

# Japan's National Greenhouse Gas Emissions and Removals in Fiscal Year 2021 (Final Figures<sup>1</sup>) <Executive Summary>

## 1. Greenhouse Gas Emissions and Removals

Japan's greenhouse gas (GHG) emissions and removals in fiscal year <sup>2,3</sup> (FY) 2021:

1,122\* million tonnes of carbon dioxide equivalent (Mt CO<sub>2</sub> eq.<sup>4</sup>) (a 21.5 Mt CO<sub>2</sub> eq. increase compared to FY2020)

➤ Emissions decreased by 20.3% (285.3 Mt CO<sub>2</sub> eq.) compared to FY2013<sup>5</sup> emissions (1,408 Mt CO<sub>2</sub> eq.).

\*Emissions for FY2021: 1,170 Mt CO<sub>2</sub> eq. (a 2.0% (23.2 Mt CO<sub>2</sub> eq.) increase compared to FY2020)

Removals for FY2021: 47.6 Mt CO<sub>2</sub> eq. (a 3.6% (1.6 Mt CO<sub>2</sub> eq.) increase compared to FY2020)

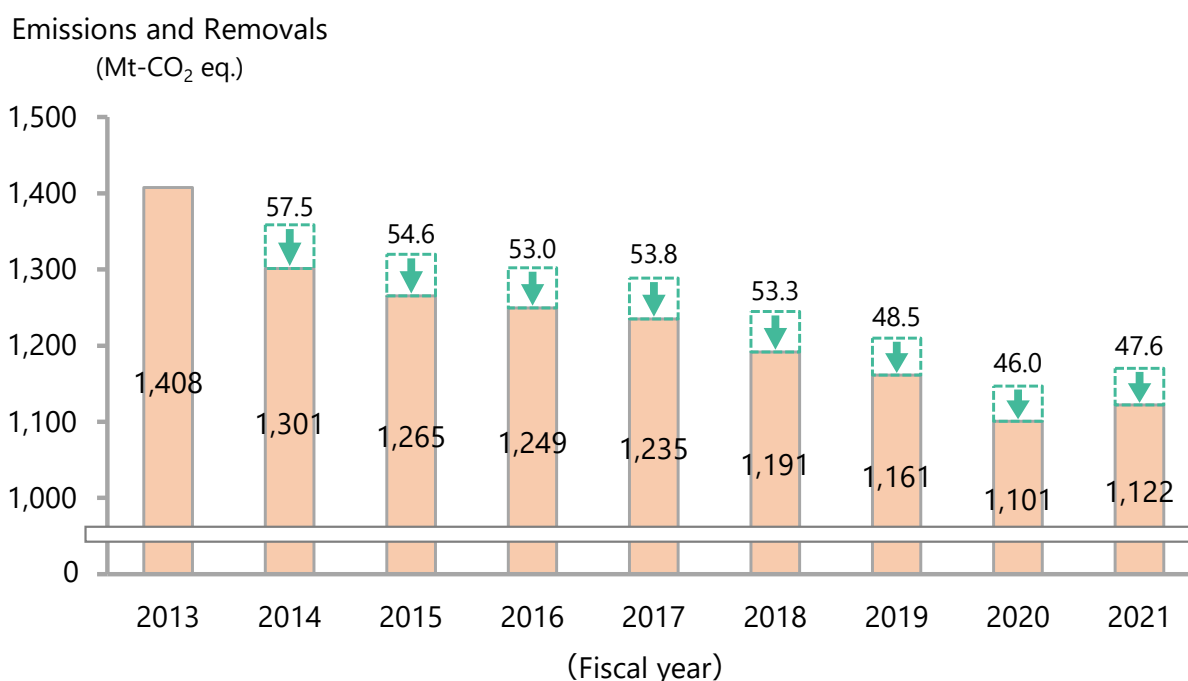


Figure 1 Trends in Japan's national GHG emissions and removals in FY2021 (final figures)

Footnote:

