

The LP Gas Industry in Japan



SEISUKE IWAI
Chairman,
Japan LP Gas Association

International LP Gas Seminar 2019 March 5, 2019

About Japan LP Gas Association

- **Chairman: Seisuke IWAI**
(Representative Director President, ENEOS GLOBE Corporation)
- **Founded in 1963**
- **Mission: Securing stable supply, safety measures, demand development, environmental protection, public communications, statistics, policy proposals and other LP gas related activities**
- **Members (11 Japanese primary distributors producing/ importing LP gas in Japan)**

Astomos Energy	ENEOS GLOBE
GYXIS	Itochu
Iwatani	JAPAN GAS ENERGY
JAPEX-SKS	Kygnus LP-Gas
National Federation of Agricultural Co-operative Association	
Taiyo Oil	Tokyo Gas

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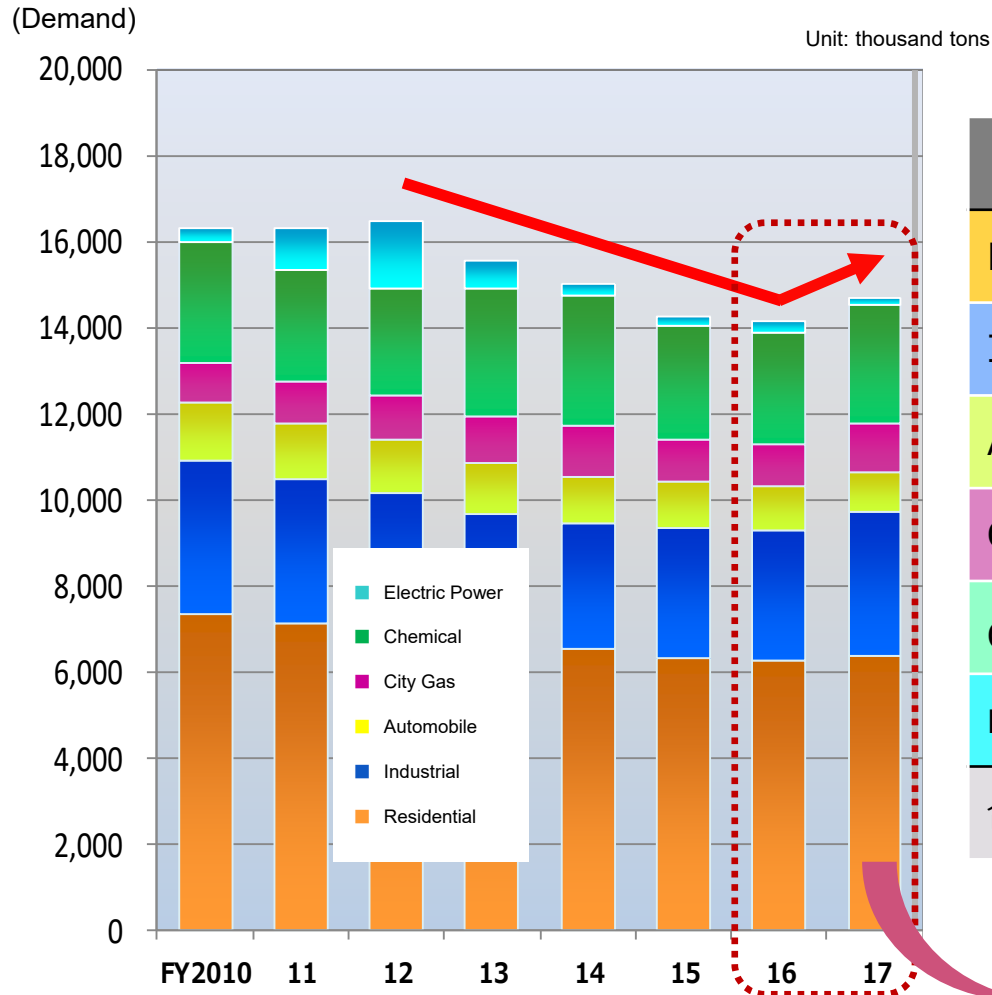
- 1. Latest Trend in Supply and Demand of LP Gas**
- 2. Actions toward 2025 in LP Gas Industry**
- 3. Imminent Challenges for LP Gas Industry**

Chapter 1

Latest Trend in Supply and Demand of LP Gas

LP Gas Demand: Trend in Japan

- LP gas demand has been dwindling after the peak in 1996, but in 2015, it turned upward for the first time in 5 years, mainly driven by severe winter weather.



LP gas demand by sector:
FY2016/FY2017

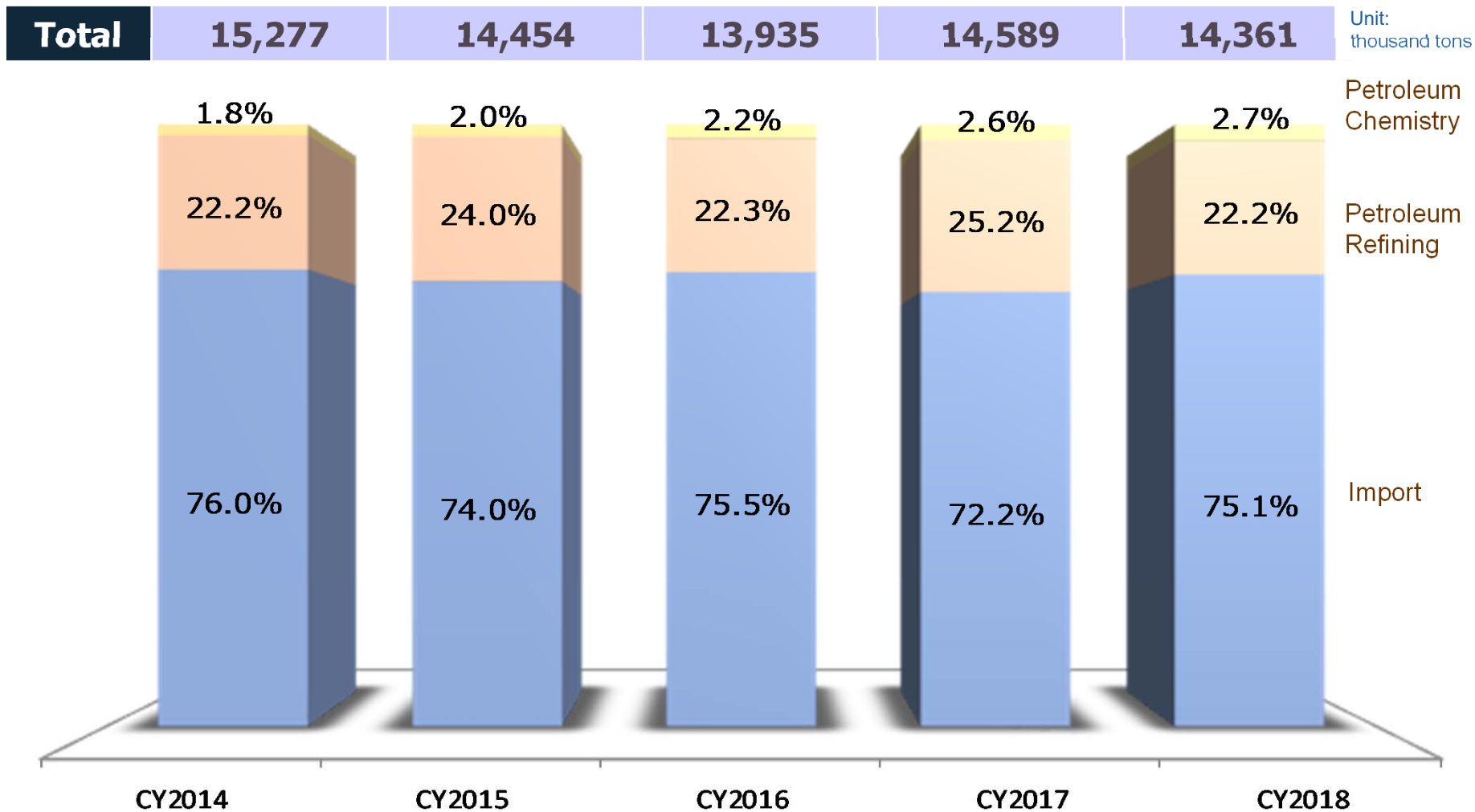
Unit: thousand tons

	FY2016	FY2017	Yr/Yr
Residential	6,275	6,384	102%
Industrial	3,030	3,309	109%
Automobile	985	940	95%
City Gas	995	1,110	116%
Chemical	2,572	2,762	107%
Electric Power	294	182	62%
合計	14,151	14,687	104%

Source: METI, "Committee of Forecast of Global Supply and Demand Trends for Petrochemical Products, Liquefied Petroleum Gas WG"

LP Gas Supply by segment : Trend in Japan

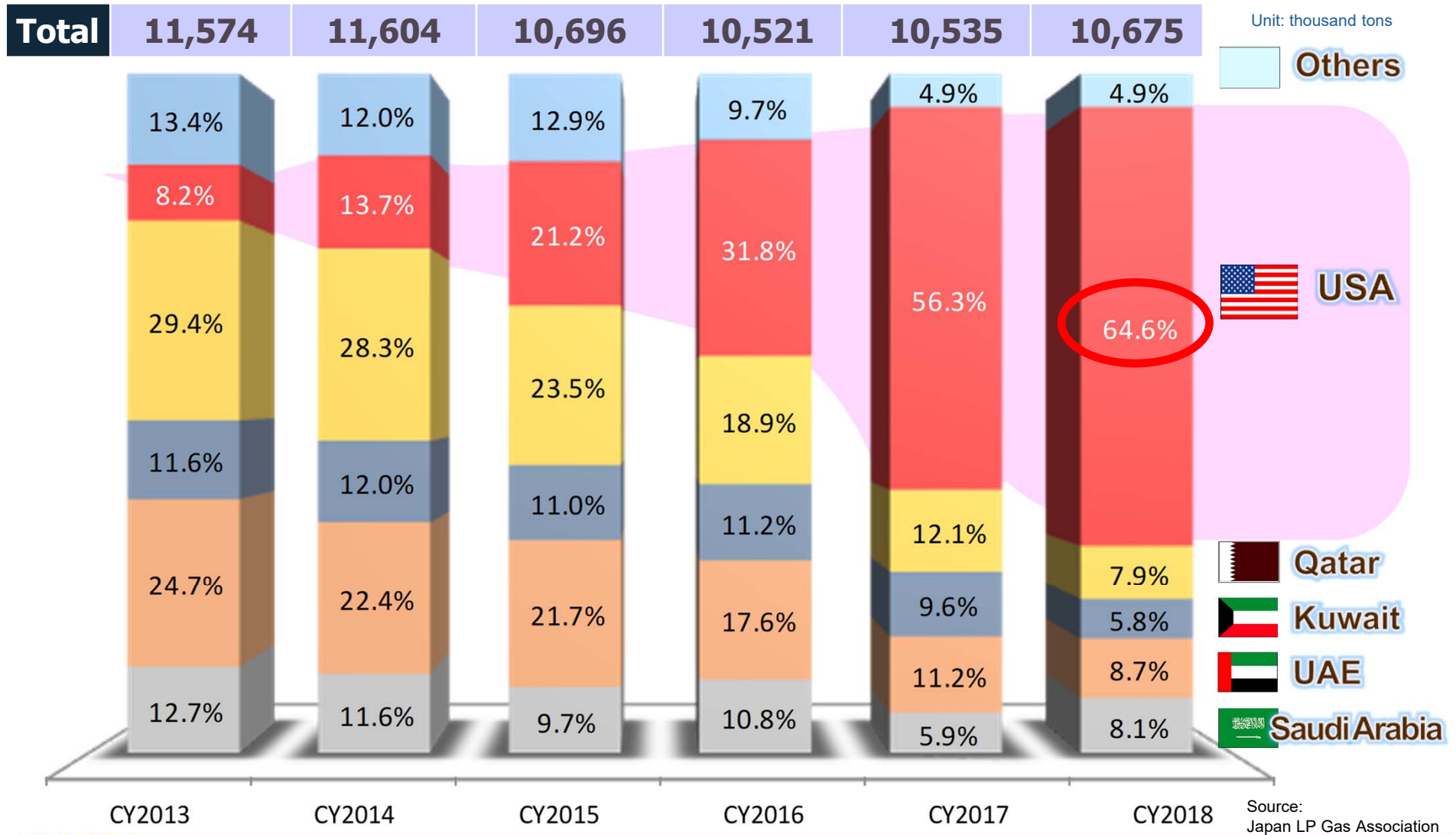
- LP gas supply has recovered to above 14 million tons after hitting the bottom in CY2016, backed by the latest demand rebound.



