

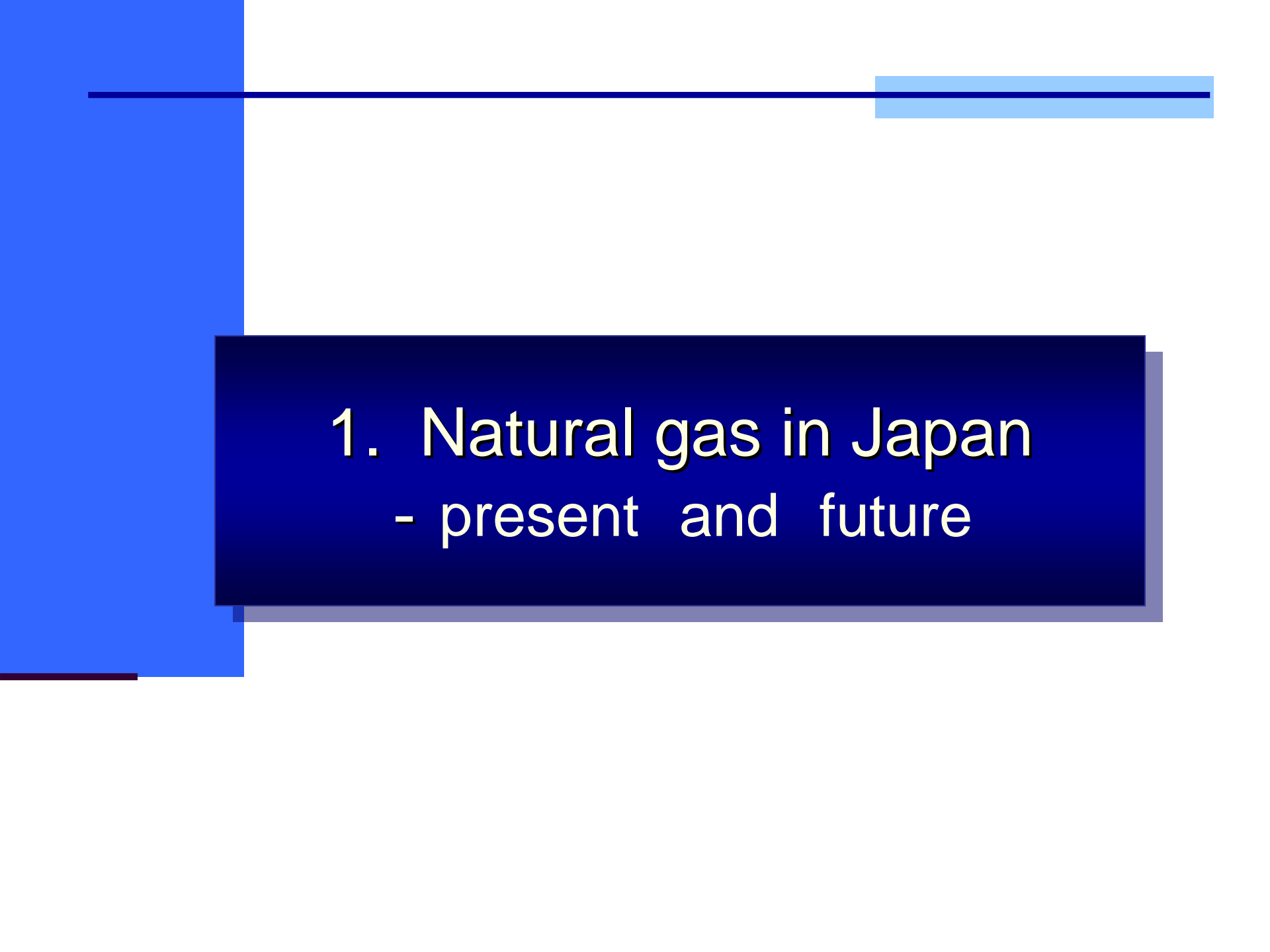
The 3rd IAEE Asian Conference

Contribution of Natural Gas to Sustainable Growth of Asia

20 February, 2012

**Hiroshi Ozaki
President
Osaka Gas Co., Ltd.**

- 1. Natural gas in Japan: present and future**
- 2. Technology for natural gas**
- 3. Role of natural gas in Asia**
- 4. Issues in furthering the role of natural gas**
- 5. Conclusion**

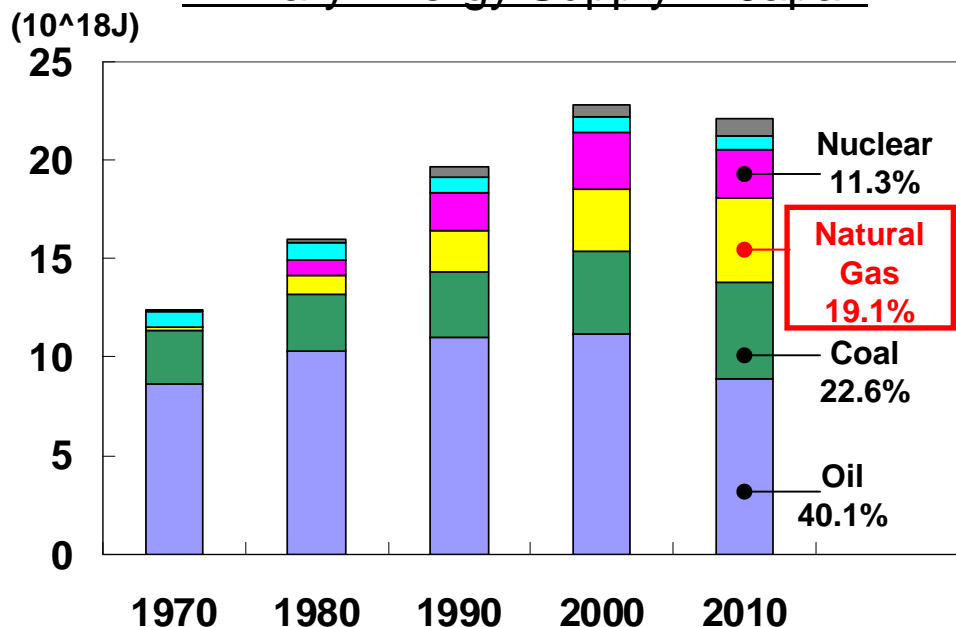


1. Natural gas in Japan

- present and future

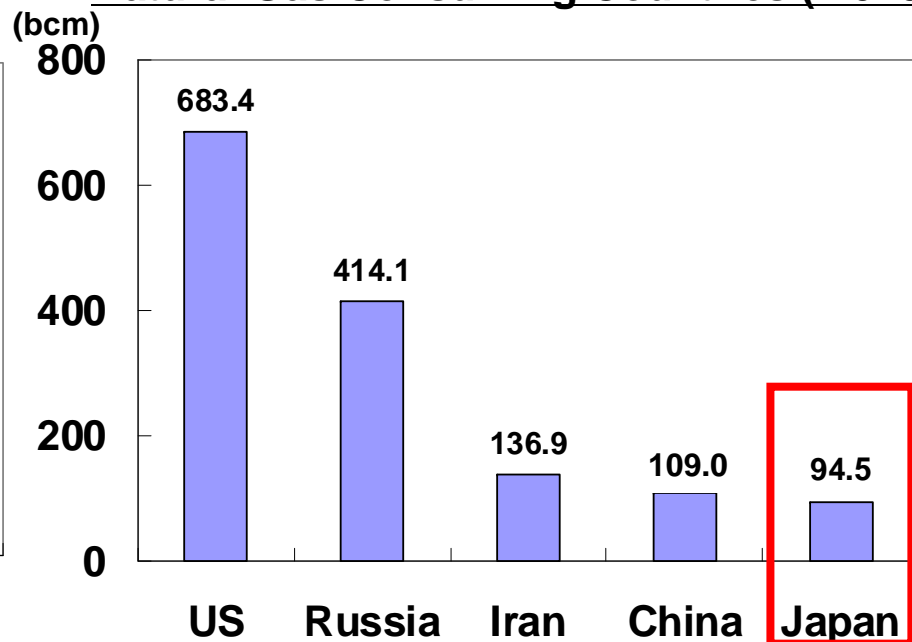
1.1 Natural Gas in Japan

Primary Energy Supply in Japan



Source: METI FY 2010 Energy Supply and Demand Report (preliminary report)

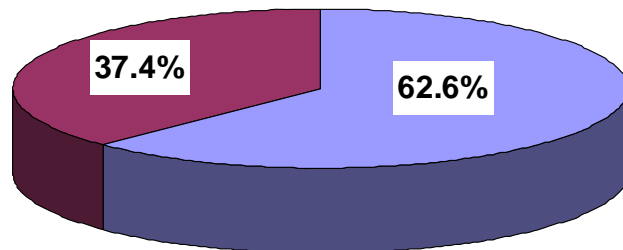
Natural Gas Consuming Countries (2010)



Source: BP Statistical Review of World Energy June 2011

LNG for power generation and gas supply (FY2010)

