

Submission for Talanoa Dialogue
Key Message from Japan
- Talanoa JAPAN -

1. WHERE ARE WE? – Current progress of Japan’s actions and achievements

- Japan has already achieved its target of reducing emissions by 6% compared to 1990 levels during the 1st commitment period of the Kyoto Protocol. We are most likely to achieve the Cancun target.
- GHG emissions in FY2016 have declined by 64 million tons (CO₂ eq., 4.6%) compared to FY2005. The key contributors were the industrial and transportation sectors for energy-oriented CO₂ emissions, and removals by sinks through forest management. Japan has successfully achieved the positive outcomes for GHG emission reductions based on the “Plan for the Global Warming Countermeasures” and through a wide range of domestic measures.
- In a global context, Japan announced the “Action for Cool Earth 2.0” and committed to provide approximately 11.6 billion US dollars (1.3 trillion yen) of climate finance to developing countries in 2020 and has been providing financial support and technical assistance to developing countries through ODA (23.3 billion US dollars), GCF (1.5 billion US dollars), and the Joint Crediting Mechanism (JCM) finance support program.

2. WHERE DO WE WANT TO GO? – Japan’s future targets and vision

- Japan commits to reduce “GHG emissions **by 26% compared to FY2013 levels in FY2030**” domestically. In addition, under a fair and effective international framework applicable to all major Parties, Japan leads international community so that major emitters undertake emission reduction in accordance with their capacities, and also aims to reduce GHG emissions **by 80% by 2050** while Japan achieves both climate action and economic growth.
- Moreover, we will contribute toward achieving the world’s drastic emission reduction through the “**Co-innovation**”. Japan will work together with partner countries by sharing its advanced technology and know-how, and establish a mutually beneficial relationship with partners that can create a market for products, services, technologies reflecting on their challenge and needs. *Co-innovation* aims to generate transformation in technology, socio-economic systems and lifestyles.

3. HOW DO WE GET THERE? – Areas of contribution by Japan

- Japan will further promote drastic emission reduction domestically through innovation in the areas of hydrogen, storage battery, CCUS etc. Such technologies have large potential to reduce GHG emissions dramatically. We will accelerate

efforts and support further climate actions among all stakeholders.

- In addition, Japan promotes *Co-innovation* through international cooperation to create and scale up successful models in partner countries, by strengthening partnerships, advancing institutional development and ownership, as well as mobilizing private finance through utilizing public funds.

We are pleased to announce the launch of the [Japan Talanoa Dialogue Platform](#) (website¹) with the intention to collect a wide range of in-deep knowledge and experiences, share the lessons learned with all the participants in the Talanoa Dialogue, create awareness, raise domestic ambitions, and promote activities. Japan hopes to contribute to a successful COP 24 through our active participation in the Talanoa Dialogue.

¹ http://www.env.go.jp/earth/ondanka/talanoa_japan/index.html

Table of Contents

Preamble.....	1
Where are we?	2
1. Steady progress in domestic mitigation actions	2
Promotion of energy efficiency	3
Promotion of next-generation automobiles and improvement of fuel efficiency.....	4
Low /decarbonized energy generation by renewable energy	4
Realizing a hydrogen based society	5
Actions by industrial sector	6
Other initiatives	7
2. Support for developing countries — the "ACE 2.0"	7
Bilateral Assistance through ODA	8
Mobilization of private finance through public funds	8
Diffusion of low carbon technology by utilizing market mechanism (Joint Crediting Mechanism: JCM).....	8
Good practice of capacity building: GCF access support	9
Observation of global greenhouse gas concentration by satellite (GOSAT)	10
Where do we want to go?	10
1. Achievement of Japan's mid-term and long term target.....	10
2. Drastic GHG emission reduction through <i>Co-innovation</i>	11
How do we get there?	11
1. Significant domestic emission reduction through innovation	12
Promotion of energy efficiency and large-scale introduction of renewable energy	12
Research and development (R&D) of innovative technologies based on the national strategy	13
Accelerating efforts by broad range of Non-State actors	15
2. Promotion of international cooperation with continuous <i>Co-innovation</i>	16
Successful models for <i>Co-innovation</i>	18
Contribution to scientific knowledge.....	18

Submission for Talanoa Dialogue
- Talanoa JAPAN -
April 2018

Preamble

Japan recognizes the importance of addressing the increasing threat of climate change in recent years. In order to achieve the 2 °C goal of the Paris Agreement it is necessary to realize a decarbonized society that balances anthropogenic emissions by sources and removal by sinks of greenhouse gases (GHG) in the second half of this century. Japan has already over-achieved the target of the Cancun Agreements underpinned by a PDCA cycle (The Plan–Do–Check–Act Cycle) within the frame work of the "Plan for Global Warming Countermeasures", and is steadfastly implementing the Nationally Determined Contribution (NDC). Japan aims for the drastic emission reduction through further practice of energy conservation and maximum usage of renewable energy. Japan is determined to blaze the trail in transformative innovations such as hydrogen energy system and Carbon Capture, Utilization, and Storage (CCUS).

Japan is making the utmost efforts to reduce GHG emissions both domestically and globally. Japan has already provided assistance of 23.3 billion US dollars in 2015 and 2016, which is consistent with the pledges of 1.3 trillion yen in 2020 (equivalent to 11.6 billion US dollars²) under the Action for Cool Earth 2.0 (ACE2.0) announced in 2015. For future international cooperation, Japan proposed the principle of "Co-innovation". *Co-innovation* is not an introduction of technology or systems from one side to another; it establishes a mutually beneficial relationship, can lead to the creation of a market for products, services, technology that is customized to each country, and enables transformative change in socio-economic systems and lifestyles. Based on the principle of *Co-innovation*, Japan will simultaneously accomplish climate change actions and economic growth, and share the outcomes with the world (Figure 1).

