THE JAPAN GAS ASSOCIATION

GASEX2014 HONG KONG Conference & Exhibition

Member Economy Report

Current Status of Gas Industry in Japan

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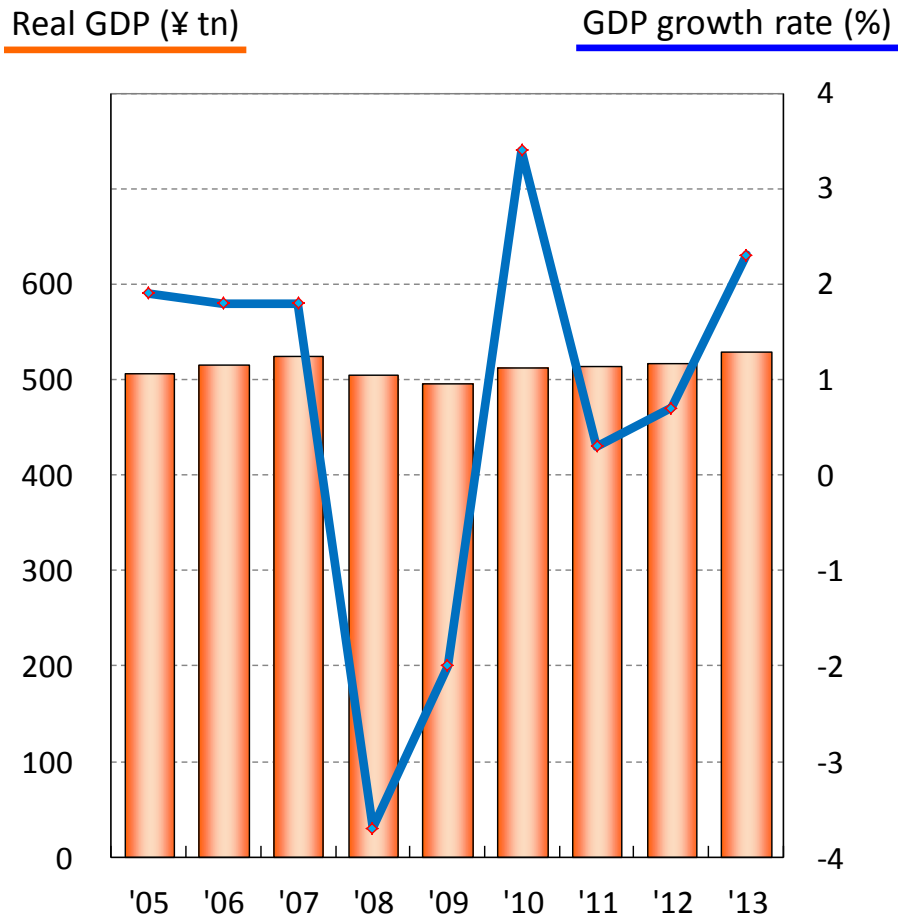
1. Japan’s Energy Situation

General Information on Japan

Basic data

Land area	377,900 sq km
Population	127 M
Total exports	¥69.8 tn
Total imports	¥81.2 tn
Trade balance	-¥11,4 tn
LNG imports (FY 2013)	87.7 Mt ¥7.3 tn

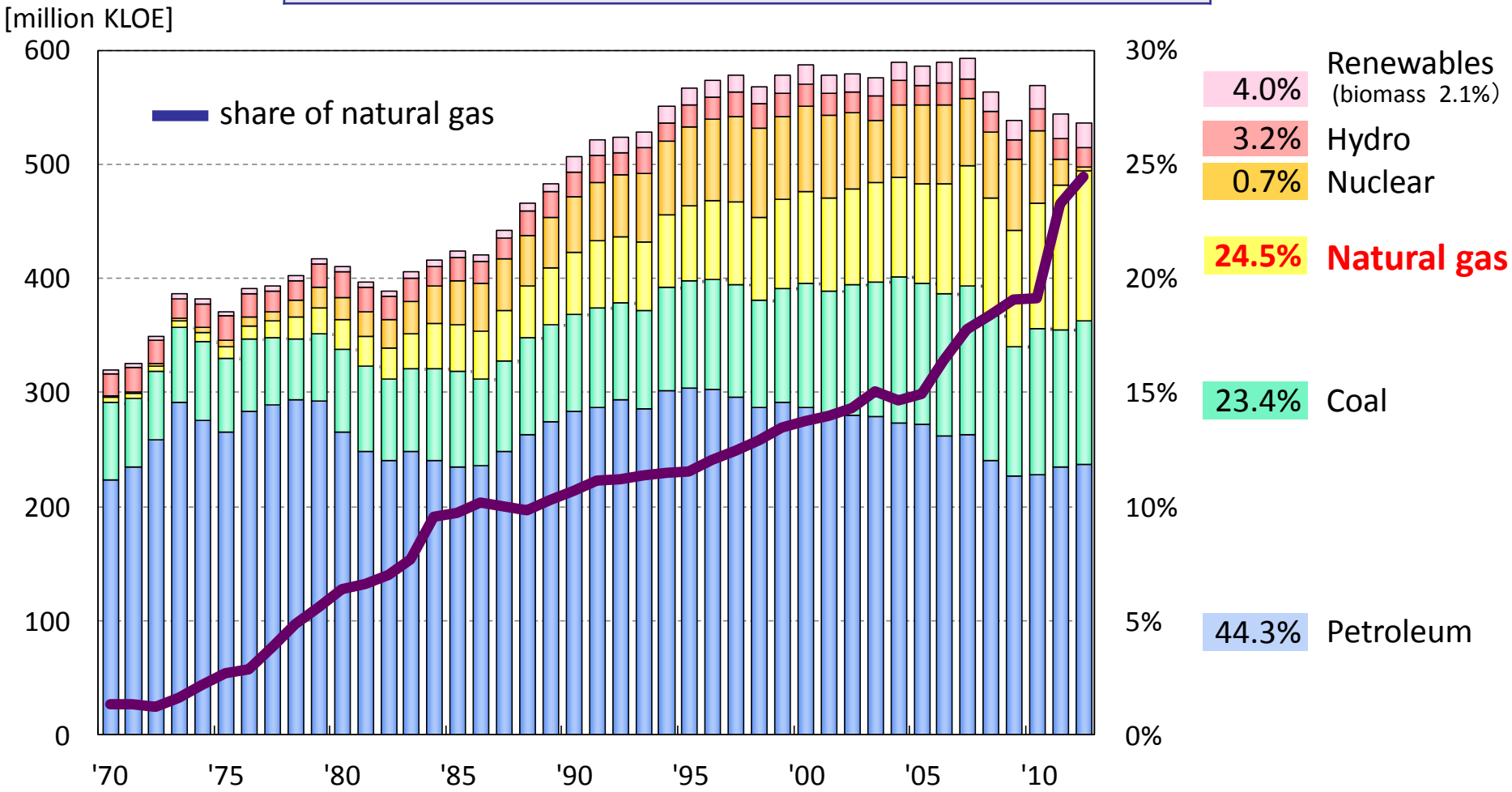
Real GDP & GDP growth rates



Sources: Ministry of Internal Affairs and Communications, Japan Statistical Yearbook; Cabinet Office, Annual Report on National Accounts; Ministry of Finance, Trade Statistics of Japan; IEEJ, Energy Economy Handbook

