

Energy in Japan

Research Analysts

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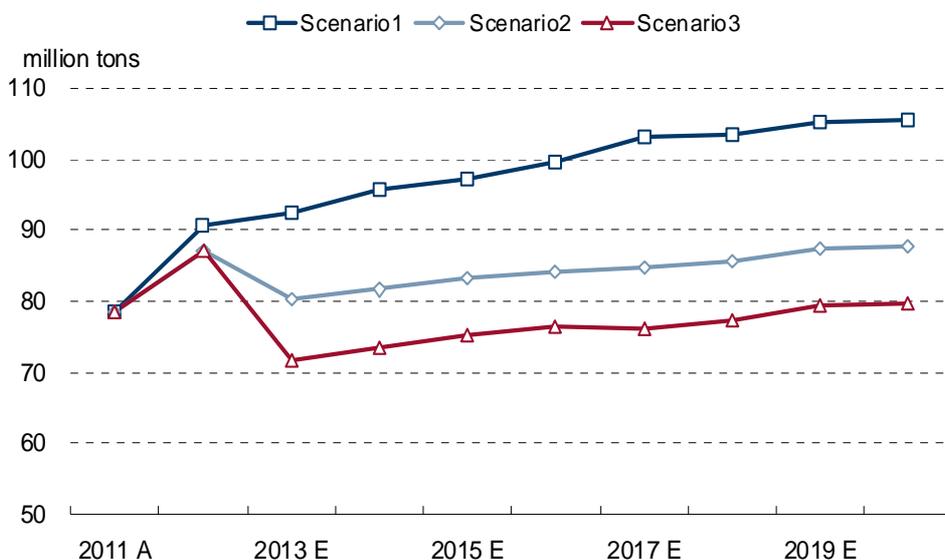
COMMENT

No.5: LNG demand outlook

- **Forecasting LNG demand:** In this fifth report in our energy series to focus on LNG, we look at the demand outlook and Japan's import capacity. Rather than reaching a single conclusion, we have devised three scenarios, as future LNG demand will likely hinge on capacity utilization at nuclear power plants.
- **Three scenarios:** In our first scenario, there is no resumption of nuclear power plant operations, with base-load power generation dependent entirely on gas-fired thermal power plants. In the second, some nuclear power plants restart, but with only 45% capacity utilization and reactors with more than 40 years in service scrapped. In the third scenario, too, reactors with more than 40 years in service are scrapped. However we assume a recovery to 60% capacity utilization and expect new reactors in Shimane and Oma to start up.
- **Expect 30% nuclear capacity factor in 2012:** In all three scenarios, we assume all gas-fired thermal power plants now in planning will be commissioned as expected. In estimating an overall nuclear capacity factor, we exclude the combined 9,096MW capacity of the 10 reactors at Fukushima Daiichi and Daini Nuclear Power Plants (19% of the total). For our second and third scenarios, we assume a 30% nuclear capacity factor. Based on supply plans, we assume the same city gas demand for all three scenarios.
- **2020 demand over 100mn tonnes assuming no nuclear plant restart:** After this long preamble, we now come to discussing LNG demand under each scenario. In the first, we assume base-load power generation is entirely dependent on gas-fired thermal power plants, resulting in 75% capacity utilization for such plants. On this basis, we see LNG demand rising from 78.53mn tonnes in 2011 to 90.60mn tonnes in 2012, 97.20mn tonnes by 2015, and 105.60mn tonnes by 2020.
- **LNG demand around 88mn tonnes assuming 45% nuclear capacity factor:** In our second scenario, we see LNG demand rising to 87.10mn tonnes in 2012, then slipping to 83.10mn tonnes in 2015 before increasing again to 87.80mn tonnes in 2020. Finally, our third scenario sees LNG demand falling from 87.10mn tonnes in 2012 to 75.20mn tonnes in 2015, before increasing again to 79.70mn tonnes in 2020.
- **Need to procure additional 25.30mn tonnes in 2020:** Long-term supply contracts currently in place for LNG guarantee 66.48mn tonnes in 2012, 66.72mn tonnes in 2015, and 54.38mn tonnes in 2020. Under the second scenario, Japan would need to procure an additional 20.60mn tonnes in 2012, 16.40mn tonnes in 2015, and 33.40mn tonnes in 2020. Under the third, an additional 8.5mn tonnes would be required in 2015, while the expiration of long-term contracts would see 25.30mn extra tonnes required in 2020.

