

# Promotion of Natural Gas Vehicles in Japan

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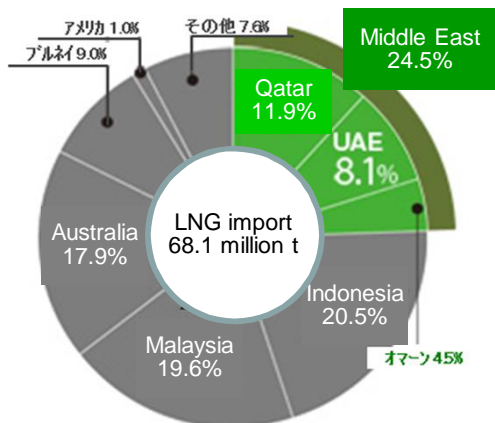
Ministry of Land, Infrastructure, Transport and Tourism (MLIT)

Japan

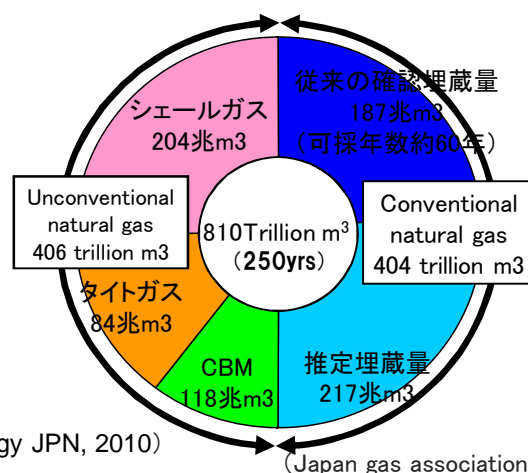
- Natural gas production sites are located all across the world. → Geographical Risk: Low
- Shale gas revolution → Recoverable reserves increased dramatically (810trillion m<sup>3</sup>)
- 30% reduction of CO<sub>2</sub> emissions , No PM emissions

## Low geographical risk

<Japan's main LNG supplier>

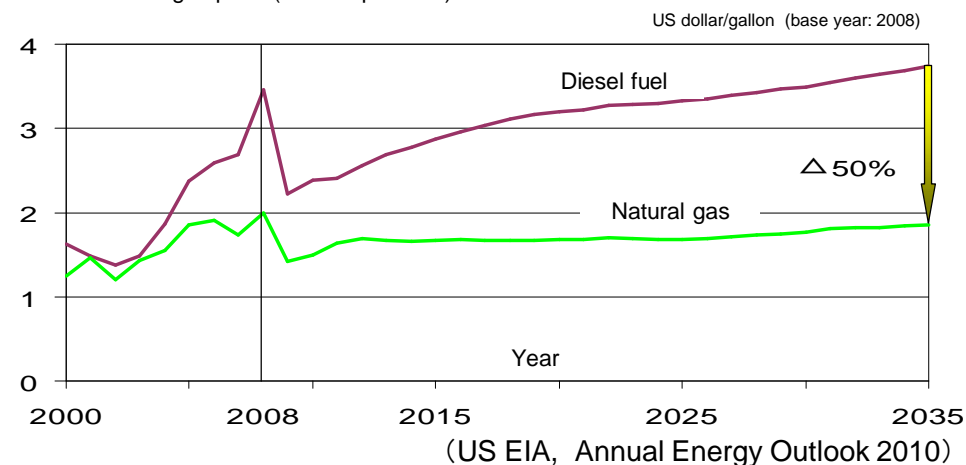


## Recoverable reserves estimation



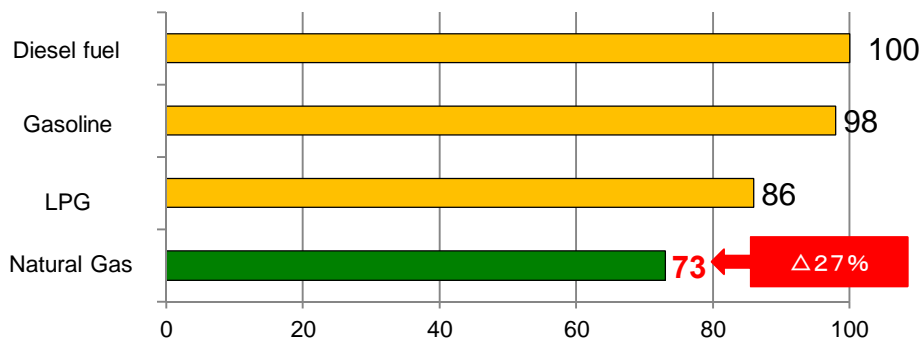
## The price of natural gas will be 50% lower than that of diesel fuel

