Driving the Clean Energy Transition in ASEAN and Japan

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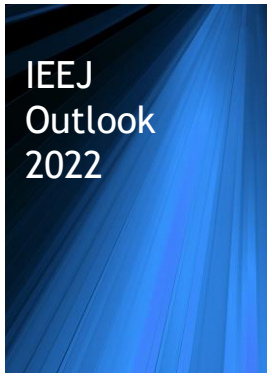
Managing Director
Institute of Energy Economics, Japan (IEEJ)

Today's Contents

- Japan's 6th Basic Energy Strategy (main points)

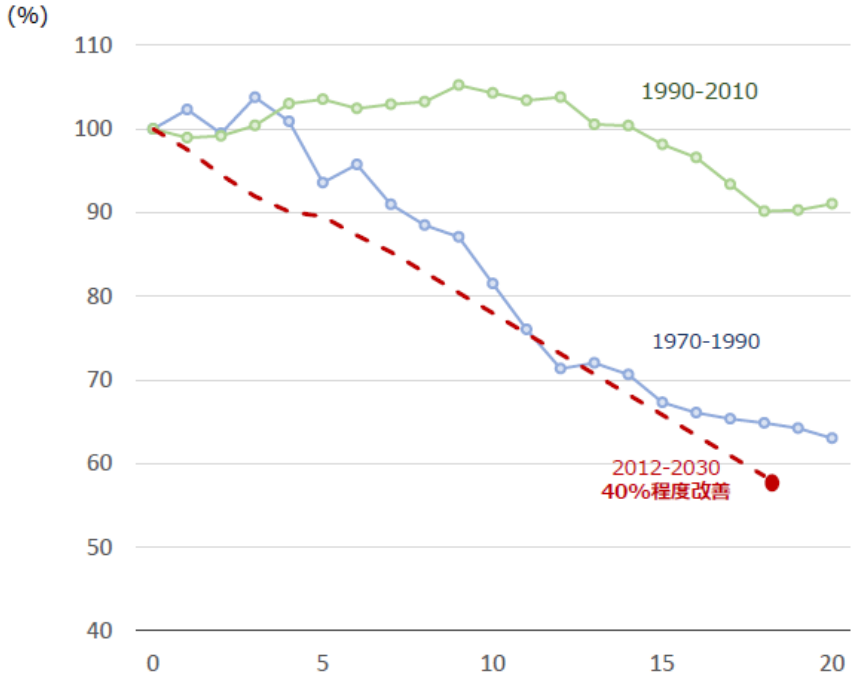
- IEEJ's Outlook 2022
  - Where we stand in meeting Carbon Neutral by 2050?
  - What to expect towards 2050?
  - Some challenges



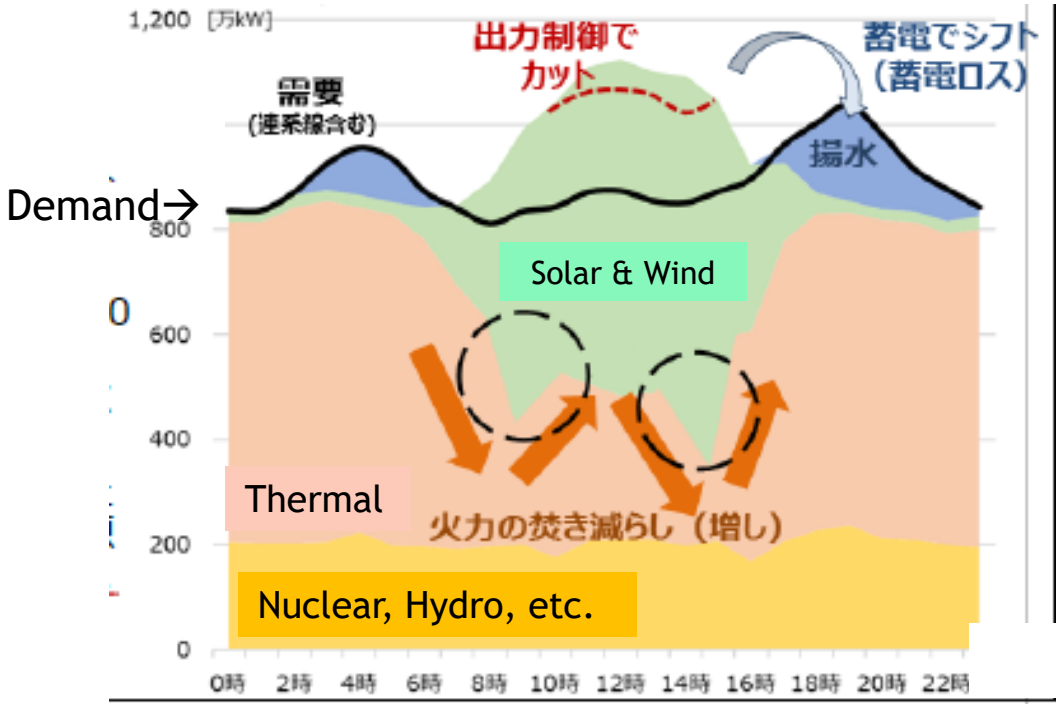
Japan: Basic Approach towards 2030 with 2050 CN target

- Deeper Energy Efficiency Improvement and Energy Saving
- Electrify as many sectors and usages as possible
- Decarbonization of power generation
- Fuel switching (shift away from coal & oil to gas)

