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Mr. Chairman, Ranking Member Bera, and distinguished Subcommittee members:

Thank you for inviting me here to share my views on U.S. policy toward supplying liquefied natural gas (LNG) resources to Asia. My name is Mikkal Herberg and I am Research Director for the Energy Security Program at The National Bureau of Asian Research (NBR). These views are mine alone and do not reflect the views of NBR which does not take institutional positions on any policy issue.

The Energy Security Program at NBR has been studying these issues and last June 2013, held a day-long workshop in Washington, D.C. on "Asia's Uncertain LNG Future" and issued a report in November 2013. It concluded that LNG will play an increasingly important role in ensuring Asia's future energy security as well as helping shift Asia's coal-intensive energy fuel mix towards a more environmentally sustainable path. Asia traditionally accounts for two-thirds of global LNG consumption. Japan and South Korea have alone have been the large, base-load buyers of LNG, typically accounting for one-half of global LNG consumption. Asia's LNG consumption is expected to grow dramatically over the next two decades as China and India boost their LNG imports and as Japan and South Korea substitute LNG for declining nuclear energy supplies. Even Southeast Asia, traditionally a significant exporter of LNG to Northeast Asia, is seeing a dramatic shift in consumption and will become increasingly dependent of imported LNG.

This positive outlook, however, is also somewhat uncertain. The outlook for LNG demand growth in China, Japan, South Korea, and India is uncertain as each grapples with domestic energy supply challenges and critical policy decisions over the role of nuclear energy, environmental goals, and gas pricing challenges. On the supply side, while it is clear that substantial new supplies will be coming to Asia from Australia, Russia, the U.S. (including Alaska), Canada, and offshore East Africa, there are enormous questions over the rising cost of LNG projects, Russia's gas and LNG decisions about investing in its far eastern gas supplies and infrastructure, and domestic policy constraints in the U.S. and Canada. Finally, the evolution of LNG prices in Asia is critical to the scale and pace of Asia's LNG demand growth. High oil-linked prices that prevail in Asia today threaten to slow the growth in use of LNG. In this regard, U.S. pricing of LNG potentially linked to market-driven domestic Henry-Hub gas prices could be an important factor in strengthening and re-shaping Asia's LNG future.

Both in LNG supply and in pricing terms, potential U.S. LNG exports to Asia have the potential to play a very important and positive role in Asia's energy and energy security future. In fact, the boom in U.S. shale gas production is already benefiting Asia and especially Japan. Seven years ago it was expected that the U.S. would be a very large importer of LNG by 2014, competing with Japan and other importers for global LNG supplies. Instead, the U.S., combined with Canadian gas imports, is now essentially self-sufficient in natural gas on a North American basis. As a result, large new LNG supplies from Qatar that came on line in 2010-2011 that were originally destined for the U.S. market suddenly became available to help meet Japan's increased LNG needs in the wake of the Fukushima nuclear disaster and shutdown of Japan's nuclear generation capacity. Japan's nuclear energy crisis would have been far more damaging to Japan's economy and energy security without those unexpected LNG supplies freed up by U.S. shale gas production. South Korea has benefited similarly.

Questions about U.S. LNG exports to Asia and the potential economic and strategic implications require some discussion of potential volumes of U.S. LNG exports and assumptions about U.S. natural gas and Asian LNG prices. Forecasts from Japan's Institute of Energy Economics (IEEJ) suggest that Asia's LNG demand will roughly double between 2013 and 2040, from 180 million metric tonnes per year (mmt/y) to 360 mmt/y in 2040. As of early 2014 the U.S. Department of Energy has issued permits for five potential U.S. LNG export projects for over 9 billion cubic feet per day (bcf/d), equivalent to roughly 65-70 mmt/y of LNG that could come on line between 2015 and 2025. Many more projects are in line for approvals for a total potential of more than 100 mmt/y. Hence, technically U.S. LNG could be a major source of Asia's rising LNG needs.

