

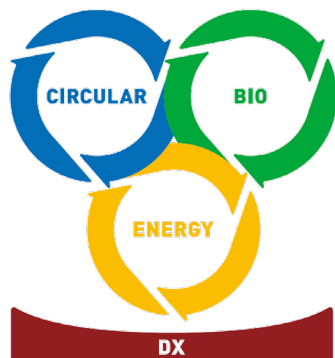
9th IEEJ/APERC International Energy Symposium

NEDO's Activities toward building Sustainable Society

Apr. 19th, 2023

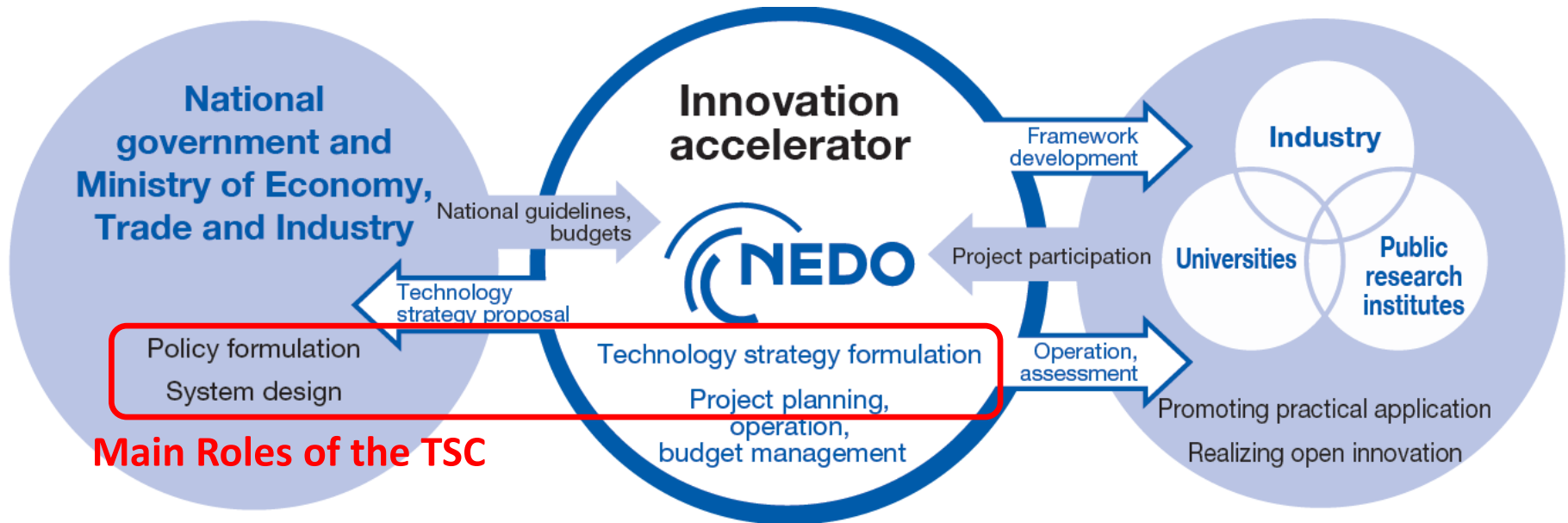
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New Energy and Industrial Technology
Development Organization (NEDO)**



■ **N**ew **E**nergy and Industrial Technology **D**evelopment **O**rganization (**NEDO**)

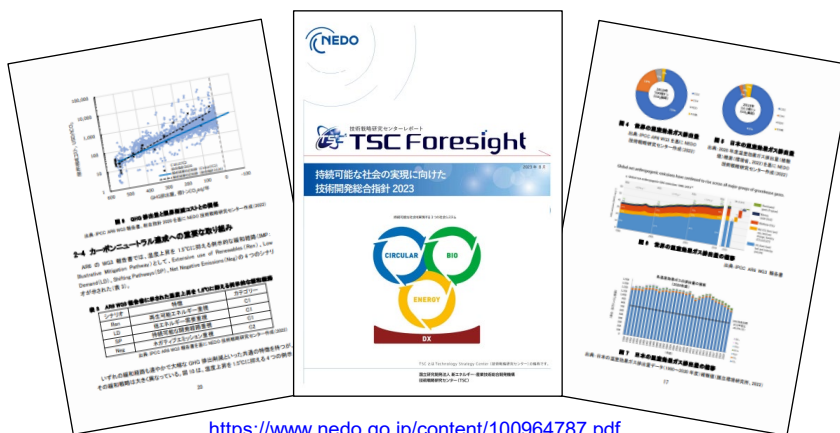
Organization	National Research and Development Agency	
Mission	1. Addressing energy and global environmental problems 2. Enhancing industrial technology	
Established	1980	
Budget	1.01 billion US dollars (FY2023)	+ additional “funds”
Employees	1,464 (as of Apr. 1, 2023)	



