Outlook on National Energy & Environment Strategy for Technological Innovation towards 2050 (NESTI 2050)

Ⅰ. Strategy

○ To meet the "2℃ target" referred in COP21, global GHG emissions need to be reduced to about 24 billion tons per year by 2050. Currently, global annual GHG emissions are approximated to 50 billion tons. Since the amount is projected to be about 57 billion tons based on submitted INDCs, approximately 30 billion tons of additional reduction is necessary. In so doing, it is essential to promote innovation for drastically reducing emissions on a worldwide scale.

○ Looking ahead to 2050, Japan has identified a number of innovative technologies with potential to make huge impacts on emission reductions, while assuming that the entire energy system will be optimized with the realization of "super smart society" (Society 5.0). R&D of the prioritized technologies will be promoted in the medium-to-long term, while identifying and addressing technological challenges.
⇒ Out of 30 billion tons of CO_2 reductions that are necessary to meet the 2 ℃ target, **several billion to 10 billion tons or more** of reductions are expected through this strategy.

* Based on the figures estimated by IEA. In the selected technological areas, the application of innovative technologies is added to the application of technologies whose development and demonstration have already been advanced.

Ⅱ. Identified target technology fields

Technologies :
(1) that are innovative and not the extension of the existing efforts but discontinuous and impactful
(2) with the potential for widespread adoption and significant emission reductions
(3) that require medium-to-long-term investment and combined forces among industry, academia and government
(4) in which Japan can take the lead or demonstrate our superiority

Energy Systems Integration Technologies
so that various components (i.e. energy production, transport, consumption) are networked by ICT and energy system is optimized by AI, big data and IoT

Core Technologies for Systems
namely, next generation power electronics, innovative sensors and superconductivity

Each innovative technologies

Energy Saving	**1 Production process**	○ Membrane Separation / Catalysts
	2 Structural material	○ Ultralight and super heat-resistant
Energy storage	**3 Storage Battery**	○ Metal-Air Batteries / All-Solid-State Batteries
	4 Hydrogen	○ CO_2 free hydrogen
Energy generation	**5 Photovoltaic**	○ Perovskite structure / Quantum dot
	6 Geo-Thermal	○ Hot dry rock geo-thermal / Supercritical geo-thermal
7 Capture and Effective Usage of Carbon Dioxide		

Ⅲ. Enhanced R&D systems

1. Forming R&D Structures as Unified Government Agencies
2. Creation of Innovation Technology Seeds and Flexible Positioning
3. Mechanisms to Encourage Industry Investment in R&D
4. Promotion of International Coordination and Joint R&D

Leading the world through innovation while keeping mitigation efforts and economic growth compatible with each other.

NESTI 2050