Energy Efficiency Improvement

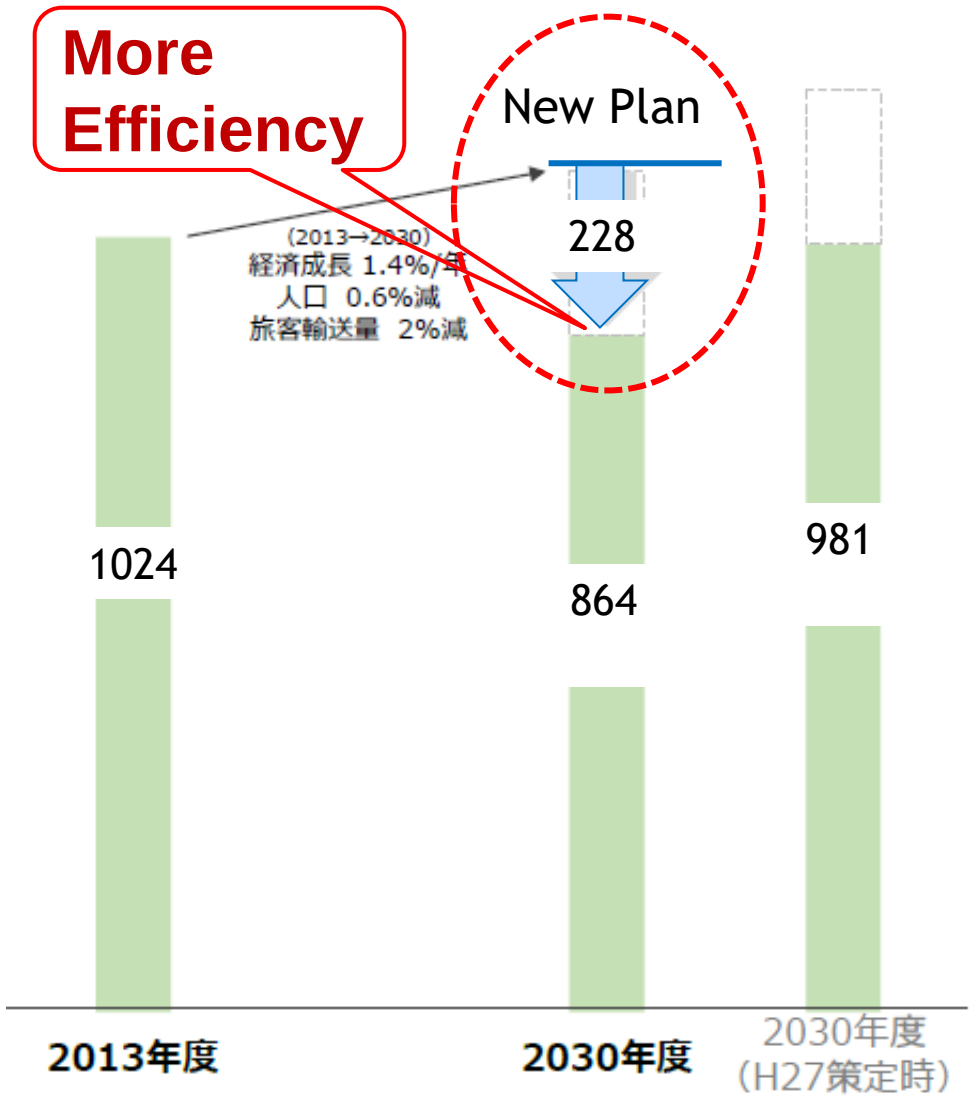


Lord Curve Management

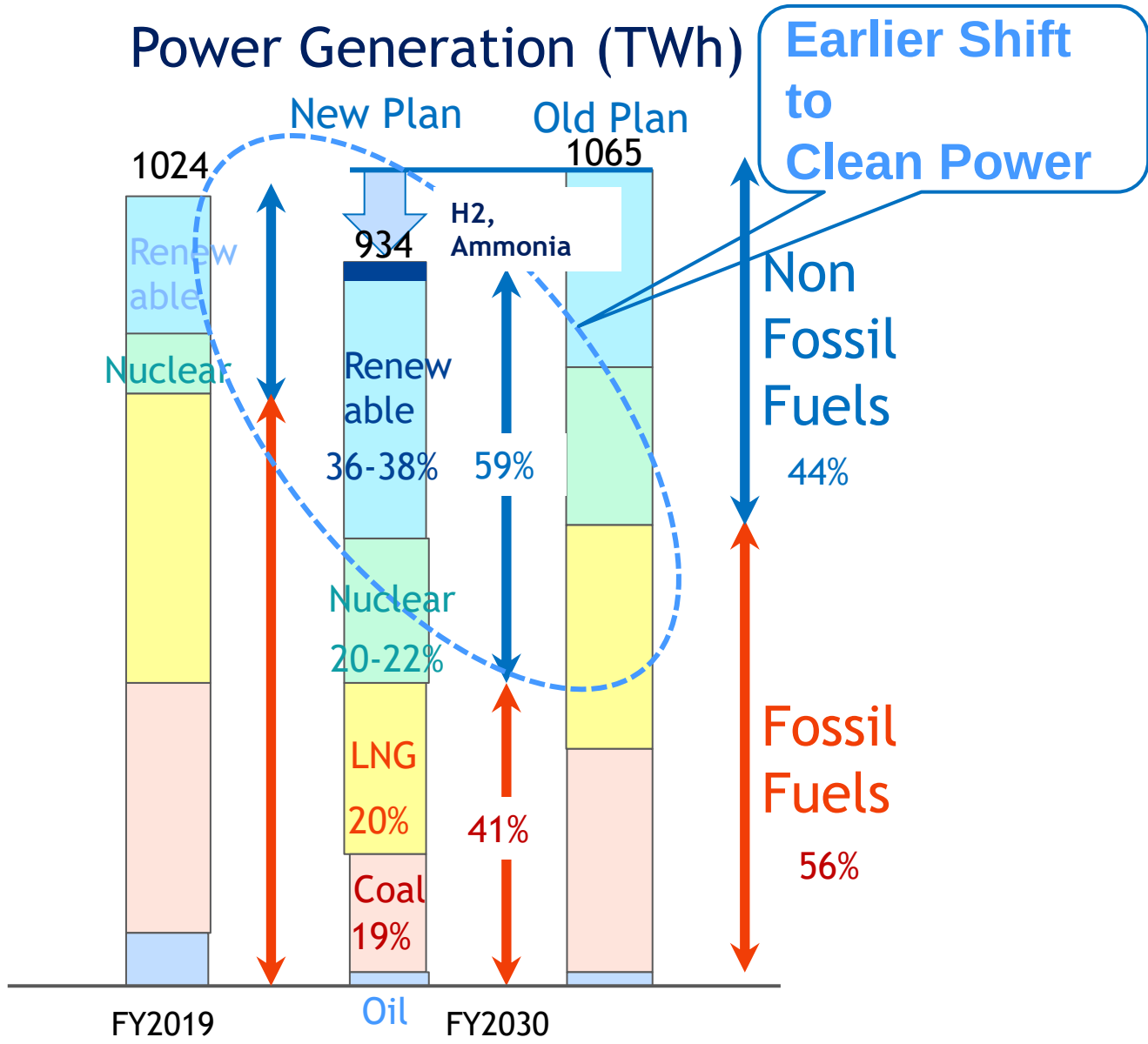


Energy Mix (Power Demand and Generation)

Power Demand (TWh)

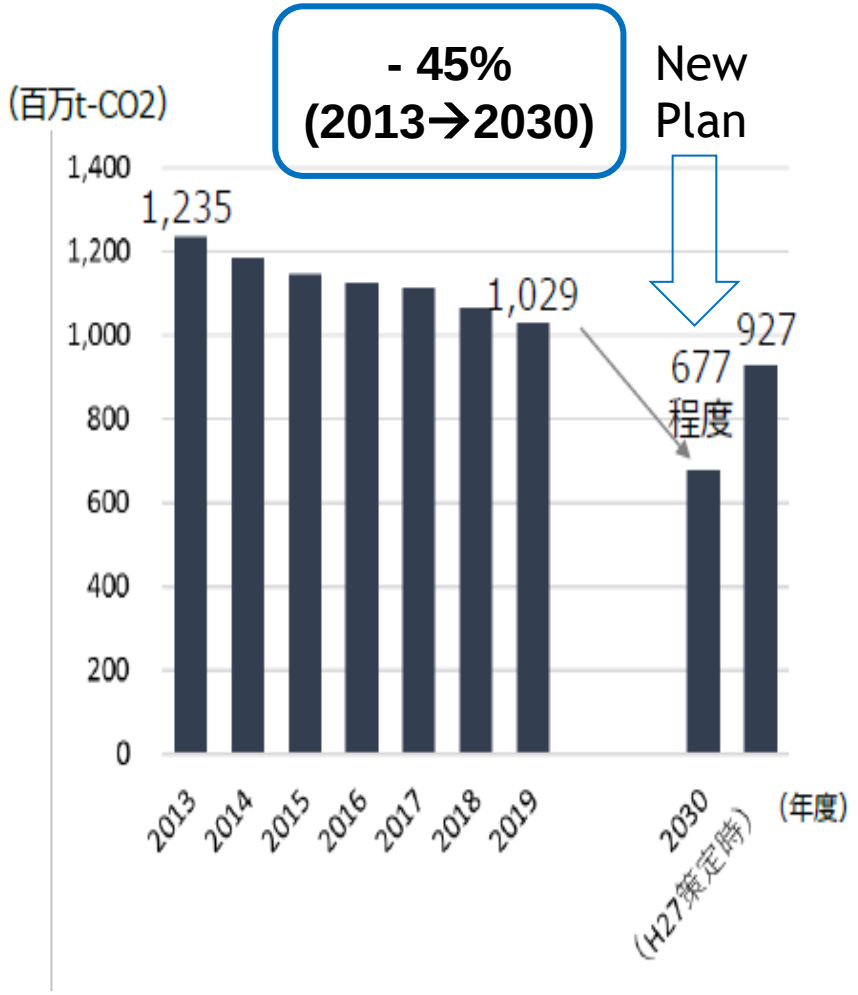


Power Generation (TWh)

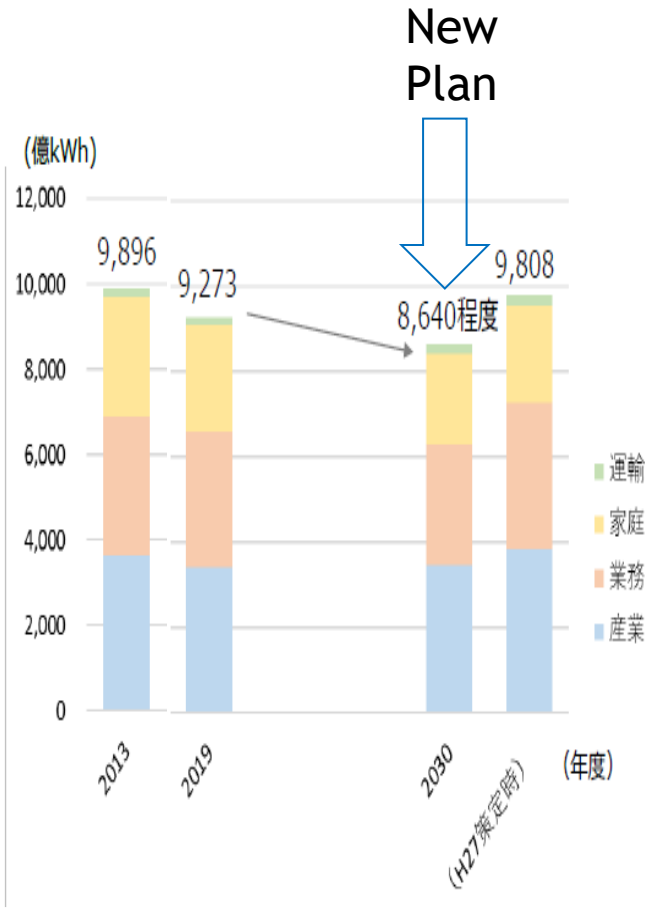


2030: 45% CO_2 Reduction from 2013

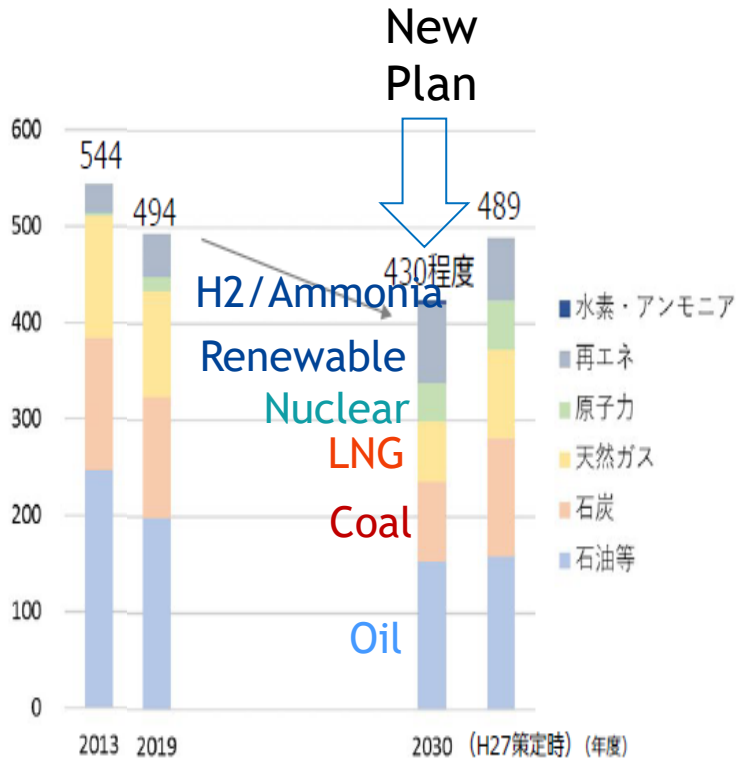
Energy-Related CO_2 Emission



Power Demand

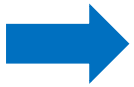


Primary Energy Demand



Japan: Challenges Remain for Meeting 2030 Target

- Deeper Energy Efficiency Improvement and Energy Saving
- Electrify as many sectors and usages as possible
- Decarbonization of power generation
- Fuel switching (shift away from coal & oil to gas)



- Need more tools to utilize energy saving potential
- Transport and industrial sectors remain difficult to electrify
- Nuclear re-start is slow while plants are aging
- Accommodating increasing VRE is a challenge (batteries, fluctuation, reserve, etc.)
- Too much dependence on one energy source (=natural gas) causes traditional energy security concern

