

2013

OIL & GAS SECURITY

Emergency Response of IEA Countries

JAPAN

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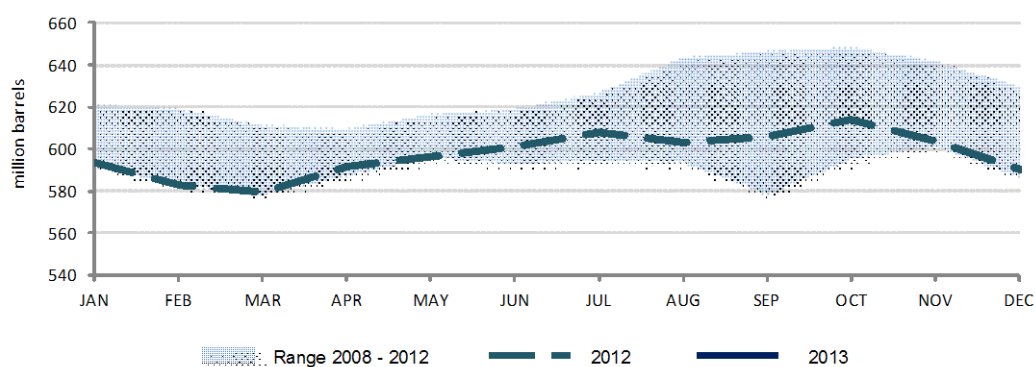
International
Energy Agency

Japan

Key Oil Data

	1985	1990	1995	2000	2005	2010	2011	2012
Production (kb/d)	13.7	13.3	18.7	17.5	18.5	18.1	17.4	16.5
Demand (kb/d)	4 436.0	5 315.3	5 692.9	5 515.4	5 327.9	4 464.7	4 480.5	4 728.5
<i>Motor gasoline</i>	569.5	738.5	879.0	998.9	1 045.6	1 003.4	977.9	979.7
<i>Gas/diesel oil</i>	798.9	1 112.3	1 271.1	1 241.3	1 149.8	844.6	820.0	824.5
<i>Residual fuel oil</i>	950.9	898.3	795.6	653.2	581.5	395.3	440.5	563.8
<i>Others</i>	2 116.6	2 566.2	2 747.1	2 622.0	2 551.1	2 221.5	2 242.0	2 360.6
Net imports (kb/d)	4 422.3	5 302.0	5 674.2	5 497.9	5 309.4	4 446.6	4 463.1	4 712.0
Import dependency	99.7%	99.7%	99.7%	99.7%	99.7%	99.6%	99.6%	99.7%
Refining capacity (kb/d)	4 966	4 198	4 847	4 998	4 707	4 896	4 896	4 896
Oil in TPES	55.3%	57.0%	53.4%	49.2%	46.7%	40.9%	45.0%	-

End-Month Total Oil Stock Levels¹ - Five Year Range

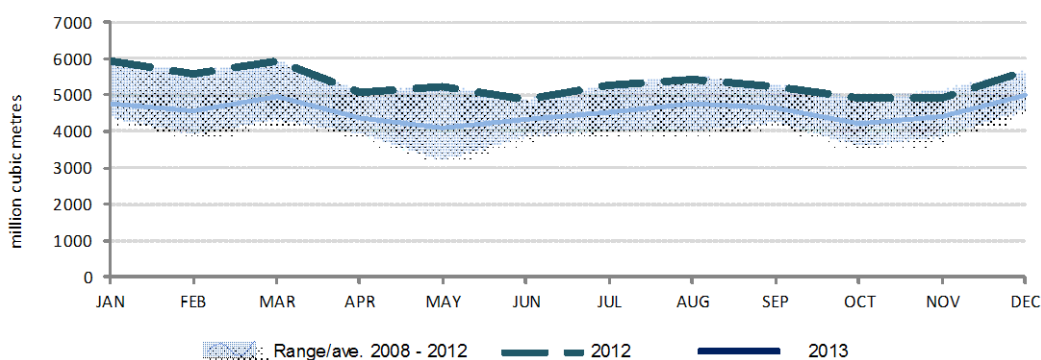


Key Natural Gas Data

	1985	1990	1995	2000	2005	2010	2011	2012 *
Production (mcm/y)	2 225	2 119	2 247	2 499	3 140	3 343	3 334	3 273
Demand (mcm/y)	41 558	58 107	69 519	83 499	88 067	109 344	126 358	124 239
<i>Transformation</i>	30 664	39 526	45 759	55 840	52 768	64 244	80 304	-
<i>Industry</i>	3 267	4 728	6 437	6 266	8 153	9 666	10 372	-
<i>Residential</i>	4 910	8 696	10 133	10 640	11 081	10 849	10 841	-
<i>Others</i>	2 717	5 157	7 190	10 753	16 065	24 585	24 841	-
Net imports (mcm/y)	39 333	55 988	67 272	81 000	84 927	106 001	123 024	120 966
Import dependency	94.6%	96.4%	96.8%	97.0%	96.4%	96.9%	97.4%	97.4%
Natural Gas in TPES	9.6%	10.1%	10.7%	12.7%	13.6%	17.3%	21.8%	-

* based on monthly data submissions to the IEA

End-Month Natural Gas Stock Levels² - Five Year Range



1 -Primary oil stocks on national territory; these exclude utility stocks and including pipeline and entrepot stocks where known.
2 -Stocks held on national territory, as reported to the IEA in monthly data submissions.

OVERVIEW

Oil remains the most significant energy source in Japan, accounting for some 45% of the country's total primary energy supply (TPES) in 2011. Japan's oil demand steadily decreased from 5.71 mb/d in 1997 to 4.47 mb/d in 2010. However, its oil demand increased to 4.48 mb/d in 2011 and 4.73 mb/d in 2012 due to the Great East Japan Earthquake in March 2011 and its subsequent impacts. The transport sector represented around 38% of total consumption in 2010, while the industry sector accounted for 30%. A significant proportion of the industry sector's oil demand comes from the chemical industry.

