

Submission of Japan's Intended Nationally Determined Contribution (INDC)

Japan is pleased to communicate its intended nationally determined contribution, as well as information to facilitate the clarity, transparency, and understanding of the contribution.

Climate change is a global challenge. To solve the problem, it is essential to establish a fair and effective new international framework which is applicable to all major Parties. Japan will contribute, in cooperation with other Parties, to the establishment of such an international framework at the twenty-first session of the Conference of the Parties (COP) to the United Nations Framework Convention on Climate Change (UNFCCC).

Thereunder, Japan will, together with all major emitters, undertake domestic emission reductions and also contribute to reducing global greenhouse gas (GHG) emissions through Japan's leading technologies and support for developing countries.

Having faced a drastic change in its circumstances with regard to energy due to the Great East Japan Earthquake and the accident at the Tokyo Electric Power Company's Fukushima Dai-ichi Nuclear Power Station, Japan decided the new Strategic Energy Plan last year as a starting point for reviewing and rebuilding our energy strategy from scratch.

Japan's INDC towards post-2020 GHG emission reductions is at the level of a reduction of 26.0% by fiscal year (FY) 2030 compared to FY 2013 (25.4% reduction compared to FY 2005) (approximately 1.042 billion t-CO₂ eq. as 2030 emissions), ensuring consistency with its energy mix¹, set as a feasible reduction target by bottom-up calculation with concrete policies, measures and individual technologies taking into adequate consideration, *inter alia*, technological and cost constraints, and set based on the amount of domestic emission reductions and removals assumed to be obtained.

¹ The term "energy mix" in this INDC refers to the "Long-term Energy Supply and Demand Outlook" for FY 2030, decided by the Ministry of Economy, Trade and Industry on July 16, 2015.

Fairness and Ambition

- Japan's GHG emissions per gross domestic product (GDP) are 0.29 kg-CO₂eq./U.S. dollar in 2013 and per capita are 11t-CO₂eq./person in 2013, while the energy efficiency of the country as a whole (primary energy supply/GDP) is 95 t of oil equivalent/U.S. million dollars in 2013, all of which are already at the leading level among developed countries.
- While it is generally analyzed that the marginal cost of reducing GHG emissions is high in Japan due, *inter alia*, to the measures taken so far, the indicators noted above are projected to improve by around 20 to 40% by 2030 with further measures to reduce emissions.
- Japan's INDC is highly transparent and concrete, as it has been drawn up by accumulating concrete policies and measures for major sectors with clear breakdowns. Each Party's submission and sharing of information on each sector in this manner would contribute to improving transparency, ensuring fairness, and also enabling effective reviews. This would promote sector-by-sector actions, which would lead to fair and efficient reductions of global emissions.
- For example, with regard to Japan's industrial sectors, both steel (converter steel production) and cement (clinker production) have attained the world's highest level of energy efficiency, but further improvement is planned through specific policies and measures listed in the attached documents, such as promotion and enhancement of the industries' action plans towards a low carbon society.

Contribution towards achieving the objective of the Convention as set out in its Article 2

- Towards achieving the ultimate objective of the UNFCCC, in order to hold the increase in global temperatures below 2 degrees Celsius, it is indispensable to take measures for long-term emission reductions globally. Japan's INDC is consistent with the long-term emission pathways up to 2050 to achieve the 2 degrees Celsius goal as presented in the Fifth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC), and with the goal the country upholds, namely, "the goal of achieving at least a 50% reduction of global GHG emissions by 2050, and as a part of this, the goal of developed countries reducing GHG emissions in aggregate by 80% or more by 2050". Japan will contribute proactively to these long-term reductions, through its GHG emission reduction measures presented in its INDC, and through actions that will be continuously taken into the future such as development and diffusion of low-carbon technologies and transition to a low-carbon socio-economic structure.

Japan's Intended Nationally Determined Contribution (INDC)

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Information to facilitate clarity, transparency and understanding

Base years:

- FY 2013 and FY 2005; FY 2013 is the base year mainly used for presenting Japan's INDC.

