# Main Economic Indicators (1)

## There are many similar points between Germany and Japan：ドイツと日本の類似点

Economy：Japan is the 3rd and Germany is the 4th largest GDP in the world. (2020)

Export：Germany is the 3rd and Japan is the 4th largest exporter in the world. (2020)

Land Area：Almost the same size; Japan (377,972 K㎡) and Germany (357,578 K㎡)

Aging Society：Japan is the 1st and Germany is the 6th top aging country in the world. (2019)

Industrial Structure：Compared with OECD countries, Germany and Japan comprise high share of manufacturing in each total value added(2018)

GHG Emission: Japan is the 5th and Germany is 6th largest emitters.

**Ambitious Long-term target: Carbon Neutrality in 2050.**

# Main Economic Indicators(2)

## Differences between Germany and Japan ドイツと日本の相違点

- ***Location***

Germany locates in the center of the European Union(EU) region, while Japan locates in the Asia Pacific Economic Cooperation(APEC) Region.

- ***Market***

Market activity of Germany is carried predominantly in EU, while that of Japan is in APEC.

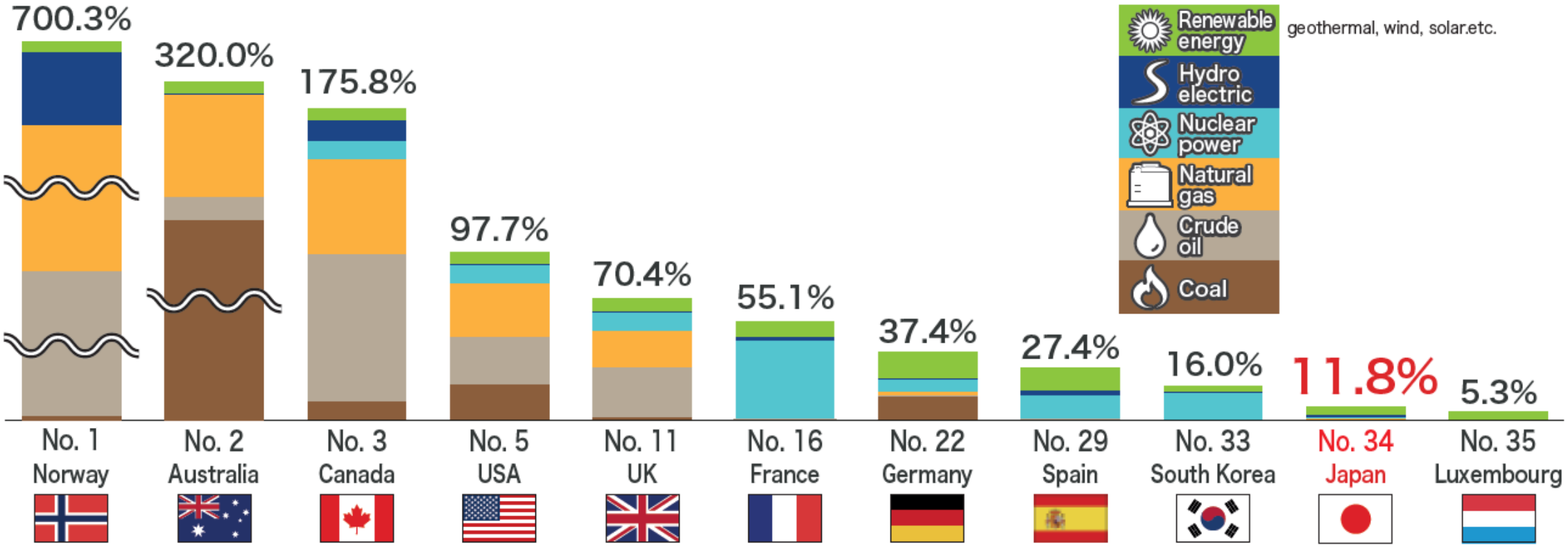
- ***Grid and Pipeline***

Connecting to neighboring countries on the European continent allows Germany to access flexibly to wide power grids and gas pipelines within the European region.

On the other hand, Japan is an isolated island that has to be self-independent in both power grids and gas pipelines.

# Self-Sufficiency Ratio in Primary Energy Supply in Major Countries
# 主要国の一次エネルギー供給自給率

- Japan is the second lowest energy self-sufficient country among OECD members.
- In Japan, many nuclear power plants have not been able to restart since the Great East Japan Earthquake 2011. It resulted in lower energy self-sufficiency rate by far.