Scenario exercises for 2050 include yet to be innovated technologies

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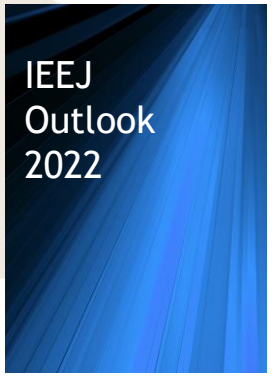
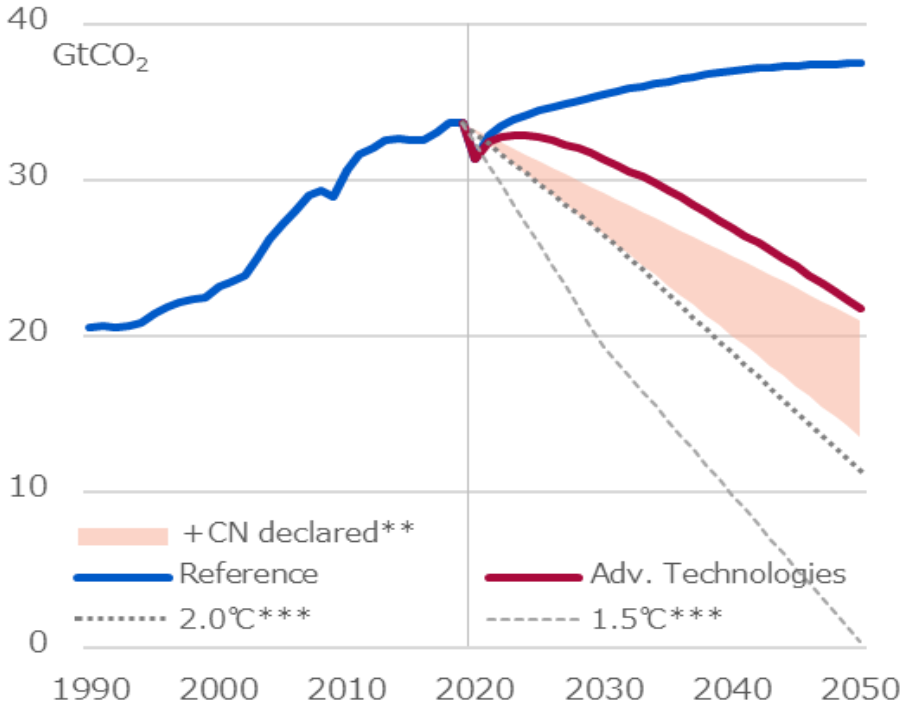
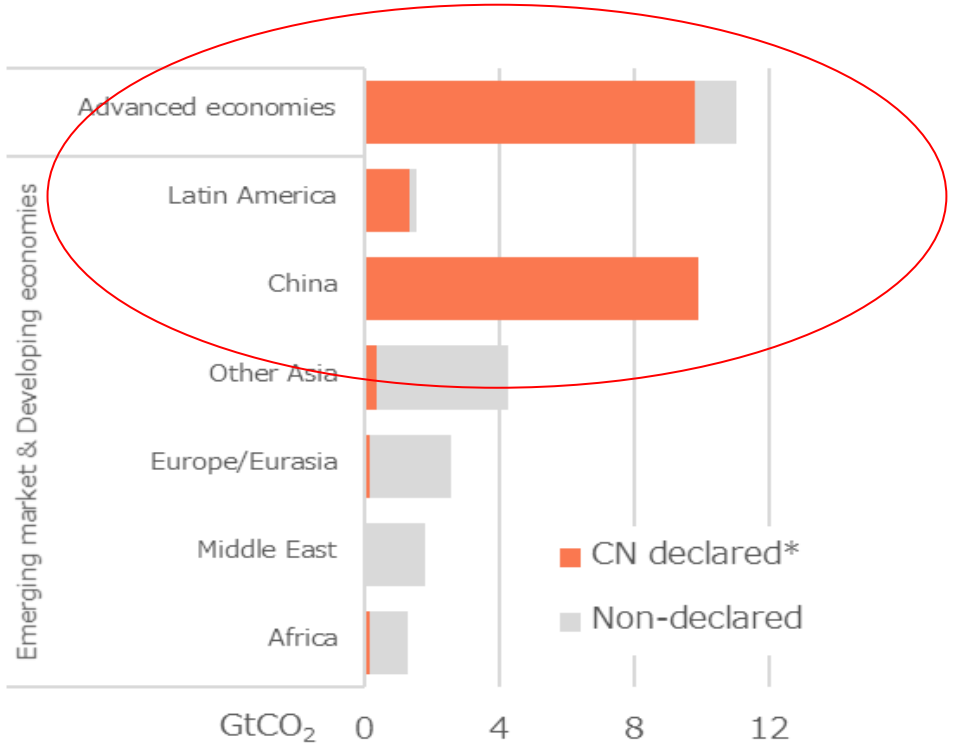


Emitters of two-thirds of the emissions declare CN, but…

❖ Energy-related CO_2 emissions (global)



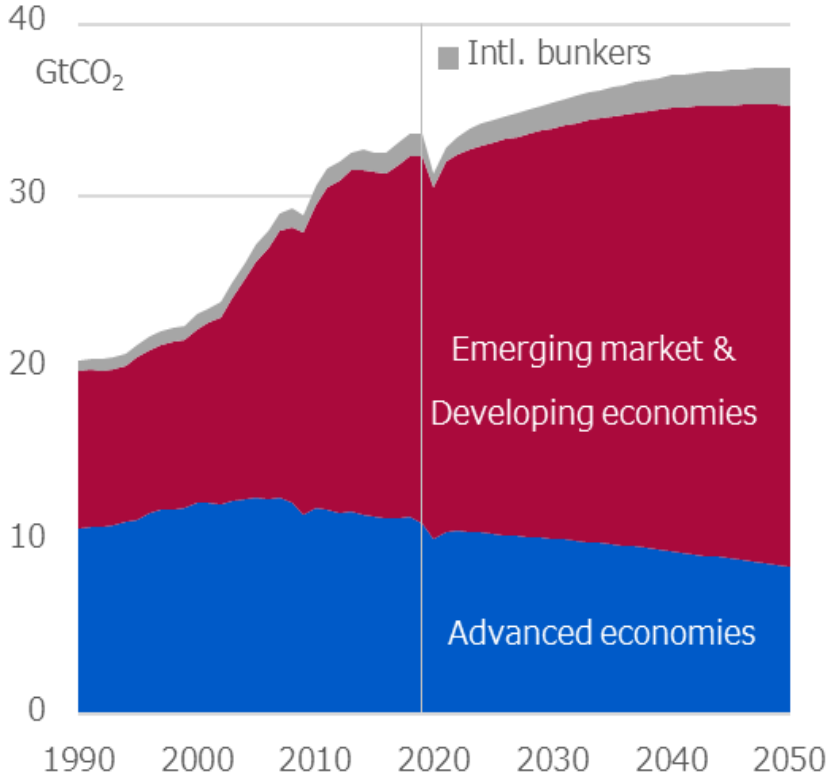
❖ Breakdown of CO_2 Emissions (2019)



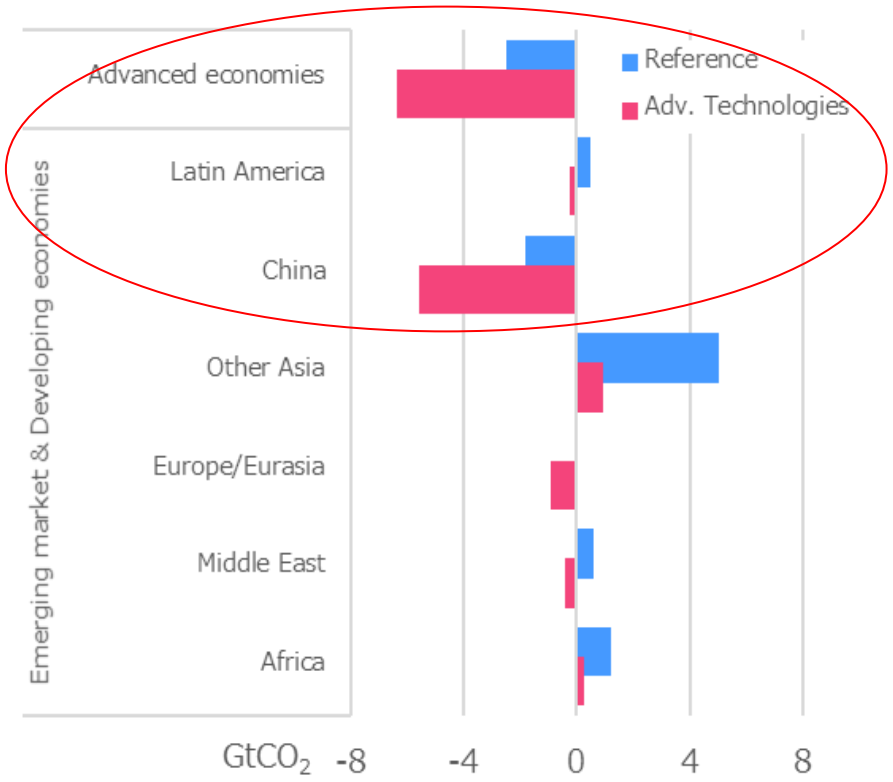
* United States, Brazil, South Korea, Poland, China and Climate Ambitions Alliance (121 countries). ** When the CN-stated countries achieve zero emissions in 2050 based on the emissions in the Reference / Advanced Technologies scenarios (For China, that announced 2060 CN, the emissions as of 2050 by linear interpolation between today and 2060). *** Average paths referred to the IPCC "Global Warming of 1.5°C".

