

Summary Statement October 18, 2017 Tokyo

Ministry of Economy, Trade and Industry
Asia Pacific Energy Research Centre

The LNG Producer-Consumer Conference was held in Tokyo on October 18, 2017. It was attended by more than 1,200 participants from 32 countries and regions including 12 Cabinet members (Minister of Economy, Trade and Industry, Seko, the host of the event included) and a head of an international institution as well as those from businesses producing or consuming LNG, governments and research institutions. The Conference was hosted by the Ministry of Economy, Trade and Industry (METI) and the Asia Pacific Energy Research Centre (APERC).

*The following includes comments which have not been confirmed by speakers.

Opening Address/Background Briefing

(Japan) H.E. Hiroshige Seko, Minister of Economy, Trade and Industry:

As the US has started exporting LNG without restrictions on destinations and LNG international price indices from Asia are increasingly accepted, the global LNG market is steadily changing. Japan promotes third-party access to LNG receiving terminals and also pointed out that destination restrictions may violate the Antimonopoly Act in a report from the Japan Fair Trade Commission. Furthermore, Japan is strengthening cooperation with EU, India, etc. Japanese public and private sectors will arrange finance in a scale of 10 billion US dollars and provide opportunities of capacity building related to LNG for 500 personnel in the next 5 years in order to develop the Asian LNG market with growth potential. I would like to extend a message to all leaders of Asia: "Let's Buy LNG!! Let's Achieve Growth Together."

(Qatar) H.E. Dr. Mohammed Bin Saleh Al-Sada, Minister of Energy and Industry:

The LNG market in Asia will continue to grow further going forward because emerging LNG importing countries including China and India are expected to see higher demand and other consuming counties including the Philippines, Sri Lanka, and Vietnam are also starting import. As a trusted supplier, Qatar will continue stable export of LNG going forward without being affected by recent changes in relationship with surrounding countries. Long-term contract pricing of LNG should not be affected by prices which reflect short-term supply-demand fluctuations. It should be linked to a price based on liquid and transparent market transactions, and the crude oil price will be an indicator for a long-term contract price for the time being.

(International Energy Agency) Dr. Fatih Birol, Executive Director:

Led by increased LNG supply capabilities, the second natural gas revolution is underway. While supply exceeds demand as a whole market, secure supply of natural gas is still an important policy challenge considering local circumstances and issues found in each region. As the number of countries importing LNG grows, the structure of security of gas supply is expected to change as well. Against such a backdrop, it became apparent that LNG contracts were becoming increasingly flexible in terms of destinations and contract periods. The IEA will contribute to improvement of gas security in the world, and for that we will work towards greater transparency, flexibility, and resilience of the market.

Session 1: Producer Consumer Cooperation towards Developing LNG Market in Asia: Ministerial Keynote Speeches

Keynote speeches were given by ministers of various countries including existing Asian producing countries and emerging producing countries such as the US, and other emerging Asian countries which have huge potential as consumers. Both producing and consuming countries presented stronger policy commitments for expanding the Asian LNG market and announced measures to promote LNG-related investment by businesses.

(Brunei) H.E. Pehin Dato Mohammad Yasmin Umar, Minister of Energy and Industry at the Prime Minister's Office

ASEAN recognizes importance of natural gas, shares a policy objective of increasing the share of natural gas in the region as an energy source, and will also become one of the largest LNG markets in the world. This was recognized in the East Asia Summit (EAS). As supply and demand of LNG grows, the market is becoming more flexible and emerging/small-scale consumers are gaining power. New types of LNG contracts are being adopted including those with a shorter contract period, smaller transaction volume, more flexibility, or pricing which is not linked to the oil price. Small-scale LNG for transportation/generation is also seeing cost reduction. Brunei is going to work together with Japan in a hydrogen-supply project as well.

(India) H.E. Shri Dharmendra Pradhan, Minister of Petroleum and Natural Gas, Minister of Skill Development and Entrepreneurship,

Gas-producing countries and consuming countries can cooperate in establishing an LNG market which is transparent, highly flexible, efficient, and competitive. To promote the use of LNG, as clean energy, India plans to develop receiving capacity of 50 million tons per year by 2022. Based on the recent change in the market environment, producing and consuming countries should work together to create a more flexible contract form in terms of price revision, destination restrictions, and the take or pay clause.