Of the 4.8 mb/d of oil imported by Japan in 2012, 3.5 mb/d consisted of crude oil, 209 kb/d of NGLs and feedstocks, and some 1.2 mb/d of refined products. About 83% of Japan's crude oil imports in 2012 came from the Middle East. The country has 27 operational refineries with a total crude distillation capacity of around 4.5 mb/d.

Japan meets its 90-day stockholding obligation to the IEA by holding government emergency stocks and by placing a minimum stockholding obligation on industry. JOGMEC's primary role is to manage public stocks under the Oil Stockpiling Act, while industry (refineries, specified distributors and importers) is obliged to hold the equivalent of 70 days of their daily imports, sales or refinery production, based on the average of the previous 12 months. The public stocks mostly consist of crude oil, but the Administration has expanded its emergency inventory to include four categories of refined products - gasoline, kerosene, fuel oil and diesel oil.

Japan held some 591 million barrels (mb) of oil stocks at the end of January 2013, equating to 166 days of 2011 net-imports (92 days of government stocks and 74 days of industry stocks). Around 72% of total stocks were held in the form of crude oil. Japan has consistently met its minimum IEA stockholding obligation.

The share of natural gas in the country's TPES increased significantly from 17% in 2010 (before the March 2011 earthquake) to 22% in 2011, due to growing demand from the electricity generation sector. Japan's demand for natural gas steadily increased from some 26 billion cubic meters (71 mcm/d) in 1980 to around 109 bcm (298.6 mcm/d) in 2010, to 124 bcm (340 mcm/d) in 2012. Japan's domestic natural gas production is limited – with production of around 3.3 bcm in 2012.

Natural gas supply sources to the country are well diversified. In 2011, Malaysia was the largest supplier, representing 18% of total imports. As Japan has no cross border pipelines, the country imported natural gas through 31 LNG terminals with around 10 bcm of natural gas storage capacity.

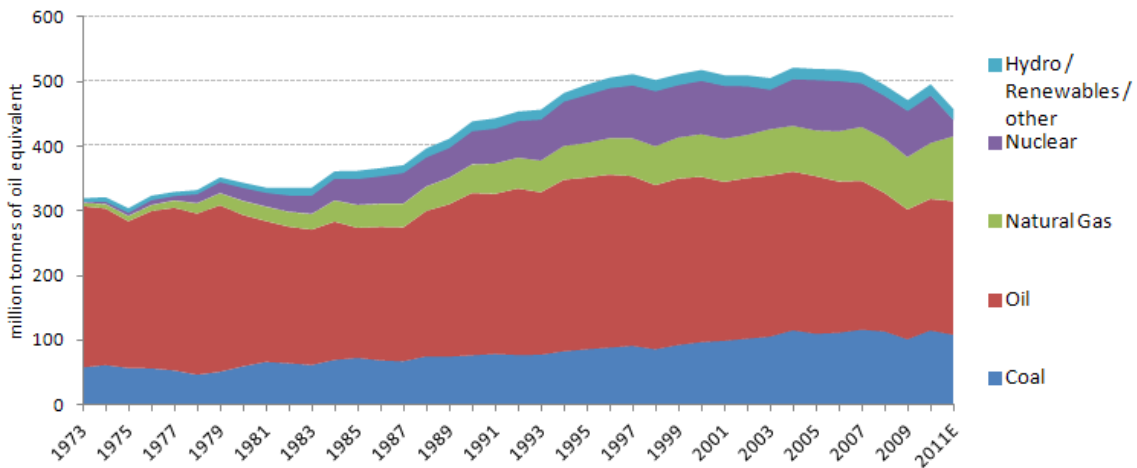
Key elements of Japan's overall gas security policy are diversifying its long-term supply contract portfolio, ensuring flexibility of increasing imports in times of an emergency in long term contracts, and using voluntary commercial LNG stocks in industry. Even though industry is not obliged to hold any emergency gas stocks, industry has commercial stocks equivalent to about 20 to 30 days of consumption.

There is no single transmission operator in the country as the trunk line networks have developed separately around LNG terminals and they are not necessarily connected to each other. Each gas company is asked to ensure its natural gas supply to its distribution area.

1. Energy Outlook

The country's TPES sharply decreased from 497 Mtoe in 2010 to some 458 Mtoe in 2011 due to the Great East Japan Earthquake in March 2011 and its subsequent impacts.