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Figure 1: LNG demand outlook under three different scenarios



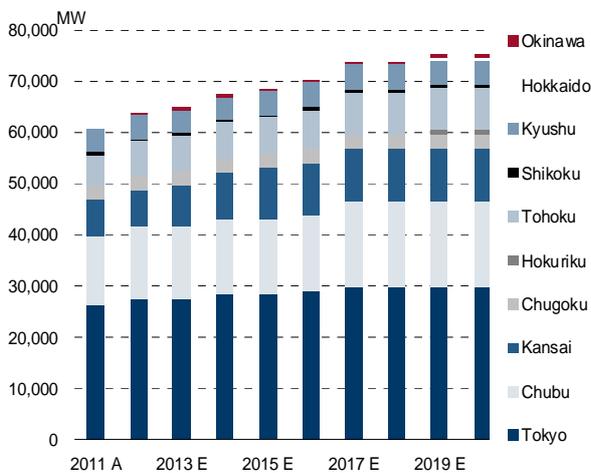
Source: Ministry of Finance, Credit Suisse estimates

We see generating capacity of gas-fired thermal power plants rising 24% between 2011 and 2020: Along with the nuclear capacity factor, we think the generating capacity of Japan's gas-fired thermal power plants will also have a bearing on LNG demand. Based on supply plans issued by the electric power companies at end-March, we see the generating capacity of Japan's gas-fired thermal power plants rising from 60.5GW at end-2011 to 63.5GW at end-2012, 68.4GW at end-2015, and 75.2GW at end-2020.

We see generating capacity of Japan's nuclear power plants falling 15% between 2011 and 2020: On the assumption that reactors with more than 40 years in service are scrapped but some new reactors start up, we see the generating capacity of Japan's nuclear power plants falling from 39.9GW at end-2011 to 38.7GW at end-2012, 37.4GW at end-2015, and 33.9GW at end-2020. In short, between 2011 and 2015 we see the generating capacity of Japan's nuclear power plants declining by 2.5GW, while over the same period the capacity of gas-fired thermal power plants increases by 7.9GW. Similarly, between 2011 and 2020 we see the generating capacity of Japan's nuclear power plants declining by 5.9GW, while over the same period the capacity of gas-fired thermal power plants increases by 14.6GW.

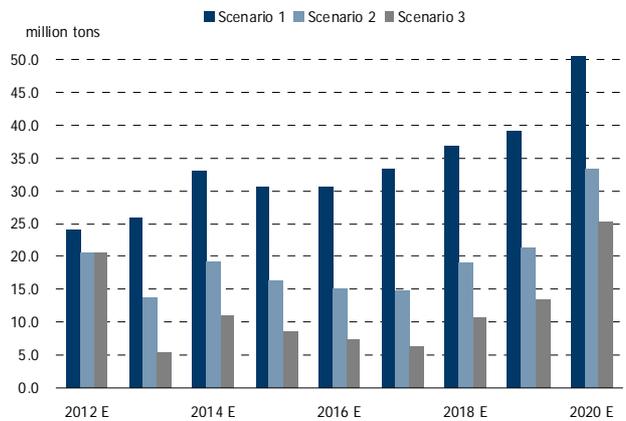
Decline in nuclear power plant generating capacity not that great, even considering loss of reactors with more than 40 years in service: Our projections for LNG demand growth may seem small in comparison with the figures being bandied about at present. That is first because there has already been significant growth, and second because the declines we forecast in nuclear power plant generating capacity are not actually that large, at 6% through 2015 and 15% through 2020. Even if the decline in nuclear power plant generating capacity is not that significant, however, low capacity utilization will inevitably result in LNG demand increasing.