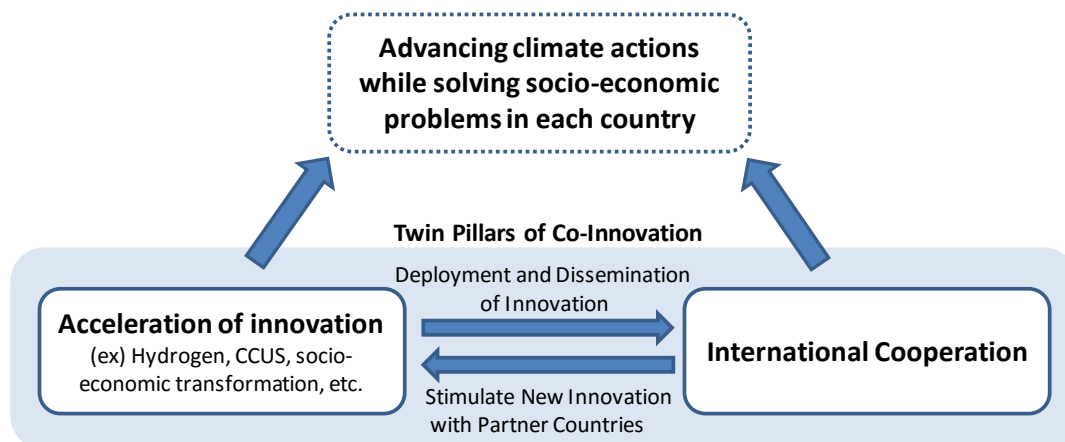


Figure 1: Japan's contribution to the world's drastic emission reduction through Co-innovation

² Exchange rate: 115 Japanese yen = 1 US dollar

The global emission reduction actions by the private sector must be encouraged. For this reason, it is important to increase the visibility of GHG emission reduction, develop rules to enhance climate change actions, and share best practices in the private sector.

Japan highly appreciates the efforts paid by the COP22 and COP23 Presidencies who had designed the Talanoa Dialogue. Given the importance of inputs from a wide range of Non-State actors, Japan has launched a special website for the Dialogue and encourages the inputs from various actors including local governments, companies and NGOs in Japan. This website enables Japan to develop its comprehensive inputs to the Dialogue prior to COP24, particularly through integrating best practices and knowledges obtained by various actors. The Japanese government calls on all stakeholders to share their knowledge, lessons, and cases in terms of useful structures, plans and analysis that contribute to achieve the 2 °C target³, explaining the purpose and schedule of the dialogue on the website. The government will synthesize those inputs and submit them as an input by October 29th under the UNFCCC process, and this information will be made public with a view to raising ambition and communicating efforts made.

This submission will aim to present the role and the achievements by the Japanese government (Where are we?), vision of the future (Where do we want to go?), and the commitments (How do we get there?).

Where are we?

1. Steady progress in domestic mitigation actions

In March 2011, Japan was struck by the Great East Japan Earthquake and sequentially by the Tokyo Electric Power Company Fukushima Daiichi Nuclear Power Plants accident. Though the disaster created a drastic change in the internal and external energy environment, Japan successfully fulfilled the promise of reducing GHG emissions by 6% in comparison to 1990 levels during the first commitment period of the Kyoto Protocol (2008-2012) by galvanizing efforts of all stakeholders. In order to continue the implementation of global warming countermeasures in the post-KP1 period, Japan has partially revised the Act on Promotion of Global Warming Countermeasures in 2013 with a view to promote comprehensive and phased approach to tackle global warming.

Following the Cancun Agreements, Japan pledged a target of 3.8% reduction by FY2020 as compared to the FY2005 levels in 2013. In addition, Japan submitted its INDC in 2015, including Japan's FY2030 mid-term target of reduction 26% compared to the FY2013 levels.

Moreover, in light of progress of the discussion on the Paris Agreement, the "Plan for Global Warming Countermeasures" was adopted by the Cabinet in May 2016 after a number of commissions consisting of

³ http://www.env.go.jp/earth/ondanka/talanoa_japan/index.html

diverse stakeholders including government officials, private companies, and researchers. The Plan includes basic points related to the measures to be taken by business operators and citizens, and the policies and measures that national and local governments should take for the achievement of the NDC. In addition, progress in implementation of the measures and the status of achievement of targets will be rigorously monitored annually based on periodical assessments and reviews by relevant councils as part of the PDCA cycle. Furthermore, a revision of the Plan will be considered every three years, taking into account Japan's GHG emissions and absorptions.

Preliminary reports for FY2016 showed the total amount of GHG emissions in Japan to be 1,322 million tons (CO₂ eq.), indicating a decrease of 4.6% (64 million tons of emission) as compared to FY2005 (1,386 million tons). While emissions of hydrofluorocarbons (HFCs) increased in the refrigerant sector as a result of substitution from ozone-depleting substances, energy-oriented CO₂ emissions in the industry and transportation sectors declined. In addition, the amount of removals by activities for sinks following the Kyoto Protocol reached 58.8 million tons in FY2015. As a result of those factors contributing to the reduction in emissions, the 2020 target of the Cancun Agreements will most certainly be achieved.

The following is a list of the latest outcomes of key measures in the "Plan for Global Warming Countermeasures".