■ NEDO published the 2nd edition of “Comprehensive R&D Principle for Sustainable Society” in 2023.

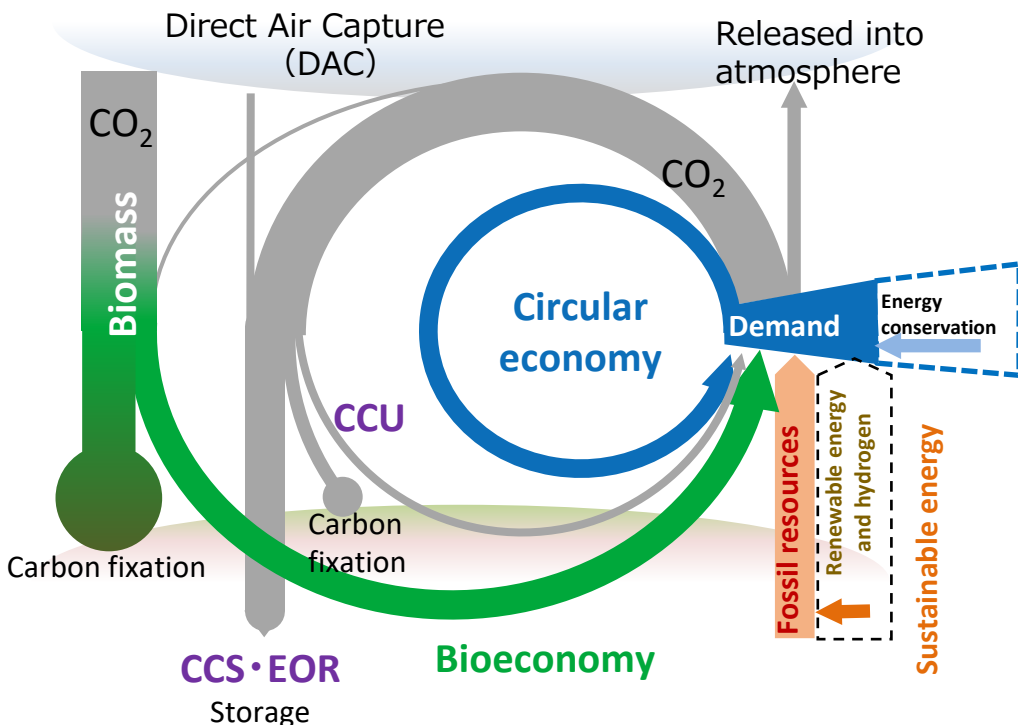
“Objective of Comprehensive R&D Principle 2023”

- The purpose of Comprehensive R&D Principle 2023 is to **identify and overlook of key technologies for achieving carbon neutrality** based on the latest social and technological trends, and to **advocate for the comprehensive and objective evaluation of the CO2 reduction** of these technologies.
- Additionally, NEDO expects to **provide specific calculations for several key technologies** to assist evaluating the technologies you should focus on for development and demonstration.