<Estimated natural gas price (as transport fuel) in the US>



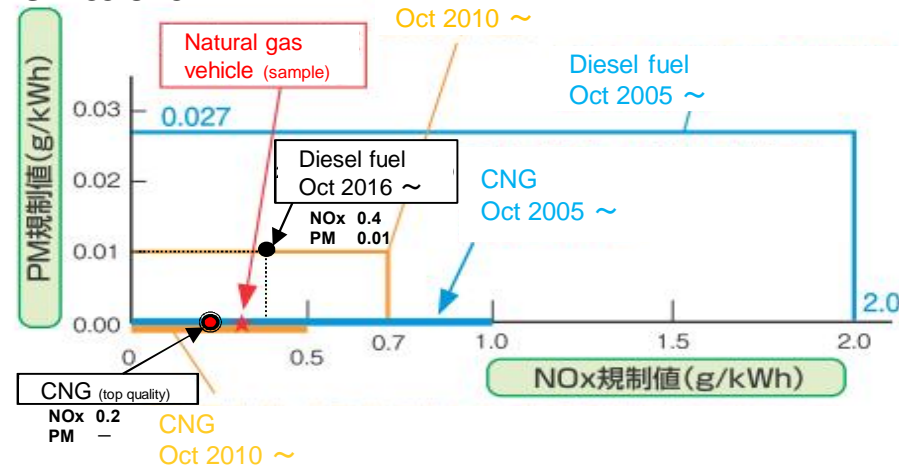
## Low CO<sub>2</sub> emissions

<CO<sub>2</sub> emissions/Unit energy (Diesel Fuel =100)>



(Ministry of Environment JPN, 2010)

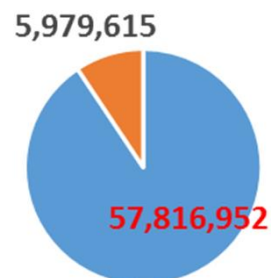
## No PM emissions, 50% or more reduction of Nox emissions



Diversification of transport fuel sources is an important task for securing logistics in the case of emergency; and for enhancing economic sustainability.

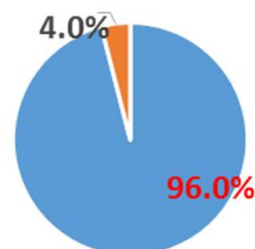
■ Diesel is the main source of energy in truck transport in Japan.

Conveyance distance (2013) [1,000km]



■ truck  
■ bus, taxi

Truck fuel (2013)

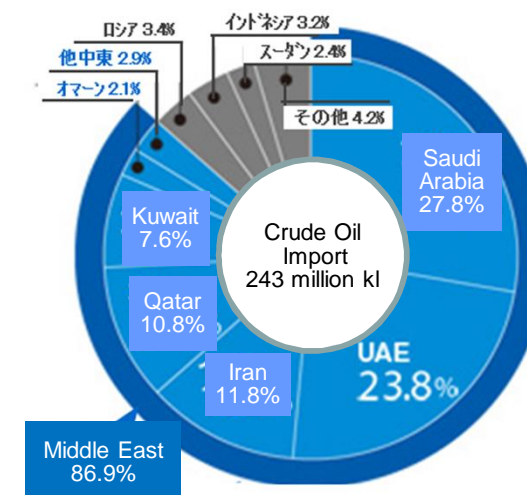


■ Diesel fuel  
■ gasoline

( Ministry of Land, Infrastructure, Transport and Tourism JPN )

■ High geographical risk (High dependency on Middle East)

<Japan's main crude oil supplier>



( Agency for Natural Resources and Energy JPN, 2010 )

■ Delivery of emergency goods delayed because of a fuel shortage (Great East Japan Earthquake in 2011)



Damage on oil refineries



Long queue for refueling

- The government aims to raise the proportion of next generation vehicles in the sales of new cars to 50%-70% by 2030 (“Japan Revitalization Strategy”(14th June, 2013)).
- In the light of promoting the measures for global warming in the automobile field and air pollution, promote environmental measures strongly by promoting repurchase/purchase of environment-responsive vehicles by automobile transport business operators, etc.

