

# **Current status and issues of LP Gas Industry in Japan**

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**Kazuhiro Ezawa**  
**Chairman/Japan LP Gas Association**

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**The International LP Gas Seminar 2023**

**March 7, 2023**

## **Chairman**

Kazuhiko Ezawa (Representative Director President, ENEOS GLOBE Corporation)

## **Establishment**

1963

## **Mission**

Securing stable supply and safety measures, demand development, environmental protection, public communications, statistics, policy proposals and other LP gas related activities

## **Members**

(10 Japanese primary distributors, producing / importing LP gas in Japan)

Astomos Energy Corporation

ENEOS GLOBE Corporation

GYXIS Corporation

ITOCHU Corporation

Iwatani Corporation

Japan Gas Energy Corporation

Kygnus LP-Gas Co., Ltd.

National Federation of Agricultural Cooperative Associations

Taiyo Oil Co., Ltd.

Tokyo Gas Co., Ltd.

# Contents

**1. LP Gas Demand and Supply Trends**

**2. Resilience of the LP Gas Industry**

**3. Pathway to the Green LP Gas**



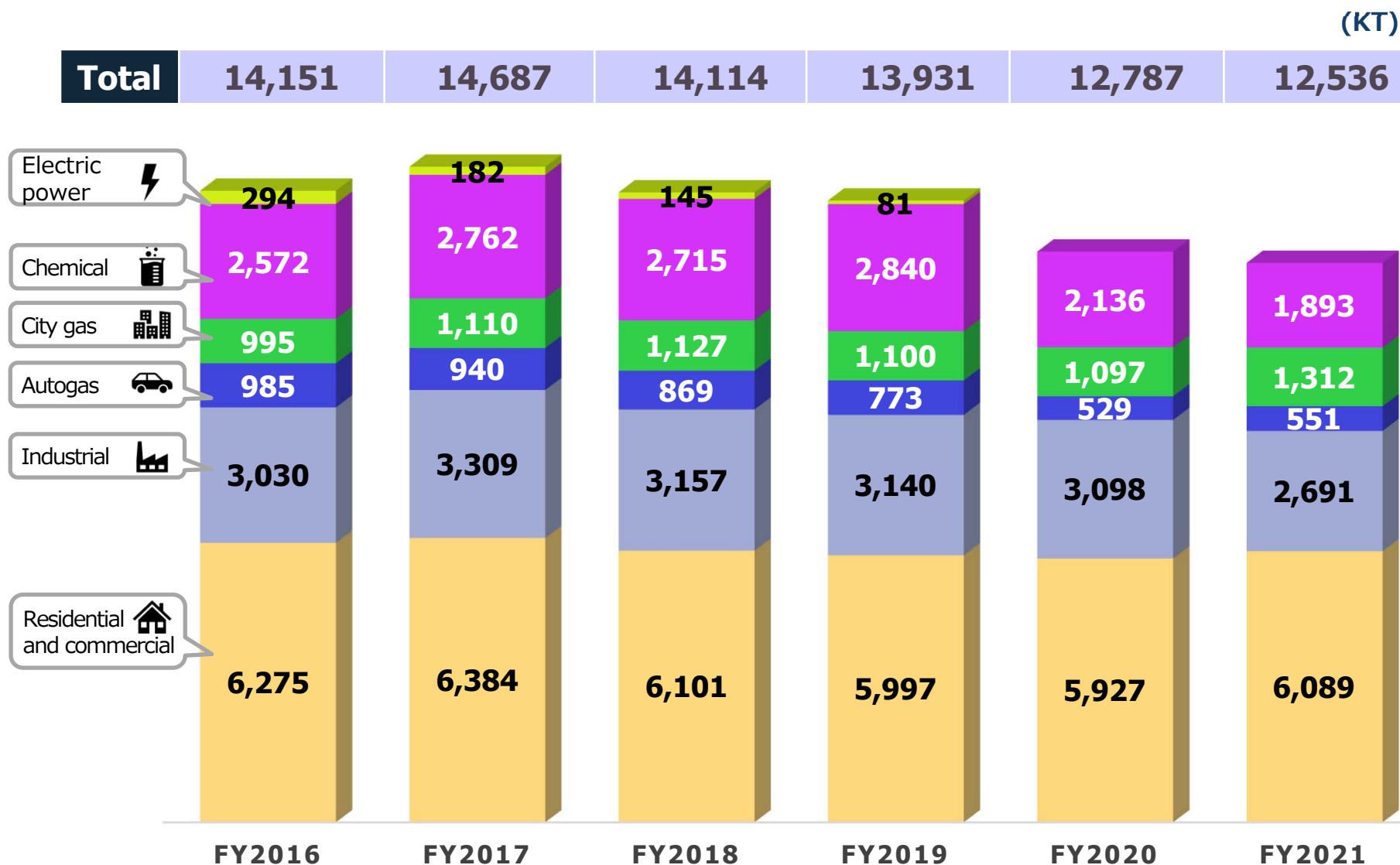
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➤ LP gas demand in recent years has been around 13-14 million tons.