Primary Energy Supply

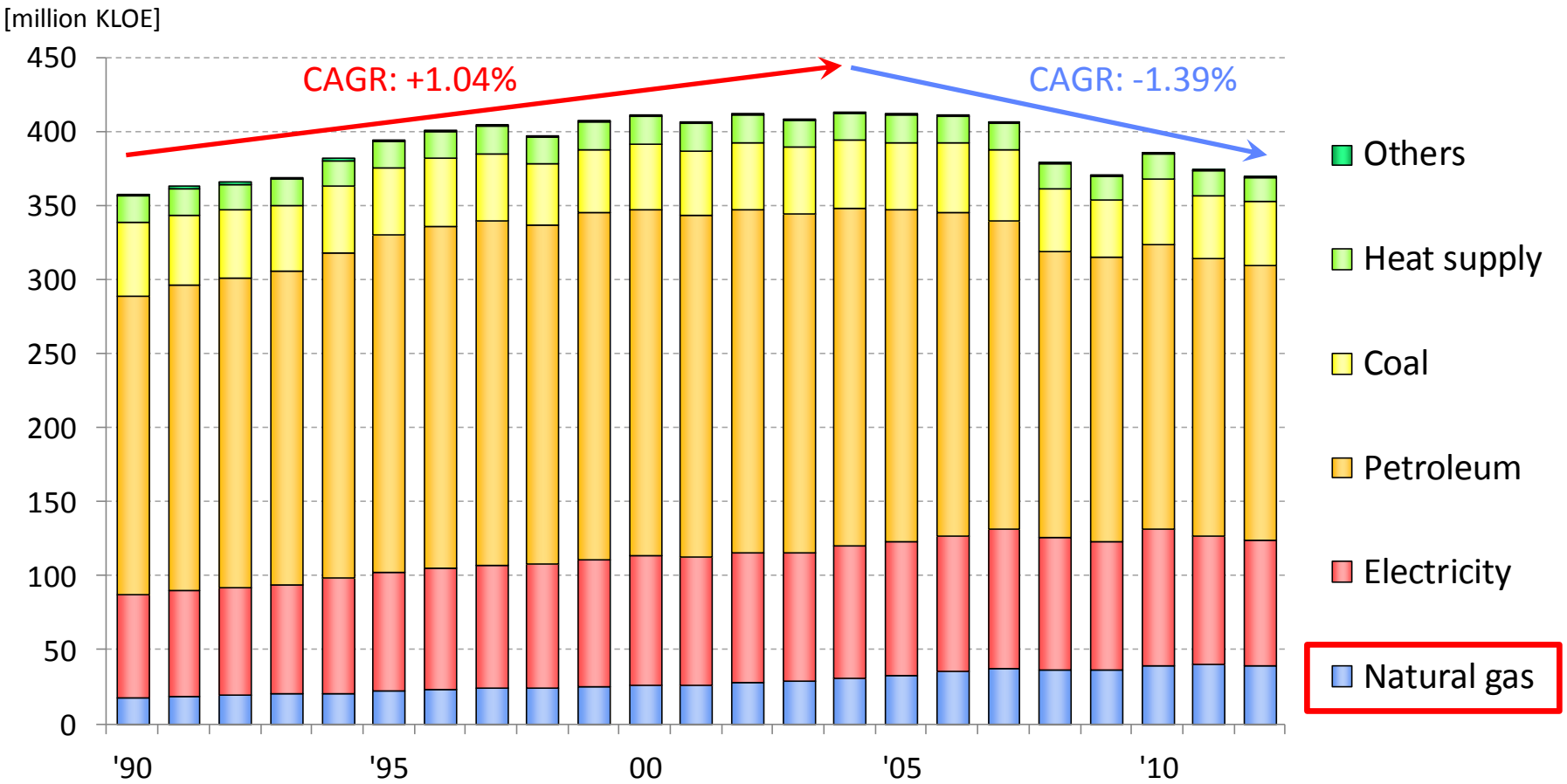
Primary energy supply :	537.6 million KLOE
Natural Gas:	131.6 million KLOE
Energy self-sufficiency:	8.7% (including nuclear)



Sources: Calculated from Agency for Natural Resources (METI), *FY 2012 Energy Supply and Demand Report and Energy White Paper*

Final Energy Consumption

Final energy consumption			Natural gas (mainly city gas)		
FY1990	FY2012	CAGR	FY1990	FY2012	CAGR
359 M KLOE	370 M KLOE	+ 0.15%	17.8 M KLOE **(5%)**	39.8M KLOE **(11%)**	+ 3.71%

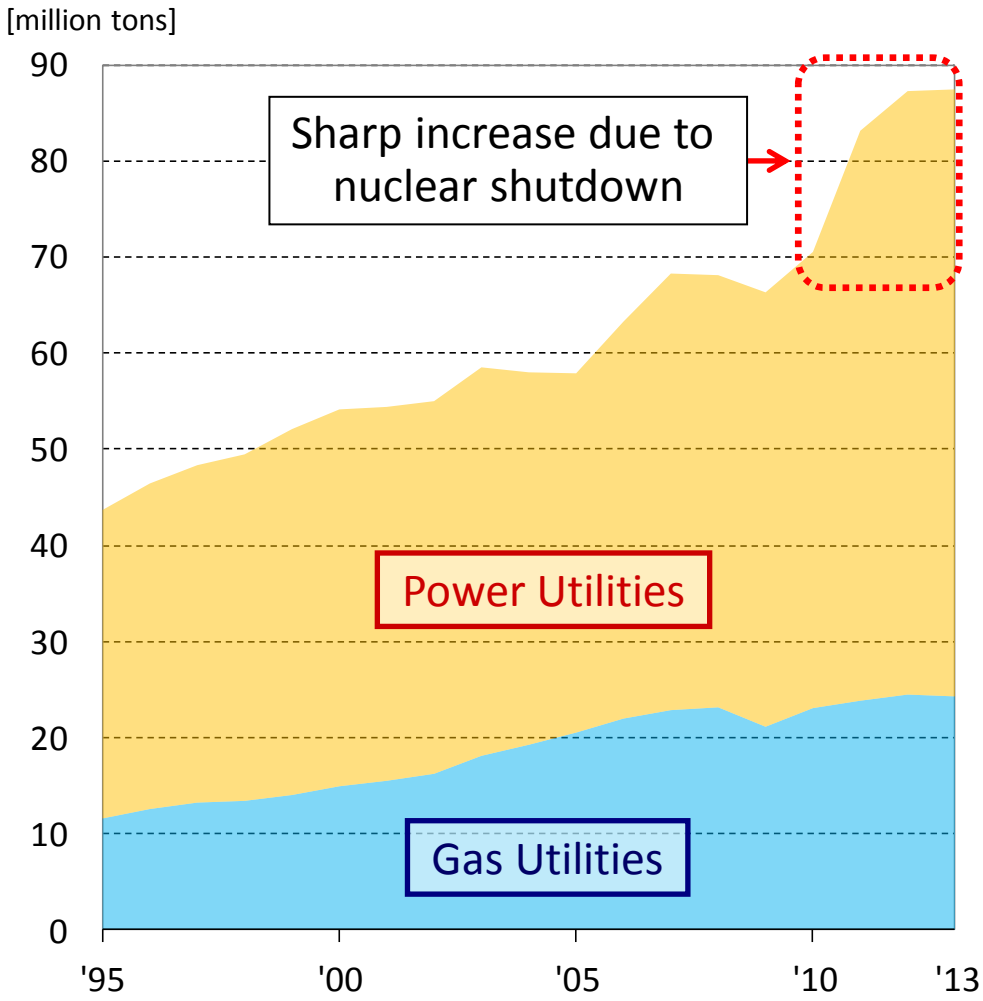


Sources: Calculated from Agency for Natural Resources (METI), *FY 2012 Energy Supply and Demand Report*

