

THE TRANS-ASEAN GAS PIPELINE – ACCELERATING GAS MARKET INTEGRATION WITHIN THE ASEAN REGION

A case study prepared for the International Gas
Union's Gas Market Integration Task Force.



The Trans-ASEAN Gas Pipeline – Accelerating Gas Market Integration within the ASEAN Region

To formalise the spirit of cooperation among the countries within South East Asia, the Association of South East Asian Nations (ASEAN) was established on August 8, 1967 in Bangkok by the five original Member Countries, namely, Indonesia, Malaysia, Philippines, Singapore and Thailand. Brunei Darussalam joined on January 8, 1984, Vietnam on July 28, 1995, Lao PDR and Myanmar on July 23, 1997, and Cambodia on April 30, 1999.

The objectives of ASEAN, as per the ASEAN Declaration, state the aims and purposes of the Association as being to:

- Accelerate economic growth, social progress and cultural development in the region; and
- Promote regional peace and stability through abiding respect for justice and the rule of law in the relationship among countries in the region and adherence to the principles of the United Nations Charter.

On December 15, 1997, at the 2nd ASEAN Informal Summit held in Kuala Lumpur, Malaysia, the ASEAN Heads of State adopted the ASEAN Vision, which amongst other issues, called for cooperation to “establish inter-connecting arrangements for electricity and natural gas within ASEAN through the ASEAN Power Grid and Trans-ASEAN Gas Pipeline”. The objective was to enhance security of energy supply for ASEAN while forging greater economic cooperation amongst Member Countries.

The Heads of ASEAN Power Utilities and Authorities (HAPUA) were entrusted to lead the ASEAN Power Grid while the ASEAN Council on Petroleum (ASCOPE) was entrusted to spearhead the Trans-ASEAN Gas Pipeline (TAGP). These two major initiatives constitute the Trans-ASEAN Energy Network.

The ASEAN Vision 2020, adopted by the ASEAN leaders on the Association’s 30th anniversary, also agreed on a shared vision of ASEAN as an assembly of South East Asian nations, outward looking, living in peace, stability and prosperity, bonded together in partnership in dynamic development and in a community of caring societies.

ASEAN Member Countries have adopted the following fundamental principles in their relations



An ASCOPE delegation visited the ASCOPE Gas Centre in Bangi, Malaysia, in November 2008.

with one another, as contained in the Treaty of Amity and Cooperation in South East Asia (TAC):

- Mutual respect for the independence, sovereignty, equality, territorial integrity and national identity of all nations;
- The right of every state to lead its national existence free from external interference, subversion or coercion;
- Non-interference in the internal affairs of one another;
- Settlement of differences or disputes by peaceful manner;

Renunciation of the threat or use of force; and
Effective cooperation among themselves.

As of 2008, the ASEAN region has a population of about 580 million, a total area of 4.44 million square kilometres, a combined GDP of approximately \$1500 billion and a total trade of about \$1700 billion.

● ASEAN Council on Petroleum

The ASEAN Council on Petroleum (ASCOPE) was established on October 15, 1975, as an “instrument for regional cooperation among Member Countries of ASEAN”. Member Countries are represented in ASCOPE by their respective National Oil Companies (NOCs) or, in cases where the country does not have an NOC, by the authority in charge of petroleum matters (see Table 1 and Figure 1).

In 1999, ASCOPE’s Vision, based on its initial objectives of establishment was agreed upon as follows: “ASCOPE shall be globally competitive in an open international market by creating and facilitating synergistic business opportunities while actively engaging in the petroleum and petroleum related business.”