City Gas
25.9 Mil. tons

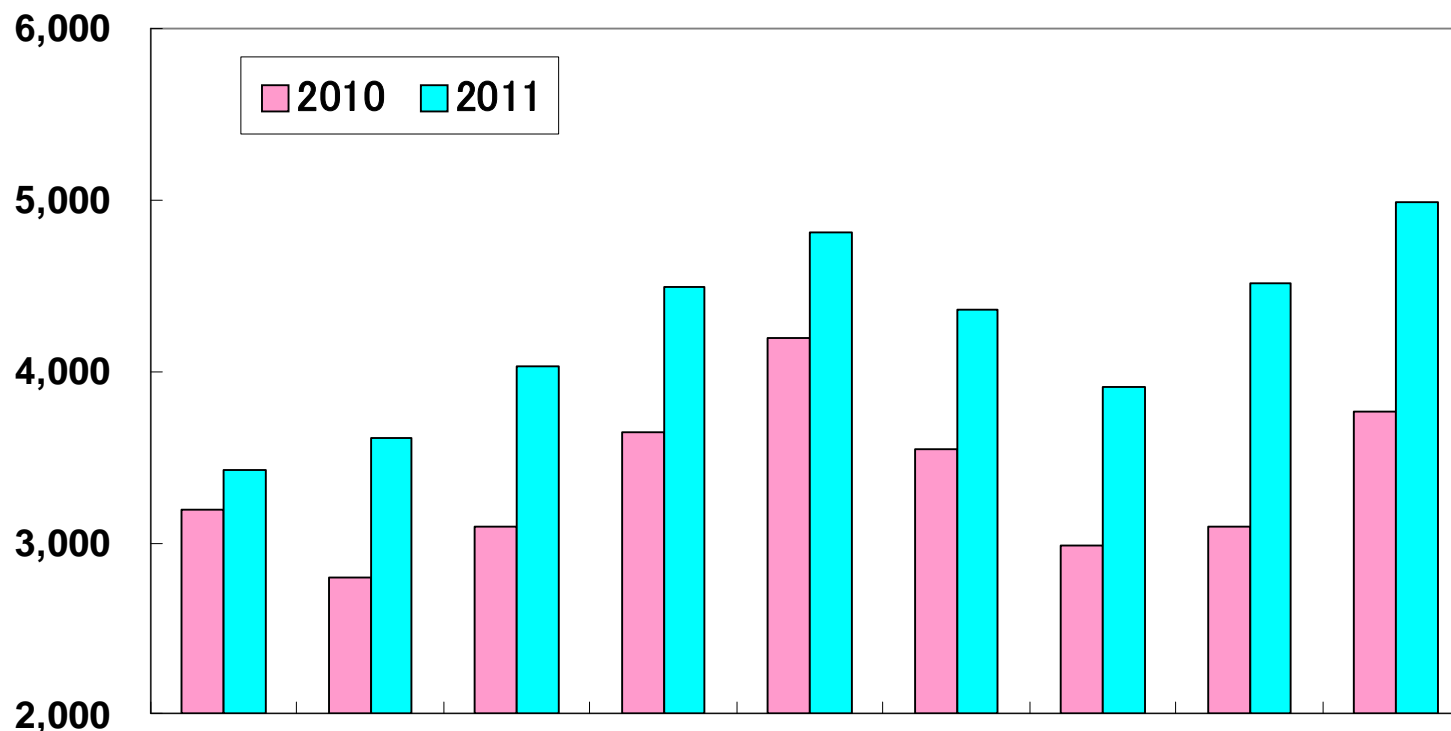


Power Generation
43.3 Mil. tons

Source:
METI "Annual Report on Energy 2011"

1.2 LNG demand for power sector before/after the earthquake

(1,000 tons)



	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
2010	3,192	2,793	3,098	3,640	4,195	3,542	2,989	3,099	3,761	30,309
2011	3,422	3,609	4,030	4,493	4,809	4,356	3,910	4,509	4,982	38,120
yoy	7.2%	29.2%	30.1%	23.4%	14.6%	23.0%	30.8%	45.5%	32.5%	25.8%

Source: Monthly Report of Agency for Natural Resources and Energy

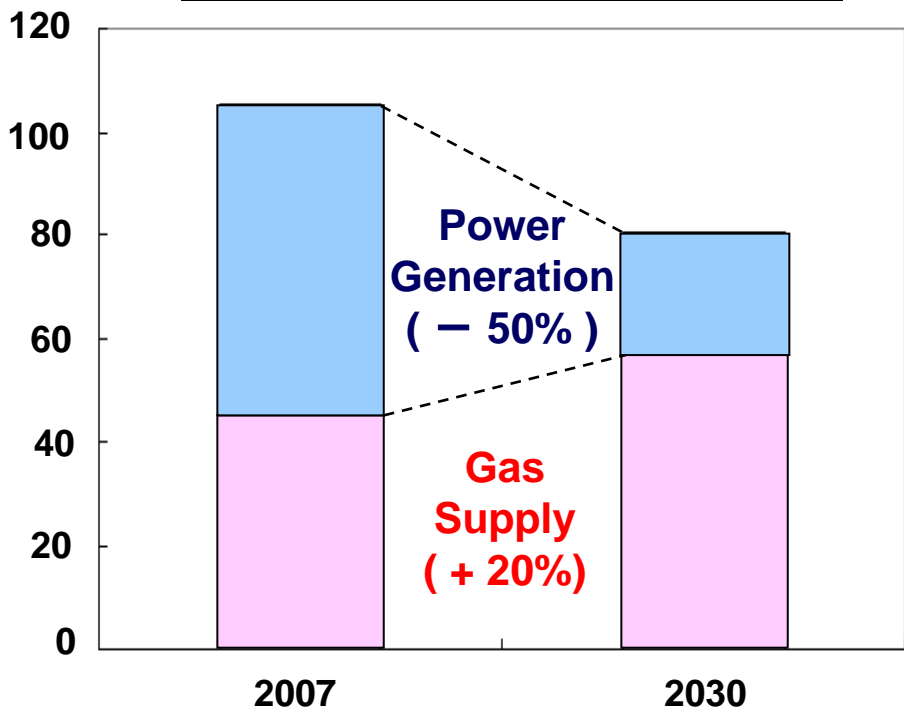
Av. 30% increase between April - December 2011 (YoY)

1.3 Natural Gas as alternative source of nuclear power

Strategic Energy Plan 2010

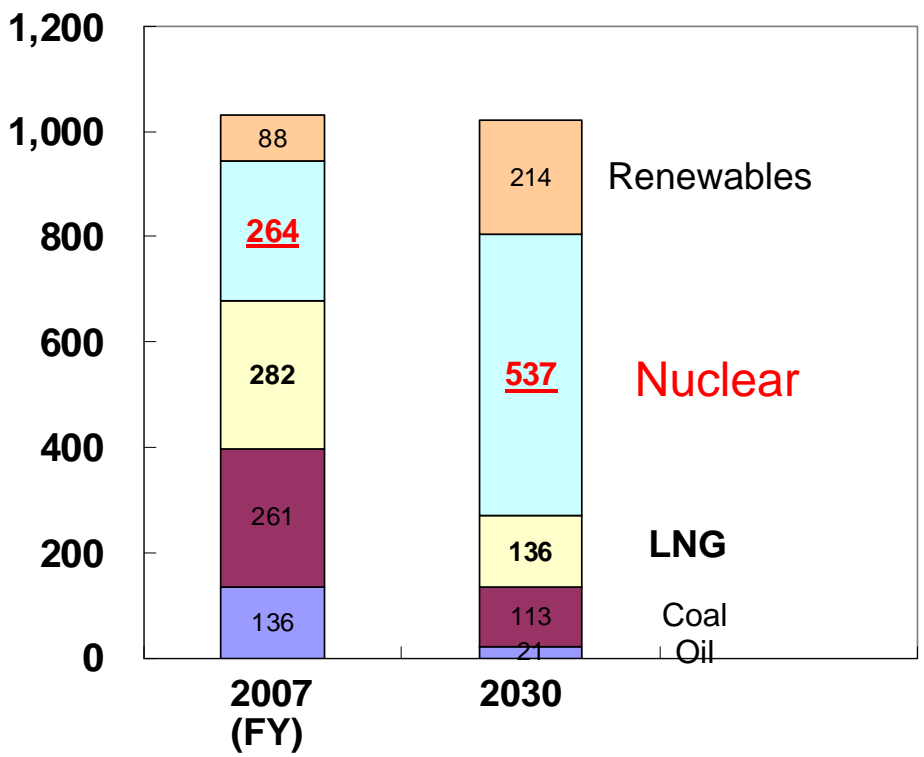
(10⁶ kL of oil equivalent)

Forecast of Natural Gas Demand



(bil.kWh)

Breakdown of Generated Electricity



Source: Study Group on Desirable Gas Utility Business in a Low-Carbon Society (Report of IEEJ)