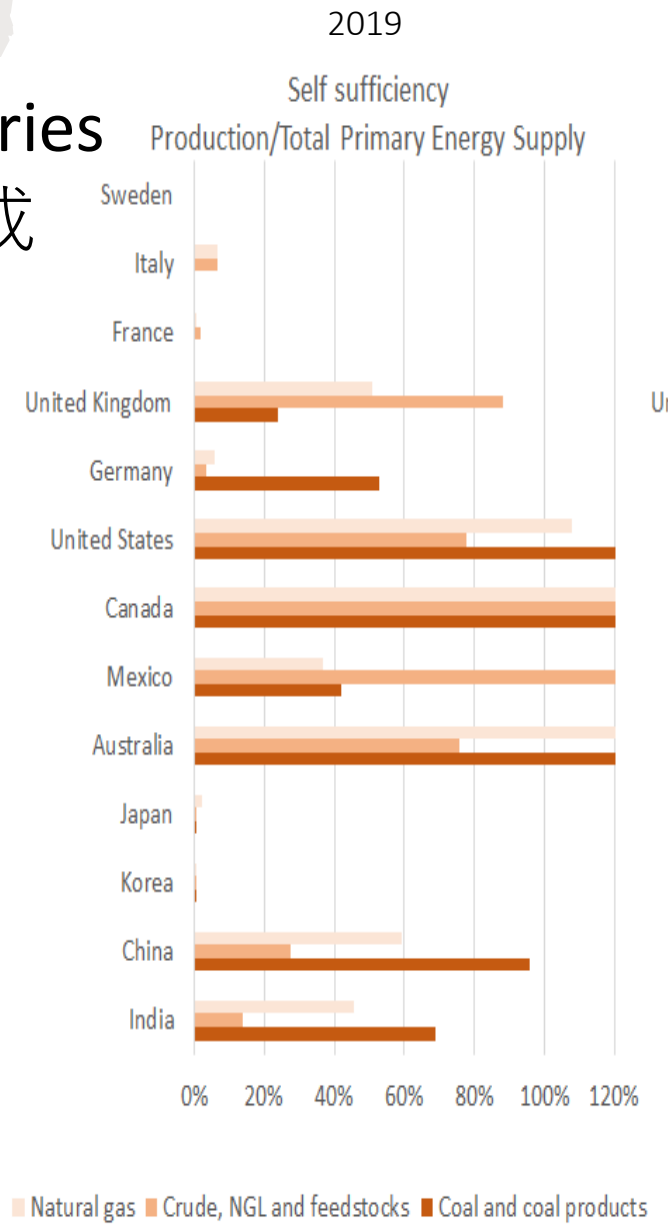


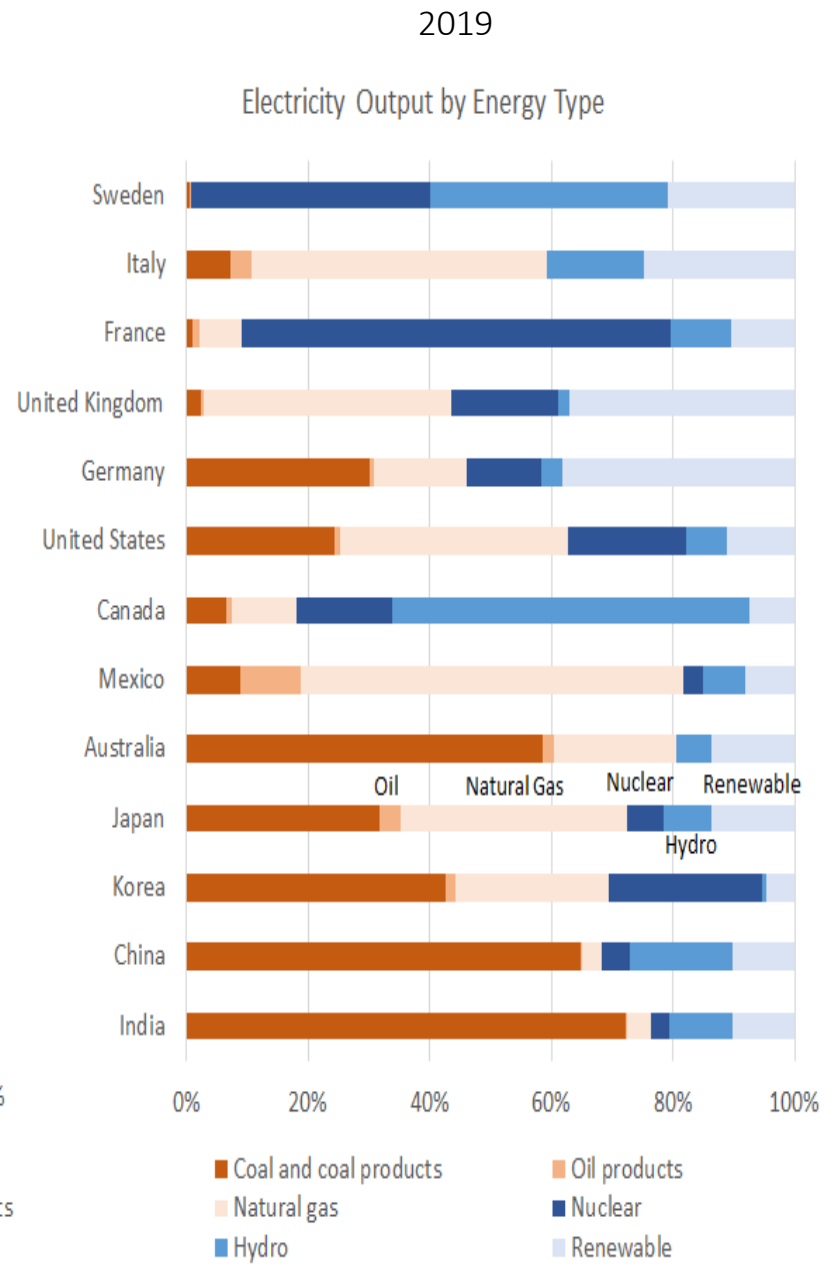

Source: Estimates for 2018 from IEA "World Energy Balances 2019", except for data for Japan, which are confirmed values of FY 2018, derived from "Comprehensive energy statistics of Japan", Agency for Natural Resources and Energy. ＊ The ranks in the table are those of the 35 OECD member countries.

(Source) Agency for Natural Resources and Energy, "Energy in Japan 2020"

# Energy Self Sufficiency and Electricity Output in Major Countries
# 主要国の燃料自給率と電源構成

- Countries that are rich in natural resources tend to utilize these for domestic power generation.
- Since Japan lacks domestic natural resources, it needs to diversify its energy sources, both in terms of fuel types and sources of imports, in order to secure a stable supply of energy.
- Germany has achieved the highest rate of renewable energy among the major countries.



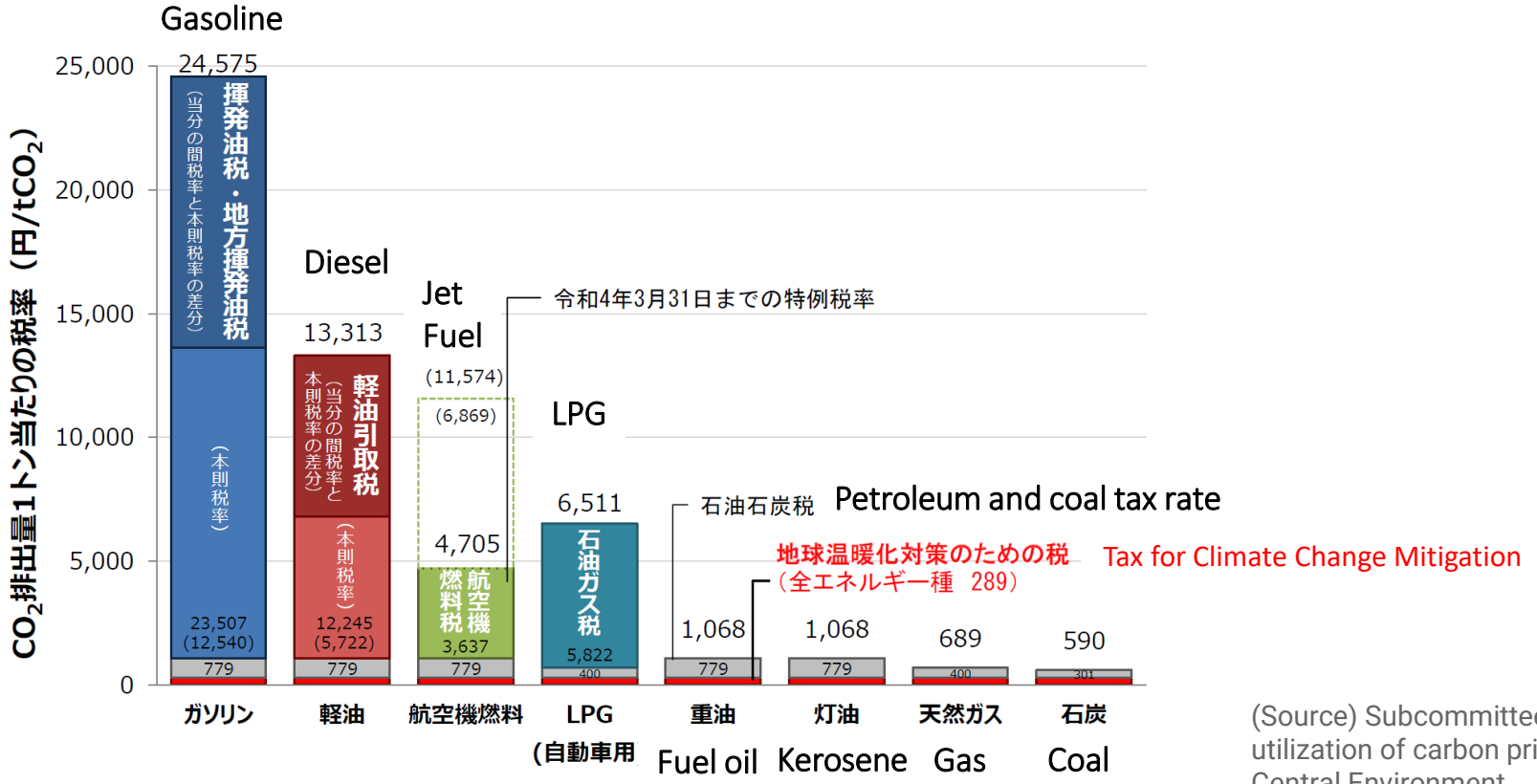

(Source) IEA, “World Energy Balances”

# Energy Taxes
## エネルギー関連諸税

- Other than Petroleum and Coal Tax, various types of taxes were introduced to fossil fuels.
- As a result, a carbon equivalent energy taxes and FIT charge have reached JPY 6,300/tCO2. That of Japan's average energy prices is JPY25,000/tCO2.