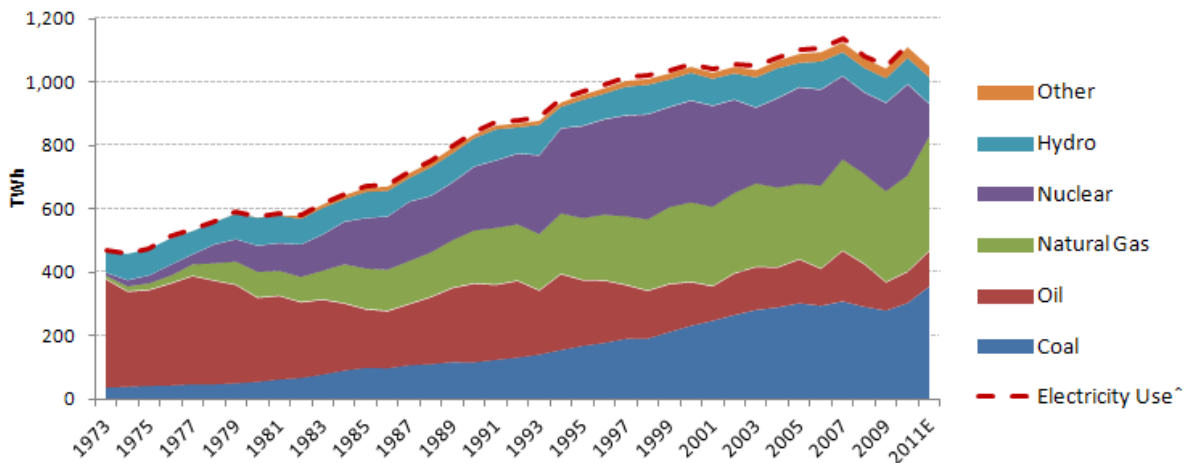
Total Primary Energy Supply



Source: Energy Balances of OECD Countries, IEA

Oil has been one of the main energy sources in Japan, accounting for some 45% of the country's total primary energy supply (TPES) in 2011. The share of natural gas in the country's TPES significantly increased to 22% in 2011, compared to 17% of pre-earthquake TPES in 2010. Coal is also a large energy source in Japan, whose share in the country's TPES accounted for 23% in the same year. The share of nuclear energy stood at 15% in 2010, but after the earthquake and the subsequent accident at the Fukushima Daiichi nuclear power station, only two units of Oi Nuclear Power Plants were put back into operation in 2012. The Administration has been working to set up the new standards for nuclear safety. Reopening of the other existing nuclear power plants is considered to be subject to those safety standards.

Electricity Generation, by Fuel Source

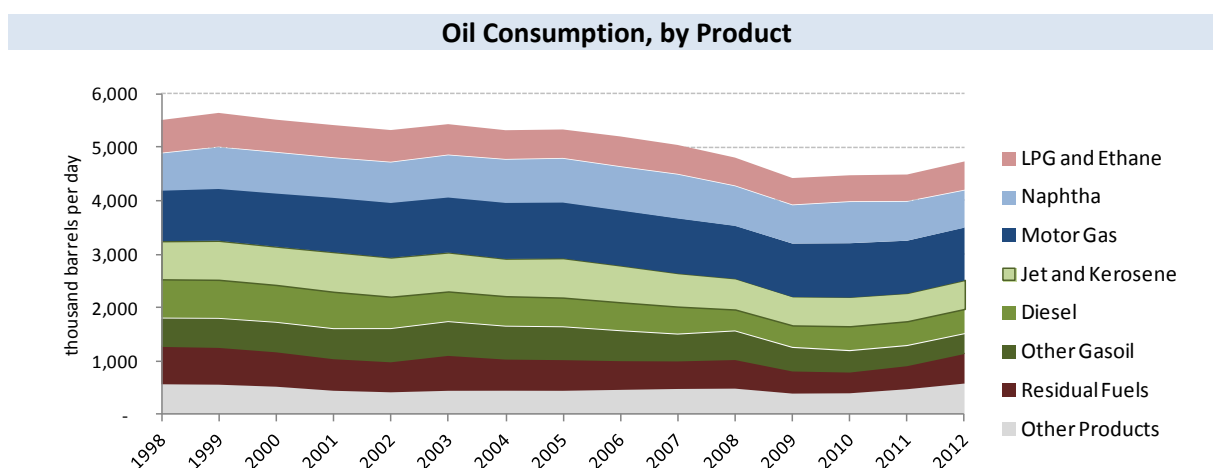


Source: Energy Balances of OECD Countries, IEA

2. Oil

2.1 Market Features and Key Issues

Japan produced only 16 kb/d of crude oil in 2012, which was equivalent to 0.3% of total consumption. Almost all Japanese oil consumption is covered by imports. The country's oil demand steadily decreased from 5.71 mb/d in 1997 to 4.47 mb/d in 2010. However, its oil demand increased to 4.48 mb/d in 2011 and 4.73 mb/d in 2012 due to the Great East Japan Earthquake in March 2011 and its subsequent impacts.



Source: Monthly Oil Statistics, IEA

In 2010, around 38% of Japanese total oil demand was consumed in the transport sector, while the industry sector and transformation/energy sector accounted for 30% and 16% respectively. High oil demand in the industry sector mostly derives from the chemical sector including petrochemicals, accounting for over 65% of total industry consumption. In terms of oil demand by product, demand for all oil products decreased from 2003 to 2012. Demand for gasoline decreased by 5% during the last decade, while demand for diesel dropped by about 18%. Demand for heating/other gasoil also significantly decreased by 41% from 632 kb/d in 2003 to 370 kb/d in 2012. Although demand for naphtha also dropped by 12% during the same period, it remained at a high 702 kb/d in 2011, which was supported by strong demand for the product in the chemical sector.

Oil Demand (kb/d)				
kb/d	2003	2012	% change	% change p.a.
LPG and Ethane	574	534	-7.0%	-0.8%
Naphtha	796	702	-11.9%	-1.4%
Gasoline	1,033	979	-5.2%	-0.6%
Kerosene	733	544	-25.8%	-3.3%
Diesel	556	454	-18.2%	-2.2%
Heating/other Gasoil	632	370	-41.4%	-5.8%
Residual Fuels	662	564	-14.8%	-1.8%
Other Products	449	582	29.6%	2.9%
Total Products	5,434	4,729	-13.0%	-1.5%