LNG Imports

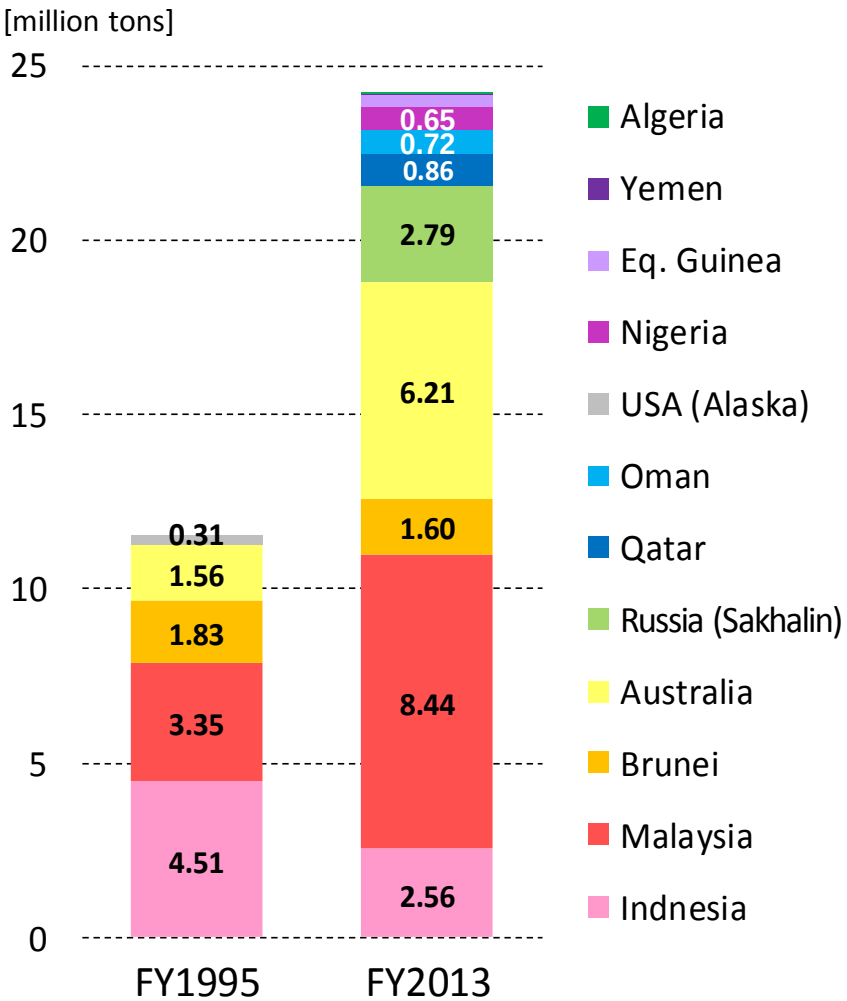
LNG import volume

Total LNG imports [FY2013]: 87.5 million tons



LNG import by gas utilities

[FY2013] 24.3 million ton (28% of total imports)



Source: JGA, *Gas Business Handbook, 2014*

Methane Hydrate Development

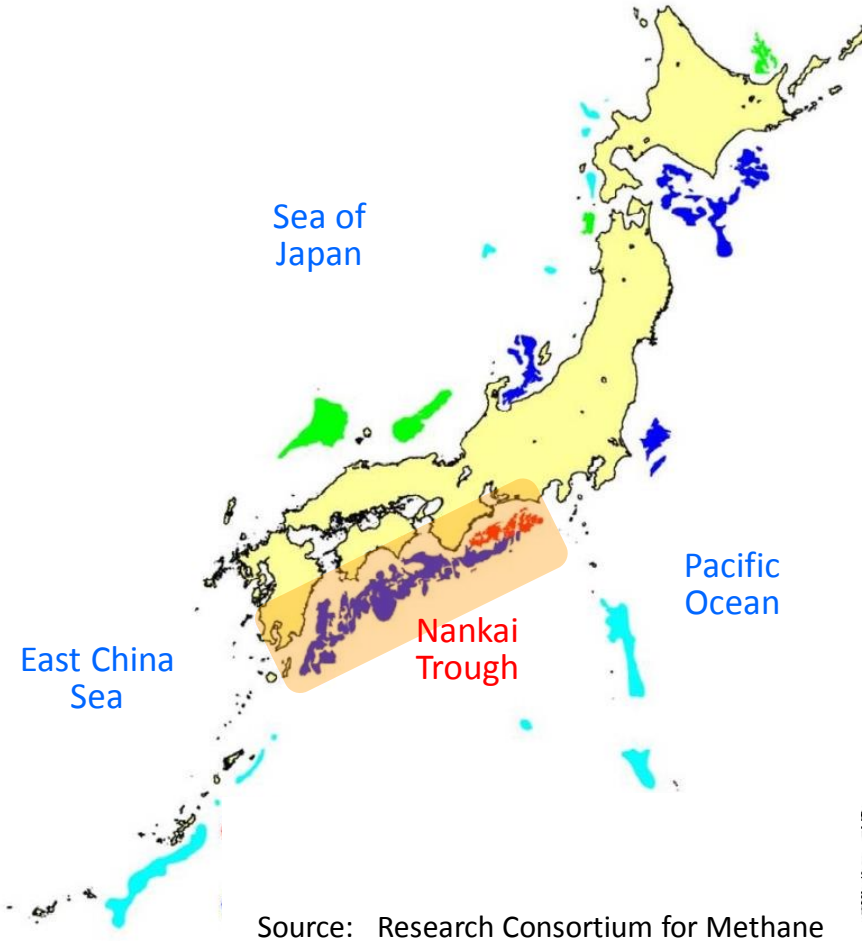
Steps toward commercial gas extraction

Phase 1 2001-08	• Basic research • Resource survey in Japan's EEZ • On-shore production tests in Canada
Phase 2 2009-15	• Offshore production tests World first gas extraction from ocean floor methane hydrate (March 2013)  • Long-term on-shore production tests in Alaska
Phase 3 2016-18	• Preparations for commercial extraction • Comprehensive evaluation (e.g. economic viability, environmental impact)

Source: : JOGMEC

Estimated resource areas

Total size of resource areas: 122K sq km



Source: Research Consortium for Methane Hydrate Resources in Japan (MH21)

Japan's 4th Strategic Energy Plan

BASIC VIEWPOINT	**3E + S** = Energy Security Economic Efficiency + Safety Environment
TARGET	Build a "multilayered and diversified flexible energy supply-demand structure"
POLICY DIRECTIONS	➢ Creation of a multilayered supply structure with various energy sources ➢ Promotion of a resilient energy supply structure ➢ Promotion of new entrants into the energy market through structural reforms ➢ Creation of an efficient energy market through providing various options to end users ➢ Improvement of self efficiency by developing and introducing indigenous energies ➢ Contribution to global warming countermeasures

Positions of Energy Sources in Strategic Energy Plan

Nuclear

Position in the 4th Strategic Energy Plan

- Important base-load power source
- Reduce dependence as much as possible

Policy directions

- Possible restart of Sendai Nuclear Power Plant early next year followed by others

Renewables

Position in the 4th Strategic Energy Plan

- Important diverse and promising domestic low carbon energy source

Policy directions

- Review of feed-in tariff (FIT) program launched in 2012

Coal

Position in the 4th Strategic Energy Plan

- Important base-load power source with excellent supply stability and economics
- Reduce environmental burden