Source: Japan LP Gas Association

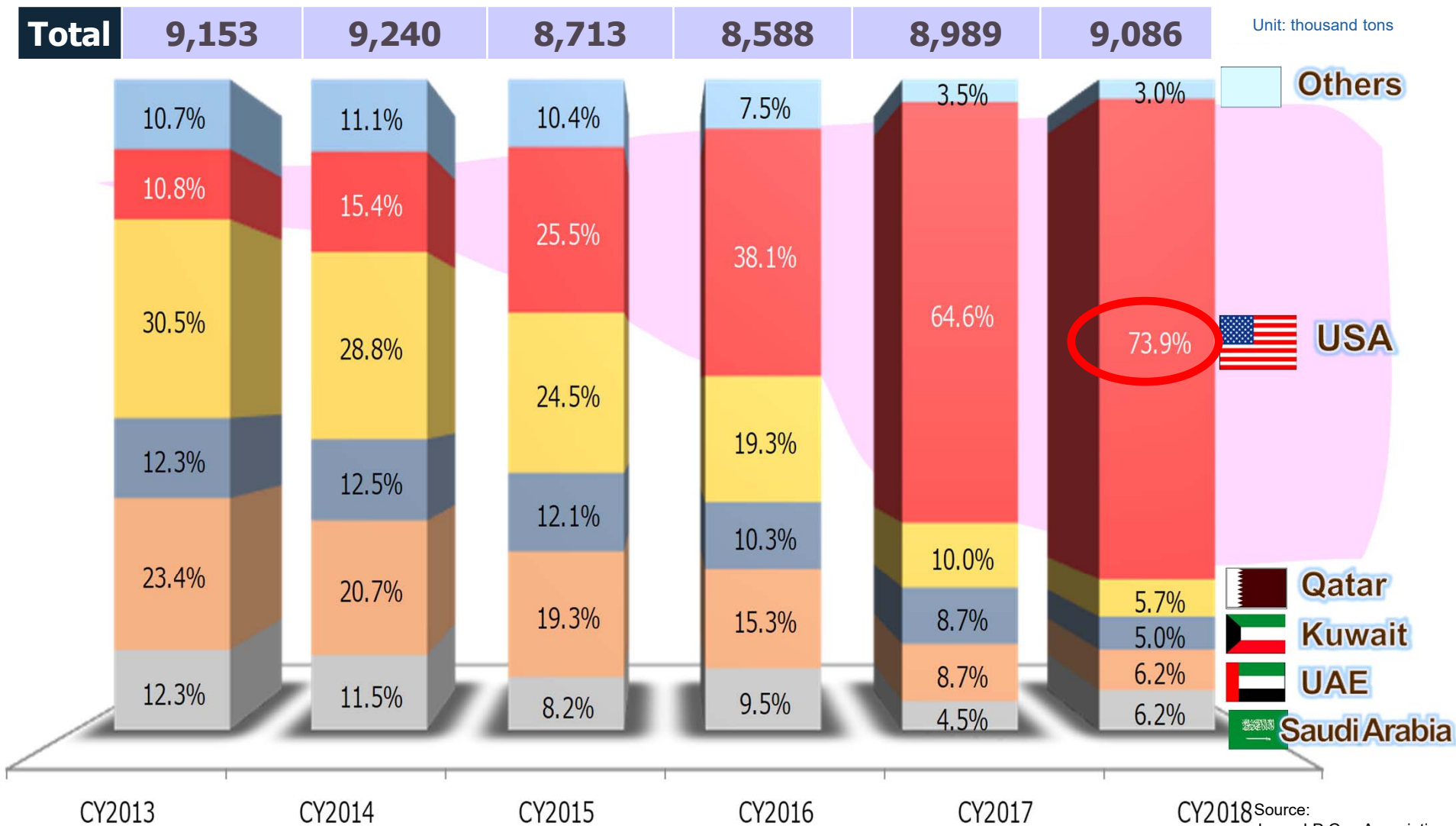
LP Gas Import sources by country : Trends in Japan (Propane and Butane)

➤ Backed by the increasing supply from the US, its share in Japan's LP gas import has been growing, reaching 65% in CY2018.



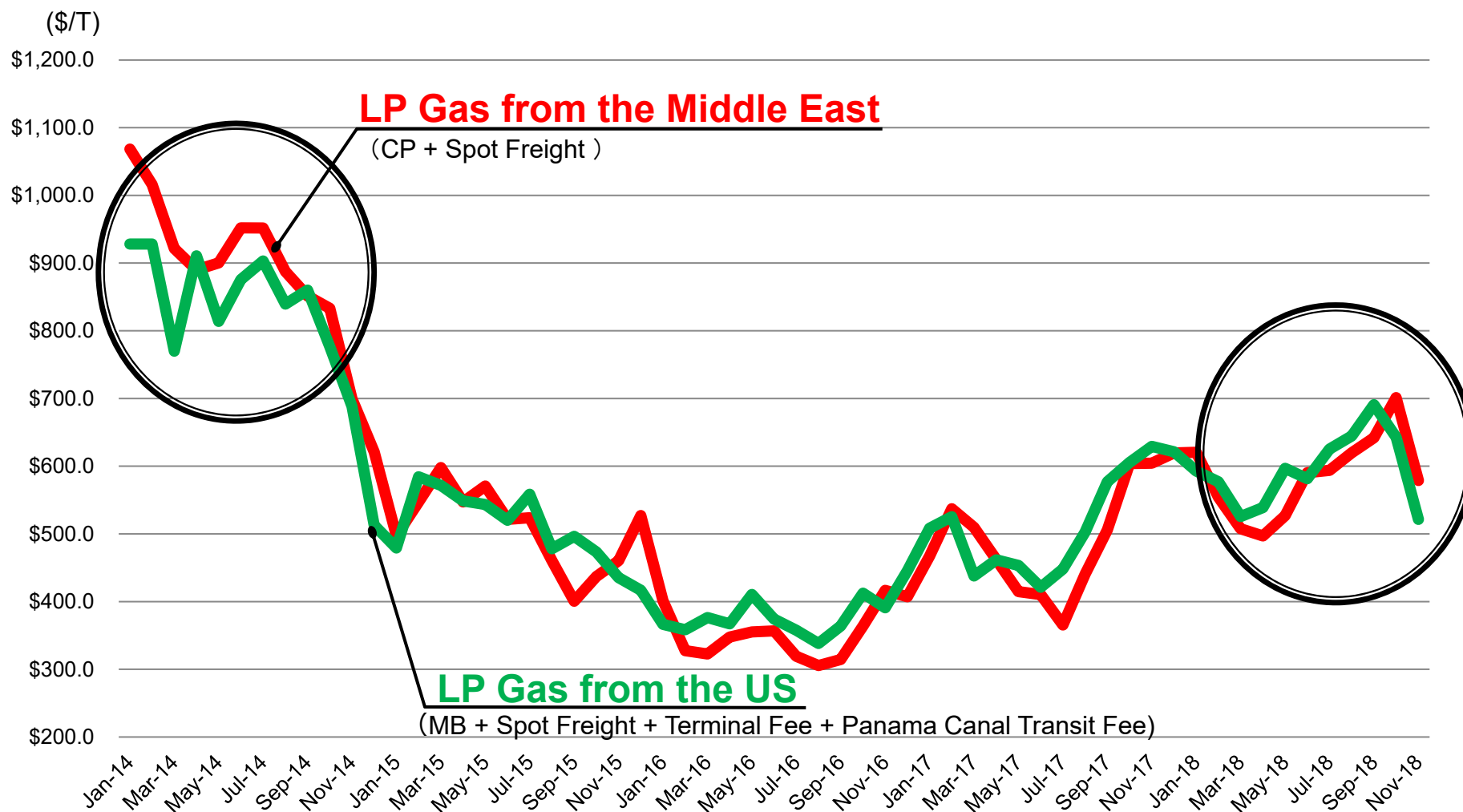
LP Gas Import sources by country: Trend in Japan (Propane only)

➤ As the butane import from the US has still stayed low, US's import share, in terms of propane only, reached 74% in CY2018.