(Indonesia) H.E. Ignasius Jonan, Minister of Energy and Mineral Resources

The prospects of Indonesia's gas production continue to be promising for the next 20 years and the country can continue to export LNG. Gas is a major fuel for the domestic power source and PLN, the national power company, plans to develop infrastructure for diversification of fuel procurement. Small and medium-scale infrastructures are important for Indonesia especially because our country is made up of 800 islands. Receiving terminals are planned mainly in the eastern part of the country, and we will develop receiving facilities combined with small-scale LNG and thermal power generation.

(South Korea) Mr. Lee Inho, Vice Minister, Ministry of Trade, Industry and Energy

Consumers in South Korea now have better control in supply demand adjustment thanks to the greater flexibility of the LNG market. South Korea's energy policies include shutdowns of nuclear power plants within 60 years, phase-out of old facilities for coal fired power generation, increase of renewable energy percentage (20% in 2030), and increase of clean fuel use and the country has a potential to increase the use of LNG as long as it is economically feasible. To establish a transparent market, we propose 1) improvement of contract forms including a relaxation of destination restrictions, 2) development of new demand through cooperation between producers and consumers, and 3) establishment of an LNG hub in Northeast Asia.

(Malaysia) Tan Sri Wan Zulkiflee bin Wan Ariffin, President & Group Chief Executive Officer, Petroliam Nasional Berhad (PETRONAS)

The world's LNG market is undergoing a great change including new players' entry. Governments of various countries will have important roles in expanding the market going forward, including improvement of an investment environment. PETRONAS has so far put a high priority on both flexibility and security. If LNG price is not high enough to attract new development, investment will fall and eventually the LNG industry as a whole will stagnate. Secure demand is as much important for suppliers as secure supply is for buyers. The key will be cooperation between the both sides.

(Mozambique) H.E. Leticia Deusina da Silvia Klemens, Minister of Mineral Resources and Energy

Mozambique has one of the largest natural gas reserves in the world and is at a geographically advantageous location to the growing Asian market. LNG development is a key to Mozambique's economic and social development and we are aiming to become a trusted LNG supplier. Investment for the first LNG project has been approved, which will mark a milestone for our country's LNG development. Having set our sights on becoming an LNG exporter in the early 2020s, we are now working on our political environment and regulatory framework. We are set to make decisions required for realizing both offshore and onshore LNG projects.

(Myanmar) H.E. U Win Khaing, Union Minister, Ministry of Electricity and Energy

In Myanmar, we have positioned natural gas as a major energy source as a clean energy source. While our domestic power demand surges, a number of offshore gas fields are seeing reduced output. For this reason, LNG is expected to play an important role as an alternative energy source replacing the conventional home-produced gas until new gas fields are developed.

(Papua New Guinea) H.E. Dr. Fabian Pok, Minister for Petroleum and Energy

Papua New Guinea is basically aiming to secure domestic power supply by expanding LNG supply from the PNG LNG project which is already in operation while promoting industrial development thereby attracting more investment and developing human resources required for domestic industries. We also set our sights on realizing another one or two LNG projects going forward. To make this reality, we consider it important to promote cooperation between the government and corporations and make sure that regulations are reliable and procedures are reasonable.

(The Philippines) H.E. Alfonso G. Cusi, Secretary of Energy

In the Philippines, we are currently obtaining 22% of power from gas fired generation. However, output from our gas fields is falling and we plan to import LNG as an alternative energy source. We are going to announce new natural gas regulations in October this year, and promote investment in gas-related facilities through system improvement. We have a plan to become an LNG hub of Asia by taking advantage of our strategically favorable geographical location, and will make intensive construction of LNG receiving facilities from 2021 to 2024.

(Thailand) H.E. General Anantaporn Kanjanarat, Minister of Energy

While domestic gas demand will increase, home-produced gas and pipeline-imported gas will fall. As a result, domestic LNG demand is expected to reach 36 million tons in 2036. To meet this increase in demand, Thailand is now going ahead with total seven receiving-terminal construction plans. In LNG procurement, our country places importance on a balance among three factors: a reasonable price, third-party access to all facilities, and energy security.