Promotion of energy efficiency

Enhancing energy efficiency in each sector

"Act on Rational Use of Energy" sets standards regarding energy efficiency efforts for the industry, commercial, and transportation sectors. The Act also shows efforts targets for the rational use of energy and the measures to be taken systematically to achieve such targets, and requires business operators with 1,500 or more kl/year energy consumption to report their activities on energy efficiency to the government and the Japanese government provide guidance as appropriate. Additionally, the efficiency of electrical appliances and automobiles has been improved by "Top Runner Program under the Act" which Japanese government sets the efficiency standard targets each categories (appliances and automobiles) and companies (manufactures and importers) are obliged to make effort to meet the targets.

The Japanese government subsidized the replacement of facilities with high energy efficiency effects at factories, workplaces, etc. In FY2017, it supported two types of applications: 1) "factory and workplace units" that do not limit targeted facilities (411 cases) and 2) "facility units" that limit the targeted facilities but have a relatively simple procedure (2,497 cases).

The Net-Zero Energy House (ZEH) project supported new house owners, prospective buyers of newly built houses, and house owners for introducing highly efficient equipment (components of ZEH such as

high efficiency air conditioning, hot water supply facility, and lighting).

(Column: LED lighting renovation project at Byodoin Temple Phoenix Hall)

Byodoin Temple Phoenix Hall, the world heritage site in Kyoto with approximately 1000 year of history, underwent a large scale renovation over two years from September 2012. They adopted Toshiba Lighting Tech's LED lightings, which has great advantages for controlling light distribution, energy conservation and long product life. In Japan, it is popular to open shrines and temples to public in the night for visitors. The LED lighting successfully reduced power consumption by 55% in comparison to conventional* halogen lamp lighting. Toshiba has developed this new high-performance LED lighting that achieves both low power consumption and the beautiful night view of the Temple at the same time. This project showed new potentials for LED lighting not limited to energy saving performance.



(*Comparison of 6 conventional halogen lamp lighting which total power consumption is about 3 kWh) and 16 LED lighting (total power consumption about 1.36 kWh))

Promotion of next-generation automobiles and improvement of fuel efficiency

Next-generation automobiles and vehicles with high fuel efficiency were promoted by implementing measures such as tax reduction or exemption (automobile tax and light vehicle tax), eco-car tax cut (that governs motor vehicle tonnage tax and automobile acquisition tax), and the standards based on the Act on Rational Use of Energy that facilitate improvement of energy efficiency.

Hydrogen stations are essential for expanding the use of fuel cell-powered vehicles. Japan has subsidized hydrogen supply facility development projects operated by the private sector.

The tax treatment (customs duty exemption and gasoline tax exemption) enabled the achievement of the bioethanol targets of 440,000 KL (2016FY) of crude oil equivalent.

Low /decarbonized energy generation by renewable energy

Reduction of CO2 emission intensity in electric power sector

In April 2016, the benchmark indices related to thermal power generation facilities defined in the Act on Rational Use of Energy were revised according to the energy mix. In addition, for electricity, gas, and oil energy suppliers, the non-fossil power supply target was reviewed in order to align with the energy mix based on the Sophisticated Methods of Energy Supply Structure Law which promotes the use of renewable energies and nuclear power as well as the effective use of fossil fuels.

In December 2017, the Natural Resources and Energy Working Group of Global Environment Subcommittee under the Industrial Structure Council followed up the progress of efforts through a voluntary framework in the electric power industry.

Renewable energy has been spreading across Japan as solar power generation prompted a total expansion by 50 GW in 2017 after introducing the feed-in-tariff system in 2012⁴.

With regard to CCS, Japan has conducted domestic large-scale demonstration and experiments to commercialize CCS technology by around 2020, including research and development to reduce costs and improve safety, an assessment of the environmental burden associated with CO₂ separation and recovery, and a geological survey to identify domestic reserve sites .

(Column: Introduction of geothermal power plant in Toya-ko (Lake-Toya) hot spring resort area

Toya-ko hot spring resort area introduced rare and cutting-edge geothermal power generation. Binary generators (output 41 kW) produce electricity by turbines using the evaporation generated through a heating medium with a low boiling point. The geothermal heat is primarily used for electricity generation and secondary as a hot spring resource. Residents in the community share high uptake on resource conservation and its effective use, and also the association of Toya-ko hot spring supports the geothermal development. The plan called “Toya-ko Town Comprehensive Development Plan” states the effective use of geothermal heat and the project is implemented as a part of this plan.



Realizing a hydrogen based society

Hydrogen is known for its unique environmental characteristics of producing electricity and heat without CO₂ by utilizing fuel cell technologies. Japan regards hydrogen as a good energy carrier for renewable energy since renewable energy can be converted to hydrogen as well as hydrogen can store, carry and utilize renewable energy in a variety of situations.

⁴ IEA Photovoltaic Power Systems Programme

A subsidy for the introduction of commercial fuel cells (Ene Farms) to spread the use of fuel cells has been provided for 236,000 equipment in FY2017 (delivery decision base). Moreover, by FY2016, the subsidy was given to 1472 FCV (delivery decision base) to promote the introduction of clean energy vehicles. In 2016, a subsidy for the installation of 2 FCVs (business operation buses) was approved as a part of the regional transportation greening project, and the buses were installed accordingly in March 2017.

For the purpose of encouraging the use of fuel cell vehicles, by FY2017, approximately 100 commercial hydrogen stations were built in total by the private sector utilizing the subsidy provided. In addition, regional hydrogen stations generated through a renewable energy source were developed and 19 stations were opened in total by the end of November 2017.