Target year: Japan's FY 2030

Period for implementation : from April 1, 2021 to March 31, 2031 (FY 2021 to FY 2030)

Scope (Sectors, Gases, Coverage)

- Sectors: All sectors and categories encompassing the following:
 - (a) Energy
 - Fuel Combustion (Energy industries, Manufacturing industries and Construction, Transport, Commercial/Institutional, Residential, Agriculture/Forestry/Fishing, and Other)
 - Fugitive emissions from fuels
 - CO₂ transport and storage
 - (b) Industrial processes and product use
 - (c) Agriculture
 - (d) Land Use, Land-Use Change and Forestry (LULUCF)
 - (e) Waste
- Gases: CO₂, CH₄, N₂O, HFCs, PFCs, SF₆ and NF₃
- Coverage: 100%

Planning process

- Japan's INDC has been developed, taking into account, *inter alia*, decisions of the COP, actions by other countries, progress in deliberations on a future framework under the Convention, and domestic consideration of the energy policies and its energy mix.
- The INDC was considered through discussions open to the public at the Joint Experts' Meeting of the Central Environment Council (Subcommittee on Global Warming Measurement after 2020, Global Environment Committee) and the Industrial Structure Council (INDC WG, Global Environment Subcommittee, Committee on Industrial Science and Technology Policy and Environment).
- Energy policies and the energy mix were considered through open discussions at the Advisory Committee for Natural Resources and Energy.
- The main policies and measures that are expected, at this time, to be implemented for reduction of GHG emissions and removals are listed in the reference information attached.
- Based on the discussions above, the Global Warming Prevention Headquarters (ministerial decision-making for global warming countermeasures) developed a draft INDC. After going through public comment procedure, it made a final decision on the INDC.
- Japan is to develop the Plan for Global Warming Countermeasures based on the Act on Promotion of Global Warming Countermeasures.

Assumptions and methodologies

- Methodologies are in line with the Guidelines for National Greenhouse Gas Inventories prepared by the IPCC, and adopted by the COP.
- The metrics used for the total GHG emissions and removals is the Global Warming Potentials of a 100-year time horizon which were presented in the IPCC Fourth Assessment Report.
- Removals by LULUCF sector are accounted in line with approaches equivalent to those under the Kyoto Protocol.
- The Joint Crediting Mechanism (JCM) is not included as a basis of the bottom-up calculation of Japan's emission reduction target, but the amount of emission reductions and removals acquired by Japan under the JCM will be appropriately counted as Japan's reduction.
- These methodologies are subject to change depending on the progress of future international negotiations on estimating and accounting rules.

Reference information

1. GHG emissions and removals

1. GHG emissions reductions

(1) Energy-Originated CO₂

Approximately 90% of GHG emissions in Japan is covered by energy-originated CO₂. Emissions of energy-originated CO₂ will be reduced by 25.0% compared to FY 2013 level (24.0% reduction compared to FY 2005 level) (approximately 927 million t-CO₂). The estimated emissions in FY 2030 in each sector are shown in Table 1.

Table 1 Estimated emissions of energy-originated CO₂ in each sector

| | Estimated emissions of each sector in FY 2030 | FY 2013 (FY 2005) |
|-----------------------------------|---|-------------------|
| Energy originated CO ₂ | 927 | 1,235 (1,219) |
| Industry | 401 | 429 (457) |
| Commercial and other | 168 | 279 (239) |
| Residential | 122 | 201 (180) |
| Transport | 163 | 225 (240) |
| Energy conversion | 73 | 101 (104) |

[Value : million t-CO₂]

(2) Non-energy originated CO₂

The target is set as 6.7% reduction compared to FY 2013 level (17.0% reduction compared to FY 2005 level) (approximately 70.8 million t-CO₂).

(3) Methane

The target is set as 12.3% reduction compared to FY 2013 level (18.8% reduction compared to FY 2005 level) (approximately 31.6 million t-CO₂eq.).

(4) Nitrous oxide

The target is set as 6.1% reduction compared to FY 2013 level (17.4% reduction compared to FY 2005 level) (approximately 21.1 million t-CO₂eq.).