Natural gas to play a more important role

1.4 Evolution of natural gas in Japan

1960

2010

Environmental pollution



manufactured gas



LNG



Policy Focus

NOx, SOx reduction

Energy security
Alternative energy

Peak-shaving of
electricity demand

Energy
conservation

Reducing CO2
emissions

Japan introduced LNG in 1969

1.4 Evolution of natural gas in Japan

1960

2010

Policy Focus

NOx, SOx reduction

Energy security
Alternative energy

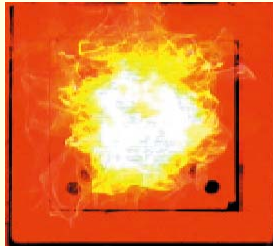
Peak-shaving of
electricity demand

Energy
conservation

Reducing CO2
emissions

Oil crises

Oil



Conventional
equipment

Natural gas



High-efficiency
equipment

Natural gas for industries: improving energy efficiency

1.4 Evolution of natural gas in Japan

1960



absorption chiller

2010

Gas heat pump



Policy Focus

NOx, SOx reduction

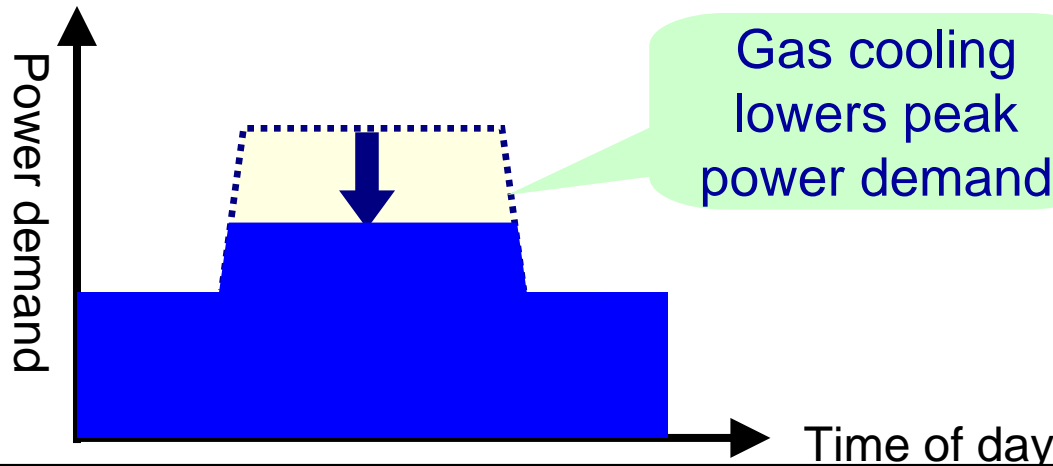
Energy security
Alternative energy

Peak-shaving of
electricity demand

Energy
conservation

Reducing CO2
emissions

Dealing with load factor problem

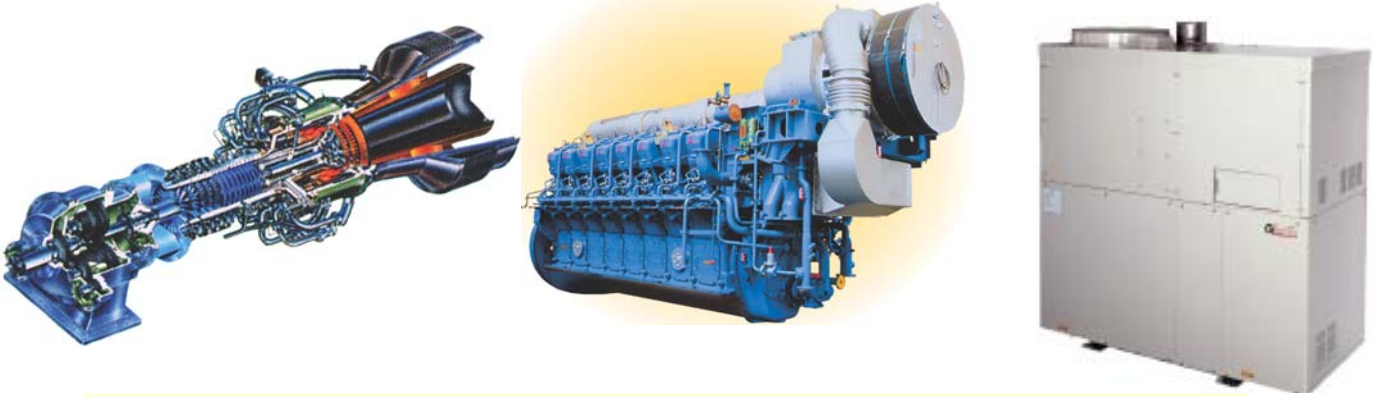


Gas cooling for peak shaving of electricity demand

1.4 Evolution of natural gas in Japan

1960

2010



Gas cogeneration systems

Low economic growth & global competition

Global warming

Policy Focus

NOx, SOx reduction

Energy security
Alternative energy

Peak-shaving of
electricity demand

Energy
conservation

Reducing CO2
emissions

Cogeneration systems: solution to improving efficiency and environment

1.4 Evolution of natural gas in Japan

1960

2010

Policy Focus

Environmental pollution

NOx, SOx reduction

Oil crises

Energy security
Alternative energy

Lower load factor of elec. supply

Peak-shaving of
electricity demand

Low economic growth
& global competition

Energy
conservation

Global warming

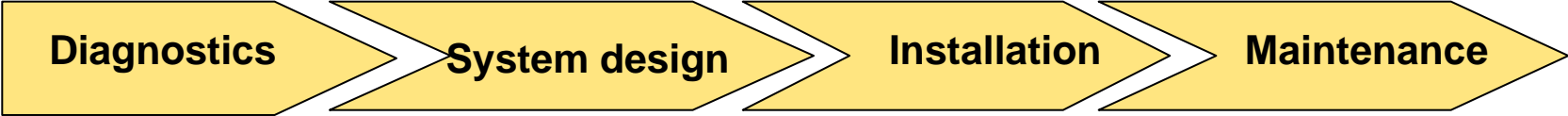
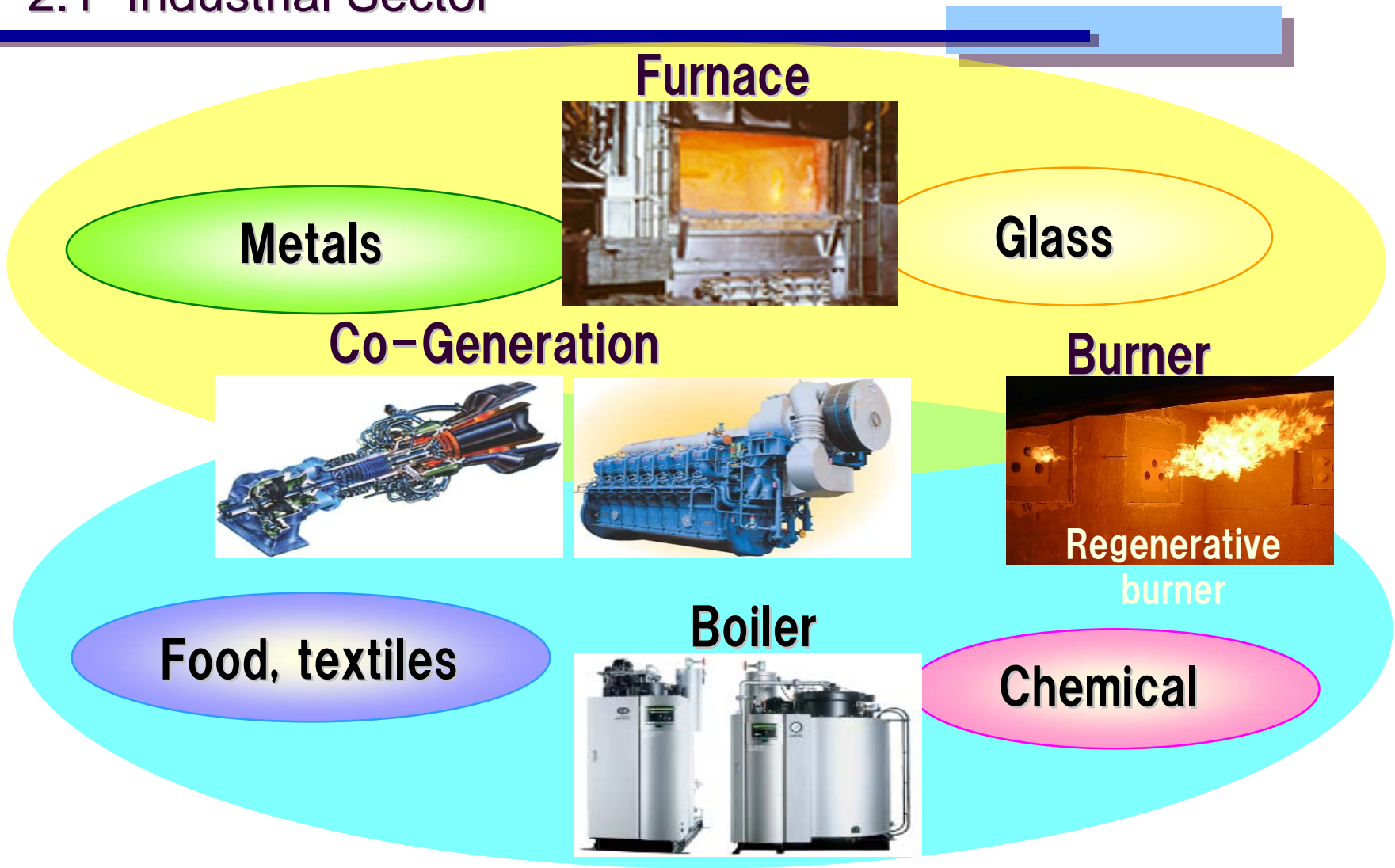
Reducing CO2
emissions

