



Japan's Long-term Strategy under the Paris Agreement

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Ministry of the Environment of Japan

Japan's Long-term Strategy under the Paris Agreement (1/2)

Chapter 1: Basic Concept

Vision: Proclaiming a “**decarbonized society**” as the ultimate goal and aiming to accomplish it ambitiously **as early as possible in the second half of this century**, while boldly taking measures towards the reduction of GHGs emissions by 80% by 2050

* an unconventional vision of an “ideal future model”

* contributing to the achievement of the long-term goals of the Paris Agreement, including efforts to limit the temperature increase to 1.5°C

Basic Principles of Policy:

Realizing “a virtuous cycle of environment and growth” towards the vision with business-led disruptive innovation, Swift implementation of actions from now, contributing to the world, **Action Towards a bright Society with Hope for the Future**

[Factors: Achievement of SDGs, Co-creation, Society5.0, the Circulating and Ecological Economy, leading country in solving problems]

Chapter 2: The Vision of Each Sector and the Direction of Measures



1. Energy

Pursuing every option for promoting **energy transitions and decarbonization**



2. Industry

Decarbonized manufacturing



3. Transport

Contribution to the challenge of **“Well-to-Wheel Zero Emission”**



4. Community and Living

Realizing **carbon neutrality**, resilient and comfortable **communities and lives** by 2050/
creating the **“Circulating and Ecological Economy”**



5. Measures for Carbon Sinks

Conserving the natural environment and creating sustainable new values in agriculture, forestry and fisheries industries to secure **sufficient carbon sink** for decarbonized society

Japan's Long-term Strategy under the Paris Agreement (2/2)

Chapter 3: Cross-sectoral Measures to realize “a virtuous cycle of environment and growth”

1. Promotion of Innovation

Promoting innovation for practical application and wider usage of cross-sectoral decarbonization technologies that lead to drastic reduction of GHG, achieving cost that allows commercialization

- (1) Progressive environment innovation strategy
- (2) Innovation in economic and social systems/Lifestyle innovation

2. Promotion of Green Finance

Appropriate “visualization” of innovation, and mobilization of finance for the innovation by financial institutions

- (1) Mobilizing green finance through TCFD* disclosures and dialogues
* Task Force on Climate-related Financial Disclosures
- (2) Promoting initiatives to expand ESG finance

3. Business-led International Application and International Cooperation

Promoting environmental technologies and products that excel/
Promoting “Co-innovation” that benefits both sides in collaboration with partner countries

- (1) International application of decarbonization technologies linked to policy / institution building and international rule-making
- (2) Increasing infrastructure development and investment that contributes to CO₂ emissions reduction
- (3) Building platforms for decarbonized societies on a global scale



Fuel Cell Bus



CO₂ Capture Plant



TCFD Consortium



ESG Finance High-Level Panel



JCM Partner Countries Meeting

Chapter 4: Other Measures

- Human resource development
- Just transition
- Government-led initiatives
- Integrative promotion in collaboration with development of a resilient society by adaptation to climate change
- Carbon pricing (expert-driven technical debate is necessary)

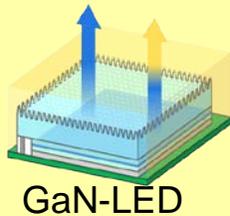
Chapter 5: Review and Implementation of Long Term Strategy

- **Review:** Flexibly considering of the long-term strategy taking circumstances into account and as necessary reviewing it, about every 6 years
- **Implementation:** Analysis that takes future change in situation into account/Partnerships/Dialogue