As stipulated in the ASCOPE Declaration, the Council’s Objectives shall be to:

- Promote active collaboration and mutual assistance in the development of the petroleum resources in the region through joint endeavours in the spirit of equality and partnership;
- Collaborate in the efficient utilisation of petroleum;

MEMBERS OF ASCOPE

Founding members

Pertamina for Indonesia

Petronas for Malaysia

Philippine National Oil Company (PNOC)

Singapore (later Singapore Petroleum Co. Ltd)

Thailand (later Petroleum Authority of Thailand)

Other members

For Brunei Darussalam, the Petroleum Unit of the Prime Minister’s Department joined in 1985. It was later replaced by Petroleum Brunei

PetroVietnam joined on November 5, 1996

Myanmar Oil and Gas Enterprise (MOGE) joined on February 14, 2001

The Cambodian National Petroleum Authority (CNPA) also joined on February 14, 2001

The Ministry of Energy and Mines for Lao PDR became the 10th member in 2006

- Provide assistance to each other in the form of training, the use of research facilities and services in all phases of the petroleum industry;
- Facilitate the exchange of information which will promote methodologies leading to successful achievements in the petroleum industry and which may help in formulating policies within the industry;
- Conduct petroleum conferences on a periodical basis; and
- Maintain close and beneficial cooperation with existing international and regional organisations with similar aims and purposes.

● Trans-ASEAN Gas Pipeline

The Trans-ASEAN Gas Pipeline (TAGP) project is an ASEAN project based on the ASEAN Vision 2020.

The 17th ASEAN Ministers of Energy meeting in Bangkok, Thailand in 1999 requested ASCOPE



to undertake the TAGP project. The conceptual TAGP masterplan was completed in 2000 and the ASEAN Memorandum of Understanding (MoU) on the TAGP project was signed by all the ASEAN Ministers of Energy on July 5, 2002 in Bali, Indonesia. In June 2004, the MoU came into force.

Various bilateral agreements have been signed between Petronas of Malaysia and Pertamina of Indonesia, between Singapore and Malaysia and between Singapore and Indonesia on the sale and purchase of gas. New initiatives to implement the MoU, such as the ASCOPE Gas Centre in Malaysia and the establishment of the ASEAN Gas Consultative Council, have been put in place.

With strong political will and support from the ASEAN Ministers of Energy and the cooperation of the ASEAN senior energy officials, the TAGP project is being pursued collectively.

Activities undertaken by TAGP Task Force

Since its formation in 1999, the TAGP Task Force has completed various activities to facilitate the realisation of the TAGP.

To ensure smooth implementation of the above activities, several Expert Working Groups (EWGs) were established under the TAGP Task Force. The EWGs were assigned to cover the main issues and challenges in implementing the TAGP and their activities include the following:

- Formulating a conceptual masterplan for the TAGP infrastructure project;
- Facilitating the completion of a conceptual project feasibility study;
- Identifying and addressing issues relating to institutional, legal, financial/commercial, health, safety and environmental, technical and management matters; and
- Facilitating the execution and realisation of the TAGP infrastructure project.

Key achievements of the TAGP Task Force

The key activities undertaken and completed by the TAGP Task Force are as follows:

- Completion of the conceptual masterplan study for the TAGP project in 2000, which was approved by the ASCOPE Council in 2001. The masterplan identified seven new possible gas pipeline inter-connections in ASEAN and it served as a useful guide in the long-term development of the Trans-ASEAN Energy Network;
- Formation of the ASEAN Gas Consultative Council (AGCC) in July 2003. AGCC was created comprising representatives from the ASEAN governments/authorities and ASCOPE to address cross-border issues relating to gas market integration and to facilitate the implementation of the TAGP project;
- Formulation and finalisation of the ASEAN MoU on the TAGP in June 2004. The MoU provides a broad framework for the ASEAN Member Countries to cooperate towards the realisation of the TAGP project to help ensure greater regional energy security;
- Establishment of the ASCOPE Gas Centre (AGC) in Malaysia that serves as the strategic, technical and commercial information resource and capacity building centre in facilitating the implementation of the TAGP project; and
- Completion of the model TAGP Gas Sale and Purchase Agreement and the Gas Transportation Agreement.