Policy directions

- Development of advanced coal fired power generation
  - IGCC (Integrated Coal Gasification Combined Cycle)
  - A-USC (Advanced Ultra Supercritical Power Plant)
- Practical realization of CCS after 2020

Impact on future natural gas demand

Position of Natural Gas in Strategic Energy Plan

Natural Gas

Position in the 4th Strategic Energy Plan

- **Important energy source with expanded role**
- Fuel for intermediate-load power station

Characteristics

- Least carbon intensive among fossil fuels
- Low geopolitical risk thanks to disperse reserves

Policy directions

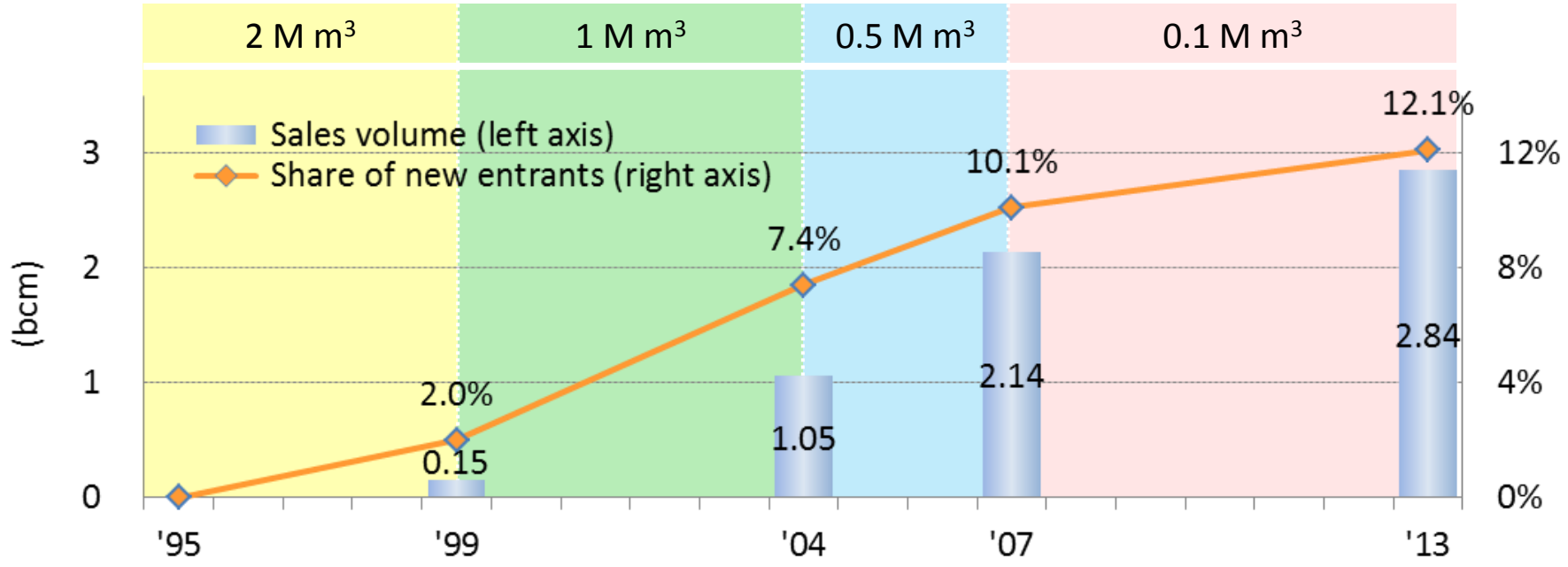
- Procurement cost reduction
  - Diversification of supply source, contractual terms, etc.
- Steady energy shift toward wider natural gas use
- Sophisticated and efficient natural gas use
  - Diversified application (distributed generation, cogeneration, etc.)

Gas Market Liberalization

Liberalization of gas retail market

	1995	1999	2004	2007	2017?
Threshold for liberalization (Annual contracted volume)	2 mil. m^3	1 mil. m^3	0.5 mil. m^3	0.1 mil. m^3	Full Liberalization?
Share of gas demand in liberalized market	46%	50%	54%	61%	