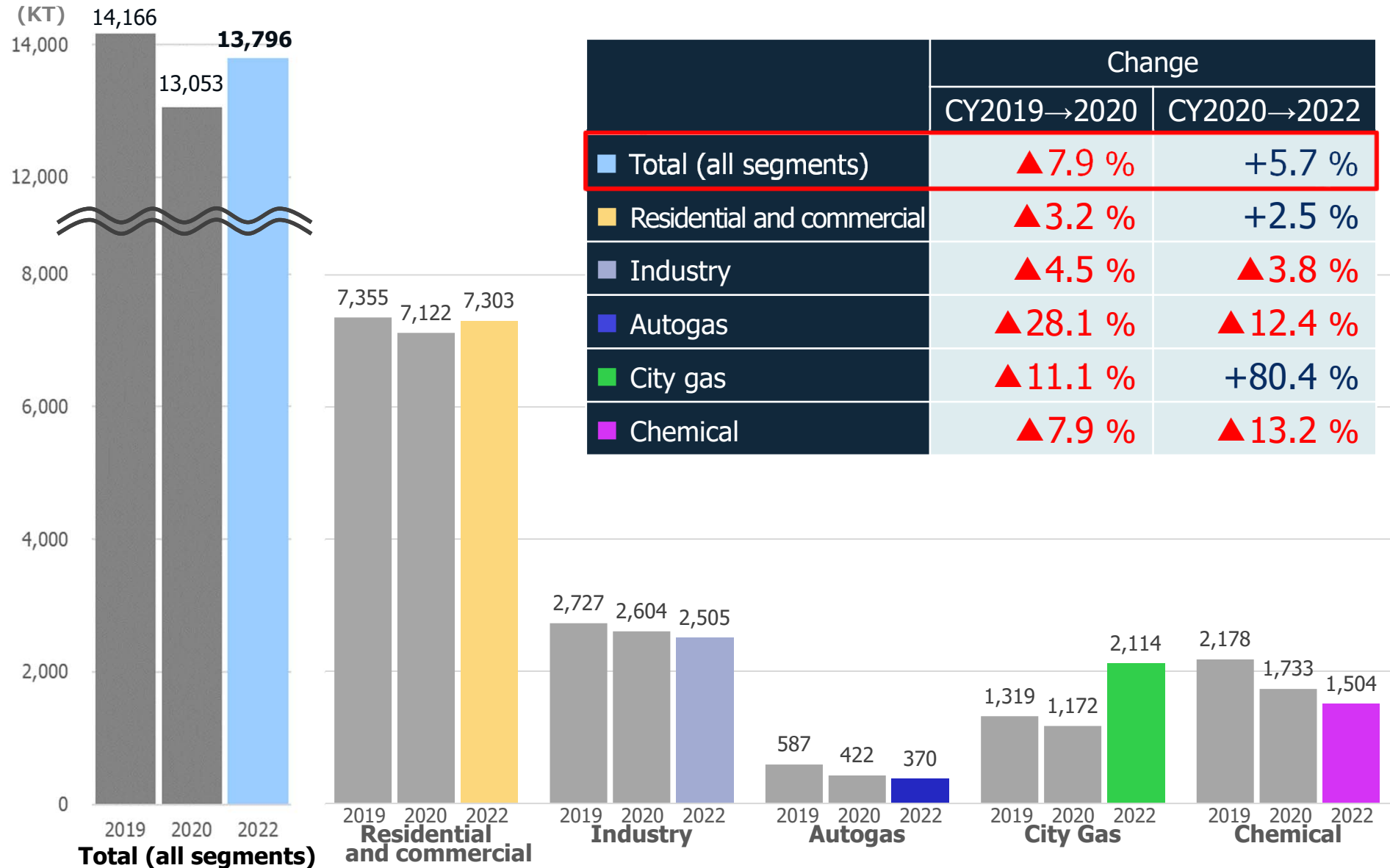


Source: Ministry of Economy, Trade and Industry (METI), Japan LP Gas Association

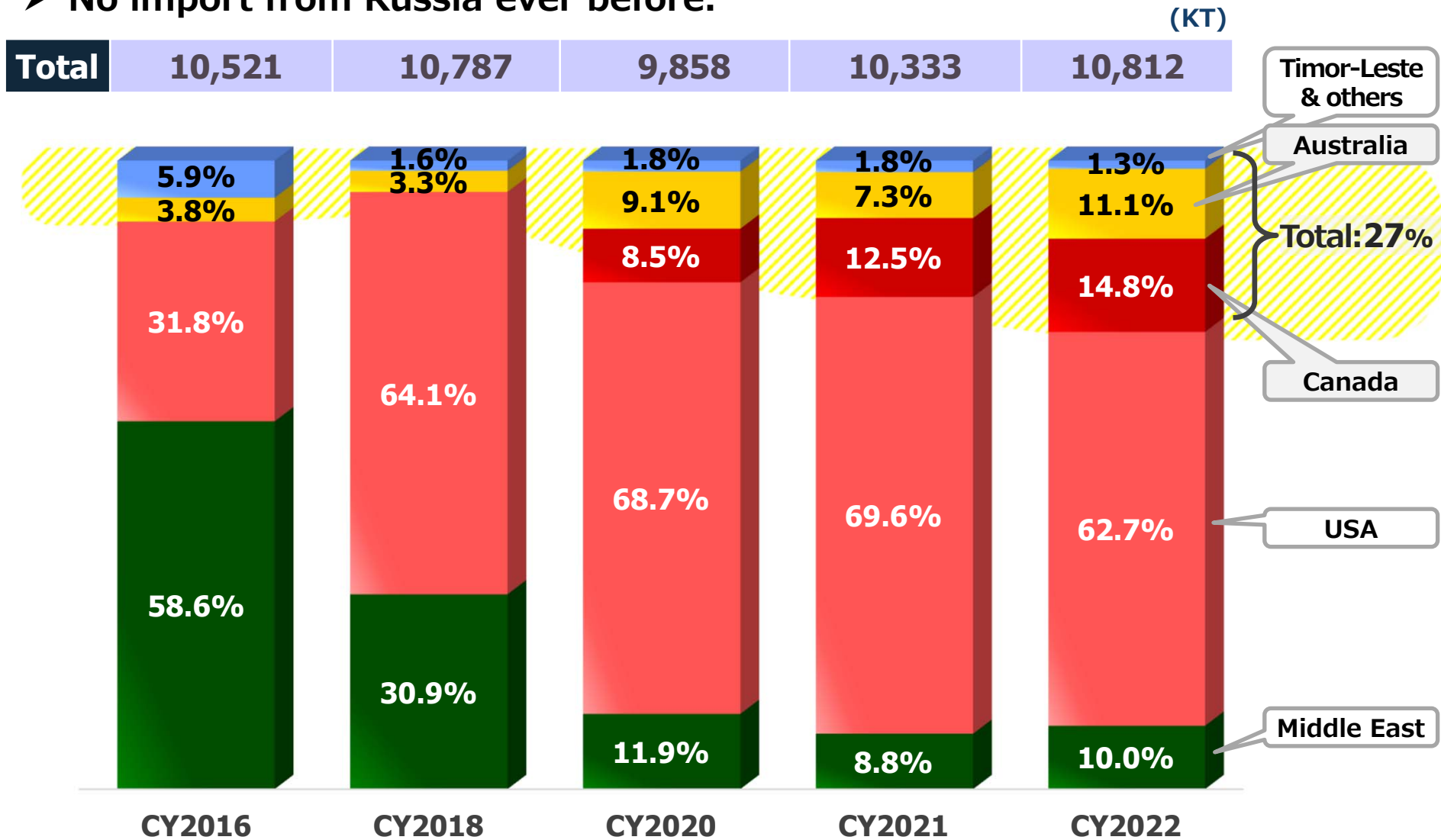
(Note)  
 FY: Fiscal year (April-March)  
 CY: Calendar year (January-December)



- LP Gas sales volumes in total has been recovering to the level before COVID-19.
- Sales volume for City gas has rapidly increased but that for Autogas has kept declined.



- In addition to imports from the USA and the Middle East, Canada's and Australia's shares have been increasing.
- No import from Russia ever before.