The TAGP Task Force's on-going activities include the following:

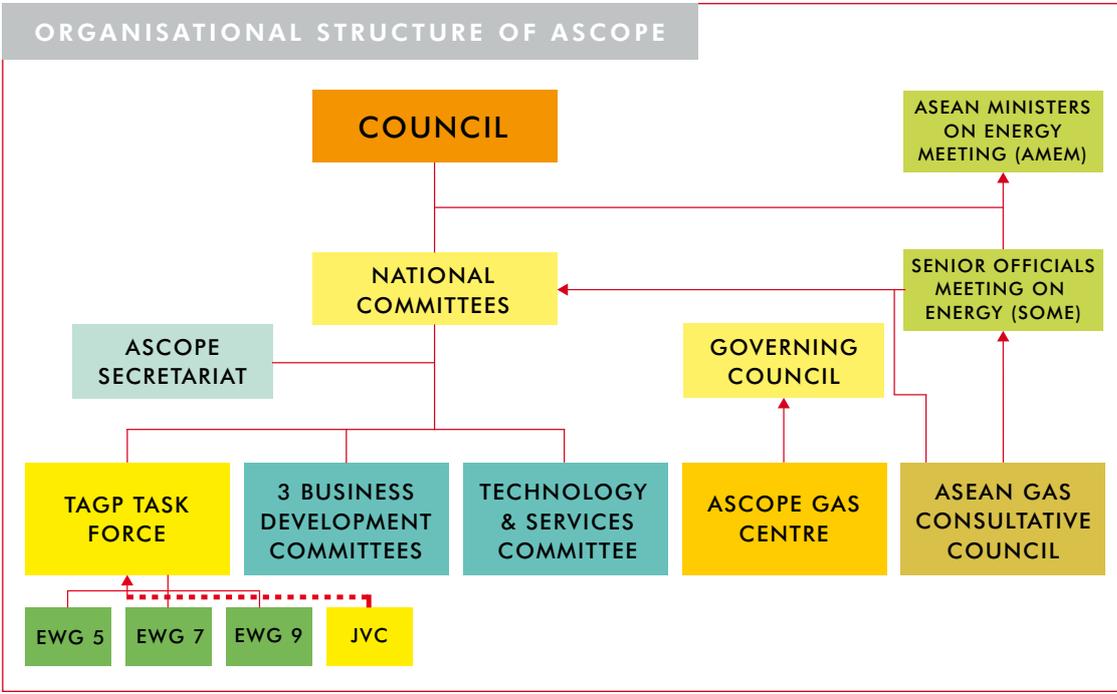
- Creation of the Joint Venture Company (JVC); and
- Conducting discussions on "Unaccounted-for Gas Guideline", "Emergency Pipeline Repair" and "Corrosion Management".