- Number of FCV⁵: 1,807
- Number of Hydrogen Station opened⁶: 100

Actions by industrial sector

GHG Emissions Accounting, Reporting and Disclosure Program

Based on the Act on Promotion of Global Warming Countermeasures, emitters that exceed a given threshold of GHG emission are required to report their emission quantities to the Japanese government on an annual basis which are collected and disclosed it to the public. It aims at facilitating voluntary actions by stakeholders for tackling global warming by visualizing the information of their emission.

Promotion of voluntary efforts by industrial sector

Each industrial sector in Japan voluntarily sets GHG emission reduction targets and develops action plans. These plans focus on reducing GHG emissions in their business activities by applying a PDCA cycle and reducing global GHG emissions through providing low-carbon products and services. In fact, the industrial sector reduced energy-oriented CO₂ emissions in FY2016 by 10% compared with FY2013 levels. The Japanese government ensures their voluntary actions against global warming through strict periodical reviews and assessments.

The Japanese government sets up a study group in coordination with industrial sector to discuss the quantification of GHG emissions reduction through low-carbon products and services from the industrial sector and published the concept in March 2018.

⁵ <http://www.cev-pc.or.jp/tokei/hanbai.html>

⁶ http://www.cev-pc.or.jp/suiso_station/index.html

Promotion of J Credit System

The Japanese government is promoting the “J-Credit System”, which registers GHG reduction or carbon sinks through installation of energy efficient and renewable energy equipment or forestry management. Private companies, farmers, forest owners, local governments register a project and the Japanese government provides them with support in monitoring and verifying process. The credit is supposed to be issued after the monitoring report is submitted. As of March 2018, the system registered 690 projects and issued credits of 3.43 million t-CO₂. The credits can be utilized not only for carbon offsets but also for the national reporting scheme, and disclosure of information regarding climate actions for investors and consumers.

The Japanese government provides support for credit bidding and matching of J credit. In addition, at the G7 Ise Shima Summit in May 2016, the first G7 carbon offsets were made in cooperation with 111 corporations and local governments. It showcased Japan's engagement to tackle climate change, and contributed to enhance momentum for domestic understanding and cooperation for countermeasures against global warming and raise awareness on the merits to choose low carbon products and services.

Other initiatives

To fulfil the obligation to reduce HFCs emissions of the Montreal Protocol adopted in 2016, Japanese government submitted to the parliament a draft amendment to the Ozone Layer Protection Law. Japan also implements a wide range of measures including conversion of fluorocarbons for systematic reduction, conversion to low greenhouse gas and non-fluorocarbon products, and prevention of leakage during product use as well as collection and appropriate disposal of fluorocarbon related products.

In May 2016, Japan revised the Basic Plan for Forest and Forestry, to promote the removals from the forest carbon sink through appropriate forest management and conservation.

2. Support for developing countries — the "ACE 2.0"

At COP21 in 2015, Prime Minister Abe announced the "Action for Cool Earth 2.0 (ACE 2.0)"; a pledge to increase financial support to developing countries from about 8.9 billion US dollars (1 trillion yen) to about 11.6 billion US dollars (1.3 trillion yen) in 2020, and strengthen innovation⁷. Major support programs are as follows:

In 2015 and 2016, Japan provided developing countries with a total of approximately 23.3 billion US dollars through ODA, OOF and private contributions.

⁷ Exchange rate: 115 Japanese yen = 1 US dollar

In 2015, Japan decided to contribute 1.5 billion US dollars to GCF. Japan annually provides approximately 2.5 million US dollars for the Climate and Clean Air Coalition to Reduce Short-Lived Climate Pollutants (CCAC). In 2017, Japan also provided 5 million US dollars for Capacity Building Initiative for Transparency (CBIT).

In line with the pledge of ACE2.0, Japan has achieved the following progress:

Bilateral Assistance through ODA

Japan implemented 434 projects in 91 countries in 2015 and 2016, based on the request and needs of the recipient countries. In particular, Japan focuses on adaptation projects for countries vulnerable to the impacts of climate change such as island countries. Assistance to these island countries amounted to 44.1 million US dollars in 2015 and 2016.

Some examples of Japanese climate change projects through ODA are as follows;

- Installation of renewable energy facilities such as construction of geothermal power plants in Laguna Colorada geothermal area in Bolivia and Hurghada wind power plant in Hurghada city in Egypt enabled mitigation measures for the impacts of climate change.
- Construction of the Pacific Climate Change Center in Samoa which supports climate change-related operations of the Secretariat of the Pacific Regional Environment Programme (SPREP), as well as capacity building of human resources in the Oceanian region, strengthened resilience for climate change and environment in the region.
- In Colombia, the capacity of the national disaster risk management system improved to mitigate risks including flood control measures. In Mozambique, weather forecasting capacity was enhanced by improving climate observation capability and assisting the improved issuance of disaster warnings based on meteorological data.

Mobilization of private finance through public funds

Japan has encouraged mobilizing private funds, using public funding as an incentive, through co-financing with the private sector via JBIC and the mobilization of trade insurance by NEXI. In 2015 and 2016, more than 3.8 billion US dollars were mobilized out of total assistance of 23.3 billion US dollars.