- LP gas exports from Russia is relatively small compared to crude oil and petroleum products. Also, Europe's dependence on Russia is low.
- The Ukraine's situation currently gives minor impact on the global supply and demand balance of LP gas.

Energy	Export ※ <sup>1</sup>		Export Destination (%)			Europe's Dependence on Russia (%)
		PJ ※ <sup>2</sup> based	Europe ※ <sup>3</sup>	Asia	Others	
Crude oil and petroleum products	7.6 million BD	18,000 PJ	53 %	39 %	8 %	31 %
Natural gas (including LNG)	8.5 trillion CF	9,000 PJ	78 %	22 %	0.3 %	34 %
Coal	210 million tons	5,000 PJ	35 %	56 %	9 %	21 %
<b>LP Gas</b>	<b><u>5.3 million tons</u></b>	<b><u>270 PJ</u></b>	<b>85 %</b>	<b>—</b>	<b>15 %</b>	<b><u>14 %</u></b>

None to Japan

## 【Breakdown of LP gas】



※1 : Actual 2021 data for LP gas. Actual 2020 data from BP statistics for other energies.

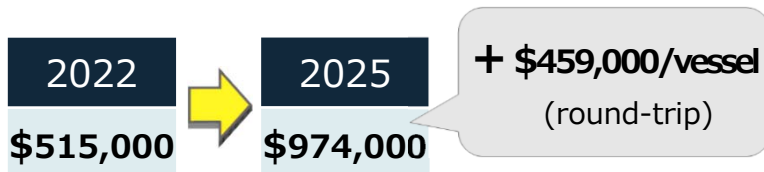
※2 : PJ (petajoule): A unit of energy, a thousand trillion (10 to the 15<sup>th</sup> power) joules.

※3 : In principle, CIS countries such as Belarus are excluded.



Under the situation that Japan imports LPG From the U.S. more then 60%, there remains a task which may lead to less competitiveness of LPG shipping navigation due to the continuous increase in Panama Canal tolls, chronic congestion in canal passage, and passage priority given to container ships and etc. after change in reservation rules.

## I . Increase in tolls



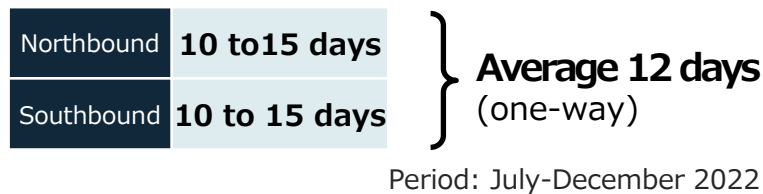
### [Impact on shipping freight]

LP gas imports from the US <sup>(※1)</sup> × \$459 thousand/vessel = \$73 million/year  
 (equivalent to VLGC 158 vessels/year)

