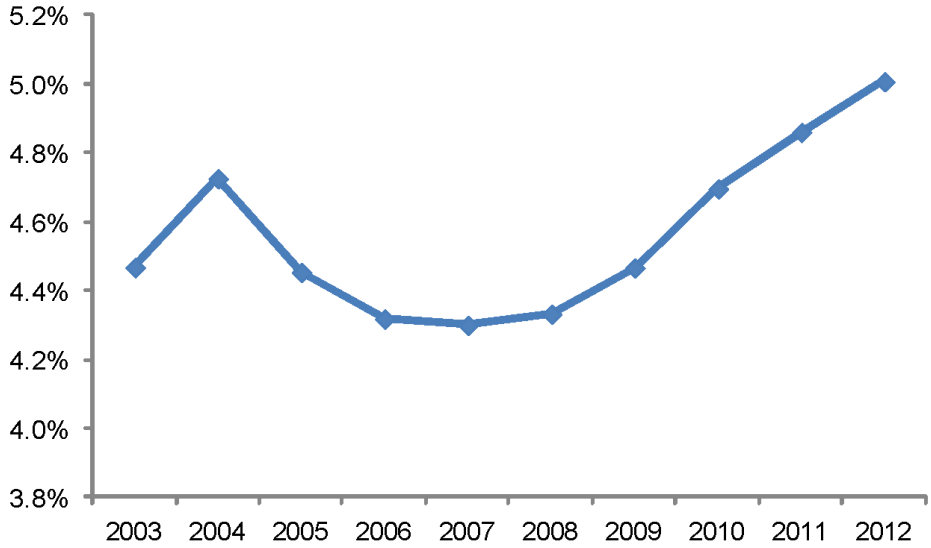
Source: International Monetary Fund (IMF),' International Financial Statistics' (2015).

Figure 4-1-3. Total Primary Energy Supply in Southeast Asia



Source: International Energy Agency (IEA), 'Southeast Asia Energy Outlook' (Paris, 2013).

Figure 4-1-4. Share of the ASEAN in the World Oil Market



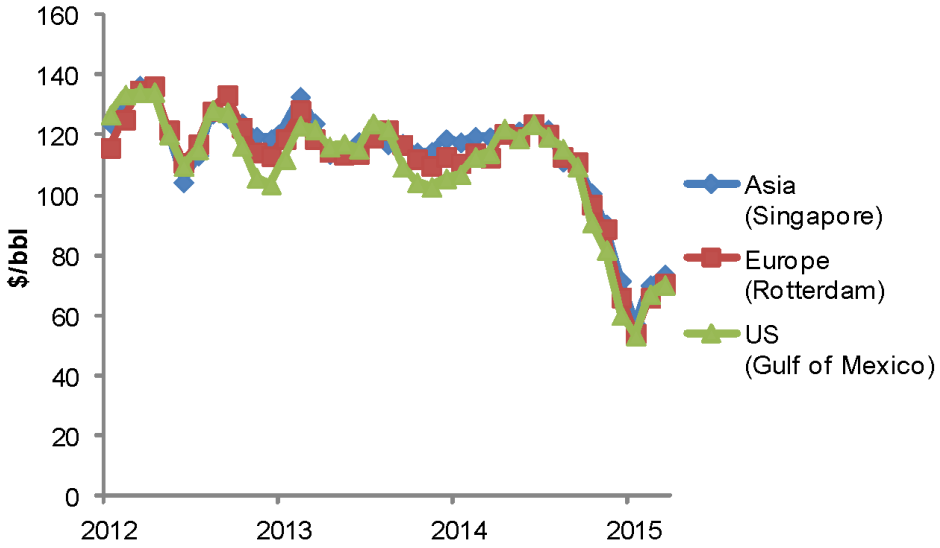
Note: ASEAN figures do not include figures from the Lao People's Democratic Republic due to data constraints.
Source: International Energy Agency (IEA), 'Energy Balances of Non-OECD Countries (Paris, 2014).

4-1-2. Globally integrated international oil market

Because the international oil market is integrated, any supply disruption affects the global oil market as a whole. Figure 4-1-5 suggests that gasoline prices in different regions have very close correlations. This is because of the arbitrage process where a high price in one market attracts additional supplies from another market, and eventually the high price converges with those of other markets. It also means that any supply

disruption in one market can cause a price rise effect in other markets. As the share of the ASEAN in the world oil market has been consistently increasing, it is becoming more relevant for non-ASEAN countries to ensure a stable oil supply in the ASEAN. In this sense, all ASEAN and non-ASEAN countries are in the same boat. Non-ASEAN countries should have a strong interest in the oil-supply security of the ASEAN in order to ensure the security of their own supplies.

Figure 4-1-5. Gasoline Prices in the United States, Europe, and Asia



Source: International Energy Agency, 'Oil Market Report' (various editions).

4-1-3. Investments in the ASEAN's oil market

Third, the ASEAN's oil market is a place where a number of US, Japanese, and Chinese oil companies have already invested or are planning to make investments. US and Chinese companies have refining capacities in ASEAN countries, and one Japanese company is constructing a refinery in Viet Nam. Developing a sound oil market and ensuring that the ASEAN oil market is functioning properly will certainly meet the long-term objectives of those oil companies because such market development will facilitate the generation of an appropriate return on their investments.

4-2. Cooperation with the United States

The US has well-developed systems for oil stockpiling and emergency response. Its systems have been tested and improved through a number of experiences in supply disruption caused by natural disasters (particularly hurricanes) and by terrorism. The country can provide its valuable expertise to ASEAN countries in areas such as the principle concept of an emergency response system, the organisational design of emergency response, and smooth and timely procedures to release its SPR in case of emergency.

4-2-1. Concept of energy response measures: all-hazards approach

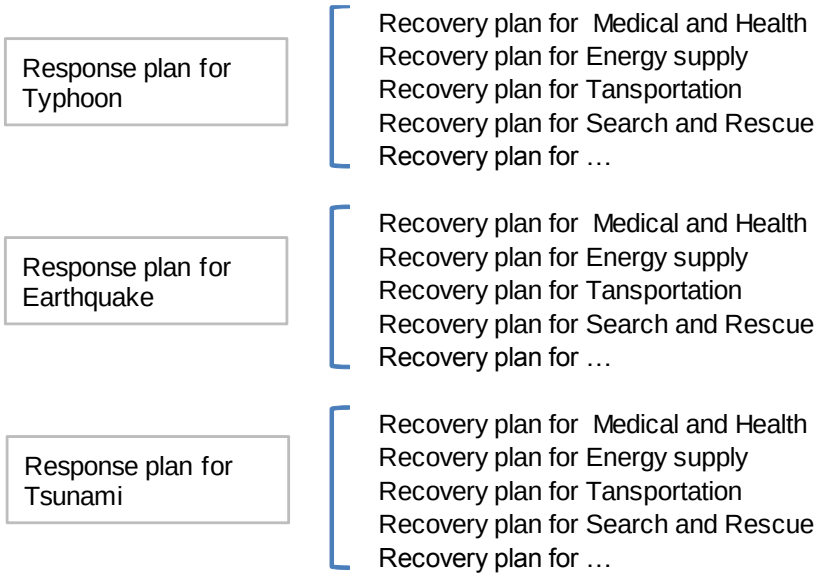
First of all, the US has a very advanced emergency response system, which can be introduced to ASEAN member countries as a reference for their own emergency response systems.

One of the most outstanding aspects of the US emergency response system is its key concept: all-hazards planning. This concept is the idea that an emergency response plan should be based on the affected functions rather than on the type of emergency. Emergency response plans tend to be developed assuming the occurrence of a specific event such as a typhoon, an earthquake, or a tsunami. An all-hazards approach does not take this event-based view. This is because the activities of emergency response plans based on specific events are more complicated on the whole. Until the 1970s, the US response system was also built on an event-based system. In 1979, however, a new emergency response organisation named the Federal Emergency Management Authority was established, and a new all-hazards approach was introduced. This approach has been used as a guiding principle for the US emergency response system since then (Figure 4-2-1 and Figure 4-2-2).

In the all-hazards approach, an emergency response plan is developed based on the affected functions instead of a specific type of event. Such functions are called Emergency Support Functions, and 15 such functions have been identified (Table 4-2-1). A specific government department or agency is designated as the leading organisation for each function. In case of emergency, each leading organisation has the responsibility to

restore its respective function, regardless of the type of emergency. The leading organisation acts as the response coordinator in an emergency. For ESF Energy, for example, the leading organisation is the Department of Energy, which is responsible for restoring the energy supply regardless of what causes the supply disruption. Table 4-2-1 lists the leading organisations of the 15 ESFs.