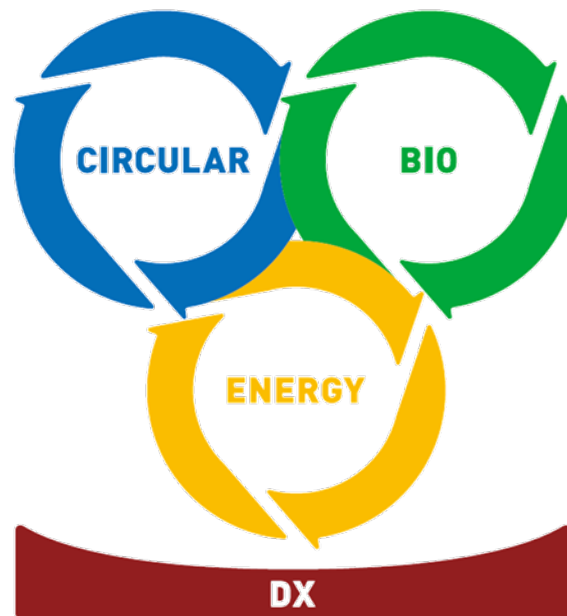
<https://www.nedo.go.jp/content/100964787.pdf>

- CO₂ emissions in the **"demand"** category shown in blue are reduced through **energy conservation and substitution with renewable energy, hydrogen, and biomass**, as well as through **recycling and sharing to reduce the demand for energy and materials themselves**.
- Emitted CO₂ is separated and recovered, **stored in CCS**, and partially **used in CCU**.
- **Atmospheric CO₂ is fixed in biomass** through afforestation, etc., and separated and recovered **using DAC**.



Source : NEDO Technology Strategy Center(2019)

3 Essential Social Systems for Sustainable society

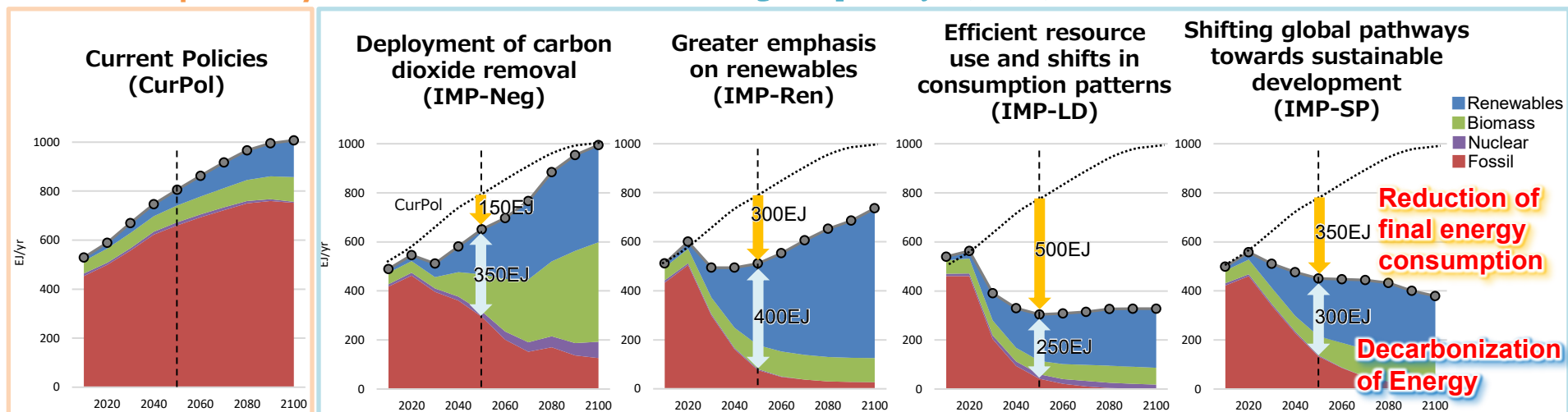


- Limiting warming to 1.5°C, rapid and significant GHG emission reductions have illustrated in the scenarios (IMPs) by IPCC AR6 WG3.
- Efforts to **decarbonize energy supplied, reduce final energy consumption, and introduce negative emission technologies (NETs)** are the key initiatives in each 4 scenario.
- In addition, **GHG reduction from non-energy sources**, such as utilizing CO₂ and biomass as raw materials, are also important.

