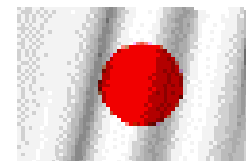




Joint Qatari-Japanese Energy Seminar



The Current Status of LNG: Uncertainty from Japan

29 SEPTEMBER 2010, IMPERIAL HOTEL, TOKYO

Koji MORITA
IEEJ



- 1. Global Energy/Natural Gas Supply/Demand Outlook**
 - LNG Supply/Demand Continuing to Expand -

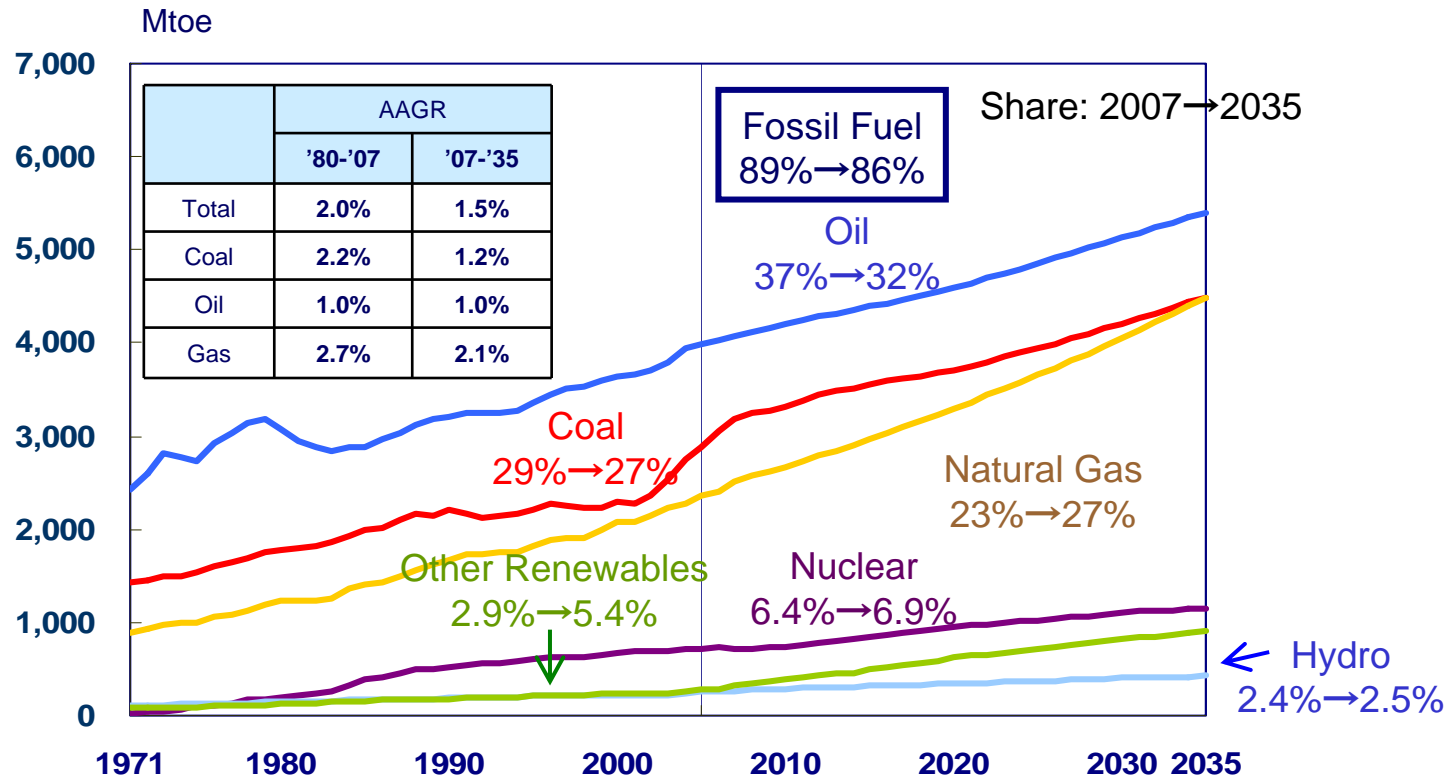
- 2. Uncertain Factors in LNG Demand Outlook (in Japan)**

- 3. What Are the Uncertain Factors?**

1. Global Energy/Natural Gas Supply/Demand Outlook

- LNG Supply/Demand Continuing to Expand -

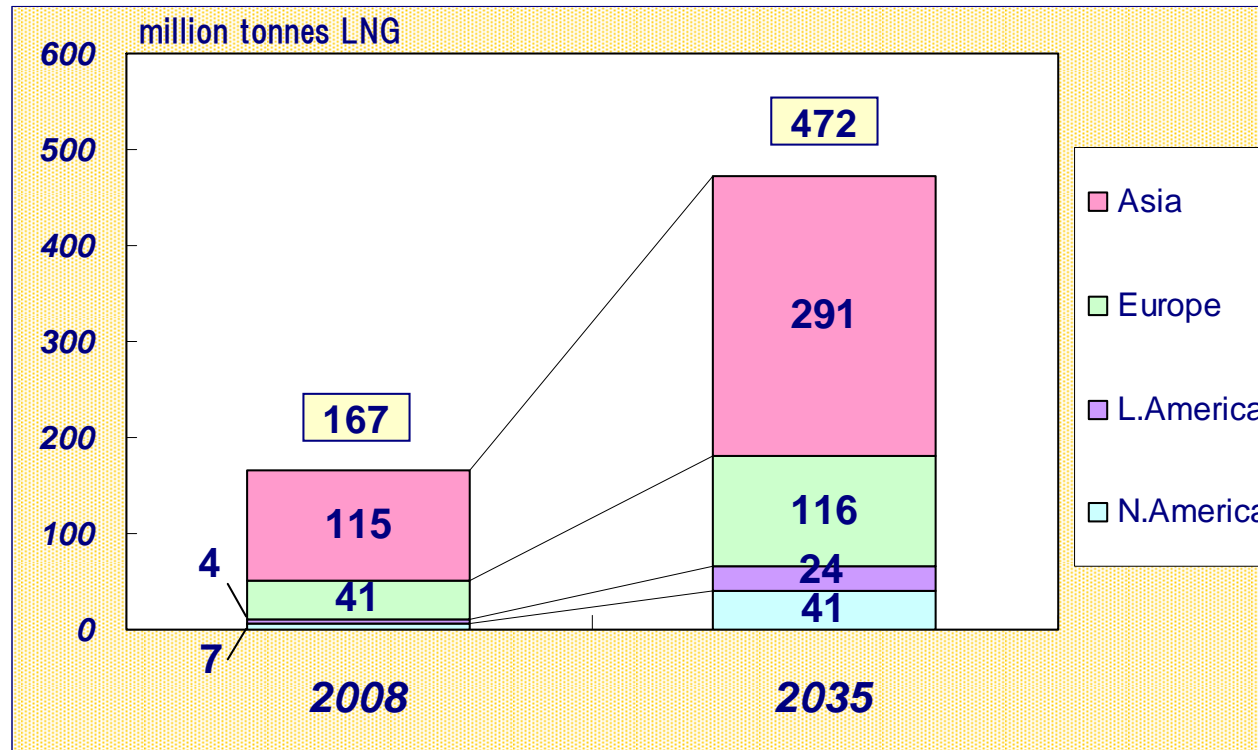
Global Primary Energy Consumption (by energy source)



Source: Excerpts from IEEJ Asia/World Energy Outlook 2009 (October 23, 2009)

- Natural gas demand will grow at an average annual rate of 2.1% and increase its share of total energy demand to the same level as for coal around 2035.
- Global gas consumption will expand 1.8-fold from 2.8 trillion cubic meters in 2007 to 5 trillion cubic meters in 2035.