Diffusion of low carbon technology by utilizing market mechanism (Joint Crediting Mechanism: JCM)

Through the Joint Crediting Mechanism (JCM), government-run projects will contribute to the reduction and absorption of international emissions in the range of 50 million to 100 million t-CO₂ eq. by FY2030. This will also contribute to spreading low carbon technology, and accumulate experiences on MRV for

both Japan and JCM participating countries. The Japanese government has signed bilateral memorandums on JCM with 17 countries, and already implemented more than 120 projects. The cumulative emissions reduction and absorption by these projects will reach approximately 7 million t-CO₂ (direct effect up to FY2030) in total. Several JCM projects have resulted in leading transformation in infrastructure and market systems towards a low carbon society in partner countries.

Examples of good practices:

- Encouraged the installation of low-carbon technologies (e.g., installation of high-efficiency transformers, high-efficiency refrigerators, etc.) in the partner countries and making the effect of the operation visible. These projects facilitates the partner countries to realize the long-time operation returns from GHG reduction and fuel consumption improvement, and contributed to developing procurement standards for the installation of high-spec technologies.
 - Constructed small scale pilot plants initially to foster the understanding of the JCM project by local governments, central government officials and local residents. The appropriate management and operation of the plants with additional support also served for installing (large scale) full plant facilities (e.g., development of waste collection and separation in installation of power plants fueled by waste, establishment of plant operation manual for waste heat recovery power generation, implementation of OJT, etc.).
 - Smoothly installed low-carbon technology (e.g. high efficiency air conditioning, introduction of various renewable energy, etc.) in partner countries by combining JCM and technical cooperation by JICA (e.g. formulation of master plan on climate change, energy conservation standards and labeling system, identifying mitigation projects suitable to regions as a result of cooperation among local governments of Japan).
- Partner Countries: 17
 - Expected 50 to 100 million tons CO₂ cumulative reduction and absorption by FY2030
 - Expected expansion of business scale up to 1 trillion yen by FY2020

Good practice of capacity building: GCF access support

In cooperation with IRENA, Japan invites foreign government officials for practical training to support the introduction of renewable energy in Small Island Developing countries (SIDs) etc. In the past four years, 93 administrative officials from the Asia-Pacific Small Island Developing countries and regions participated in the seminars to understand the mechanisms of various climate funds such as GCF and to learn how to develop concept notes for the project.

Observation of global greenhouse gas concentration by satellite (GOSAT)

Japan contributes to the refinement of climate change forecasting by continuous observation of global GHG concentrations using the GHG observation satellite "IBUKI" (GOSAT). In addition, to support domestic and international actions on GHG reductions, we are also encouraging other countries to use the satellite observation data in comparison and evaluation of their emission report.

- Investment Amount: 40 billion yen (GOSAT-2)
- Observation frequency: Possible to measure at least twice in every 6 days anywhere in the world

(Column: Satellites for global warming observation)

The GHG observation satellite "IBUKI" (GOSAT) has continuously been observing global GHG concentrations from space ever since its launch in 2009 (Picture). "IBUKI" was the world's first spacecraft to measure the concentrations of CO₂ and methane, the two major greenhouse gases.

It confirmed that the results estimated from the observational data of "IBUKI" roughly coincide with the projection based on inventory on the



anthropogenic methane concentration in the global mega city areas such as the Tokyo metropolitan area that is in the vicinity of natural gas / oil production / refining areas. This finding indicates the possibility of utilizing satellite observation data for parties to report GHG amounts in accordance with the Paris Agreement. The successor "IBUKI 2" (GOSAT-2) drastically improves the observation accuracy and is scheduled to be launched in 2018. GOSAT2 is expected to contribute further in refining climate change forecasting through its continuous observation. The Japanese government will facilitate capacity-building opportunities so that countries can utilize the observation data for comparison and evaluation with GHG reports.

Furthermore, "SHIKISAI" (GCOM-C), carrying a SGLI (Second generation GLObal Imager), was launched in December 2017. "SHIKISAI" will improve our understanding of climate change mechanisms through long-term monitoring of aerosols and clouds, as well as vegetation and temperatures, in the land and ocean regions.

Where do we want to go?

1. Achievement of Japan's mid-term and long term target

Japan aims to achieve the objective stated in Article 2 of the UNFCCC that is the "stabilization of GHG concentrations at a level that would not prevent dangerous anthropogenic (human induced) interference with the climate system", and the 1.5 °C or 2 °C targets articulated in Article 2-1 (a) of the Paris Agreement. To this end, our best efforts must be directed towards the realization of a

decarbonized society that balances anthropogenic emissions by sources and removals by sinks of GHG in the second half of this century. Japan is committed to continuously working towards achievement of the target of “reducing emissions to 26.0% compared to FY2013 level in FY2030” as described in our NDC.

Moreover, at the G8 L'Aquila Summit Leaders' Declaration of 2009, Japan supported the developed countries' goal of an 80% or more reduction in GHG by 2050 compared to 1990 levels or that of recent years. The Plan for Global Warming Countermeasures states "based on the Paris Agreement, under a fair and effective international framework applicable to all major Parties, Japan leads the international community so that major emitters undertake emission reduction in accordance with their capacities, and aims to reduce GHG emissions by 80% by 2050 as its long-term goal while Japan achieves both climate action and economic growth".

2. Drastic GHG emission reduction through *Co-innovation*

It is necessary to create a global-scale decarbonized society so as to meet the Paris Agreement goal, and is desirable to practically achieve zero emission by 2050 with the autonomous mitigation measures taken by all countries.

Japan will promote the world innovative high-end infrastructure, products and services, which are elaborated through the experiences of significant emission reduction. Japan will also contribute to creating a global-scale decarbonized society through *Co-innovation* benefitting both Japan and the stakeholders.