≒ ¥10 billion/year <sup>(※2)</sup>

※1 CY2021 US imports: 7.11 million tons  
 ※2 Exchange rate: 135 yen/\$

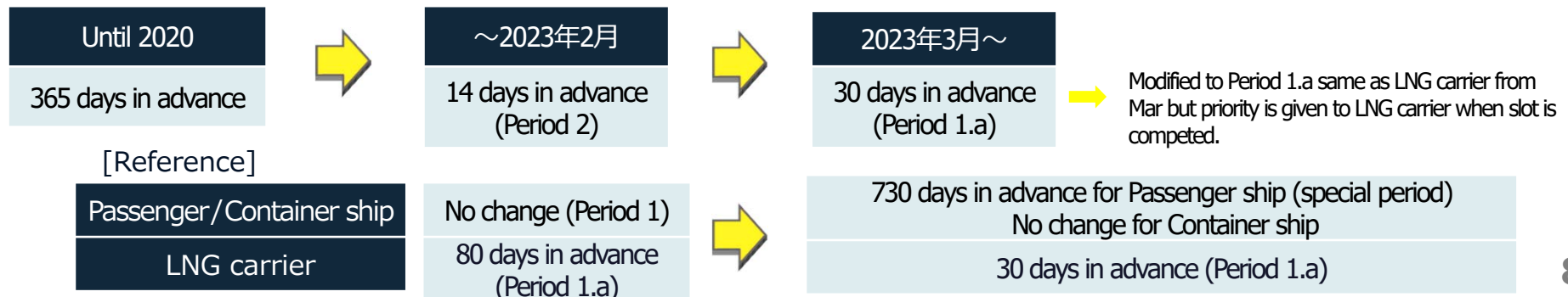
## II . Increase in waiting times



### [Voyage days from US (Gulf of Mexico) to Japan]



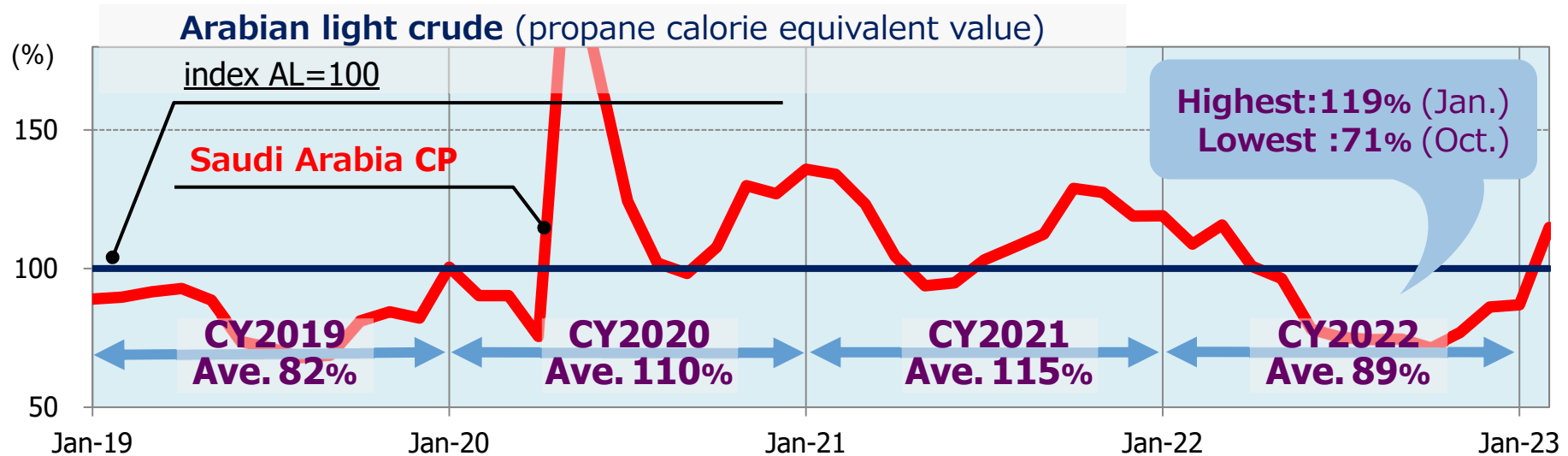
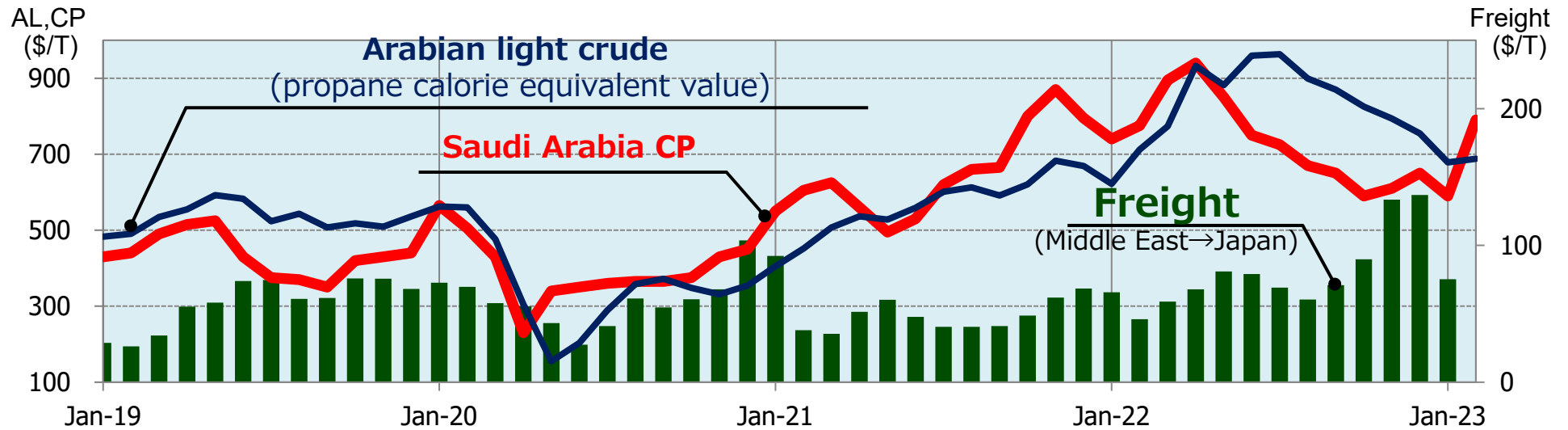
## III . Task for reservation rules