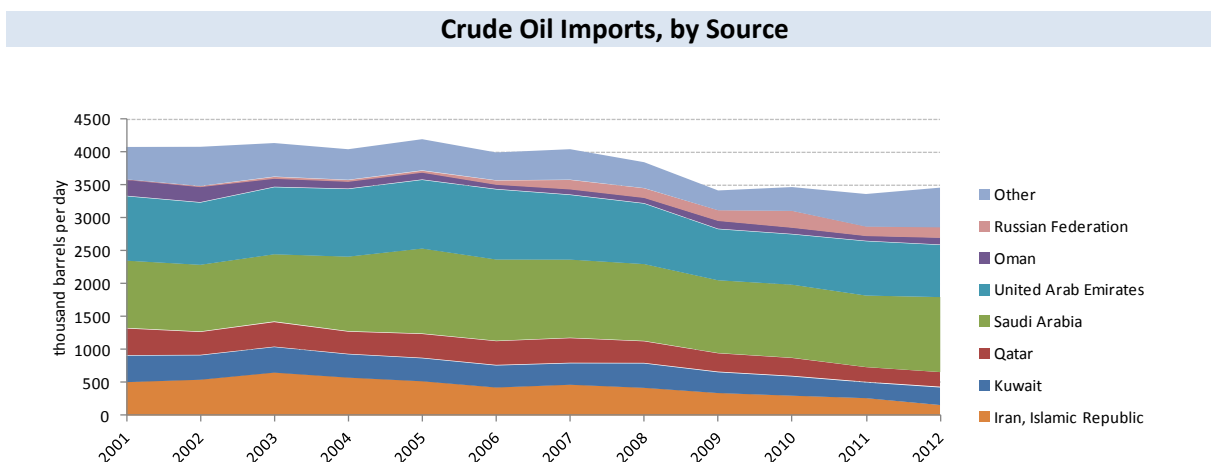
Source: IEA Monthly Oil Statistics

Imports/exports and import dependency

Japan's oil imports in 2012 were some 4.8 mb/d, consisting of about 3.5 mb/d of crude oil, 209 kb/d of NGL and feedstocks, and some 1.2 mb/d of refined products. Concerning crude import sources,

Saudi Arabia was the biggest supply source of crude oil with about 33% of the 2012 total, followed by United Arab Emirates (23%), Kuwait (8%), Qatar (6%), Russia (5%) and Iran (5%).

In 2012, almost half of refined product imports came from OPEC countries, followed by OECD countries (27%) and non-OPEC Asia (18%). By country, Korea was the biggest supplier of refined products with about 15% of the 2012 total, followed by Qatar (14%), UAE (13%), Kuwait (10%) and Saudi Arabia (10%).



Source: Monthly Oil Statistics, IEA

Oil Company Operations

Oil exploration and production in foreign countries are conducted by private-sector companies. Japan Oil, Gas and Metals National Corporation, JOGMEC, provides financial supports to those private companies for oil and gas exploration, production and project operation. As over 85% of crude oil is imported from the Middle East, National Oil Companies of oil producing countries are dominant crude oil suppliers.

Refining and distribution of oil products are also fully privatized and open to foreign capital companies. As domestic oil demand has continuously decreased in the country, the retail market has been rationalized accordingly. The number of filling stations has been streamlined from over 60,000 in 1995 to some 38,777 stations in March 2011. Oil companies in the country have also been reorganized in the context of high crude oil prices and severe competition in the overall energy market.

The Petroleum Association of Japan, PAJ, represents 14 major oil companies which include refineries and primary distributors in Japan. Those companies collectively represent over 98% of crude distillation capacity in the country.

Taxes and maximum price mechanism

Wholesale and retail prices are mainly influenced by the relevant quotation prices and exchange rates, which are driven by the global market fundamentals and expectations. Government interference is mainly limited to determining the level of the excise tax and VAT. As of 3Q2012, while the share of all tax components in the retail price is some 44% for unleaded gasoline, the share of all tax components is some 31% for automotive diesel (for non-commercial purposes), and the share of

all tax components is about 7% for light fuel oil. Japan’s tax share on gasoline price is relatively low compared to Europe, though higher than all other Asia-Pacific countries in the IEA except Korea. Taxes on diesel are even lower than all IEA countries other than the United States and New Zealand.

2.2 Oil Supply Infrastructure

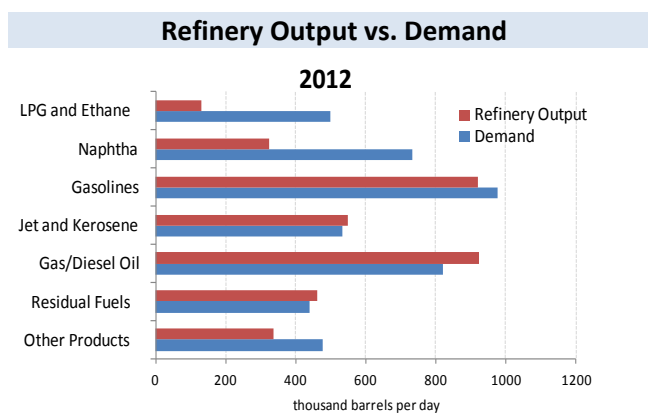
Refining

In 2012, there are 27 refineries with a total crude distillation capacity of around 4.5 mb/d, which decreased by some 850 kb/d from 5.3 mb/d in 2000 alongside with decreasing domestic oil demand. The refineries also process feedstocks which directly go through in secondary units. Those refineries have a vacuum distillation capacity of around 1.7 mb/d, which can process vacuum residue or vacuum gasoline.

By company, four major oil companies own 17 refineries in 2012: Cosmo Oil operates four refineries with a total capacity of 635 kb/d; Idemitsu Kosan operates four refineries (640 kb/d); JX Nippon Oil & Energy operates six refineries (1.2 mb/d); and Tonen General operates three refineries (661 kb/d). Refineries are mostly located close to demand centres of refined products, and eight refineries are located in Kanto Region in order to supply oil products in the region which includes Tokyo.

By March 2014, three refineries, with a capacity of 440 kb/d in total (amounting to almost 10% of the country’s capacity in 2012), are expected to be closed according to the Law for Sophisticated Methods of Energy Supply Structures in 2009.

In 2011, the total crude throughputs were around 198 million kiloliters, averaging some 3.4 mb/d. Total utilization rate of refineries was around 75%, although six refineries had been temporarily shut down by the March 2011 earthquake, which reduced total operational refining capacity to some 70% at the moment. While three refineries came online 10 days after the earthquake, Cosmo Oil’s Chiba Refinery had been severely damaged. The refinery partially restarted its operation in early 2012.



Source: Monthly Oil Statistics, IEA

In the same year, the refined product output totalled 3.65 mb/d. The main product of the refineries is gas/diesel oil (25%), which is followed by gasoline (25%), other middle distillates (15%), residual fuel oil (13%), naphtha (9%) and LPG (4%).