(United States) Mr. Dan Brouillette, Deputy Secretary, Department of Energy

The US is currently the world's largest oil, gas producing country, and will become a gas net exporter in 2017. Not only we have resources but we have also established a transparent market realized by pipeline networks and brisk spot trading. The US will be able to export gas up to 10 billion cubic feet a day by 2020. As LNG export is economically beneficial to the US as well, we have already approved export of 21 billion cubic feet a day, including quantity for 2020 and thereafter. With regard to the risk of revocation which some importers are concerned about, the US government stresses that it will respect contracts between businesses and will not cancel them unilaterally. As well, we have released a handbook for those involved in LNG export/import, and

would like to use it for human resources development in Asia.

(Vietnam) H.E. Tran Tuan Anh, Minister of Industry and Trade

With an aim to meet increasing energy demand in the country and promote introduction of clean energy, Vietnam will also increase LNG consumption going forward. We will prepare a regulatory framework concerning LNG import, and construct LNG receiving facilities in five to six locations from 2025 to 2030. LNG import is expected to reach five million tons in 2025. As we do not have adequate knowledge on LNG business, we will welcome investment from other countries, which will also help develop our domestic LNG industry.

Session 2: Producer Consumer Cooperation towards Developing LNG Market in Asia (Panel Discussions)

A panel discussion was held by US LNG exporting businesses and Asian LNG importing businesses. They discussed from the perspective of private corporations on efforts for and the outlook of future market expansion based on policy proposals from industrial sectors of Japan and the US which were put together and released by think tanks of the two countries.

<On stage>

Moderator

Prof. Jonathan Stern, Distinguished Research Fellow of the Natural Gas Research Programme,
 The Oxford Institute for Energy Studies

Research Presentation

- Prof. Jun Arima, Senior Policy Fellow for Energy and Environment, Economic Research Institute for ASEAN and East Asia (ERIA), Professor, Graduate School of Public Policy, University of Tokyo
- Mr. Masakazu Toyoda, Chairman & CEO, The Institute of Energy Economics, Japan (IEEJ)
- Mr. Lucian Pugliaresi, President, Energy Policy Research Foundation Inc. (EPRINC)

Speakers

- Mr. Rob Smith, Deputy Assistant Secretary, Office of Oil and Natural Gas, Department of Energy, United States
- Mr. Masaaki Yamada, Managing Executive Officer, Global Head of Energy and Natural Resources Finance Group, Japan Bank for International Cooperation (JBIC)
- Mr. Kohei Okada, Managing Executive Officer, Member of Board, Nippon Export and Investment Insurance (NEXI)

Panelists

Mr. Anatol Feygin, Executive Vice President and Chief Commercial Officer, Cheniere Energy,
 Inc.

- Ms. Jane Liao, CEO of Natural Gas Business, CPC Corporation
- Mr. Bhuwan Chandra Tripathi, Chairman & Managing Director, GAIL (India) Limited
- Ms. Elizabeth Spomer, CEO & President, Jordan Cove LNG, LLC
- Mr. Abul Mansur Md. Faizullah, NOC, Chairman, Petrobangla
- Mr. Wuttikorn Stithit, Executive Vice President, Natural Gas Supply & Trading Gas Business
 Unit, PTT Public Company Limited
- Mr. Michiaki Hirose, President, Tokyo Gas Co., Ltd.