In collaboration with partner countries and relevant stakeholders, Japan will contribute to transforming the world into decarbonized society. This can be achieved through enhancing transparency in terms of GHG emissions, reduction activities, and investment for global warming measures, identifying challenges and needs, and advancing mutually beneficial innovations. This leads to both creation of a global sustainable society and economic growth.

How do we get there?

In order to meet these goals described in previous section, all countries should make further efforts for emissions reduction. Furthermore, it is important that as many countries as possible shift their reduction targets to an economy-wide emissions basis and improve transparency regarding emissions reduction.

For the implementation of climate change measures, it is important to design the policies to generate the utmost impacts on environmental conservation. At the same time these measures should address socio-economic challenges taking into consideration the linkage between these challenges.

Japan possesses internationally competitive technologies such as hydrogen and storage battery. Making most of our technologies, Japan will work toward drastic reduction of domestic GHG emission and also keep contributing to the worldwide GHG emission reduction to the maximum extent, and play a leadership role to address both economic growth and climate change. Japan will formulate and communicate a long-term low GHG emission development strategy well ahead of 2020 deadline.

1. Significant domestic emission reduction through innovation

Promotion of energy efficiency and large-scale introduction of renewable energy

Japan promotes domestic actions thorough energy efficiency and makes efforts to introduce renewable energy to the maximum extent. These are considered as the main pillars of measures against global warming, and will also contribute to energy security by increasing the rate of energy self-sufficiency leading to a decrease in primary energy imports, improving the balance of payments and strengthening industrial competitiveness.

Japan will promote the following initiatives:

Promotion of energy efficiency

Enhancing energy efficiency by sector

Japan will keep striving to achieve targets using regulatory measures based on the Act on Rational Use of Energy, with subsidies and tax support measures.

For further improvement of energy efficiency, in the industrial, commercial and transportation sectors, the Japanese government is submitting to the Diet a bill to revise the Act on Rational Use of Energy. The amendment includes the certification of energy-efficiency efforts by multiple business operators so that the Japanese government evaluates the activities appropriately and fairly under the Act. In response to the increasing trend of e-commerce, the definition of consigners in the existing law will be revised so that it certainly includes e-commerce retail business operators as legal subjects to promote their energy efficiency actions.

Promotion of next-generation automobiles and improvement of fuel efficiency

Japan will promote the spread of next-generation automobiles (HV, EV, Plug-in Hybrid Vehicle (PHV), Fuel Cell Vehicle (FCV), Clean Diesel Vehicle (CDV), Compressed Natural Gas Vehicle (CNGV) Etc.) so that next generation cars can make up 50% to 70% of new car sales by 2030.

Energy efficiency and CO2 reduction of residential houses and buildings

Japan will accelerate the deployment of the net Zero Energy House (ZEH) and the net Zero Energy Building (ZEB) with annual energy consumption by combining drastic energy efficiency and renewable energy. The Japanese government promotes a wide range of measures including cost reduction and

improvement of public awareness in order to achieve the target of net energy zero consumption from newly constructed housing and building on average, respectively by FY2030.

Low /decarbonized energy generation by renewable energy

In order to ensure the effectiveness of actions towards achieving the goals under the voluntary framework advanced by electric power generation industry and the electricity liberalization, Japan will implement the policy measure articulated under the Act on Rational Use of Energy and the Sophisticated Methods of Energy Supply Structure Law.

Japan will introduce and expand renewable energy resources, carefully considering the burden on citizens, and will properly address issues such as stable energy supply, cost and environment. Japan supports start-ups by local companies that supply locally generated energy through renewable resources (electricity and heating) and services based on the values of saving and storing energies. This will promote energy security and decarbonized local community through a new model, which is the combination of creating awareness among local people to develop and utilize renewable energies and, thereby using it to benefit their own community.

The government will strongly support cost-effective renewables projects that do not rely on the FIT system. For example, for the introduction of renewables such as geothermal power generation facilities, Japan will subsidize facilities to monitor the spilling state, calories, and components, and also to support feasibility studies on existing hot springs for multi-stage use, as well as projects that introduce facilities to utilize hot spring heat by private enterprises.

Research and development (R&D) of innovative technologies based on the national strategy

Since Japan is aware that continuing the conventional and existing actions are not enough to make substantial and further reductions of GHG emissions in line with the Paris Agreement, Japan will promote research and development of innovative technologies based on the "National Energy and Environment Strategy for Technological Innovation towards 2050" formulated in 2016. In addition to the core technologies that form the integrated technologies and systems of energy systems, R&D will target the areas of energy conservation, energy storage, energy creation, CO2 fixation and effective utilization. The total amount of CO2 reduction in the target fields selected in this strategy is estimated more than 5 billion tons. Therefore, if these technological developments succeed and are applied, together with the application of advanced technologies that have already developed and demonstrated in the selected technical field, the global reduction of GHG emissions will be about the same level or more (on a scale of several billion tons to 10 billion tons) by around 2050.

Cases of R&D of innovative technologies are as follows:

Hydrogen

Hydrogen has the potential to diversify Japan's primary energy supply structure and achieve drastic CO₂ reduction. Japan decided on the Basic Hydrogen Strategy in December 2017 to achieve the world's first hydrogen-based society. It includes the existing roadmap for introduction and diffusion of individual technologies. Moreover, it presents hydrogen as a new carbon-free energy option like renewable energy. Based on the strategy, Japan will strive to realize the supply costs of hydrogen (20 yen/Nm³) which is the same level of as that of gasoline and LNG, and advance the initiatives on both supply and utilization side.