Figure 2: Generating capacity of Japan's gas-fired thermal power plants



Source: Company data

Figure 3: Additional volume of LNG purchases required under each scenario



Source: Bloomberg, Credit Suisse estimates

Does Japan have capacity to process additional LNG procurements? In the short term, Japan could meet the demand for LNG called for in our second scenario by drawing on surplus capacity in nations such as Qatar. Over the medium to long term it could commit to buying from projects in Australia and Indonesia, as well as projects in North America and East Africa. We wonder, though, if Japan has the capacity to process close to 90mn tonnes of LNG annually.

Japan's official LNG receiving capacity is around 70mn tonnes at present: According to the Japan Oil, Gas and Metals National Corporation (JOGMEC), Japan currently has 29 LNG receiving terminals (excluding secondary terminals servicing domestic vessels, and two terminals whose capacity is not clear), with a total receiving capacity of around 70mn tonnes annually. As Japan's LNG import volume was 78.53mn tonnes in 2011, the official capacity is clearly a bit understated. We think it unlikely, though, that the nation's LNG receiving terminals could cope with import volume 20–30% in excess of official capacity.

Receiving capacity likely to be pushed to limit in 2012: Under our second scenario, we forecast LNG demand of 87.10mn tonnes in 2012, which is likely to put considerable strain on Japan's LNG receiving terminals. Currently, another 12 LNG receiving terminals are planned (in three cases, the plan is limited to constructing additional tanks). Considering planned addition of storage capacity, we calculate this will add 14mn tonnes to LNG receiving capacity. As our 2020 LNG demand forecast of 87.80mn tonnes is largely unchanged from our 2012 projection, there should be little problem with receiving capacity if 2012 can be weathered. The fact remains, though, that Japan's LNG receiving capacity will be pushed to the limit this year. Investment in new capacity would provide business opportunities for manufacturers in many fields, including heavy machinery, steel, and tanks.

Limits on LNG tankers entering Tokyo Bay: Receiving capacity is just one issue. Under an agreement with the fishing industry, there are restrictions governing LNG vessels entering Tokyo Bay. While we have been unable to confirm whether the restrictions govern LNG volume or vessel numbers, the limit appears equivalent to roughly 600 vessels.

We calculate import growth of around 10% over 2011 is within reason: For FY11, we estimate that LNG consumption at Tokyo Electric Power and Tokyo Gas came to 22.67mn tonnes and 10.22mn tonnes, respectively, for a total of 32.89mn tonnes. This equates to 548 LNG vessels, based on an average capacity of 60,000t for LNG tankers. This leaves a surplus receiving capacity of 3.12mn tonnes (another 52 vessels each carrying up to 60,000t), based on which import growth of around 10% over 2011 seems to be within

reason. LNG vessels are governed by other restrictions, though, such as a ban on night-time navigation. Our armchair theorizing therefore has its limitations. In the next report in this series, we plan to look at pipelines.

Figure 4: Japan's LNG terminals (primary terminals)

