

Overview of Japan's Green Growth Strategy Through Achieving Carbon Neutrality in 2050

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Background and concept

- In Oct 2020, Prime Minister Suga declared Japan's intention to aim for carbon neutrality by 2050. This challenge has become the core of Japan's growth strategy.
- **The Green Growth Strategy is an industrial policy** which aims to create a positive cycle of economic growth and environmental protection, together with the business community.
- The aim is to set ambitious goals and fully support the private sector's efforts toward carbon neutrality.
- The strategy includes 5 cross sectoral policy tools (support measures) and action plans for 14 sectors, and will be updated continuously.

Items

- 1. Green Growth Strategy in line with Carbon Neutrality in 2050**
- 2. Energy Outlook for Carbon Neutrality in 2050 (Reference)**
- 3. Structure of the Green Growth Strategy**

Annex1. Points of the 5 Policy Tools

Annex2. List of 14 Growth Sectors

1(1). Green Growth Strategy in line with Carbon Neutrality in 2050

- In Oct 2020, Japan declared its intention to achieve a carbon neutral society by 2050.
- Tackling climate change is an opportunity for further growth.
 - Green Growth Strategy is an industrial policy towards a “Positive cycle of economic growth and environmental protection”
- However, it is not easy to realize.
 - Support for the private sector to tackle ambitious goals = Role of the Government
- The Government presents a concrete national vision and goals, which motivates business players
 - This strategy provides a reference on both the energy policy and energy outlook for 2050 CN in order to identify industries with high potential
 - This will constitute a list of 14 sectors with high growth potential, for which the Government will provide necessary policy measures and show ambitious goals.

1(2). Green Growth Strategy in line with Carbon Neutrality in 2050

● Decarbonization of electricity

- Renewables

Maximum introduction. Grid development, cost reduction, batteries.

→ Offshore wind and battery industry

- Hydrogen power

Pursue as an option. Increase of supply/demand, infrastructure, cost reduction

→ Hydrogen industry

- Thermal power generation with CCUS/Carbon Recycling

Pursue as an option. Technology development, site development, cost reduction

→ Carbon Recycling, ammonia as fuel industry

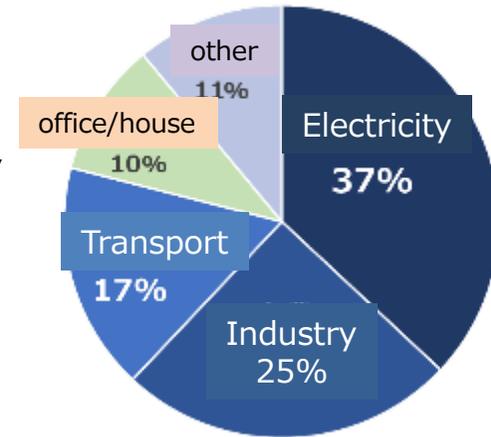
- Nuclear Power

Proven de-carbonization technology. Further safety enhancement, restart of plants.

→ Maximizing utilization of existing nuclear infrastructure, while aiming to decrease dependency on nuclear power.

→ R&D for safer next-generation reactors

CO2 emission by sector



1(3). Green Growth Strategy in line with Carbon Neutrality in 2050

- Promote “electrification” in all sectors. For non-electricity demand, “hydrogen use” and “CCUS”.

Industry ... Manufacturing process

Transport ... Electrification, bio fuel, hydrogen fuel

Business/household ... Electrification, hydrogen, batteries

→ Hydrogen, auto/battery, transport and housing industries

- Storage of electricity ... Carbon neutral society means electrification.