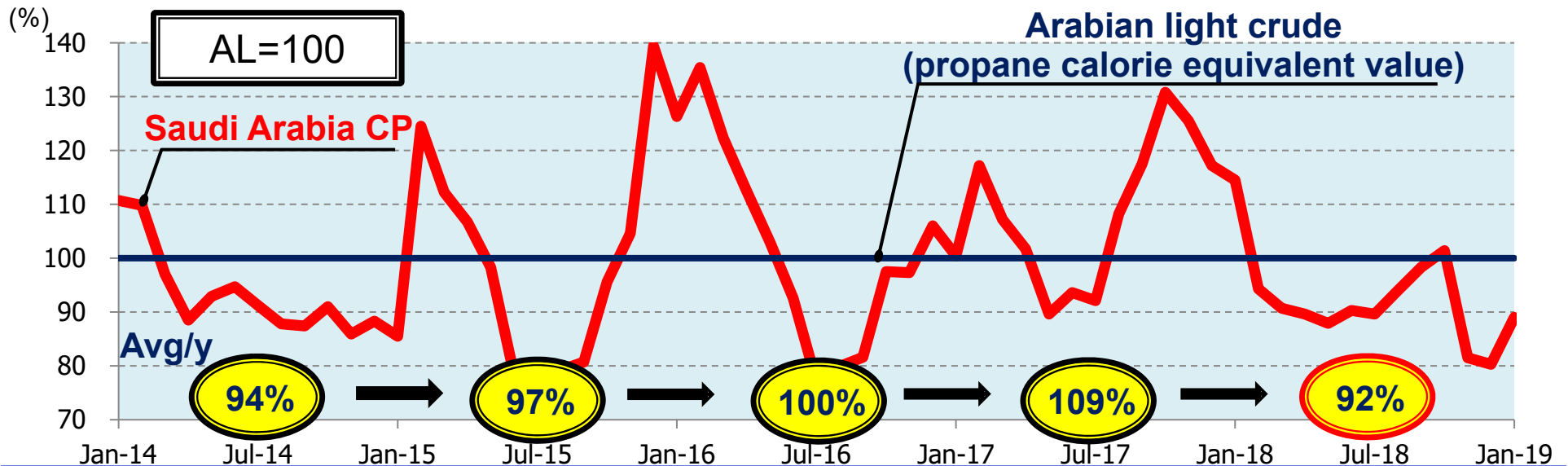
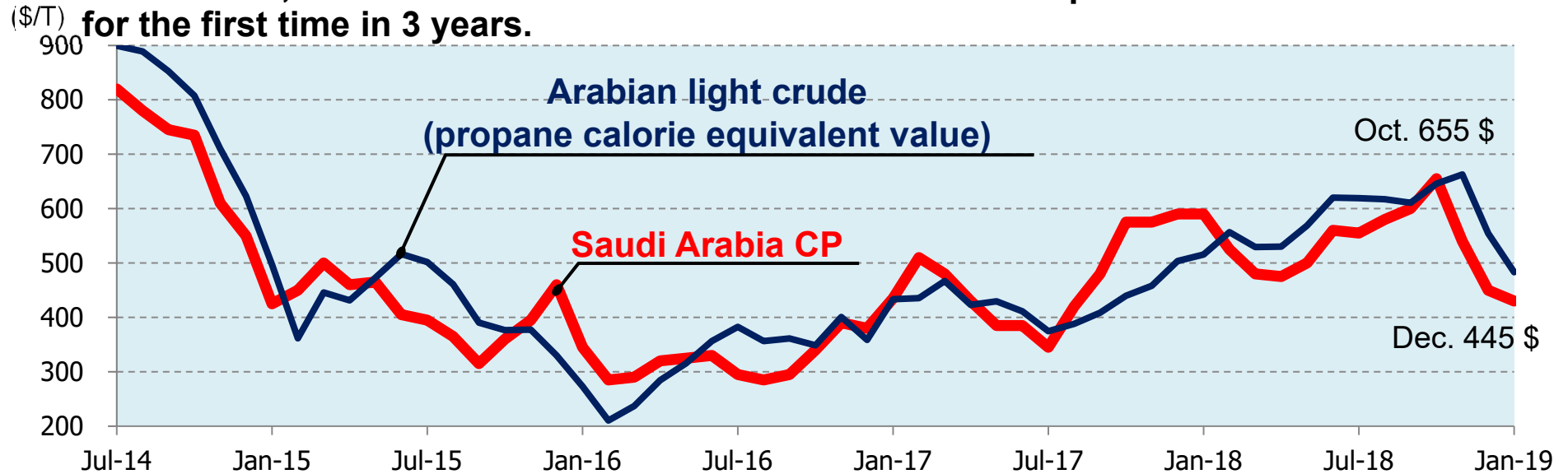
LP Gas Price Trend : Originated in the Middle East and the US (MB) (Japan arrival basis)

- Prices of LP gas originated in the Middle East and the US (MB) have been moving closely in recent years in line with the oil market trend.



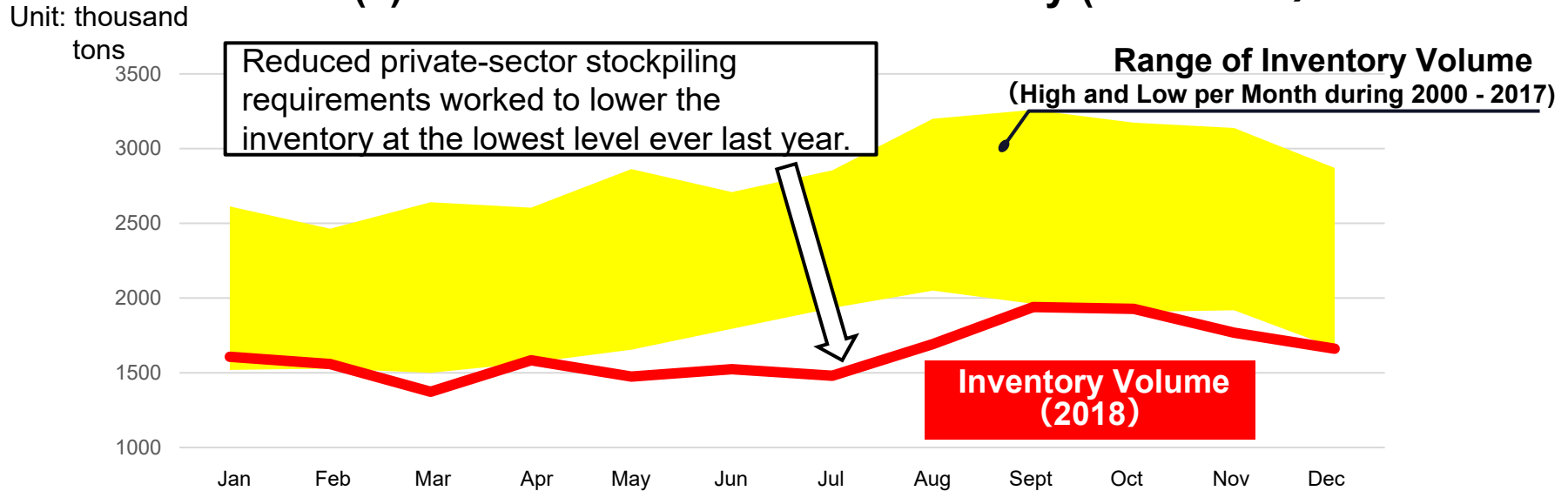
Crude Oil (AL) Price Trend and CP (Propane) Trend

- LP gas supply & demand balance eased temporarily, backed by the rise of the supply from the US, which led to the decline of CP's AL calorific equivalent value below 100% for the first time in 3 years.

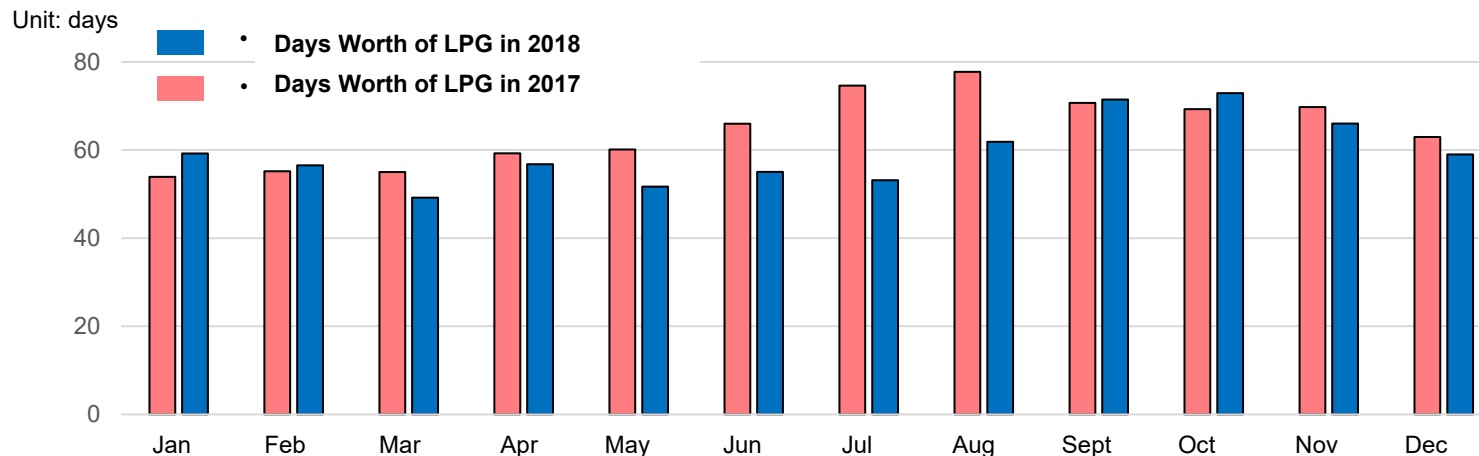


Trend of LP Gas Inventory and How Many Days' Worth of LP Gas was Stored in Private-sector

(1) Trend in Private-sector Inventory (2000 - 2018)