(Source) Ministry of Economy, Trade and Industry, Study Group on Economic Approaches to Achieving Global Carbon Neutrality,2021
Ministry of Economy, Trade and Industry, "The Long-term Climate Change Policy Platform",2017

CO2 equivalent Tax Rates (JPY/tCO2)



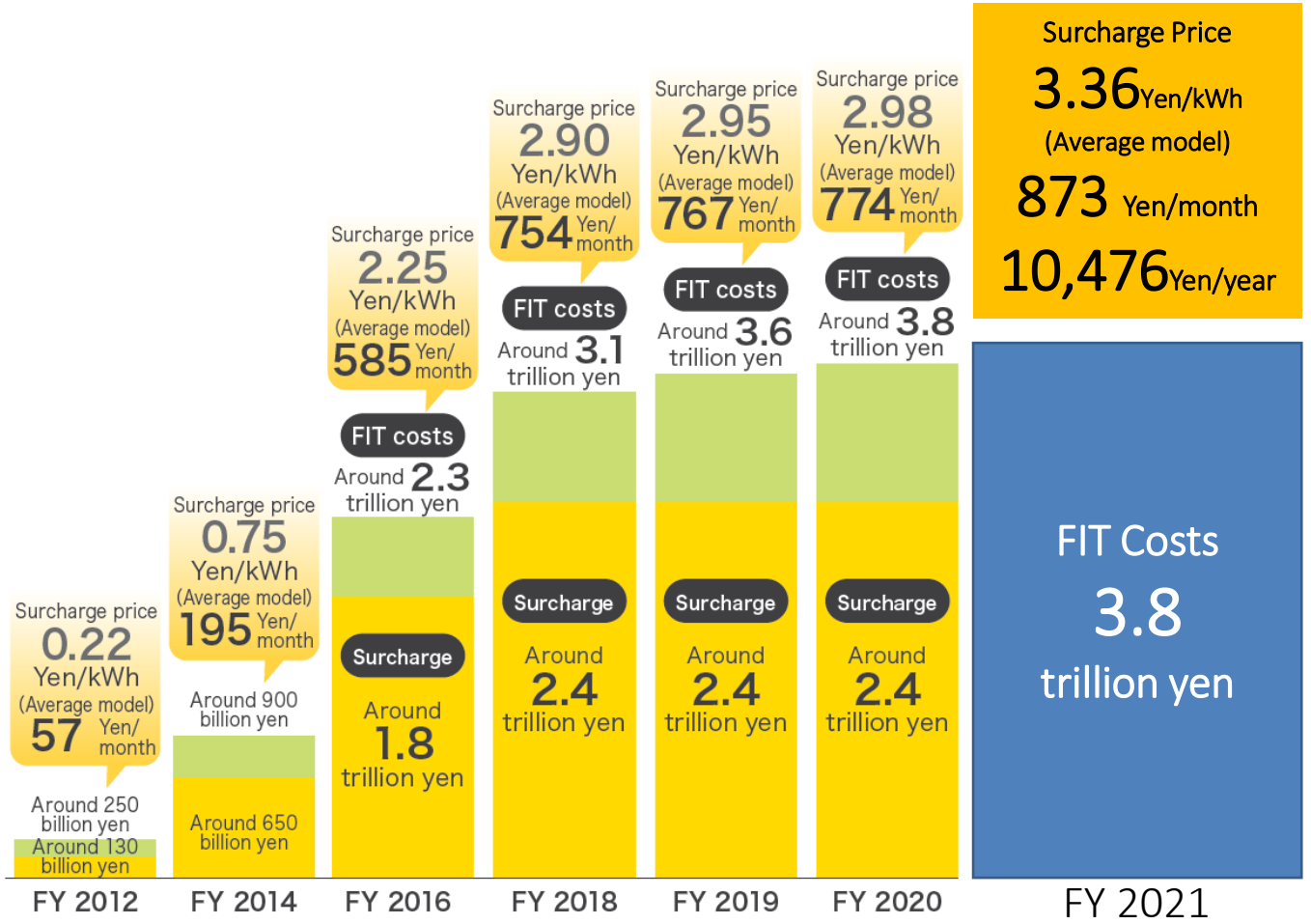

（注１）CO2排出量1トンあたりの税率は、エネルギー課税の固有単位当たり税率を、資源エネルギー庁「エネルギー源別標準発熱量・炭素排出係数（2018年度改訂）」を用いて、CO2排出量当たりに換算したもの。
（注２）上記のほか、一般送配電事業者の販売電気には電源開発促進税が課税される（375円/千kWh）。電源開発促進税のkWhあたりの税率を、IEA（2019）「World CO2 Emissions from Fuel Combustion」の日本の各燃料種火力排出係数（tCO2/kWh）を用いて、燃料ごとにCO2排出量当たりに換算すると、例えば重油580円/tCO2、天然ガス907円/tCO2、石炭412円/tCO2となる。

(Source) Subcommittee on the utilization of carbon pricing Central Environment Council,2021

# The Surcharge and Total Cost under the Feed-in Tariff Scheme

## 再生可能エネルギーの固定価格買取制度による賦課金と総コスト

- Feed-In Tariff (FIT) scheme was introduced in 2012.
- The purchase costs have reached 3.8 trillion yen (approximately 36 billion USD)
- The surcharge cost to ordinary households based on the average model (260 kWh/month) has risen to 873yen/month and 10476yen/year.