1. "Final figures" refers to the figures officially submitted to the Secretariat of the United Nations Framework Convention on Climate Change (UNFCCC) as Japan's GHG emissions and removals in the national GHG inventory. The final figures compiled this time may be recalculated when annual statistical data are updated, and/or estimation methods are revised. The announcements of the "preliminary figures" and the "final figures" have been combined from FY2021 GHG emissions and removals estimates onward.
2. Japan's fiscal year runs from April 1 to March 31.
3. The emissions of the four kinds of GHGs (hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), sulfur hexafluoride (SF<sub>6</sub>), and nitrogen trifluoride (NF<sub>3</sub>)) are estimated on a calendar year basis.
4. The emissions of each GHG are converted to CO<sub>2</sub> equivalent by multiplying the emissions of each gas by their respective global warming potential values (GWP values). Aggregate emissions are a summation of these. GWP values are the degree to which each GHG contributes to global warming, expressed as a ratio to the global warming effect of CO<sub>2</sub>. Based on the UNFCCC Reporting Guidelines on Annual GHG Inventories, GWP values for a 100-year time horizon provided in the Intergovernmental Panel on Climate Change (IPCC) Fourth Assessment Report (2007) are adopted.
5. In the updated Nationally Determined Contribution (NDC) submitted to the UNFCCC Secretariat in October 2021, Japan expressed that it "aims to reduce its greenhouse gas emissions by 46 percent in fiscal year 2030 from its fiscal year 2013 levels, setting an ambitious target which is aligned with the long-term goal of achieving net-zero by 2050. Furthermore, Japan will continue strenuous efforts in its challenge to meet the lofty goal of cutting its emission by 50 percent."

## 2. Greenhouse Gas Emissions<sup>6</sup>

Japan's GHG emissions in fiscal year (FY) 2021: 1,170 Mt CO<sub>2</sub> eq.

- Emissions increased by 2.0% (23.2 Mt CO<sub>2</sub> eq.) compared to FY2020 emissions (1,147 Mt CO<sub>2</sub> eq.).
- Emissions decreased by 16.9% (237.7 Mt CO<sub>2</sub> eq.) compared to FY2013 emissions (1,408 Mt CO<sub>2</sub> eq.).