<Main discussions>

- In the electronic survey taken in the beginning of the session, a majority answered China and India to the question asking about which Asian countries' LNG markets are promising. As for a challenge facing emerging countries in Asia when they import LNG, more than half of the respondents indicated development of infrastructure. While the respondents were divided on the question asking future impact of LNG produced in the US on the international LNG market, flexibility in contracts was most agreed on.
- ERIA reported that natural gas demand in ASEAN and India in 2030 could be up to 2.5 times as large as that in 2015 and estimated that required development of LNG-related infrastructure would cost as much as 81 billion dollars by 2030. As well, research institutions from Japan and the US presented the following policy proposals as a result of joint study prepared for this Producer-Consumer Conference: 1) Removal of destination restrictions and preparation of a fair transaction environment for realization of a liquid and transparent international LNG market 2) Acceleration of LNG-export approval process and mitigation of revocation risk as an effort to develop an environment which helps increase export of LNG produced in the US, 3) Realization of efficient navigation in Panama Canal waters, and 4) Assistance from Japanese and the US governments to Asian consuming countries for expansion of the Asian market especially in terms of policy making, financing, and human resources development.
- With regard to so-called a revocation risk, a presenter reported that the US Department of Energy confirmed that US government would respect contracts and would not suspend export unilaterally. JBIC and NEXI both expressed their intentions to further increase their assistance for LNG-related projects. JBIC stated that its assistance would cover not only LNG-related projects for the Japanese market but also projects to expand demand in Asia and governments and state-run companies in Asia which would enter the LNG market. NEXI presented its plan to support LNG projects which have not decided destinations and to examine constructively the possibility of assisting Asian LNG projects involving Japanese companies and projects with sub-sovereign risks.
- Panelists gave various comments on US export of LNG and expansion of gas demand in Asia.
 With regard to US export of LNG, some mentioned a portfolio effect expected from inclusion of a different price index in addition to its flexibility in contracts and others pointed out the

benefits of the US West Coast project which is free from restrictions of Panama Canal navigation. With regard to expansion of gas demand in Asia, participants from the relevant countries in the region stated that expectations for LNG as an alternative to declining home-produced gas were growing and presented their views that demand for LNG together with renewable energy would increase for its cleanliness especially for power generation and industrial use. As well, some argued that political measures to facilitate LNG use must be taken by governments of the relevant countries in order to expand LNG demand steadily in the Asian market.

• In the Panel Discussion, there was a question on the role which the US would play by exporting LNG, to which panelists from the US pointed out flexibility and cost advantage realized by the country's abundant reserves. Some participants from Asia also mentioned that it would be hard to secure market in Asia without sufficient cost competitiveness. While there were various opinions on development of gas infrastructure in Asia going forward, panelists expressed their expectations that Japanese government and the Multilateral Development Bank should support efforts of raising an enormous amount of capital required for infrastructural development and developing required human resources.

Session 3: New LNG Opportunities driven by Innovation: Panel Discussions

Innovation could stimulate demand by reducing cost for LNG-related infrastructure and thus attracts interest from the industrial circles. In this session, panelists exchanged opinions on specific efforts made by the industry and the state of business in recent years and shared understanding that innovation plays an important role not only in cost reduction for LNG liquefaction facilities or receiving facilities through technological advance but also in business aspects.

<On stage>

Moderator

Dr. Kenneth Medlock, Senior Director, Baker Institute for Public Policy, Rice University

Speaker

 Mr. John McCarrick, Deputy Assistant Secretary, Bureau of Energy Resources, Department of State, United States

Panelists

- Mr. Visal Leng, President for Asia Pacific, Baker Hughes, a GE company
- Mr. Øivin Iversen, Chief Technical Officer, Höegh LNG
- Mr. Kenji Ando, Senior Executive Vice President, President and CEO, Power Systems,
 Mitsubishi Heavy Industries, Ltd., and Representative Director, President & CEO, Mitsubishi
 Hitachi Power Systems
- Mr. Jean-Marc Ichbia, LNG Projects Department Director of NOVATEK
- Ms. Meg A. Gentle, President and Chief Executive Officer, Tellurian Inc.

<Main discussions>

- The electronic survey conducted in the beginning of the session revealed that most people considered gas exploration and new sources of supply as the biggest impact on LNG markets in the past 10 years whereas for the next 10 years growth in market liquidity was viewed as important and many agreed that more flexibility in contracting would be required for development of markets. As well, the survey showed that lower capital expenditure was the most attractive about FSRU (Floating Storage and Regasification Unit) to new importers.
- The US State Department pointed out the following: innovation remains important in the US supplier side as well; American LNG has already contributed to strengthening the world's gas markets; efficient and competitive gas markets would lead to enhanced security and help realizing commercial benefits of the US and allies; and inter-regional cooperation in gas market is important.
- In the Panel Discussion, FSRU was presented as innovative technology/business having advantage both in cost and required time compared to onshore terminals. As well, the discussion provided information on a new solution combining a floating gas terminal and floating power facilities.
- Examples of efforts in individual projects were presented including modularization of LNG
 facilities and a plan to establish a transfer station in the Kamchatka Peninsula for reduction of
 required capital and ocean transport cost in the arctic LNG project; and adoption of small-scale
 liquefaction facilities and buyers' greater involvement in a plan of new LNG project based in
 the US Gulf of Mexico coast.
- The moderator asked about fields with high innovation potential, to which panelists replied a number of fields including digital technologies and big data utilization. As well, it was pointed out that not only technological innovation but also innovation for services would be important.