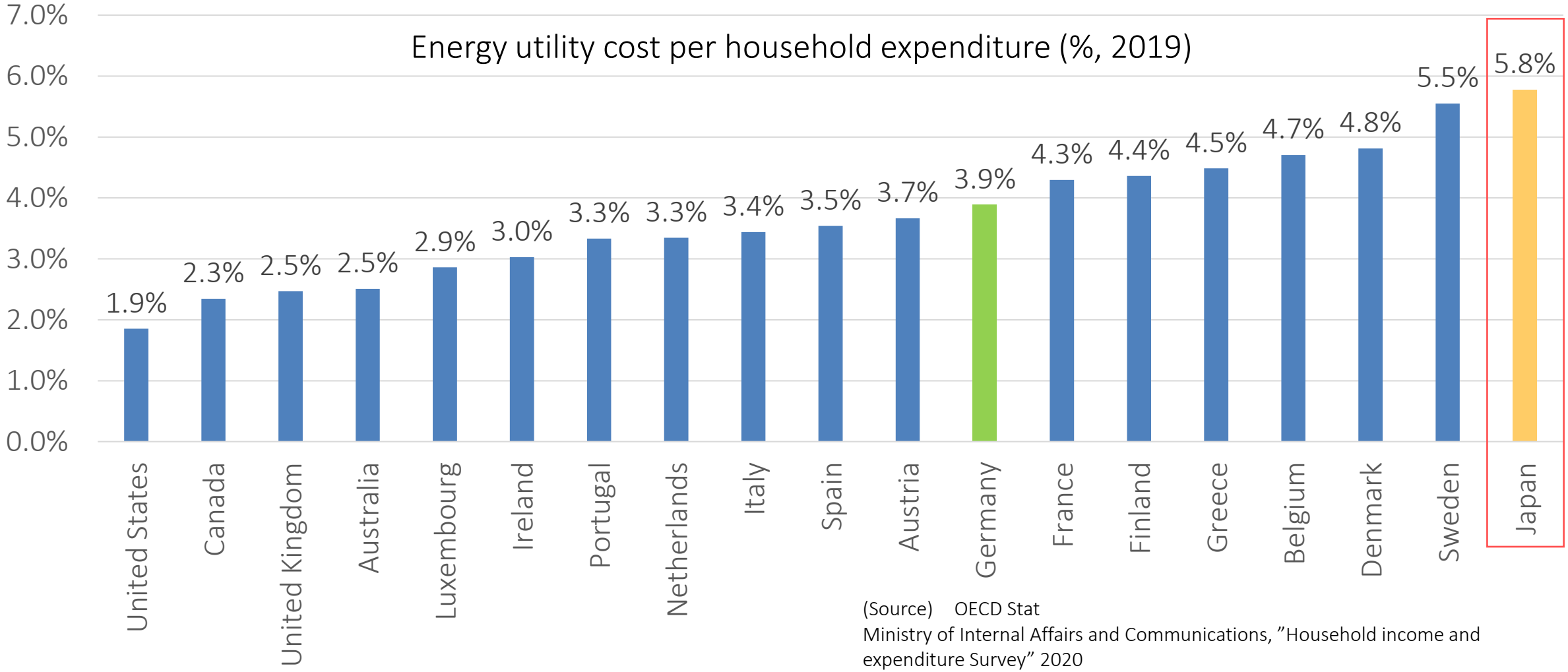



(Source) Agency for Natural Resources and Energy

# Burden of Energy Bill in the Household Sector.

## 先進国の一般家庭における光熱費負担率

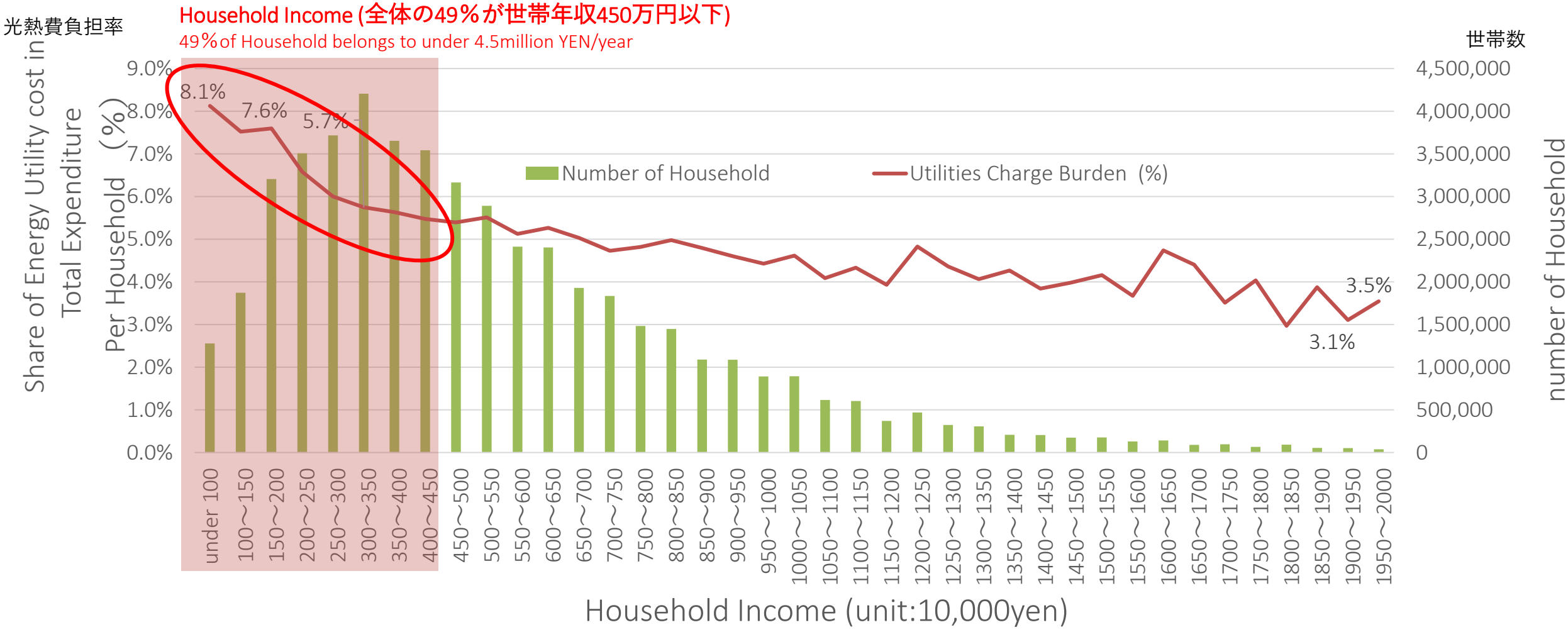
- The ratio of energy utility costs to total household expenditures was calculated for countries for which data were available.
- The household energy bill burden in Japan is the highest level among the major OECD countries.
- This fact shows that the burden of energy costs on households is already significant even before additional carbon pricing enforcement.




(Source) OECD Stat
Ministry of Internal Affairs and Communications, "Household income and expenditure Survey" 2020

# Regressive Nature of Energy Price: The Share of Energy Bill in Total Household Expenditure by Income groups.
# エネルギー価格の逆進性:　所得階層別の光熱費負担率

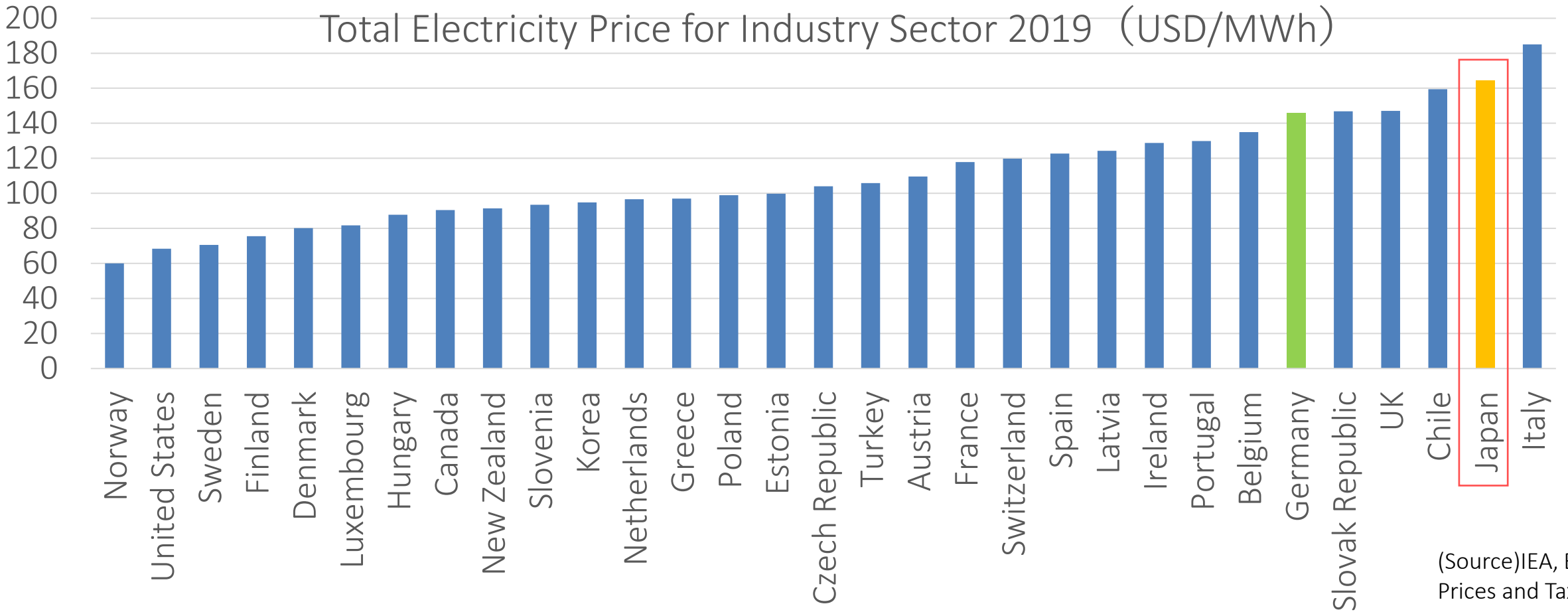
- Since energy is a necessary goods for our daily life, a certain amount is consumed, regardless of the income level.
- This results the burden of energy costs is greatest in the low-income household.