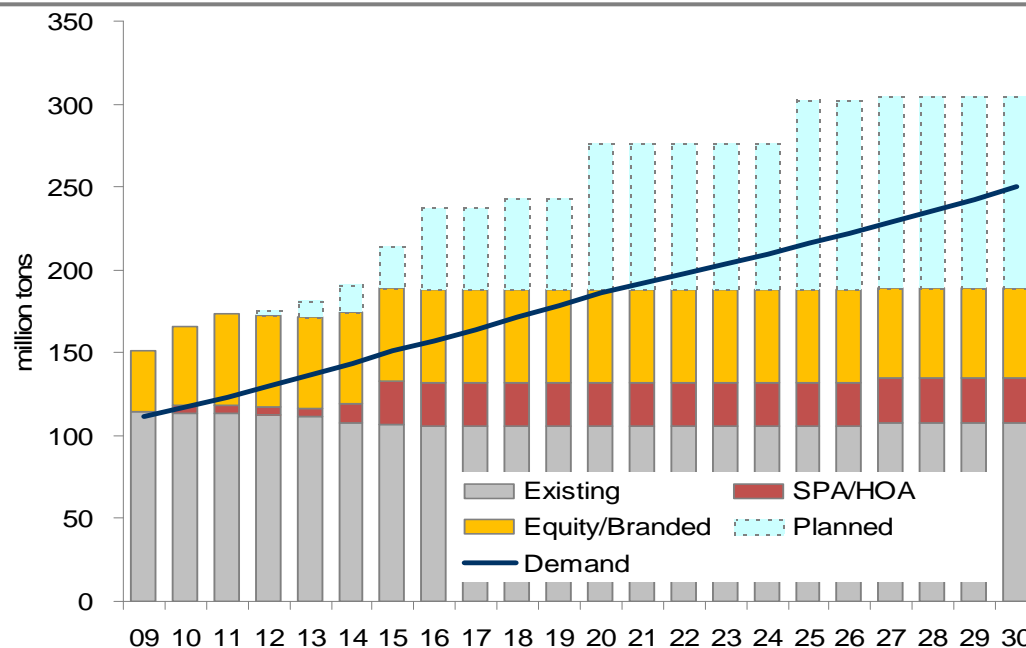
Global LNG Demand Outlook



Source: Excerpts from IEEJ Asia/World Energy Outlook 2009 (October 23, 2009)

- Global LNG demand will expand 2.8-fold from 167 million tons in 2008 to 472 million tons in 2035.
- Asian LNG demand will expand by 176 million tons to 291 million tons.
- A key point is whether LNG projects will be developed steadily to meet the global LNG demand growth.

Asian LNG Supply/Demand Balance



Source: Prepared by IEEJ.

- Asian LNG demand will expand 2.25-fold from 111 million tons in 2009 to 250 million tons in 2030.
- Sufficient supply will exist to meet the demand expansion.
- Over a short to medium term, a buyer's market will remain for LNG until equity/branded LNG is sold out. Over a long term, it will be important for projects under planning to be launched in a timely fashion to meet the demand expansion.
- Equity/branded LNG is called portfolio LNG, excluding LNG for long-term contracts for specific buyers. Depending on prices, equity/branded LNG may be shipped to any of the three major markets. At present, equity/branded LNG has some difficulties in securing buyers on an easing supply/demand balance in European and U.S. markets and has become an additional supply source for Asia. Equity/branded LNG is mostly produced in the Middle East and Africa.

Qatari LNG Production Capacity

World	Number of trains	Capacity (mt/y)
Operational	93	263
Under Construction and Proposed	104	440
		703

Qatar	Number of trains	Capacity (mt/y)
Operational	12	61.6
Under Construction and Proposed	2	15.6
		77.2

Production capacity of Qatar

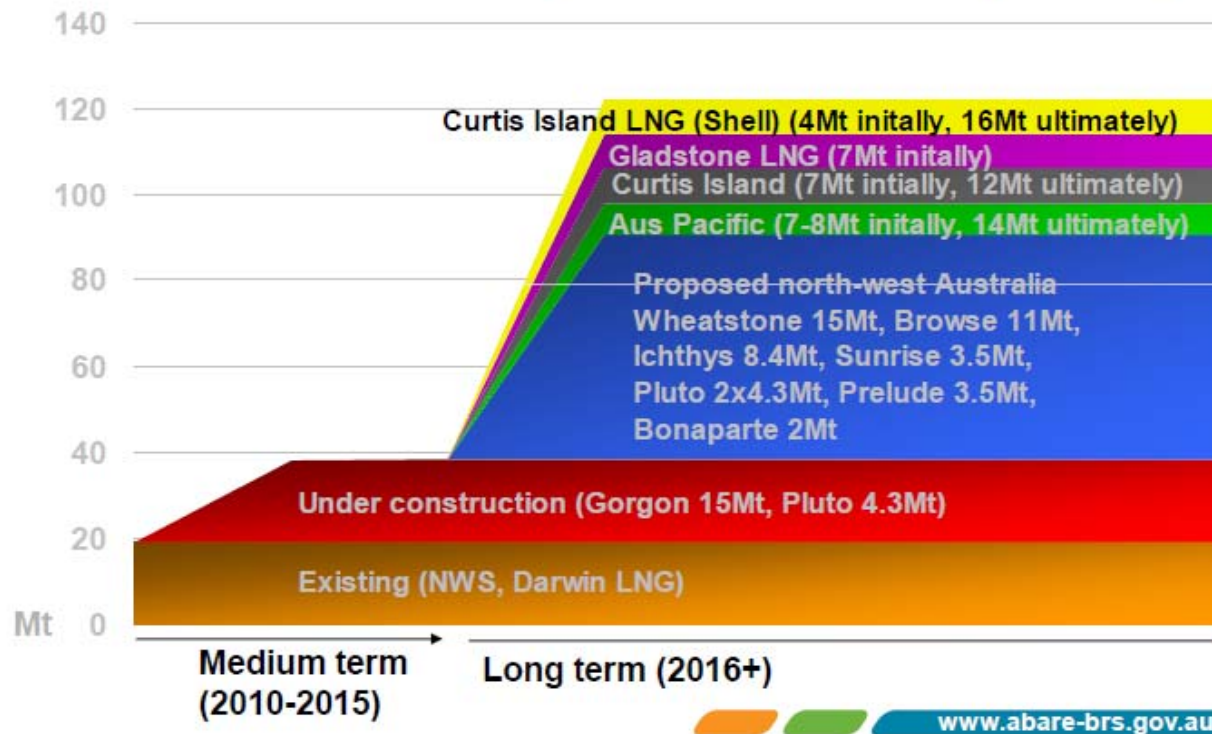
Project	Owner	Number of trains	Nominal capacity (mt/y)	Start-up date	Status
Qatargas (Train 1-3)	Qatargas (QatarPetroleum 65%, ExxonMobil 10%, Total 10%, Mitsui 7.5%, Marubeni 7.5%)	3	9.7	1997	Operational
Qatargas II (Train 4)	Qatar Petroleum 70%, ExxonMobil 30%	1	7.8	2009	Operational
Qatargas II (Train 5)	Qatar Petroleum 65%, ExxonMobil 18.3%, Total 16.7%	1	7.8	2009	Operational
Qatargas 3	Qatar Petroleum 68.5%, ConocoPhillips 30%, Mitsui 1.5%	1	7.8	2010/4Q (planned)	Under Construction
Qatargas 4	Qatar Petroleum 70%, Shell 30%	1	7.8	2011 (planned)	Under Construction
RasGas (Train 1, 2)	RasGas (Qatar Petroleum 63%, ExxonMobil 25%, KOGAS 5%, Itochu 4%, LNG Japan 3%)	2	6.6	1999	Operational
RasGas II (Train 3)	Qatar Petroleum 70%, ExxonMobil 30% ※CPC have acquired 5% in T5, but breakdown is unknown	1	4.7	2004	Operational
RasGas II (Train 4)		1	4.7	2005	Operational
RasGas II (Train 5)		1	4.7	2007	Operational
RasGas3 (Train 6)	Qatar Petroleum 70%, ExxonMobil 30%	1	7.8	2009	Operational
RasGas3 (Train 7)	Qatar Petroleum 70%, ExxonMobil 30%	1	7.8	2010/Feb	Operational