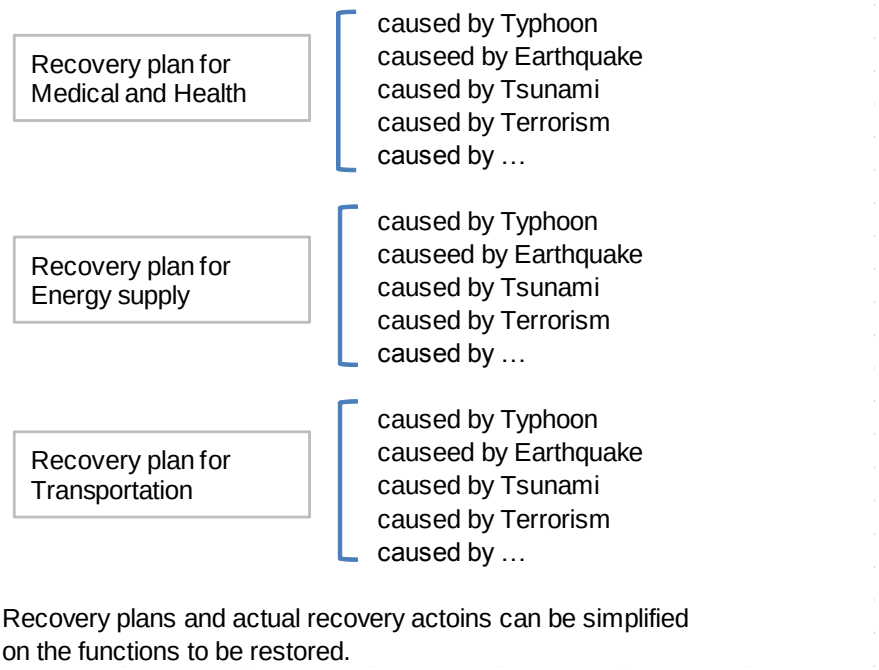
Figure 4-2-1. Scenario-Based Approach



Recovery plans and recovery actions tend to be very complicated
Actual response may not well function when two emergencies simultaneously occur (e.g. earthquake and tsunami)

Source: International Institute of Global Resilience.

Figure 4-2-2. All-Hazards Approach



Source: International Institute of Global Resilience.

Table 4-2-1. Emergency Support Functions

ESF 1: Transportation (Dept. of Transportation)	ESF9: Search and Rescue (Federal Emergency Management Agency / Dept. of Homeland Security)
ESF 2: Communications (National Communication Systems / Dept. of Homeland Security)	ESF 10: Hazardous Materials (US Coast Guard, Dept. of Interior)
ESF 3: Public Works (US Army Corps of Engineers / Dept. of Defense)	ESF 11: Food (Dept. of Agriculture)
ESF 4: Fire Fighting (Forest Service / Dept. of Agriculture)	ESF 12: Energy (Dept. of Energy)
ESF 5: Emergency (Federal Emergency Management Agency / Dept. of Homeland Security)	ESF 13: Public Safety and Security (Dept. of Justice)
ESF 6: Mass Care (Mass Feeding and Shelter) (Federal Emergency Management Agency / Dept. of Homeland Security)	ESF 14: Long-term Community Recovery (Federal Emergency Management Agency / Dept. of Homeland Security)
ESF 7: Logistics (Federal Emergency Management Agency / Dept. of Homeland Security)	ESF 15: Public and External Affairs (Federal Emergency Management Agency / Dept. of Homeland Security)
ESF 8: Health and Medical (Dept. of Health and Human Services)	

Note: The organisations listed in parenthesis are the leading agencies for each ESF.
Source: Federal Emergency Management Agency website.

This concept was generated and refined through the various experiences of emergency response activities in the US. In an emergency, a number of unexpected events occur and in such cases, it is always challenging to know who made what decisions based on what kind of information. The concepts above will help develop an effective emergency mechanism by clarifying that the core of emergency response is restoring affected functions and specifying who is responsible for the mission. In designing an emergency response system in the ASEAN, this all-hazards approach would work as a very useful principle.

4-2-2. Organisational design: Incident Command System

Another outstanding and useful element of the US emergency response system for the ASEAN to learn from is the organisational design of its emergency response: Incident Command System. The ICS is an organisational template that all emergency response organisations in the US are encouraged to adopt (Figure 4-2-3). In this template, the incident commander is the chief of the response organisation who oversees four functional groups: operations, planning, logistics, and finance and administration. The incident commander also has supporting staff responsible for safety, information and communication, and liaison with other organisations. By following the same organisational template and developing an identical organisation within each emergency response organisation, it is possible to facilitate communication and coordination amongst them and achieve a smooth and well-functioning response.

Figure 4-2-3. Incident Command System

Source: Federal Emergency Management Agency website.

ICS has the following two characteristics.

- It is a standardised organisation. Each organisation has a common organisational design that facilitates efficient coordination, avoiding redundant roles and communication.
- It is highly adaptable. The ICS organisation can expand or shrink in answer to the development of emergency response. The number of staff can increase or decrease depending on the status of the emergency.

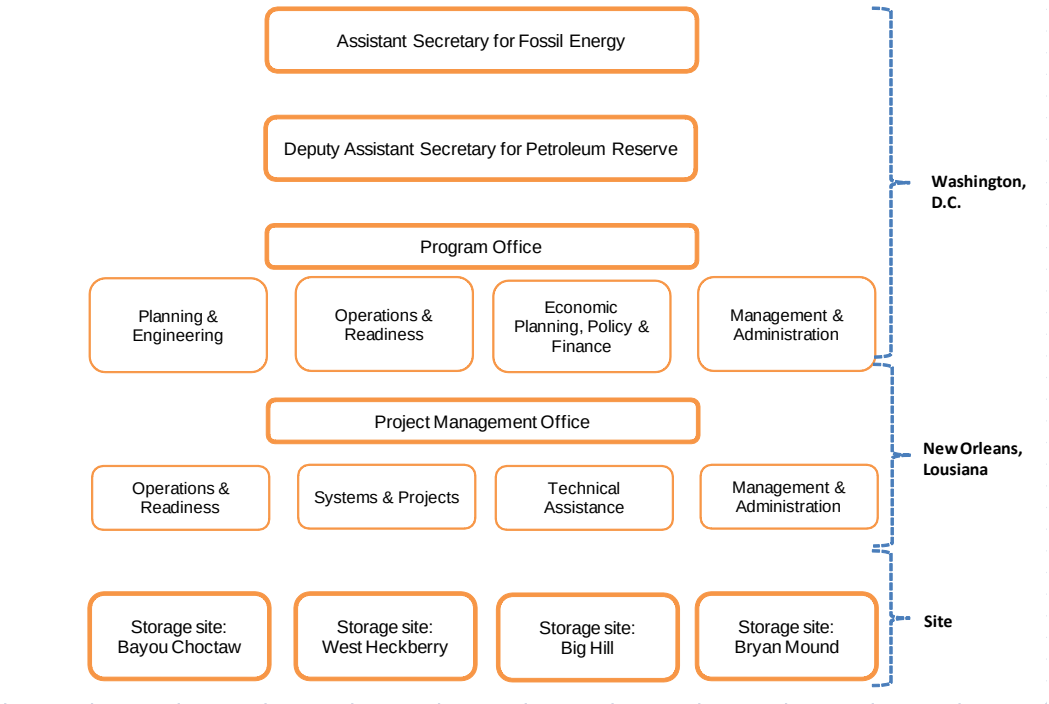
The US has deep expertise in designing emergency response mechanisms utilising the ICS. In particular, the Federal Emergency Management Authority under the Department of Homeland Security manages and operates emergency response systems based on ICS and was able to achieve very effective response actions in their response to Hurricane Sandy in 2012. The ICS can provide useful guidance to ASEAN countries that have not yet developed such emergency response activities but plan to do so in the future.

4-2-3. Stockpiling system in the United States

The US has one of the best-functioning oil-stockpiling systems in the world. The legislative framework of the US oil-stockpiling system is provided by Energy Policy and Conservation Act, which was originally provided in 1975, and modified most recently in 2012. The Department of Energy's assistant secretary for fossil energy is responsible for meeting the objectives of the SPR. Practical matters are handled by the Department of Energy's deputy assistant secretary for petroleum reserves. Stockpiling policy implementation is undertaken by the Program Office in Washington, DC and day-to-day operations are overseen by the Project Management Office in New Orleans, Louisiana. The United States has four major SPR bases in Louisiana and Texas where major refineries exist nearby. All stockpiling operation activities are undertaken by these local stockpiling bases. According to the annual SPR report issued by the Department of Energy, 111 federal government staff and 834 contractors were engaged in SPR operations as of the end of 2012.

