

Structure of the 5th Strategic Energy Plan

Chapter 1 Structural Issues, Changes in Circumstances, and Policy Timeframe

Section 1 Structural issues faced by Japan

1. Vulnerability due to high dependency on overseas energy resources

Worsening of the situation due to suspension of nuclear power plants; Japan's energy self-sufficiency rate for FY2016 remaining around 8%

2. Mid- to long-term changes in the energy demand structure (population decline, etc.)

Demand decrease due to population decline; Possible changes in energy demand structure due to digitalization, such as the dissemination of AI, IoT and VPP

3. Instability of resource prices (increased energy demand in emerging countries, etc.)

Changes in demand trends (China, etc.) and in supply structure (shale revolution) → Oil price in 2040 estimated to be 60 to 140 dollars (IEA)

4. Increasing global greenhouse gas emissions

32 billion tons in 2016 → Approx. 36 billion tons in 2040 (IEA's New Policy Scenario); Momentum caused by the Paris Agreement and SDGs

Section 2 Changes in energy environments

1. Start of inter-technology competition for decarbonization

Efforts to create a decarbonized energy system by combining technologies for renewable energy, electricity storage, digital control, etc.

2. Geopolitical risks increased by technology changes

Energy structure remaining subject to geopolitical risks; Geopolitical risks coming to the surface; Dependence on China for solar panels

3. Intensified competition between nations and firms

Setting of ambitious visions by the national government; Individual firms' activities to pursue new technologies; Responses of financial and capital markets

Section 3 Achievement of an optimal energy mix by 2030 and its relation with the 2050 scenario

● Efforts to achieve an optimal energy mix by 2030 only half done

(i) Energy efficiency

Estimated to achieve energy reduction of around 50 million kl in FY2030

The amount of reduction as of FY2016 around 8.8 million kl

(ii) Zero-emission power source ratio

Estimated to be around 44% in FY2030

The ratio as of FY2016 being 16% (renewable energy: 15%; nuclear power: 2%)

(iii) Energy-derived CO2 emissions

Estimated to be around 0.93 billion tons in FY2030

The emissions as of FY2016 around 1.13 billion tons

(iv) Electricity cost

Estimated to be 9.2 trillion to 9.5 trillion yen in FY2030

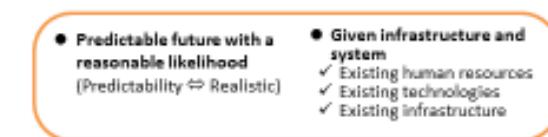
The cost as of FY2016 around 6.2 trillion yen

(v) Energy self-sufficiency rate

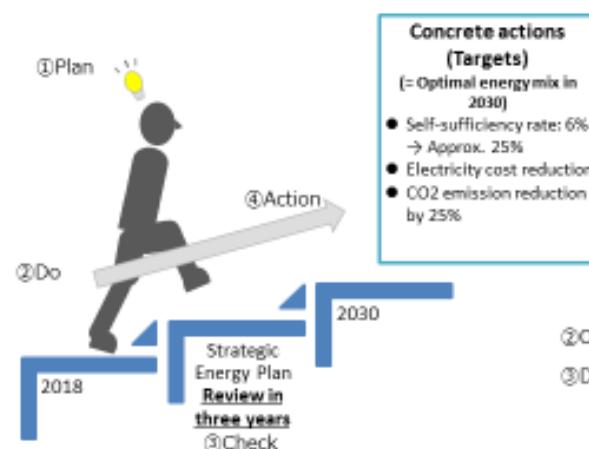
Estimated to be 24% in FY2030

The rate as of FY2016 around 8%

● Ideas towards 2030



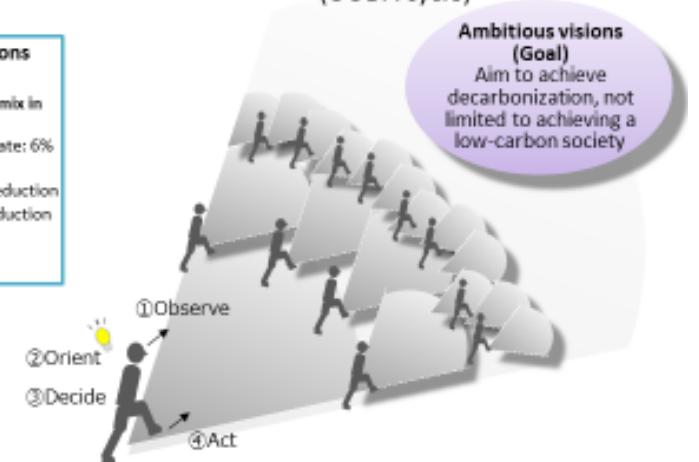
Straight-line efforts to achieve realistic targets (PDCA cycle)



● Ideas towards 2050



Multiple track scenario with diverse options (OODA cycle)