Share of new market entrants

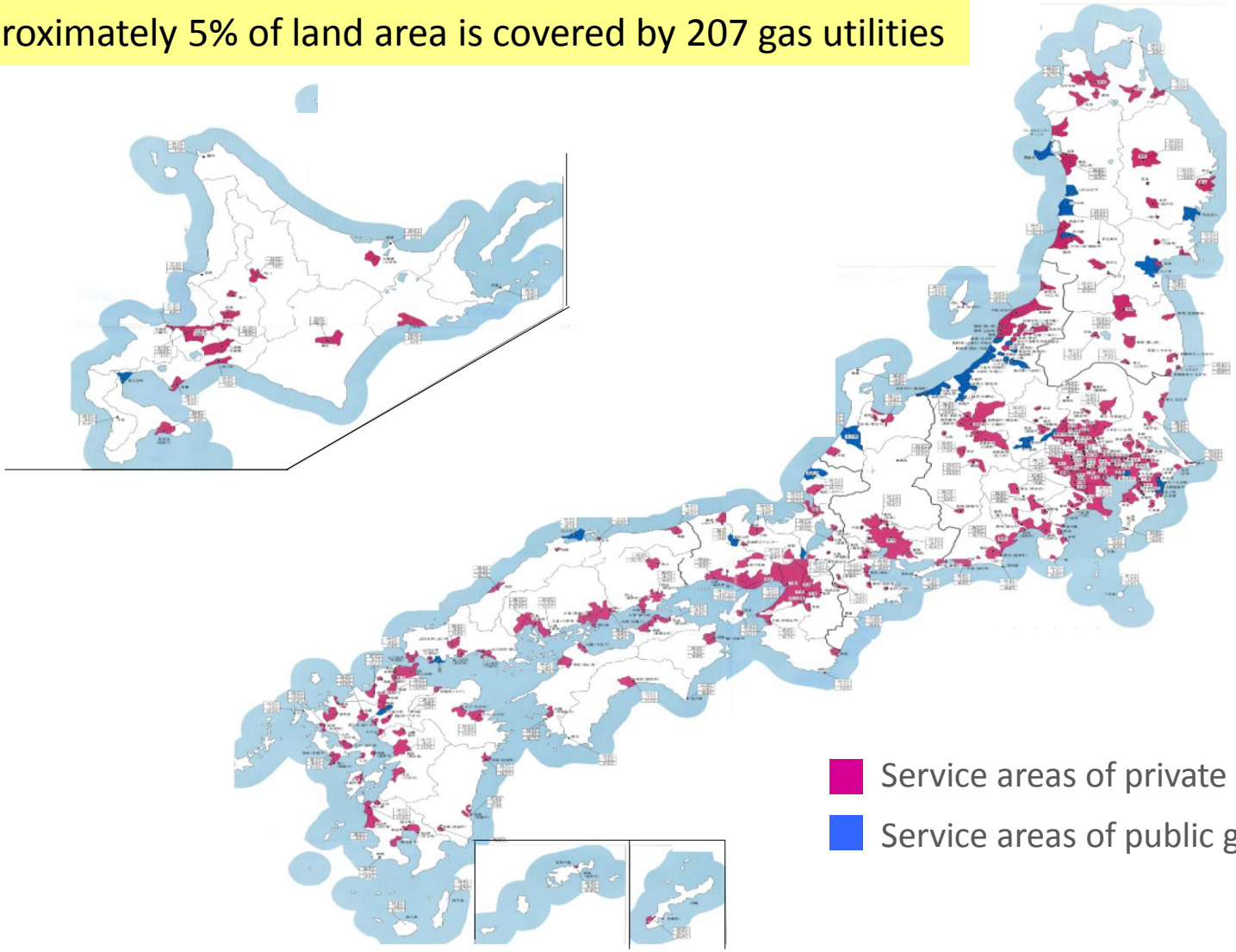


2. Overview of Japan's Gas Industry

Overview of Japan's gas industry

Gas utilities' service areas

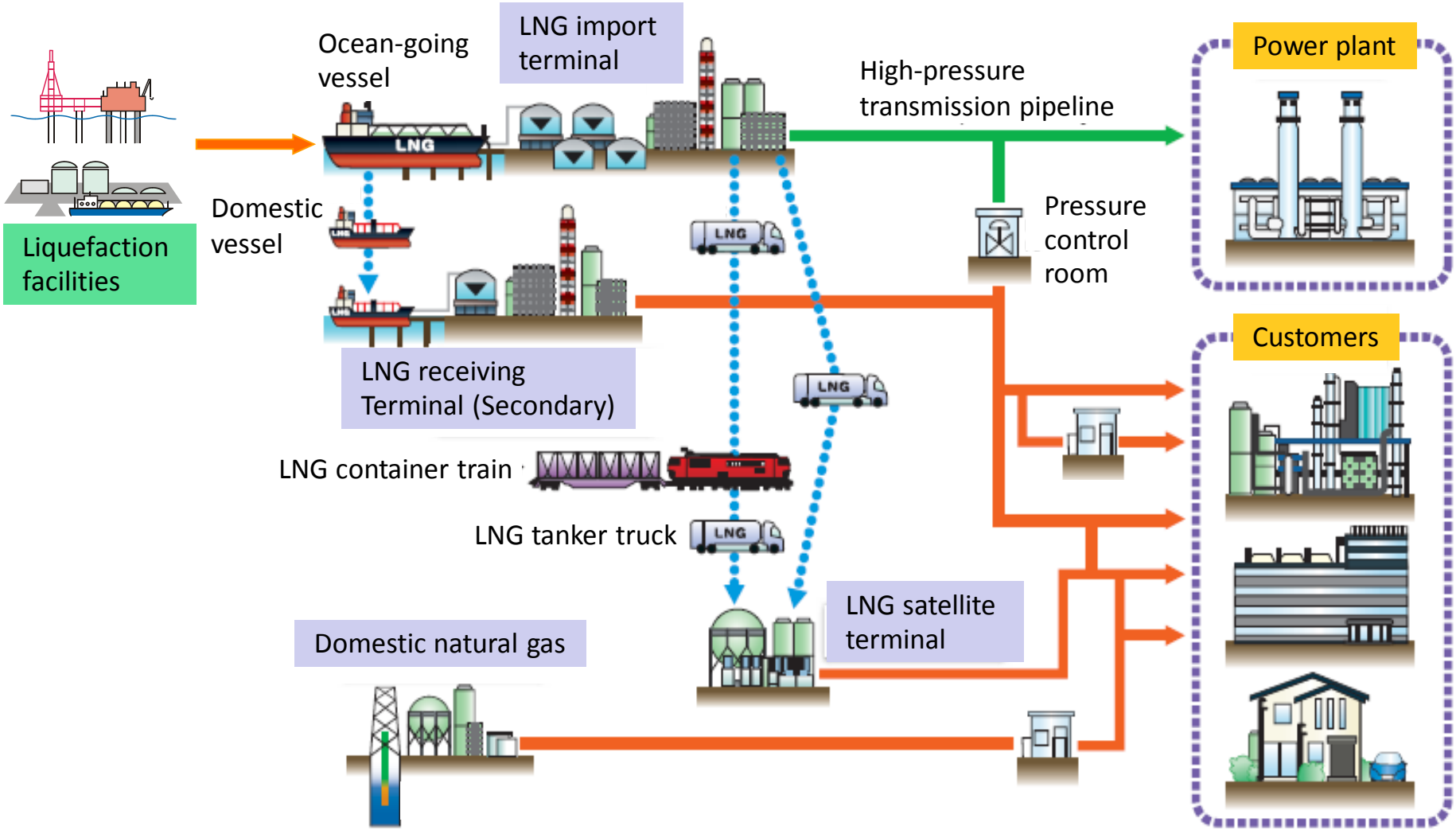
Approximately 5% of land area is covered by 207 gas utilities



Source : JGA, Gas Energy News

Overview of Japan's gas industry

Each vertically integrated gas utility is responsible for entire process of "gas value chain" from gas procurement to distribution to sale of city gas



Diversification for Stable & Competitive NG Procurement

Supplier diversification

- New suppliers
  (Queensland, North America, East Africa, etc.)