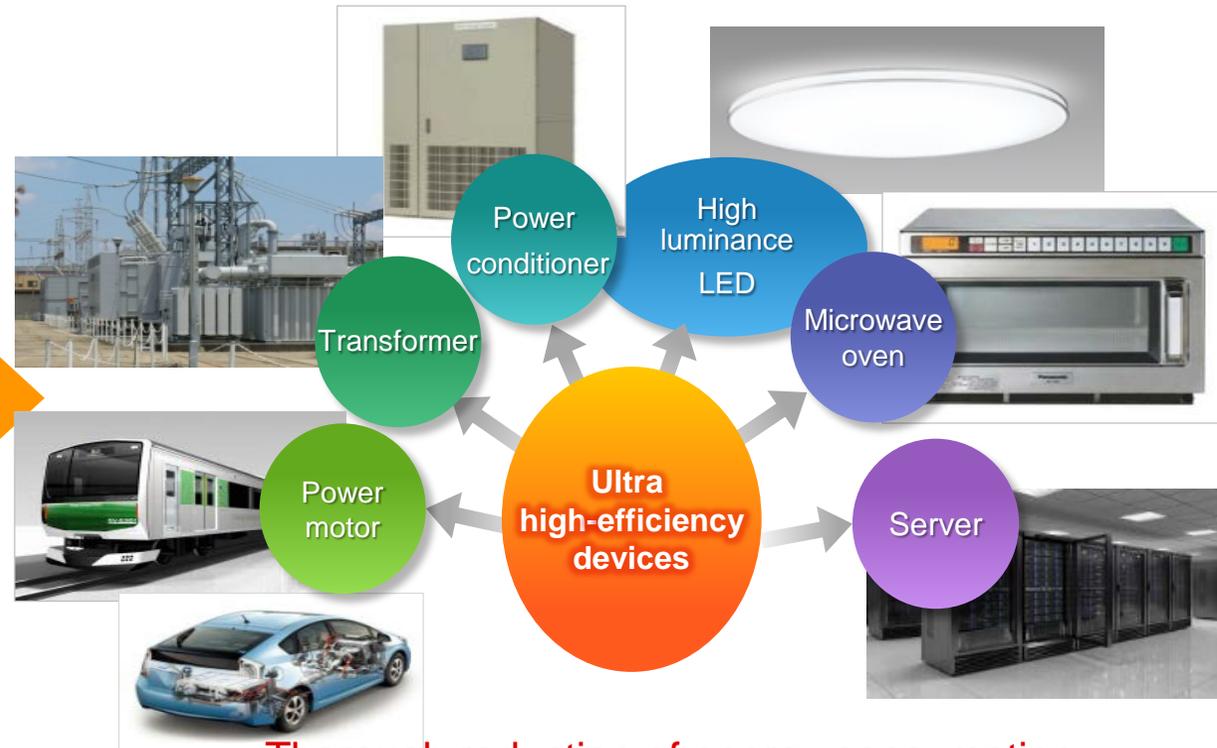
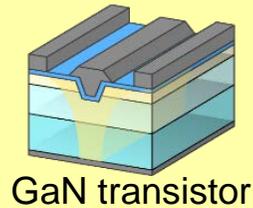
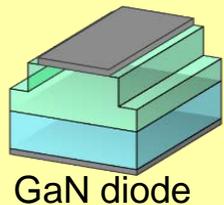
Innovation: Technology development using new semiconductor materials

- Maximize the efficiency of all sorts of electronic devices using new semiconductor materials (gallium nitride (GaN)). (For example, reduce the energy loss to less than a sixth compared with the current level)

High-efficiency optical device



Large-current, high-voltage power devices



Thorough reduction of energy consumption

Capable of **reducing energy consumption by an amount larger than the volume of power generated by four large power stations (1 million kW)** in the private sector alone

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Chapter 4: Other Measures

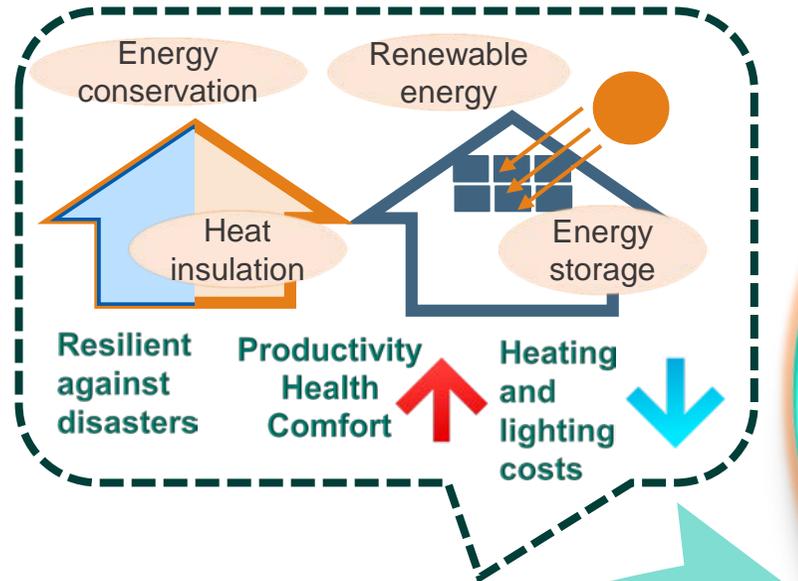
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Circulating and Ecological Economy