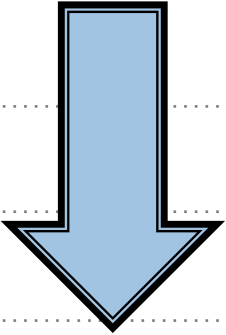


(2) How Many Days' Worth of LP Gas was Stored in Private-sector in 2017 and 2018



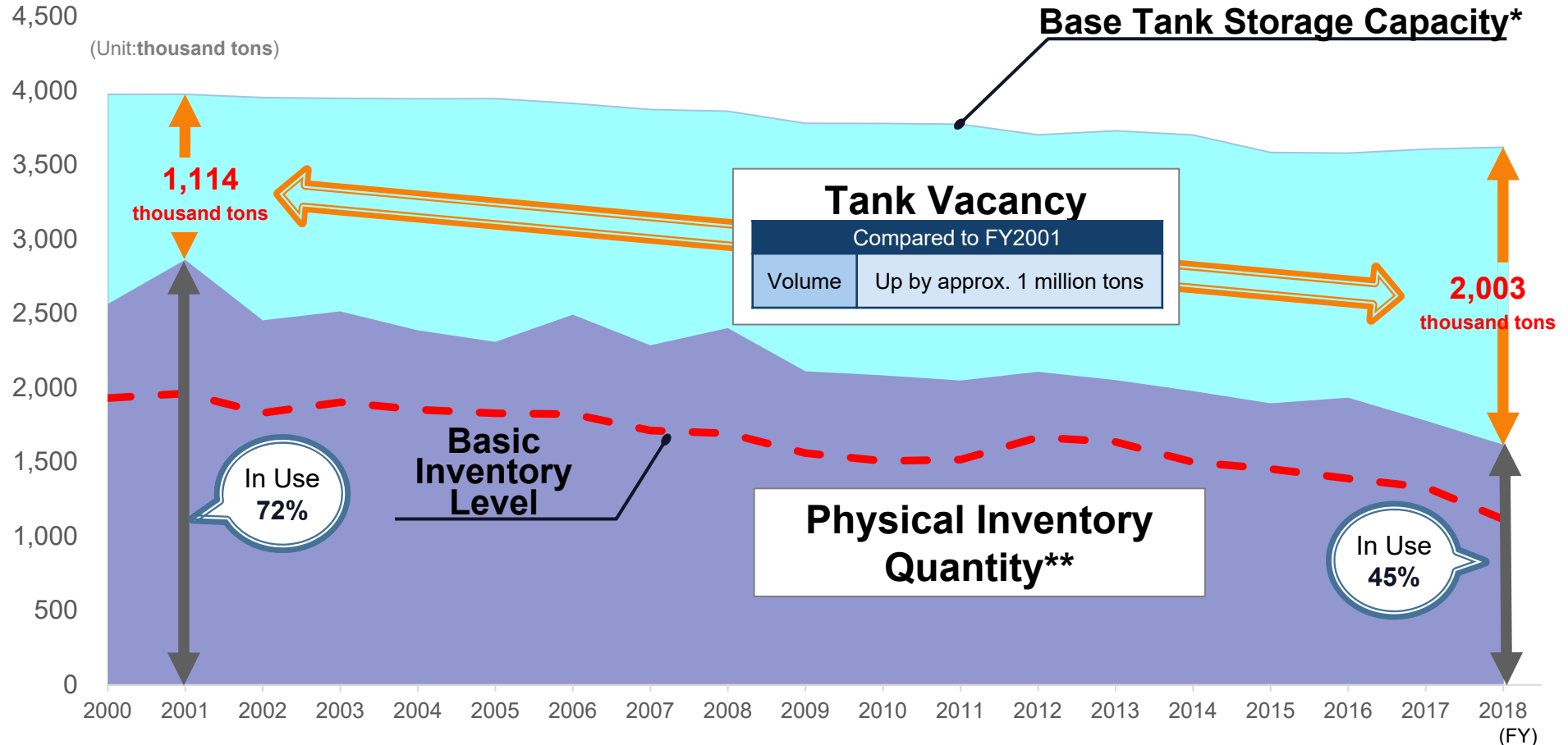
History of LP Gas Stockpile System in Japan

- National stockpile target, a quantity sufficient to last 50 days (1.4 million tons, stored in 5 locations) was achieved in November 2017.
- Mandatory private stockpile has been reduced from the level to last for 50 days to that for 40 days since February 2018.

Year	Mandatory private stockpile	National stockpile
1981	LP gas stockpiles made mandatory with the revised "Oil Stockpiling Act".	
1989	Private sector stockpiles of 50-days worth achieved in March.	
1991		National LP gas stockpile target was developed to mitigate supply disruption risk after the Gulf War : (1.5 million tons / worth 40 days by 1991 standards).
2005		Nanao Base, Fukushima Base and Kamisu Base completed.
2011		40,000 tons of propane released after the March 11 disaster (replaced by private sector stockpiles).
2013		Kurashiki Base and Namikata Base completed in March.
2016		Government panel proposed to lower stockpile levels.
2017	Relevant ministry ordinance revised in December.	National stockpile target achieved in November 2: 50-days worth, or 1.4 million tons.
2018	Private sector stockpiles reduced to 40-days worth effective from February.	

Vacancy and Actual Inventory in Base Tank Storage Capacity

- Tank vacancy tends to rise due to the shrinking domestic demand and the reduction of mandatory private stockpile.
- Industry-wide review on the optimal stations is needed, while ensuring the supply stability.



* Non JLPGA's member tank storage capacity is not included in this base tank storage capacity.

** Inventory quantity is calculated as an average per physical year. (As for FY2018, an average between April and September)

Source:
Japan LP Gas Association

Chapter 2

Actions toward 2025 in LP Gas Industry

What and Why “Vision 2025”?

Global Market Change

- Growing production of LP gas in the US (shale gas / oil)
- Global warming issues (Paris Agreement)
- Japan’s less presence among importing countries
- Stricter environmental control by IMO

Revision of Basic Energy Plan

- (Last update: 2014)
Expectation on LP Gas Industry, newly mentioned in the Plan
- LPG fuel ships
 - Expansion of the use of high-efficiency LP gas fuel equipment
 - Enhancement of the efficiency of distribution system with cooperative networks

Japan LP Gas Association

Vision 2025 for LP Gas Industry

(Last update: 2015)

Business Environmental Change in Japan

- Stagnated demand for LP gas
- Reduction of mandatory private stockpile level
- Severe competition between various energy industries
- Frequent natural disasters occurrences (earthquakes/ extreme weather)
- Labor shortage and shrinking population due to low birthrate and longevity.

Ongoing Efforts

- Stable supply / Diversification of supply sources
- Improvement of quality and safety measures for LP gas
- Establishment of an effective and robust logistic system

Critical Pillars for addressing JLPGA's "Vision 2025 in LP Gas Industry"

Total demand target by 2025: 15 to 16 million tons per year

- ◆ Promotion of the use of high-efficiency household appliances such as "Ene-Farm"



Ene Farm

- ◆ Replacement of fossil fuels including oil with LP gas, taking its advantage as Eco-friendly energy



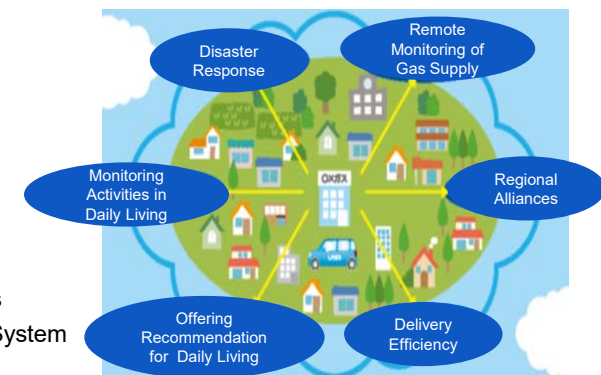
Gas Heat Pump (GHP) for LP gas

- ◆ Promotion of air-conditioning in critical public facilities such as evacuation center with the use of GHP and LP gas-powered generator, capitalizing the strength of LP gas as a resilient distributed energy



LP gas power generator

- ◆ Streamlining logistics in Japan with the use of IoT and other advanced technologies to develop new customer services




Next Generation LP Gas
Centralized Monitoring System

New Vision (1) LPG Fuel Ships and Bunkering

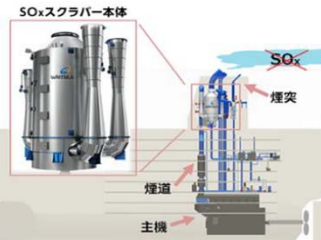
➤ **JLPGA aims to expand the use of LPG as a ship fuel, in response to strict ship fuel regulations set by IMO and possible CO₂/NO_x regulations in the future.**

■ (1), (2), (3) are not the last resort to tackle the tasks

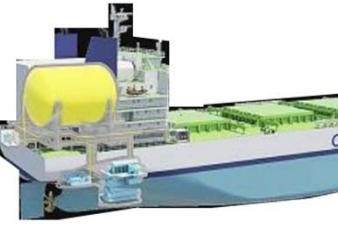
(1) Switching to low-sulfur fuel oil



(2) Scrubber (Shipboard Desulfurizer)



(3) LNG Fuel Ship




Cultivate the ships' fuel demand: 8.7 million kl of fuel oil (equivalent to **5 million tons of LPG**)

■ Tasks to encourage broad use of **LPG fuel ships**

- ❑ LPG engine development
- ❑ LPG supply infrastructure
- ❑ Promote LPG's publicity
- ❑ Applications to authorities (including standardization of bunkering safety)

- Negotiations with Port Authorities
- Negotiations with Maritime Safety Agency etc.
- Ensuring safe navigation
- Build bunker supply vessels

LPG is eco-friendly almost equivalent to LNG and more economically efficient than LNG in terms of supply infrastructure costs etc.

Property Comparison		Liquid Natural Gas (LNG)	Liquefied Petroleum Gas (LPG)
Boiling Temperature		-162	-42
Heating Value (LNG, Propane)		40 MJ/m ³	99 MJ/m ³
Specific weight of liquid		0.42	0.58
Environmental Performance* (to heavy oil)	CO ₂ Reduction Rate	23%	20%
	SO _x Reduction Rate	90-97%	90-97%
	NO _x Reduction Rate	20-30%	15-20%

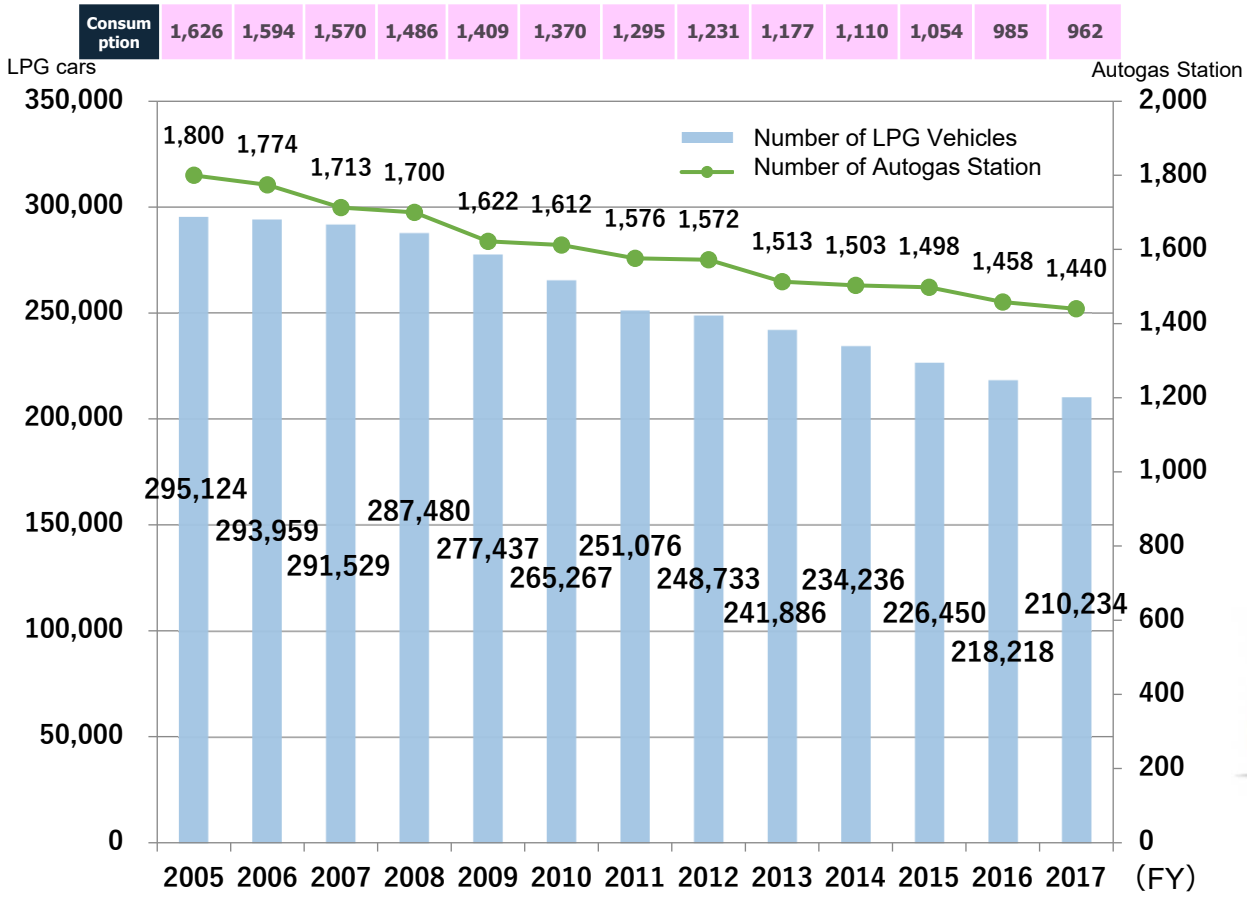
*Source: LPG for Marine Engines/The Marine Alternative Fuel (WLPGA)

New Vision (2) Promotion of the use of LPG Vehicles and Infrastructure Building

➤ JLPGA aims to accelerate the diversification of fuel supply for transportation through the approach to encourage public administrations to introduce LPG vehicles and request for easing regulations for better infrastructure.