Emissions in countries that have not declared CN increase and They Need More Energy

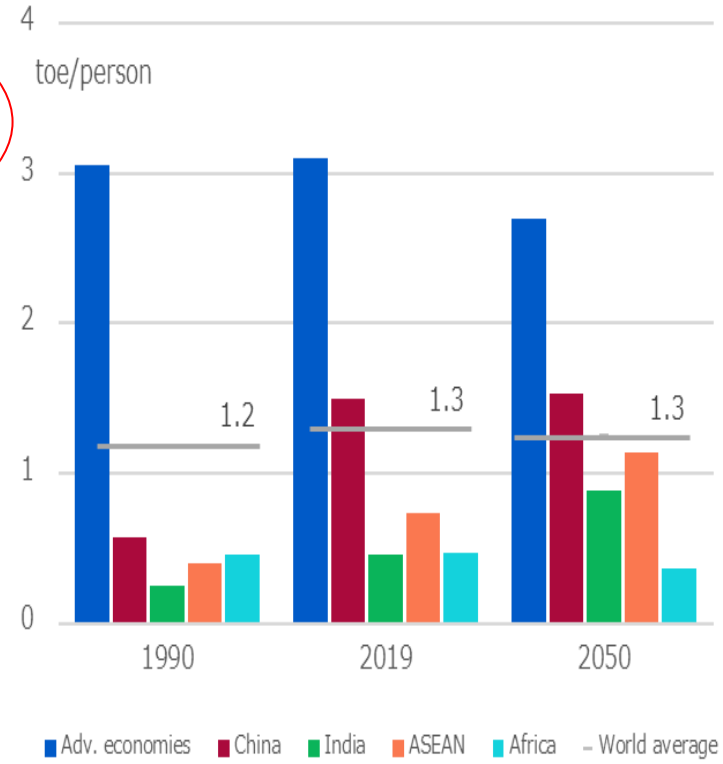
❖ Energy-related CO_2 emissions (Reference)



❖ Changes in emissions (2019-2050)



❖ Energy consumption per capita



Power demand is certain to grow

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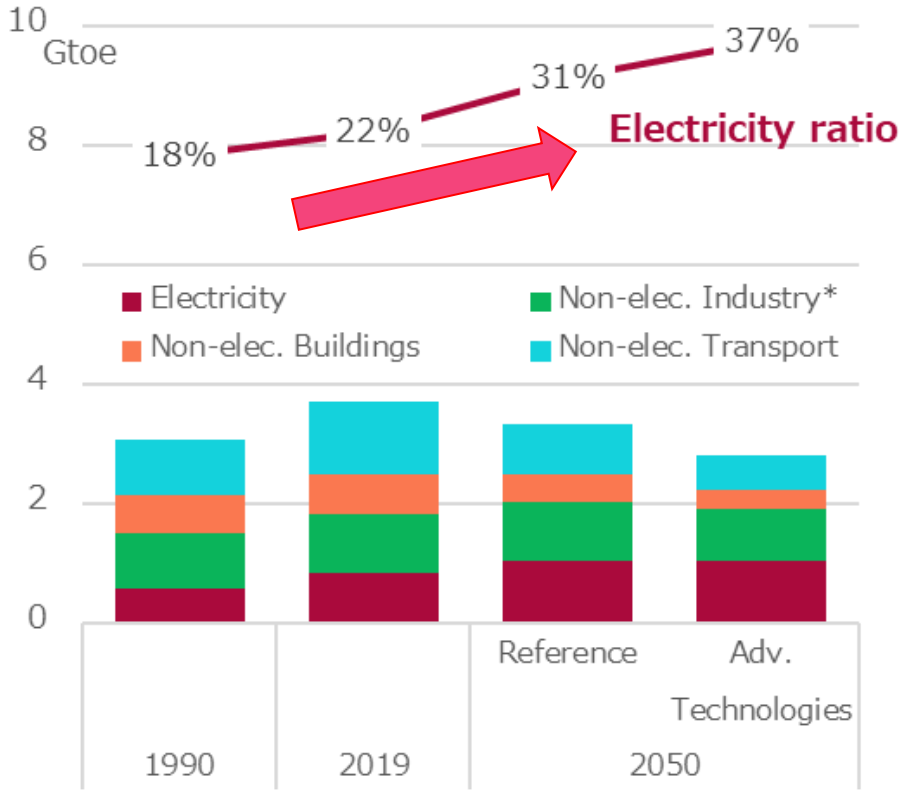
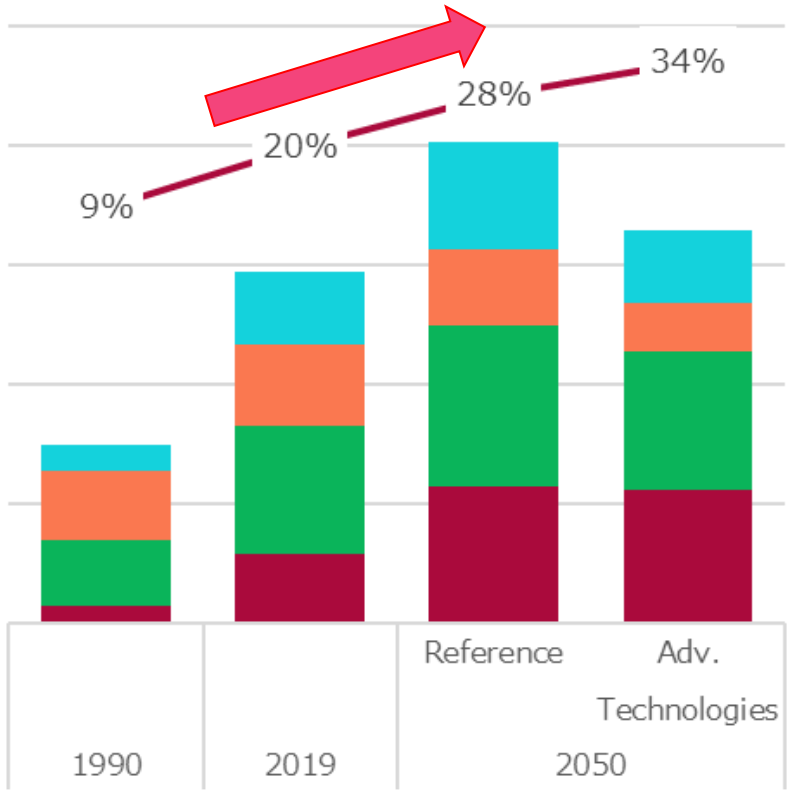
❖ Final Energy Consumption (Advanced Economies)



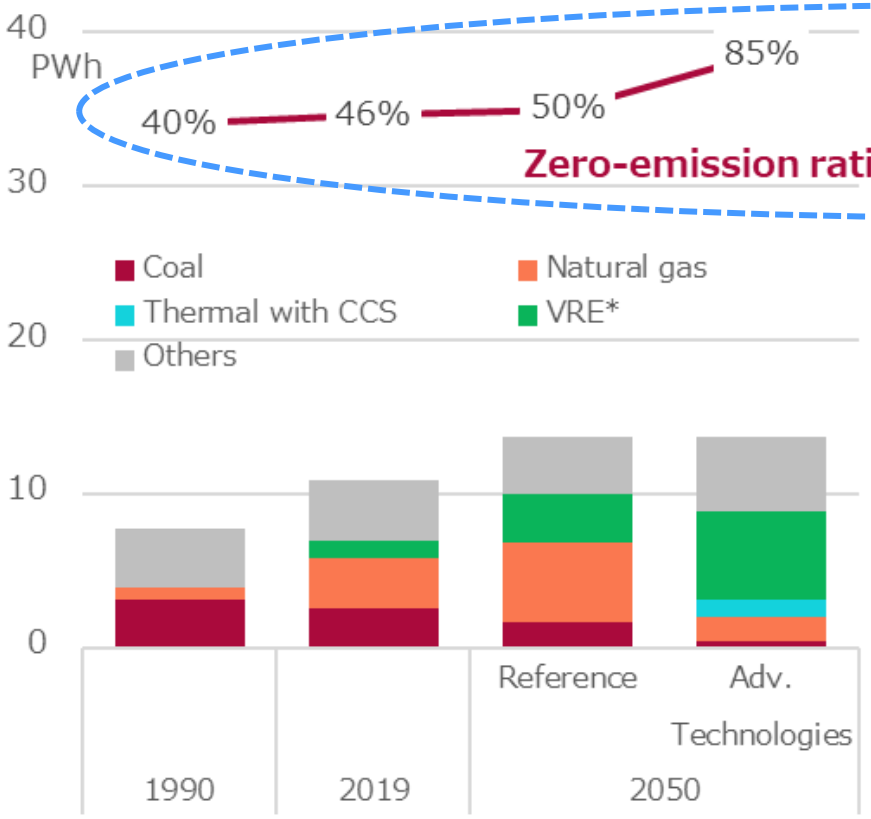
❖Final Energy Consumption (Emerging and Developing Economies)



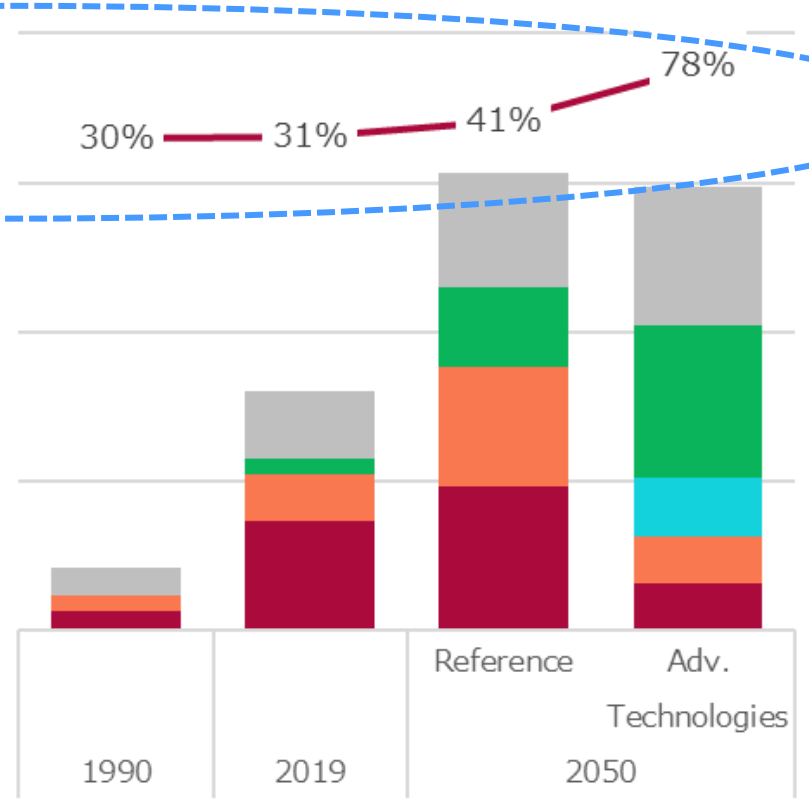
* Industry includes agriculture, forestry and fisheries and non-energy sector.