➤ Promoting the creation of a “Circulating and Ecological Economy” from the perspective of the community and living



Zero energy community = Circulating and ecological economy



Zero Energy Buildings and Houses (ZEBs/ZEHs)

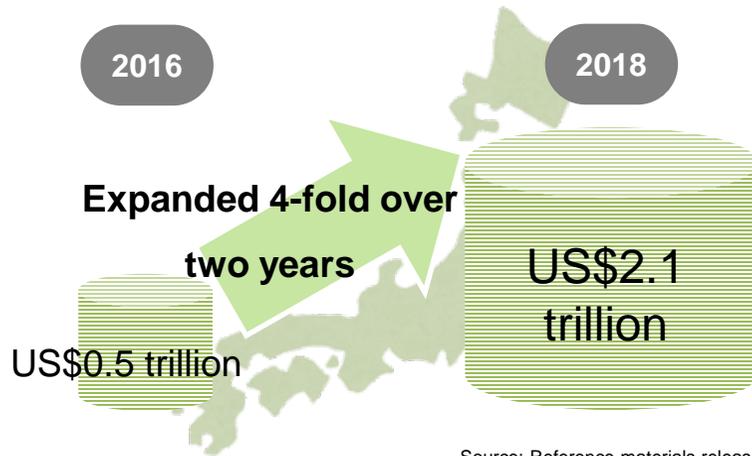
Element technologies related to zero energy

※Zero Energy buildings and houses



Green Finance: Promoting ESG finance

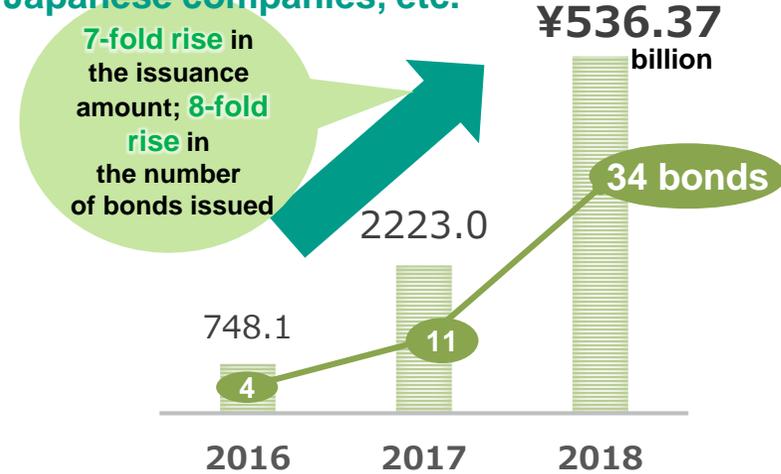
Expansion of ESG investments in Japan



Source: Reference materials released by JSIF

ESG Finance High-Level Panel, which brings together top officials of the financial industry

Increase in green bond issuance by Japanese companies, etc.



Support for issuance of green bonds

Promote the popularization of regional ESG finance



A collection of pioneering cases and a national caravan

Support for developing a screening process that gives consideration to ESG factors

Subsidy for ESG loans

Much-in-demand Scientific knowledge

What research do you expect scientists to do in implementing a long-term strategy, e.g. system transition, structural change, costs of mitigation/adaptation, financial mechanism, behavioral change, international collaboration?

- A factor that has a large impact on energy consumption and hard to project for long-term such as the progress of the information and communications society, global energy trends, and industrial transitions
- Relationship between costs of adaptation and mitigation;
- The amount of innovation and marginal cost reduction required to achieve the Paris Agreement through a backcasting approach;
- The relationship between positive and negative impacts on human activities and changes in lifestyle caused by technological and lifestyle innovations and GHG emissions
- How to promote decarbonization behavior that each individual can enjoy and practice spontaneously through the fusion of behavioral science knowledge such as Nudge and advanced technologies such as AI and IoT; People can't move just by inciting a sense of crisis

Process of Formulation of Japan's Long-term Strategy

Long-term Strategy based on the Paris Agreement

“All Parties should strive to formulate and communicate long-term low greenhouse gas emission development strategies, mindful of Article 2 (2°C goal, efforts to limit the temperature increase to 1.5 °C, etc.), ...” (Article 4, para19)



Under the instruction of the prime minister, “**the Meetings on a Long-Term Strategy under the Paris Agreement as Growth Strategy**” was held to discuss fundamental approach. In April 2019, a **recommendation** for the government was compiled.