Progress of the TAGP infrastructure

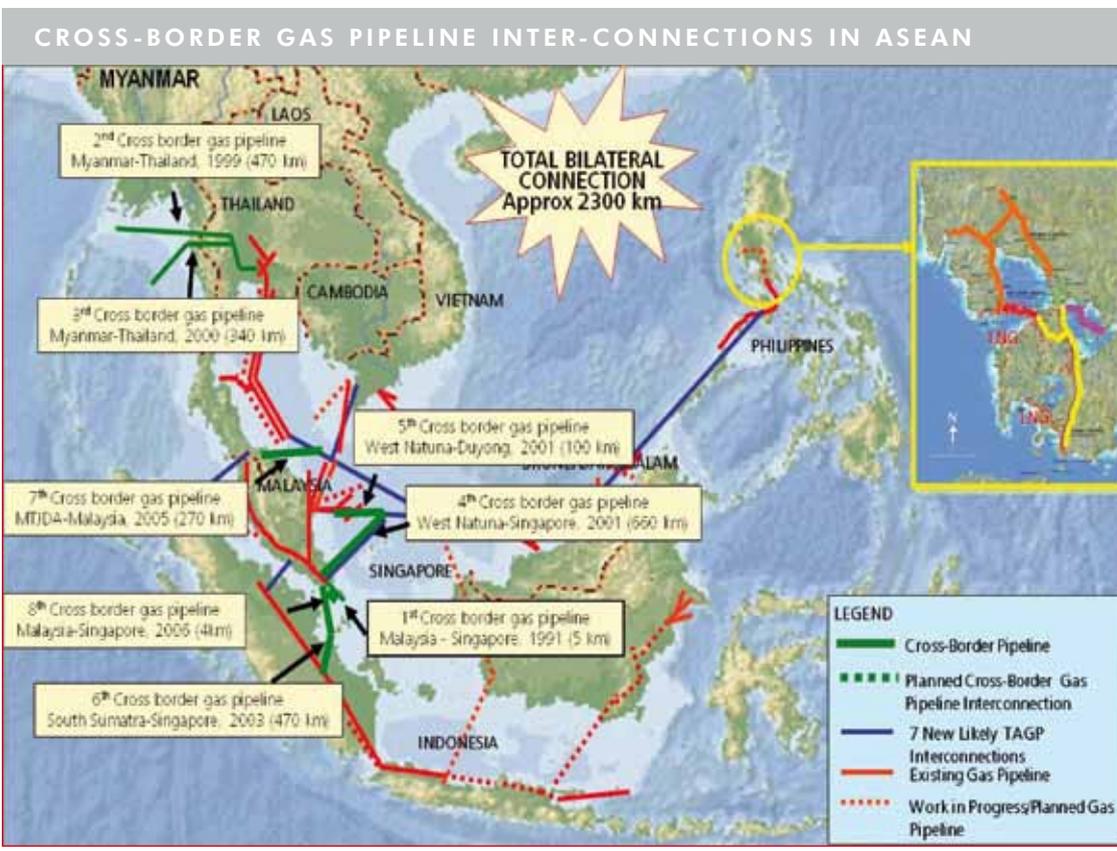
The existing and planned cross-border gas pipeline inter-connections in ASEAN are shown in Figure 2.

The first cross-border gas pipeline inter-connection was built in 1991 between Malaysia and Singapore. Achievements from 1999-2006 were:

- 1999 – a 470-kilometre cross-border pipeline



LEFT Figure 1.



LEFT Figure 2.



Indonesia is ASEAN's biggest producer and consumer of gas – its West Natuna gas field supplies Singapore via a pipeline opened in 2001.

- from Yadana, Myanmar to Ratchaburi, Thailand;
- 2000 – a 340-kilometre cross-border pipeline from Yetagun, Myanmar to Ratchaburi, Thailand;
- 2001 – a 660-kilometre cross-border pipeline from West Natuna, Indonesia to Singapore;
- 2001 – a 100-kilometre cross-border pipeline from West Natuna, Indonesia to the Duyong field of Peninsular Malaysia;
- 2003 – a 470-kilometre cross-border pipeline from South Sumatera, Indonesia to Singapore;
- 2005 – a 270-kilometre cross-border pipeline from the Malaysia-Thailand Joint Development Area to Peninsular Malaysia via Songkla; and
- 2006 – a 4-kilometre cross-border pipeline from Malaysia to Singapore.

In addition to the above, several domestic gas pipelines were completed in Vietnam and

Myanmar in 2007 and 2008. New projects underway or proposed are shown in *Table 2*.

Some of the additional initiatives planned to be undertaken in the near future towards fully implementing and realising the TAGP project are updating the TAGP masterplan as well as formulating harmonised principles for gas transit, tariffs, technical specifications and taxation.

● **Impact of the TAGP on gas market integration in ASEAN**

Currently, the TAGP is not fully integrated; but it is being undertaken on a step-by-step approach based on bilateral inter-connections, evolving towards more integrated cross-border gas pipeline inter-connections.