Natural gas: solution to energy and environmental challenges



2. Technologies for natural gas

2.1 Industrial Sector



2.2 Commercial/Household Sector

Gas-fired
air-conditioning

Absorption



Gas Heat Pump



Small scale co-generation



Micro
cogeneration

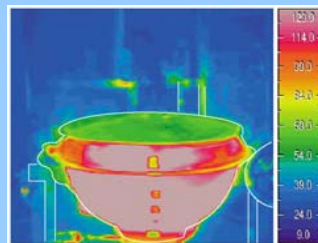


Fuel cell
for household

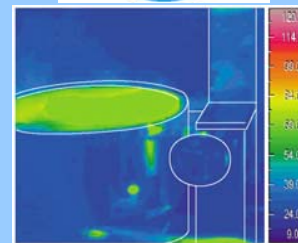
Condensing
boiler



《涼厨》
- cool kitchen -



Conventional

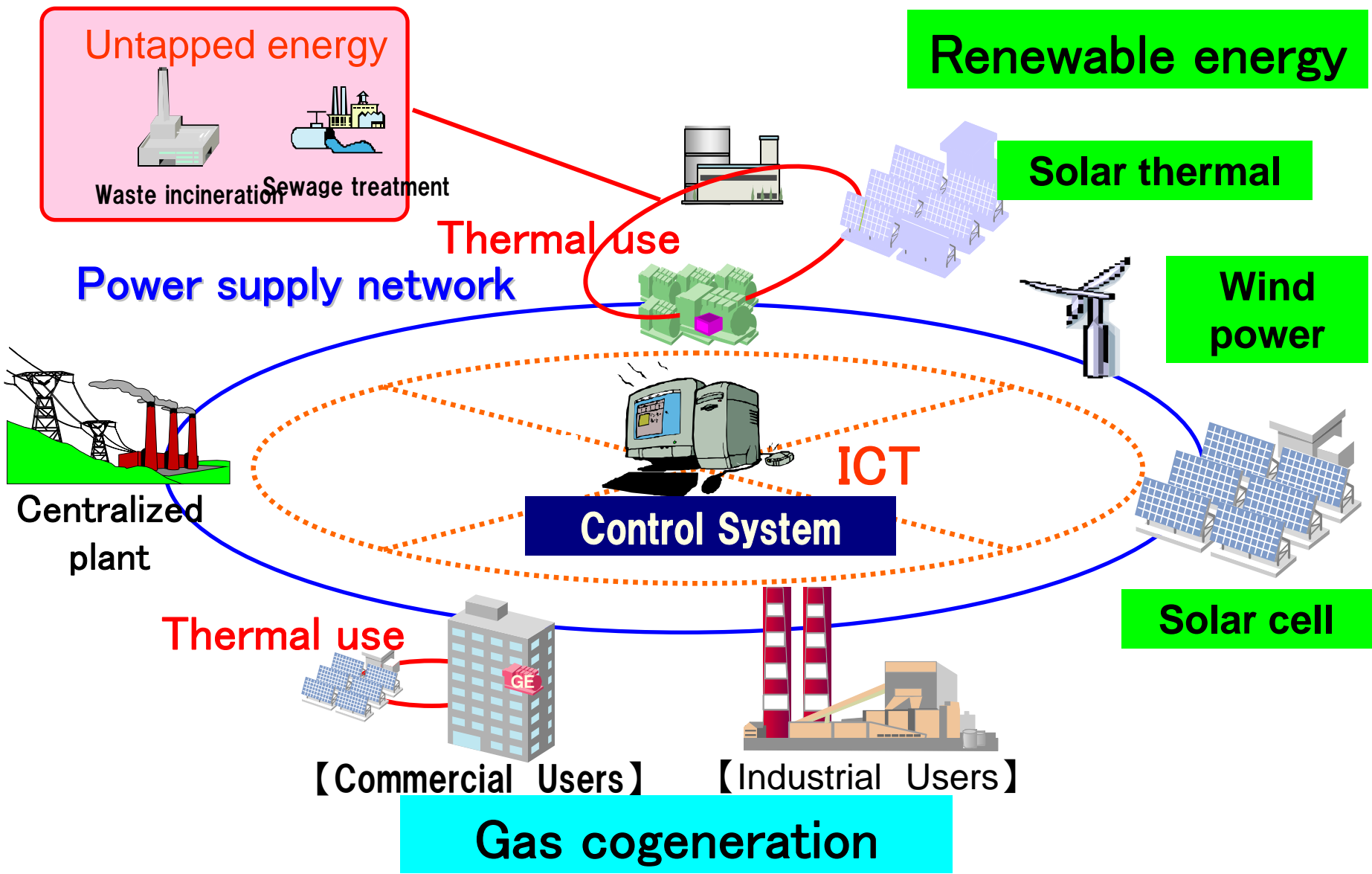


SUZUCHU



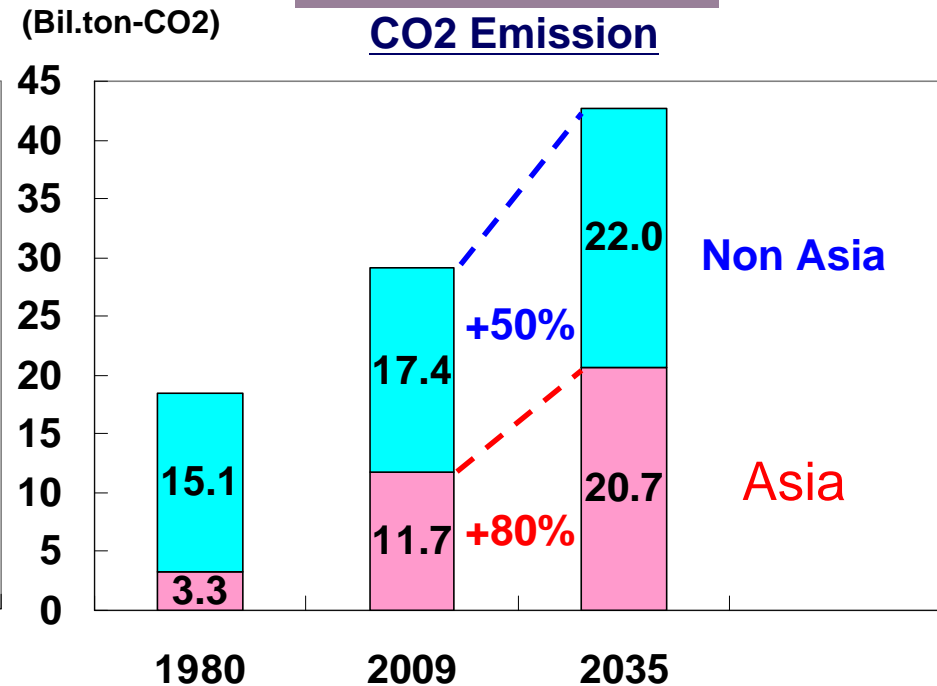
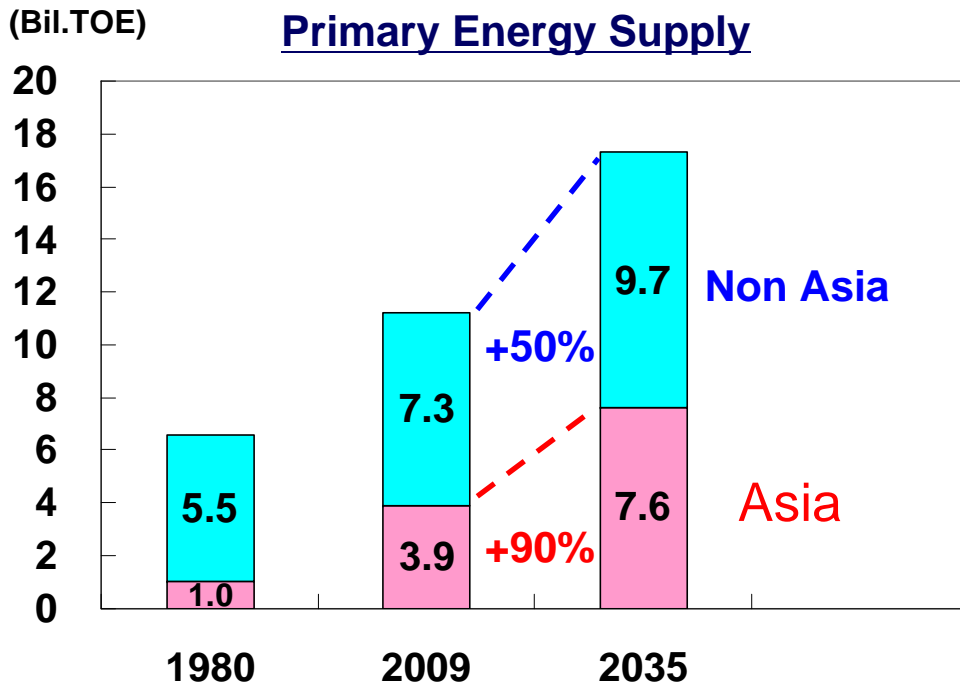
(cool enough to touch)

