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**Fueling Sustained Growth:
Strengthening Energy Markets for Economic Development**

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EXECUTIVE SUMMARY

This working paper examines the importance of energy market integration for capturing the advantages of energy cooperation between Asia and North America.

Main Argument

The ASEAN and East Asia region relies significantly on imports of fossil fuel from the Middle East to power its economy. This dependence makes the region vulnerable to disruptions in the supply of oil and gas—for example, as a result of political instability. In some major energy consumers within Asia, demand for fossil fuels is growing at a faster pace than domestic production; thus, their import dependence, particularly on oil and natural gas, is becoming larger, rendering energy security concerns greater. In order to maintain energy security and fuel sustained growth in the ASEAN and East Asia region, the leaders of the East Asia Summit (EAS) agreed to promote energy efficiency, greater reliance on renewable energy, and clean use of coal, among other measures. In this regard, energy cooperation in terms of technology transfers and developing management and regulatory frameworks for integrating energy markets in the ASEAN and East Asia region with the rest of the world, and especially with the United State and Canada, will play a crucial role in connecting Asia to North America.

Policy Implications

- Energy market integration between the ASEAN and East Asia region and North America will be even more important in the future given the recent development of unconventional resources, which has led to the prospect of abundant energy supplies.
- The development of green and low-carbon-emitting technologies will be central to sustaining future growth. Thus, energy market integration in both soft and hard infrastructures is necessary to allow markets to interact.
- The ASEAN and East Asia region and North America need to view energy market integration as a win-win framework for fueling sustained growth.

The Importance of Energy Market Integration

The continued growth in the use of fossil fuels in East Asia Summit (EAS) economies has a substantial impact on energy security and also the increase in carbon dioxide (CO₂) emissions. The Association of Southeast Asian Nations (ASEAN), together with China and India, is already shifting the center of gravity of the global energy system toward Asia. In addition, the total population of the sixteen countries of ASEAN and East Asia, which is roughly 3.3 billion people, puts pressure on future energy consumption and supply security in the region. The primary energy consumption of EAS countries is projected to increase from 4,079 million tons of oil equivalent (Mtoe) in 2010 to 8,533 Mtoe in 2035.¹ In this regard, gas consumption is projected to increase significantly. Gas consumption is growing the fastest in China (at a rate of almost 13% annually). Japan's gas demand is met almost entirely by imports, particularly of LNG, and its natural gas consumption will increase at an average annual rate of 1.6%. India's natural gas consumption is likewise projected to increase by 4.9% per year between 2010 and 2035. Although ASEAN has also experienced rapid growth in demand for natural gas, coal remains strategically important for its member states, reflecting the differences in the energy policies of countries and regions. Whereas Japan and China, taking into account environmental issues, are shifting their energy sources from coal to gas, ASEAN and India are shifting to the utilization of affordable coal. Both shifts are backed by the robust increase of electricity consumption.

The ASEAN and East Asia region relies significantly on imports of fossil fuel from the Middle East to fuel its economy. This dependence makes the region highly vulnerable to disruptions in the supply of oil and gas—for example, as a result of political instability in the Middle East. In some major energy consumers within ASEAN and East Asia, demand for fossil fuels is rising at a faster pace than domestic production; thus, their import dependence, particularly on oil and natural gas, is becoming larger, rendering energy security concerns greater.

Realizing the risks related to energy security in the region, the heads of state of Australia, China, India, Japan, South Korea, New Zealand, and the member countries of ASEAN, on the occasion of the second East Asia Summit on January 15, 2007, adopted the Cebu Declaration focusing on energy security. In order to maintain energy security and sustain economic growth in

¹ Shigeru Kimura, "Analysis on Energy Saving Potential in East Asia," Economic Research Institute for ASEAN and East Asia (ERIA), Research Project Report, no. 18, June 2012.

the ASEAN and East Asia region, the leaders pledged to not only focus on reducing dependence on fuel imports by oil stockpiling but also improve fuel-use efficiency and the diversification of fuel sources, especially by increasing the share of renewable energy in total consumption. In addition, they agreed to improve energy efficiency by promoting conservation, the clean use of coal, the use of biofuels for transportation, and energy market integration.

Energy cooperation between the ASEAN and East Asia region and the rest of the world, especially the United States, presents many opportunities and advantages. The United States, European countries, Australia, New Zealand, Japan, and South Korea are leading countries in energy and thus could cooperate with China, India, and ASEAN countries in improving technologies, management, and regulatory frameworks. Australia is particularly important to the EAS region because of its endowment of energy resources, including coal, natural gas (distributed as LNG), and uranium, which can help secure the energy supplies of other EAS countries. Brunei, Indonesia, Malaysia, and Vietnam also have large potential reserves of oil and gas and could benefit from technology transfer and investment from Australia, China, Japan, Korea, India, and New Zealand (ASEAN +6 grouping). The refinery capacities in South Korea and Singapore and the oil storage capacity in Japan could provide further benefits with more integration.