Following the recommendation, relevant ministries developed a draft of the strategy. Invited views from members of councils, public comments, and opinion exchange with young generation and local communities.



In June, “**Long-Term Strategy under the Paris Agreement**” was approved by the cabinet.



As the G20 presidency of 2019, to realize a virtuous cycle between the environment and economic growth and to lead global energy transition and decarbonisation, an expert panel is established for setting out a long-term low greenhouse gas emission development strategy under the Paris Agreement as growth strategy.

< Prime minister's instruction overview at the Meeting of the Council on Investments for the Future on June 2018 >

- ① **Stimulate active green finance**, not by adhering to existing forms of regulations, but by advancing the disclosure of information and transparency.
- ② Promote measures on a global scale, including developing countries, by shifting from support centered on public funding to **private financing led by businesses**.
- ③ Combine the wisdom of not only the public and private sectors but also the world, setting ambitious goals towards **fostering revolutionary innovation**.

<Member>

- **Shuzo Sumi** Chairman of the Board, Tokio Marine Holdings, Inc.
 - **Hiro Mizuno** Executive Managing Director and CIO, Government Pension Investment Fund (GPIF)
 - **Takeshi Uchiyamada** Chairman of the Board of Directors, Toyota Motor Corporation
 - **Kosei Shindo** Representative Director and President, NIPPON STEEL & SUMITOMO METAL CORPORATION
 - **Hiroaki Nakanishi** Chairman, KEIDANREN (Japan Business Federation)
 - **Junko Edahiro** Founder and President, e's Inc.
 - **Shinichi Kitaoka** President, the Japan International Cooperation Agency (JICA) **[Chairman]**
 - **Yukari Takamura** Professor, Integrated Research System for Sustainability Science
 - **Itaru Yasui** Emeritus Professor, The University of Tokyo
 - **Masashi Mori** Mayor, Toyama City
- source : <https://www.kantei.go.jp/jp/singi/parikyoutei/>
- | | |
|------------------|---|
| Finance | Shuzo Sumi, Hiro Mizuno |
| Industry | Takeshi Uchiyamada, Kosei Shindo, Hiroaki Nakanishi |
| Expert | Junko Edahiro, Shinichi Kitaoka, Yukari Takamura |
| Local Government | Itaru Yasui, Masashi Mori |

<Past meeting schedule>

- 2018/8/3 1st meeting : Setting up the meeting
- 9/4 2nd meeting : Hearing from external experts① (Professor Amano, Nagoya University / Professor Gonokami, University of Tokyo)
- 11/19 3rd meeting : Hearing from external experts② (Yves Perrier, CEO of Amundi Asset Management / Noboru Ota, Mayor of Maniwa City / Didier Holleaux, Executive Vice President of ENGIE)
- 12/25 4th meeting : Free discussion
- 2019/4/2 5th meeting : Making the recommendation

Innovation: NCV (Nano Cellulose Vehicle) project

- Implementing the **NCV (Nano Cellulose Vehicle)** project, which aims to reduce vehicle weight by around 10% by 2020 using CNF (cellulose nanofiber).

◆ Characteristics of CNF

- ◆ Weighing a fifth of steel and five times as strong
- ◆ High recyclability
- ◆ Renewable resources
- ◆ Plant-derived and carbon-neutral



◆ Initiative to make maximum use of CNF

Resin material	Almost fully substitutes for existing materials comprising the interiors and exteriors.
Metal material	Examine the possibilities of exterior covers (e.g. engine hoods) and develop applications for bodies, engines and structural materials.
Others	Reinforce glass with CNF

Scheduled to be exhibited from October 24 to November 4, 2019 at the **Tokyo Motor Show**.