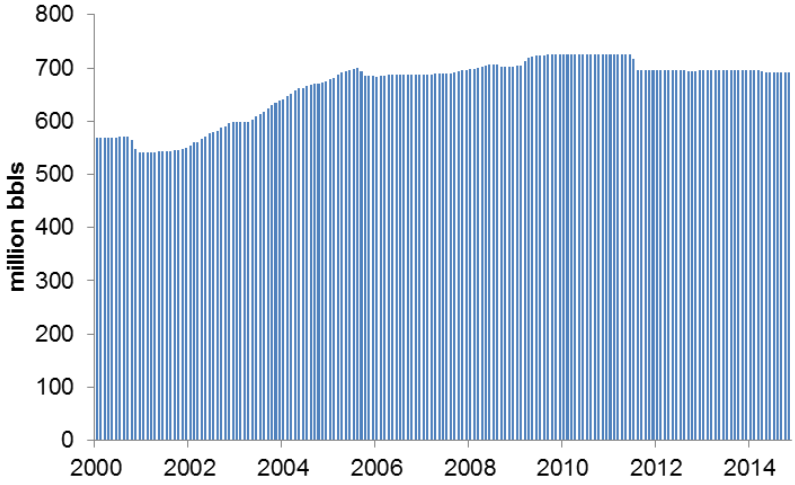
Being the largest oil-consuming country in the world, the US holds about 700 million bbl of oil stockpiling, by far the largest stockpiling volume in the world. The volume was raised to its current level in 2005 under the Bush administration. This decision to raise the volume of oil stockpiling was made when the international oil market balance was tight and the US oil import volume was rising due to declining domestic production (Figure 4-2-5). The experience of simultaneous terrorism attacks in 2001 strengthened awareness of national security in the US, and rising oil imports made the then administration find the necessity to increase the SPR stockpiling. Since then, however, the oil supply situation surrounding the US market in 2015 has been significantly different. Thanks to the shale revolution that makes it possible to extract oil and gas resources from shale reservoirs, US oil production has greatly increased and as a result, the country's oil imports have been rapidly decreasing (Figure 4-2-6). In this sense, the incentive to hold the existing high levels of stockpiling volume is receding for the United States.

Figure 4-2-4. Organisation of the United States SPR System



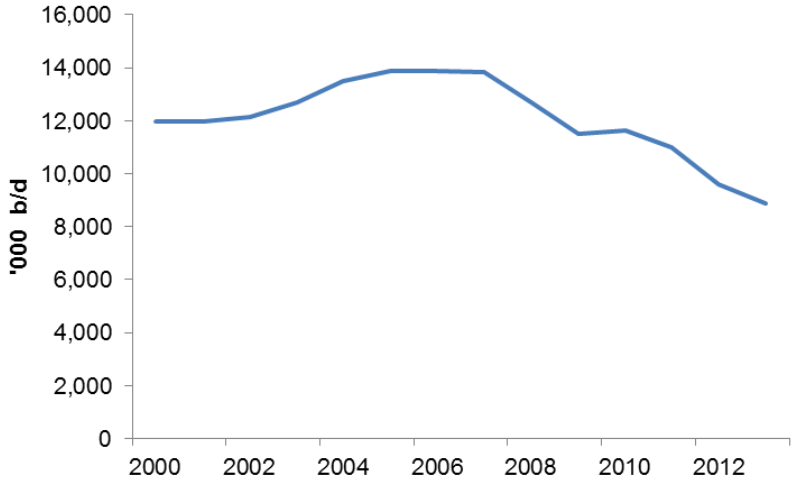
Source: US Department of Energy website.

Figure 4-2-5. United States Stockpiling Volume



Source: US Energy Information Administration website.

Figure 4-2-6. Oil Net Import in the United States



Source: British Petroleum, 'Statistical Review of World Energy' (2014).

All of the stockpiling volume in the United States is owned and operated by the US government; there is no private stockpiling system in the country. All the oil stocks US oil companies have are commercial stocks. Until the US Department of Energy began to stockpile low- sulphur heating oil in 2000,[20] all stockpiling was held in the form of crude oil. As of the end of 2013, more than 99 percent of the total oil stockpiling is crude oil.

[20] Stockpiling of low-sulphur heating oil is located in states in the Northeastern region (e.g. New Jersey, Rhode Island, and Connecticut) and its total stockpiling volume is two million barrels.

Figure 4-2-7. Stockpiling Bases in the United States

Source: US Department of Energy website.

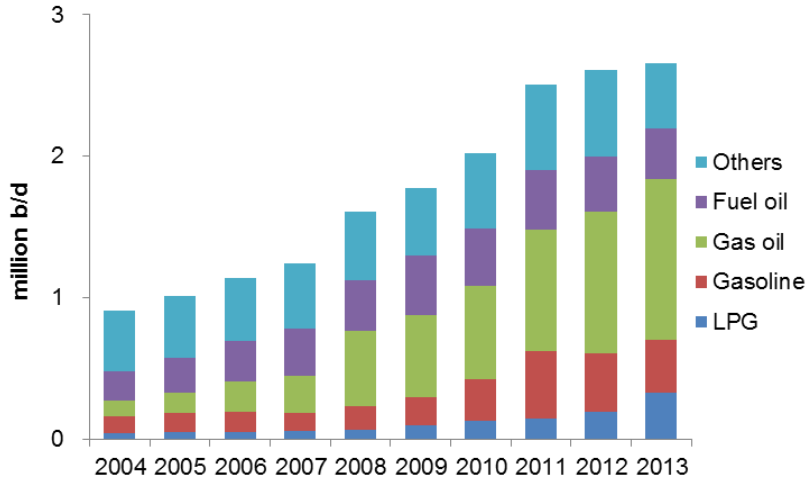
The US has four major crude oil stockpiling bases in the states of Texas and Louisiana (Figure 4-2-7). All of the stockpiling bases are linked to major refineries along the coast of the Gulf of Mexico by a domestic pipeline network, and the operation of releasing the stockpiled oil to the refineries is quite easily accomplished.

4-2-4.Limited possibility of physical product supply to Asia

Although the US has ample stockpiling and the largest refining capacity in the world, it is unlikely to be a major direct and physical supplier of oil to ASEAN countries in an emergency. Thanks to the shale revolution and growth in the production of domestic crude oil, crude oil prices in the US market have been traded at a discounted level compared to the international market.[21] Natural gas prices in the US are much lower than those at the international level, and refineries in the US enjoy the benefits of cheap feedstock and refinery fuel and have significantly increased their operational utilisation and product exports as well. The US has ample *physical* capacity to supply oil products to ASEAN countries if the region has a product shortage problem.

[21] In 2014, West Texas Intermediate (WTI), the US benchmark crude oil price, was $6/bbl cheaper than Brent, the European benchmark crude oil price.

Figure 4-2-8. United States Oil Product Exports (2004–2013)



Source: US Energy Information Administration website.

It is, however, a significant distance from the US to the ASEAN region. Even after the Panama Canal expansion is completed, it will take more than 20 days to navigate to the Asian market region from the Gulf of Mexico, the refining hub of the US. This may be too slow to meet the urgent need of Asian countries in an emergency.

Even if this distance is permissible, government-to-government coordination to arrange the export of oil products on a cooperative basis might be difficult. This is because all refiners in the US are private players and they will not export their product by US government mandate. They will only do so if the commercial conditions of such trade are met.

Furthermore, as mentioned earlier, all of the oil stockpiling held by the US government is crude oil but export of crude oil is prohibited in the US, with very limited exceptions. Asian countries will need the final product in case of emergency because many ASEAN countries have a refining capacity shortage. Therefore, there is limited chance of the US becoming a direct and physical oil supplier to ASEAN countries.

4-2-5. Oil product supply by US oil companies in Asia

Several US oil companies are operating globally and they could be an important source of oil products in the ASEAN in case of emergency. As shown in Table 4-2-2, US oil companies hold a refining capacity of 1.6 million b/d in the Asia–Pacific region and will be an important source of product supply.

Table 4-2-2. US Oil Companies Downstream Assets in Asia Pacific

(as of 31 December 2014)

Company	Country	Refining capacity (total capacity, '000 b/d)
ExxonMobil	Singapore	592
	Thailand	167
	Other Asian countries	256
Chevron	Republic of Korea	393
	Singapore	145
	New Zealand	14
	Australia	54
Total		1,621

Source: Websites of the above-mentioned companies.