(Source) Calculate by the  presenter using data from “Statistics Bureau of Japan, “National Survey of Family Income and Expenditure”, 2021

# Electricity Price for the Industry Sector
## 先進国の産業用電力価格

- Japan's energy prices are among the highest in OECD due to the multiple policy approaches, the shutdown of nuclear power, and the lack of domestic resources.
- The Japan’s electricity price for industrial sector is the second highest among OECD countries.

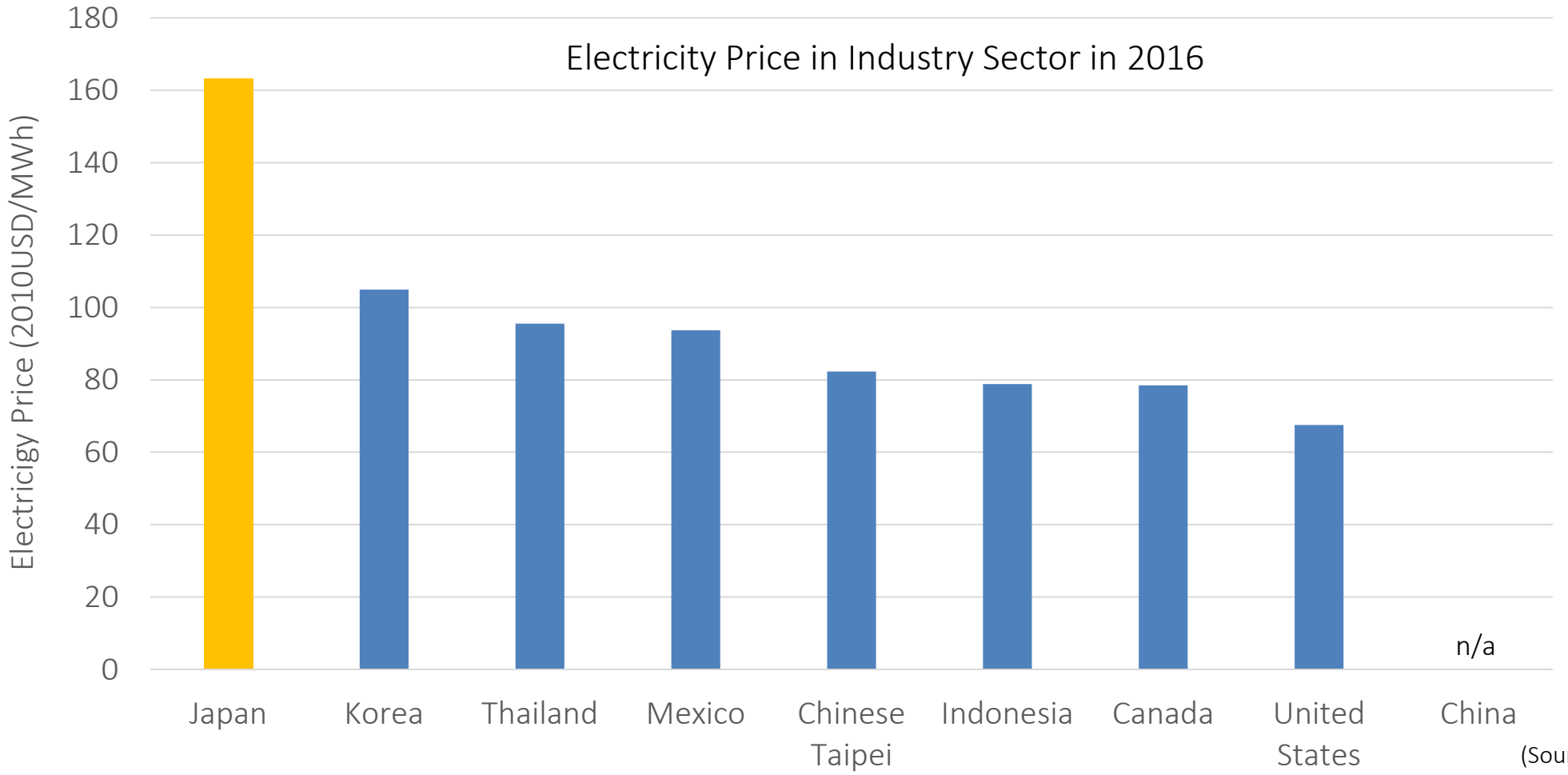



(Source)IEA, Energy Prices and Taxes

# International Competitiveness: Electricity Price in Industry Sector in the APEC region.

# 国際競争力への影響:　産業用電力価では日本の価格はAPEC域内 では最も高額

- Among the APEC economies, which accounts for more than 80% of Japan's trading partners, industrial electricity price in Japan is by far the most expensive.
- It is 1.6 times higher than that of South Korea, the second highest in the region, and 2.4 times higher than that of the United States.

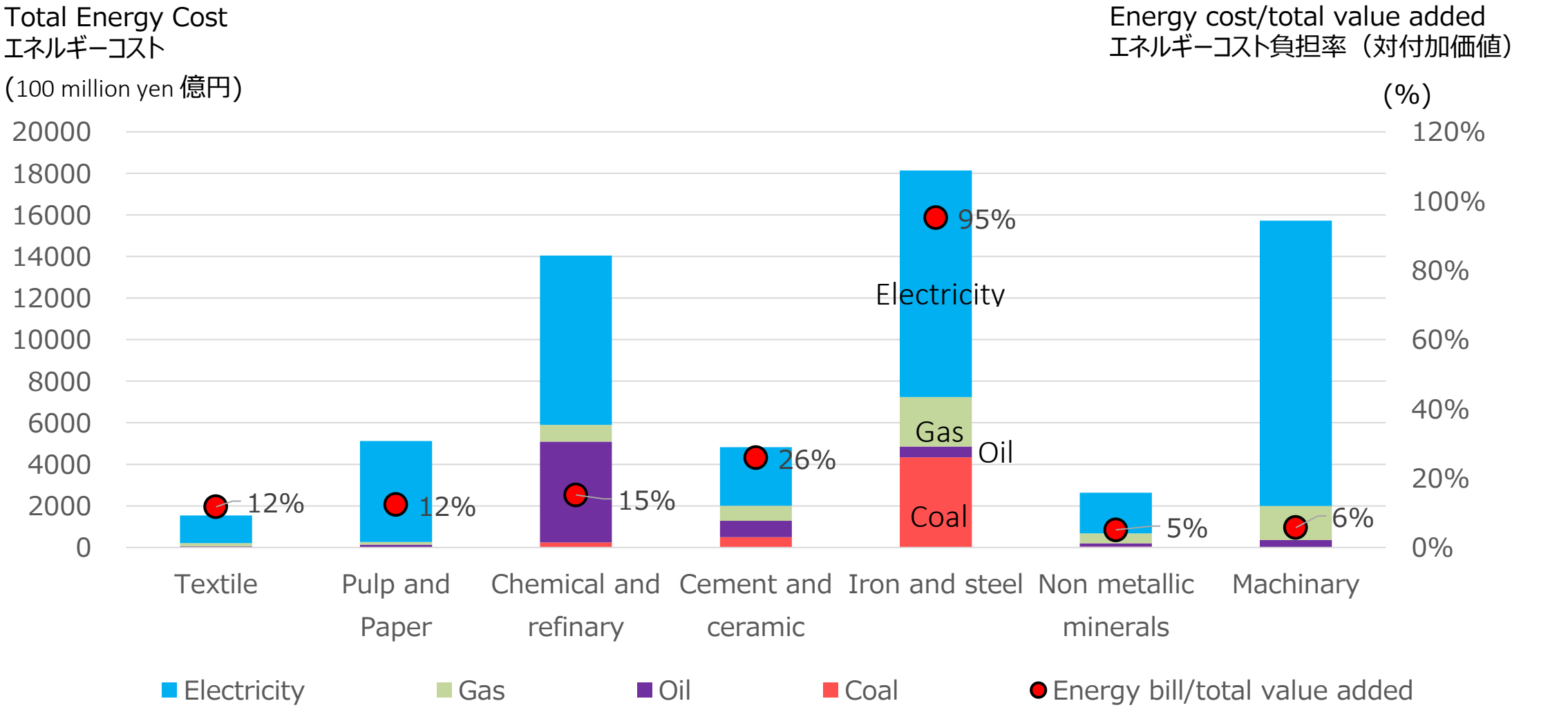



(Source)
IEA, World Energy Prices

# Impact on Economy: High Energy Cost in Manufacturing Sectors

# 経済への影響:　製造業における高額なエネルギー価格

- Japan's manufacturing sector accounts for a large share in the total value added.
- The highest energy prices cause to rise production costs and expose energy-intensive manufacturing to severe international competition.