Carbon Capture, Utilization, and Storage (CCUS)

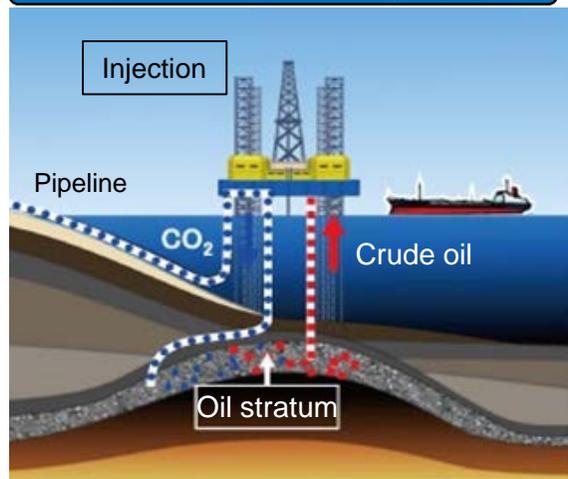
- Pursuing the possibilities of diverse technologies, for example through the world's first BECCS (Bio-energy CCS) project

Sequestering and capture (C)



CO2 capture demonstration plant (under construction) Capture capacity: 500 tons/day

Injection and storage (S)

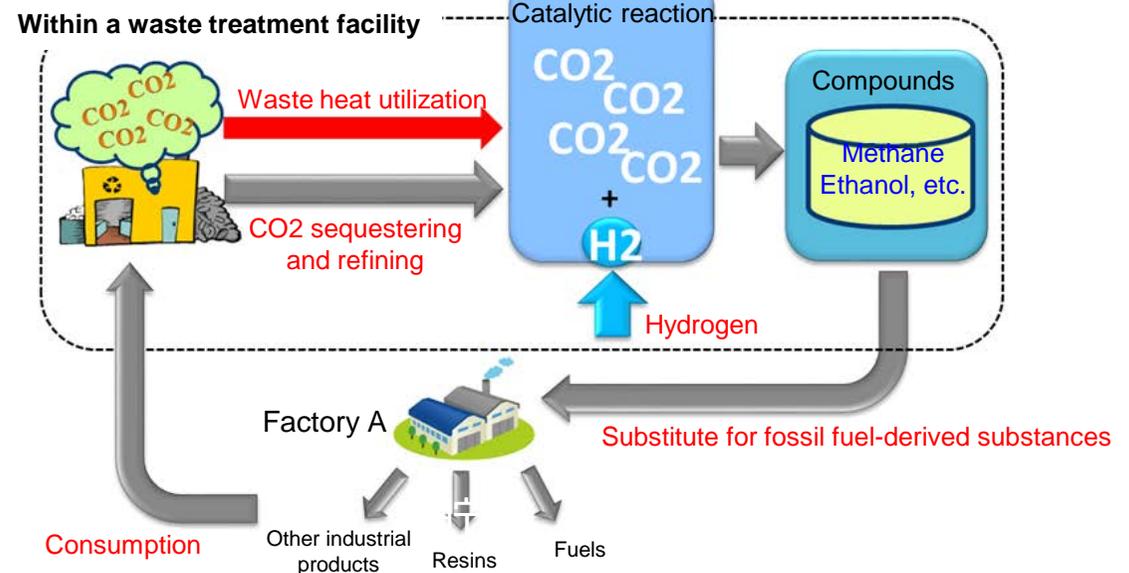


- Demonstrate **Japan's first CO2 capture technology on a commercial scale** in Omuta City, Fukuoka Prefecture (scheduled for fiscal year 2020).
- **Expected to become the world's first BECCS* (Bio-energy CCS) project.**

*Negative emission technology that captures biomass-derived CO2

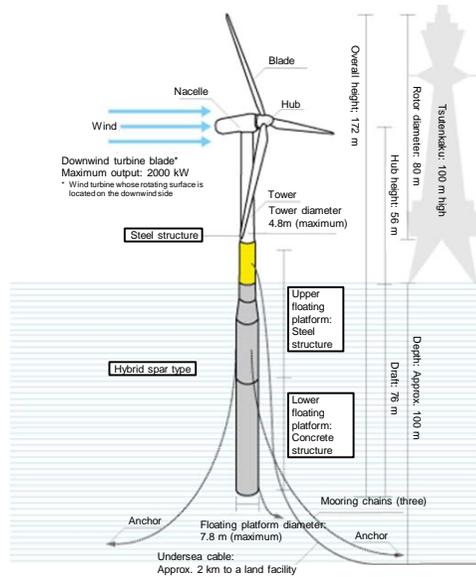
Diagram

Effective utilization (U)



Floating Offshore Wind Turbine

- Floating offshore wind turbine can be introduced in deep sea areas.
- The demonstration project with a commercial scale (2 MW) has been implemented.