Decarbonization of the power sector is progressing

❖ Power Generation Mix (advanced economies)



❖ Power Generation Mix (Emerging and Developing Economies)



* VRE (Variable Renewable Energy): photovoltaic power, wind power, etc.

Decarbonization of non-power generation sector is difficult

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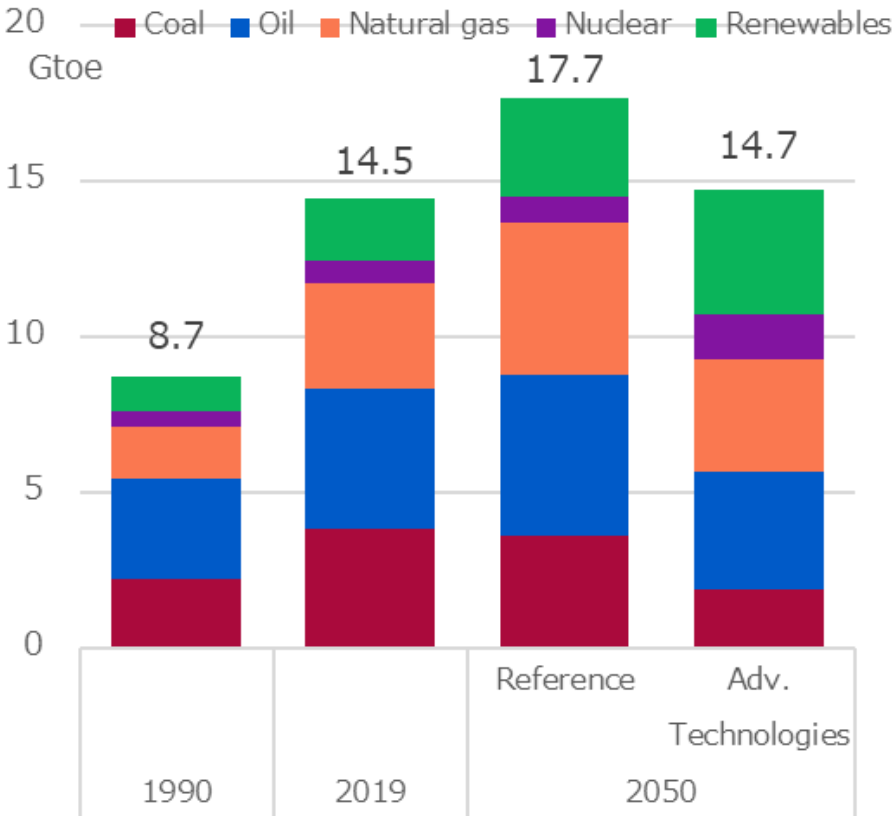
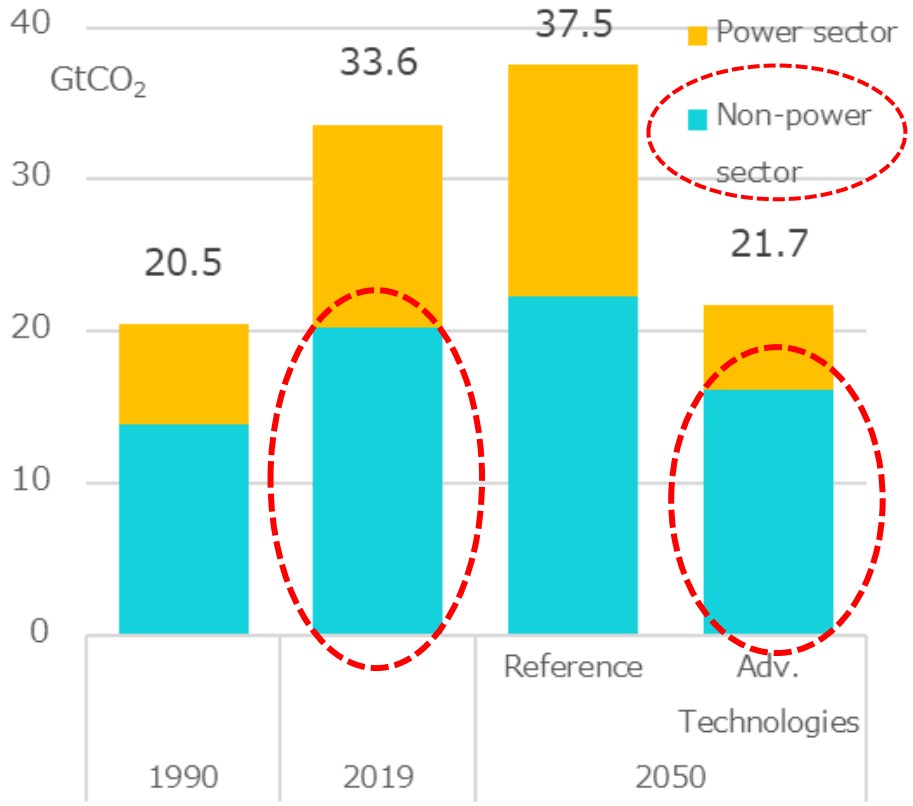
❖ Primary energy demand



❖ Energy-related CO_2 emissions



The introduction of non-fossil energy in non-power sectors is a challenge

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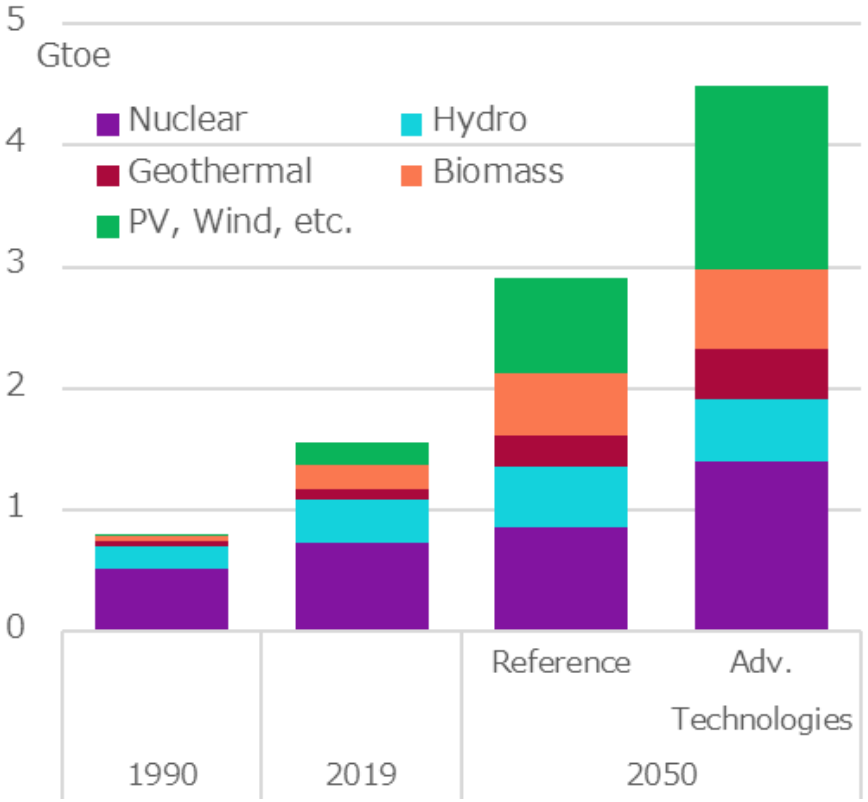
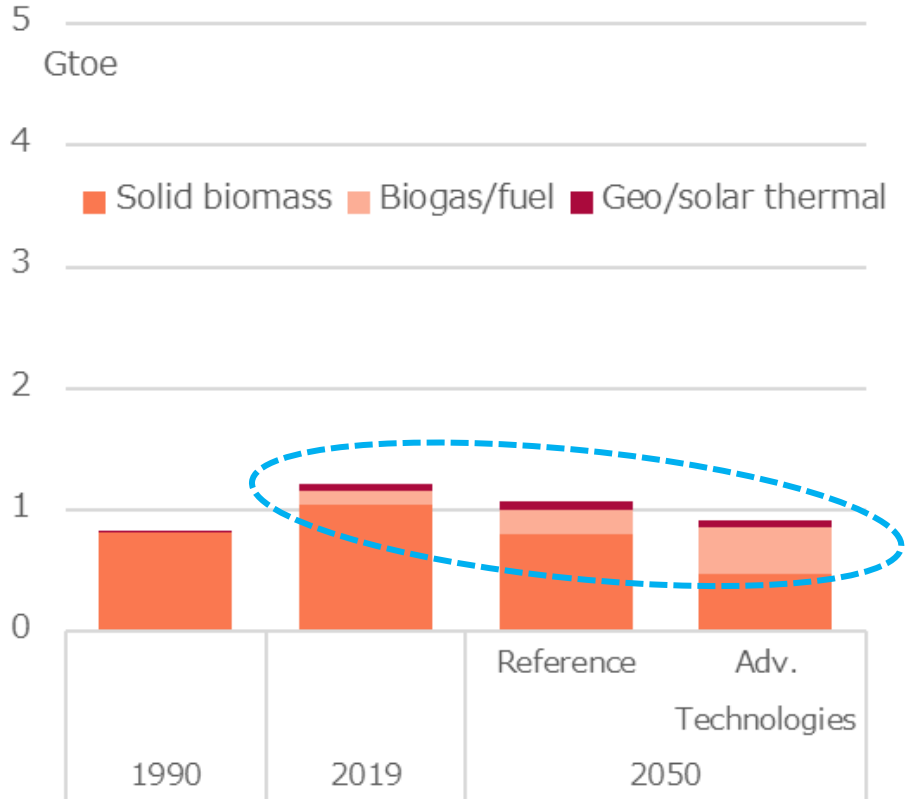
❖ Non-fossil energy in the power generation sector