Pricing diversification

- US/European gas price-indexed formula
- Futures market and Asian hub price

Delivery mode diversification

- LNG vessel fleet
- International pipeline

Resource diversification

- LNG from unconventional gas
- Methane hydrate

US LNG

Freeport (2018-)
Osaka Gas: 2.2 Mt/year

Cove Point (2017-)
Tokyo Gas: 1.4 Mt/year

Cameron (2018-)
Tokyo Gas: 0.52 Mt/year
Toho Gas: 0.3 Mt/year

Queensland LNG

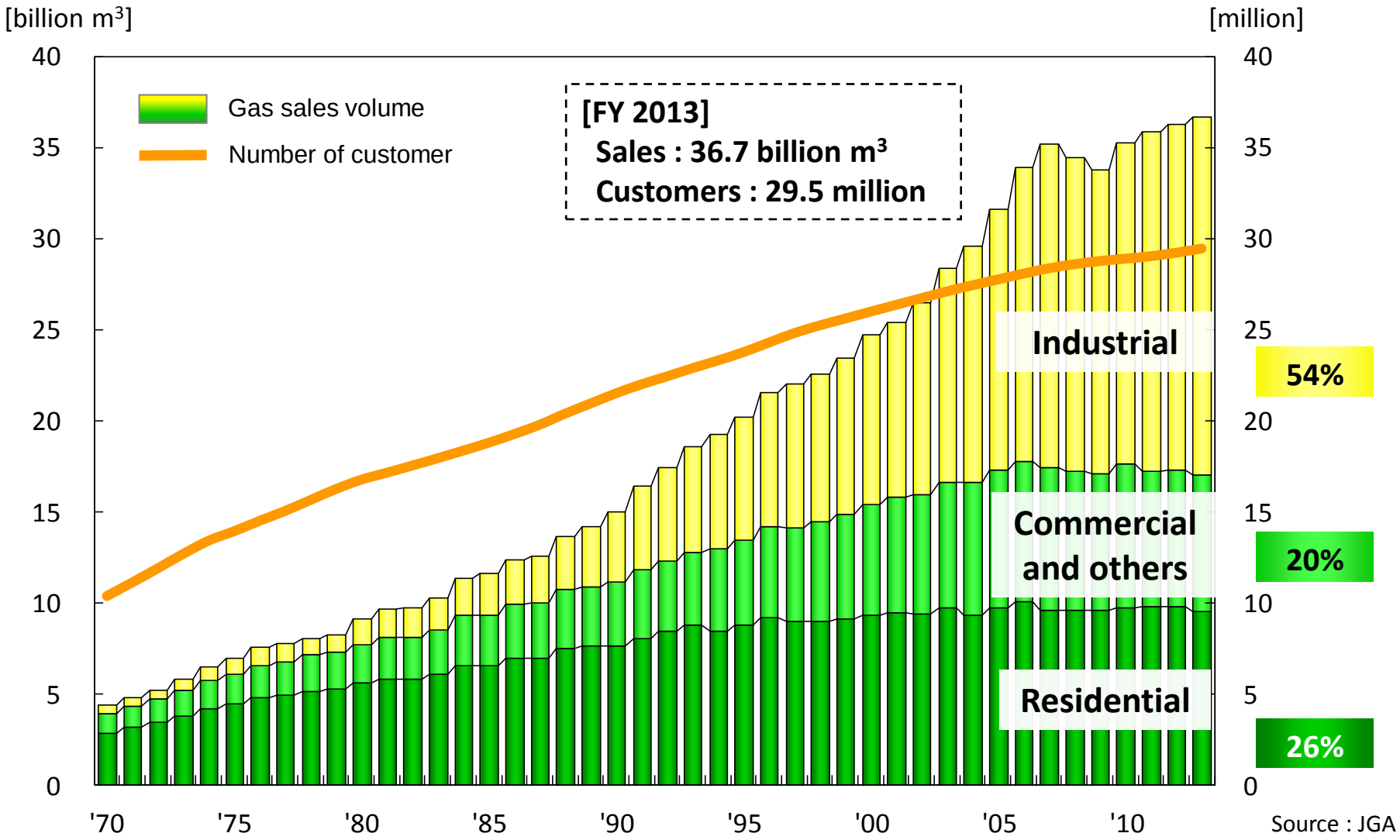
QCLNG (2015-)
Tokyo Gas: 1.2 Mt/year

New Addition to LNG vessel Fleet

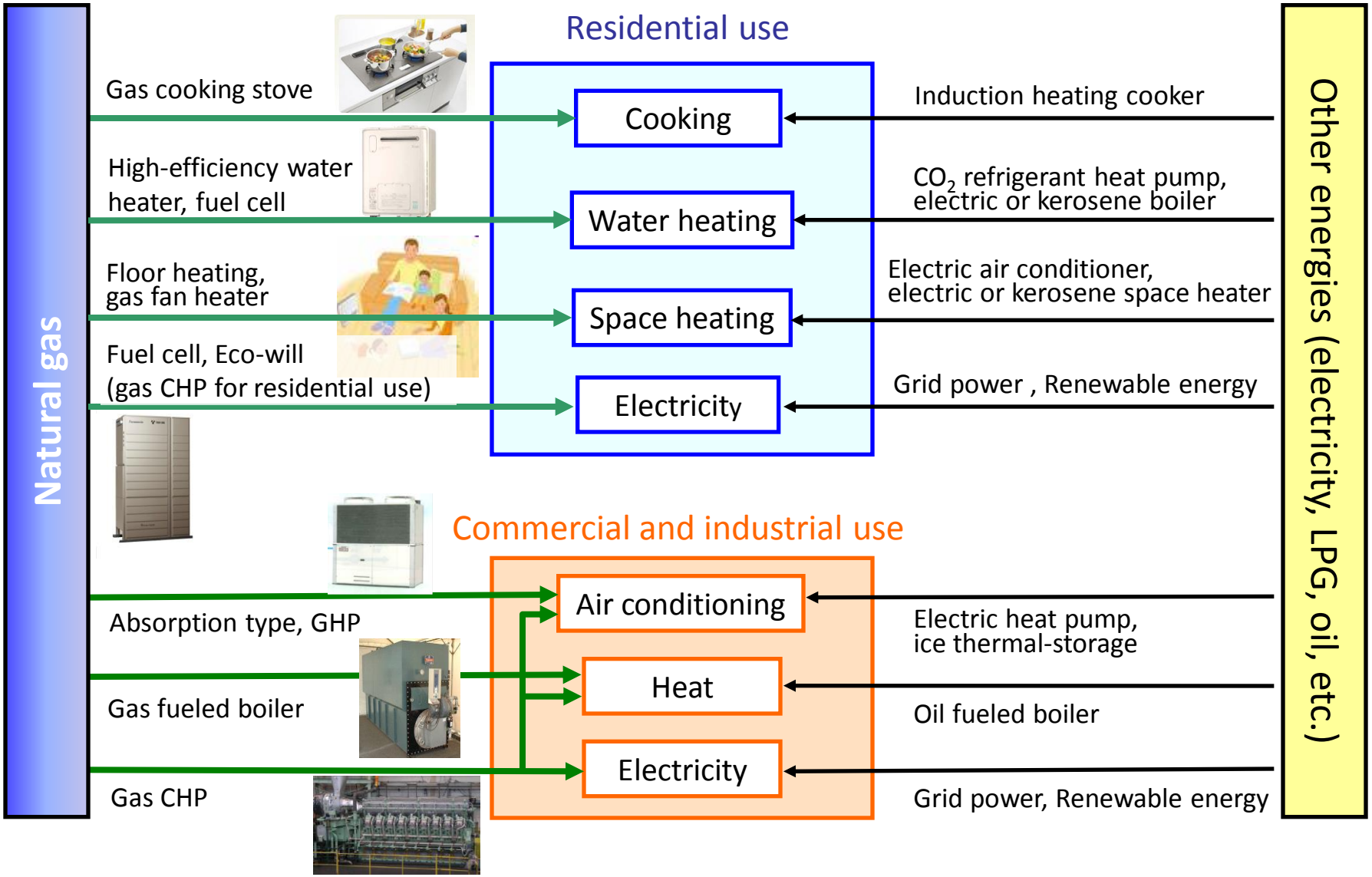
Tokyo Gas: 2 x SPB type vessels
Osaka Gas: 2 x “Peapod” vessels

Sales Volume and Number of Customers

Wider use of gas in the industrial sector has been the driver of sales volume increase



Competitive environment surrounding natural gas



JGA's "Gas Vision 2030": Toward wider use of natural gas

Major Targets

2012		2030
Cogeneration		
4.82 GW	6x	**30 GW**
Gas air conditioning (peak shaving effect)		
14 GW equivalent	2x	**26 GW Equivalent**
Industrial heat demand (market share)		
11.5%	2x	**25%**
Residential fuel cell (units)		
40,000	125x	**5.3 mil.** (incl. LPG fueled)
Natural gas vehicle (units)		
40,000	12x	**500,000**

Expected Effects

Stabilize Power Supply

- 15% of total power demand
- Peak shaving effect: 38 - 43 GW

Save Energy

- 826 KLOE

  (2% of total final energy consumption)