On the supply side, Japan will advance a project to develop an international hydrogen supply chains, connecting the manufacturing of hydrogen from Australian brown coal, etc. and transporting it to Japan to utilize cheaper raw materials available. In addition, as the leading case of hydrogen production in the local area, the world's largest CO₂-free hydrogen production project is in progress at Namie, Fukushima Prefecture in Japan. We will also utilize hydrogen produced in Fukushima during the Tokyo Olympic and Paralympic Games in 2020.

Japan will accelerate the use of hydrogen mainly in the transportation and power generation sectors. Towards the expansion of the deployment of the FCV, it will integrate activities for technological development, regulatory reform and strategic development of hydrogen stations. It will also enhance further actions to commercialize hydrogen power generation, with the world's first demonstration in Kobe City.

Japan aims to further develop energy carriers that enable efficient transport and storage of hydrogen, and promote research and development of next generation fuel cells composed entirely of electrolytes, electrodes, etc., and support basic technologies. Japan will also develop technologies that economically produce energy carriers using renewable energy without releasing CO₂, and technologies that extract energy by directly burning it (hydrogen dedicated power generation technology, etc.).

Storage battery

A next generation storage battery is being developed that achieves an energy density more than seven times the current cost of 1/10 or less, and enables a travel distance of 700 km or more on one charge, at low cost, and with high safety, which exceeds the limits of existing mainstream lithium ion batteries currently in use.

CO₂ capture, utilization, storage technology (CCUS)

In FY2018, Japan has allocated 15.1 billion yen in CCS's empirical development and geographical survey to commercialize CCS, which is a large-scale CO₂ reduction technology, at lower cost.

Japan is actively involved in the intergovernmental forum that aims for international expansion of CCS

such as CSLF. In order to promote international standardization of CCS technology, Japan leads the discussion in collection and storage of CCS.

Japan also actively promotes bilateral cooperation in this area, including a Memorandum of Cooperation (MoC) with the United States. Also Japan supports the formulation of projects, including joint Feasible Study of CCUS project formation with countries in North America, Latin America, the Middle East and Southeast Asia. Especially with the United States, as one of the pillars of bilateral Energy cooperation, Japan and United States decided to cooperate with CCUS project last year. Indonesia is supporting their first CCS demonstration under the JICA technical cooperation. Saudi Arabia uses CCUS technology to manufacture CO₂-free hydrogen and ammonia from crude oil and formulates a master plan to create a global supply chain.

Power Electronics Technology

Gallium nitride used for blue light emitting diodes (LEDs) etc., for which Professor Hiroshi Amano and others won the Nobel Prize in Physics in 2014, has excellent durability against voltage. It can be thinner than silicon that is a similar type of material. For this reason, energy loss is reduced by about one tenth, so an energy saving effect is expected. To further disseminate energy saving technologies, Japan will conduct R & D and empirical projects for practical application to power conditioners for solar cells using this type of power electronics technology, microwave ovens, etc.

Cellulose nanofibers

Cellulose nanofibers are a carbon-neutral material with 5 times the strength, but one fifth the weight of iron. It will be utilized in automobiles parts, home appliances, residential building materials, etc. This will assist in verifying how much reduction of CO₂ emissions can be achieved by reducing the weight of car bodies and improving heat insulation.

Creation of energy

To improve energy conversion efficiency and lower the cost, Japan will develop next generation solar cells that are completely different from current solar cells, utilizing new structures and new materials (quantum dots · perovskites etc.).

Accelerating efforts by broad range of Non-State actors

Science Based Target (SBT)

Global major companies are taking the lead on climate change action, not only seeing it as a risk but also as a new business opportunity. The Science Based Targets (SBT) initiative, in which businesses set their own mid- to long-term reduction targets, has attracted attention worldwide and Japanese companies such as Sony and Toyota are also joining the initiative. In FY2017 Japan provided support to 63

companies which aim to have their targets verified by the SBT. Specifically, for companies without the SBT validation, the Japanese government offered guidance on the SBT criteria as well as development methodology of the targets, examined the consistency of the reduction targets developed by each company with the SBT standards, and estimated emissions in supply chains, thus encouraging businesses to take part in the movement. In March 2018, Japan organized a joint workshop event inviting all the companies that received support. At the workshop, each company had an opportunity to share their motivations to set a SBT and discuss any challenges and solutions. Currently, 14 Japanese companies hold approved SBTs, and Japan aims to increase this number to 100 by the end of FY2020.

➤ **Number of Companies supported: 63**

➤ **Number of Companies with approved SBTs by the end of FY2020 (target): 100**

Innovation for Cool Earth Forum (ICEF)

To achieve climate goals, Japan has hosted an international conference called the “Innovation for Cool Earth Forum (ICEF)” annually in October since 2014. The ICEF brings together global leaders and experts from business, academia and the public sectors to promote discussions and cooperation on innovation, and help disseminate innovations in those fields. Through this conference, we will deepen international understanding that it is important for the whole world to work on addressing climate change through innovation and promote collaboration. (The 5th Annual Meeting will be held on October 10 and 11, 2018)

Promote efforts in industry

In order to achieve reduction targets in the Plan for Global Warming Countermeasures, the industry sector will continue to make efforts and take voluntary actions in this area.

The industrial sector is expected to contribute to worldwide GHG emissions reduction by supplying low-carbon products and services onto the global market and visualizing its contributions.

It is expected that half of the capacity of renewables will be installed in China, India, Brazil, Indonesia and Russia by 2030, which shows that the green market is expanding even in developing countries. Japan will accelerate greening of the market and economic growth especially in Asia through technologies and services from the industry sector.