The trend of world primary energy supply in each of the illustrative pathways

Reference pathways

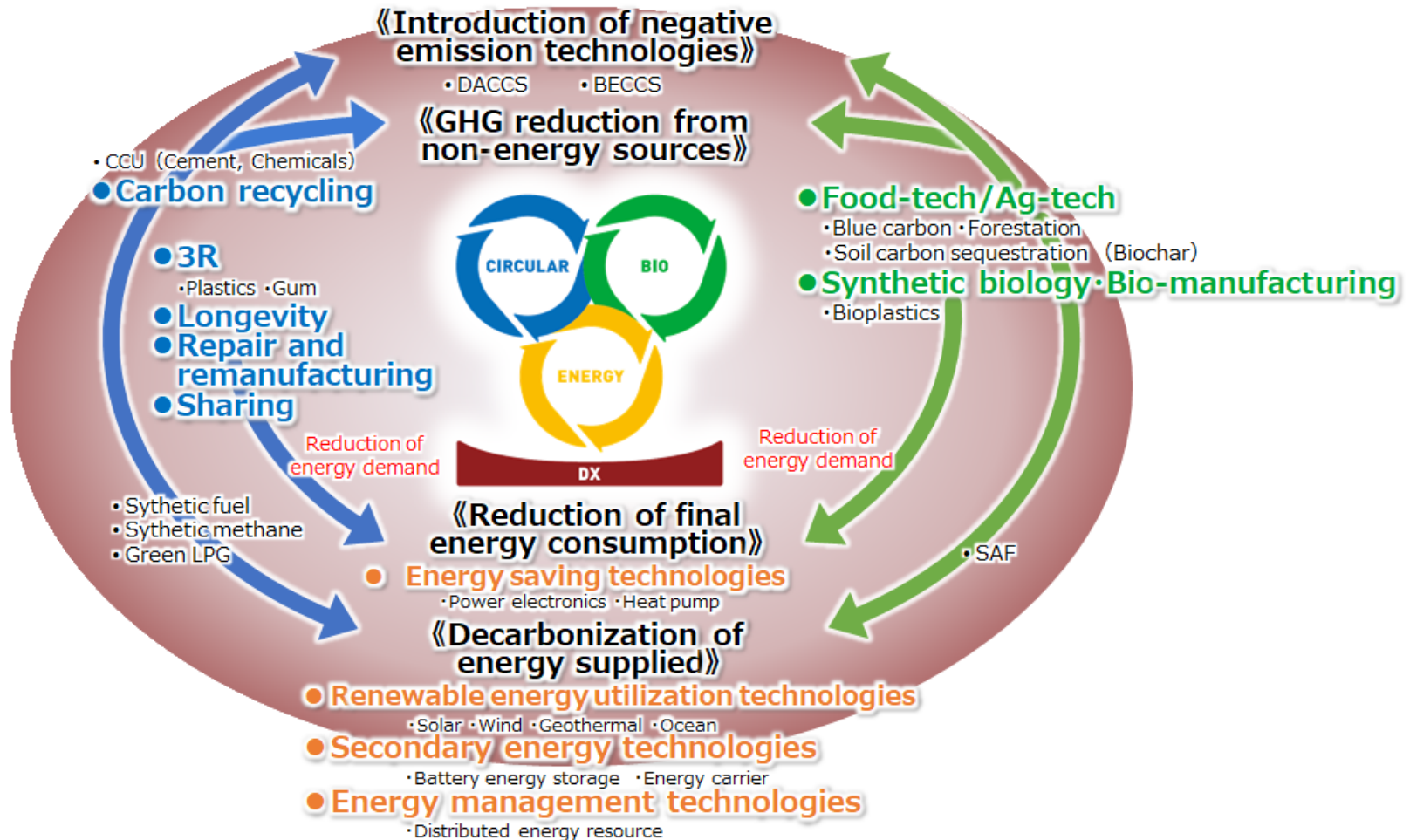
Illustrative mitigation pathways (IMPs)



CO₂ reduction by NETs in 2050



- The figure below shows key technologies that contribute to the "Key Initiatives" for carbon neutrality.
- It is important to promote "Key Initiatives" through collaboration and synergy among the three social systems.