# Arabian Light (AL) Crude Oil and CP Price Trends



- The average AL equivalent of 2019 fell to a record low of 82%.
- From 2020 to 2021, the AL equivalent exceeded 100% due to weak crude oil market brought by COVID-19.
- In 2022, CP dropped much below the AL equivalent for the first time in 3 years (89%)



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## ➤ Establish and maintain supply chains in preparation for disasters.

### Stockpile system

Specified quantities of LP gas are always stockpiled in government and private facilities.

Classification	Stockpiled quantity	Remarks
National stockpile	<b>1,394</b> KT	Equivalent to 50 days imports.
Mandatory private stockpile	<b>1,111</b> KT	Equivalent to 40 days imports.

(as of the end of October 2022)

Relevant law:  
"Oil Stockpiling Act"



Fukushima National Stockpile Base and Adjacent Private Base.

### Mobile Power Generator Cars

Mobile Power Generator Cars are deployed at certain bases for power recovery when electricity supply is lost.

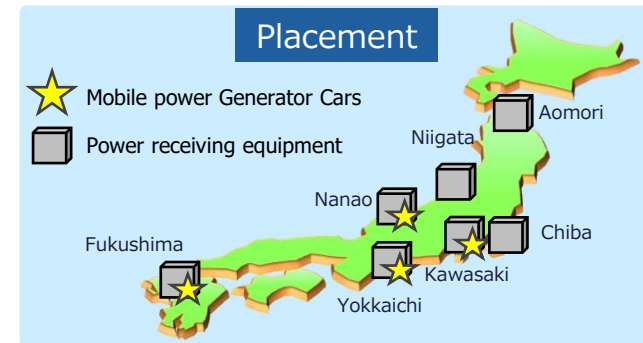


Power connection training

A mobile power generator car connected to power receiving equipment at the base.



Power supply from the on-board generator.



### Collaboration against an Emergency

Build a collaboration system to maintain supply in domestic logistics.

Regional collaboration	Formulation of <b>Emergency supply collaboration plan:</b>	Companies to cooperate within the specific regions and supply LP gas to the disaster area in case of emergency.
Securing traffic routes	Nominated as <b>Designated Public Institution:</b>	LPG trucks are registered as "Emergency Vehicles" those can run major highways even road transportations are restricted in an emergency.
Mutual support between primary suppliers	Conclusion of <b>Mutual assistance agreement:</b>	Mutual support among LP gas companies of the Japan LP Gas Association in the event of supply insecurity in an emergency.

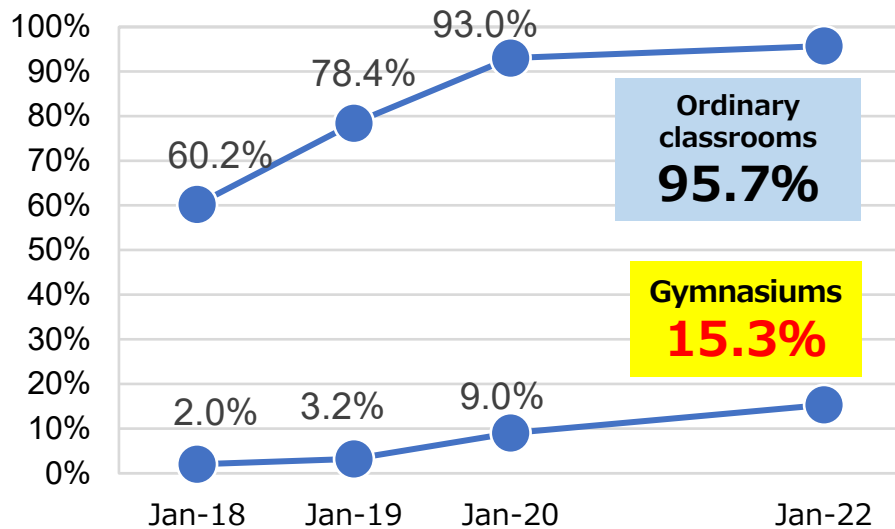


# AC Installation Status of Public Elementary and Junior High School Gymnasiums



- The AC (Air Conditioner) installation rate of public elementary and junior high school gymnasiums nationwide is as long as 15.3%.
- The challenge is to enhance installation of AC in the gymnasiums, which serve as evacuation centers in the event of a disaster.