However, how much of that LNG actually gets developed will depend heavily on the cost and price of that LNG and the evolution of LNG prices in Asia and globally. Asia's current oil-linked spot market price for LNG is roughly $16-17 per million btu's (mmbtu), well above Europe's average $9-11 gas prices and U.S. Henry Hub prices presently around $4.50. With a liquefaction and transportation cost estimate of roughly $6.00 per mmbtu to send U.S. Gulf coast LNG to Asia, U.S. gas *at current prices* would be highly competitive in Asia's market. Asia would also benefit from the introduction of flexible, market-based U.S. gas prices into regional LNG pricing formulas.

Nevertheless, the share of U.S. LNG in Asia's future market depends ultimately on the evolution of U.S. gas prices as well as the evolution of Asia's LNG prices. Many expect U.S. natural gas prices to gradually rise in the future as domestic demand grows strongly. In other words, hub-based pricing is no long-term guarantee of low prices. At the same time, many forecasts also suggest that Asian LNG prices should decline over the next decade towards $12-13 per mmbtu as large new supplies hit the market from Australia, Russia, the U.S. and Canada, as well as offshore East Africa. While all this is highly speculative, the point is that the future volume of U.S. LNG exports to Asia will ultimately depend on Asian LNG demand and prices and

U.S. natural gas prices, rather than how much LNG supply is permitted by the U.S. government. At $6.00 U.S. gas prices and $12-13 Asian LNG prices the two markets largely equilibrate and the commercial incentive to invest in new U.S. LNG supplies for the Asian market disappear. The implication is that U.S. exports could be 30 mmt/y by 2025 or could be 80 mmt/y depending on these market developments.

It is within these broad boundaries of LNG market dynamics and prospects that I address the Subcommittee's questions.

It seems clear that the largest buyers of U.S. LNG are likely to be Japan and South Korea. Both have substantial needs to contract for new long-term LNG supplies as many of their existing long-term LNG contracts gradually expire over the next 10 years and as each faces similar constraints on their nuclear power capacities. Wood Mackenzie consultants estimate that together their incremental un-contracted LNG volumes will rise to 30 mmt/y by 2020. Japan is most focused on securing future U.S. LNG supplies for many reasons, mostly related to the Fukushima nuclear crisis and the very high cost of their LNG supplies at high oil-linked prices. According to the IEEJ, Japan's trading houses and large utilities currently have offtake agreements to buy 17 mmt/y of LNG from planned U.S. LNG projects. These Japanese companies have equity ownership stakes in four major U.S. LNG projects. Japanese companies are also participating in four proposed Canadian LNG projects. South Korea also will be a significant buyer of U.S. LNG. South Korea is also facing its own nuclear energy crisis due to the shutdown of three of its 23 nuclear generating plants due to a corruption scandal over fraudulent parts and substandard maintainance. State-owned KOGAS has a contract to buy 3.5 mmt/y with the Sabine Pass project.

Substantial U.S. LNG exports to Japan and South Korea can have important knock-on effects in strengthening our respective strategic alliances with our strongest security partners in Asia. For Japan, energy security is national security. The Fukushima crisis represents the most serious energy crisis faced by Japan since the 1970s. The notion that the U.S. would not export LNG to Japan due to the lack of a Free Trade Agreement when it simultaneously would export to South Korea, which has a Free Trade Agreement with the U.S., would cause real damage to the most important U.S. strategic alliance in Asia. Both Japan and South Korea have been disappointed in the lack of progress with Moscow in developing more LNG supplies from Far East Russia for Northeast Asia as a result of lack of investment from Moscow. For South Korea the availability of new LNG supplies from the U.S. helps them diversify their 100% import dependence on LNG. South Korea has few other options for natural gas. Efforts over the past decade to forge an agreement to build a natural gas pipeline to bring Russian gas supplies across North Korea to South Korea have been stymied by North Korean intransigence or Russian disinterest. For both Japan and South Korea, the opportunity to incorporate market-based U.S. gas pricing into their LNG contracts has the potential to substantially reduce their LNG import costs. No other LNG supply source promises to introduce a new, potentially more favorable pricing mechanism.

The best way for the U.S. to bolster its influence in Asia in terms of its LNG is to maximize the amount of U.S. LNG available for Asia, as well as Europe, albeit within the framework of allowing markets to ultimately determine the volumes and prices. I would not advocate trying to use LNG exports or availability as some sort of diplomatic tool. U.S. influence will come from being a substantial, reliable, and price competitive source of LNG to the global market. Lower LNG prices in Asia and more reliable supplies strengthen our role in the region where secure LNG supplies are a critical dimension of economic prosperity in Asia and, therefore, for the U.S.