Green Innovation Fund Projects

(converted at the exchange of 1 USD = 150 yen)

- To achieve carbon neutrality by 2050, Government of Japan established a fund of about **18B USD (2.7T JPY)** as part of NEDO. The fund will be executed over a ten-year period.
- METI/NEDO seeks the commitment of the company managers to persevere in challenging these goals.
- Currently **20 projects** are underway

Project cases (For more information, please check <https://green-innovation.nedo.go.jp/en/>)



Cost Reduction for **Offshore wind** Power Generation



Hydrogen Production through Water Electrolysis Using Power from Renewables



Large-scale **Hydrogen Supply Chain** Establishment



Development of Technology for **CO2 Separation, Capture**, etc.

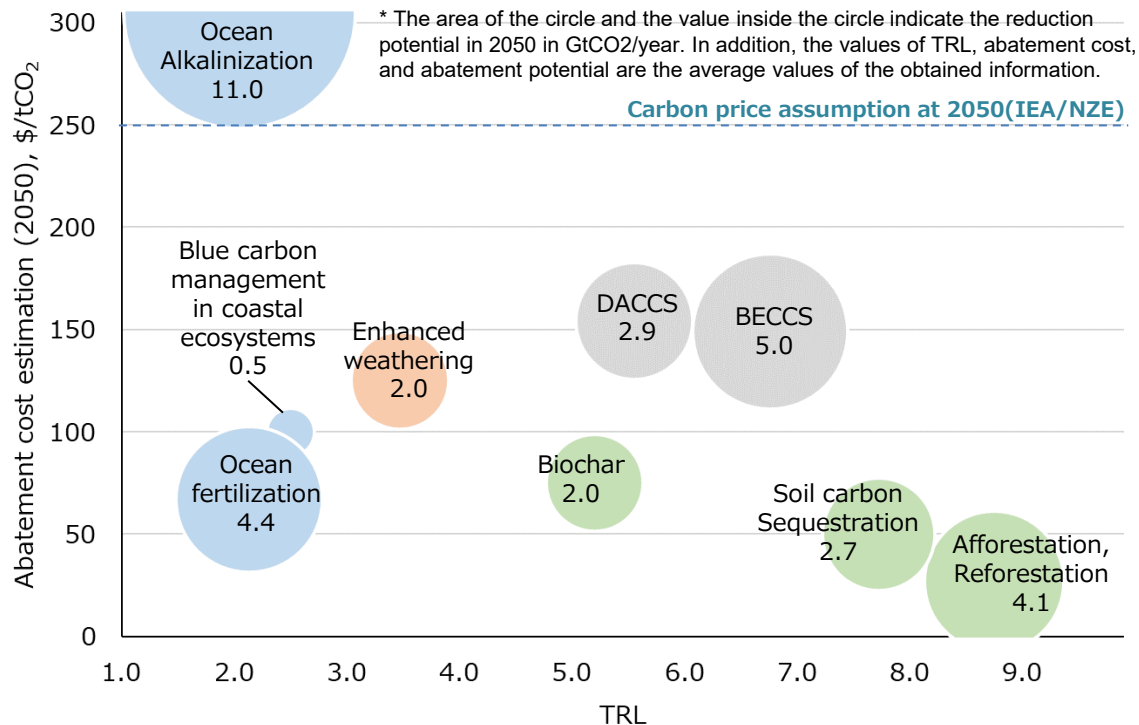


Development of Technology for Producing **Fuel Using CO2**, etc.