2.3 Smart Energy Network



3. Role of natural gas in Asia

3.1 Issues in realizing sustainable growth of Asia



Source: IEEJ Asia/World Energy Outlook 2011

Economic Growth

- Industrialization
- Urbanization

Environmental Issues

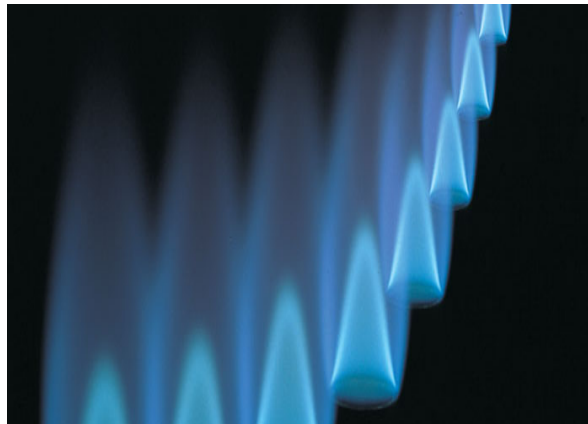
- CO2 emission
- Air pollution

3.2 Expected role of natural gas in Asia

Nuclear



Natural gas



Renewables



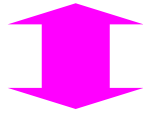
Natural gas: key energy source

3.3 Advantages of natural gas (shorter lead time)

Development of natural gas infrastructure

Natural gas

Proven technologies

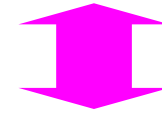


Renewables

Further R&D required

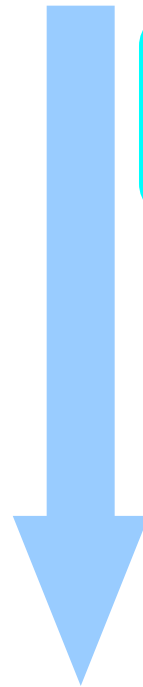
Natural gas power plant

Construction lead-time: short



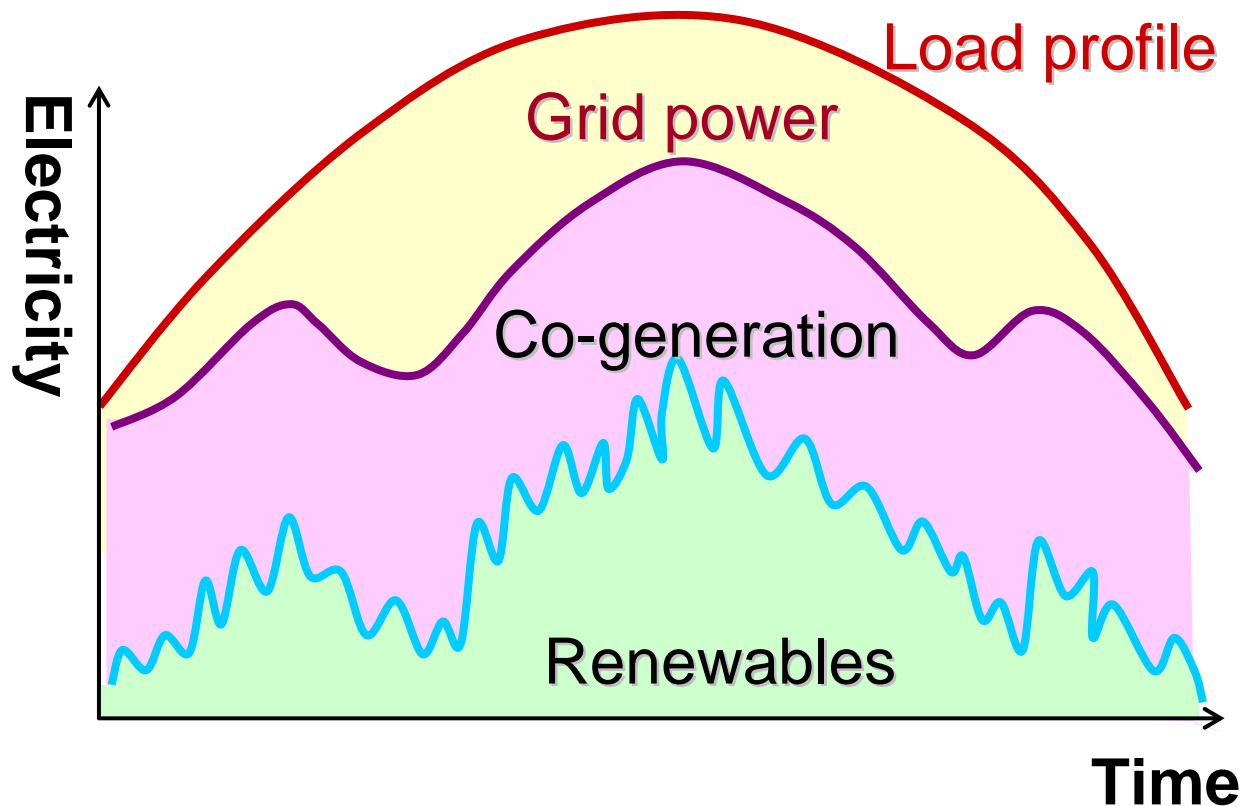
Nuclear

Construction lead-time: long



Natural gas: responsive to fast demand growth

3.4 Advantages of natural gas (compatibility with renewables)



Natural gas supplements and stabilizes variable power output of renewables.

3.5 Role of natural gas in Asia (summary)

Issues

- ❑ Response to rising energy demand
- ❑ For early realization of low carbon society

【Advantages of natural gas】

《Shorter lead time》

- ❑ Fast start-up to rise in demand

《Compatibility with renewables》

- ❑ supplement to renewables

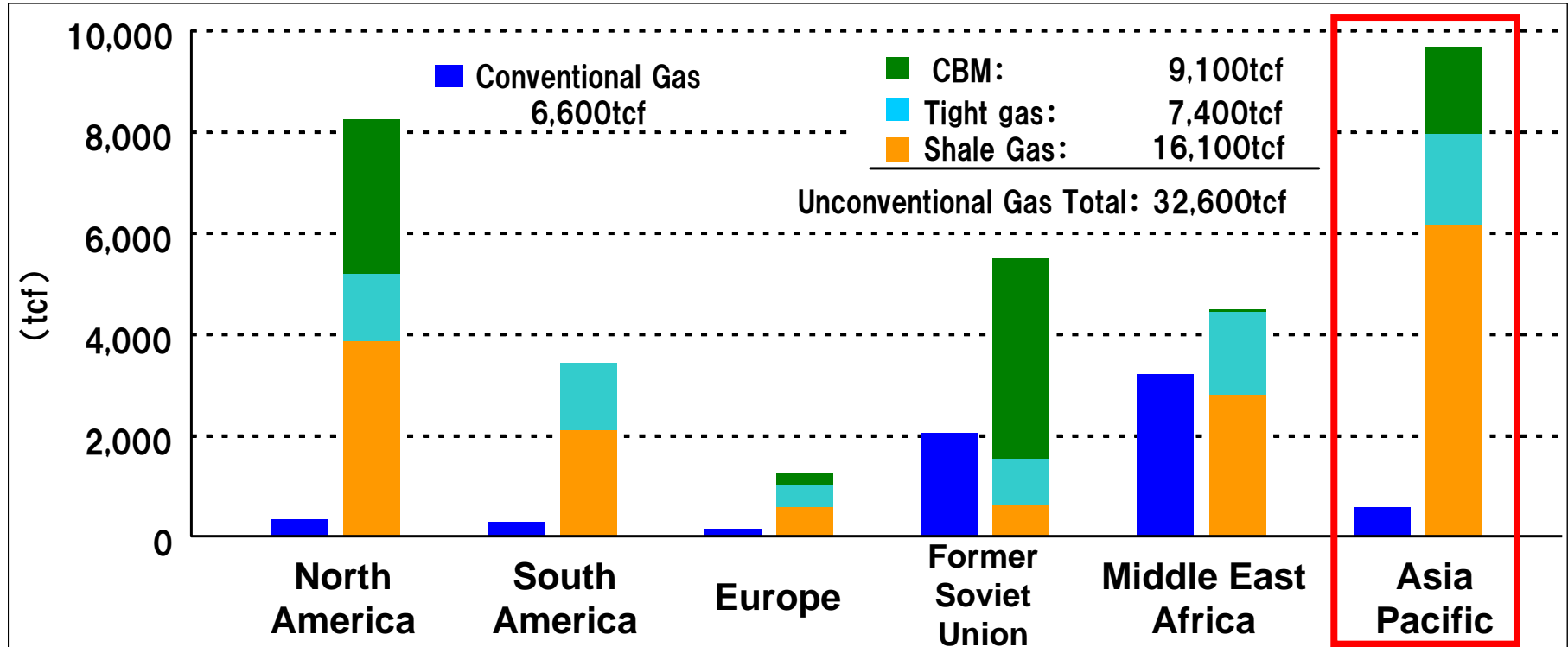
Natural gas: appropriate and favourable choice



4. Issues in furthering the role of natural gas

4.1 Natural gas supply

Reserves of conventional and unconventional natural gas



Sources: BP Statistic Report 2011

Distribution of Worldwide Unconventional Gas Resources (Rogner 1996, Kawata and Fujita 2001)