[Autogas consumption and the number of LPG vehicles]

Unit: thousand tons



■ Proposal of LPG vehicle introduction to local government (Kanagawa pref.)



LPG Bi-fuel vehicle (LPG & Gasoline)



JPN TAXI
TOYOTA



NV200
NISSAN

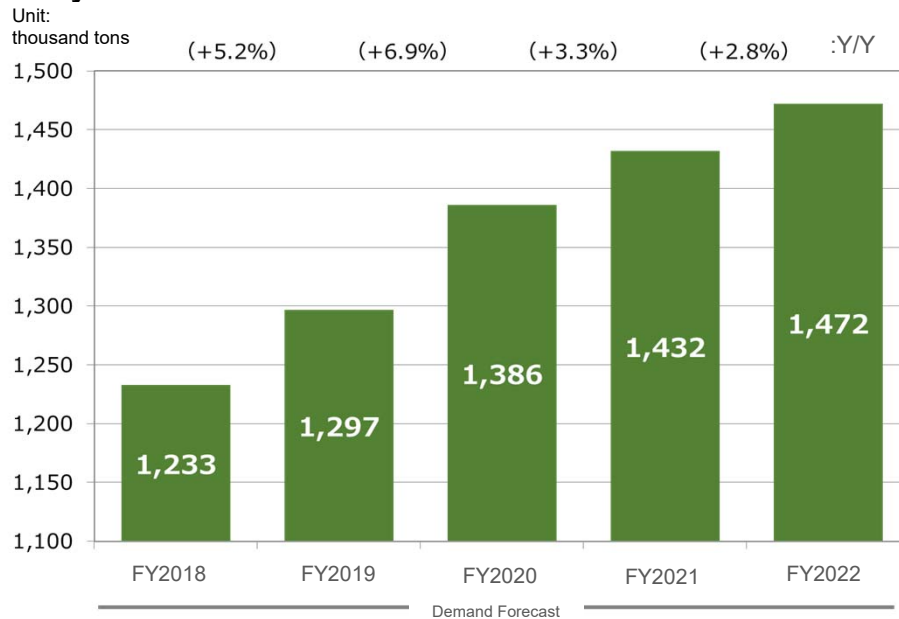
New Vision (3) LPG demand for City Gas and Chemical Use

➤ **JLPGA aims to maintain and increase the demand by taking its advantage, while keeping a close eye on the price trends of naphtha and LNG.**

For City Gas Use

■ Forecast of Global Demand Trends for Petrochemical Products FY2018-2022, Liquefied Oil Gas Sector (Advisory Committee for Natural Resources and Energy, Natural Resources and Fuel Committee, Petroleum and Natural Gas Subcommittee, Petroleum Market Trends WG)

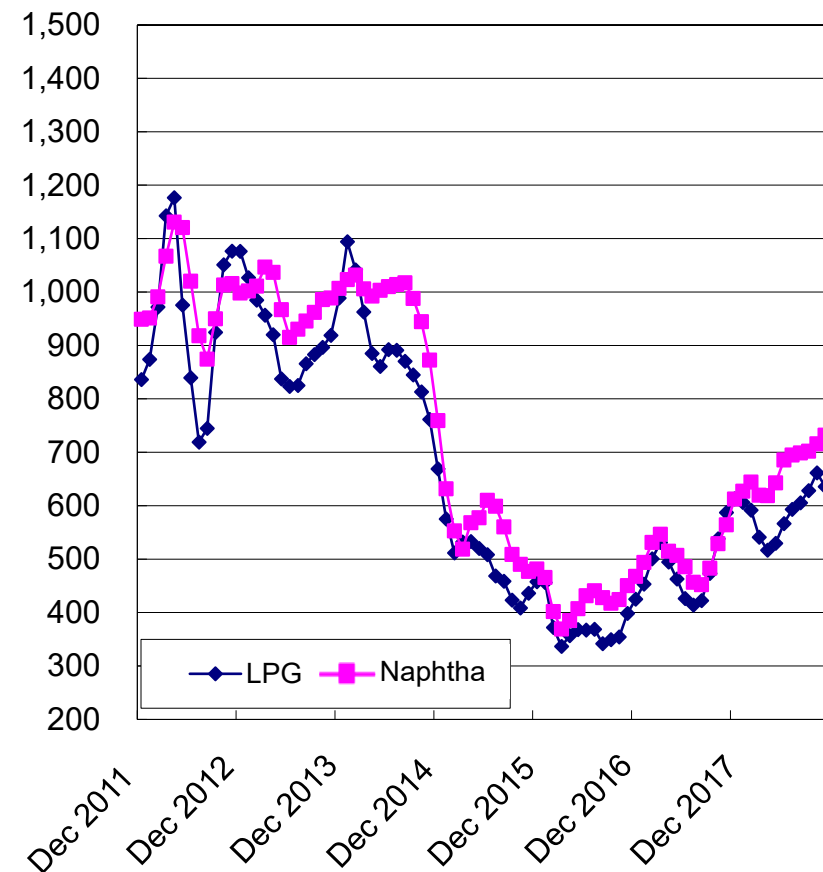
City Gas Demand Forecast



It is also necessary to pay close attention to the discussions at the Regulatory Reform Promotion Council on the City Gas calorific regulation

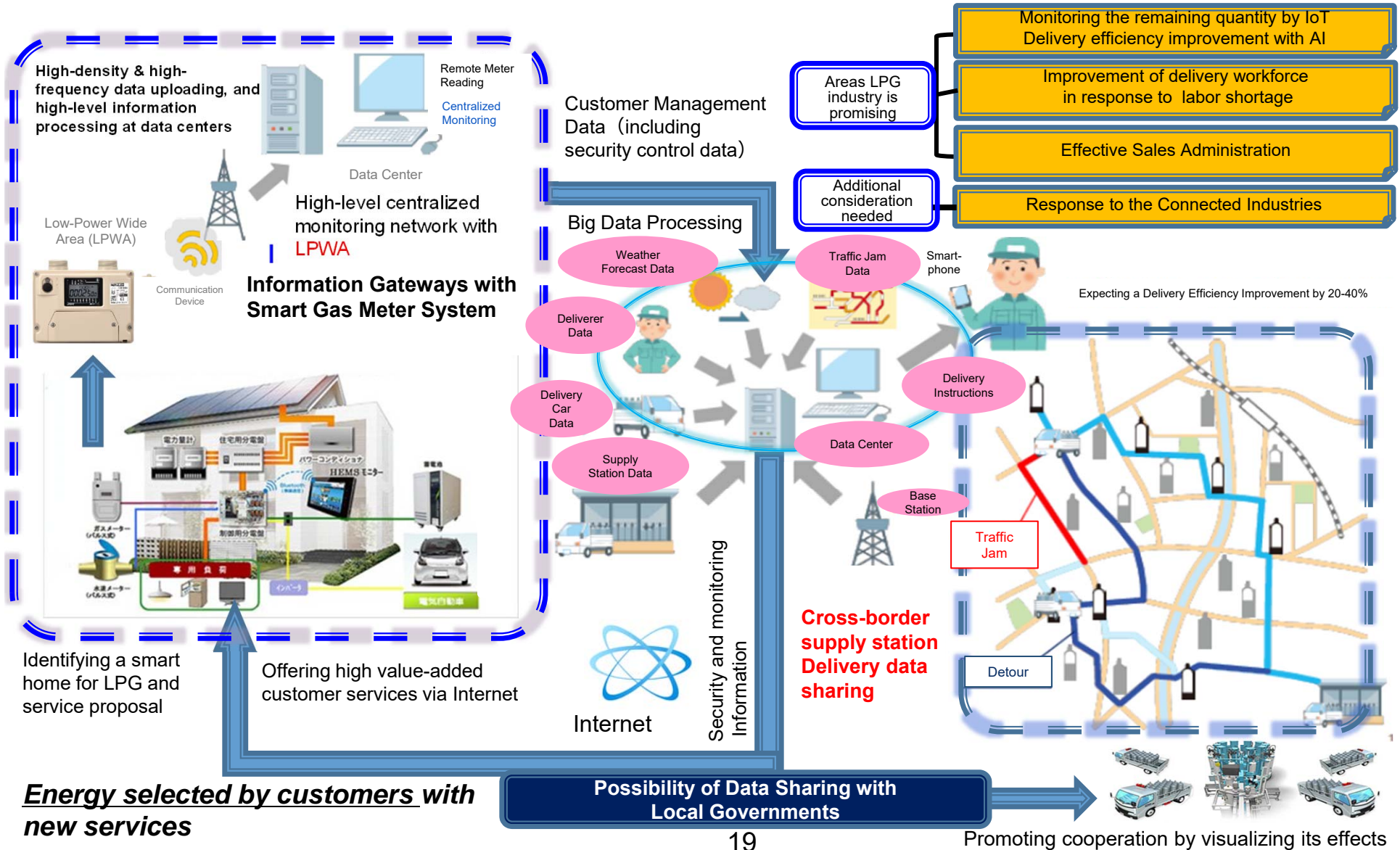
For Chemical Use

Comparison: CIF Price in LPG equivalent (Foreign Trade Statistics)



New Vision (4) Advanced Logistics and Building of Next Generation Infrastructure in Japan

➤ JLPGA aims to develop new customer services for next generation infrastructure with utilizing the evolving communication technologies so that LP gas remains as an energy to be selected.