(source)Calculated by the presenter using data from METI “Economic Census for Business Activity 2016” and ANRE “Energy Balance Tables 2016”

# Japanese energy-intensive industries are at a risk of withdrawal due to soaring energy costs エネルギーコスト高騰によるエネルギー多消費産業事業の撤退

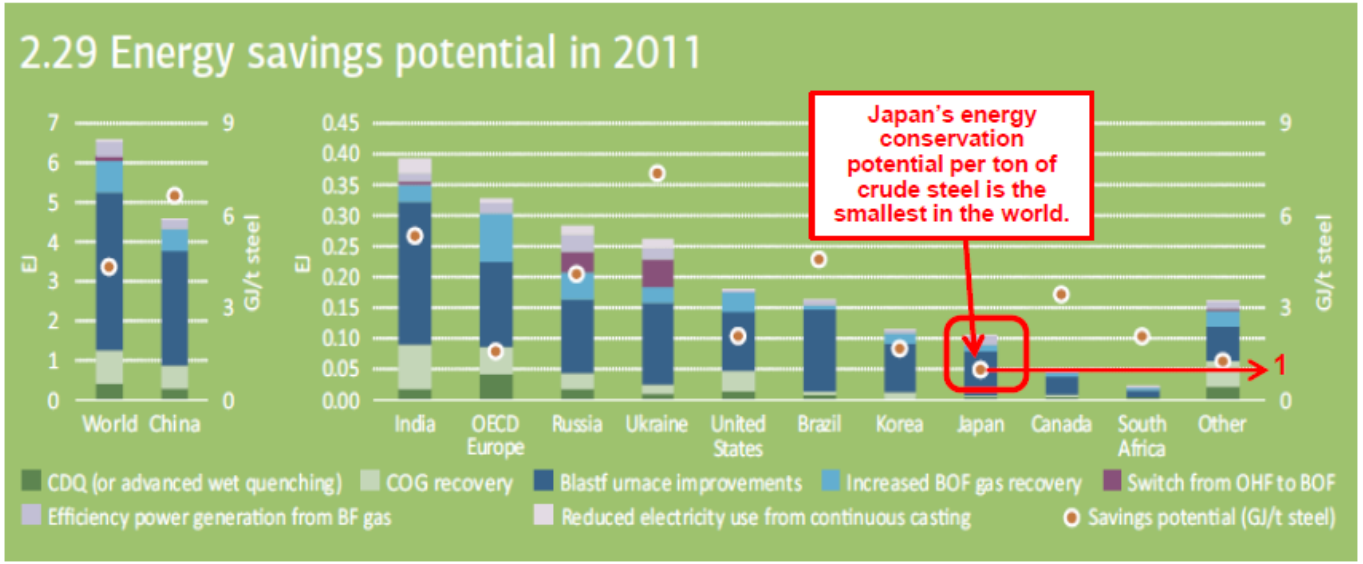
- With Japan's far high energy price from international standards, industries that are exposed to international competition are finding it difficult to pass on the higher energy costs to customers. The industries are being forced to take measures such as relocating factories overseas, reducing personnel, and cutting wages.
- Particularly for the energy-intensive industries, the impact of rising energy costs due to rigorous climate policy is humongous. For example, the cost of electricity purchased by the steel industry is 782.2 billion yen (2014), and it is estimated that a 1 yen/kWh increase in electricity rates would increase the burden by 700 yen per ton of crude steel, equivalent to over 30% of its profit (source: Federation of Steel Industries).
- Examples of how does rise in energy price impact on industries; Japanese aluminum industry, which was once the third largest industry in the world, has been closed due to the sharp rise in electricity price by renewable FIT and nuclear shutdown in 2014.

# International Comparison of Energy Efficiency in the Steel Industry

- According to the IEA, Japan has the world's smallest potential for energy conservation per ton of crude steel. According to RITE, Japan has the world's most energy efficient steel industry. These figures demonstrate that virtually all steel mills in Japan use existing technologies and that there is very little potential for further energy-conservation measures.

How would be the world GHG emission, if the Iron and Steel industry were to be transferred to other countries?

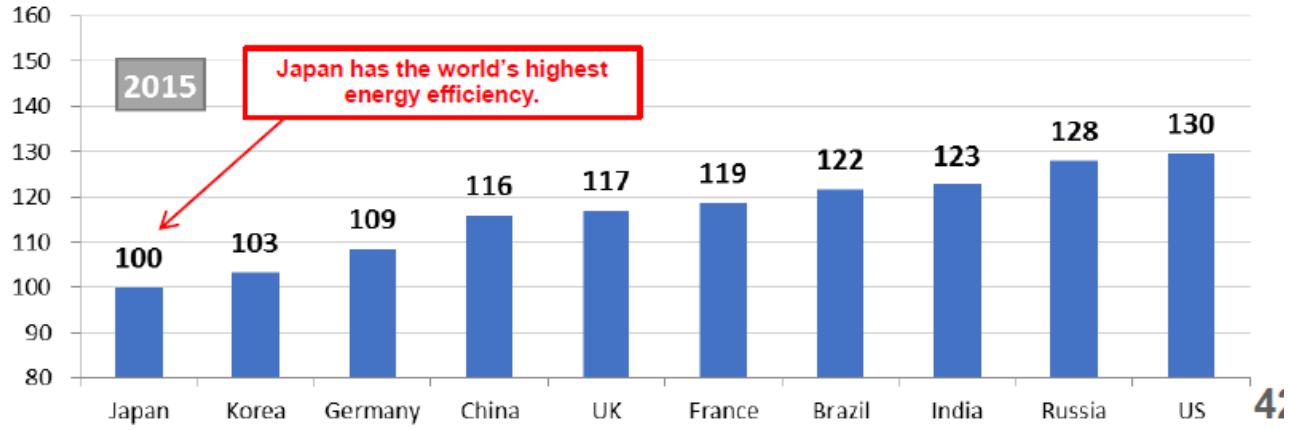
**Energy Saving Potential from Transferring and Promoting Energy Conservation Technologies (2011)**




Source: IEA "Energy Technology Perspective 2014"