Green Growth Strategy underpins robust digital infrastructure

→ Semiconductor/ICT industry

Electricity ... Smart grid, supply/demand response, infrastructure maintenance

Transport ... Self driving

Factory ... Factory automation

Business/household ... Smart houses, robots

→ From R&D to implementation + cost reduction

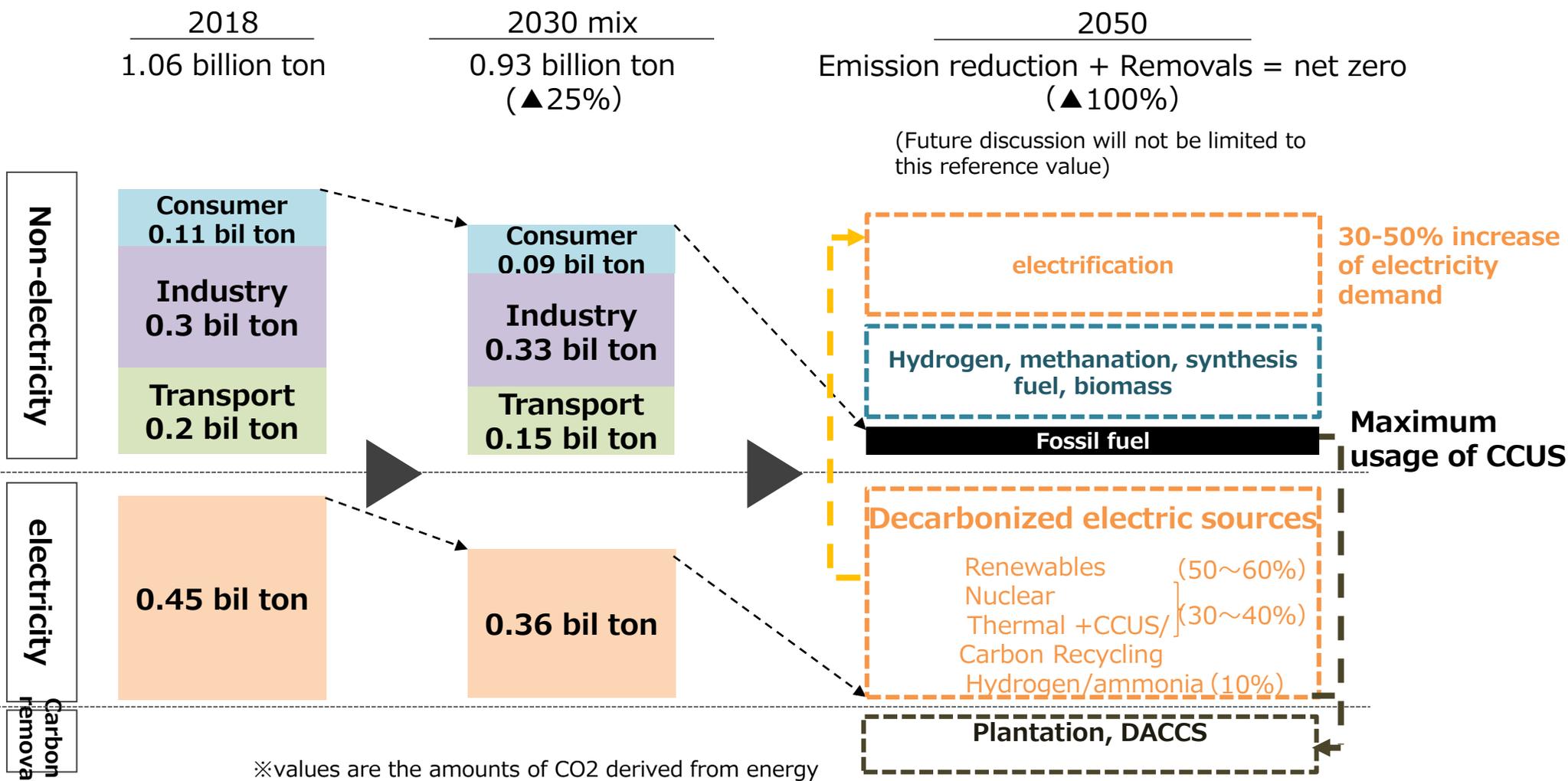
→ Expected economic gain is 90 trillion yen in 2030 and 190 trillion yen in 2050

(approximately, 880 billion USD and 1.8 trillion USD)

2(1) Energy Outlook of Carbon Neutrality in 2050 (Reference)

- Electricity demand will increase by 30-50% (1.3~1.5 trillion kWh)
- Maximum introduction of renewables
 - Challenges; power adjustment/transmission/grid inertia, social conditions, cost
 - Unrealistic to cover all electricity demand only with renewables
 - Setting "50-60% renewables in 2050" as a reference, based on experts' comments
- Further innovation needed in thermal power plants with CCUS and hydrogen
 - 10% - hydrogen and ammonia power generation, 30-40% - nuclear and thermal power plants with CCUS as a reference
- Analyzing scenarios further, discussion continues towards revision of the Strategic Energy Plan.