The role of energy market integration between Asia and North America will be even more important in the future given the recent development of unconventional resources, which has led to the prospect of abundant energy supplies. Unconventional gas, in particular, has emerged as a game changer with the potential to simultaneously drive sustained economic growth and address environmental concerns. The shift of energy demand toward Asia and the shale gas revolution are thus happening at the right time. Asia will need more energy, and the United States' surplus will complement the deficit of the region's demand surplus. However, some gas-producing countries in the Middle East may adopt "wait and see" policies because of the uncertainty of the unconventional gas revolution, which could result in ongoing tight supply to Asia. Thus, markets need to be integrated in such a way that energy commodities can be moved between regions as fast and efficiently as possible. Specifically, investments to improve the connectivity of both hard and soft infrastructure will need to be in place to facilitate energy market integration.

The Economic Impacts of Investment in Energy Market Integration

Regional Power Connectivity

As part of the ASEAN Interconnectivity Master Plan Study proposed by the Heads of ASEAN Power Utilities/Authorities, the Economic Research Institute for ASEAN and East Asia (ERIA) analyzed the “effective investment of power infrastructure in ASEAN +6 through power-grid interconnection” in order to quantify the benefits of a pan-regional power infrastructure.² If we assume that the study could be completed by 2020, ASEAN countries could save \$12.1 billion on the generation cost of new power plants. If ASEAN chooses a strict environmental standard, there will still be a meaningful economic gain from greater regional power connectivity. In this regard, ERIA suggests that ASEAN countries make a platform to ensure implementation of the master plan. In addition, ERIA continues to study ways to procure the large amount of money needed for investment in pan-regional power infrastructure as well as institutional aspects such as contracts between producers and consumers and the system of regional tariffs.

The Trans-ASEAN Gas Pipeline

ASEAN has huge gas reserves, but they are unevenly distributed; thus, the construction of a regional gas pipeline will be very important for the region’s energy security. In this regard, one of the most significant initiatives of the ASEAN Council on Petroleum is the trans-ASEAN gas pipeline (TAGP) project, which would “establish interconnecting arrangements of electricity and natural gas in ASEAN” in order to ensure greater security and sustainability of energy supply in the region.³ To date, eleven bilateral connections have already been established. The TAGP is a massive project that would connect Southeast Asia in one of the largest networks of its type in the world. Linking the gas reserves of Indonesia, Malaysia, Singapore, Vietnam, Myanmar, the Philippines, Brunei, and Thailand, the project is backed by the major oil and gas companies in each of these countries and was originally projected to be in full operation by 2020.

² Ichiro Kutani, “Effective Investment of Power Infrastructure in East Asia through Power Grid Interconnection,” ERIA, Research Project Report, no. 23, December 2012.

³ “Trans ASEAN Gas Pipeline Project (TAGP),” ASEAN Council on Petroleum (ASCOPE), <http://ascope.org/component/content/article/6-projects/28-tagp.html>.

The existing pipelines between Myanmar and Thailand, Malaysia and Singapore, and Indonesia and Singapore are not connected regionally to allow gas-rich countries to export to poorer ones. This means that the pipeline linking Myanmar and Thailand is still only one-way. The network already has ten cross-border gas pipelines (costing \$14.2 billion), traverses more than 3,000 kilometers, and transports 3,095 million cubic feet per day of gas, and there are at least six other projects that remain to be completed. One of the biggest challenges in implementing the initiative is that different countries have different regulations. For this reason, private companies are reluctant to invest in the TAGP. Thus, ASEAN will need to speed up the harmonization of policy among its members in order to create a favorable investment environment for the TAGP to be realized. Because of delays, some countries are now discussing alternatives such as building gas-receiving terminals rather than connecting pipelines.

Energy Efficiency and Conservation

ERIA's study on "Economic Impact from Investments on Energy Efficiency and Saving" found that additional investments in technologies to conserve energy and lower carbon emissions would significantly reduce energy demand, especially coal demand in EAS countries, while reducing the price of fossil fuel in both domestic and global markets.⁴ Most strikingly, the study found that the total GDP of EAS countries would increase by 4.0% under an alternative-technologies scenario compared with a business-as-usual scenario. With the comprehensive effect of additional energy investment, Japan and Korea would experience the largest GDP growth rate at 5.4%, while China and India would grow at 3.3%, Thailand at 2.7%, Indonesia at 2.0%, Malaysia at 1.7%, the Philippines at 1.6%, and Australia at 1.7%. Furthermore, GDP increases in ASEAN and East Asia would have an impact on the GDP of the rest of the world, which would be 1.8% higher under the alternative-technologies scenario than under a business-as-usual scenario.