Vast Reserves in Asia-Pacific Region

4.1 Natural gas supply

Huge investments required for broad regional infrastructure

Exploration/
Production

International Pipeline



Liquefaction



Shipping



Regasification

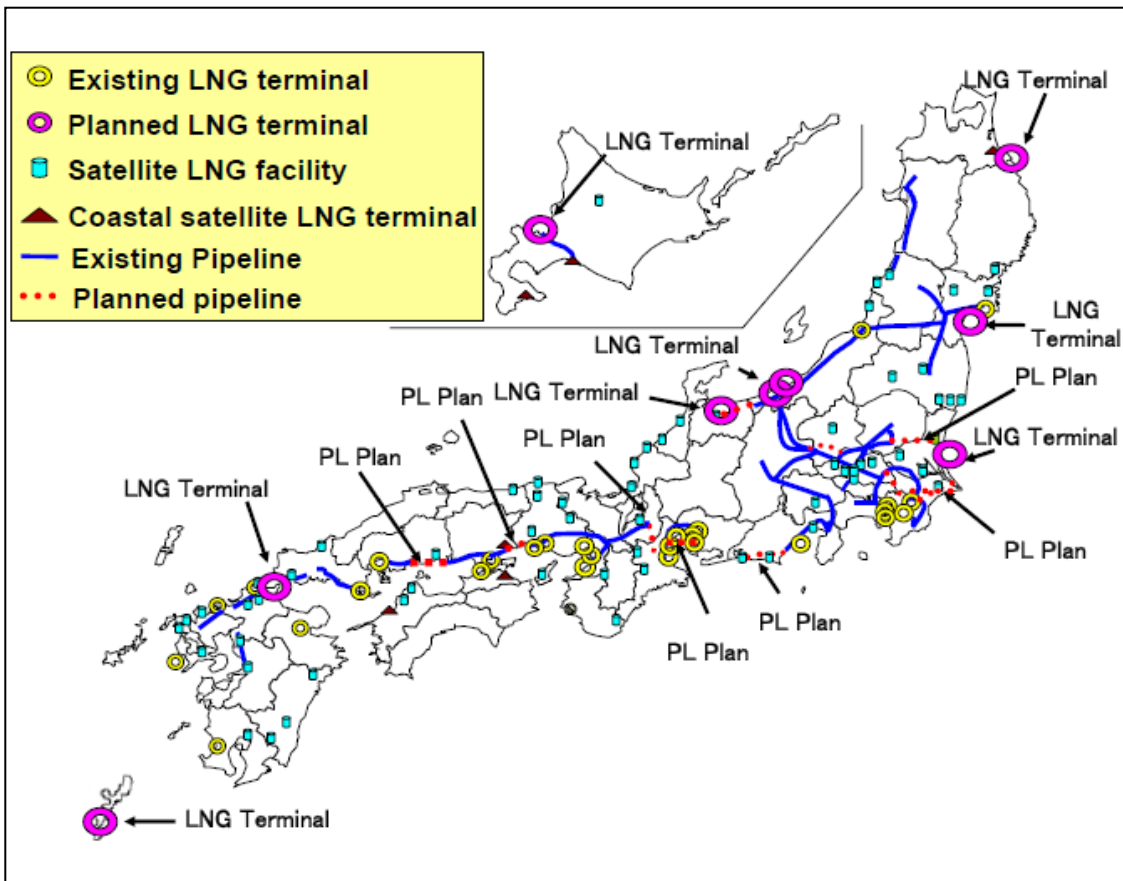


Transmission/
Distribution

Int'l investment/financing to accelerate development

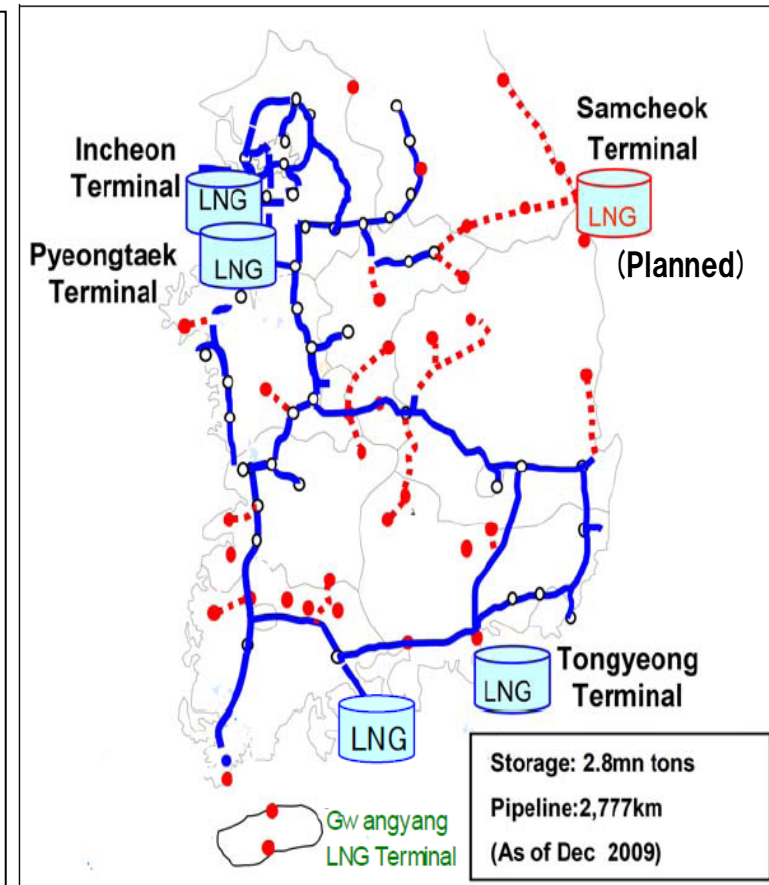
4.2 Infrastructure

Natural gas infrastructure in Japan



Sources: Agency for Natural Resources and Energy press release

Natural gas infrastructure in Korea

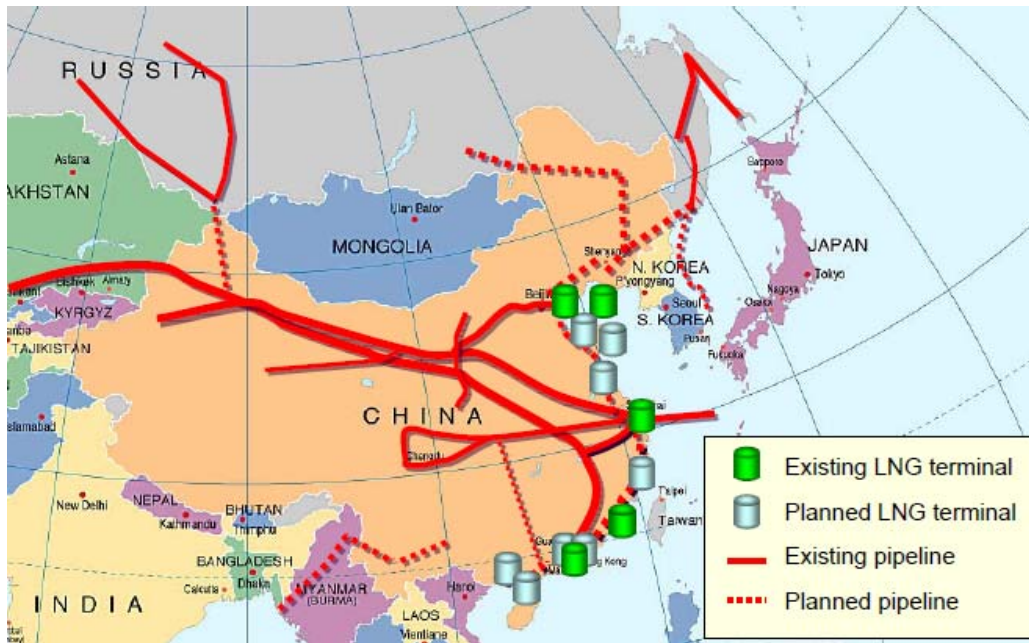


Sources: Asia Pacific & Atlantic natural gas research report 2010 (IEEJ)