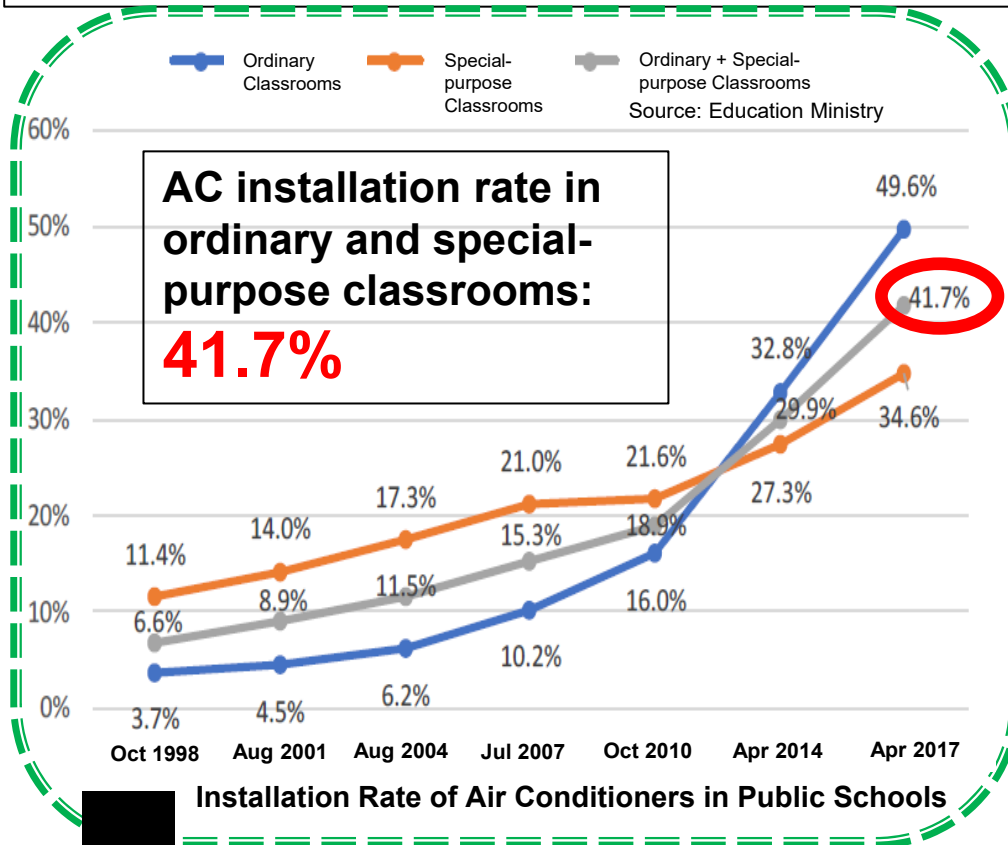


Chapter 3

Imminent Challenges for LP Gas Industry

Installation Rate of Air Conditioners (AC) in Public Elementary and Junior high Schools

- The government allocated ¥82.2 billion of budget to install ACs in the remaining (unequipped) 170 thousands ordinary classrooms of public elementary and junior high schools across Japan.
- Only 1% of school gyms have ACs. Further installation of ACs is required.



Number of schools designated as evacuation center

	Schools	Designated as Shelters
Total	33,638	30,994 (92.1%)

Installation rate of AC **1.2%**



Source: Disaster Photo Database, INSTITUTE OF SCIENTIFIC APPROACHES FOR FIRE & DISASTER

Completion Target: by Summer of 2019.

FY2018 Supplementary Budget (cabinet approval)

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Installation of ACs in all ordinary classrooms (170 thousands) of public elementary and junior high schools, kindergartens, and special-needs schools

Budget

82.2 billion yen

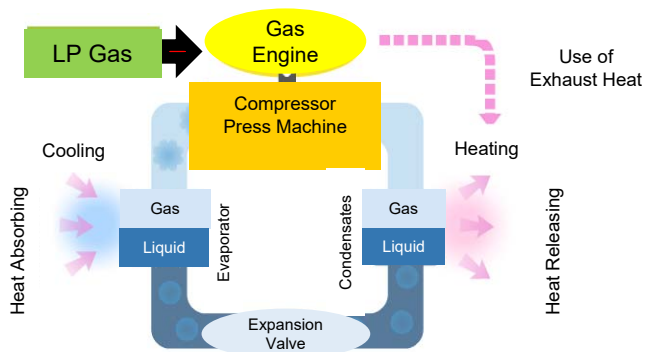
Further Installation of Air Conditioners in Schools (Classrooms and Gyms) by Introducing LP Gas Heat Pumps

- Gyms contribute to local communities, as evacuation centers in case of disasters as well as serving for ordinary classwork.
- Installation of air conditioners is vital since extreme heat in mid-summer or severe cold in mid winter during a disaster evacuation could risk even people's lives.
- Combination of emergency power generators, bulk supply units, cooking utensils, and other tools can strengthen their functions as evacuation centers in case of disaster or power outage.

■ What is GHP ?

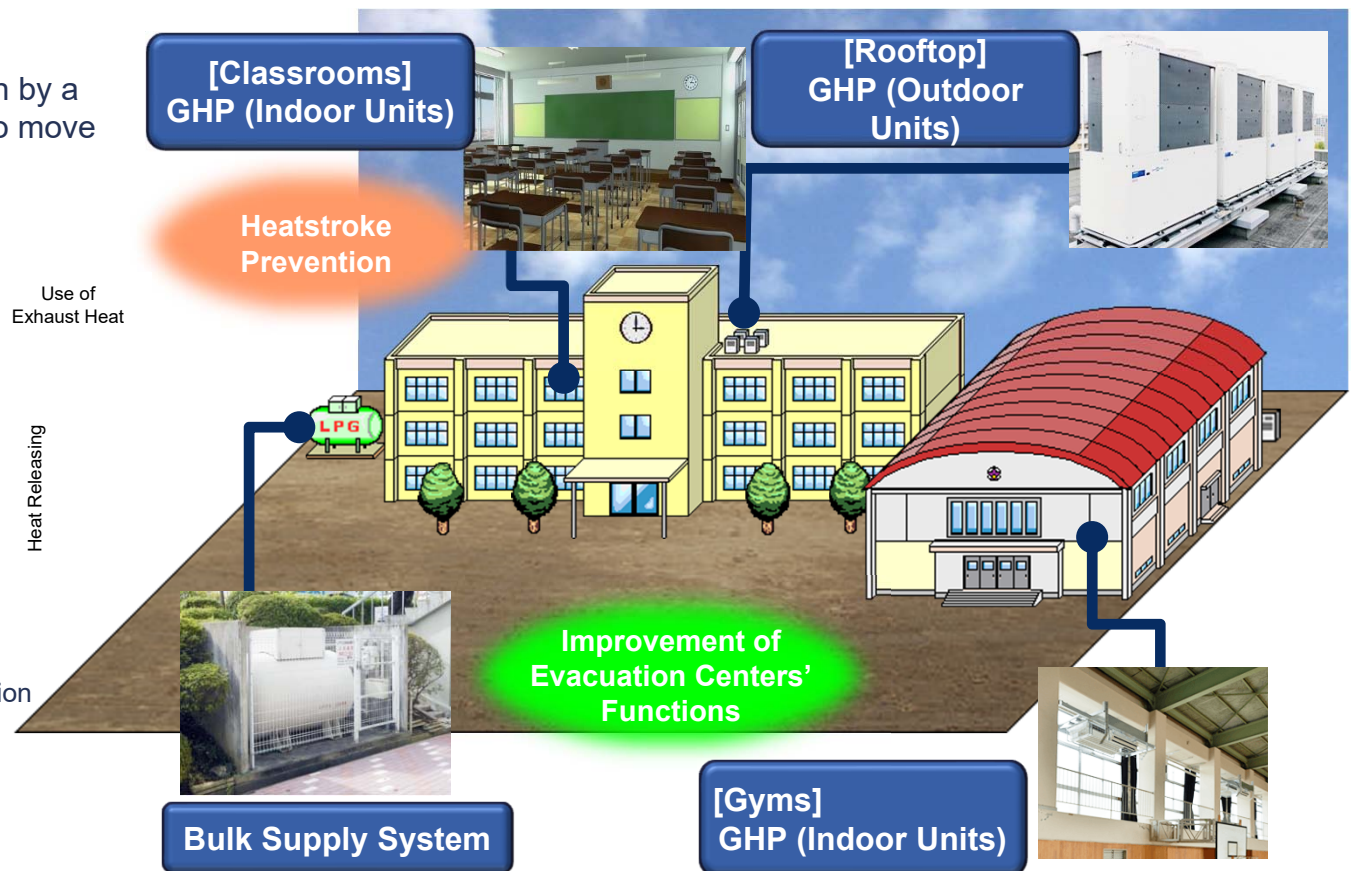
[GHP] is an air conditioning system run by a gas engine which drives compressor to move a heat pump.

■ GHP Mechanism



■ Gas Energy benefits

- Contribution to curbing the electric consumption peak with its power-saving capability.
- [Use of exhaust heat] when heating.
- [Stand-alone running functionality] on emergency such as blackouts.



GHP Introduction Examples in Local Governments (including installation in gyms)

(1) Minoh City, Osaka Pref.

- The city is located in city gas service area, but the local government has selected LP gas for the sake of prioritizing disaster countermeasures.
- 56 units of LP gas GHP have been installed in 20 gyms of the local elementary and junior high schools in the city.
- LP gas-powered emergency power generators also have been installed.



(2) Kumamoto City, Kumamoto Pref.

- With the lessons from the Kumamoto Earthquakes in April 2016, countermeasures against power outage at the local elementary and junior high schools, which are designated as evacuate centers, have been reinforced.
- Stand-alone-type LP gas-powered GHPs have been installed in 53 local schools on a one-to-one basis.