Despite the recent trend of US oil companies reducing their refining assets around the world[22], US companies still have large refining capacities and will be an important supply source in an emergency. US oil companies have a long history in the downstream oil business in particular and have experienced a number of emergencies in the past. All US oil companies have developed business continuity plans which prescribe actions to be taken in an emergency and have established procedures to respond to such an emergency. These companies are likely to be reliable suppliers to consumers.

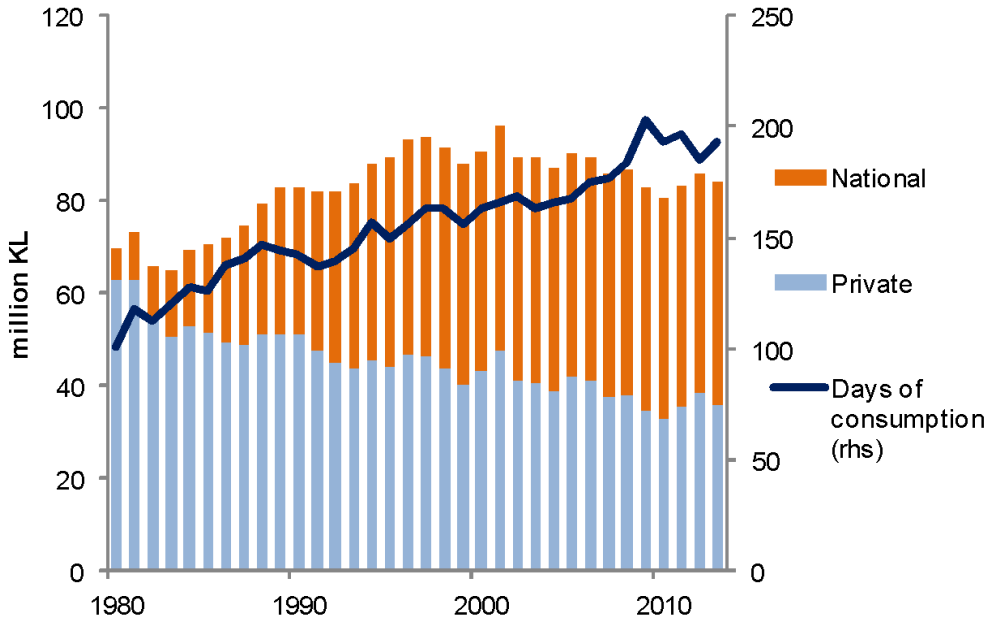
4-3. Cooperation with Japan

4-3-1. Japan's oil-stockpiling systems

The development of the Japanese oil-stockpiling system dates back to 1963 when the Energy Committee under the Industrial Structure Council of the Japanese government proposed to develop oil stockpiling equivalent to 60 days in accordance with a recommendation by the Organisation of Economic Co-operation and Development. After Japan achieved the 60-day target in 1974, another target of 90 days was set because the first oil crisis had occurred in 1973 and 60-day stockpiling was no longer considered sufficient to meet such a large-scale oil supply disruption. Oil stockpiling was continued and the 90-day target was achieved in April 1981.

[22] Chevron closed its refinery in 2003 and turned it into an import terminal. ExxonMobil also sold its Malaysian refinery to San Miguel Corporation in 2011.

Figure 4-3-1. Oil Stockpiling Volume in Japan

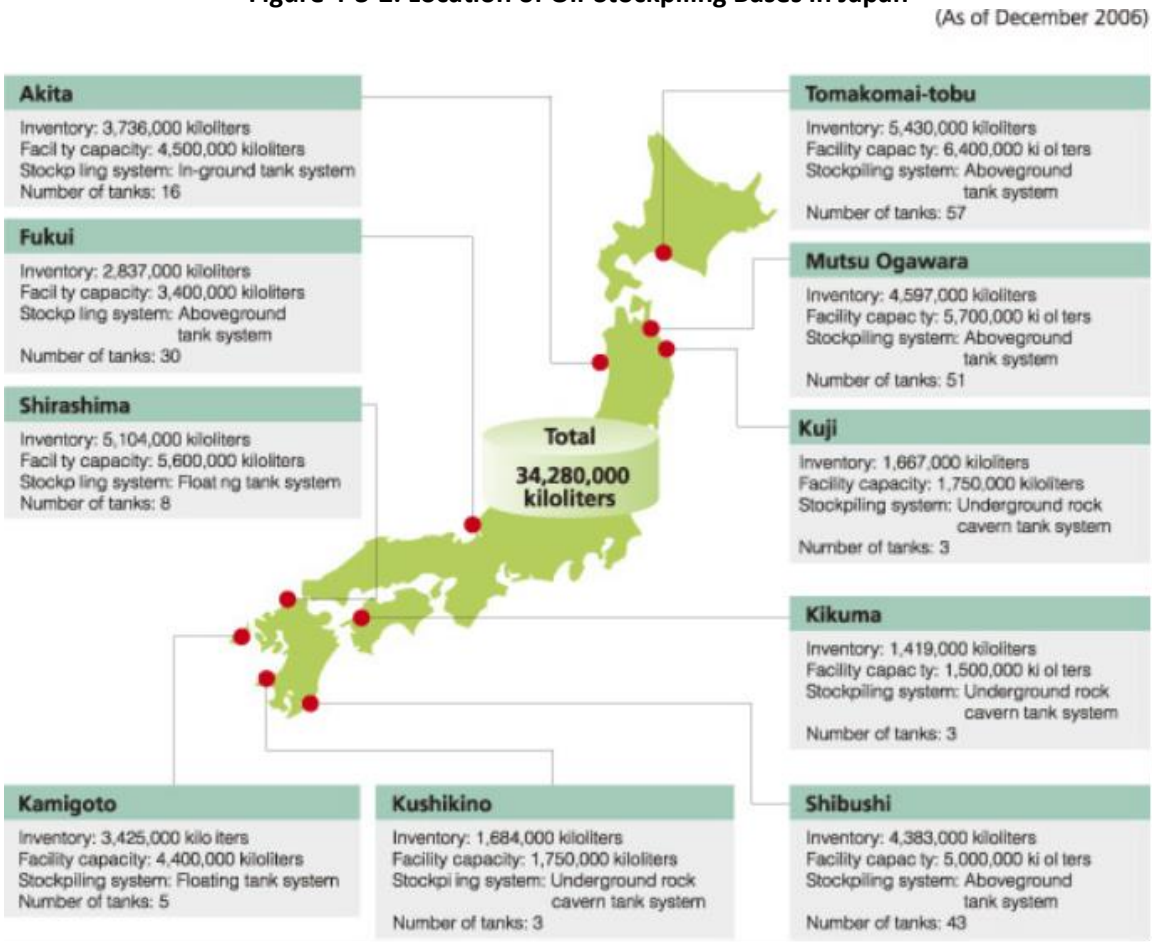


Source: Petroleum Association of Japan, '*Sekiyu Shiryo Geppou*' (2015).

While most of the initial oil stockpiling in Japan was built up by private oil companies with the government's financial support, the Japanese government also started to build oil stockpiling by itself (Figure 4-3-1). Japan National Oil Corporation (currently reorganised as the Japan Oil, Gas, and Metals National Corporation) began to raise government stockpiling in 1978. The target of the government stockpiling was 50 million KL (310 million bbl), and this was achieved in 1998. The government stockpiling was held in 10 oil-stockpiling bases in Japan (Figure 4-3-2) as well as in leased crude oil tanks in private companies' refineries in Japan.

As for the private stockpiling system, the Oil Stockpiling Act prescribes that oil refiners have to hold a minimum of 70 days of their sales volume and oil importers have to hold a minimum of 40 days. These refiners and importers are required to regularly report their crude oil and product inventory to show that they are maintaining the minimum inventory requirement for stockpiling purposes.

Figure 4-3-2. Location of Oil-Stockpiling Bases in Japan



Source: Japan Oil, Gas and Metals National Corporation (JOGMEC) website.

Japan has released private oil stockpiling five times but never government stockpiling (Figure 4-3-3). This is because private stockpiling is part of the commercial inventory of refiners or importers and is more easily released by utilising the regular commercial supply infrastructure. Particularly in the case of crude oil, private stockpiling is held within refinery premises and can thus be transported and processed at a refinery much more easily than the government-stockpiled crude oil, which is stored at a more remote location.