With the exception of jet and kerosene, gas/diesel oil and residual fuels, domestic refinery production is insufficient for meeting demand in the country. In 2012 domestic production of gasoline was able to meet 94% of domestic oil use. Domestic production of naphtha and LPG/ethane, however, met 44% and 26% of each domestic demand respectively.

Ports and Pipelines

As Japan is an island country surrounded by ocean, imports of crude oil and petroleum products are undertaken by oil tankers. 837 crude oil tankers arrived at Japanese ports during the fiscal year 2010 starting from April 2010 to March 2011. The country has 5 main oil ports which are located in Chiba, Yokohama, Yokkaichi, Shibushi and Okinawa. Chiba port unloads crude oil to supply four refineries holding a total distillation capacity of some 760 kb/d. Yokohama port supplies imported crude oil to two refineries in Kawasaki, while Yokkaichi port also delivers crude oil to two refineries in the city. In addition, other two oil ports in Shibushi and Okinawa mainly supplies crude oil to closely located national stockholding bases.

Oil products are delivered from refineries to consumers mostly by coastal tankers, tank trucks, and railroad tankers in the country. There were 574 domestic vessels for oil products transport at the end of March 2011, while 1,644 railroad tankers were also registered at the same time. Some 7,000 tank trucks were deployed for domestic transport at the end of 2010.

There is only one oil pipeline in the country, which transports jet fuels from Chiba refinery to Narita International Airport.

Oil Infrastructure Map



This map is without prejudice to the status of or sovereignty over any territory, to the delimitation of international frontiers and boundaries and to the name of any territory, city or area.

Storage Capacity

Storage capacity in Japan is estimated at over 900 mb (over 150 million cubic meters) at the end of March 2010. Within the supply chain, private companies own 39.3 million kiloliters (247 mb) of crude oil storage capacity - mainly located at refineries. The country also has 11.5 million kiloliters (72 mb) of fuel oil storage capacity in distribution sector, and 46.9 million kiloliters (295 mb) of storage tanks for oil products.

In addition, JOGMEC operates national emergency crude oil reserves at 10 national stockholding bases (40 mcm or about 251 mb) and in 16 industry-leased tanks (15.7 mcm or some 99 mb). National stockholding bases are spread in coastal areas in the country in different forms: 20.5 mcm (129 mb) are held in the form of above-ground tanks at four national stockholding bases; 5 mcm (31 mb) in the form of underground rock cavern at three bases; 10 mcm (63 mb) in floating tanks at two bases in the south of the country; and 4.5 mcm (28 mb) in the form of in-ground tank at Akita base.

2.3 Decision-making Structure for Oil Emergencies

The Petroleum Refining and Reserve Division of Natural Resources and Fuel Department coordinates as secretariat and forms the core of the Japanese National Emergency Strategy Organisation (NESO) during oil supply disruptions, cooperating with other relevant ministries and industry.

The Oil Stockpiling Act allows the Minister of the Economy, Trade and Industry to make a decision to release government stocks and lower industry obligation. According to a decision by the Minister, the Petroleum Refining and Reserve Division coordinates government stock release with JOGMEC which manages the stocks. When lowering industry obligation, the Division cooperates closely with the Petroleum Association of Japan.

The Administration has implemented changes for improvements following the regional shortages of oil products caused by the 2011 earthquake. One of the improvements is to oblige oil companies to jointly prepare Emergency Oil Supply Cooperation Plans in order to ensure cooperation among companies in supplying oil products to end-users in the event of a disaster.

2.4 Stocks

Stockholding Structure

Japan meets its stockholding obligation to the IEA by holding government emergency stocks and by placing a minimum stockholding obligation on industry.

Under the Oil Stockpiling Act, the METI delegates JOGMEC to manage government emergency stocks. The country has accomplished its national stockholding target of holding 50 million kiloliters (equivalent to 315 mb) since February 1998. JOGMEC also manages around 0.64 million kiloliters (some 4 mb) of national liquefied petroleum gas (LPG) stocks, accounting for some 19 days of imports, at four national LPG stockholding bases at the end of August 2012.

According to the Act, refineries, specified distributors and importers are obliged to hold from 70 days to 90 days of their daily import, sale or refined production based on the average of previous 12 months according to an ordinance of the Administration. Since 1993, the target of stock obligation on industry has been set to 70 days. In addition, LPG importers are obliged to maintain 50 days of daily LPG import.

The METI is responsible for ensuring the implementation of the oil stockpiling obligations. It is empowered to set up the quantities of oil to be stockpiled on an annual basis and to supervise the compulsory stocks and their use.

Crude or Products

Japan held some 591 mb of oil stocks (323 mb of government stocks and 268 mb of industry stocks) at the end of January 2013, equating to 166 days of 2011 net-imports (92 days of government stocks and 74 days of industry stocks), to meet the IEA obligation. Around 72% of total stocks were held in the form of crude oil, as crude oil accounted for about 98% of public stocks. However, according to the amendments of the Oil Stockpiling Act, the Administration plans to hold up to four days of public stocks of refined products such as gasoline, kerosene, fuel oil and diesel oil in the national emergency oil inventory.

In terms of industry stocks, crude oil is the main product held in reserve (41%), followed by NGL & feedstocks (23%), middle distillates (13%), and motor gasoline (5%). Industry may substitute crude oil for oil products which it is obliged to hold.

Location and Availability

Japan has a bilateral agreement with New Zealand that allows it to hold stocks on New Zealand's behalf (using petroleum reserve 'ticket' contracts) that count towards that country's 90-day IEA obligation. At the end of September 2012, Japan held a small portion of New Zealand's emergency oil stocks – 413 kb/d (or 55,780mt for the period 1 Jan 2013 to 31 March 2014).

Public crude oil stocks are widely dispersed at 10 national stockholding bases and in 16 domestic private terminals. Around 70% of public stocks are held at national stockholding bases. Compulsory stocks are comingled with commercial and operational stocks. Around 70 companies were obliged to hold compulsory stocks in 2012.