■ **The world's first hybrid spar #wind floating type**

■ **High efficiency and high resilience**

■ **Cooperation with the local residents including fishery**

Float Raiser is the **world's first technology of its kind** that realizes an **efficient construction process** and **cost reduction**.

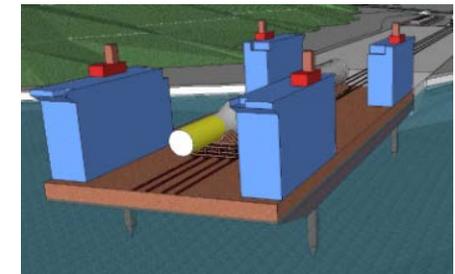


Diagram of loading a windmill pile

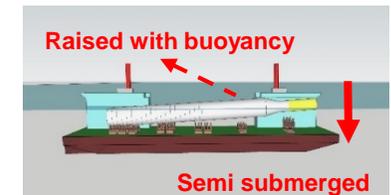


Diagram of construction onshore

Float Raiser: A vessel designed for installation of floating offshore wind turbines that enables wind turbines to be fully constructed onshore or nearshore without a huge crane.

International application and cooperation

- Creating co-innovations whereby Japan and partner countries develop a win-win relationship.

International application of environmental technologies / examples of contributions to the SDGs (Joint Crediting Mechanism)

Generating electricity through waste treatment for local supply (Myanmar)



Generating electricity through solar power and invigorating agricultural businesses (Mongolia)



Changing social and economic systems through co-innovations

Using electric motorbikes as storage batteries. Introducing renewable energy mobility. (Philippines)



*The sources of the above pictures are the websites of JEF Engineering, Farmdo, and Honda Motors.

Chapter1: Basic Concept

1. Intent and Purpose

- Formulating a long-term low greenhouse gas emission development strategy (“Long-term Strategy”) as requested in the Paris Agreement. Sharing Japan’s concept and actions with the world; contributing to the achievement of the long-term goals of the Paris Agreement, including **efforts to limit the temperature increase to 1.5°C**; and leading international discussions.

2. Long-term Vision

- **Proclaiming a “decarbonized society” as the ultimate goal and aiming to accomplish it ambitiously as early as possible in the second half of this century**, while boldly taking measures towards the reduction of GHGs emissions by 80% by 2050.
 - an unconventional vision of an “ideal future model”

3. Basic Concepts of Measures Towards the Long-term Vision

- **Realizing “a virtuous cycle of environment and growth”** towards the vision with business-led disruptive innovation; worldwide actions essential.
- Swift implementation of actions from now
- Contributing to the world

4. Action Towards a bright Society with Hope for the Future

Elements : Achievement of SDGs; “Co-innovation”, Society 5.0; the “Circulating and Ecological Economy”; and leading country in solving problems

Chapter2: Vision of Each Sector and Direction of Measures

Section 1: Emission Reduction Measures

1. Energy

(1)Future vision

- For **energy transition/decarbonization**, pursuing every option including energy efficiency, renewable energy, battery, hydrogen, nuclear, and CCS&CCU.

(2)Direction of measures towards the vision

- Renewable energy: Economically stand-alone and decarbonized major power source (e.g. drastic cost reduction, overcoming power grid constraints)
- Thermal power: Reducing CO2 emissions from the thermal power in line with the long-term goals of the Paris Agreement (e.g. lowering the dependence on thermal power as much as possible) , **promoting CCS&CCU/ Carbon Recycling**(e.g. establishing the first commercial-scale CCU technology by 2023/early practical use of CCS&CCU)
- Hydrogen: **Realizing a “Hydrogen Society”**
- Energy efficiency/distributed energy system: e.g. efficient use of heat/development of distributed energy system

2. Industry

(1)Future vision

- Establishing new manufacturing processes to achieve **decarbonized manufacturing** through disruptive -innovation