The TAGP infrastructures are being planned to partly address the emerging and growing supply-demand gas gaps in the region, in addition to the

planned LNG imports by countries such as Thailand and Singapore.

The impact of the TAGP on the regional gas market

The TAGP has significant impact on the gas market integration efforts in ASEAN. Generally, the TAGP has helped to enhance the overall integration between the various gas markets within the region. There are numerous benefits derived from gas market integration, as summarised below:

- Augment energy supply security and promote energy diversification to reduce dependence on oil;
- Monetise and maximise value of excess indigenous natural gas resources in the region (e.g. Myanmar and Indonesia);
- Enhance foreign income earnings for gas exporting countries (e.g. for Myanmar and Indonesia);
- Create local gas infrastructure/market and other spin-off to industrialise the economies in the region;
- Promote the use of natural gas which is a more environmental friendly fuel; and
- Promote regional cooperation to enhance energy security and reduce reliance on energy/

gas import from outside ASEAN, dampening the external effect relating to energy/gas supply uncertainties and gas price volatilities.

Nevertheless, the extent of the benefits depends on the state of the economy of each country (whether it is a net gas exporter or importer) and it varies from one country to another due to country specific factors such as the energy mix, energy diversity, availability of domestic gas production, contribution of gas revenue to the nation's GDP and others.

Security of energy supply and diversity

The issue on security of energy/gas supply and diversity are more pronounced for gas importing countries. In ASEAN, the major net gas importers are Singapore and Thailand. For net gas importing countries, gas importation diversifies their energy mix. Instead of relying on one energy source such as oil or coal, these countries have access to gas as an alternative source of energy. Gas market integration via the TAGP allows gas to be imported from different supply sources that may emerge as the gas market develops.

In the case of Singapore, gas is imported from both Malaysia and Indonesia. Previously, Singapore relied on oil for its energy needs. Singapore

NEW PROJECTS

Country	Pipelines and LNG Terminals
Thailand	Proposed fourth Arthit to Rayong pipeline in Thailand Proposed 5 mtpa LNG terminal
Indonesia	Proposed Cirebon to Semarang pipeline and Semarang to Gresik pipeline Proposed Kalimantan to Java pipeline Proposed LNG terminal
Singapore	Proposed 3 mtpa LNG terminal
Malaysia	Proposed Sabah to Sarawak gas pipeline
Philippines	Proposed Batman 1 pipeline Proposed 1.5 mtpa LNG terminal
Vietnam	Proposed Block B to O Mon pipeline

LEFT
Table 2.

diversified its energy sources and improved energy supply security when it started to import gas from Malaysia in 1991. Singapore subsequently enhanced its energy diversity and security of supply when it imported gas from West Natuna, Indonesia, in 2001. This situation was further improved when Singapore imported gas from another source in Indonesia i.e. South Sumatra in 2003. Moving forward, Singapore is in the process of developing an LNG terminal to augment its energy security. The LNG terminal is expected to be completed in 2012 and it will definitely increase Singapore's integration with the regional and global gas markets while at the same time boosting its supply security.

For Thailand, domestic oil and gas production was insufficient to meet its fast growing demand. Hence, Thailand decided to import gas from Myanmar in 1999 to ensure availability of sufficient energy, diversifying supply sources and enhancing security of gas supply. To enhance its gas source diversity and security of gas supply, Thailand imported gas from the Malaysia Thailand Joint Development Area (MTJDA) in 2005. Moving ahead, Thailand is developing an LNG terminal

with the hope of integrating its local gas market with both the regional and global gas markets and at the same time further improving its gas supply diversity and gas supply security.

Malaysia is the only country in the region that enjoys the benefits of both exporting and importing gas. Malaysia has been a major LNG exporter to Japan, South Korea and Taiwan and gas is also exported to Singapore via pipeline. By importing gas via pipeline from Indonesia, Malaysia is able to supplement its indigenous gas production, prolonging its indigenous gas reserve life.