2. Promotion of international cooperation with continuous Co-innovation

For immediate international cooperation, following the ACE 2.0, Japan will continuously support developing countries by annually providing 1.3 trillion yen through public and private finance. Based on

the concept of *Co-innovation*, Japan will steadily implement concrete support including "Japan's Assistance Initiative to Address Climate Change 2017"⁸ announced in October 2017.

In order to realize *Co-innovation*, actions by Non-State actors in Japan and partner countries are essential. The Japanese government promotes collaboration with various actors and will aim at major efforts that are radically different from current actions, thereby achieving drastic emissions reduction.

Japan is working on four themes to deliver *Co-innovation*. (Figure 2)

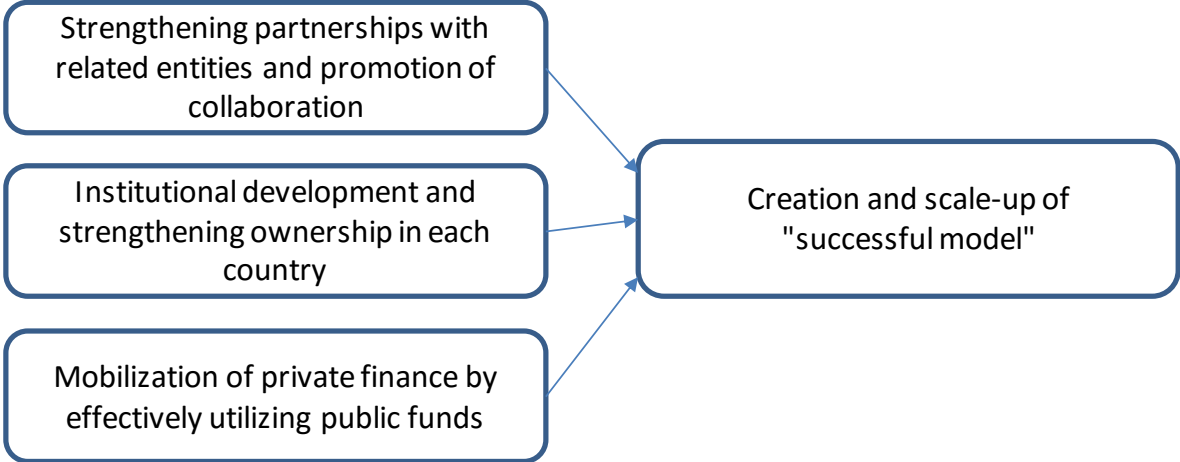


Figure 2 : Four themes to realize Co-innovation

Japan will identify the challenges and needs of each partner country by strengthening partnerships with diverse entities and having a continuous dialogue with the national and local governments, industrial organizations, companies, experts, NGOs, research organizations, and others in the partner country. In addition, the visualization of possible measures and needs of other countries will help establish a foundation for creating decarbonized markets as it improves transparency regarding the status of GHG emissions and reduction efforts. At the same time, we will provide support for developing plans on mitigation and the development of new domestic structure and systems. Japan will promote awareness to include the aspects of climate change in public funds, which are effectively used to promote private sector investment, and an enabling environment will be created for *Co-innovation* by accumulating these successful models and scaling them up.

Further developing and expanding of the "successful model", Japan will also utilize public finance from JICA and JBIC, as well as climate-related financial assistance schemes such as GCF and ADB. Our priorities are as follows:

- (i) Scaling up from pilot projects to larger projects

⁸ <https://www.env.go.jp/press/files/en/738.pdf>

- (ii) Horizontal expansion of effective projects
- (iii) Built-in low carbon/ decarbonization technology for large-scale infrastructure projects.

Successful models for Co-innovation

Transportation sector

Japanese companies succeeded in developing a traffic monitoring system utilizing AI image recognition technology through joint demonstration experiments with research institutions in developing countries. This system makes it possible to capture the traffic situation over a wider area, optimally control traffic light conditions according to traffic conditions, reduce traffic congestion and facilitate traffic, thus leading to a reduction in CO2 emissions. This system will be introduced in Japan, China and some European countries.

Energy sector

Companies in Japan and Vietnam used the JCM facility subsidiary business to reduce the initial cost, and introduced the Alfa MOS High Efficiency Transformer. This case has successfully demonstrated the positive effect of reducing GHG emissions. This technology has been deployed in other regions in Vietnam as well as in other countries. Furthermore, the Vietnamese electric distribution company will develop procurement standards etc. for introducing this technology.

On a remote island in Indonesia, Japan is carrying out a project to establish a method of operation & maintenance (O & M) for a micro grid. The cost was successfully reduced by modifying the storage battery with EMS to ensure that recharge generation, storage technology and long-cycle technology were adjusted to fit the local environment and specifications in cooperation with the local government agencies. This will greatly reduce CO2 emissions by reducing diesel power generation.

Contribution to scientific knowledge

In addition, Japan will contribute to the enhancement of scientific knowledge through financial support to the IPCC Trust Fund and the Task Force on National Greenhouse Gas Inventories (TFI). Scientific knowledge is considered to be indispensable for the formulation and evaluation of long-term goals and the implementation of climate change measures. Japan also supports the development of methodologies to better capture the emissions by each country. Providing calculation formulas and various coefficients necessary for calculation will help make the calculation consistent, and allow comparability of emissions numbers.

- Contribution to the IPCC so far: 4.3 million US dollars⁹ (3.5% of total)
- Accumulation of the contribution to the TFI: 33 million US dollars

⁹ Exchange rate: 1 Swiss franc = 1 US dollars