Monitoring and Non-compliance

Japan has consistently met its minimum IEA stockholding obligation, with total stock coverage between 116 and 171 days. It has been well above 140 days since July 2006, and public stock levels have been above 90 days of net-imports since December 2009. Minimum stock levels necessary to cover the 90 days of net imports required by the I.E.P. Agreement range between 250 and 313 mb, depending on the mix of crude and product stocks held.

The METI can conduct on-site inspection on stockholding facilities to monitor physical availability of compulsory stocks. In cases of a failure to comply with stock obligation, companies can be sentenced to up to one year in prison or up to 3 million yen (or around 32,000 US dollars) fines.

Stock Drawdown and Timeframe

The Oil Stockpiling Act requires a decision by the Minister of the Economy, Trade and Industry to draw down public stocks in global supply disruptions or local disruptions due to natural disaster. Upon receiving the stock release order from the Minister, the Ministry would open public tendering process. After completion of the tendering process, JOGMEC would be instructed to supply public stocks to successful bidders. It is estimated to take around 10-15 days to drawdown public stocks after receipt of the instruction from the administration. The amendments of the Act in 2012 also allow the Administration to loan public stocks to the market.

As for the industry obligation, the Minister will make a decision to lower the amount of stockholding obligation. Decisions on how the compulsory stocks should practically be released are made by the stockholder in close cooperation with the Petroleum Association of Japan.

The country has never released public oil stocks since its establishment, while it has lowered industry obligation several times. In response to the March 2011 earthquake, the Administration lowered the industry obligation by three days on 14 March. Several days after, given the gravity of the damage in disrupted areas, the Administration lowered the obligation to 45 days for two months from 21 March to 20 May, which gave greater flexibility of production and of transportation to the industry.

Financing and Stockholding Costs

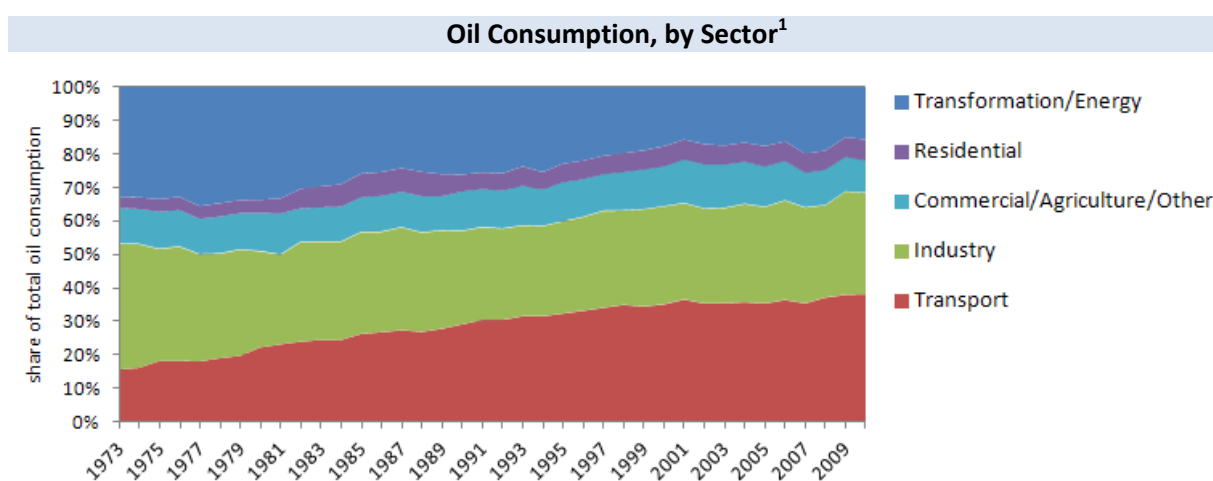
In fiscal year 2012, the Administration budgeted 45 billion yen (or some 485 million US dollars) for the maintenance and administration of public stocks managed by JOGMEC. By simple arithmetic, it is estimated that the annual maintenance cost might be around 18 US dollars per tonne.

The cost of compulsory industry stocks is basically passed onto final consumers in market prices. JOGMEC, however, provides a loan for industry to purchase a part of compulsory oil stocks. And the Administration provides industry under obligation with interest subsidies for purchasing compulsory oil.

3. Other Measures

3.1 Demand Restraint

The transport sector makes up the largest share of oil consumption in Japan. In 2010, the transport sector represented around 38% of total oil use in the country. However, this is much lower than in most IEA countries (the IEA average is around 60% for the transport sector). Following the transport sector, the industry sector represented 30% of total oil demand (compared to an IEA average of 21%). High oil demand in the industry sector mostly derives from the chemical sector including petrochemicals, accounting for over 65% of total industry consumption. The remainder of oil consumed in Japan in 2010 was in the transformation/energy sector (16%) and commercial/agriculture/other sector (10%).



Source: Oil Information, IEA

Demand restraint is considered as a secondary emergency response measure that could complement an oil stock release in Japan. But, as Japan has abundant amounts of emergency oil stocks, demand restraint measures would only be deployed in case of severe oil supply crisis.

Japan's demand restraint measures would range from light-handed measures (e.g. accurate information sharing and energy saving campaigns) to heavy-handed measures (e.g. limitations in oil use in specific industrial sectors, instruction of oil products mediation for end-users and allocation of oil). The latter measures would be taken under the Petroleum Supply and Demand Optimization Act. According to the Act, the Prime Minister can announce necessary demand restraint measures based on a cabinet council decision.

As for monitoring, the Petroleum Supply and Demand Optimization Act requests the Administration to report to the parliament regarding the implementation status of demand restraint measures which the Prime Minister has announced. The METI and relevant ministries will monitor measures through regular reports from the oil industry. The Administration can also conduct on-site inspection if necessary.

¹ Total Consumption (including refinery consumption), does not include international marine bunkers.

3.2 Fuel Switching

Short-term fuel switching from oil to other fuels is not regarded as an emergency response measure in Japan, as the country had only 2.5 kb/d of potential fuel switching capacity in 2010. In addition, the Administration has no legal authority to oblige power generators to switch fuels.