Table 2 Estimated emissions of non-energy-originated CO₂, methane and nitrous oxide

| | Estimated emissions of each gas in FY 2030 | FY 2013 (FY 2005) |
|--|--|-------------------|
| Non-energy originated CO ₂ | 70.8 | 75.9 (85.4) |
| Methane (CH ₄) | 31.6 | 36.0 (39.0) |
| Nitrous oxide (N ₂ O) | 21.1 | 22.5 (25.5) |

[value : Million t-CO₂eq.]

(5) Fluorinated gases (HFCs, PFCs, SF₆ and NF₃)

The target is set as 25.1% reduction compared to Calendar Year(CY) 2013 level (4.5% increase compared to CY 2005 level) (approximately 28.9 million t-CO₂eq.).

Table 3 Estimated emissions of fluorinated gases

| | Estimated emissions in CY 2030 | CY 2013 (CY 2005) |
|----------------------|-----------------------------------|-------------------|
| Fluorinated gases | 28.9 | 38.6 (27.7) |
| HFCs | 21.6 | 31.8 (12.7) |
| PFCs | 4.2 | 3.3 (8.6) |
| SF ₆ | 2.7 | 2.2 (5.1) |
| NF ₃ | 0.5 | 1.4 (1.2) |

[value : Million t-CO₂eq.]

* Fluorinated gases are estimated on a CY basis.

2. Removals by LULUCF

The target for removals is set as approximately 37 million t-CO₂ (corresponding to 2.6% reduction of total emissions in FY 2013 (corresponding to 2.6% reduction of total emissions in FY 2005)) (approximately 27.8 million t-CO₂ by forest carbon sinks measures (corresponding to 2.0% of total emissions in FY 2013 (corresponding to 2.0% reduction of total emissions in FY 2005)), and approximately 9.1 million t-CO₂ by cropland management, grazing land management and revegetation (corresponding to 0.6% reduction of total emissions in FY 2013 (corresponding to 0.7% reduction of total emissions in FY 2005))).

3. JCM and other international contributions

Japan establishes and implements the JCM in order both to appropriately evaluate contributions from Japan to GHG emission reductions or removals in a quantitative manner achieved through the diffusion of low carbon technologies, products, systems, services, and infrastructure as well as implementation of mitigation actions in developing countries, and to use them to achieve Japan's emission reduction target. Apart from contributions achieved through private-sector based projects, accumulated emission reductions or removals by FY 2030 through governmental JCM programs to be undertaken within the government's annual budget are estimated to be ranging from 50 to 100 million t-CO₂. As part of international contributions other than the JCM, worldwide emission reduction potential in FY 2030 through the diffusion of leading technologies by Japanese industries' actions is estimated to be at least 1 billion t-CO₂.

Japan will also actively contribute internationally towards, *inter alia*, human resource development and promotion of development and diffusion of technologies relating to emission reductions in developing countries.

2. Energy mix used for the bottom-up calculation of the emission reduction target

| | |
|------------------------------|----------|
| | FY 2030 |
| ● Final energy consumption | 326 M kl |
| (Energy efficiency measures) | 50 M kl |

| | |
|--------------------------|--------------------------|
| ● Total power generation | approx. 1065 billion kWh |
| Renewables | approx. 22-24% |
| Nuclear power | approx. 22-20% |
| Coal | approx. 26% |
| LNG | approx. 27% |
| Oil | approx. 3% |
| (within renewables) | |
| Solar | approx. 7.0% |
| Wind power | approx. 1.7% |
| Geothermal | approx. 1.0-1.1% |
| Hydro power | approx. 8.8-9.2% |
| Biomass | approx. 3.7-4.6% |

3. Measures which form the basis for the bottom-up calculation of the GHG emission reduction target

| | FY 2030 emission targets (million t-CO ₂) | FY 2013 (FY 2005) (million t-CO ₂) | Measures |
|-----------------------------------|---|--|--|
| Energy-originated CO ₂ | 927 | 1,235 (1,219) | |
| Industry sector | 401 | 429 (457) | <ul style="list-style-type: none"> • Promotion and enhancement of the industries' action plans towards a low carbon society <u>Iron and steel industry</u> <ul style="list-style-type: none"> • Efficiency improvement of electricity-consuming facilities • More chemical recycling of waste plastic at steel plants • Introduction of next-generation coke making process (SCOPE21) • Improvement of power generation efficiency • Enhanced energy efficiency and conservation facilities • Introduction of innovative ironmaking process (Ferro Coke) • Introduction of environmentally harmonized steelmaking process (COURSE50) |