Hydrogen Utilization in Iron and Steelmaking Processes

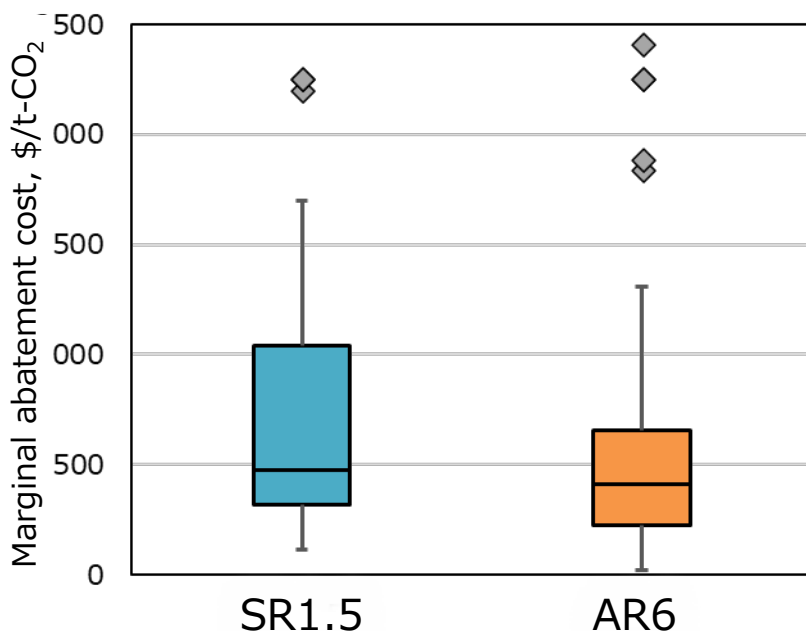
- Most of the NETs are expected to achieve abatement cost of **less than \$200/tCO₂ in 2050**, although some technologies, such as ocean-related, enhanced-weathering, DACCS, and biochar, are in development.
- DACCS and BECCS have definite CO₂ removal effect, but **costs need to be reduced**.
- NETs, which accelerates natural phenomena, has excellent features for low-cost CO₂ removal, but they are **need to evaluate scientifically the CO₂ removal effect and environmental impacts, co-benefits**.
- NEDO is developing technologies for DAC, blue carbon, biochar and enhanced weathering in the moonshot project and GI-fund project.



- The marginal abatement cost ※ under the 1.5°C scenario in IPCC AR6 (2022) can reach **\$200~700/tCO₂ in 2050**. It tends to decrease compared with the value in the IPCC special report, Global Warming of 1.5°C.
- The costs of technologies for carbon neutrality such as PV, wind power and battery storage have been continuously reduced. However, **disruptive innovation** is necessary in various technological fields in order to reduce the marginal abatement cost further to the value that the world can accept.

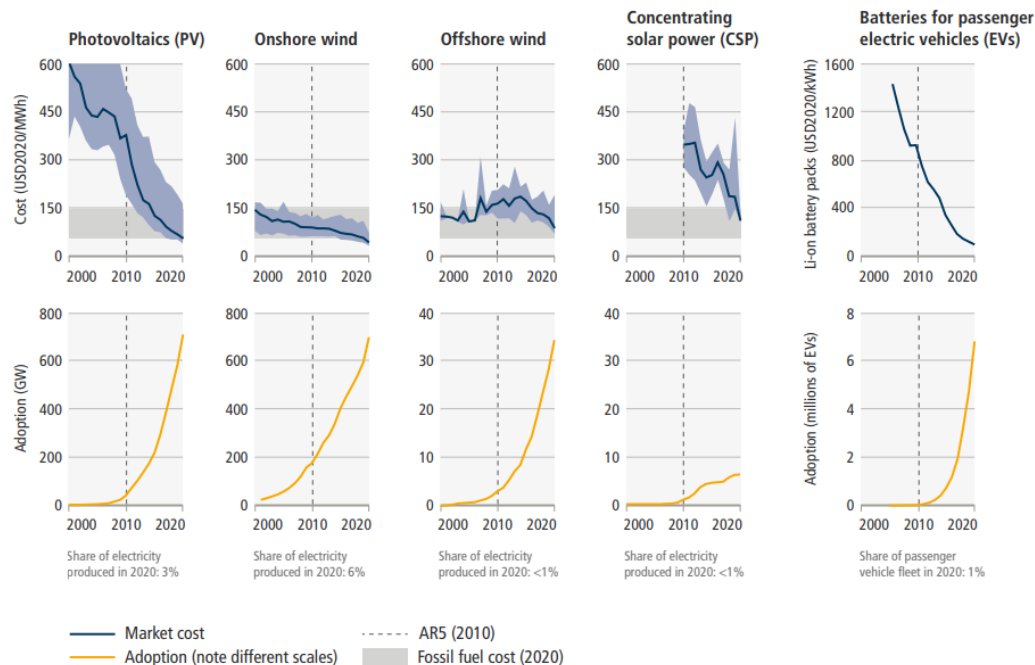
※the cost incurred to reduce an additional 1 ton of CO₂ emissions