Monetise excess gas resources and augment local gas infrastructure/market

For exporting countries such as Myanmar and Indonesia, one of the benefits of cross-border pipelines is to monetise the excess gas (beyond domestic requirements) and to earn foreign exchange from the exports of excess gas. The export contracts provide some level of certainty on the volumes (via an annual or monthly contract quantity) and prices (fixed, formula based or a combination of the two) for the gas being supplied to the buyer countries. This is important to ensure the long-term viability of gas production value chain, which includes upstream development and production as well as the supporting downstream infrastructure – particularly the cross-border gas pipelines. The foreign earnings received from gas exportation can be used in many ways to enhance the local economies. This is particularly true for both Myanmar and Indonesia.

In the case of Malaysia, exporting gas helped to enhance gas transmission and related infrastructure while at the same time augment the local gas market. Malaysia also enjoys foreign earnings from gas exportation and channels a substantial portion of the earnings to strengthen its gas-related infrastructure and operations.

In addition to the above, the development of a gas transmission system would encourage the development of stranded gas fields whose smaller



Thailand is one of the biggest gas consumers in ASEAN – a gas-fired power station in Khanom.

size may not be commercially attractive without such infrastructure. This is particularly true for gas exporting countries such as Indonesia and Malaysia.

Promote usage of cleaner fuel and regional cooperation

Through cross-border pipelines, more environmental friendly fuel is made available to the end customers within the region. Hence, over the years, gas demand within the region has been increasing steadily. To a certain extent, the availability of gas provides the ability for end customers to switch to a cleaner source of fuel. The power sector has been very responsive in capitalising on the availability of a more efficient and cleaner fuel and has emerged as the main gas user in the region.

The development of the TAGP is an initiative that requires extensive cooperation between relevant parties at all levels. Due to its strategic importance, it has been collectively recognised as a regional initiative. Hence, the implementation of the TAGP has assisted in enhancing regional cooperation particularly on regional energy security (in terms of energy availability and price) and sustainability.

In addition to the country specific benefits, the ASEAN region as a whole has benefited in terms of enhanced regional cooperation, creation of jobs, capability development and the associated economic spill-over benefits arising from the cross-border pipeline projects.

● Challenges in implementing gas market integration in ASEAN

The challenges facing efforts such as the TAGP

The main challenge in integrating the ASEAN gas markets relates to the different stages of market development within the region. Some countries are quite advanced in terms of market structure, regulation and operation, whereas some countries are lagging behind. The situation calls for the har-

monisation of rules and regulatory frameworks, standards and procedures etc.

Singapore probably has the most advanced gas market in the region with a fully market-based approach. Gas markets in some countries in the region such as Cambodia and Laos are non-existent whereas other countries are between the two extremes. This situation, at times, makes market access challenging.

The different economic conditions amongst ASEAN countries results in varying levels of purchasing power and hence, gas prices and subsidies. The diversity in gas pricing structures, formulae and commercial terms affects, to a certain extent, the pace of gas market integration within the region.

One of the pre-requisites for gas market integration is the development of supporting infrastructure such as gas pipelines. The infrastructure requires substantial upfront investment which needs to be financially viable. Unlike the gas markets in Europe which are more developed and with greater economies of scale, the developing gas markets in South East Asia are relatively small and will take time to be developed into more integrated and matured gas markets. This affects the ability to secure an attractive financing package for the TAGP implementation. Additionally, the recent banking crisis and global economic slowdown make the task of securing attractive financing package even more challenging.