Place	Plant Name	Receiving Capacity (ktpa)	Storage Capacity (000 KL)	Storage Facility	Operation Start	Company
In Operation						
Miyagi	Minato	150	80	1	1997	Sendai Municipal Gas
Niiqata	Niiqata	4,000	720	8	1984	Nihonkai LNG (Tohoku EP, Japex)
Niiqata	Joetsu	NA	540	3	2012	Joetsu Co-op Power (Chubu EP, Tohoku EP)
Kanaqawa	Neqishi	3,500	1,180	14	1969	Tokyo Gas, TEPCO
Kanaqawa	Hiqashi Oqishima	6,000	540	9	1984	TEPCO
Kanaqawa	Oqishima	2,500	600	3	1998	Tokyo Gas
Chiba	Sodeqaura	9,500	2,660	35	1973	Tokyo Gas, TEPCO
Chiba	Futtsu	9,000	1,110	10	1985	TEPCO
Shizuoka	Shimizu LNG Sodeshi	NA	337	3	1996	Shimizu LNG (Shizuoka Gas, TonenGeneral Seki yu)
Aichi	Chita LNG	1,400	300	4	1978	Toho Gas, Chubu EP
Aichi	Chita LNG	3,100	640	7	1983	Chita LNG (Chubu EP, Toho Gas)
Aichi	Chita Midorihama	800	400	2	2001	Toho Gas
Mie	Yokkaichi LNG Center	3,000	320	4	1988	Chubu EP
Mie	Yokkaichi	330	160	2	1991	Toho Gas
Mie	Kawaqoe	4,000	480	4	1997	Chubu EP
Osaka	Senboku No.1	800	180	4	1972	Osaka Gas
Osaka	Senboku No.2	7,700	1,585	18	1977	Osaka Gas
Osaka	Sakai LNG Center	2,700	420	3	2006	Sakai LNG (Kansai EP, Iwatani, Cosmo Oil, Ube)
Hyogo	Himeji LNG	2,600	520	7	1979	Kansai EP
Hyogo	Himeji	2,600	740	8	1984	Osaka Gas
Kaqawa	Sakaide LNG	400	180	1	2010	Sakaide LNG (Shikoku EP, Cosmo Oil, Shikoku Gas)
Hiroshima	Hatsukaichi	500	170	2	1996	Hiroshima Gas
Okayama	Mizushima LNG	1,200	320	2	2006	Mizushima LNG (Chugoku EP, JX)
Yamaquchi	Yanai	1,300	480	6	1990	Chugoku EP
Fukuoka	Tobata	1,300	480	8	1977	Kitakyushu LNG (Kyushu EP, Nippon Steel)
Fukuoka	Fukukita	230	70	2	1993	Saibu Gas
Nagasaki	Nagasaki	110	35	1	2003	Saibu Gas
Oita	Oita LNG	1,530	460	5	1990	Oita LNG (Kyushu EP, Oita Gas)
Kaqoshima	Kaqoshima	80	86	2	1996	Nihon Gas
		70,330	15,793			
Planned						
Hokkaido	Ishikari LNG	NA	180	1	2012	Hokkaido Gas
Aomori	Hachinohe LNG	NA	280	2	2015	JX
Miyagi	Shin Sendai	NA	NA	NA	2016	NA
Niiqata	Naoetsu LNG	NA	360	2	2014	INPEX
Toyama	Toyama Shinko	NA	NA	NA	2018	Hokuriku EP
Ibaraki	Hitachi LNG	NA	200	1	2015	Tokyo Gas
Kanaqawa	Oqishima	NA	250	1	2013	Tokyo Gas
Mie	Kawaqoe	NA	360	2	2013	Chubu EP
Osaka	Sakai LNG	NA	NA	1	NA	Sakai LNG (Kansai EP, Iwatani, Cosmo Oil, Ube)
Wakayama	Wakayama	NA	880	8	2018	Kansai EP
Fukuoka	Hibiki LNG	NA	360	2	2014	Hibiki LNG (Saibu Gas, Kyushu EP)
Okinawa	Yoshinoura	700	280	2	2012	Okinawa EP
		700	3,150			

Source: JOGMEC

Reports in this series:

- [No.4: Two trading companies in US LNG deals](#) (18 Apr 2012)
- [No.3: On the introduction of shale gas](#) (17 Apr 2012)
- [No.2: On the introduction of shale gas](#) (12 Apr 2012)
- [No.1: On the introduction of shale gas](#) (9 Apr 2012)

Companies Mentioned (Price as of 25 Apr 12)

Tokyo Electric Power (9501, ¥199, SUSPENDED [V])

Tokyo Gas (9531, ¥389, UNDERPERFORM, TP ¥320, MARKET WEIGHT)

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