**Estimate of Steel Industry (BF-BOF) Energy Efficiency**

**(2015, Japan=100)**

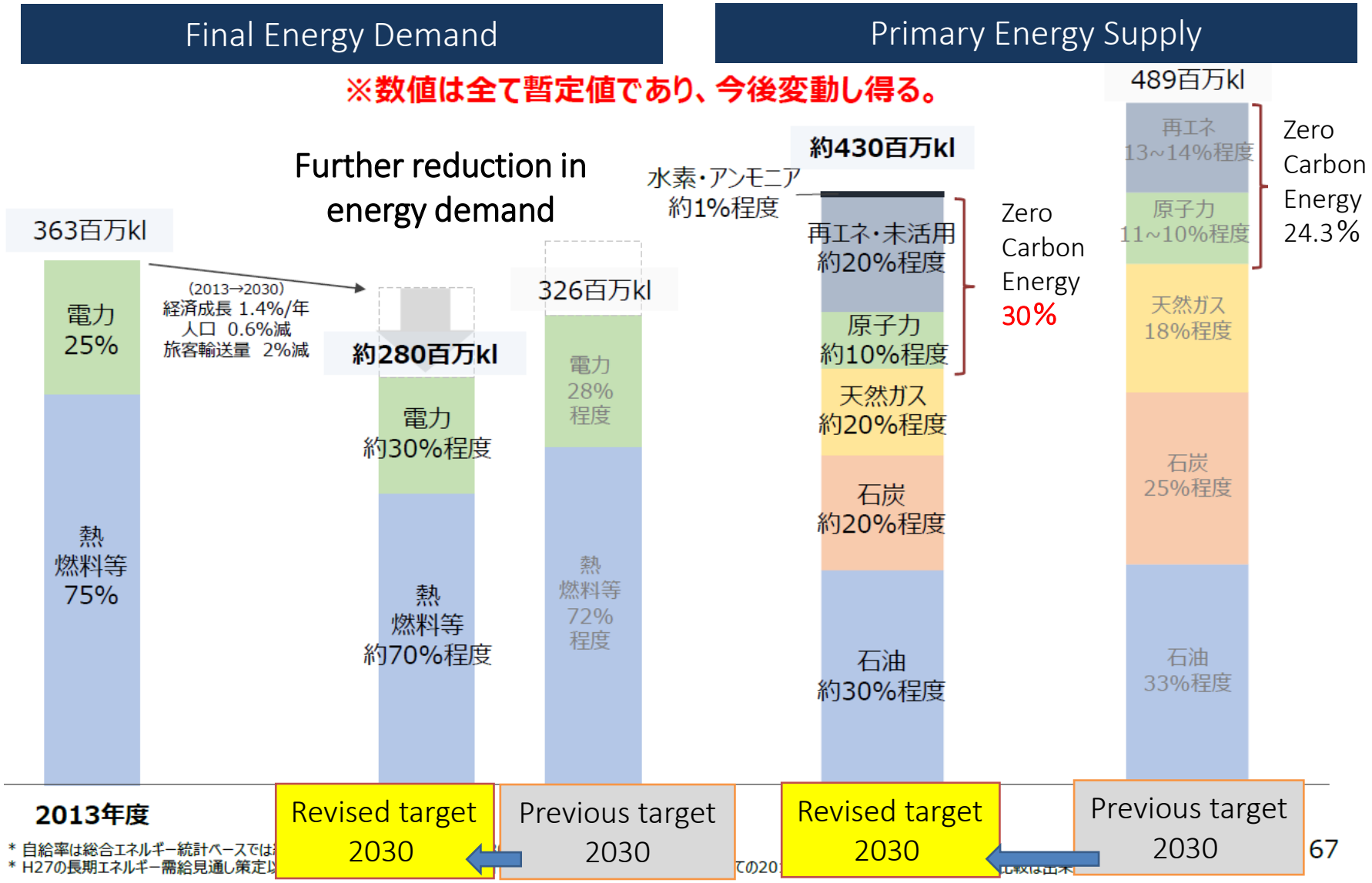



Source: RITE "Estimated Energy Unit Consumption in 2015"

(Source) The Japan Iron and Steel Federation,"Activities of Japanese Steel Industry to Combat Global Warming"
Report of "JISF's Commitment to a Low Carbon Society" February 2021

# Japan's approach in 2030 towards carbon neutrality in 2050

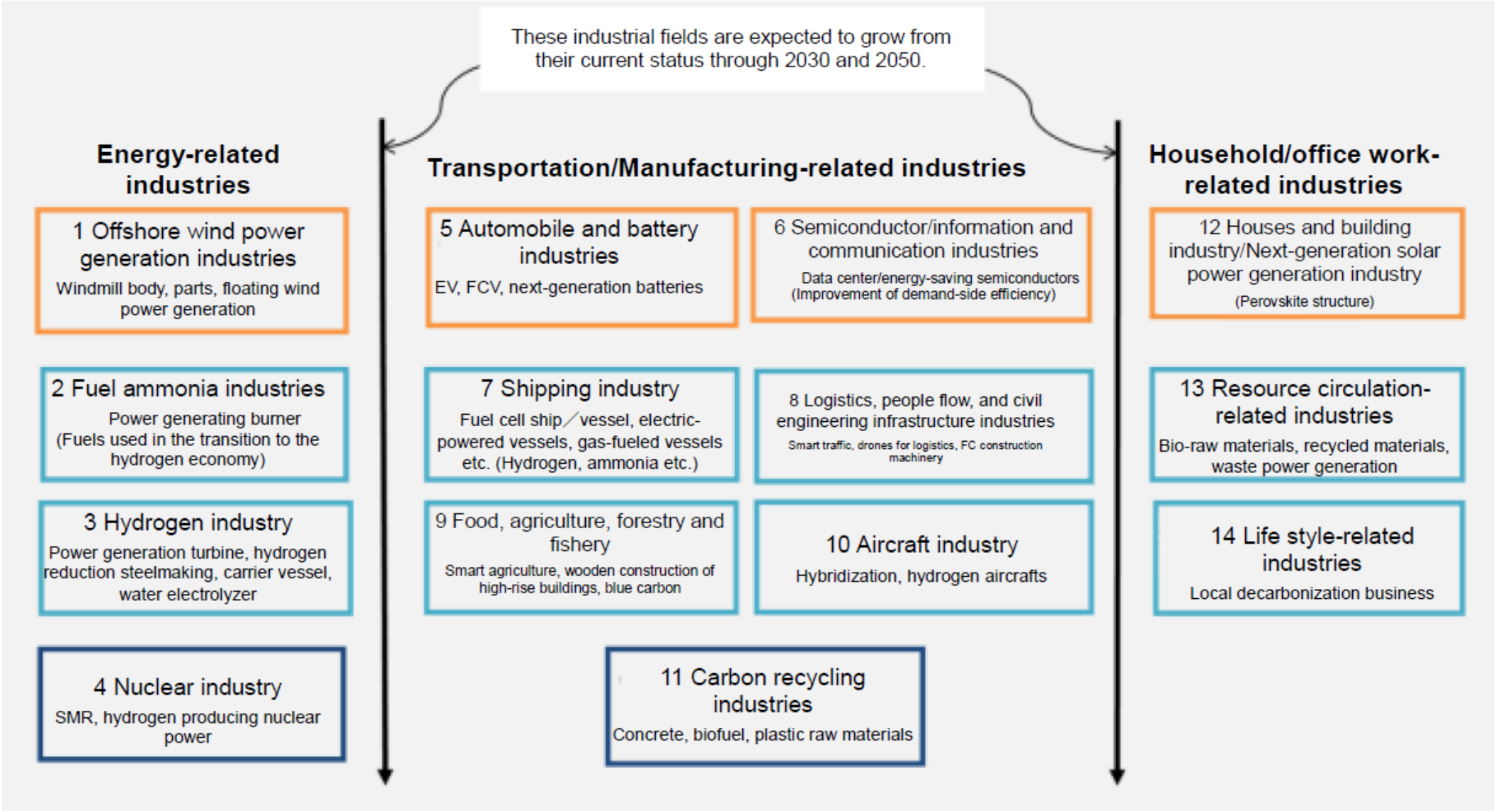
Japan just amended it's 2030 emission reduction target to **-46%** from -23%.
(1)Further reduction in energy demand
(2)More ambitious implementation rate of renewable energy.
(3)Aiming on commercial use of innovative zero-carbon energy, ammonia and hydrogen.