Source:
Prepared
by IEEJ

■ Qatari LNG production capacity will reach 77 million tons in 2011, accounting for 30% of global capacity in operation.

Australian LNG Production Capacity

Australia's LNG production capacity



Source: "LNG in an Australia and world energy context" by Alan Copeland, ABARE-BRS at 5th Annual LNG World

- Australian LNG production capacity will double to about 40 million tons per year by 2014/2015.
- New projects under planning will bring the total capacity to more than 120 million tons in the long run.

2. Uncertain Factors in LNG Demand Outlook (in Japan)

Revision of Basic Energy Plan

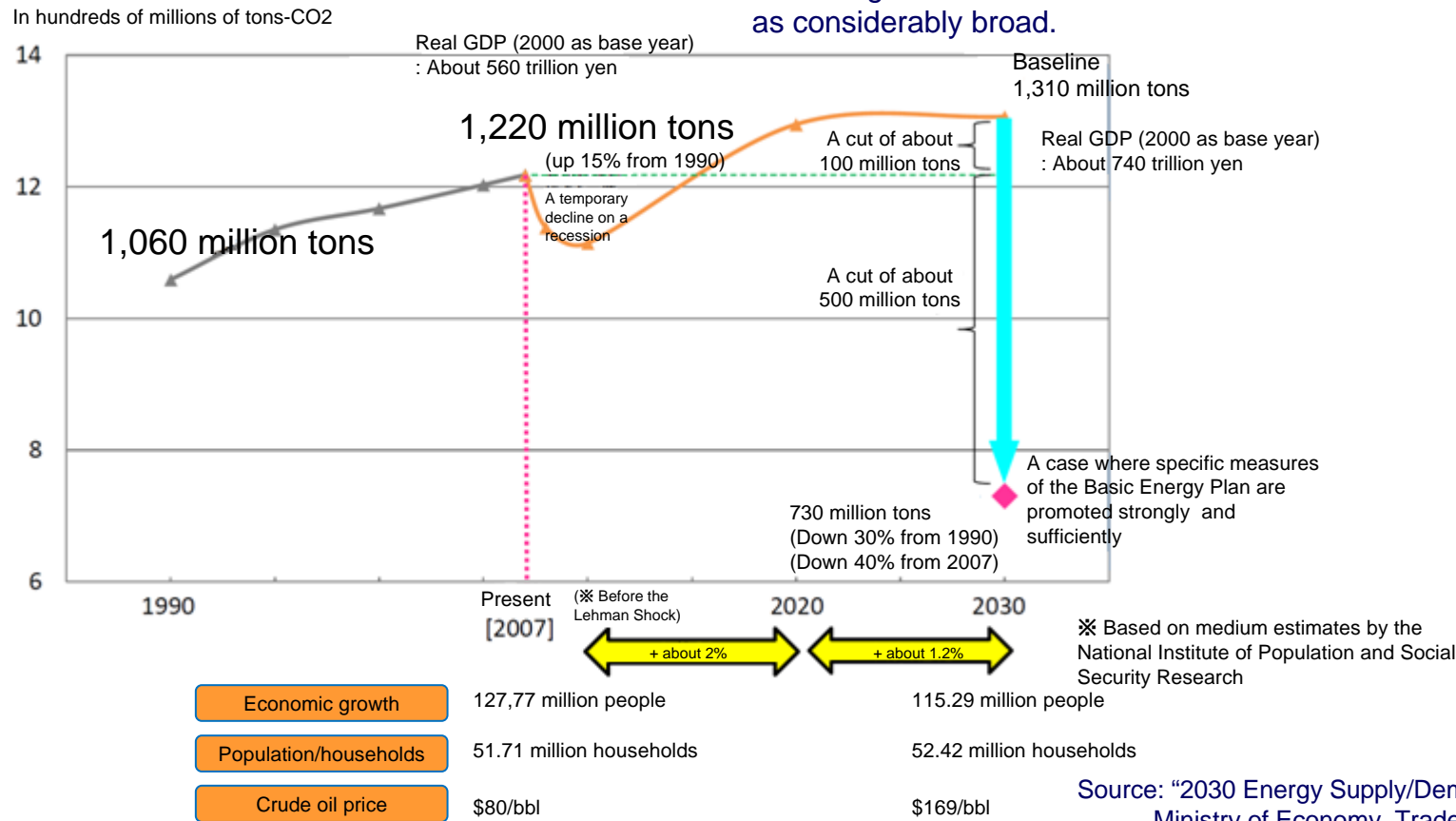


The plan was made in 2003, revised in 2007 and revised again in June 2010

1. Stable resources and energy supply for Japan
2. Solving the global warming problem
3. Energy and environment sectors designed to drive economic growth

<Concept of estimates>

- By promoting policies under the plan strongly and sufficiently, Japan is estimated to reduce greenhouse gas emissions in 2030 by about 30% or more from 1990 (about 40% from 2007).
- The estimates may change depending on the degree of regulations accepted by citizens, fiscal outlays, progress in technological innovation and the like and should be understood as considerably broad.