Chemical industry

- Introduction of energy efficiency and conservation process technology in petrochemicals
- Introduction of energy efficiency and conservation process technology in other chemical industry
- Introduction of energy efficiency and conservation technology using membranes for distilling process
- Introduction of technology which uses CO₂ as a feedstock
- Introduction of chemical product production technology with inedible plant-based material
- Introduction of electricity-generating waste water processing with microbe catalysis
- Introduction of sealed plant factory

Ceramics, stone and clay products industry

- Introduction of conventional energy efficiency and conservation technologies (waste heat power generation, slag crusher, air-beam cooler, separator improvement, vertical roller coal mills)
- Introduction of technology for using waste (e.g. waste plastic, etc.) as alternative thermal energy
- Introduction of innovative cement production process
- Introduction of glass melting process

Pulp/paper/paper products manufacture industry

| | | | |
|--|--|--|--|
| | | | <ul style="list-style-type: none"> • Introduction of high-efficient pulp production technology using old paper • Introduction of high-temperature and pressure recovery boilers <p><u>Cross-sectoral/Other</u></p> <ul style="list-style-type: none"> • Introduction of high-efficient air conditioner • Introduction of industrial HP (heating-drying) • Introduction of industrial light • Introduction of low-carbon industrial furnace • Introduction of industrial motor • Introduction of high performance boiler • Direct use of recycled plastic flakes • Introduction of hybrid construction machine, etc. • Introduction of energy efficiency and conservation farming machinery • Introduction of energy efficiency and conservation equipment in horticultural facility • Switch to energy efficiency and conservation fishing vessels • Promotion of cooperative energy efficiency and conservation measures across the industries • Promote low-carbonization in special vehicles <p><u>Factory energy management</u></p> <ul style="list-style-type: none"> • Thorough implementation of energy management in the industry sector |
|--|--|--|--|

| | | | |
|-------------------------------------|------------|------------------|--|
| <p>Commercial and other sectors</p> | <p>168</p> | <p>279 (239)</p> | <ul style="list-style-type: none"> • Promotion of compliance of energy saving standards for newly constructed buildings • Energy efficiency and conservation buildings (remodeling) • Introduction of commercial-use water heater (latent heat collection water heater, commercial-use heat pump water heater, high-efficient boiler) • Introduction of highly efficient light • Introduction of refrigerant control technology (F-gases) • Improvement of energy efficiency and conservation performance of equipment by the top runner program, etc. • Thorough implementation of energy management in commercial sector with BEMS and energy efficiency diagnosis • Efficient use of light • Promotion of nationwide campaigns (thorough promotion of Cool Biz/Warm Biz, repair of local government buildings) • Expansion of shared use of energy • Promotion of measures for energy efficiency and conservation of/energy generation from sewerage systems |
|-------------------------------------|------------|------------------|--|

| | | | |
|--------------------|-----|-----------|---|
| | | | <ul style="list-style-type: none"> • Promotion of measures for energy efficiency and conservation/renewable energy in water business • Promotion of activities based on action plans of local governments (administrative business section) • Promotion of sorted collection and recycling of plastic containers and packaging • Low-carbonization of cities by improving urban thermal environments through measures against the urban heat island effect • Promotion of inter-ministry collaborative measures following the Roadmap of Global Warming Counter-measures, etc. |
| Residential sector | 122 | 201 (180) | <ul style="list-style-type: none"> • Promotion of compliance of energy saving standards for newly constructed housing • Promotion thermal insulation in renovation of existing houses • Introduction of high-efficient water heater (CO₂ refrigerant HP water heater, latent heat collection water heater, fuel cell, solar water heater) • Introduction of high-efficient light • Improvement of energy efficiency and conservation performance of equipment by the top runner program, etc. |