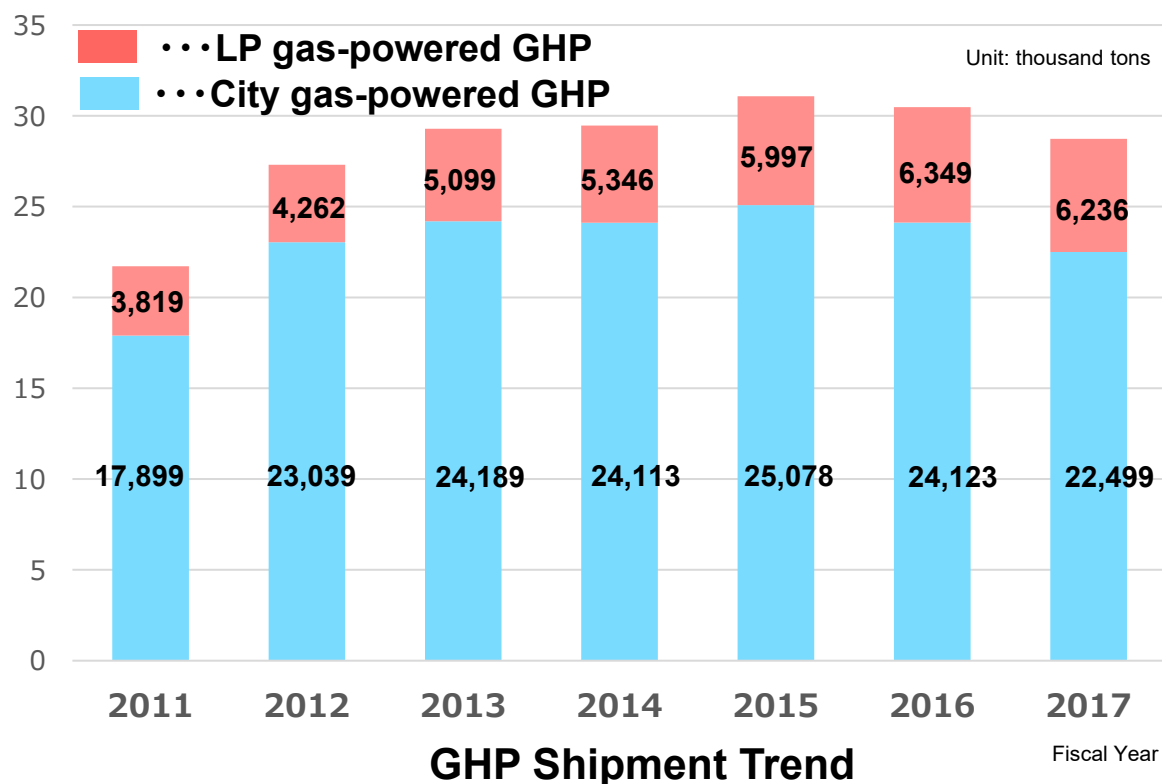
(3) Fujimi City, Saitama Pref.

- Disaster countermeasures in response to the outcome of the Great East Japan Earthquake, curbing the maximum power consumption, and other measures are considered.
- LP gas-powered GHPs have been introduced into the city gas service areas.
- Emergency bulk storage units are used for fuel supply.



Trend of GHP Shipments

- After the Great East Japan Earthquake in March 2011, introduction of stand-alone-type power generators, which can supply electricity for air conditioners in case of power outage, had boosted the shipments of LP gas-powered GHPs for 5 consecutive years.
- However, since 2017, the trend has turned to level off. (e.g. GHP shipments of the 1st half of 2018 was 99% year on year)
- To expand the use of LP gas-powered GHPs, development of production system and expansion of installation work capability at manufacturers as well as financial support from the government is needed.



GHP manufacturer

▶ AISIN SEIKI Co.,Ltd.

▶ DAIKIN INDUSTRIES, Ltd.

▶ Panasonic Corporation

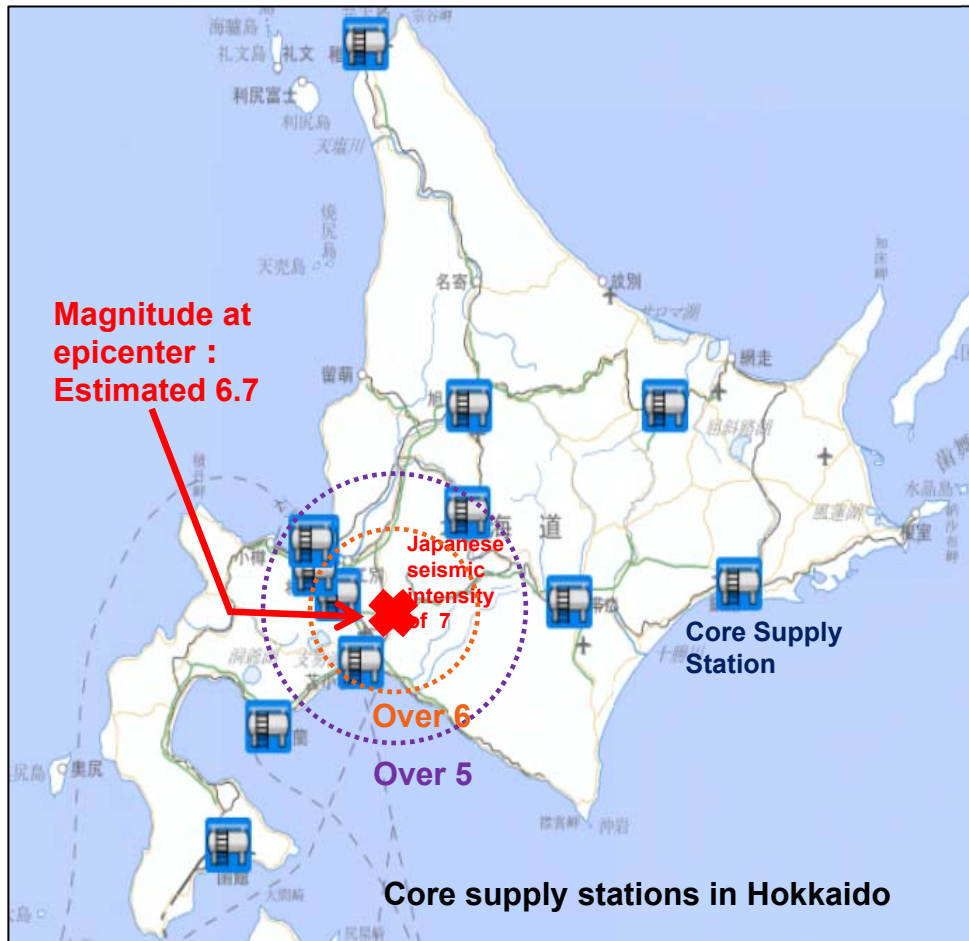
▶ MITSUBISHI HEAVY INDUSTRIES
Air-Conditioning and Refrigeration
Corporation

▶ YANMAR Co., Ltd.

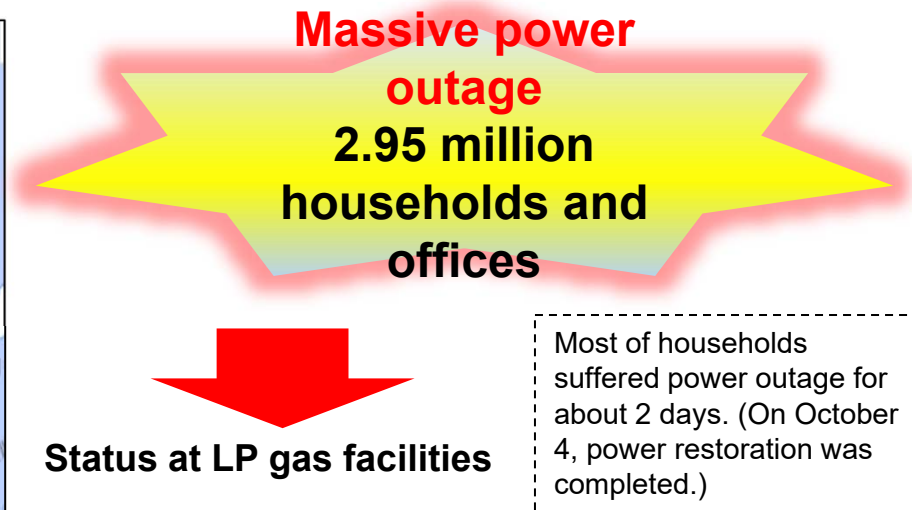
(GHP Consortium member companies listed in order of 50 Japanese syllables)

Countermeasures to the 2018 Hokkaido Eastern Iburi Earthquake taken by LP Gas Industry

➤ The Hokkaido Eastern Iburi Earthquake on Sept. 6, 2018, led to the serious impact on lifelines such as broad range of power outage for almost two days.



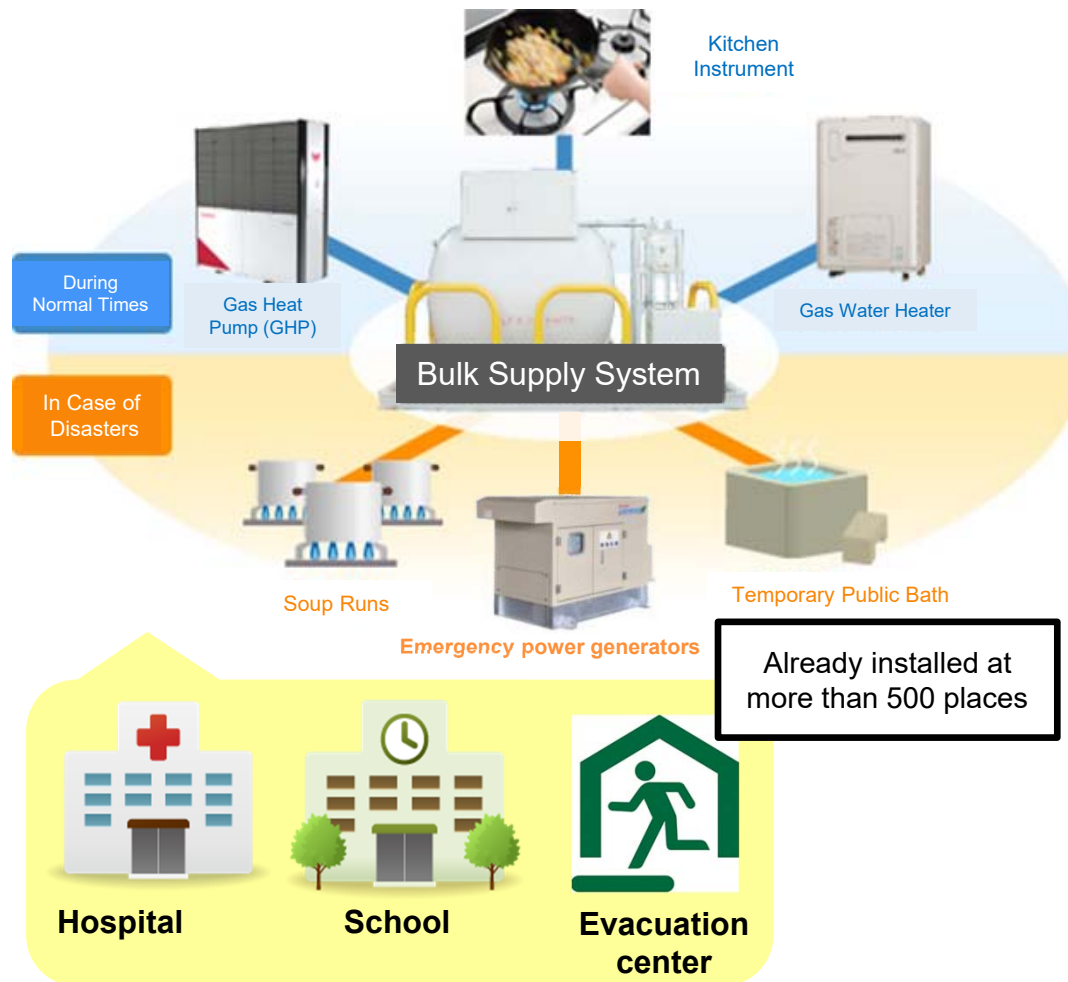
Source: Japan LP Gas Association



- During the power outage, supply and shipment of LP gas was maintained at 14 core supply stations.
- 25 out of 31 LP gas bulk storage units for disaster supply in Hokkaido had emergency power generators
 - All generators worked smoothly (at hospitals or welfare facilities)
- Mobile power generator cars were lent to evacuation centers or local municipalities.