(2)Direction of measures towards the vision

- ①Use of CO2-free hydrogen (e.g. a challenge towards “zero-carbon steel” through technologies such as hydrogen reduction)
- ②Feedstock change(e.g. CCU including artificial photosynthesis, Carbon Recycling and biomass)
- ③Achieving drastic energy efficiency, development and introduction of low-GWP/non-fluorocarbon refrigerant technology towards complete transition from fluorocarbons in mid-long term, promotion of decarbonization in corporate management

Chapter2: Vision of Each Sector and Direction of Measures

Section 1: Emission Reduction Measures

3. Transport

(1) Future vision

- Challenging for **“Well-to-Wheel Zero Emission”**
(e.g. achieving the highest level of environmental performance of Japanese vehicles supplied worldwide by 2050)

(2) Direction of measures towards the vision

- Enhanced international policy coordination on electrified vehicles, including automotive environmental performance assessment on “Well-to-Wheel” base, promotion of open innovation for the electrified vehicle technology, road/transport systems using big data and IoT.

4. Community and Living

(1) Future vision

- **Creating a “Circulating and Ecological Economy”** aimed at the achievement of SDGs through local decarbonization and integrated environmental/economic/social improvement in the region, striving for the achievement of carbon-neutral, resilient and comfortable communities and living by 2050.
- **Capable communities and corporations to achieve carbon neutrality even before 2050**

(2) Direction of measures towards the vision

- Shift to carbon neutral living (**encouraging technology development and dissemination to achieve net Zero Energy Buildings, equivalency in stock average of housing and office buildings/** shift of lifestyles)
- Carbon-neutral community building (urban city building, farming/forestry/fishing villages building, and development of distributed energy systems)

Section 2: Measures for Carbon Sinks

- Aiming to secure sufficient carbon sinks to achieve a balance between anthropogenic emissions by sources and removals by sinks of GHGs (natural environment conservation, sustainable and new value creating initiatives in agriculture and fishery)

Chapter3:Cross-sectoral Measures for Achieving a Virtuous Cycle of Environment and Growth

Section 1: Innovation

[Basic Direction]

Promoting innovation for practical application and wide usage of cross-sectoral decarbonization technologies leading to drastic reduction of GHG, achieving cost that allows commercialization for social application. Constant reviewings of state-of-the-art technology based on latest scientific findings.

(1) Progressive Environment Innovation Strategy

- Setting clear goals such as costs, maximizing investment of public and private resources, discovering and creating technological seeds in and outside Japan, setting issues from demands, strengthening support that leads to commercialization
- ① **Discovering and Creating technological seeds in and outside Japan, Setting issues from demands**
 - Technical Review based on cost required by users and GHG emission reduction effect by objective LCA (life cycle assessment)
 - Accelerating public R&D and challenging R&D with ambitious targets
 - Hosting an international conference inviting leaders in science and technology from G20 to drive disruptive innovations in the clean energy technology field gathering wisdom from around the world, and enhancing alliances among R&D institutes with facilitation of international joint R&D activities **[Research and Development 20 for clean energy technologies (RD20)]**
- ② **Enhanced support leading to actual business**
 - Providing expertise (e.g. NEDO Pitch) to selected companies and "visualize", so that technological seeds and human resources of the competent venture business with superior environmental energy and other technologies will connect to actual business.
- ③ **Target setting and visualizing challenges for the practical use**
 - [Energy efficiency/energy conversion] Maximum introduction of energy efficient technology with cost-effectiveness
 - [CCUS/negative emission] **CCU/carbon recycled products to be provided with costs equivalent to existing products**
 - [Hydrogen] **Realizing hydrogen cost equivalent to existing energy: e.g. lowering manufacturing cost of CO2-free hydrogen to 1/10**
 - [Renewable energy] Establishment of technology enabling significant increase of renewable energy in total capacity, available with the equivalent cost levels to other existing power sources; utilization of demand-response (DR) at the similar level to the United States
 - [Nuclear] Pursuing reactors with superior safety, economic efficiency and flexibility and developing technology aimed at the resolution of backend problems and Fusion

(2) Innovation in Economic and Social Systems/lifestyle

Chapter3 : Cross-sectoral Measures for Achieving a Virtuous Cycle of Environment and Growth

Section 2: Promotion of Green Finance

[Basic Directions]

Appropriately “visualizing” corporate efforts in innovation etc. and mobilizing finance for innovation by financial institutions.