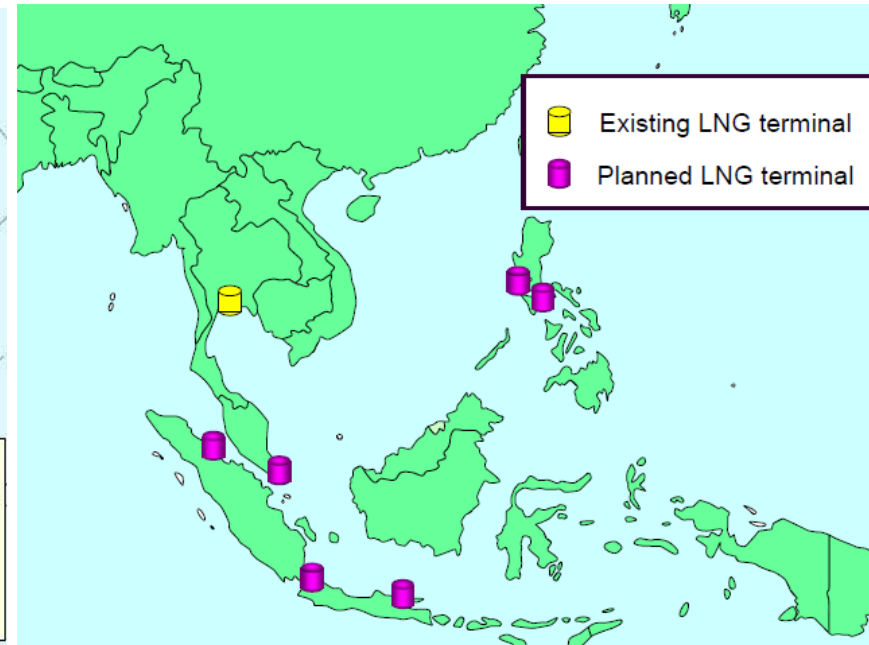
Further development planned

4.2 Infrastructure

LNG terminals and pipelines in China



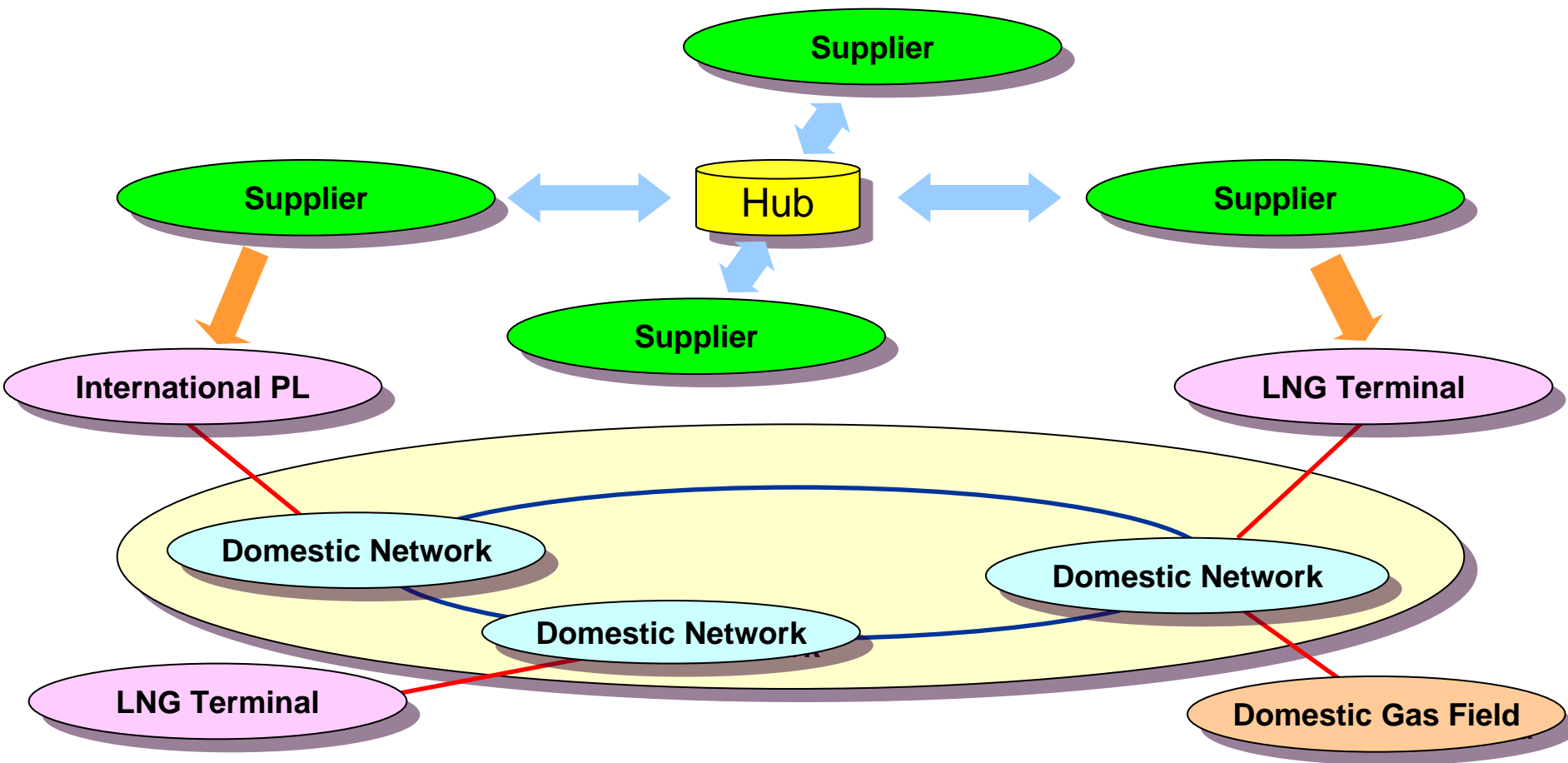
LNG terminals in Asia



Further development underway in China and SE Asia

4.3 Virtual/Physical Interconnection

Asian Regional Gas Infrastructure



Stable and flexible supply and trading of natural gas

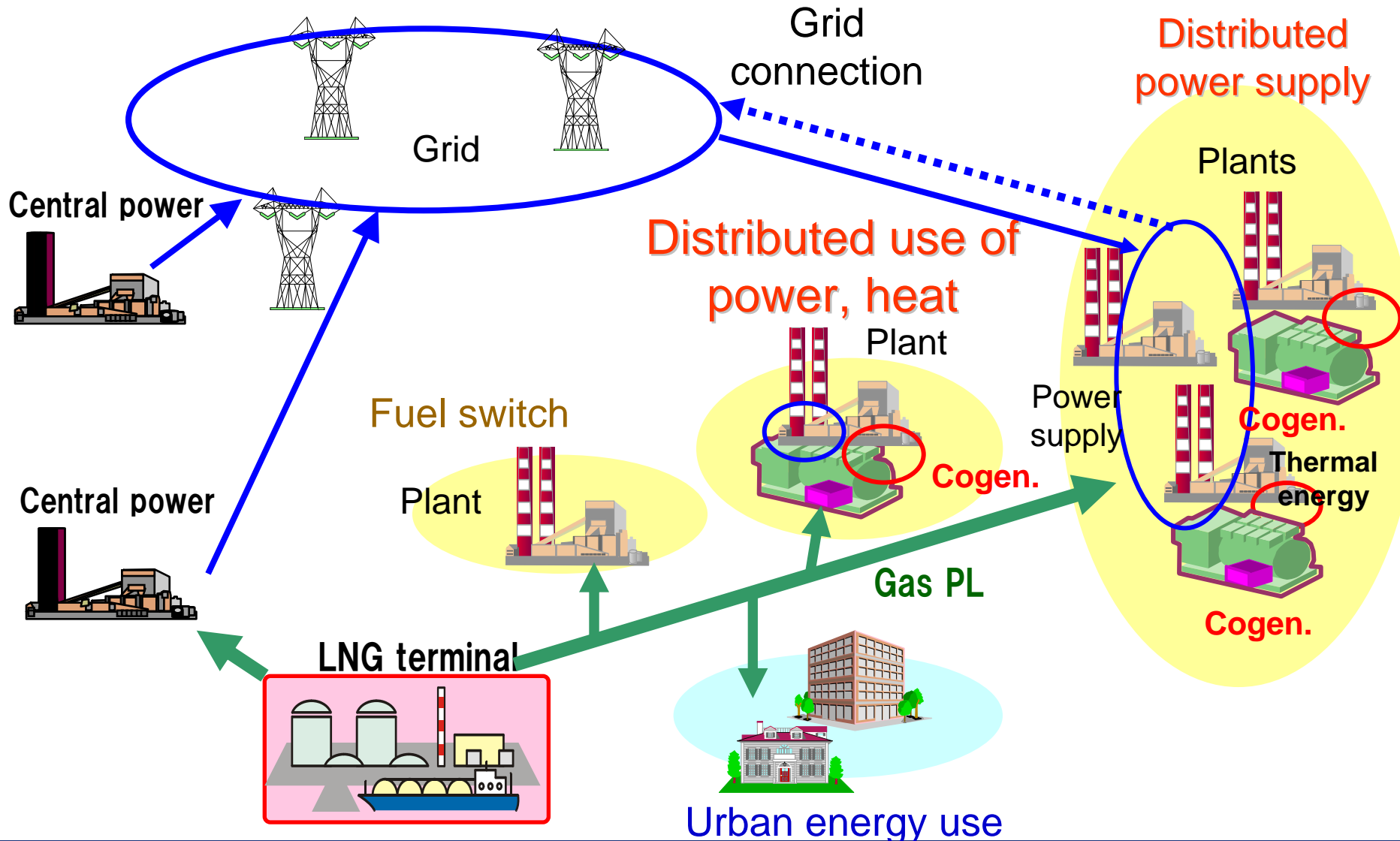
4.4 Regional cooperation across Asia

1. Formation of Asian gas market
2. Enhance the presence of Asian Gas Market

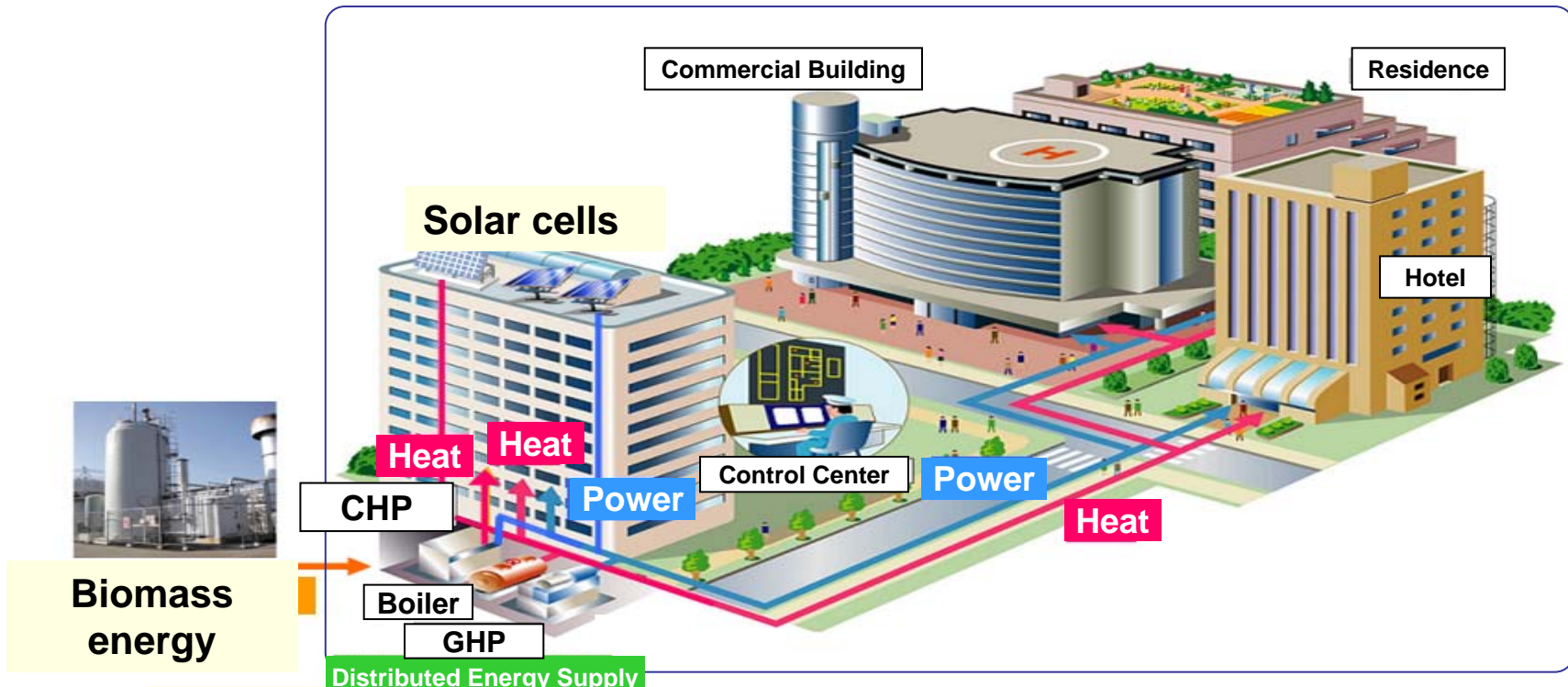


Change existing pricing and remove 'Asia Premium'