❖ Non-fossil energy in the non-power generation sector



Utilize clean hydrogen/ammonia

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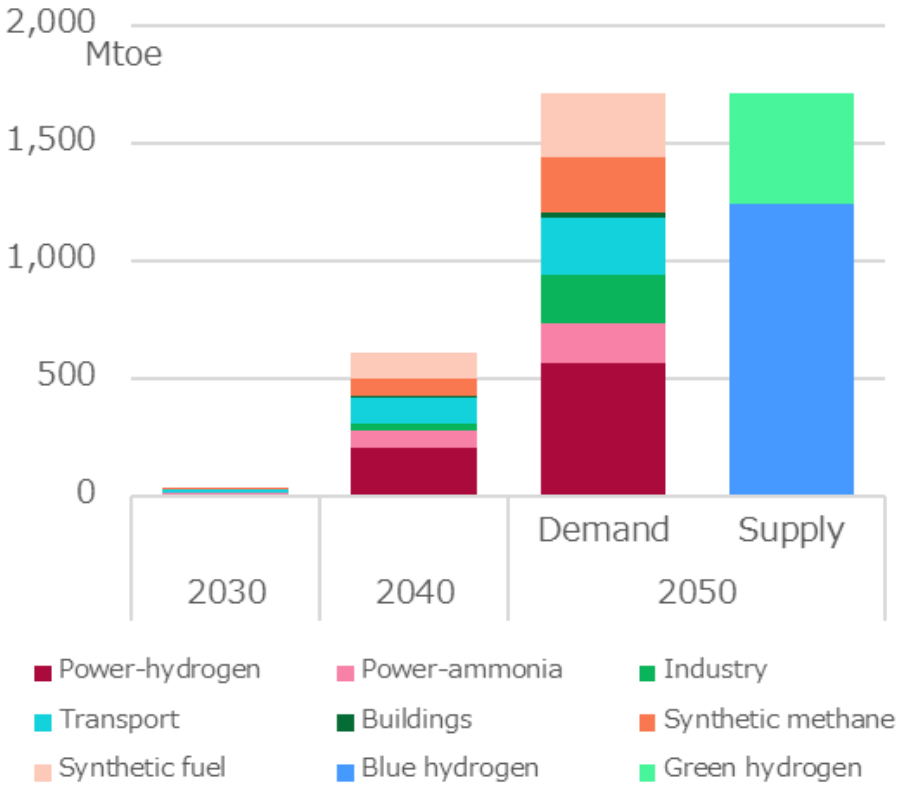
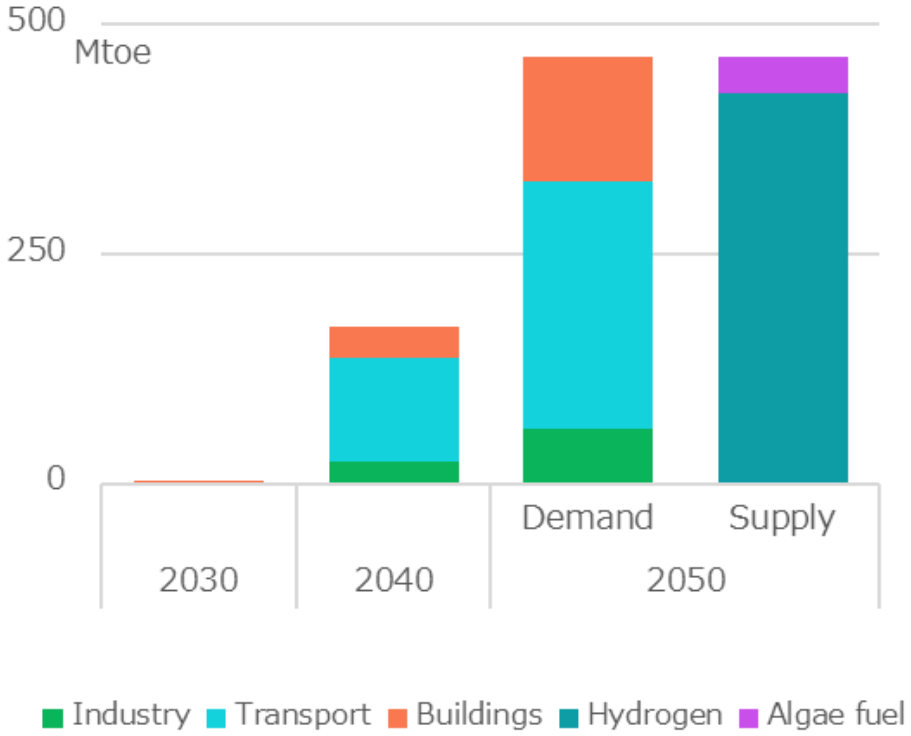
❖ Supply and demand of hydrogen/ammonia



❖ Supply and demand of synthetic methane/fuel



Reduce CO_2 emissions without reducing fossil fuels

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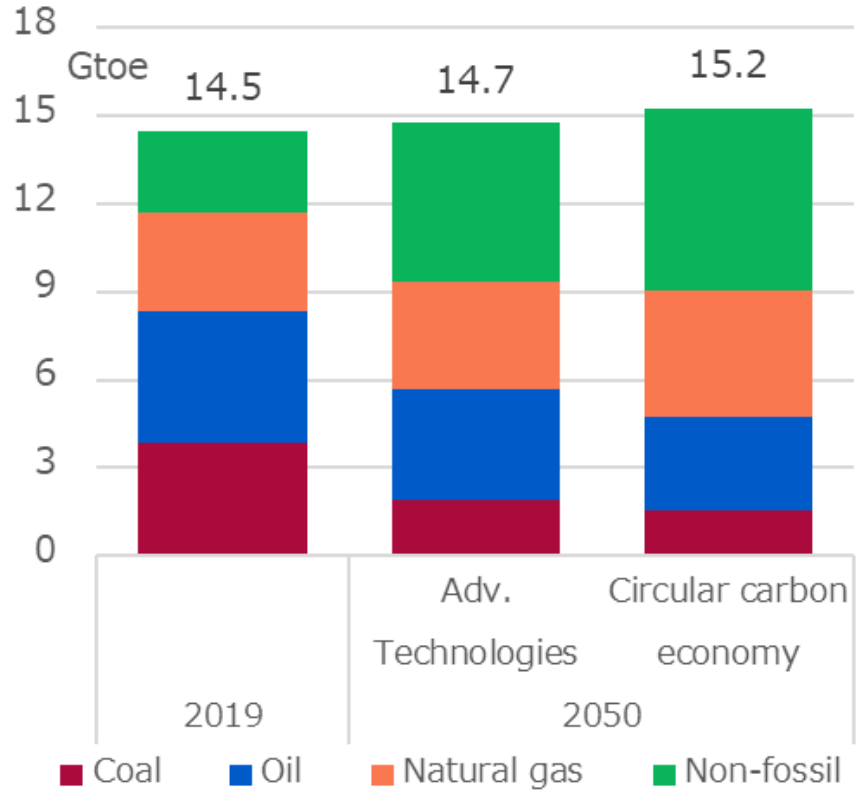
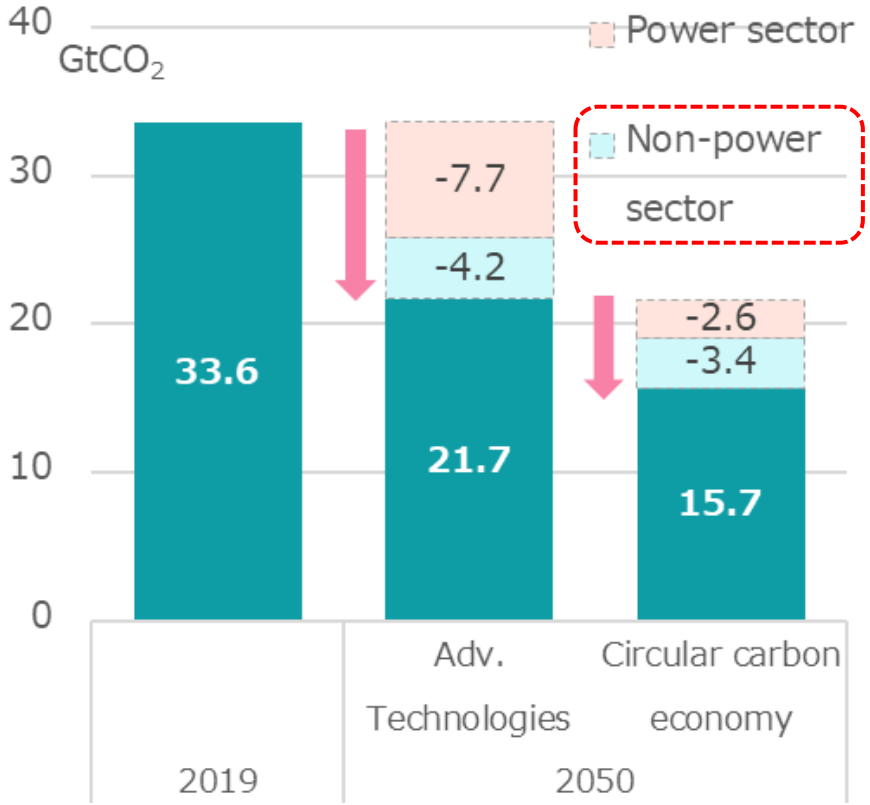
❖ Primary energy demand