Marginal abatement cost in 2050



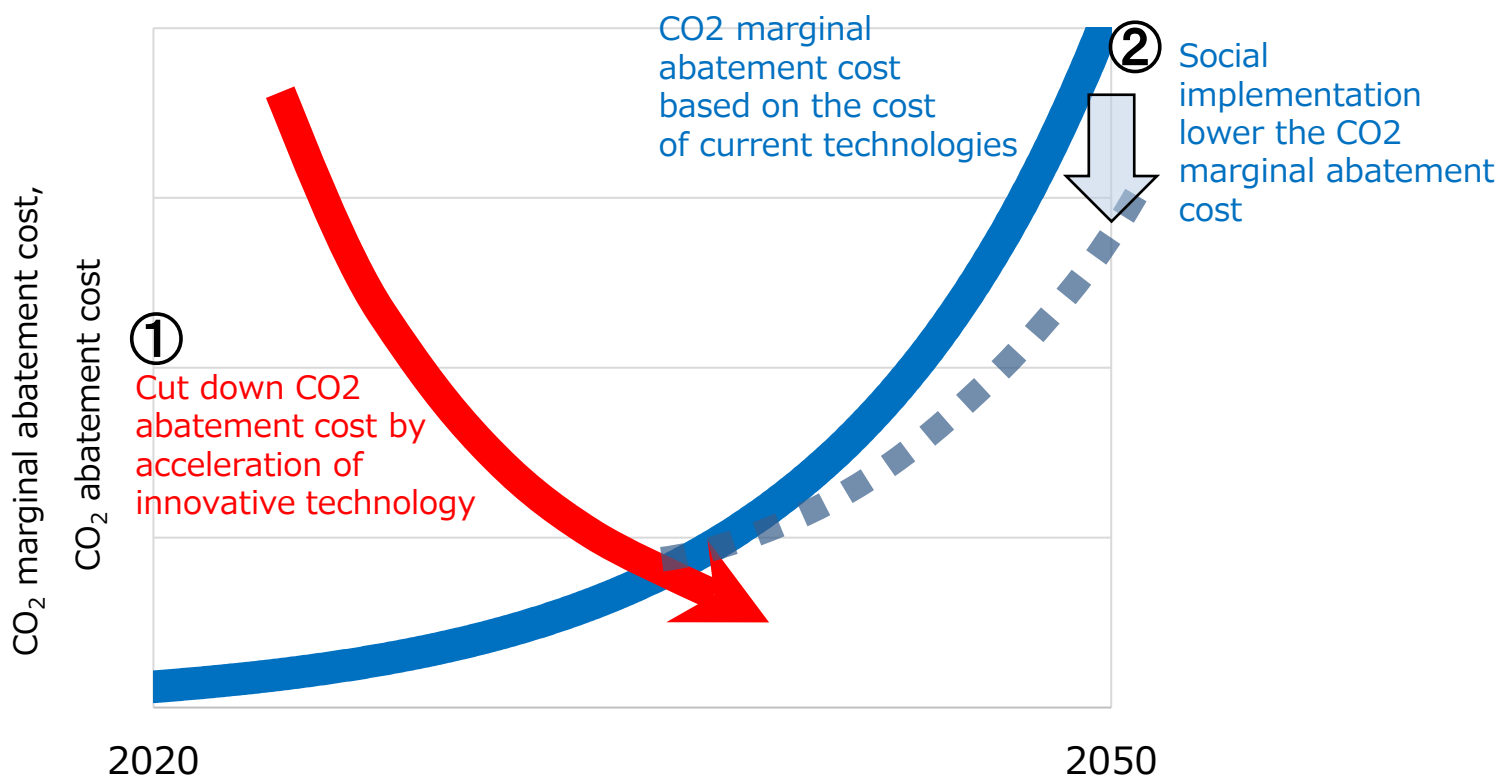
Source : Prepared by Technology Strategy Center, NEDO, 2023, based on IAMC 1.5°C Scenario Explorer hosted by IIASA, AR6 Scenario Explorer and Database hosted by IIASA

Cost and installation of Key Technologies



Source : IPCC AR6 Figure SPM.3

- Progress in the R&D of an innovative technology (e.g. PV, wind, battery, etc.) lowers the CO₂ abatement cost (red).
- Assuming that the rapid social implementation starts at the intersection of CO₂ abatement cost and marginal CO₂ abatement cost, the social implementation cuts down the marginal CO₂ abatement cost significantly, leading to dramatic reduction of countermeasures.