3.3 Others

Japan produced only 16 kb/d of crude oil in 2011, which was equivalent to 0.3% of total consumption. Although it is estimated to increase by 10 to 15%, it is too little to cover domestic oil demand.

4. Natural Gas

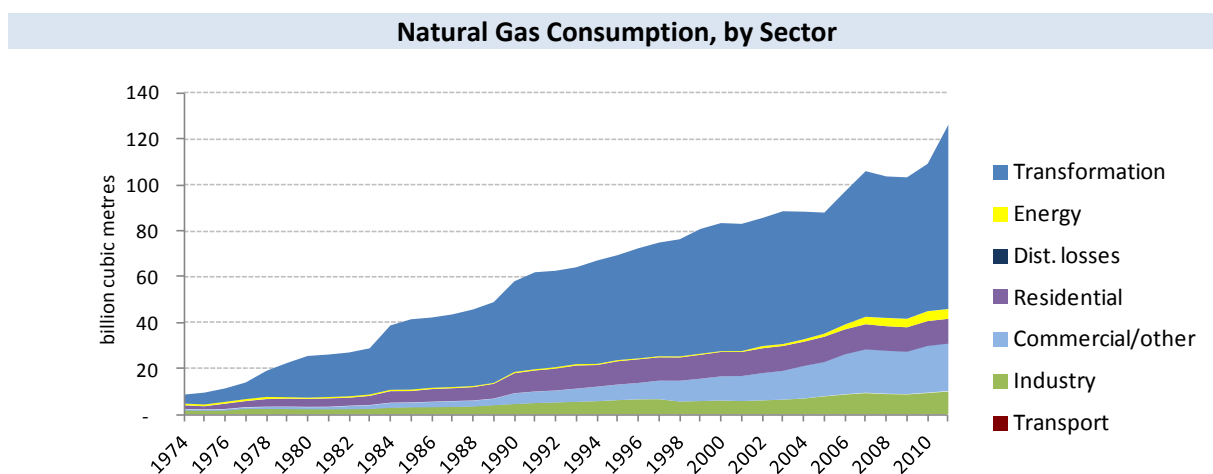
4.1 Market Features and Key Issues

Gas production

In 2011, indigenous natural gas production totalled some 3.3 billion cubic metres (bcm), which accounted for about 3% of total domestic natural gas demand.

Gas demand

Japan's demand for natural gas steadily increased from some 26 bcm (71 mcm/d) in 1980 to around 109 bcm (298.6 mcm/d) in 2010 and to 124 bcm (340 mcm/d) in 2012.



Source: Natural Gas Information, IEA

In 2011, the transformation sector was the largest consumer of natural gas in Japan, representing about 64% of the country's total gas consumption, while the commercial/other sector and the residential sector represented 16% and 9%, respectively. Gas demand in Japan peaks in winter when gas consumption significantly increases for electricity, combined heat and power (CHP) and heat plants. The Japanese monthly peak gas demand stood at some 11.8 bcm per month in January 2012. Daily peak demand was recorded in February 2012, totalling around 401 mcm/d.

In order to compensate for nuclear outages, natural gas use in power generation significantly increased by some 19% from 305 TWh (27% of total electricity generation) in 2010 to 363 TWh (35%) in 2011, while coal also increased by 17% from 304 TWh (27% of total) to 357TWh (34%).

Gas import dependency

Due to limited amount of indigenous natural gas production, Japanese gas demand is mostly supplied by imports in the form of LNG. The country's total natural gas imports in 2011 amounted to some 116.5 bcm (319 mcm/d). Natural gas imports in 2011 significantly increased by 18% from 99 bcm in

2010 due to strong gas demand in power generation. The country imported over 100 bcm of natural gas in 2011 for the first time.

Natural gas supply sources to the country are well diversified. In 2011, Malaysia was the largest supplier, representing 18% of total imports. Qatar (17%), Australia (16%), Indonesia (10%), Russia (9%), Brunei (7%), UAE (7%) and Oman (6%) are other key gas supply sources for Japan. Imports from those countries are made based on long term contracts.

In addition, most of LNG has been imported to the country through long term contracts, but the share of spot imports increased from 3% in 2010 to 7% in 2011 to 14% in March 2012 in order to meet increasing LNG demand in the country after the March 2011 earthquake.

Gas Companies

The majority of natural gas is imported by 7 electricity companies for power generation. The share of the power companies in total LNG imports increased from 62% in 2010 to 65% in 2011 and to 66% from January to July 2012. These electricity utilities import their gas independently from the city gas industry.

City gas companies sold around 35.9 bcm to some 29 million consumers throughout the country in 2011. Around 27.4 million customers (94%) were residential consumers accounting for about 27% of total city gas sales, while over half of city gas was consumed by industry.

The city gas industry is fragmented into many vertically integrated regional companies. At the end of September 2012, there were 209 general gas utilities. Of them, 29 were public utilities. According to data on gas sales volumes for the Japanese fiscal year 2011(from April 2011 to March 2012), the four major gas utilities-Tokyo Gas, Osaka Gas, Toho Gas and Seibu Gas- held a combined market share of 72 %. Tokyo gas had a share of 34%, Osaka Gas 25%, Toho Gas 11% and Seibu Gas 2%.

The Japan Gas Association, JGA, represents all city gas utilities. When the March 2011 earthquake affected 460,000 city gas customers who were supplied by 16 gas utilities in eight prefectures, the JGA organised a mobilisation of a total of 100,000 people from 58 unaffected or less affected city gas utilities. All city gas supply in the damaged area was restored in 54 days.

4.2 Natural gas supply infrastructure

Pipelines

Japan does not have any cross border gas pipelines. Total gas pipeline length accounts for 249,786 km through the country. Around 86% of gas pipeline are low pressure grids for local distribution, while only 4,772 km are for high pressure. Although there are around 43 main interconnection points between areas, the trunk line networks are not necessarily connected each other as they have separately developed around LNG terminals.