❖ Energy-related CO_2 emissions



Economic burden for the developing world (in the case of ASEAN)

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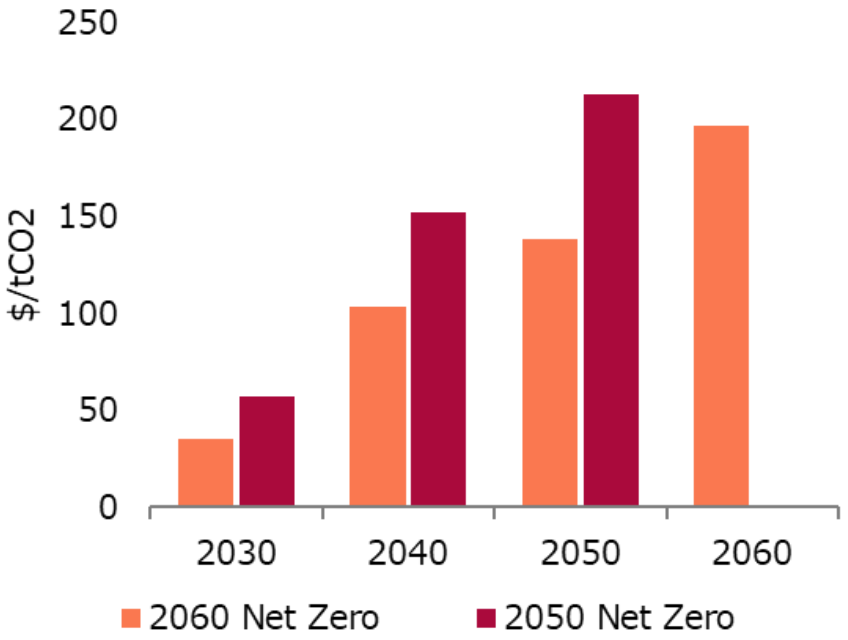
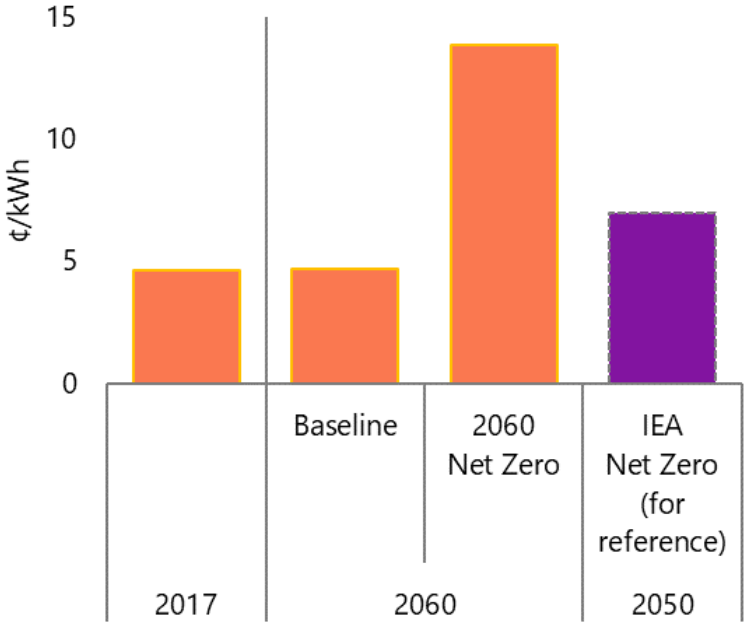
❖ Average CO_2 reduction cost in ASEAN



Source : IEEJ; IEA

❖ Electricity price in ASEAN



Note : Figure of IEA Net Zero is based on the estimated increased rate of electricity price in the world (+50%)
Source: IEEJ; IEA

Use of decarbonized fossil fuels in the developing world

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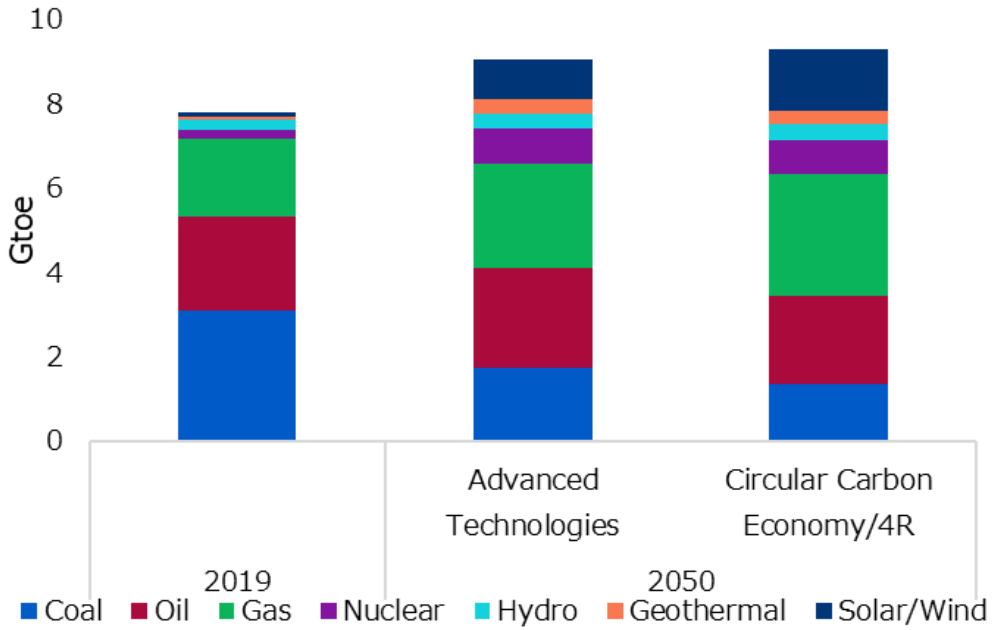
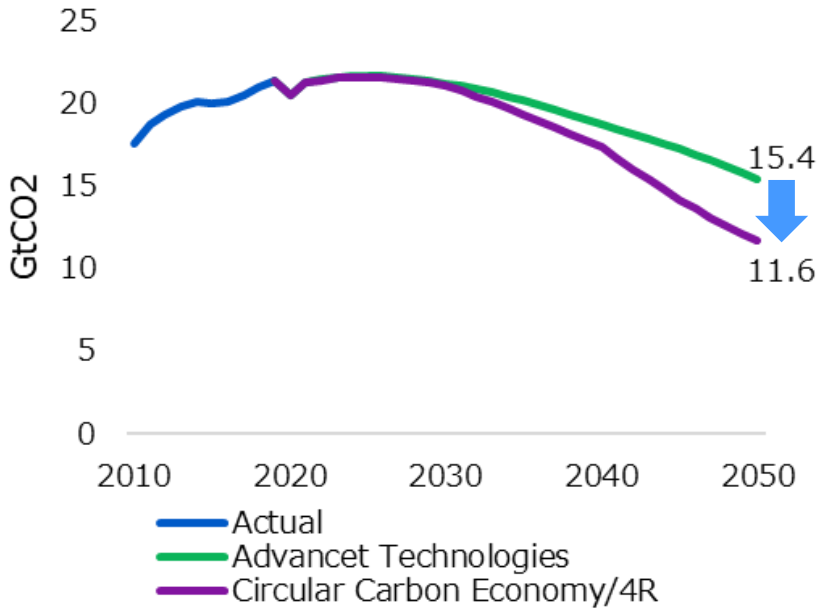
❖ Primary energy supply of developing countries



Source: IEEJ

❖ CO_2 emissions of developing countries



Source: IEEJ

There remain many challenges for CN in the world

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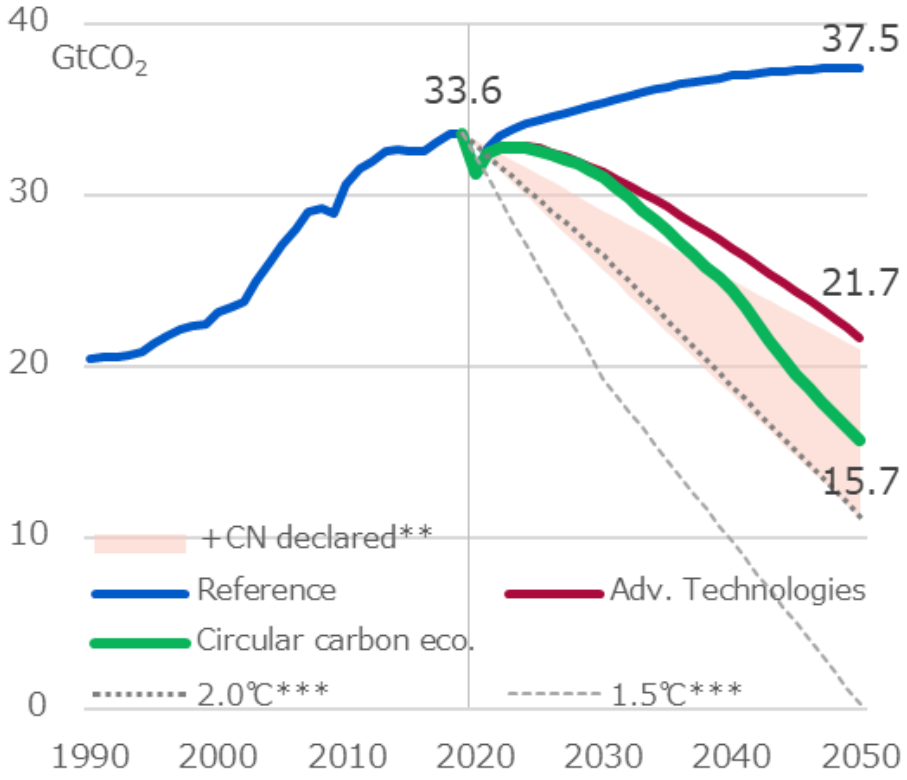
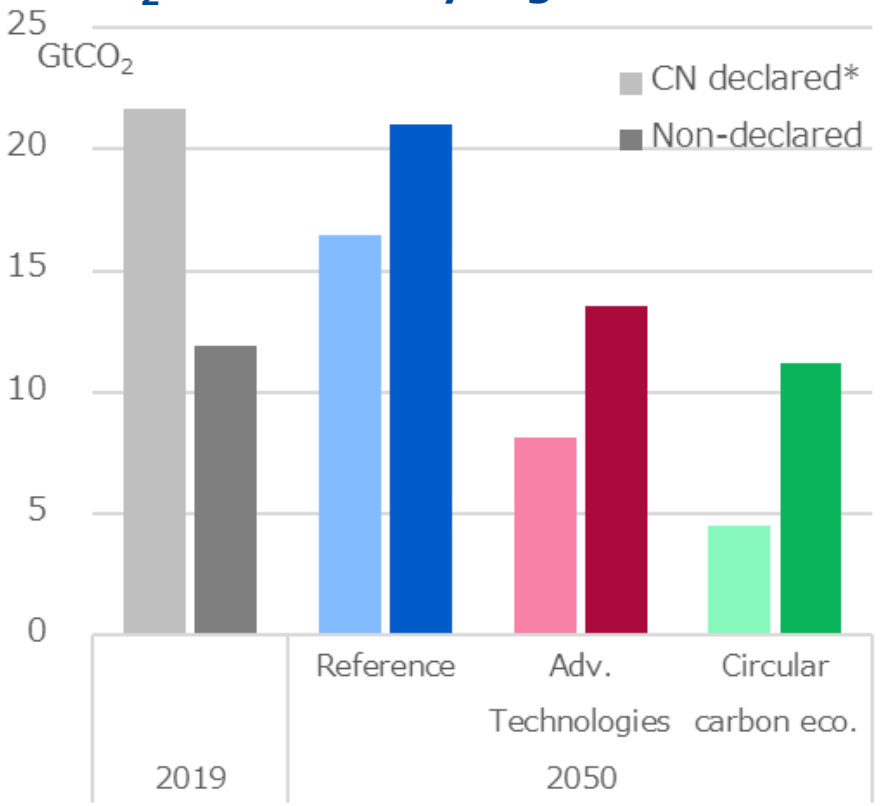
❖ Global energy-related CO_2 emissions