(1) Mobilizing green finance through TCFD* disclosures and dialogue

* TCFD : Task Force on Climate-related Financial Disclosures

- By utilizing TCFD, a global framework for climate-related disclosures, leading discussions on disclosures through which strength and contributions of companies are visualized while highlighting industry-specific characteristics, thereby developing financial flow to capture opportunities from climate change.
 - Industry: **Improving TCFD Guidance/Scenario Analysis Guide**, e.g. expanding the scope of sectors targeted by TCFD Guidance and by adding practical examples.
 - Financial sector: **Formulating a guidance on green investment** for financial institutions regarding the direction of corporate assessment
 - **Creating TCFD Consortium** as a venue for dialogue between industry and financial sector
 - **Holding a TCFD Summit** in autumn of 2019, to discuss and share the above initiatives with the world

(2) Promoting initiatives to expand ESG finance

- Aiming to brand Japanese capital market, including through support to the issuance of green bonds, and promoting ESG finance in direct finance.
- Promoting high-quality dialogues on environmental information and corporate value assessment, through the development of ESG dialogue platform
- By encouraging local ESG finance, facilitate ESG finance in indirect finance which dominates finance in Japan
- Maintaining and fostering the momentum for ESG finance by financial institutions, by enhancing ESG finance literacy, development of platform for environmental information disclosure as well as through ESG Finance High-Level Panel with commitments by top management in financial sectors

Chapter 3 : Cross-sectoral Measures for Achieving a Virtuous Cycle of Environment and Growth

Section 3: Business-led International Application and International Cooperation

{Basic Directions}

Promoting competitive technologies and products with high environmental performance contributing to the global GHG emission reductions as much as possible; **promoting co-innovation benefiting participants from both countries**; creating decarbonization technologies to suit partner countries, while contributing to development of market, capacity building and systems; internationally advocating the "Circulating and Ecological Economy" and supporting other countries for its development; effectively using public finance and mobilizing private funds in climate change areas

(1) International application of decarbonization technologies together with policy/institutional development and international rule-making

- Working for institutional development in partner countries on frameworks to compare and assess energy efficiency, energy efficiency labeling and international standardization; improving business environment and promoting wider application of decarbonization technologies **with Joint Crediting Mechanism(JCM)**, establishing public and private-sector initiatives in ASEAN, and sharing best practices at public-private workshops.
- **Leading international rule-making and developing appropriate international frameworks for utilizing market-based mechanisms**
- Reducing fluorocarbons emissions internationally by encouraging developing countries to prevent the leaks of fluorocarbon refrigerants on the usage and disposal of air conditioners and refrigerators

(2) Strengthening Development and Investment of infrastructure that contributes to CO2 emission reductions

- Development and investment of energy and city/transport infrastructure that contributes to CO2 emission reduction in line with the long-term goals of the Paris Agreement (**e.g. renewable energy such as offshore wind power and geothermal power, hydrogen, CCUS, Carbon Recycling, smart cities**)

(3) Creating platforms for global scale decarbonized society building

- Supporting partner countries in the formulation of Nationally Determined Contributions (NDCs) and mitigation measures, as well as **enhancing transparency in the overall supply chains**

Chapter 4: Other Cross-Sectoral Measures

(1) Human resource development

- Further promoting Education for Sustainable Development (ESD) and enhancing human resource development for innovation.

(2) Integrating climate change adaptation with development of a resilient society

- Implementation of measures benefiting both mitigation and adaptation measures (e.g. introduction of autonomous and distributed energy, ecosystem-based approaches such as green infrastructures) as well as improving information platforms for adaptation.

(3) Just Transition

- Promoting local vocational training and measures for smooth transition of labor force to decarbonized society with Government, local authorities and companies working together.

(4) Government-led initiatives

- The Government focus on the application to the overall society and actively lead efforts in a path to decarbonized society.

(5) Carbon pricing

- Expert/technical level discussions, considering international trends, domestic situations and impact to international competitiveness of companies required.

Chapter 5 : Review of Long-Term Strategy and its Implementation

(1) Review

- Re-examining policies and measures in the light of the visions flexibly every about 6 years with reference to situations, and improving the Long-term strategy if necessary.

(2) Implementation

- Analysing relevant factors responding to future changes in the situations / collaborating and having dialogues with stakeholders including the youth etc.