出典：総合資源エネルギー調査会 基本政策分科会、"エネルギー基本計画（素案）" 2021年8月

# Action Plan in Key Industry; the Green Growth Strategy for Carbon Neutrality in 2050
# 2050 年カーボンニュートラルに伴うグリーン成長戦略

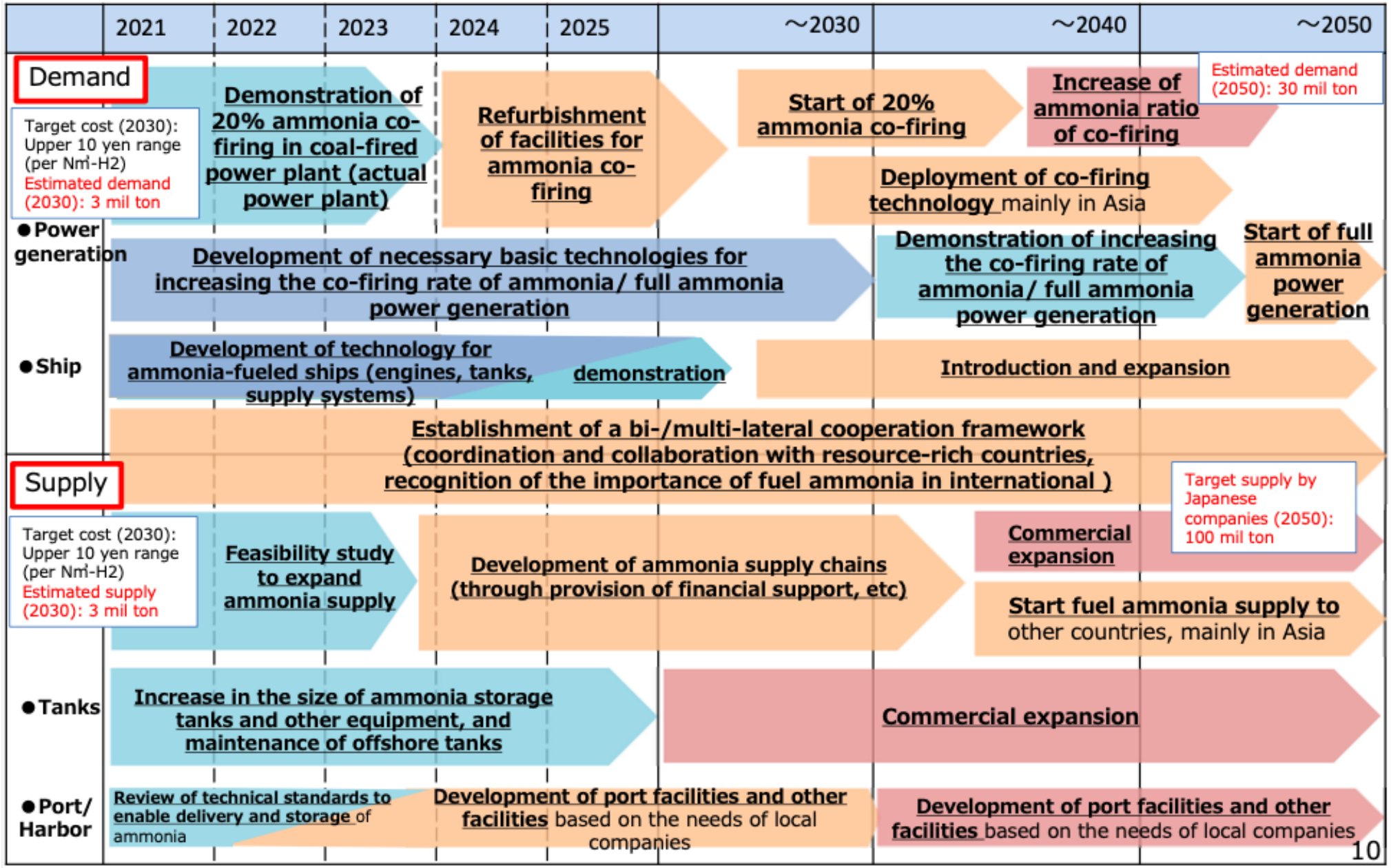





(Source)2050 年カーボンニュートラルに伴うグリーン成長戦略, the Green Growth Strategy for Carbon Neutrality in 2050 , in Japanese
https://www.meti.go.jp/press/2021/06/20210618005/20210618005-3.pdf

# Japan's Road Map for Fuel Ammonia

(Japan's Green Growth Strategy: Dec 2020, Public-Private Council: Feb 2021)




(Source) The Green Growth Strategy for Carbon Neutrality in 2050 , in Japanese

# 11 Carbon Recycling

## (11) "Roadmap" of Growth Strategies for carbon recycling industry

- Introduction phase: 1. Development phase → 2. Demonstration phase → 3. Introduction and expansion/ cost reduction phase → 4. Autonomous commercialization phase
- Policy means to be substantiated: [1] goals, [2] legal systems (such as regulatory reform), [3] standards, [4] tax, [5] budget, [6] finance, [7] public procurement, etc.

| *Representative examples are shown | 2021 | 2022 | 2023 | 2024 | 2025 | -2030 | -2040 | -2050 |
|---|---|---|---|---|---|---|---|---|
| **● Concrete**<br>Cost target for 2030<br>30 yen level /kg<br>(= Equivalent to existing products) | ・Introduction is considered in Osaka Expo (2025)<br>・$CO_2$ absorption concrete technology will be registered in the Database of the Ministry of Land, Infrastructure, Transport and Tourism on new technologies.<br>Expanding awareness to local governments.<br>Furthermore, sales channels will be expanded and costs will be reduced by expanding public procurement. | | | | | | ・**Expanding sales channels to developing countries** through global standardization, PR at large-scale international exhibitions, etc. | |
| | ・Technology development of **concrete with rust prevention performance** | | ・**Demonstration of concrete with rust prevention performance** | | | | | |
| | ・**Industry-academia-government officials from Japan and the United States** carrying out a joint project on $CO_2$ carbonate (concrete)<br>・Concluding MOC concerning collaboration in the field of Carbon Recyclig with related countries and promote joint research and demonstration | | | | | | | |
| **● Fuel**<br>Cost target for 2030<br>100 yen level/L<br>(= Equivalent to existing products)<br>(Biofuel from microalgae culture) | ・**Large-scale demonstration and cost reduction** for commercialization around 2030<br>・Regarding international aviation, **ICAO** has institutionalized not to increase $CO_2$ emissions compared to 2019 (2021-2035) (*ICAO: International Civil Aviation Organization) | | | | | | ・**Expanding** supply of competitive microalgae jet fuel to aircraft in response to **trends in the international biojet fuel market** | |
| | ・Continued technological development for **improving productivity and quality** through improvement of $CO_2$ absorption efficiency and stable growth of microalgae | | | | | | | |
| **● Chemicals**<br>Cost target for 2050<br>100 yen level/kg<br>(=Equivalent to existing products)<br>(Artificial photosynthesis) | ・Developing **highly productive photocatalyst** required for large-scale demonstration<br>・Relaxing related regulations, establish safe-keeping and safety standards | | | | | | ・**Large-scale demonstration** | ・**Support for cost reduction/introduction** by subsidy etc. |
| **● Separation recovery**<br>Cost target<br>(/CO 2 t)<br>Low-pressure gas: for 2030 2,000 yen level<br>High-pressure gas: for 2030 1,000 yen level<br>DAC : for 2050 2,000 yen level<br>Target scale for 2050<br>About 2.5 billionCO2t in the entire world | ○ Derived from exhaust gas | | | | | | | |
| | ・**Developed highly efficient CO2 separation and capture technology to reduce costs** | | ・**Large-scale demonstration** | | | | ・**Expanding introduction** by further cost reduction | |
| | ○ Derived from atmosphere (DAC) | | | | | | | |
| | ・R&D for **technology of direct $CO_2$ capture from the atmosphere (DAC)** (Enhancement of energy efficiency, **cost reduction**) through utilization of the moonshot type R&D system, etc. | | | | | | ・Further cost reduction through **demonstration** | ・**Expanding introduction** through further cost reduction and subsidy etc. |

(Source) The Green Growth Strategy for Carbon Neutrality in 2050 , in Japanese