## AC installation rate



Source: Ministry of Education, Culture, Sports, Science and Technology

## Advantages unique to LP gas

- Long-term storage is possible as LP gas does not degrade.
- Disaster response capability due to being decentralized energy
- Good communication/relations with local governments



## 【Gymnasiums details】

Number of gymnasiums	Number of installations	Installation rate
35,437	5,422	15.3%

Approximately 150 schools with LP gas types (LP gas activated) for gymnasiums  
 → Only 2.8% with LP gas types

## Bulk System installations subsidized by government

(Unit: Hundred million yen)

FY2021	FY2022	FY2023
33.6	40.4	49.0
		33.3 + 15.7
		(Self-defense stockpile budget) (Tank introduction budget)

※Including supplementary budget

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**Established**

October 18, 2021

**Members**

Astomos Energy, ENEOS GLOBE, GYXIS, Japan Gas Energy, Iwatani, JLPGA (sub-member)

	Project 1	Project 2
Announcement date	<b>October 20, 2021</b>	<b>Adopted on February 25, 2022</b>
Development theme	Inter cooler (ITC) type multi-stage LP gas direct synthesis method ( <b>self-funded research</b> )	Research and development of carbon recycling LP gas technology ( <b>NEDO project</b> )
Development period	<b>October 2021 to 2024</b>	<b>From April 2022</b>
Development system	<b>Empirical research with Professor Kaoru Fujimoto of the HiBD Research Institute (Emeritus Professor of University of Tokyo, Specially Appointed Professor of the University of Kitakyushu) in collaboration with the Kitakyushu City University.</b>	Empirical research with <b>the National Institute of Advanced Industrial Science and Technology (AIST)</b> and <b>N.E. Chemcat Corporation (a major catalyst manufacturer)</b>

Phase 2: 2025-2030

**Conducting Scale-up of empirical research for social implementation: Plant (100 kg/day)**

Phase 3: 2030-2050

**Early 2030s : Realization of social implementation / 10 to 100 tons/day**

**Until 2050 : Aiming to replace all LP gas demand with green LP gas**



# LP Gas Synthesis Technology Development in Japan and Overseas



	Business Operator	Collaborators, etc.	Business Summary	Budget scale, etc.	Implementation Period
Domestic	Furukawa Electric	Astomos Energy Iwatani Hokkaido University/Shizuoka University	LP gas synthesis from synthesis gas obtained by dry reforming reaction of biogas obtained from livestock manure	Ministry of Economy, Trade and Industry (GI Fund) Approx. 3.6 billion yen	~FY2030
	University of Toyama Nippon Steel	ENEOS GLOBE	Joint research and development of carbon recycling LP gas production technology and processes.	NEDO; Effective use of technology and project demonstration of CO2 at research and development bases.	~FY2024
	Kubota	Kyoto University Waseda University	Synthesis of LP gas using biogas obtained by collecting rice straw as a raw material (1 <sup>st</sup> year entrusted deposit : 190 million yen)	Ministry of the Environment; Demonstration project of innovative catalyst technology for decarbonization through regional resource recycling	~FY2029
	Kochi Prefecture	Waseda University Kochi University	Synthesis from algae and wood-based biogas	Approx. 15 billion yen	
Overseas	NESTE	SHV (Netherlands)	SHV takes over bio-LP gas (40,000 tons/year) produced as a by-product at NESTE's biodiesel plant in Rotterdam, Netherlands.	6 billion euros (9 billion yen)	End of 2016~
	Dimeta B.V.	SHV(Netherlands) UGI(U.S.A.)	Production of 50,000 tons per year of bio-DME (rDME) using household waste in the northeast of England (Teesworks)	150 million pounds (25 billion yen)	Operation starts from mid-2024
	UGI (U.S.A.) (AmeriGas)	GCEH	UGI takes over 20,000 to 30,000 tons/year of bio-LP gas produced at the bio plant of GCEH (Global Clean Energy Holdings) in California (Bakersfield) and sells it at local areas.		2022~



## Purpose of establishment of study group

(First meeting) July 26, 2022

- In order to realize a carbon-neutral society by 2050, a number of projects aimed at developing green LP gas production technology are being launched within the LPG industry.
- On the other hand, there is no place for the public and private sectors to share and discuss issues such as creating milestones for social implementation, unifying quality standards, and reducing the energy consumption of combustion equipment during the “transition period”.
- For solving these issues, and for public and private sectors to hold wide-range discussions and share the information, Japan LP Gas Association (Institute of Japan Green LP Gas Promotion) takes the initiative in setting up a study group with the participation of the Ministry of Economy, Trade and Industry.