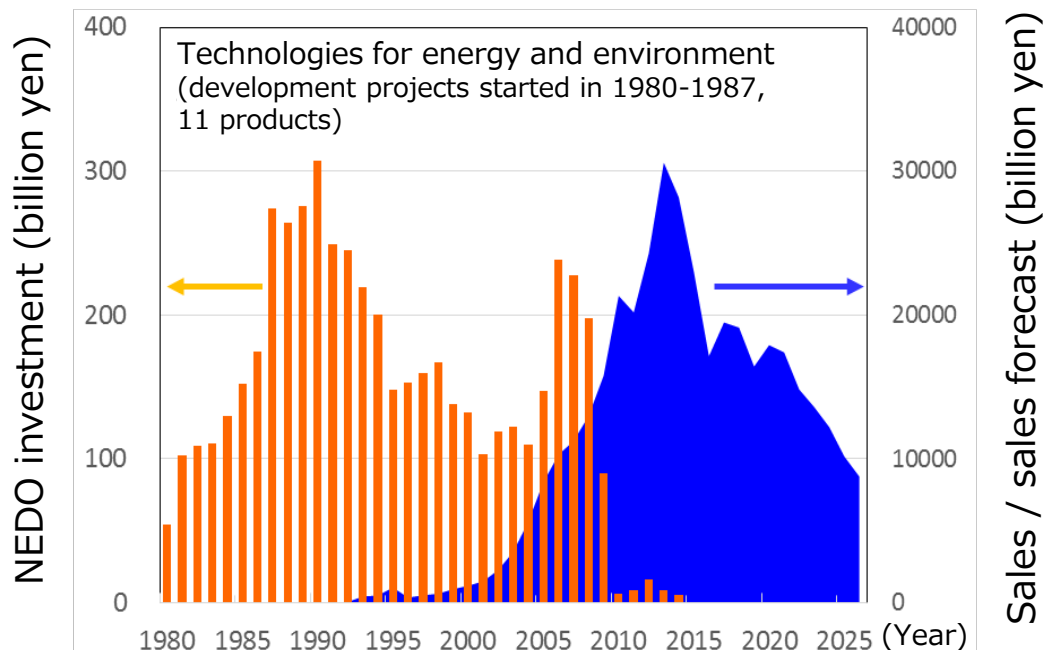


It is important to start technology development as early as possible and to accelerate innovation since it takes about **20 years until the beginning of the product sales** in the field of energy and environment according to the NEDO's analysis on the previous projects.

Technology field	Average period for NEDO investment	Average period from development to sale
Energy and environment	17 years (6~34 years)	20 years (6~34 years)
Industrial technologies	6 years (1~15 years)	7 years (3~14 years)

11 products, including solar power generation, wind power generation, and residential heat pump water heaters, which started development between 1980 and 1987

29 products, including continuously variable transmission for automobile, power semiconductors, which started development between 1998 and 2002



Source : "Investigation on the outcome of mid- and long- term projects for research and development: Analysis based on the data in follow-up research by NEDO" (NEDO)



- According to IPCC AR6, the CO₂ abatement cost in 1.5°C scenario can reach approximately \$200~700/tCO₂ in 2050. Disruptive innovation is essential to reduce the cost to levels acceptable to the world.
- To achieve carbon neutrality, innovation is necessary in key technologies such as decarbonization of energy supplied (renewable energy, hydrogen, etc.), reduction of final energy consumption (energy-efficient technologies, recycling technologies), and introduction of negative emission technologies. Additionally, non-energy-related GHG reduction sources such as raw-material conversion are also crucial.
- Since technologies in the energy and environmental sectors often take a long time to be implemented in society, it's crucial to initiate them early, accelerate their development, and promote their social implementation.
- The issue of global warming cannot be solved by Japan alone; it is a critical challenge that requires international collaboration and rule-making to address collectively on a global scale.



Thank you for your attention!