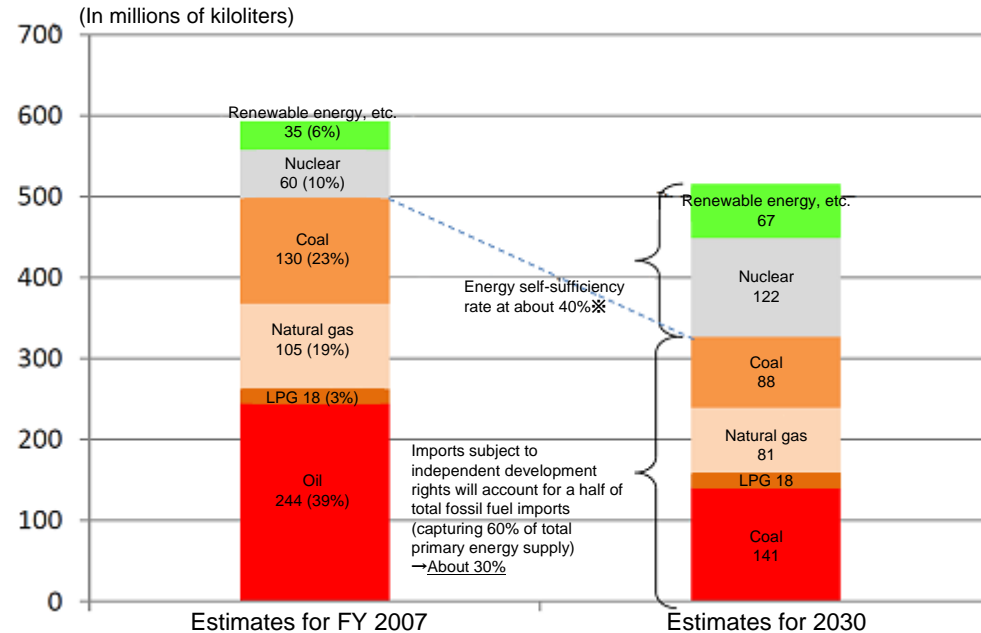
Revision of Basic Energy Plan

Supply side picture (1) (Primary energy supply)

- Energy conversion sector
- Renewable energy Implementing (depending on a feed-in tariff system for all electricity generated with renewable energy.)
 - Nuclear plants 14 new plants, capacity utilization rate at 90%

(Estimation results)

○ The energy self-sufficiency rate (18% at present) will be doubled. Fossil fuel imports subject to independent development rights (26% of total primary energy supply at present) will be doubled. As a result, the rate of independent energy supply will rise to about 70% (38% at present).



Energy self-sufficiency rate at about 40% + Fossil fuel imports subject to independent development rights at about 30% = Independent energy supply rate at about 70%

*The energy self-sufficiency rate covers renewable energy, nuclear energy and domestic fossil fuel output.
 *Renewable energy, etc. do not cover air heat from hot-water supply and air-conditioning systems.

Source: "2030 Energy Supply/Demand Picture," Ministry of Economy, Trade and Industry

■ Natural gas supply will fall to 77% of the FY 2007 level (imports estimated at 50 million tons).

(Reference) Changes in LNG imports by use

	2000	2001	2002	2003	2004	2005	2006	2007	2008
Town Gas	1,599	1,508	1,665	1,763	1,888	2,054	2,151	2,250	2,246
Electricity	3,784	3,818	3,791	3,906	3,717	3,464	3,818	4,211	4,261

Source: Ministry of Economy, Trade and Industry

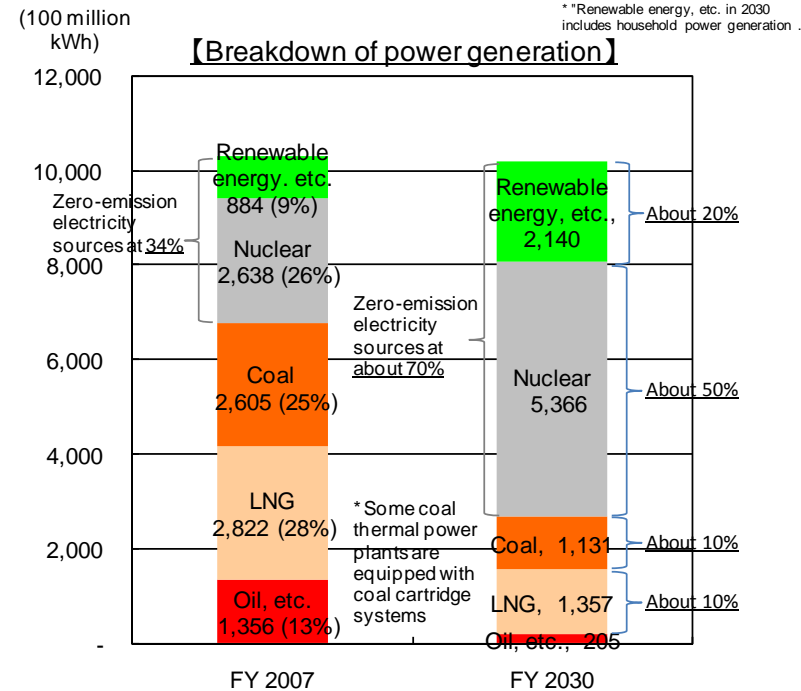
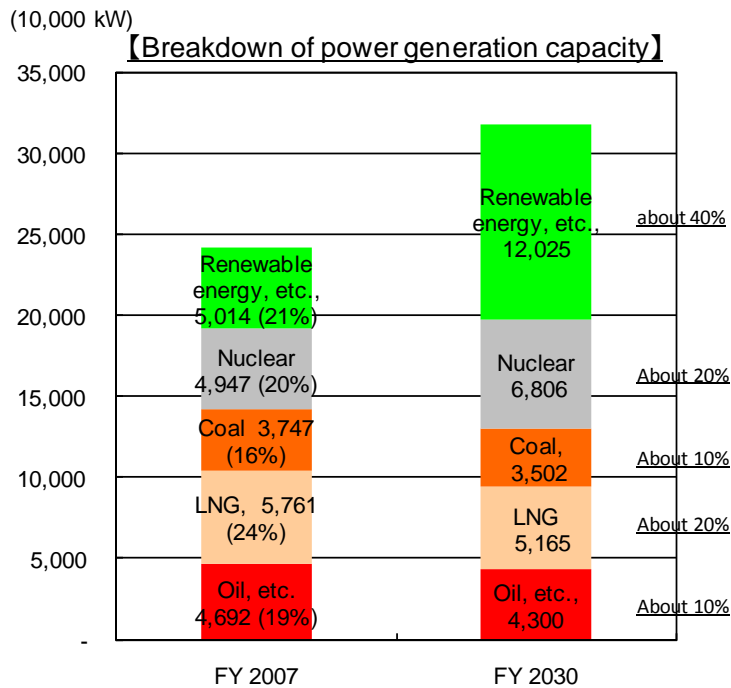
3. What Are the Uncertain Factors?

Revision of Basic Energy Plan

Supply-side picture (2) (Power generation mix and LNG)



- The power generation mix is as follows.
- Zero-emission electricity sources' share will rise to about 70% ※(34% at present)



*Substantial energy conservation efforts, the construction of (at least 14) new nuclear power plants based on understanding and confidence among the people including residents near plant locations and on secured safety, the raising of the nuclear plant capacity utilization rate (to about 90%) and the maximum introduction of renewable energy are preconditions for the estimates. The degree of electricity grid stability should be considered separately.

*In response to the commercialization of CCS, coal thermal power plants are projected to be equipped with these systems upon replacement. We must note that these estimates could change depending on future technology development and secured CO2 storage locations.

*Zero-emission electricity sources at about 70% exclude waste and pumped-storage power generation plants out of renewable energy power plants.