Biofuel Market Integration

ASEAN and East Asia are exploring investment in biofuel as one of the possible options to address the issue of oil security. Expanding the use of biofuel will not only reduce oil demand but

⁴ Akira Yanagisawa, "Economic Impact Evaluation of Investments on the Energy Savings and Low-carbon Emitting Technologies in East Asia," ERIA, Research Project Report, no. 15, October 1, 2012.

also help diversify import sources for liquid fuels. Moreover, biofuel production provides an additional way to increase the income of farmers. ASEAN and East Asia have the potential for growth in biofuels. By 2035, the total bioethanol and biodiesel demand of the 16 countries that make up the region are projected to be 49 Mtoe and 37 Mtoe, respectively, while the supply potential of bioethanol and biodiesel is estimated to be 70 Mtoe and 57 Mtoe, respectively.⁵

This implies that the ASEAN and East Asia region as a whole would hold enough supply potential to cover demand driven by policies promoting the use of biofuels. EAS economies have plans to increase the amount of biofuels in the transport fuel mix in order to enhance energy security. The largest increase in consumption of biofuels is expected in India and China. The rest of the EAS economies will need to double their blending target as well as biofuel production to increase the use of biofuel in the transportation sector. However, the EAS can only realize such a potential supply of biofuels if the feedstock markets are integrated. This means that the movement of feedstock within the ASEAN and East Asia region shall be eased in terms of tariffs and non-tariff measures.

Strategic Usage of Coal for Market Integration

According to the Southeast Asia Energy Outlook, use of coal is strategically important for the ASEAN and East Asia region.⁶ Clean coal technology (CCT) supports the use of low-rank coal and helps reduce CO₂ emissions through carbon capture storage (CCS). According to the ERIA's study on the strategic usage of coal, deployment of CCT will create an investment opportunity for high-efficient coal power plants and induce development of coal mining business.⁷ The effect is an estimated \$3-trillion investment opportunity and 550,000 new jobs in the coal mining sector. However, two issues with CCT are the high investment cost and the fact that CCS is still at an experimental stage. ERIA will continue the study CCT to find an appropriate framework that could

⁵ Kaoru Yamaguchi, "Study on Asia Potential of Biofuel Market," ERIA, Research Project Report, no. 25, June 2013.

⁶ IEA and ERIA, *Southeast Asia Energy Outlook*, World Energy Outlook Special Report (Paris: OECD/IEA, 2013), http://www.iea.org/publications/freepublications/publication/SoutheastAsiaEnergyOutlook_WEO2013SpecialReport.pdf.

⁷ Hironobu Oshima, "Study on the Strategic Usage of Coal in the EAS Region," ERIA, Research Project Report, no. 27, June 2013.

support the deployment of this technology in the developing world by lowering the upfront cost of investment. One possibility is the current initiative for a bilateral offset credit mechanism that could be used to lower the upfront cost of CCT through a carbon credit.

The Need for an Appropriate Energy Policy for Renewables in the Integrated Market

ASEAN needs to promote the study and deployment of green energy such as solar photovoltaic, wind, geothermal, hydropower, advanced biofuels, and other renewable energy. Renewable power generation can help countries meet their sustainable development goals through provision of access to clean, secure, reliable, and affordable energy.⁸ To this end, governments will need to adopt appropriate energy policies, including feed-in-tariffs, renewable portfolio standards, and incentives for technology development. As green energy technology advances in developed countries, ASEAN will need to tap those technologies and leverage them in an ASEAN context. Experience with these practices shows that generous policy schemes in developed countries have already led to skyrocketing demand for renewable energy, while China's dominance and scale in supply have greatly reduced the cost over the last five years. The Philippines, Thailand, and Malaysia are now embarking on the implementation of renewable energy policies, particularly feed-in tariffs. Other ASEAN members are closely watching the progress of the implementation of feed-in-tariffs, which could be replicated for the whole ASEAN region.

Conclusion

Energy cooperation between the ASEAN and East Asia region and the rest of the world, especially the United States, has great potential for capturing many opportunities and advantages. The United States, European countries, Australia, New Zealand, Japan, and South Korea are leaders in energy and could cooperate with China, India, and ASEAN countries in developing technologies, management, and regulatory frameworks, thus driving investment in the energy sector.

⁸ Fukunari Kimura, Han Phoumin, and Brett Jacobs, "Energy Market Integration in East Asia: Renewable Energy and its Deployment into the Power System," ERIA, Research Project Report, no. 26, August 2013.

Energy market integration between Asia and North America will be even more important in the future, given the recent development of unconventional resources, which has raised the prospect of abundant energy supplies. Although ASEAN has also experienced fast growth in natural gas demand, coal remains of strategic importance for the region. Whereas Japan and China are shifting their energy source from coal to gas, taking into account environmental issues, ASEAN and India are promoting the utilization of affordable coal. Thus, coal produced in the United States could possibly be exported to Asia. This means that superpowers like the United State, Japan, and possibly China could work closely to invest in clean coal technology.

ERIA's studies have proved that energy market integration plays a vital role in energy security, increased investment, and the creation of opportunities. Countries are encouraged to cooperate in order to achieve sustained growth as regions become more integrated. Finally, green technology and low carbon emitting technology are critical for future sustained growth. Thus, promoting energy market integration in both soft and hard infrastructure is fundamental to allowing markets to interact and integrate. Without proper policies and frameworks, adequate infrastructure, cross border interconnection, and new technologies, energy market integration would not be successful.