Figure 4-3-3. Government Stockpiling and Private Stockpiling

■ Current Status of Oil Stockpiling in Japan (as of Dec 2013)

	Private Stockpiling	Government Stockpiling
Stockpile Days	82 days	108 days
Stockpiling Volume	36.4 million kl	47.8 million kl
Obligation Days	70 days of domestic demand	50 million kl (attained in Feb 1998)
Holding Method	Through production and distribution processes	In sealed designated storage tanks (Oil products are held through production and distribution processes.)
Holding Location	Private sector tanks in refineries and oil terminals	Crude oil: ① Tanks of national stockpiling bases ② Tanks borrowed from private sector Oil products: Private sector tanks in refineries and oil terminals
Composition	Crude oil : 50% Oil products: 50%	Crude oil : 97.3% Oil products: 2.7%
Administrative Body	Oil refiners and importers (It is however possible for the joint stockpiling companies to act for such management.)	① 10 national stockpiling bases (2/3 of government reserve) ② Private oil companies (1/3 of government reserve): (Management on consignment)
Effect of Stockpile Release	① Prompt supply to distribution markets as a large part of stockpiles are held at refineries and oil terminals ② Flexible release of stockpiles depending on crude procurement status and seasonal demand fluctuation	① strong psychological effect on the market when the government announces its decision to release its stockpiling to increase oil supply in the market ② Reduced mobility of released stockpiling, compared with the private sector release, as reserves are stored at remote national stockpiling bases
Cases of Stockpile Release	① 2nd Oil Crisis (Mar 1979~Aug 1980) ② Gulf Crisis in response to CERM (Jan~Mar 1991) ③ Hurricane Katrina aftermath (Sep~Dec 2005) ④ The Great East Japan Earthquake (Mar~May 2011) ⑤ Libyan situation (Jun~Dec 2011)	None
Financial Measures	Subsidy for oil purchasing costs and tank construction costs	Government's budget (Petroleum and Coal Tax)
Cost Recovery	Part of product cost (passing the cost on to consumers is expected)	Part of product cost (passing the cost on to consumers is expected)

Source: Petroleum Association Japan website.

In the late 2000s, the Japanese government introduced the third category of oil stockpiling besides government stockpiling and private stockpiling; namely, joint stockpiling with oil producers. This is a framework where the Japanese government or oil companies lease their crude oil tanks to an oil exporter, such as a Middle Eastern crude oil producer, for commercial and trading purposes. Under ordinary circumstances, the oil exporter can utilise the tanks for commercial activities. Because the tanks are located in the Asian market region, the exporter can readily and easily respond to Asian importers' demand for crude oil. The exporter may even export to refiners on the West Coast of the United States if market conditions are met. In an emergency, on the other hand, Japan has priority claim to the tankers of the stored crude oil as if it were part of emergency oil stockpiling. The Japanese government entered into such an agreement with Abu Dhabi National Oil Company in 2009 and again with Saudi Aramco in 2010.

4-3-2. Administration experience to introduce stockpiling system

As an IEA member country, Japan is Asia's pioneer in developing oil stockpiling systems and has deep expertise and experience in developing and managing such systems. In developing a stockpiling system, a government needs to deal with numerous issues in initiating its efforts. It needs to determine who will undertake the stockpiling operation. Will it be the government or an oil company? If it is the government, a budget needs to be secured. If it is the private sector, the government may have to provide some financial assistance. The government also sets the target for the stockpiling volume.

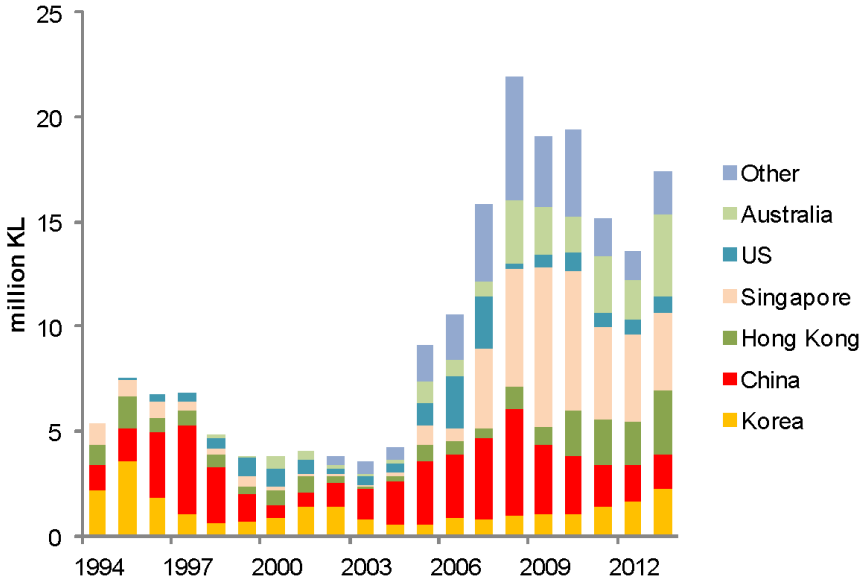
The government also needs to tackle many other issues. For instance, it has to provide a legal framework and set up a regular monitoring system to ensure that sufficient stockpiling volume is maintained within the country. In monitoring the volume, the government needs to develop an accurate statistical system for oil supply and demand as well as a regular reporting system. The government may need to establish a dedicated organisation to oversee oil stockpiling issues. In setting a specific target for oil stockpiling, it is necessary to examine the future demand outlook not only for oil but also for other energy sources such as natural gas or electricity. The target can be set as an import volume or a total demand volume. The government may decide which base is more relevant for the stockpiling target they set. Japan has developed its own stockpiling system by dealing with all of these issues and can therefore share its experience and administrative know-how with ASEAN countries.

4-3-3. Japan's product supply capacity to the ASEAN

Japan has an ample product supply capacity with its large refining capacity and stockpiling volume. In fact, Japan has maintained a high level of product exports in recent years despite its rationing of the refining capacity. This is because its domestic demand is rapidly declining and, therefore, its surplus refining capacity forces it to export its refined products abroad. While Japanese refineries are, in general, originally designed to refine products mainly for the domestic market, they have invested in export facilities such as berths and loading pumping capacity because the demand decline since the mid-2000s has been so large and rapid. Its export volume has significantly increased since the mid-

2000s as shown in Figure 4-3-4. Most Japanese oil product exports are directed mainly to the Asia–Pacific market, and this consistent export supply can be utilised as an emergency supply source if any oil-product supply disruption occurs in ASEAN countries.

Figure 4-3-4. Japan's Oil Product Export by Direction (1994–2013)



Source: Ministry of Economy, Trade and Industry, 'Yearbook of Mineral Resources and Petroleum Products Statistics' (2014).

Since the demand for Japan's domestic oil products is expected to decrease, its oil refiners will continue to have a surplus refining capacity and, consequently, the capability to provide a short-term measure for ASEAN countries.

4-3-4. Expertise on the various types of stockpiling bases and their construction and maintenance

Another kind of expertise that Japan can share with ASEAN countries is about constructing and operating various kinds of oil-stockpiling bases. In addition to the ordinary above-ground stockpiling bases, Japan also has floating tank stockpiling bases, underground stockpiling bases, and semi-underground (or in-ground) stockpiling bases.

Selecting a specific type of stockpiling base is a very important process in developing oil stockpiling. A number of factors and conditions need to be considered, such as economics, storage capacity, securing a site for the stockpiling base and consent

from the local community, and the geological structure of the construction site. Different types of stockpiling bases have different maintenance costs, and these costs may change as the stockpiling base continues to operate. Japan has a long history spanning more than 40 years of operating these stockpiling bases. It has accumulated expertise on selecting a specific type of stockpiling base and on construction and maintenance cost structure. This expertise will be a useful resource for ASEAN countries that plan to construct their own stockpiling bases.

4-3-5. Paper-based stockpiling

Utilising its ample stockpiling volume, Japan can provide an opportunity for paper-based stockpiling. It has stockpiling equivalent to almost 200 days and as its domestic demand decreases, its stockpiling days tend to rise. Japan, therefore, has sufficient volume of stockpiling and can lend it to another country on a paper basis.

In fact, Japanese oil companies have been lending a certain volume of stockpiling to New Zealand since 2009. In this case, based on an intergovernmental agreement between Japan and New Zealand, the New Zealand government bid for the rights to purchase oil stockpiling in an emergency, and a Japanese oil company was awarded the bid to sell those rights to the New Zealand government. In this transaction, the New Zealand government pays a fee to Japanese oil companies in return for the right to secure oil products in an emergency. Until ASEAN countries develop their own stockpiling bases, Japan can provide them a similar arrangement as an interim oil stockpiling measure.