Chapter 2 Basic Policies and Measures towards 2030

Section 1 Basic policies

- 1. Confirmation of the basic viewpoint (3E+S):** To ensure environmental suitability while improving economic efficiency, on the premise of safety and with energy security as the top priority; To aim to achieve an optimal energy mix by 2030 under the principles of 3E+S
- 2. Building of a "multilayered and diversified flexible energy supply-demand structure" and policy direction:** Full utilization of AI and IoT
- 3. Position of each energy source in the primary energy structure and its policy direction:** Position of each energy source; Policy direction to achieve an optimal energy mix by 2030; Preparation for utilizing renewable energy as the major power source
- 4. Principles of the secondary energy structure:** Facilitation of strategic development of the system and infrastructure based on the Basic Hydrogen Strategy

Section 2 Policy measures towards 2030

- 1. Promotion of securing of resources:** Promotion of independent development of fossil fuel and mineral resources and establishment of a robust industrial system
- 2. Realization of a thorough energy efficient society:** Integrated implementation of the Act on Rationalizing Energy Use and support measures
- 3. Efforts for the utilization of renewable energy as the major power source:** Efforts to reduce costs, overcome system constraints, and secure sufficient load following capacity
- 4. Re-establishment of the nuclear energy policy:** Reconstruction and revitalization of Fukushima; Continuous pursuit of safety and establishment of stable business environment
- 5. Efficient and stable use of fossil fuel:** Promotion of effective use of high-efficiency thermal power generation
- 6. Fundamental reinforcement of measures for realizing a hydrogen society:** Implementation of measures based on the Basic Hydrogen Strategy
- 7. Promotion of energy system reform:** Promotion of competition; Development of market environments for responding to public issues and balancing public interests
- 8. Enhancement of resilience of the domestic energy supply networks:** Strengthening of the preparedness against disaster risks such as earthquakes and snow damage
- 9. Improvement of the secondary energy structure:** Promotion of cogeneration; Utilization of storage batteries; Dissemination of next-generation vehicles
- 10. Development of energy industry policy:** Enhancement of competitiveness and international expansion; Promotion of a distributed energy system based on the idea of local production for local consumption
- 11. International energy cooperation:** Strengthening of collaboration with the US, Russia and Asian countries; Contribution to significant CO₂ emission reduction in the whole world

Section 3 Promotion of technology development

- 1. Formulation of plans and roadmaps for energy-related technology development:** Promotion of energy and environmental innovation strategies
- 2. Technical challenges to be addressed:** Discovery and cultivation of innovative seeds of renewable energy; Innovation of nuclear technologies based on social demand; Reduction of hydrogen costs; Development of methanation technologies

Section 4 Enhancement of communication with all levels of the society

- 1. Deepening of understanding of all levels of the society:** Ongoing efforts to improve PR activities and ways of information provision; Positive publication in an easy-to-understand manner
- 2. Transparent policy planning processes and enhancement of two-way communication:** Utmost disclosure of policy planning processes; Enhancement of two-way communication; Communication concerning nuclear power through a regional symbiosis platform

Chapter 3 Efforts for Energy Transitions and Decarbonization towards 2050

Section 1 Ambitious multiple track scenario - Pursue every option

● Comparison with major countries

- UK: Combining multiple means for decarbonization, such as expanded use of renewable energy, shift to gas, and continuous use of nuclear power → Effectively reducing CO2 emissions
- Germany: Pursuing decarbonization-only through energy saving and expanded use of renewable energy → CO2 emission reduction stagnating due to dependence on coal

● Energy environments unique to Japan (poor in resources, lacking international interconnections, facing area constraints)

→ Adoption of ambitious multiple track scenario to pursue every option

Section 2 Designing of the 2050 scenario

1. Sophisticated 3E+S

- Safety: With safety as the top priority, achieve innovation by technology/governance reform
- Energy Security: Raise resource self-sufficiency rate and technical self-sufficiency rate and ensure diversity of choice
- Environment: Work towards environmental suitability and decarbonization
- Economic Efficiency: Mitigate the cost burden on the people and enhance domestic industrial competitiveness

2. Scientific review mechanism

Regularly ascertain the latest technological trend and circumstances and flexibly correct and decide development goals and relative priorities of each option

3. Cost/risk verification and dynamism among decarbonizing energy systems

Shift from cost verification by power source to cost/risk verification among decarbonizing energy systems

- Comparison of all costs actually required (including costs for supply and demand adjustments and system reinforcement, etc.) is difficult through cost verification by power source.
- Verify technologies and costs of energy systems as a whole, including heat and transportation systems, and achieve dynamic energy transitions

Section 3 Issues faced by each option and priorities in response thereto

- **Renewable energy:** Aim to develop and utilize renewable energy as the major power source, economically independent and decarbonized; Development of high-performance low-price storage batteries
- **Nuclear power:** Practical option for decarbonization; Pursuit of safe reactors and development of back end technologies for restoring social trust
- **Fossil fuel:** Major power source during the transitional period until the achievement of decarbonization; Shift to gas; Fadeout of inefficient coal use; CCS and shift to hydrogen

Section 4 All-out efforts to realize the scenario

- **All-out efforts:** Public-private collaborative efforts to constantly promote technological innovation and foster and secure human resources
- **Measures for the global issue of underinvestment:** Steady designing and creation of a mechanism to secure required investment
- **Implementation scenario:** Intensive allocation of policy resources to achieve energy transitions and decarbonization; Implementation of political measures such as market reform and system reform; Efforts to make international collaboration; Enforcement of the industry and reconstruction of energy infrastructure; Reconstruction of a fund flow mechanism