Availability of substantial gas reserves within the region is critical to ensure the long-term sustainability of the TAGP. In ASEAN, most of the prospective blocks in gas exporting countries such as Indonesia, Malaysia and Myanmar have been explored. Generally, recent gas discoveries within the region have been relatively remote in terms of location and smaller in size. Nonetheless, the general outlook for gas reserve addition within the region is still positive. Deep water exploration activities have just started and recent gas discoveries



In the ASEAN residential sector gas is primarily used for cooking although space heating is needed in parts of the region such as Hanoi in winter.

in deep water blocks in Malaysia and Myanmar are very encouraging. The main gas reserve in the region is the East Natuna field which is located in Indonesia. The gas field contains about 220 tcf (6.16 tcm) but it has an exceptionally high percentage of CO₂. Despite the technological challenges in handling the high percentage of CO₂, efforts to develop the East Natuna field at a gas price that is affordable and competitive to the alternative fuels such as coal or fuel oil have been initiated.

Unlike countries in temperate climates where gas usage is almost evenly distributed between the power, industrial (as feedstock or for industrial processes) and residential sectors (for space heating), in the tropical countries of ASEAN, gas is used primarily for power generation. Usage of gas by industrial users is growing but growth is quite limited for the residential sector where gas is mainly use for cooking. Within the region, space heating is generally not necessary except for cooler parts of countries in Lao PDR,

Myanmar, Thailand and Vietnam. The uneven distribution of the gas customer mix to a certain extent hinders the gas demand growth, which in turn, affect the pace of gas infrastructure development.

Thus, some of the key challenges faced in implementing gas market integration efforts with ASEAN can be summarised as follows:

- Different states of the economy and gas market development within the region;
- Different levels of purchasing power and varying gas prices and subsidies in some of the countries in ASEAN;
- Project funding/financing, particularly the need to incur substantial upfront investment and to secure an attractive financing package;
- Rather limited sources of regional gas supply except for in Indonesia and Myanmar. The major gas supply source in Indonesia's East Natuna field has a high CO₂ content. The gas supply needs to be developed at a gas price that is affordable and competitive to the alternative fuels such as coal or fuel oil. Future alternatives may include coal-bed methane gas and renewables; and
- Uneven distribution of the gas customer mix affects overall gas demand growth and, hence, the pace of gas infrastructure development.

The future challenges in making the TAGP a reality

In ASEAN, most of the existing cross-border pipelines were undertaken on a bilateral basis. Hence, the next challenge would be to connect all these cross-border pipelines into an integrated system. In doing so, there are numerous issues relating to harmonisation that need to be resolved. In particular, harmonisation in terms of:

- Technical specifications on the inter-connection of gas pipelines that include gas quality;
- Specifications and standards during the development, construction and operation phases, and for maintenance procedures; and

- Cross-border issues relating to more harmonised regulations on health, safety, the environment, company formation, transit principles, open access or third party access, taxes and tariff setting.

The above issues are mainly related to integration and harmonisation efforts that require extensive cooperation of all the industry players including gas buyers and sellers, regulators, authorities and statutory bodies.

● **Policy options to enhance gas market integration in ASEAN**

To address some of those challenges highlighted, energy policymakers and relevant authorities in ASEAN will have to examine the issues and challenges carefully with high-level energy policy responses to minimise the barriers that hinder regional gas market integration in ASEAN. Some of these policy options are highlighted below as a possible way forward to enhance gas market integration:

- Liberalising the gas market in stages to attract more gas players to compete in the market;
- Gas pricing that is market-oriented, with gradual elimination of subsidies;
- Open access or third party access to gas pipelines for common gas carriers, supporting the “gas highway concept” to attract more upstream players to explore new gas resources and utilise these infrastructure to monetise the discovered gas;
- Gas transit principles or protocol have to be put in place to enable cross-border gas pipelines to be built and to ensure smooth transportation of gas through transit countries; and
- Tax incentives and fair tariff structures that promote gas market integration.

Extensive study needs to be carried out to determine the most suitable policies as well as the potential impact of adopting them. Regardless of the eventual policies adopted, it is important to maintain a stable business environment to attract

investment, maintain predictable and consistent application of policies and, at the same time, create healthy competition amongst the players to attain industry-wide operational efficiency and cost effectiveness.