Reduce CO2 Emission

- 62 mil. ton - CO2

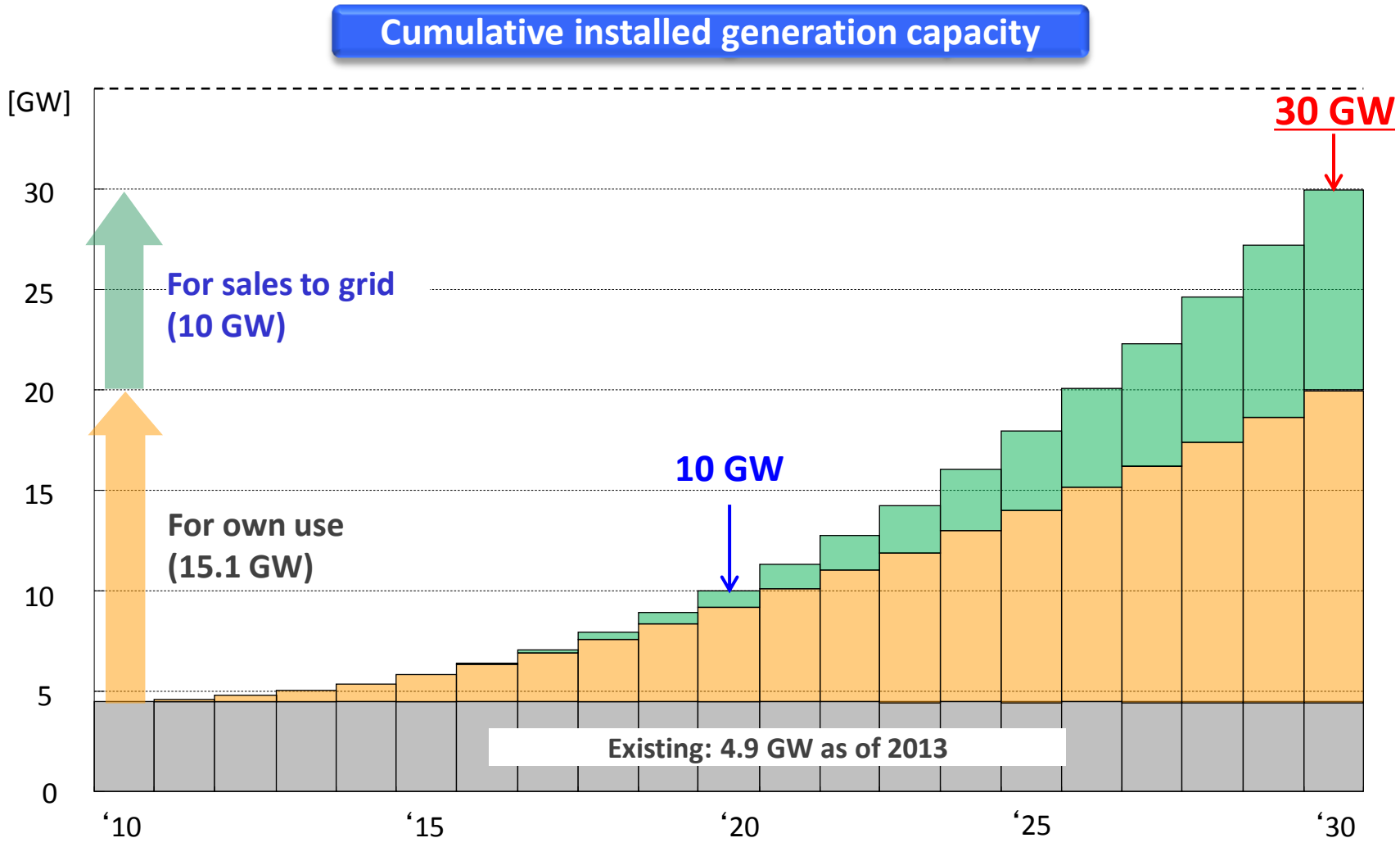
  (5% of total CO2 emission)

Boost Economy

- CAPEX: 1.2 - 1.5 trillion yen

Source: Japan Gas Association, "Expand Natural Gas Use to 2030" Revised since October 27, 2011 release