Session 4: LNG as Transport Fuel: Panel Discussions

Demand of LNG-fueled vessels is expected to grow going forward partly due to strengthening of regulations on sulfur oxides (SOx) by the International Maritime Organization (IMO). Factors driving the growth of LNG consumption and challenges against it were discussed in this session in light of advanced cases in European ports, etc. At the same time, all the participants found it an important policy challenge to build bunkering bases.

<On stage>

Moderator

 Mr. Masamichi Morooka, President & CEO, Yokohama-Kawasaki International Port Corporation

Panelists

- Mr. Denis Bonhomme, Senior Vice President, Business Development Asia, Engie Global LNG Singapore Pte Ltd
- Mr. Steve Hill, Executive Vice President, Shell Energy, Shell
- Mr. Laurent Vivier, Senior Vice President, Gas, Total S.A.
- Mr. Takamitsu Asawa, Deputy Director-General for Engineering Affairs, Ministry of Land, Infrastructure, Transport and Tourism, Japan

<Main discussions>

- The electronic survey in the beginning asked what percentage of marine fuel consumption LNG would represent in 2025 and 2035, to which "Less than 25%" and "25%-50%" were the most-voted answers respectively. Asked about the biggest challenge in terms of promoting LNG as marine fuel, the most respondents answered initial cost for developing infrastructure and building LNG-ready vessels.
- The moderator commented on IMO's tighter cap on sulfur in 2020 and explained the merits and demerits of each of the following three measures: 1) use of fuel oil which meets the regulations, 2) installation of exhaust gas cleaning devices (scrubbers) on board, and 3) a switch of fuel to LNG. Use of LNG has an advantage such as helping reduce emissions of greenhouse gas as well as SOx. However, the demerits include cost of building LNG-ready vessels which is higher than that of conventional ships as well as reduced tonnage stemming from a larger-sized fuel tank.
- Panelists presented their views and expectations for use of LNG bunkering. Currently, use of LNG-fueled ships is mainly found in Norway, but it is expected to expand into the entire Europe and North America going forward. Furthermore, demand for such vessels is expected to grow in other parts of the world including Asia from 2020 onwards due to the tougher IMO regulation. As well, it was pointed out that the field of transportation has more room for improvement than the power generation sector when we accelerate decarbonization efforts and that LNG has great potential as fuel for not only ships but also heavy vehicles including trucks.
- As well, some argued that it would be important to introduce policies based on the "transportation mix" which would indicate ratios of different energy sources used in the transportation sector and investment in infrastructure by global corporations with large investment capabilities when promoting use of LNG in the transportation sector. It was also pointed out that flexibility in price and supply would be the key to securing competitiveness of LNG in the transportation sector.
- Japan has already decided on a roadmap towards introduction of LNG bunkering, according to which the Yokohama Port would start supplying LNG from one ship to another sometime after 2020. With regard to bunkering demand in Japan, 5%-27% of fuel for conventional vessels is expected to be replaced by other types sometime during the period between 2025 and 2030, and commercialization is expected to require annual demand of 100,000-150,000 tons.

• In the Panel Discussion, some panelists expressed their cautious views against expectations for a sharp growth of LNG demand in the transportation sector revealed by the electronic survey conducted in the beginning of the session, saying that demand would grow 10%-15% at the most in the coming 15 years due to construction cost and other cost restrictions, required development of infrastructure at each port, and time required for replacing existing ships. As well, some argued that institutional support from various governments would be necessary for expanding demand for LNG bunkering in Asia. Panelists also expressed their views that national governments and relevant businesses should work together to hedge risk entailed in introduction of LNG-fueled vessels due to substantial initial cost.