Source: "2030 Energy Supply/Demand Picture,"
Ministry of Economy,
Trade and Industry

■ LNG-fueled power generation will be halved and natural gas thermal power plants' capacity utilization rate will be at 30%. Necessary LNG will total about 20 million tons (2030).

FY 2010 Electricity Supply Plan (1)

1. Electricity supply/demand outlook <long-term demand outlook>

- Average annual growth rates between FY 2008 and 2019 in the 10 general power utilities' total electricity demand (kWh) based on their customers' demand and their maximum electricity demand (kW) are given in the following table. Although **electricity demand growth will remain at 0.8%**, growth in maximum electricity demand will decline by 0.2 percentage point.
- The annual load factor is projected to improve slowly on load-leveling measures, rising from 61.2% in FY 2008 to 64.1% in FY 2019.

2. Nuclear power plant development plan

- Planned to start operations in the coming 10 years are **nine new nuclear power plants with total output of about 12.94 million kW**.

3. Thermal, hydroelectric and new-energy power plant development plans

Plants planned by general and wholesale power utilities to start operations in the coming 10 years

- Thermal power plants' total output is planned at about 14.82 million kW (2.9 million kW for coal thermal plants, **about 11.86 million kW for LNG thermal plants** and about 70,000 kW for oil and other thermal plants).
- Hydroelectric power plants' total output is estimated at about 1.52 million kW (about 250,000 kW for ordinary hydroelectric power plants and about 1.27 million kW for pumped-storage plants).
- New-energy power plants' total output is planned at about 100,000 kW (about 70,000 kW for solar power plants and about 30,000 kW for wind power plants).

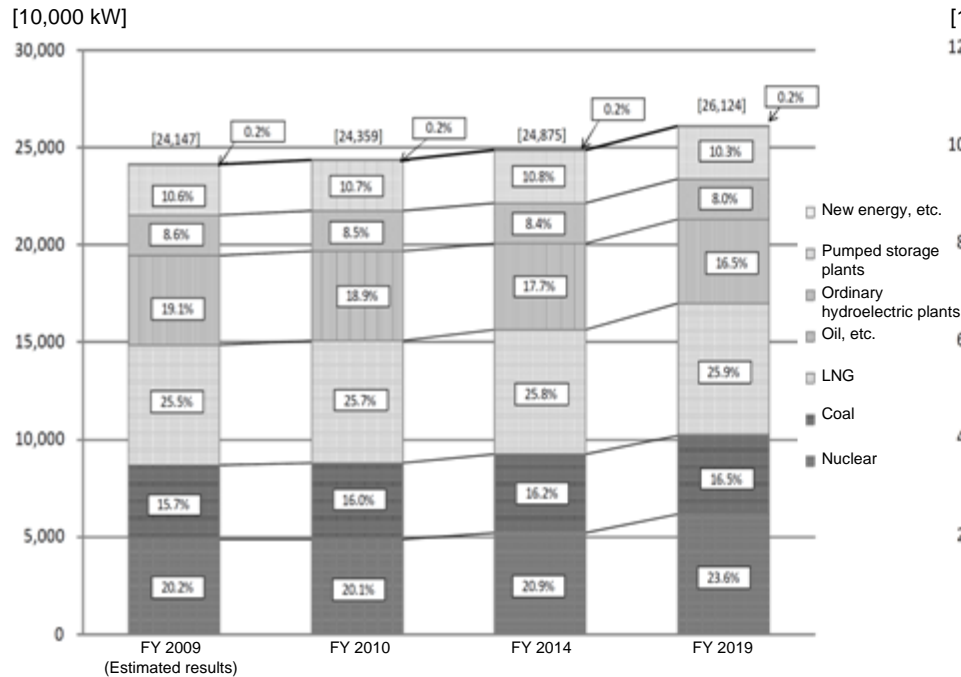
Source: "Outline of FY 2010 Electricity Supply Plan," Ministry of Economy, Trade and Industry

■ Against the demand outlook, the reserve margin is projected at 10.8% for FY 2014 and 11.0% for FY 2019, indicating that stable electricity supply will be secured. (METI)

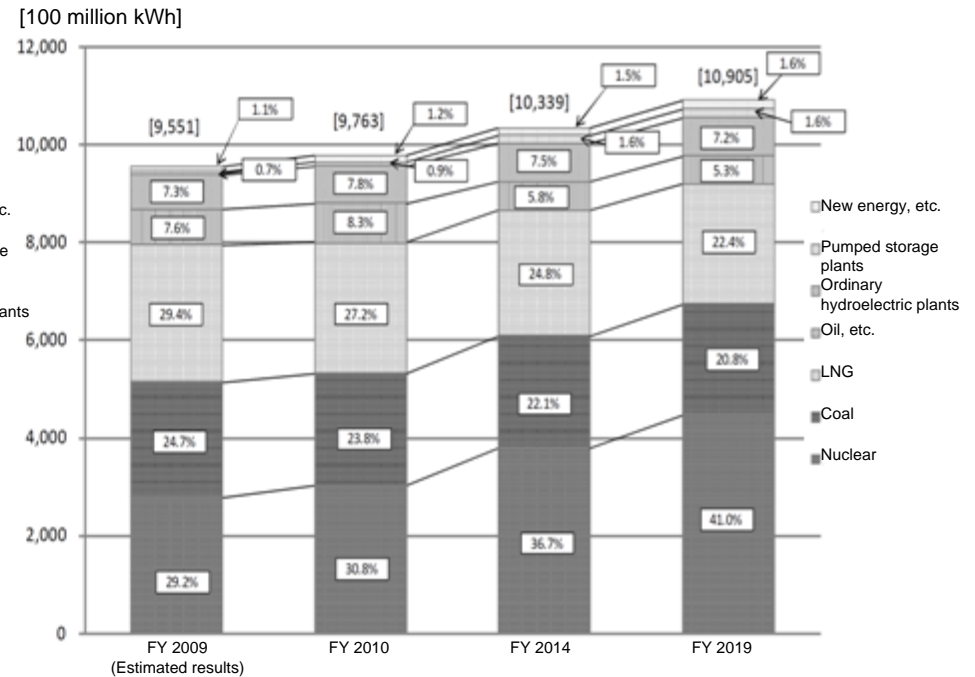
FY 2010 Electricity Supply Plan (2)



Changes in power generation capacity mix (for general power utilities at generation end)