| | | | |
|--------------------------------|------------|------------------|--|
| | | | <ul style="list-style-type: none"> • Thorough implementation of energy management in houses with HEMS and other smart meters • Promotion of nationwide campaigns (thorough promotion of Cool Biz/Warm Biz, and encouragement of purchase of upgraded, Home CO₂ advisor) • Increasing Johkasou energy efficiency and conservation • Promotion of inter-ministry collaborative measures following the Roadmap of Global Warming Counter-measures, etc. |
| <p>Transport sector</p> | <p>163</p> | <p>225 (240)</p> | <ul style="list-style-type: none"> • Improvement of fuel efficiency • Promotion of next-generation automobiles • Other measures in transport sector (traffic flow improvement, promotion of public transport, modal shift to railway, comprehensive measure for eco-friendly ship transportation, reduction of land transportation distance by selecting nearest port, comprehensive low-carbonization at ports, optimization of truck transport, energy consumption efficiency improvement of railways, energy consumption efficiency improvement of aviation, accelerated promotion of energy saving ships, making vehicle transport business more eco-friendly by eco-driving, promotion of collective |

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|--|-----------|------------------|--|
| | | | <p>shipment, promotion of Intelligent Transport Systems ITS (centralized control of traffic signals), development of traffic safety facilities (improvement of traffic signals, and promotion of the use of LED traffic lights), promotion of automatic driving, eco-driving and car sharing)</p> <ul style="list-style-type: none"> • Utilization of the special zones system for structural reform for global warming measures • Promotion of inter-ministry collaborative measures following roadmap of global warming measures, etc. |
| <p>Energy conversion sector</p> | <p>73</p> | <p>101 (104)</p> | <ul style="list-style-type: none"> • Expanding renewable energy introduction to the maximum extent possible • Utilizing nuclear power generations whose safety is confirmed • Pursuit of high efficiency in thermal power generation (USC, A-USC, IGCC, etc.) |
| <p>Cross-sectional strategies</p> | <p>—</p> | <p>— (—)</p> | <ul style="list-style-type: none"> • Promotion of the J-Credit Scheme |

| | FY 2030 emission targets (million t-CO ₂ eq.) | FY 2013 (FY 2005) (million t-CO ₂ eq.) | Measures |
|---|--|--|--|
| Non energy-originated CO ₂ | 70.8 | 75.9 (85.4) | <ul style="list-style-type: none"> • Expansion of blended cement use • Reduction of municipal solid waste incineration |
| CH ₄ | 31.6 | 36.0 (39.0) | <ul style="list-style-type: none"> • Measures to reduce CH₄ emissions from agricultural soils (reduction of CH₄ emissions from paddy rice fields) • Reduction of municipal solid waste disposed of by direct landfill • Introduction of semi-aerobic landfill system for final disposal site of municipal solid waste |
| N ₂ O | 21.1 | 22.5 (25.5) | <ul style="list-style-type: none"> • Measures to reduce N₂O emissions from agricultural soils (reduction of N₂O emissions originated from fertilizer application) • Promote the advanced technologies in the sewage sludge incineration facilities |
| Fluorinated gases | 28.9 | 38.6 (27.7) | <ul style="list-style-type: none"> • Measures to control overall emissions of fluorinated gases (Act on Rational Use and Proper Management of Fluorocarbons, emission control through industries' voluntary action plans, etc.) |
| HFCs | 21.6 | 31.8 (12.7) | |
| PFCs | 4.2 | 3.3 (8.6) | |
| SF ₆ | 2.7 | 2.2 (5.1) | |

| | | | |
|--|-----------------|-----|-----------|
| | NF ₃ | 0.5 | 1.4 (1.2) |
|--|-----------------|-----|-----------|

| | FY 2030 removals targets (million t-CO ₂) | FY 2013 (FY 2005) (million t-CO ₂) | Measures |
|--|---|--|---|
| LULUCF sector | 37.0 | — (—) | <ul style="list-style-type: none"> • Promote measures for greenhouse gas removals through the promotion of forest management/forestry industry measures • Promotion of soil management leading to the increase of carbon stock in cropland • Promotion of revegetation |
| Forest management | 27.8 | — (—) | |
| Cropland management /Grazing land management | 7.9 | — (—) | |
| Revegetation | 1.2 | — (—) | |