4-3-6.Training program and facilities

In relation to sharing its expertise with ASEAN countries, it should be noted that Japan has well-developed training program and facilities. Japan Cooperation Center, Petroleum has organised approximately 30 courses, inviting industry professionals from overseas, and has an established scheme to conduct professional education in the oil industry. Japan Oil, Gas and Metals National Corporation also regularly receives a number of international visitors and gives lectures about its operation of government stockpiling facilities. Japan already has the infrastructure as well as established procedures and the

experience to share its expertise with foreign professionals. It can utilise this in international cooperation with ASEAN countries that are considering developing their own oil-stockpiling system.

4-3-7. Emergency response measures

Japan has also recently accumulated expertise in emergency response measures, particularly against natural disasters. The Great East Japan Earthquake in 2011 revealed a number of issues in Japan's oil-supply system, such as the lack of a coordinating organisation that collects accurate information and allocates the limited supply of oil products to prioritised places such as hospitals or emergency assistance vehicles. Based on this experience, the Japanese government has modified the Oil Stockpiling Act to facilitate inter-company cooperation in case of an emergency and has built up the stockpiling of government oil products. The government also requires oil companies to provide a business continuity plan and to review it in order to develop a more effective plan. In 2014, the government conducted an emergency drill involving oil companies and the Japan Self-Defense Forces. Insights and skills gained from this drill are expected to a play crucial role during rescue operations and in the transport of necessities such as food, medical supplies, and fuel.

On the infrastructure side, the government secures the budget necessary to enhance the physical resilience of refinery sites. Because natural disasters such as typhoons, earthquakes, and tsunamis are a common threat to all ASEAN countries, how to prepare well for these threats is a major issue in oil-supply security. Japan has accumulated extensive insight in this area and can assist ASEAN countries significantly with its experience and learning process.

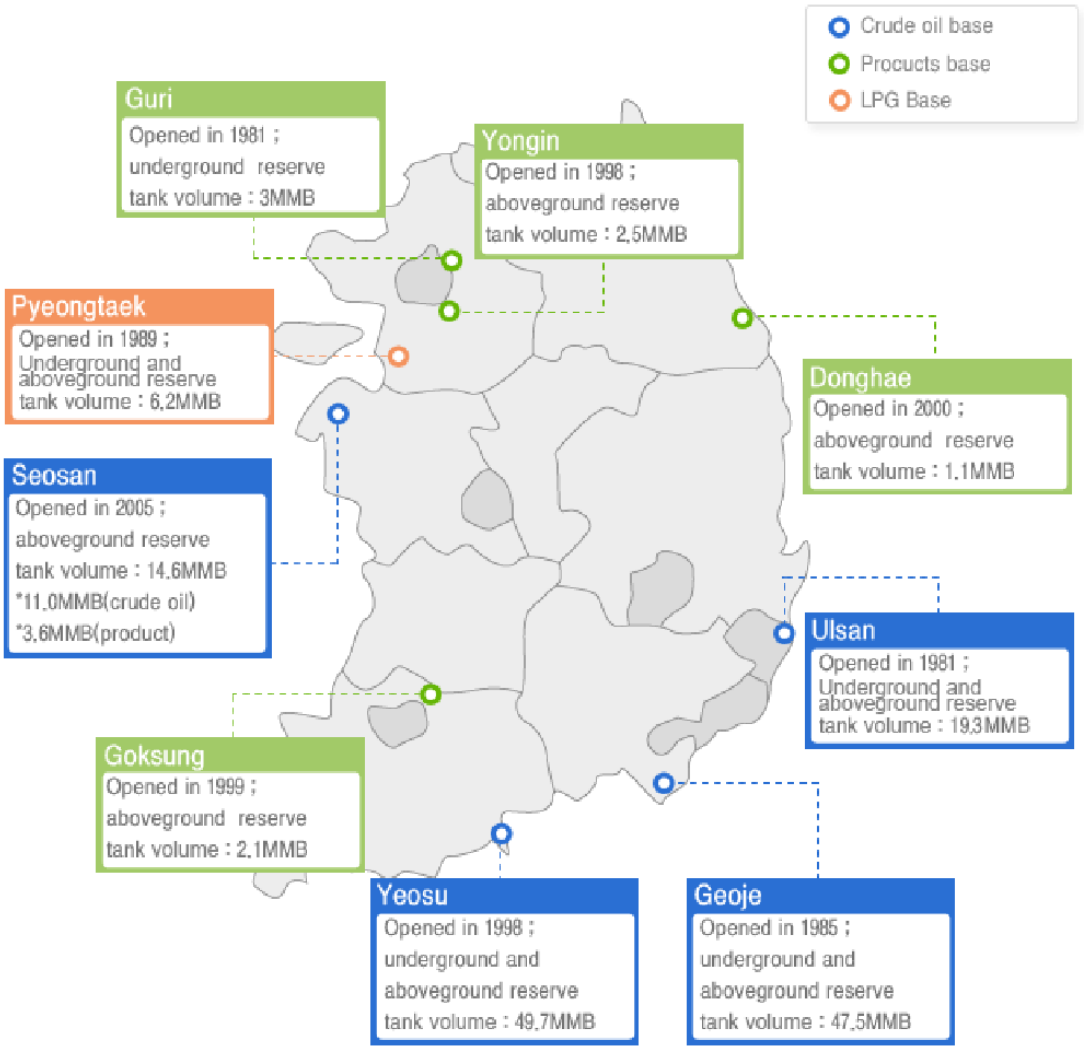
4-4. Cooperation with South Korea

Another IEA member country that has developed a sophisticated oil stockpiling system is South Korea.

4-4-1. South Korea's oil-stockpiling systems

Like Japan, South Korea has introduced both government and private oil-stockpiling systems. The government oil-stockpiling system is operated by the state-owned Korea National Oil Corporation (KNOC). KNOC has nine oil-stockpiling bases in South Korea holding 91.7 million bbl of stockpiling. Given the country's relationship with its northern neighbour, North Korea, five of these are underground storage bases for security purposes. KNOC's oil-stockpiling bases are all linked via pipeline with refineries and major cities such as Seoul and, in case of emergency, stockpiled oil can be released promptly without arranging for a tanker (Figure 4-4-1).

Figure 4-4-1. South Korea's Oil Stockpiling Facilities



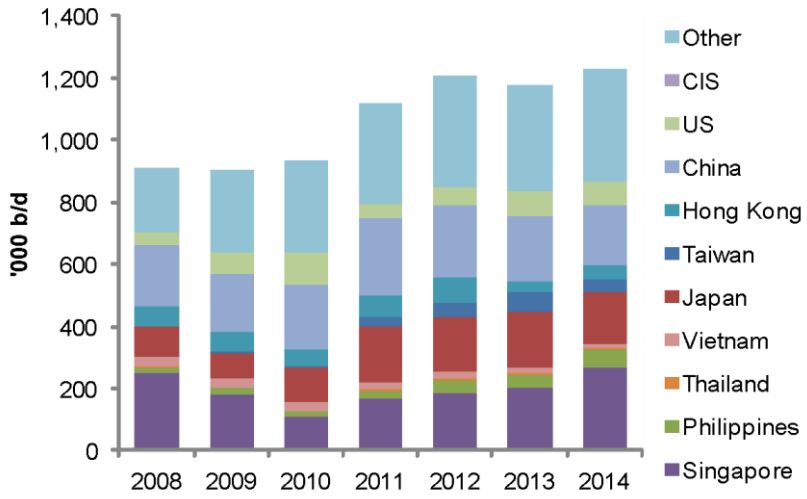
Source: Korea National Oil Corporation (KNOC) website.

In South Korea, private stockpiling is undertaken by private oil companies. South Korean oil companies are required to hold the equivalent of at least 40 days of crude oil and oil-product inventory. This stockpiled oil is held in their refineries or terminals.

4-4-2. Product supply capacity

South Korea is one of the largest oil-product exporters in the world. It has a refining capacity of more than 3 million b/d while its domestic oil product demand (excluding naphtha for petrochemical feedstock) is 1.1 million b/d. As shown in Figure 4-4-2, ASEAN countries including Singapore, the Philippines, Viet Nam, and Thailand are a major direction of export for South Korea.

Figure 4-4-2. South Korea's Product Export by Direction (2008–2014)



Source: Korea National Oil Corporation (KNOC), '*Korea Monthly Oil Statistics*' (2010--2014).