● **Lessons learned from gas market integration efforts in ASEAN**

Although the gas market in ASEAN is yet to be fully integrated, there are some lessons that can be learned from gas market integration efforts in ASEAN that can be adopted and customised in developing gas markets in other regions of the world. These include the rather unique model and positive roles performed by the governments, the NOCs or the authorities in charge of petroleum and the industry gas players and pipeline operators in ASEAN towards fully realising the aspiration to enhance regional cooperation and energy security as follows.

Role of governments

The 10 ASEAN governments have provided a very clear message and demonstrated strong political will towards establishing regional economic and energy cooperation, amongst others, recognising the importance of energy security and the need to enhance regional energy security collectively through the Trans-ASEAN Energy Network, comprising both the TAGP infrastructure and the ASEAN Power Grid.

Role of NOCs and authorities in charge of petroleum

At the industry level, the NOCs or, in cases where the country does not have an NOC, by the authority in charge of petroleum matters, were instrumental in spearheading and facilitating the aspiration of the ASEAN governments towards implementing and realising the TAGP infrastructures.

Several building blocks have been put in place besides the eight cross-border gas pipeline inter-



connections. These include obtaining the governments' support and approval to ratify the ASEAN MoU on the TAGP, and the setting up of AGC and AGCC as the appropriate institutional instruments to facilitate the implementation and realisation of the TAGP project.

Currently, both AGC and AGCC are developing appropriate guidelines to address cross-border issues relating to amongst others, the following:

- Technical specifications on the inter-connection of gas pipelines that include gas quality;
- Specification and standards during the development, construction and operation phases, and for maintenance procedures;
- Cross-border issues relating to more harmonised regulations on health, safety, the environment, company formation, transit principles, open access or third party access, taxes and tariff setting; and
- Unbundling of costs, etc.

Role of other gas industry players and pipeline operators

Pipelines are an essential part of the gas delivery system, and within the ASEAN region there are several companies that own and/or operate natural gas pipelines. Additionally, there are companies involved in the transport of oil and petroleum products that face many of the same operational issues as natural gas pipeline companies.

AGC has taken the initiative to facilitate the creation of the South East Asia Pipeline Operators Group (SEAPOG) to, amongst other factors:

- Enable participants to gain a comprehensive understanding of operational best practices employed around the region and to benchmark their practices accordingly;
- Promote discussion on pipeline incidents and safety alerts with their peers, enabling participants to exchange views and lessons learned from one another;
- Educate pipeline operators on the operational

aspects of other pipelines through the sharing of experiences and knowledge; and

- Develop a database of key owners/operators in the region to enable companies to seek information (non confidential) in a timely manner and benefit from the experiences from their industry peers.

Coordination, diligence and resolve

It is an accepted fact that any integration efforts require extensive communication between the relevant parties at all levels and excellent coordination. In implementing the TAGP, structured communication channels were established to ensure uninterrupted flow of clear messages so that actions are well coordinated. This is essential to minimise confusion and disruption.

Additionally, relevant industry players, regulators and authorities were engaged from the early stages of the TAGP and they continue to be extensively involved not only in formulating implementation strategies and plans but also in the actual execution of the strategies and plans.

In selecting the policies and formulating the implementation plans for the TAGP, due consideration is given to options available as well as to the potential impact of adopting such policies or plans. Once the policies and implementation plans for the TAGP have been collectively agreed upon, there is a conscious effort to ensure consistent and predictable application of policies as well as the execution of implementation plans.

Due to its strategic importance, the TAGP has been collectively recognised as a high priority regional initiative. From its inception, ASEAN Member Countries have displayed the political will and resolve not only to initiate but also to execute the TAGP implementation plans.

In summary, all the above are key ingredients that allow the TAGP to progress smoothly and can be used as guidance in integrating gas markets in other regions.