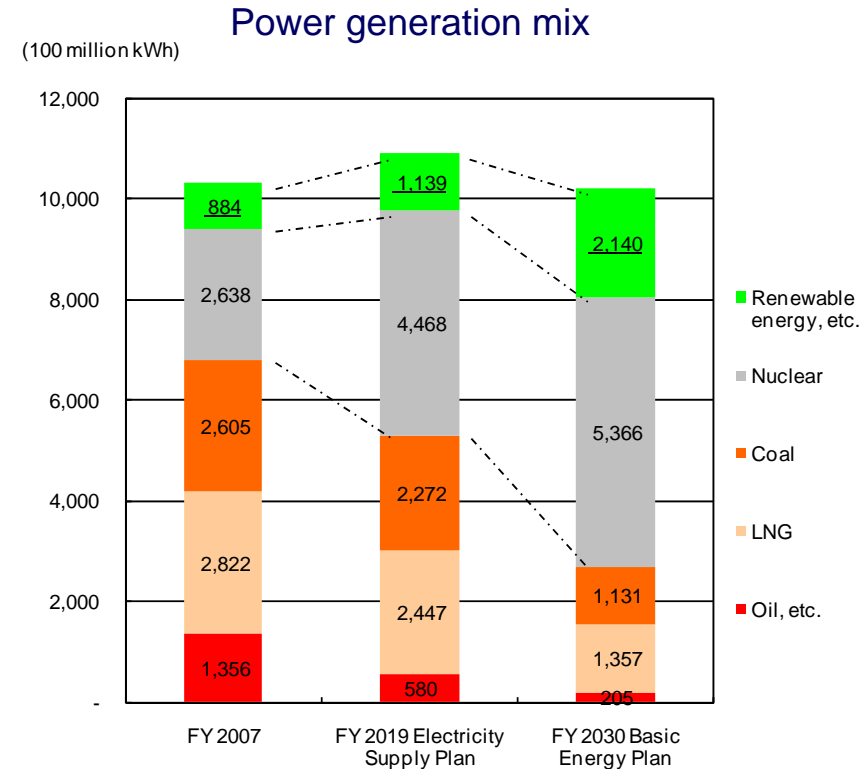
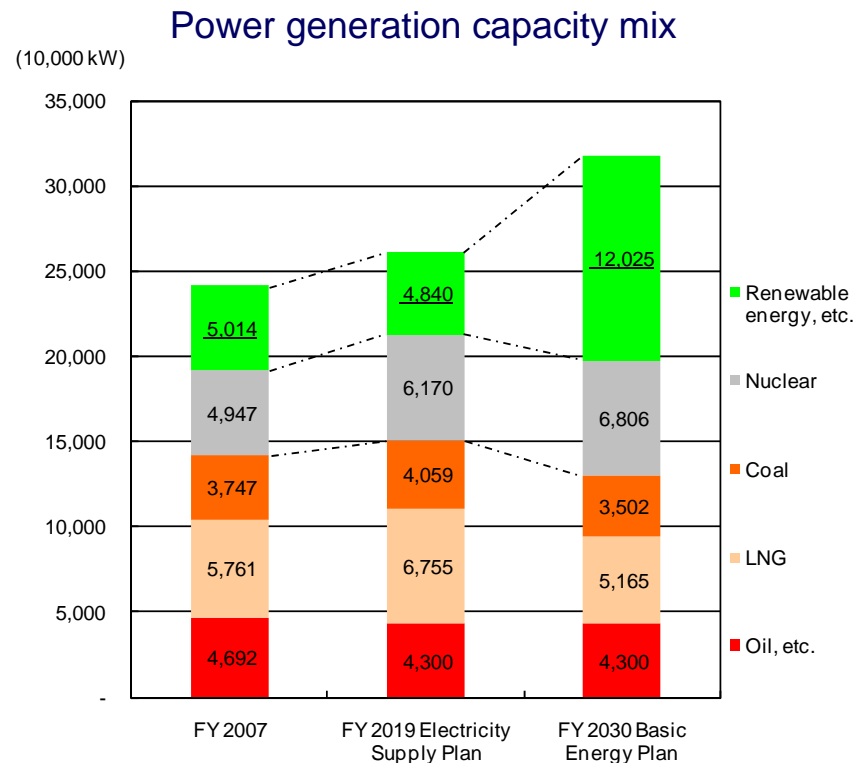
Changes in power generation mix (for general power utilities at generation end)



Source: "Outline of FY 2010 Electricity Supply Plan," Ministry of Economy, Trade and Industry

- LNG thermal plants' capacity in FY 2019 is projected at 67.55 million kW and their power generation at 244.7 billion kWh.
- Nuclear plants' capacity in the same year is projected at 61.7 million kW and their power generation at 446.8 billion kWh.
- Hydroelectric plants' capacity (including pumped-storage plants) in the same year is projected at 47.87 million kW and their power generation at 96.1 billion kWh. New-energy plants' capacity in the same year is projected at 530,000 kW and their power generation at 17.8 billion kWh. Total capacity of hydroelectric and new-energy plants is projected at 48.4 million kW and their total power generation at 113.9 billion kWh.

Comparison between Revised Basic Energy Plan and Electricity Supply Plan



- Nuclear plants' capacity at 61.7 million kW and their power generation at 446.8 billion kWh in FY 2019 are close to projections under the Basic Energy Plan.
- In the same year, capacity is projected at 47.87 million kW and power generation at 96.1 billion kWh for hydroelectric plants including pumped-storage plants. New-energy plants' capacity is projected at 530,000 kW and their power generation at 17.8 billion kWh. Total capacity of hydroelectric and new-energy plants is projected at 48.4 million kW and their total power generation at 113.9 billion kWh. New systems to be created in the future are expected to bring the total capacity to 120.25 million kW and the total generation to 214 billion kWh in FY 2030.
- LNG plants will play a new role, covering falls in supply from new-energy plants vulnerable to natural (weather) condition changes. While demand is expected to increase for LNG power generation, fine-tuned LNG supply will be difficult.

Revision of Basic Energy Plan

2030 Energy Supply/Demand Picture

(8) Promotion of natural gas use – mainly for industrial sector

Desirable picture

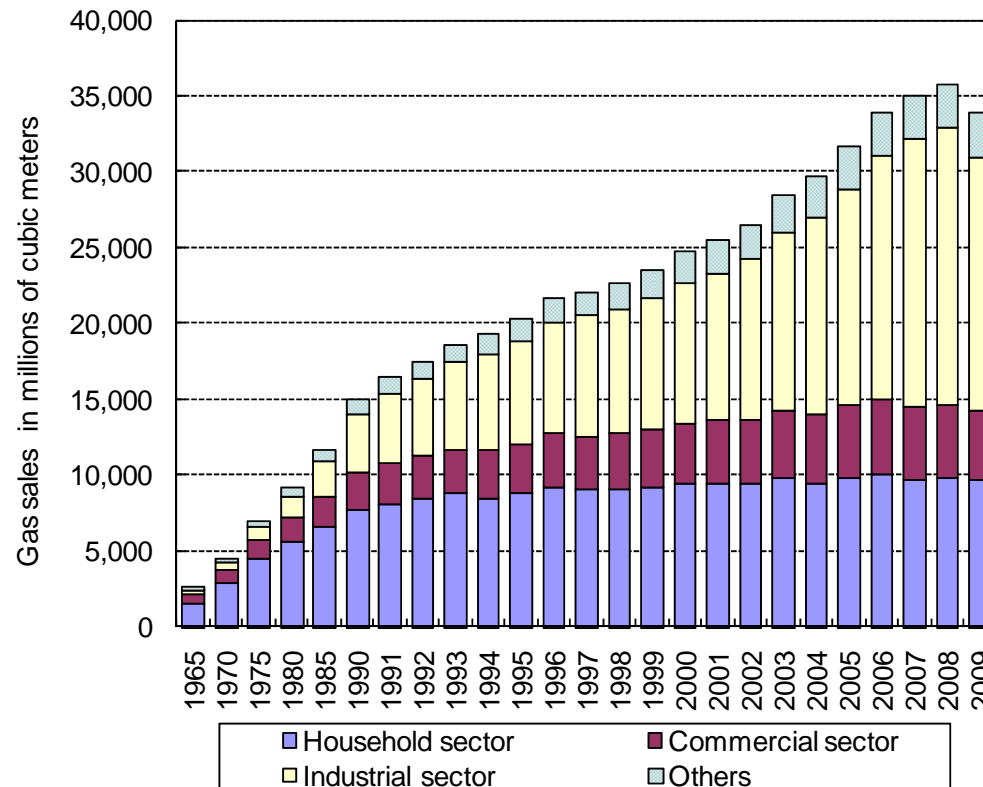
- Promoting switching from oil/coal to natural gas for boilers and industrial furnaces
 - By FY 2020, **Japan will seek to raise gas's share of fuel consumption by at least 50%.**
 - By FY 2030, **Japan will seek to double gas's share of fuel consumption.**
- By promoting the introduction of natural gas cogeneration, Japan will seek to raise gas consumption **by at least 50% from the present level** to 8 million kW by FY 2020 and **double it to 11.1 million kW** by FY 2030.