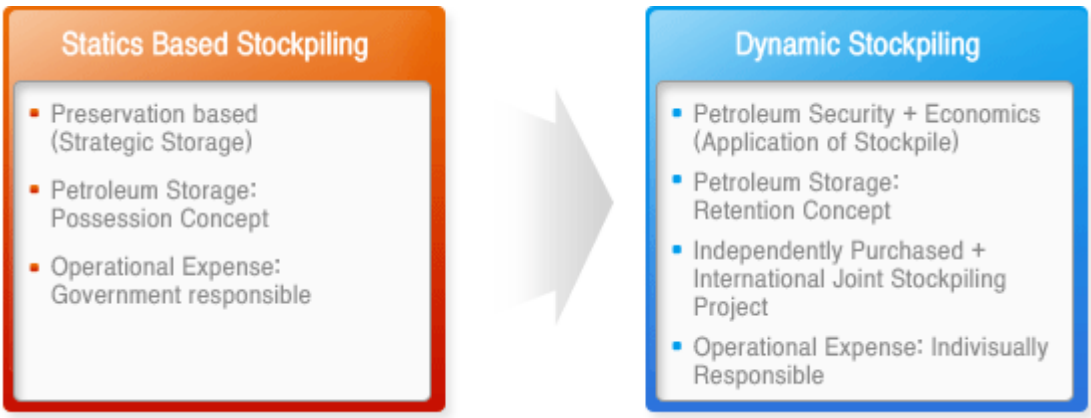
4-4-3. 'Dynamic stockpiling'

One of the unique aspects of South Korea's oil stockpiling system is its method of stockpiling operation. KNOC launched an international joint stockpiling arrangement in 1999. This agreement allows it to lease its stockpiling storage capacity to a third- party player for its commercial activities on the condition that the stored inventory will be used as stockpiling volume. Because the storage inventory is moving as a commercial product,

it remains fresh and quality degradation can be avoided while the total level of inventory is maintained. This is why it is called dynamic stockpiling. The concept of this type of stockpiling is shown in Figure 4-4-3. The essence of dynamic stockpiling is that while the total volume remains the same, the volume is not just being stored; it is always flowing. Since the inventory is always flowing, it is more easily released in an emergency.

KNOC can collect fees by leasing its storage capacity to third parties and it can utilise the revenue to develop and operate its oil-stockpiling bases. According to the KNOC's annual report, it collected US$131 million through stockpiling operations in 2013.[23] This amount may be far short of the total expenses in all its stockpiling activities but it certainly helps the state budget.

Figure 4-4-3. Concept of Dynamic Stockpiling



Source: Korea National Oil Corporation (KNOC) website.

Dynamic stockpiling has several implications for cooperation for ASEAN oil security. If storage capacity and economic conditions allow, ASEAN countries can store their stockpiling product in KNOC's storage bases. One of the most important goals for the development of oil stockpiling for ASEAN countries is, of course, to build their own stockpiling bases in their countries but it takes a long time to construct such bases. Until they can complete the construction of their own bases, ASEAN member countries can utilise South Korean storage capacity as an interim stockpiling base. ASEAN countries may bring their own product to storage for stockpiling or they may purchase the right to claim part of the existing stockpiled volume by paying a 'ticket' fee (ticket stockpiling).

South Korea's dynamic stockpiling also provides an important business model for once the oil-stockpiling base is completed. If the government has developed a stockpiling

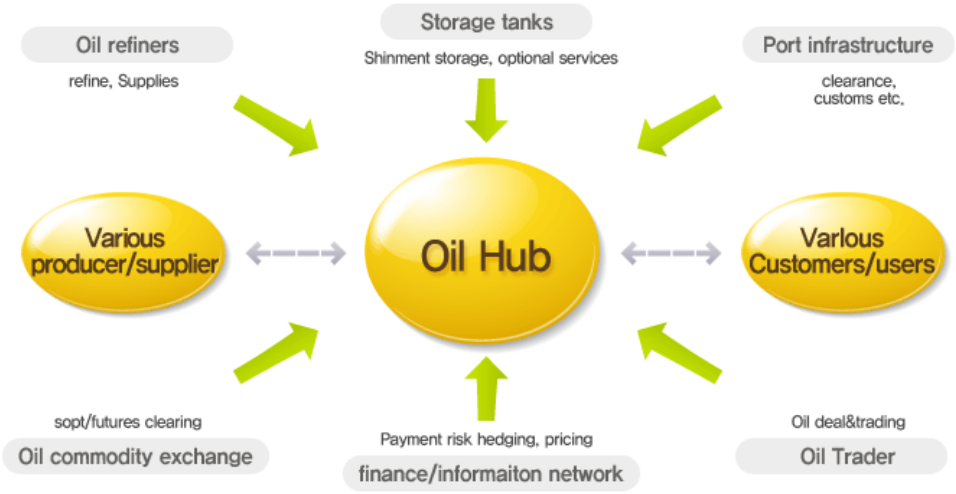
[23] Korea National Oil Corporation (KNOC) Annual Report 2013.

base and can lease out part of its capacity, it can collect fees to ease its financial burden through such leasing activities. Securing financial resources is always one of the biggest obstacles to developing oil-stockpiling bases and this leasing 'business' can ease the burden to some extent.

4-4-4. Utilisation of the Northeast Asia oil hub

The South Korean government began its Northeast Asian Oil Hub project in 2008. Being a hub in various aspects (from shipping to air transpiration to the financial sector) is a national goal for South Korea. Becoming an oil-trading hub with storage capacity and active trading activities is an envisioned goal. The joint venture, which is led by the KNOC, finished constructing a storage facility in Yeosu in April 2013. The total capacity of the newly built facility is 8.2 million bbl. The KNOC also plans to construct another storage base in Ulsan with a capacity of 28.4 million bbl.

Figure 4-4-4. Concept of the Northeast Asia Oil Hub



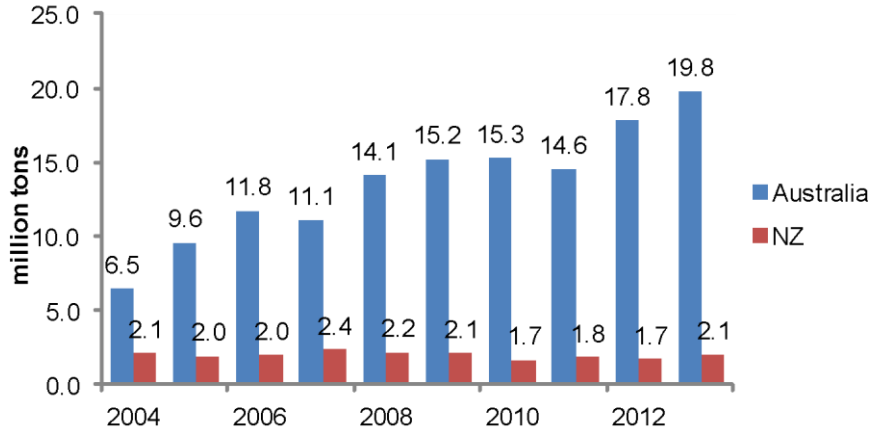
Source: Korea National Oil Corporation (KNOC) website.

ASEAN countries can also utilise this oil hub as another means of holding their stockpiling volume. ASEAN countries can borrow the storage capacity and store their stockpiling products or crude oil. If possible, they can also borrow stored volume on a paper basis (ticket stockpiling).

4-5. Cooperation with Australia and New Zealand

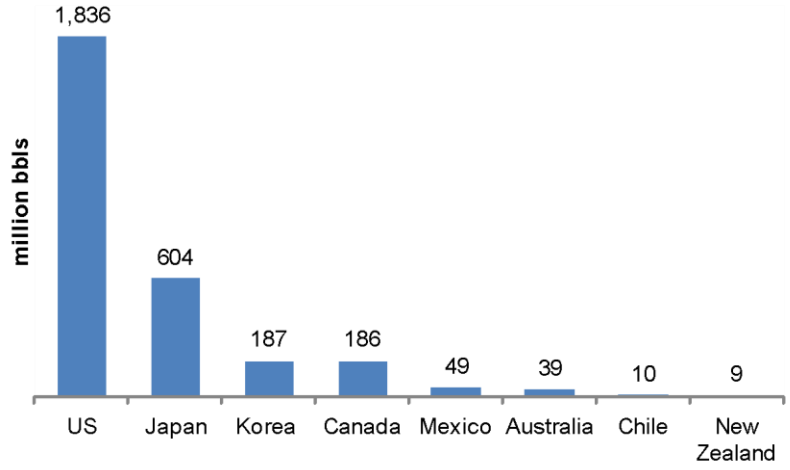
Australia and New Zealand are other IEA member countries that may be able to provide effective cooperation. These two countries are net oil-product importers. Since the 2000s, several of their refineries have shut down and their oil-product imports have been increasing (Figure 4-5-1). Their stockpiling volume is also limited compared to other Asia–Pacific IEA countries because their domestic demand is also small (Figure 4-5-2).