Substantial U.S. LNG exports to the global LNG market will also reduce the potential diplomatic leverage of other LNG suppliers who may be intent on using energy supplies for diplomatic leverage. For example, although most U.S. LNG exports will go to Asia where current LNG prices are much higher, more LNG for Asia means that other LNG supplies will be available to Europe which can, in the very long run, potentially reduce Europe's reliance on Russian pipeline gas. Gas trade in Europe is complicated and there is no one-to-one relationship between more LNG and reduced Russian gas imports. However, as Europe develops a more integrated gas market with pipeline connections that more fully incorporate the eastern part of Europe that is most dependent on Russian gas into a continental grid, the heavy dependence on Russian gas will be reduced somewhat. This can also help lower LNG and gas prices in Europe. These are some of the reasons Europe is looking to access U.S. LNG supplies as well and a number of European buyers have offtake agreements with U.S. LNG projects.

U.S. LNG supplies to Asia, depending of course on the scale and price, will inevitably compete with supplies from Malaysia, Australia, Qatar, and Russia. There is expected to be a very large expansion in supplies to Asia in the 2015-2023 period as large new supplies begin arriving from Australia, the U.S. Canada, as well as significant new LNG supplies likely from Far East Russian projects. Offshore East Africa seems likely to arrive well after 2020 due to huge infrastructure and investment challenges. Malaysian LNG supplies are not likely to grow between now and 2020 and, as Malaysian domestic natural gas consumption grows strongly in the future, many expect Malaysian LNG exports to gradually decline naturally after 2020. Australia projects appear to be among the most challenged by rising U.S. LNG exports. Australia LNG exports are expected to boom between 2015 and 2020 as nearly 50 mmt/y of new projects come on line, making Australia the world's largest LNG exporter by the early 2020's. However, Australian project costs have skyrocketed due to higher labor, infrastructure, and foreign exchange costs. These supplies will face significant price competition late in the decade as lower cost U.S. LNG supplies to Asia grow. Qatar, currently the largest LNG exporter in the world at 70 mmt/y, is holding its exports stable as the government has in place an LNG development moratorium while it evaluates the production capacity and longevity of its enormous North Dome gas field. Qatar has options that other LNG exporters don't have. Qatar's supplies are very low cost relative to most other LNG exporters. Hence, it can send LNG to Europe or Asia, although clearly Asia is favored today due

to higher prices and profitability. However, Qatar can still earn good investment returns on LNG sales in Europe.

China as a potential market for U.S. LNG deserves some attention. China's LNG imports are rising rapidly and it currently imports over 20 mmt/y in 2013. Re-gasification capacity is being built or planned that could take China to 60-80 mmt/y by the early 2020's. China is seeking to boost natural gas consumption by four-fold between 2010 and 2020 in an effort to reduce the growth in coal use and the damaging air pollution and carbon consequences. How much LNG China might import in the future, though, depends on its pipeline imports and development of domestic gas supplies, including large shale gas resources. The latest Russia-China gas pipeline agreement will provide an additional gas supply starting at the end of the decade. Up to now, China has not shown much interest in U.S. LNG supplies but this seems to be changing. Substantial U.S. LNG exports to China in the future could possibly help reduce tensions between the U.S. and China over energy security issues.

India seems likely to be a relatively modest overall factor in U.S. LNG exports. Due to its geographic location, India's LNG supplies come largely from the Persian Gulf. India imported 15 mmt/y of LNG in 2012, of which 12 mmt/y came from Qatar. However, India is an important trade partner and the U.S. has developed a closer strategic relationship with India over the past decade. India is interested in potentially lower-cost U.S. LNG supplies and its state gas company, GAIL, has a contract to import LNG from the Cove Point LNG project. Lower cost LNG would be important to India since it has struggled with raising domestic natural gas prices to levels that could cover the high cost of imported LNG. Energy and natural gas prices are highly regulated in India and, despite efforts over the past decade to reform prices, maintains energy and gas prices far below what's needed to justify much new investment in energy supplies.

Thank you for your attention and I look forward to answering any questions you might have.