❖ CO_2 emissions by region



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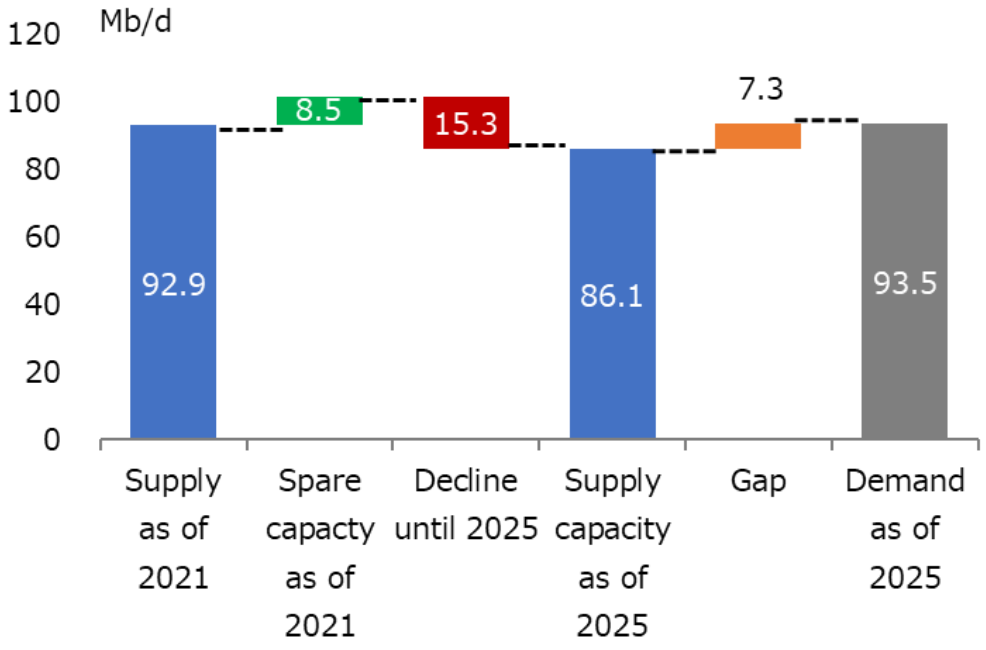
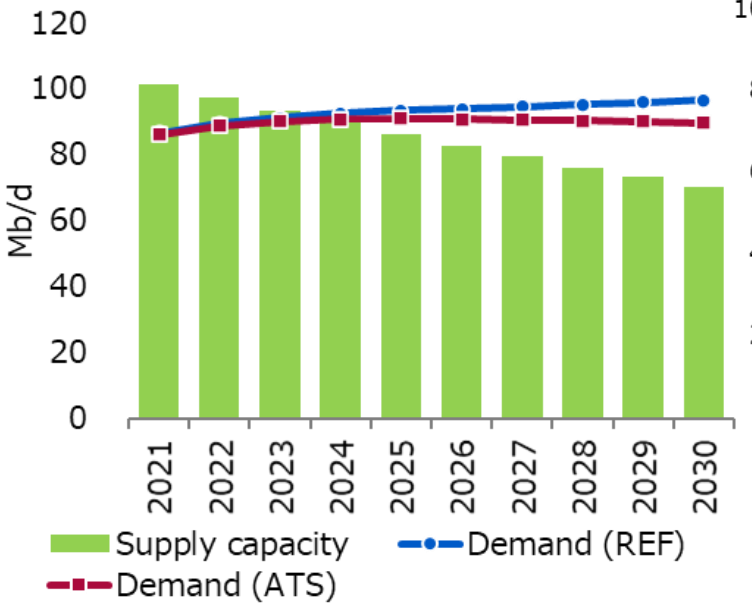
What if investments in oil markets stop?

❖ World oil demand and supply capacity as of 2025 if investment stops



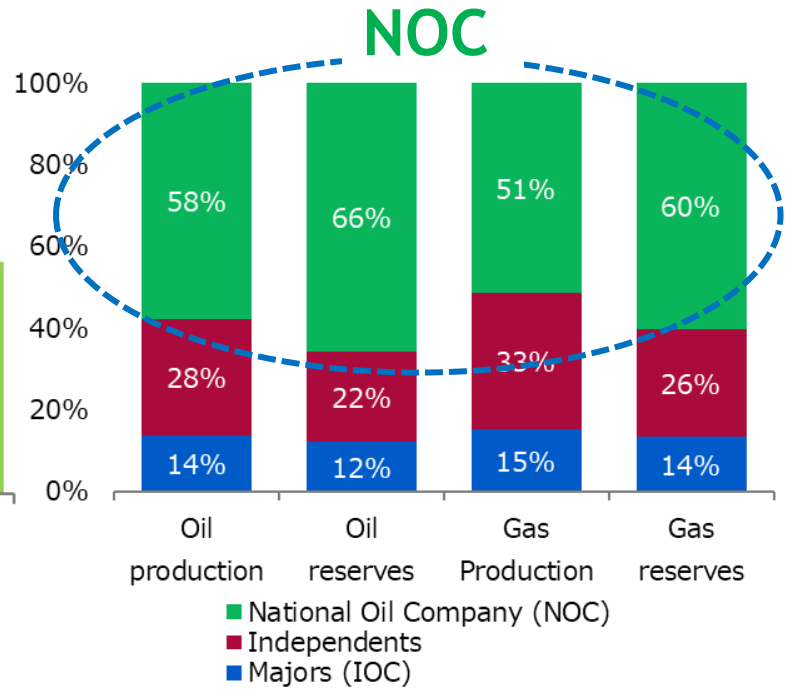
Note: Bio fuels are excluded. Supply capacity is assumed to decline by 4% annually.
Source : IEA; IEEJ estimate

❖ World oil demand and supply capacity if investment stops



Note: Demand excludes biol fuels.
Sources: IEA, IEEJ estimates

❖ Share of IOC and NOC in the world oil and gas supply in 2018



Source: IEA, Oil and Gas Industry in Energy Transitions

Summary

- CO_2 emissions would increase **in countries that have not expressed carbon neutrality (CN),** such as India, ASEAN, Africa, and others.
- Electricity demand will increase. The **stability and security of electricity supply must be improved**.

- CO_2 reduction in the power generation sector is likely to proceed, but emission reductions in the non-power generation sectors will not progress much. **Decarbonization in the non-power generation sector is key to achieve CN**.
- In order to decarbonize the non-power generation sector, **clean hydrogen/ammonia and synthetic methane/fuels using these materials will be required.**
- Even with a shift from fossil fuel trade **to hydrogen/ammonia trade**, the importance of **trade relations between Asia and the Middle East remains unchanged**.

- In order to achieve a world-wide CN, it is important **to promote and share decarbonization technologies under international cooperation**.

Thank you
for your attention!

Questions?

For IEEJ Outlook2022, visit our website:
https://eneken.ieej.or.jp/en/whatsnew/439.html

PANEL DISCUSSION

INTRODUCTION BY JUNKO OGAWA

Panelists

- **Prof. Jun Arima**

  Professor, University of Tokyo

  Senior Policy Fellow for Energy and Environment

  The Economic Research Institute for ASEAN and East Asia (ERIA)

- **Dr. Neil D'Souza**

  Principal Consultant, Argus Media

- **Mr. Suwanto**

  Power, Fossil Fuel, Alternative Energy and Storage (PFS) Officer

  ASEAN Centre for Energy (ACE)

- **Mr. Matthew Yeo**

  Managing Director

  Resources, Energy Transition Lead, Southeast Asia, Accenture

Potential Questions to the Panel

- What challenges are common between ASEAN and Japan in energy transition?
- What is the biggest challenge for ASEAN or any member country of ASEAN in energy transition?
- What do you think is the most needed to address these challenges?
- How do you define a well managed “transition” for ASEAN?
- How ASEAN and Japan collaborate in achieving Net Zero?