2(2) Energy Outlook of Carbon Neutrality in 2050 (Reference)



3. Structure of the Green Growth Strategy

- Set an ambitious goal to induce investment. Government will provide all policy measures; e.g. funding, tax, regulation/standard, PPP. Enhance international collaboration, considering global market or global ESG investment.
- Develop sector-specific action plans for 2050.
 - (1) R&D phase: Government fund + private R&D investment
 - (2) Demonstration phase: PPP that induce private investment
 - (3) Scale up Phase: Promote demand through public procurement, regulation/standard
→ cost reduction through mass production
 - (4) Commercial phase: Commercialization without further public support
- Covering private company's needs, from R&D to capital investment for 2050 CN.
 - Demand creation by regulatory reform, standards and financial markets
 - Cost reduction through increase of private investment
 - Government fund (2 trillion yen. Support long term R&D and demonstrations)
 - Tax benefits for capital investments, R&D and loss carry forward
 - Regulatory reform (Hydrogen filling stations, grid rules, gasoline cars, procurement)
 - Standards (EV quick charge, bio jet fuel, safety standards for floating wind turbines)
 - Inducing private financing (Rules for financial market, e.g. disclosure, evaluation)

Annex1. Points of the 5 Policy tools

Grant funding ✓ Green Innovation Fund: 2 trillion yen over 10 years
✓ Stimulate 15 trillion yen worth of private R&D and investment.

Tax incentive ✓ Tax incentives to stimulate 1.7 trillion yen worth of private investment over 10 years.

Guidance policy on Finance ✓ Formulate guidelines for transition finance and establish a scheme for long-term funds with an interest subsidy (1trillion yen in 3 years in business scale basis) to attract global ESG investment.

Regulatory Reform ✓ Consider regulatory reform in areas such as hydrogen, offshore wind power, and mobility/batteries.
✓ Discuss issues concerning carbon border adjustment and related policies with a view to ensuring global level playing field

International Collaboration ✓ Cooperation with various players, including both developed and emerging countries, on innovation policy, joint projects including third countries, standardization and rule-making, and providing wide variety of solutions toward de-carbonization
✓ World wide promotion efforts through "Tokyo Beyond-Zero Week"

Annex2 . 14 Growth Sectors

Energy	Transport/Manufacturing	Home/ Office
<p><u>Offshore wind power</u> Wind turbines, parts, floating wind turbines</p>	<p><u>Mobility and battery</u> EV (electric vehicle), FCV (fuel cell vehicle), next generation batteries</p>	<p><u>Housing and building,</u> <u>Next generation PV</u> (perovskite solar cell)</p>
<p><u>Fuel ammonia</u> Combustion burner (as fuel in transition period to hydrogen-powered society)</p>	<p><u>Semiconductor and ICT</u> Data centers, energy-saving semiconductors (demand-side efficiency)</p>	<p><u>Resource circulation</u> Biomaterials, recycled materials, waste power generation</p>
<p><u>Hydrogen</u> Turbines for power generation, hydrogen reduction steel- making, carrier ships, water electrolyzers</p>	<p><u>Maritime</u> Fuel-cell ships, electric propulsion ships, gas-fueled ships</p>	<p><u>Lifestyle-related industry</u> Local decarbonization business</p>
<p><u>Nuclear power</u> SMR (Small Modular Reactor), nuclear power for hydrogen production</p>	<p><u>Logistics, people flow and infrastructure</u> Smart transportation, drones for logistics, fuel-cell construction machinery</p>	
	<p><u>Foods, agriculture, forestry and fisheries</u> Smart-agriculture, wooden skyscrapers, blue carbon</p>	
	<p><u>Aviation</u> Hybrid electric, Hydrogen-powered Aircraft</p>	
	<p><u>Carbon Recycling</u> Concrete, biofuel, plastic materials</p>	