Figure 4-5-1. Oil-Product Imports in Australia and New Zealand



Source: International Energy Agency, 'Energy Balances of OECD Countries' (2014).

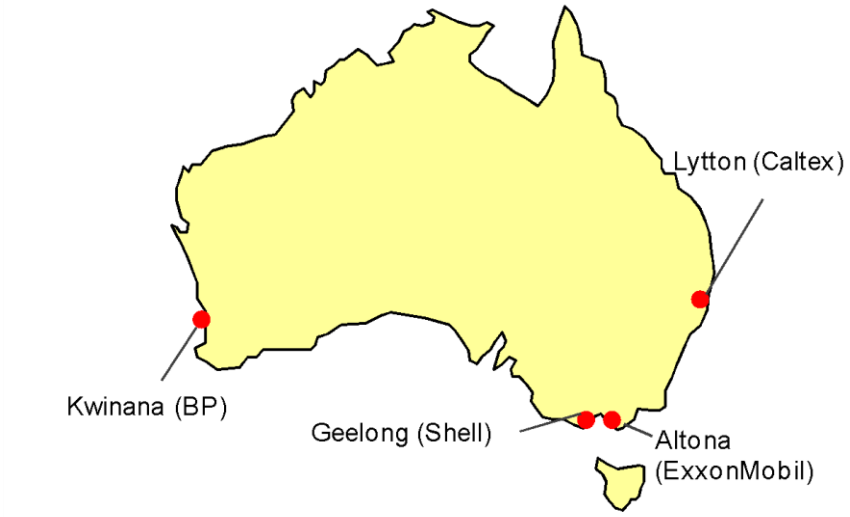
Figure 4-5-2. Total On-land Oil Stock of Asia–Pacific IEA Countries (as of September 2014)



Source: International Energy Agency, '*Monthly Oil Market Report*' (March 2015).

Australia and New Zealand may, however, provide product supply to ASEAN countries, especially to Indonesia, which is located in the southern part of the ASEAN region. Because these two countries are always importing oil products, if they decide to release their domestic oil stockpiling, those imports originally directed to them can be redirected to ASEAN countries with an urgent need to secure product supply. Some refineries in Australia, such as those in Western Australia or Queensland, may become product suppliers to the ASEAN. The oil market in Asia is essentially integrated and any release of surplus oil supply contributes to easing the market's supply and demand balance.

Figure 4-5-3. Locations of Australia's Refineries



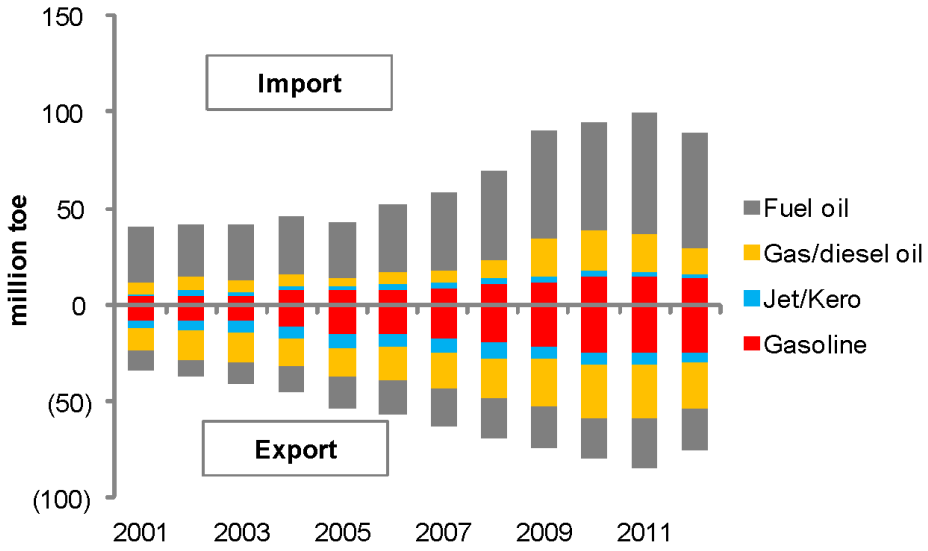
Source: Institute of Energy Economics, Japan (IEEJ).

4-6. Potential Role of Singapore

Although Singapore is itself an ASEAN member country, it has a unique position in the Asian oil market and can play an important role in ASEAN oil-supply security. Located at the heart of Southeast Asia and having surplus refining capacities and large storage capacities, Singapore has been a key supplier of primary oil products such as gasoline, diesel, or jet fuel to other ASEAN countries. Singapore hosts the offices of various oil companies and traders and provides a place for them to trade their crude oil and oil products. The country is indeed the hub of the Asian oil-product trade and its traded volume has been increasing since 2000 (Figure 4-6-1). Tank capacity in particular has significantly expanded since the 2000s and such storage-capacity expansion provides opportunities for innovative trading activities.

The existence of such a refining capacity and product inventory will undoubtedly play a very important role in supplying oil products to ASEAN countries, especially in an emergency.

Figure 4-6-1. Oil Product Imports / Exports of Singapore (2001–2011)



Source: International Energy Agency (IEA), 'Energy Balances of non-OECD Countries' (2014).

Singapore can help ensure oil-supply security by making oil-trade activities more transparent. Collecting and publishing statistical data on oil import, export, and inventory within Singapore in a timely manner can provide appropriate market information to the oil market and thus minimise the risk of market participants making ill-informed decisions in a panic. Because all oil companies in Singapore are private companies, it may be difficult to obtain such statistical information. Developing this, however, will be of increasing importance since the weight of the Asian oil market in the international oil market is growing. It is expected that Singapore will work to obtain and publish such market data.

Hosting the regional headquarters of almost all the major oil companies and traders, Singapore is also the centre of market intelligence for Asian oil markets. The existence of a strong financial industry in the country also strengthens its position and its value as the informational hub of the oil industry and market. This means that Singapore is one of the candidates to host the permanent secretariat of the APSA which will coordinate oil-supply transactions amongst the member countries as discussed in the previous chapter. One of the expected roles of the secretariat is to collect proper market information in a timely manner, and Singapore would have the easiest access to such information.

4-7. Collaboration with the International Energy Agency (IEA)

Another important source of oil stockpiling and emergency response expertise is the IEA. Because its original mission was to form a collaborative body of oil importers against the Organization of the Petroleum Exporting Countries (OPEC), the cartel of oil producers, the IEA has accumulated vast experience in oil stockpiling development and other oil-security policies for more than 40 years. In fact, no organisation other than the IEA has better understanding or know-how in oil stockpiling development. The IEA has increasingly become interested in expanding its activities to non-IEA countries and is ready to provide support for the efforts of the ASEAN countries in this area.

The first such area would be to draft a development plan for oil-stockpiling development. The method of initiating oil stockpiling varies for different IEA member countries. In the US, all oil stockpiling build-up was undertaken by the government while in Japan, the initial stockpiling was started by private companies because it was much faster to build up stockpiling with the existing infrastructure. The burden of oil stockpiling was gradually shifted to the government as the government stockpiling facilities were constructed. The IEA has a number of cases of initiating oil stockpiling in its member countries. Each ASEAN country can consult the IEA about what is the most effective way to start stockpiling. When utilising private-industry capital to build up oil stockpiling, another important issue where the IEA has expertise is how to encourage those companies to participate in stockpiling efforts or, in other words, how to reconcile commercial interests with stockpiling needs.

The IEA can also provide a useful reference in the areas of quantifying oil-stockpiling benefits and conducting emergency exercises. As mentioned above, the IEA has already established its own methodology to calculate the hypothetical economics of oil stockpiling[24], and this methodology can be utilised in quantifying stockpiling benefits. The IEA can assist the ASEAN in visualising the benefits of stockpiling development. It also has unrivalled expertise and experience in emergency exercises. It has conducted annual international exercises with member countries and has a long history of pursuing such exercises. It can facilitate exercises from substance to logistics, developing a hypothetical

[24] International Energy Agency, *Focus on Energy Security—Costs, Benefits and Financing of Holding Emergency Oil Stocks* (Paris: International Energy Agency, 2013).

supply-disruption scenario to review the exercise afterwards. Some previous materials from IEA exercises can be utilised in exercises conducted by ASEAN countries. In fact, an emergency exercise managed by APERC in 2013 was observed by IEA representatives who provided their expert comments.