4.5 Potentials of demand: Industrial and power generation use



4.6 Potentials of demand: Urban energy utilisation



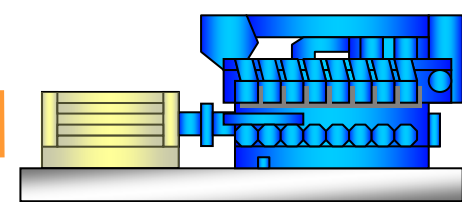
Biomass energy

Gas cooling



- Waste heat**
- Cooling/heating**
- Steam**
- Hot water**

Cogeneration



Power

4.7 Potentials of demand: transport sector

Natural gas vehicles



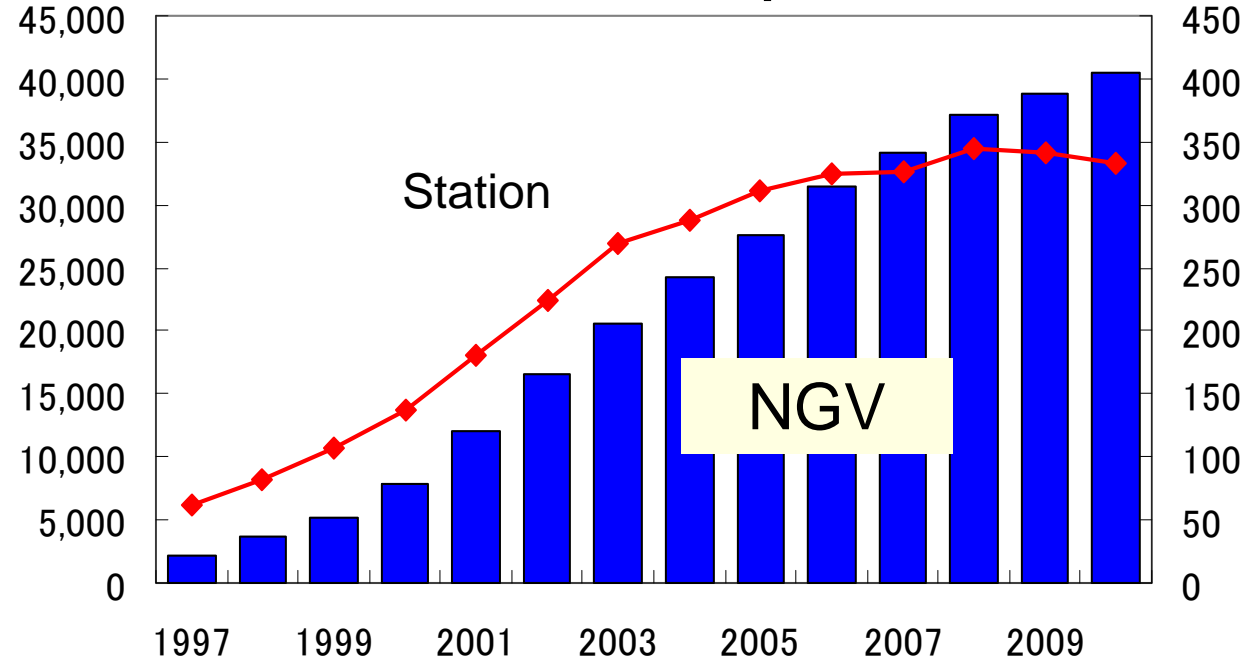
Natural gas station



No. of vehicles

NGVs in Japan

NGV stations

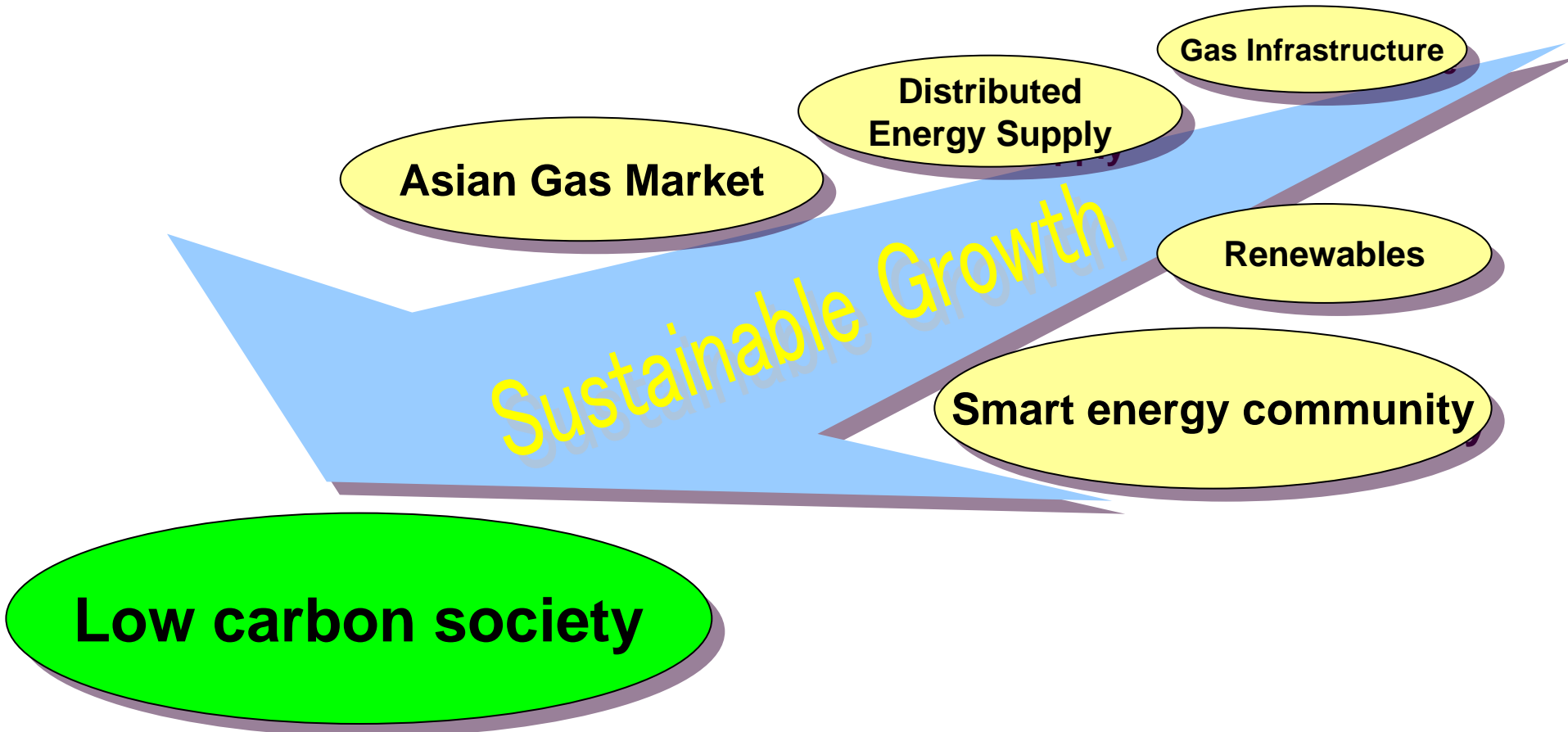




5. Conclusion

5. Conclusion

Natural Gas is a key energy source for low carbon society





Let's think gas, naturally !

Thank you!