Objective vehicles	Subsidy rate
CNG trucks, buses	<ul style="list-style-type: none"> <li>○ <b>In case of purchasing a new vehicle along with scrapping old vehicle</b> Within 1/2 of the difference from the regular vehicle price, or within 1/4 of base vehicle price</li> <li>○ <b>In case of only purchasing a new vehicle</b> Within 1/3 of the difference from the regular vehicle price, or within 1/4 of base vehicle price</li> </ul>
Hybrid trucks, buses	
Remodeling of vehicles in use to CNG vehicles	Within 1/3 of remodeling cost

**CNG (compressed natural gas) trucks, buses**

- No PM emissions, 50% or more reduction of Nox emissions
- CNG stand is required.



**Hybrid trucks, buses**

- Having 2 power sources, such as internal combustion engine and motor
- No new infrastructure is required.



# Tax incentive for environmentally friendly vehicles

## Eco-Car Tax Reduction

○Each weight tax and acquisition tax for Eco-Car are reduced.

The target of requirement		Acquisition Tax	Weight Tax	
		The time of acquisition	The time of first vehicle inspection	The time of second vehicle inspection
Electric vehicles Fuel-cell vehicles Compressed natural gas vehicle (Surpass the 2009 emission standard by 10%(Nox)) etc.		Non-taxable	Tax Exemption	Tax Exemption
Surpass the 2015 fuel efficiency standard by 15%	the 2009 emission standard	Surpass by 10% (NOx·PM)	80%-reduction	75% reduction
Surpass the 2015 fuel efficiency standard by 10%				
Surpass the 2015 fuel efficiency standard by 5%	the 2009 emission standard	Surpass by 10% (NOx·PM)	60%-reduction	50% reduction
Satisfy the 2015 fuel efficiency standard				
Surpass the 2015 fuel efficiency standard by 10%	the 2009 emission standard	Surpass by 10% (NOx·PM)	40%-reduction	25% reduction
Surpass the 2015 fuel efficiency standard by 5%				
Surpass the 2015 fuel efficiency standard by 10%	the 2009 emission standard	Surpass by 10% (NOx·PM)	—	—
Satisfy the 2015 fuel efficiency standard				

Special time : 【Acquisition Tax】 until March 31, 2017  
 【Weight Tax】 until April 30, 2017

## Green tax incentive of owner tax

○Owner tax for Eco-Car is reduced.  
 ○Owner tax of old vehicle is increased .

The target of requirement	Rate of tax reduction
<ul style="list-style-type: none"> <li>Electric vehicles</li> <li>Fuel-cell vehicles</li> <li>Compressed natural gas vehicle (Surpass the 2009 emission standard by 10%(Nox))</li> <li>Plug-in Hybrid Vehicles</li> </ul>	75% reduction

<ul style="list-style-type: none"> <li>Diesel vehicle more than 11 years old</li> <li>Gasoline vehicle and Liquefied Petroleum Gas vehicles more than 13 years old</li> </ul> <p>(Except Electric vehicles, Fuel-cell vehicles, Compressed natural gas vehicle, methanol fueled vehicles, Gasoline hybrid, a regular passenger bus and Trailer)</p>	about 10%-increased ( every year)
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Special time : until March 31, 2016

※Each middle weight vehicle and heavy weight vehicle are Diesel vehicle

# Development of LNG Commercial Vehicles

- Due to the high energy density, the range of LNG commercial vehicles (CVs) is more than twice as long as the range of CNG CVs.
- CNG engines can be used for LNG CVs. (No need to develop the engines for LNG)
- Measures against boil off gas (BOG) are required for LNG fuel tanks.

## Next-Generation Environmental Friendly Vehicles Development and Commercialization Project

- For the purpose of drastic reduction of CO2 and the other emissions from CVs, MLIT conducts technical development with the cooperation of auto manufacturers and establishes technical standards consequently.
- The project of the LNG CVs development started in 2005. The development of the measures against BOG\* has been conducted since 2015.



LNG CV

\*BOG is fuel evaporative emission from LNG. The main component of BOG is methane, which has green house effect.

## Advantage of LNG CVs

### Demonstration Range Test in 2009



Tokyo (Start)

Fukuoka (Goal)



Parking at Ashigara SA

The range of the LNG CV is over 1,200 km

- 2 times of the CNG CV range

## Remaining issues of LNG CVs

- Insulation measures and BOG recovery measures are required for the prevention from pressure rise of fuel tank.
- The measure such as setting a BOG vent other than the refilling port is required for the prevention from delay of refilling LNG due to the BOG pressure rise.



Refilling of LNG

Continue to develop measures against BOG