Expansion Use of Bulk Storage and Supply System in Preparation for Disasters

- In FY2019 budget (including 2nd supplementary budget), 3.15 billion yen (5 times higher yr/yr) is to be set for securing fuel stockpiles to maintain emergency power sources and air-conditioning as a part of self-reliant efforts at critical social infrastructure including evacuation sites and medical/welfare facilities.



Already installed at more than 500 places

Main subsidy system:

Site	Hospitals, nursing homes, public evacuation centers, temporary evacuation sites
Grants	(1) Private facilities: 2/3 (2) Public facilities: 1/2
Budget	0.6 billion yen (FY2018)

increased by 5 times

FY2018 2nd supplementary budget 0.83 billion yen
FY2019 Budget 2.32 billion yen

Total 3.15 billion yen

Maintaining and Securing Supply Chains in Case of Disasters based on the Emergency Supply Collaboration Plan

- Aiming to maintain and secure the LP gas supply chain by keeping trainings based on the “Emergency Supply Collaboration Plan” in preparation for disasters.

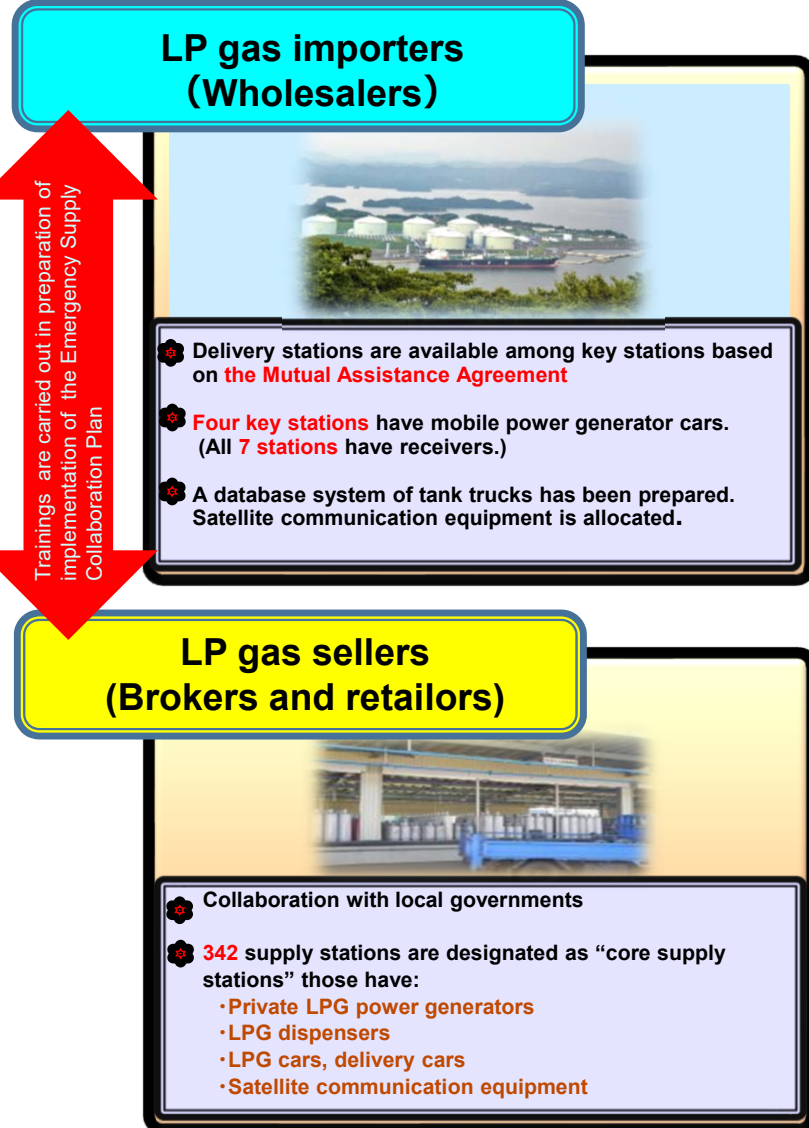
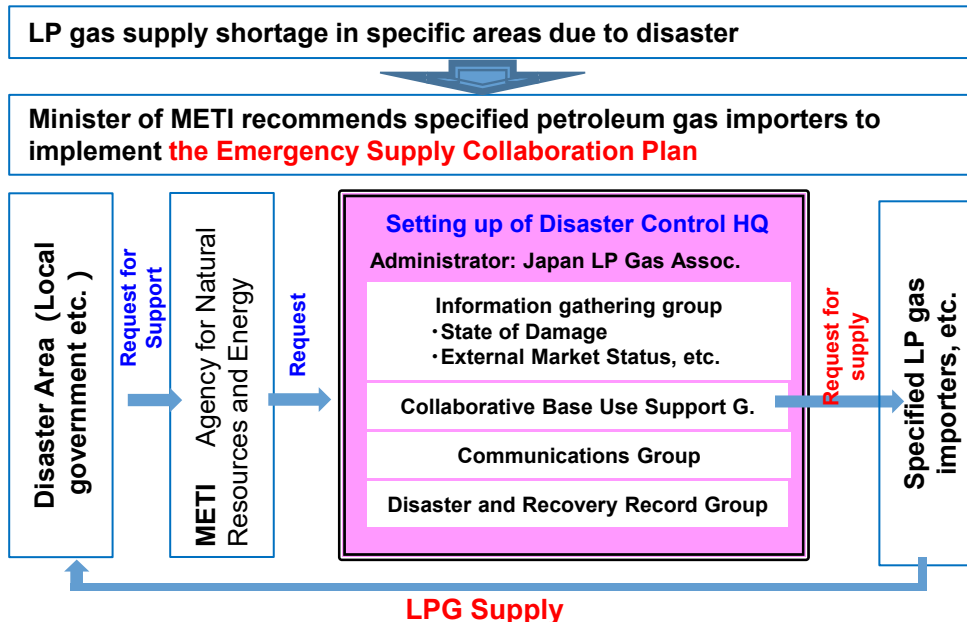
■ Emergency Supply Collaboration Plan

The New Oil Stockpiling Act, Article 14: specifies petroleum gas importers must collaborate with each other to secure stable supply of LP gas to 9 areas across Japan in case of disasters.

<Application Items>

1. Liaison
2. Joint use of gas storage facilities and workplaces
3. Cooperation in transportation of LP gas
4. Participation in local disaster prevention agreement
5. Trainings

<Flow of Emergency Supply Collaboration Plan>



Training to Connect with Mobile Power Generator Cars and Maintenance including its Power Receiving Facilities

- Mutual support network linking 7 key sites has been established so that LPG shipping function is maintained if any local LPG station lost its power source in case of disasters.

■ Mobile Power Generator Car



■ Training implementation (all of 7 key stations/each year)



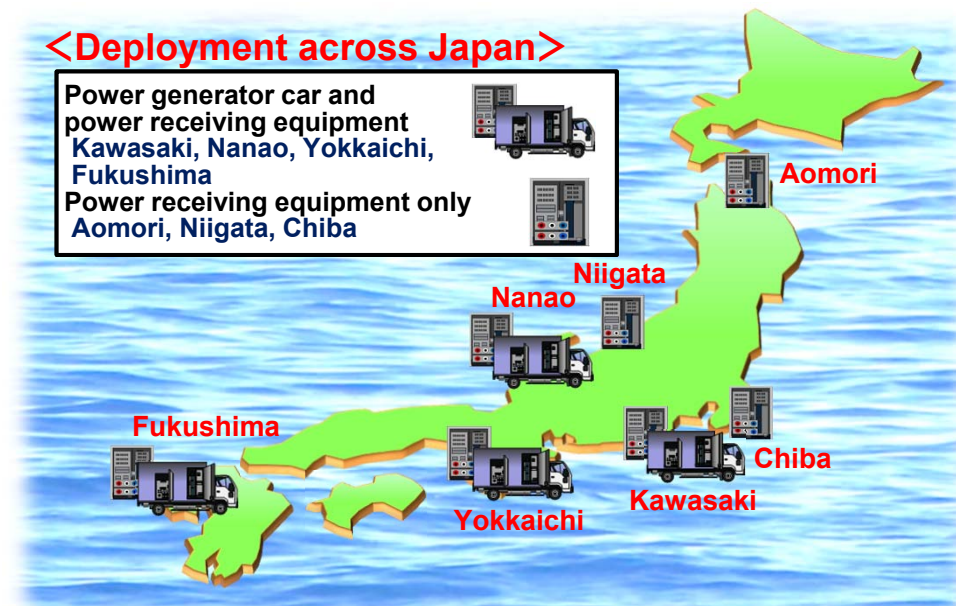
*METI: FY2012 Petroleum Gas Station Shipping Function Reinforcement Project Subsidy (Regarding the Petroleum Gas Import Station Shipping Function Reinforcement Project (mobile power generator cars)) and other materials

■ 7 Key Stations

- ENEOS Globe Gas Terminal
 - Aomori Gas Terminal
 - Niigata Gas Terminal
 - Nanao Gas Terminal
- Marubeni Ennex Corporation Chiba Terminal
- JXTG Nippon Oil & Energy Corporation Kawasaki LPG Station
- Yokkaichi LPG Station Kasumi Office
- Kyushu Liquefied Gas Fukushima Station

<Deployment across Japan>

Power generator car and power receiving equipment
 Kawasaki, Nanao, Yokkaichi, Fukushima
 Power receiving equipment only
 Aomori, Niigata, Chiba



Japan LP Gas Association's New Logo

- The new logo was designed in the motif of the sun, the symbol of Japan's national flag, and the globe. Its spherical shape was wrapped by three ribbons that symbolize "Development of the industry," "Unification of the industry," and "Contribution to the society".
- The color of those ribbons is blue that symbolizes "Message from the blue flame," which is this year's slogan of JLPGA.



[Summary] Future Effort of the LPG Industry

- To grow the significance of LPG as an energy that supports safety and security in people's life, LPG industry will work together to accomplish the target "**Total demand of 15-16 million tons by 2025**" set in our new Vision.
- LPG industry will actively work on **further enhancement of disaster resilience** as the countermeasures to potential risk of large scale of disasters by putting the lessons from natural disasters in the past, to good use.
- LPG industry will actively make efforts **to diversify the supply sources** to maintain and secure the stable supply of LPG and strengthen price competitiveness.
- LPG industry will commit to **building a solid relationship with countries** such as those in Southeast Asia through various forms of support including technical aids by utilizing the knowledge of security/safety services that Japan has nourished for years.



Thank you for
your kind attention.

Japan LP Gas Association

<http://www.j-lpgas.gr.jp>