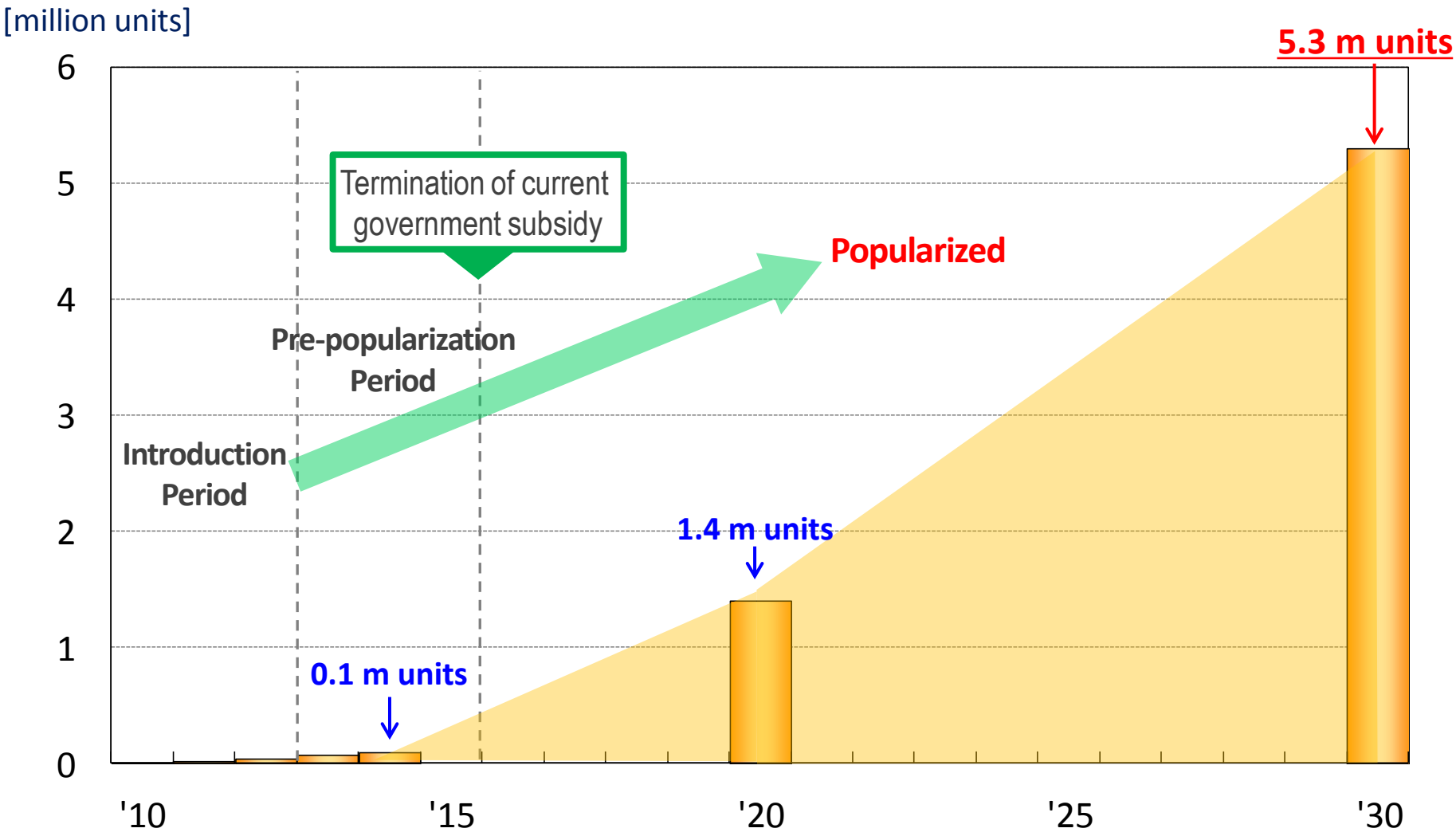
Wider use of cogeneration systems



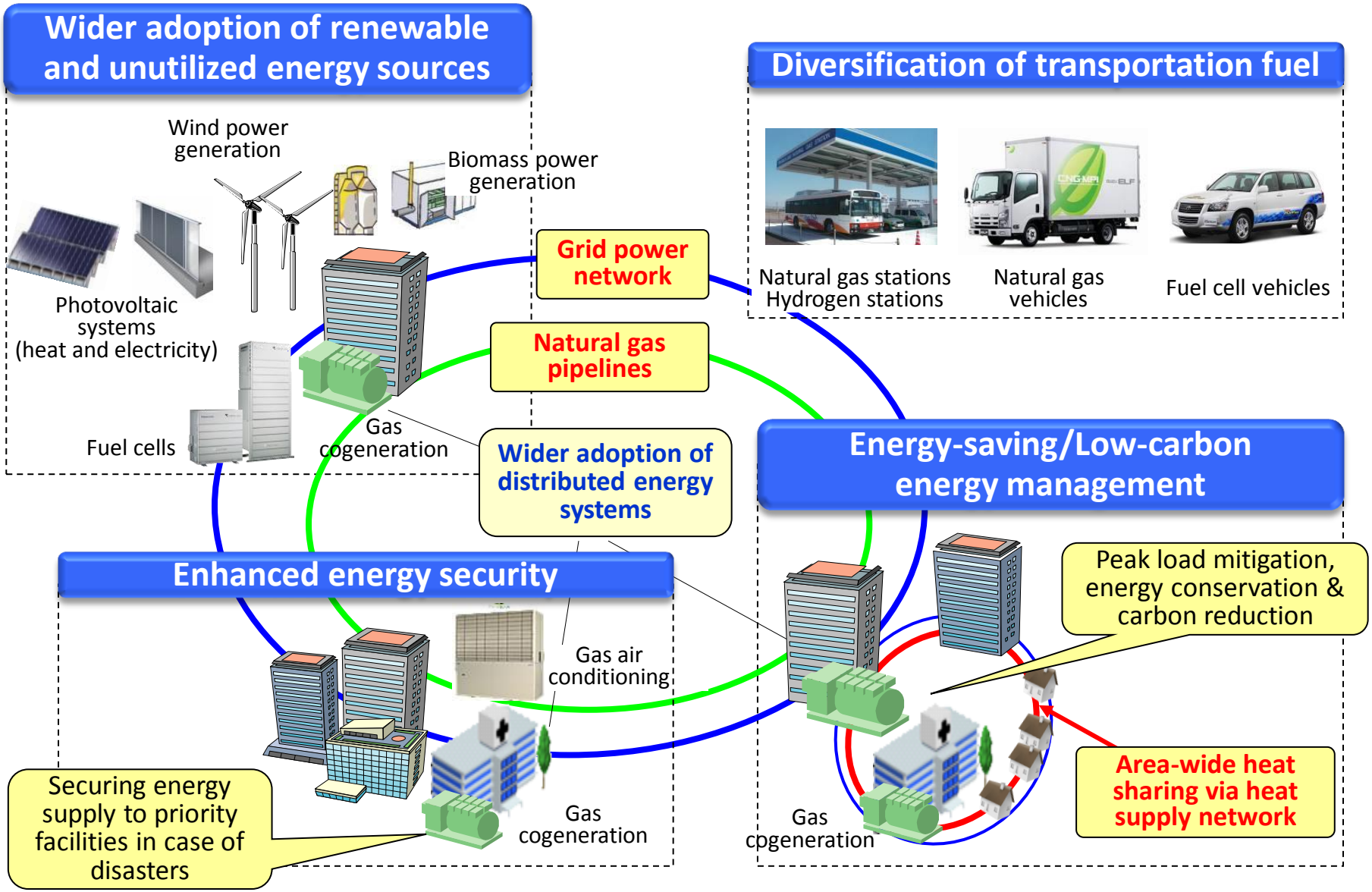
Performance upgrades and incentive measures are essential to achieve this aggressive target

Wider use of residential fuel cell

Roadmap toward popularization

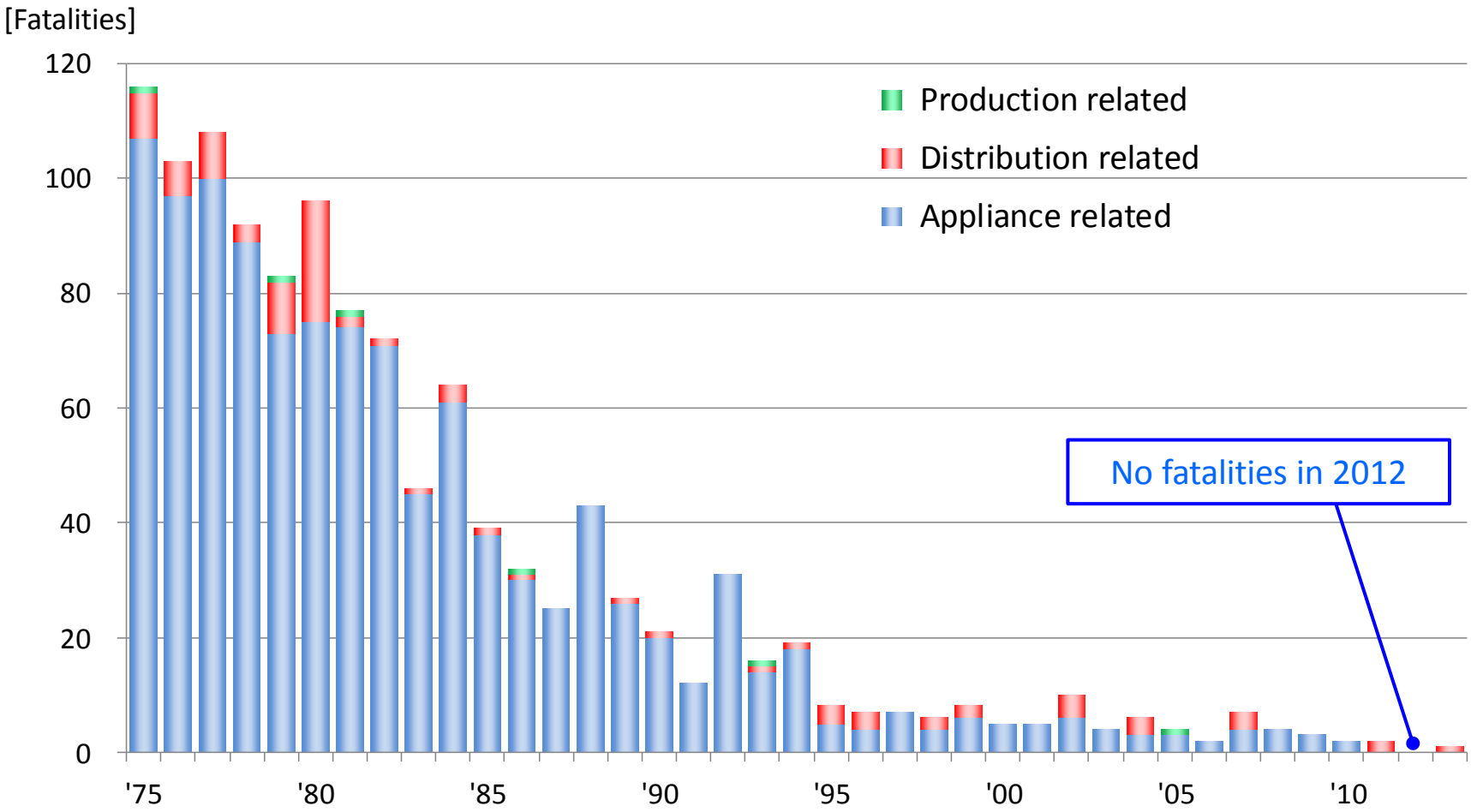


Smart Energy Network centered around Gas Cogeneration System



Fatalities from city gas related accidents

Death toll from City gas related accidents in Japan has declined from 100+ to almost **ZERO** in 35 years



Source: JGA

Thank you for your attention.

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