## Study group members

Chair: Kikkawa, Vice President of International University of Japan  
 Secretariat: Japan LP Gas Association

Industry	Japan LP Gas Association (Institute of Japan Green LP Gas Promotion), Japan L. P. Gas Sales Association, Furukawa Electric, Kubota, Japan Industrial Association of Gas and Kerosene Appliances
Academic	Professor Sekine (Waseda University), NEDO, AIST
Government	Ministry of Economy, Trade and Industry (METI)



L) Mr. Kikkawa, VP of IUJ  
 R) Mr. Sadamitsu, Director-General, Natural Resources and Fuel Department

## Discussion themes at the study groups (examples)

- ✓ Creating milestones for the LP gas industry toward social implementation
- ✓ Future procurement methods for hydrogen and CO<sub>2</sub>
- ✓ Promotion of the energy-saving equipment during the “transition period”
- ✓ Clarifying the position of CNLPG (voluntary carbon credits) and organizing issues
- ✓ Creating new quality standards/Ensuring safety/Third-party certification as a non-fossil fuel, etc.

Law/standard name		Regulation of LPG Act <sup>1</sup>			JIS K 2240							Quality guidelines		Test method	
Item	Unit	No. 1	No.2	No.3	Type 1 No. 1	Type 1 No.2	Type 1 No.3	Type 2 No.1	Type 2 No.2	Type 2 No.3	Type 2 No.4	Propane	Butane		
Density (15°C)	g/cm <sup>3</sup>	—			0.500~0.620							0.500~0.620		JIS K 2240	
Vapor pressure (40°C)	MPa	1.53 max.			1.53 max.			1.55 max.		1.25 max. 0.52 max.		1.53 max.	0.52 max.		
Component														JIS K 2240 ASTM D2163	
Ethane	mol%	5 max.			5 max.			—				5.0 Max.	Report		
Ethylene		<b>80 min.</b>	60 min. under 80	Under 60	<b>80 min.</b>	60 min. under 80	Under 60	90 min.	50 min. under 90	Under 50	10 max.	<b>92.0 min.</b>	Report		
Propane		— <sup>2</sup>		20 max.	40 max.	30 min.	10 max.	50 max.	50 min. under 90	90 min.	Report	95.0 min.			
Propylene												Report	2.0 max.		
Butane		0.5 max.			0.5 max.			—				Under 0.1 wt%			
Butylene												Report	2.0 max.		
1,3-butadiene												Report	2.0 max.		
Pentane															
Copper stripe corrosion									1 max.				1 max.		JIS K 2240
Sulfur		mg/kg	—						50 max.				50 max.		
Evaporation residue	mg/kg											10 max.		JLPGA-S-03	
Free water												None <sup>4</sup>		JLPGA-S-02	
Mercury	mg/Nm <sup>3</sup>	No corrosion to supply equipment <sup>3</sup>										0.009 max.	0.08 max.	JLPGA-S-07	

92.0% or more is required to satisfy No.1 of the Act on Liquefied Petroleum Gas because heavy components are concentrated when repeatedly filled.

- ※1 Article 12, Paragraph 1 of the Act on the Securing of Safety and the Optimization of Transaction of Liquefied Petroleum Gas (LPG Act)
- ※2 Liquefied petroleum gas according to Article 2 of LPG Act refers to gas mainly composed of propane, butane, and hydrocarbons (propylene) specified by cabinet order.
- ※3 Enforcement of Regulation exemplary standard 39
- ※4 If it is 70 mass fraction ppm or less for propane and 40 mass fraction ppm or less for butane, it is determined that there is no free water.
- ※5 In addition, quality guidelines stipulate the addition of methanol to propane in winter season (maximum 2,400ppm).

## 2023 Slogans of the Japan LP Gas Association

**LP gas that supports a green future and life**

～ Aiming for coexistence with the earth ～

**Ensure stable supply**

**Strengthen resilience capabilities**

**For the contribution to the realization of a Carbon Neutral (CN) society**

- Support transitions
- Greening of LP gas



Thank you for your kind attention.

ご清聴ありがとうございました。



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LPGAS  
ASSOCIATION**

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