Basic strategy to achieve projections

- In order to encourage industrial and commercial users to introduce natural gas boilers and industrial furnaces that can save more energy and emit less CO₂, Japan will promote efforts under the energy conservation act and give priority to support measures to this end.
- In order to increase the efficiency of energy supply for heat demand, Japan will seek to introduce more efficient cogeneration systems. Particularly, Japan will promote more efficient, larger-sized industrial cogeneration systems for constant high-load operations and systems for efficient network-based use of heat to produce more energy-saving effects.
- In order to accelerate switching to natural gas as fuel and expand cheap, stable natural gas supply, Japan will seek to **expand and enhance gas infrastructure networks**. Specific measures include the creation of incentives for investment in gas pipe networks contributing to the improvement of security and the fuel switch, relevant administrative organizations' cooperation in developing an investment-promoting environment, the promotion of third parties' use of gas pipes through the improvement of the gas wheeling service system, and the promotion of pipelines' interconnection.

Source: "Basic Guidelines for Reforming Resources and Energy Policies," Ministry of Economy, Trade and Industry

Changes in Town Gas Sales by Sector



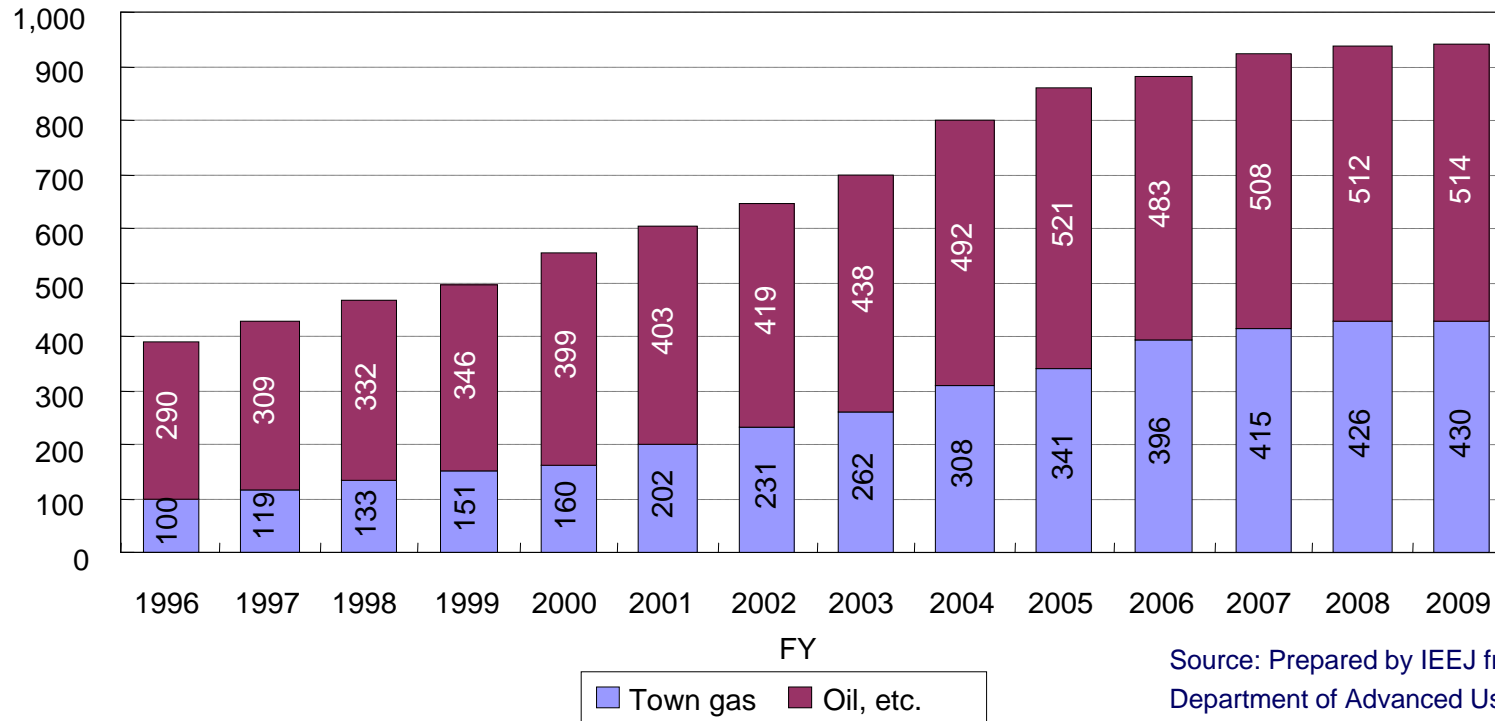
Sources: Prepared by IEEJ from the annual Gas Industry Handbook and other materials from the Japan Gas Association

- Town gas sales scored a high average annual growth rate of 6.3% between 1965 and 2008.
- Industrial gas sales posted particularly high growth (average annual growth between 2000 and 2009: 0.2% for household gas sales, 1.4% for commercial gas sales and 6.7% for industrial gas sales). Around FY 2005, industrial gas sales growth exceeded 10%.
- But industrial gas sales declined 5.0% from the previous year in FY 2008 and 3.1% in FY 2009. In addition to the recession...