When the March 2011 earthquake damaged Shin-Minato LNG terminal which is operated by Gas Bureau of Sendai City to supply natural gas mainly in Miyagi, the interregional natural gas pipeline, connecting Shin-Minato terminal and Niigata LNG terminal, contributed to quickly resuming gas supply from Niigata terminal to the disrupted area in Miyagi.

There is no single operator of the national transmission system in the country, as the trunk line networks not necessarily connected each other. Each industry (mainly electricity utilities and city gas companies) owns and operates its gas pipelines. Third-party access to trunk pipelines and distribution networks was introduced in 2004 and is to be individually negotiated by parties proposing to supply customers, although the lack of interconnections between regions may limit the ability to increase competition through TPA.

Storage and LNG Terminals

While the country has no underground storages of natural gas in its gaseous state, Japan has 31 operational LNG receiving terminals with a total LNG storage capacity of over 16 mcm (equivalent to around 10 bcm of natural gas storage capacity) as of the end of 2012. The country’s total storage capacity meets close to 30 days of domestic natural gas consumption.

The country plans to build new LNG facilities or expand storage capacity of existing terminals, which will give the country further 3.5 mcm of LNG storage capacity in total (equivalent to some 2.2 bcm of natural gas) in near future.

LNG terminals are owned and operated by electricity utilities, city gas companies, other industries such as steel company, and local governments. Electricity companies own close to half of total LNG storage capacity, followed by gas utilities (over 40%). Of operational 31 LNG terminals, 11 terminals are co-sponsored by power companies, gas utilities, industry or local governments.

Total nominal regasification capacity in LNG terminals represented around 252 bcm of natural gas per year (or 690 mcm/d) with 238 vaporizers as of February 2012.

Natural Gas Infrastructure Map



This document and any map included herein are without prejudice to the status of or sovereignty over any territory, to the delimitation of international frontiers and boundaries and to the name of any territory, city or area.

4.3 Emergency Policy for Natural Gas

Key elements of Japan's overall gas security policy are diversifying long-term supply contract portfolio, ensuring flexibility of increasing imports in contracts in an emergency situation, and using voluntary commercial LNG stocks in industry. The largest natural gas supplier, Malaysia, represented less than 20% of total imports of the country in 2011.

The Gas Business Act (1954) sets the standard of market activities for natural gas. According to Article 25, gas utilities are obliged to compile and submit gas supply plans to the Administration every fiscal year. The gas supply plans shall cover gas supply and demand in a certain period, and the plans would be evaluated by the Administration.

There is no legal obligation for industry to hold emergency stocks in the form of natural gas, LNG or alternative fuels in the country.

The country has not established a NESO structure for natural gas supply disruptions. However, the divisions in charge of natural gas emergency response at the Agency for Natural Resources and Energy (ANRE) – including the Gas Market Division – are supposed to take the leading roles in coordinating the necessary action and liaising with industry.

There is no single transmission operator in the country, as the trunk line networks have separately developed around LNG terminals and they are not necessarily connected each other. Each gas company is asked to ensure its natural gas supply to its distribution area.

Emergency response measures

Even though industry is not obliged to hold any emergency gas stocks, electric power companies and city gas companies have commercial stocks equivalent to about 20 to 30 days of consumption in normal time. When the country's peak monthly gas demand was recorded in January 2012 with 11.8 bcm, stock levels in the end of the same month and the following month represented 5.9 bcm and 5.5 bcm respectively. This indicates that the country's commercial stock levels covered between 13-16 days of domestic consumption even in the time of such high demand.

In case that LNG import is disrupted, importing companies (7 electricity companies and less than 10 gas utilities) can also allocate their gas imports through reciprocal backup supply.

Japan does not have any legislation which allows the Administration to oblige electricity utilities to switch fuels from natural gas to other fuels. The country has 23 dual-fired power generation units with a total generating capacity of 9 GW as of 2012. However, it has very limited impact to reduce gas demand in a gas supply shortage, as more than 350 TWh of electricity is generated by natural gas.

During a supply disruption, transmission system operators will reduce gas supplies according to interruptible contracts. Tokyo Gas, which has around 34% of total market sales of city gas, reduces gas supply to its customers consuming over 0.5 mcm per year except priority customers such as hospitals, welfare institutions and government offices. Tokyo gas also has over 200 portable air-mixed propane gas generators to temporarily supply gas for priority consumers.

JAPAN

In order to strengthen resistance to disasters such as earthquakes in particular, Japanese gas industry has replaced aged low pressure gas pipes with polyethylene pipes and high seismic resistant pipes. For prevention of secondary disasters, it also builds up shutting off system which uses block formations and devices for automatic remote shutdown.

INTERNATIONAL ENERGY AGENCY

The International Energy Agency (IEA), an autonomous agency, was established in November 1974. Its primary mandate was – and is – two-fold: to promote energy security amongst its member countries through collective response to physical disruptions in oil supply, and provide authoritative research and analysis on ways to ensure reliable, affordable and clean energy for its 28 member countries and beyond. The IEA carries out a comprehensive programme of energy co-operation among its member countries, each of which is obliged to hold oil stocks equivalent to 90 days of its net imports. The Agency's aims include the following objectives:

- Secure member countries' access to reliable and ample supplies of all forms of energy; in particular, through maintaining effective emergency response capabilities in case of oil supply disruptions.
- Promote sustainable energy policies that spur economic growth and environmental protection in a global context – particularly in terms of reducing greenhouse-gas emissions that contribute to climate change.
 - Improve transparency of international markets through collection and analysis of energy data.
 - Support global collaboration on energy technology to secure future energy supplies and mitigate their environmental impact, including through improved energy efficiency and development and deployment of low-carbon technologies.
 - Find solutions to global energy challenges through engagement and dialogue with non-member countries, industry, international organisations and other stakeholders.

IEA member countries:

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International
Energy Agency

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