Session 5: Flexible LNG Market and Spot Trading (Panel Discussions)

This session presented the state of use of price indices by European businesses and efforts in Asian markets in order to advance global discussion towards realization of flexible LNG transactions including removal of destination clauses.

<On stage>

Moderator

- Dr. Ken Koyama, Chief Economist and Managing Director, The Institute of Energy Economics, Japan (IEEJ)

Speaker

Mr. Isao Kasubuchi, Director General, Trade Practices Department, Economic Affairs Bureau, General Secretariat, Japan Fair Trade Commission (JFTC)

Panelists

- Mr. Jonty Shepard, Global Head, LNG, International Gas, BP Integrated Supply & Trading
- Mr. Yuji Kakimi, President, JERA Co., Inc.
- Mr. Andree Stracke, Chief Commercial Officer (Origination & Gas Supply), RWE Supply & Trading
- Mr. Dave Ernsberger, Global Head of Energy, S&P Global Platts Inc.
- Mr. Takamichi Hamada, Director, President & CEO, Tokyo Commodity Exchange, Inc. (TOCOM)

<Main discussions>

• The electronic survey in the beginning of the session revealed the following: 1) Many respondents expected that more than 50% of LNG would be traded without destination clauses in the next 10 years; 2) The majority expected that 30%-50% of LNG would be traded on spot/short term contracts; 3) Many considered "Bankability of LNG project finance" and "Lack of liquidity in spot market" as challenge to increasing spot/short term trading; and 4) Many respondents thought that the most important factor in developing LNG price benchmarks that

reflect supply and demand would be "Enhancing utilization of trading platforms (exchanges, etc.)"

- JFTC presented details included in its report on a survey concerning LNG trades and presented the following opinions: 1) LNG sellers should neither provide competition-restraining clauses nor adopt competition-restraining business practices which could lead to restriction of reselling, when LNG sellers conclude a new contract or revise a contract after the expiration; and 2) LNG sellers should review competition-restraining business practices which could lead to restriction of reselling, as for the existing contracts before the expiration.
- The Panel Discussion saw various opinions and reports including the following: it is important to build a trading portfolio because potential challenges still remain in realizing further flexibility, including shortage of storage facilities, although the LNG market has been made more flexible thanks to the increase in trading quantity and the number of cargos traded more than one time as well as diversified pricing formulas; buyers have expectations that LNG produced in the US will radically change the LNG market in terms of flexibility and formulation of a global market; buyers themselves need to get involved in reforming the LNG market; and improvement of spot price assessment functions/expansion of financial trading/cooperation between exchanges and intelligence organizations towards formulation of the LNG market.
- During questions and answers, a participant expressed his view that JFTC's report was making
 a positive impact for the ongoing trend of increasing market flexibility and trade improvement.
 As for the European market, it was pointed out that a regulatory framework was being
 developed following the principle that LNG could be bought and sold anywhere inside EU.
- Based on what was learned through liberalization of energy markets in Europe, when various gas price indices become available, consumers will adopt the one that produce a profit most at the time of transaction. Some argued that it is important to understand that advantageous trading styles may well be changed by violent fluctuations of oil prices in particular. For instance, consumers are likely to shorten contracts, reduce quantity, and switch price indices when the oil price soars. It was also pointed out that the Asian LNG market would need to be understood in the global picture in connection with European and US LNG markets on the basis that it is not connected by a pipeline which would otherwise deal with quantity risk.
- As a result of the efforts made for establishing a price index during the past one-year period, spot-transaction data provided by market players is on the steady rise. However, active market players are few as well as the number of transactions. This results in that communication between inactive players continues to be quicker. As a result, collected data is not helping to realize active market trades. As well, some pointed out that it would be an idea to use JKM as an index in short-term contracts.

Closing Remarks

Mr. Yota Ono, Director-General, Natural Resources and Fuel Department, Agency for Natural Resources and Energy, Ministry of Economy, Trade & Industry

We appreciate you joined us today. We were able to confirm that Asia is a potentially huge LNG market and that realizing this potential, although there are many challenges to overcome, would bring great merits to both producers and consumers. The Producer-Consumer Conference will strengthen public-private coordination going forward while we still keep its nature of being a policy-oriented conference body. Next year, the Conference will be held in Nagoya with Jera Co., Inc. involved as a secretariat company.