Changes in Cogeneration Systems in Operation by Fuel Category



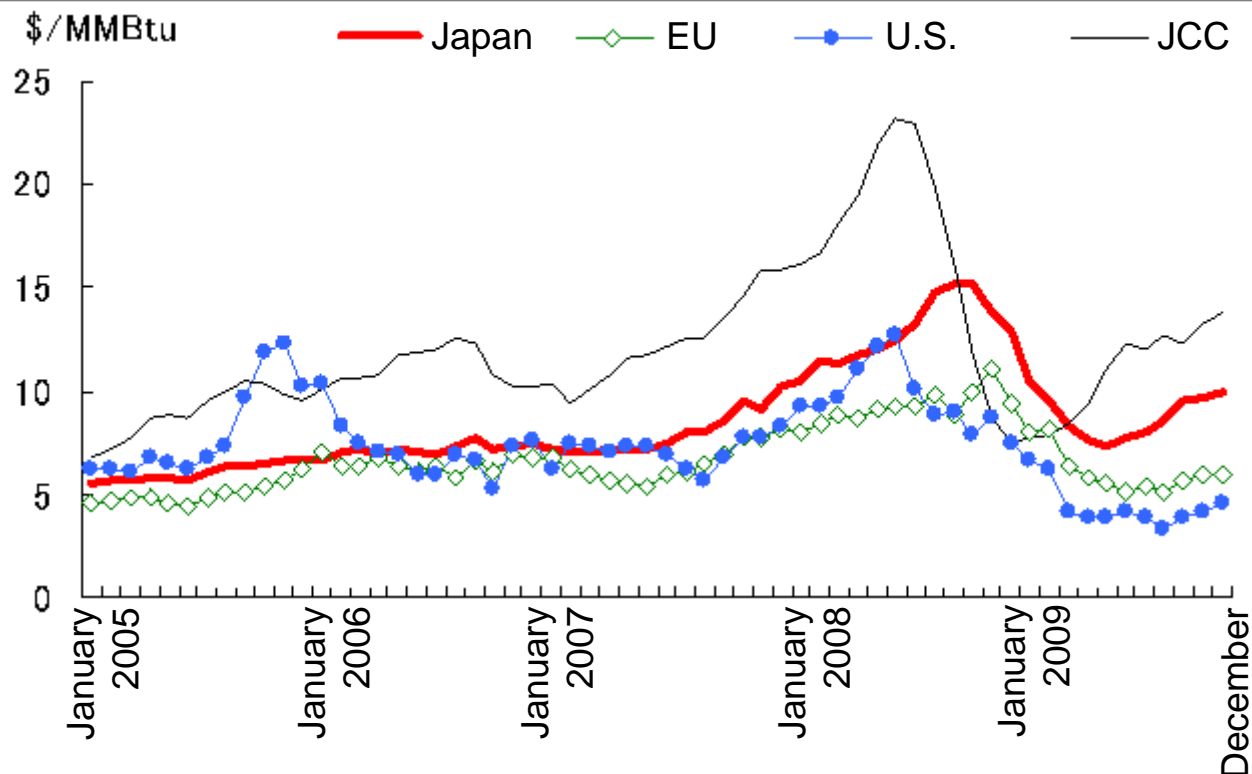
Power generation capacity: 10,000 kW



Source: Prepared by IEEJ from materials from the Department of Advanced Use of Energy, Center for Promotion of Natural Gas

- Between FY 2000 and 2009, cogeneration systems in operation grew at a high annual rate of 5.2%.
- Particularly, cogeneration systems using town gas posted high growth (11.6% per year).
- But growth has slackened over the past several years.
- The aftereffects of energy price spikes in FY 2008 and economic deterioration... (Japan Gas Association)

Changes in LNG Prices (CIF Prices)



Source: IEA Energy Prices & Taxes

- Until the middle of 2008, there was a wide deviation between the JCC (Japan crude cocktail) and LNG prices. This worked to promote town gas sales to the industrial sector and the diffusion of cogeneration.
- Later, the JCC price slipped below the LNG price and their deviation narrowed. The LNG price has begun an upward trend. Behind the price hike, LNG prices were forced to become equal to crude oil prices for projects subject to price negotiations amid a tight supply/demand balance.
- LNG's relative price competitiveness must be enhanced for expanding natural gas demand in the industrial sector and spreading cogeneration.
- This means that the LNG price trend (linked gently to oil prices) will have a major impact on the realization of the Basic Energy Plan.

Can LNG prices become competitive against oil prices?

Downward pressures on LNG prices in 3 largest markets

→Yes for a short to medium term



20

- Recently, we have frequently seen media reports that negotiations have been conducted to reduce LNG prices' linkage to the JCC price. For instance:

Factor 1 Export prices

achieve.

❖ Asia-Pacific LNG prices oil-linked:

- Straight 0.15 conversion when bullish
- Falling to 0.12 or lower when bearish

❖ Atlantic LNG pricing basis more variable, Henry Hub reference in US



Source: "The impact of LNG projects on domestic gas market" by Dr. Richard Lewis, SKM-MMA at 5th Annual LNG World

- In the Asia-Pacific market, Australian LNG suppliers have been negotiating with buyers in a bid to set LNG prices that are stable and competitive.
- Qatar's cooperation is important for LNG to sustain price competitiveness over a medium to long term.
- If Qatar aspires to expand sales channels and sales in the region, the country may have to change its pricing strategy.
- This may lead to a win-win relationship between Japan and Qatar.

Thank you for your attention.

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<Below is a reference>

Reference (FY 2010 Electricity Supply Plan)

Changes in power generation capacity mix (for general power utilities at generation end)

[Unit: 10,000 kW]

	FY 2009 (Estimated results)		FY 2010		FY 2014		FY 2019	
Hydroelectric	4,638	19.2%	4,670	19.2%	4,781	19.2%	4,787	18.3%
Ordinary	2,073	8.6%	2,076	8.5%	2,090	8.4%	2,096	8.0%
Pumped-storage	2,564	10.6%	2,594	10.7%	2,691	10.8%	2,691	10.3%
Thermal	14,572	60.3%	14,741	60.5%	14,854	59.7%	15,115	57.9%
Coal	3,795	15.7%	3,887	16.0%	4,037	16.2%	4,059	15.5%
LNG	6,161	25.5%	6,253	25.7%	6,414	25.8%	6,755	25.9%
Oil, etc.	4,617	19.1%	4,601	18.9%	4,404	17.7%	4,300	16.5%
Nuclear	4,885	20.2%	4,896	20.1%	5,187	20.9%	6,170	23.6%
New energy, etc.	53	0.2%	53	0.2%	53	0.2%	53	0.2%
Total	24,147		24,359		24,875		26,124	

Changes in power generation mix (for general power utilities at generation end)

[Unit: 10,000 kW]

	FY 2009 (Estimated results)		FY 2010		FY 2014		FY 2019	
Hydroelectric	769	8.1	848	8.7	946	9.1	961	8.8
Ordinary	699	7.3	765	7.8	777	7.5	781	7.2
Pumped-storage	70	0.7	83	0.9	168	1.6	179	1.6
Thermal	5,892	61.7	5,791	59.3	5,447	52.7	5,299	48.6
Coal	2,356	24.7	2,323	23.8	2,290	22.1	2,272	20.8
LNG	2,808	29.4	2,657	27.2	2,560	24.8	2,447	22.4
Oil, etc.	727	7.6	811	8.3	597	5.8	580	5.3
Nuclear	2,785	29.2	3,004	30.8	3,794	36.7	4,468	41.0
New energy, etc.	106	1.1	119	1.2	152	1.5	178	1.6
Subtotal	9,551		9,763		10,339		10,905	
Others	-23		-37		0		0	
Total	9,528		9,726		10,339		10,905	

- (Notes)1. Oil, etc. include LPG, other gases and bituminous mixtures as well as oil.
 2. New energy, etc. cover wind power, photovoltaic, biomass, waste and geothermal power generation.
 3. Others cover electricity of unknown origin, including transactions on the Japan Electric Power Exchange.
 4. Because of rounding, components may not add up to the total.

Source: "Outline of FY 2010 Electricity Supply Plan," Ministry of Economy, Trade and Industry