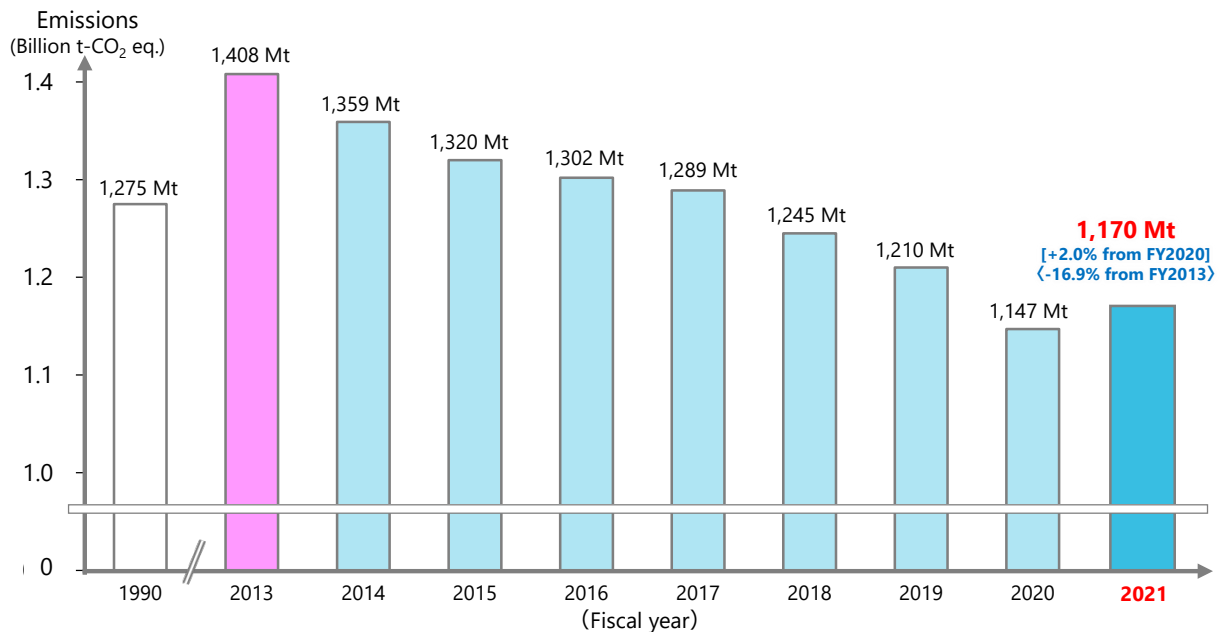


Figure 2 Japan's national GHG emissions in FY2021 (final figures)

**Note:**

- The main factor for the increase in emissions as compared to FY2020: the increased energy consumption due to the economic recovery from the COVID-19 pandemic.
- The two main factors for the decrease in emissions as compared to FY2013: the reduced energy consumption (due to improved energy conservation, etc.) and the decrease in CO<sub>2</sub> emissions from electricity production due to the wider use of low-carbon electricity (wider adoption of renewable energy, resumption of nuclear power plant operations).
- The emissions of hydrofluorocarbons that substitute ozone-depleting substances as refrigerants are increasing every year.

**Footnote:**

6. GHG emissions for each fiscal year and rates of change from preceding years do not include removals by measures for forest and other carbon sinks.

Table 1 Japan's national GHG emissions by gas in FY2021  
(compared to FY2013 and FY2020)

	FY1990 emissions [Share]	FY2013 emissions [Share]	FY2020 emissions [Share]	Emissions [Share]	FY2021	
					Amount of change 《Rate of change》	
					Compared to FY2013	Compared to FY2020
<b>Total</b>	1,275 [100%]	1,408 [100%]	1,147 [100%]	1,170 [100%]	-237.7 《-16.9%》	23.2 《+2.0%》
<b>Carbon dioxide (CO<sub>2</sub>)</b>	1,163 [91.2%]	1,317 [93.6%]	1,042 [90.8%]	1,064 [90.9%]	-253.5 《-19.2%》	22.3 《+2.1%》
Energy-related CO <sub>2</sub>	1,068 [83.7%]	1,235 [87.8%]	967 [84.4%]	988 [84.5%]	-247.2 《-20.0%》	20.8 《+2.1%》
Non-energy-related CO <sub>2</sub>	95.1 [7.5%]	82.1 [5.8%]	74.2 [6.5%]	75.8 [6.5%]	-6.3 《-7.7%》	1.6 《+2.1%》
<b>Methane (CH<sub>4</sub>)</b>	44.5 [3.5%]	29.1 [2.1%]	27.4 [2.4%]	27.4 [2.3%]	-1.8 《-6.1%》	-0.02 《-0.1%》
<b>Nitrous oxide (N<sub>2</sub>O)</b>	32.2 [2.5%]	21.9 [1.6%]	19.7 [1.7%]	19.5 [1.7%]	-2.4 《-11.1%》	-0.22 《-1.1%》
<b>Four gases incl. alternative CFC</b>	35.4 [2.8%]	39.1 [2.8%]	58.1 [5.1%]	59.1 [5.1%]	20.0 《+51.2%》	1.1 《+1.8%》
Hydrofluorocarbons (HFCs)	15.9 [1.3%]	32.1 [2.3%]	52.2 [4.6%]	53.6 [4.6%]	21.4 《+66.7%》	1.4 《+2.6%》
Perfluorocarbons (PFCs)	6.6 [0.5%]	3.3 [0.2%]	3.5 [0.3%]	3.2 [0.3%]	-0.14 《-4.1%》	-0.35 《-9.9%》
Sulfur hexafluoride (SF <sub>6</sub> )	12.9 [1.0%]	2.1 [0.1%]	2.0 [0.2%]	2.0 [0.2%]	-0.03 《-1.3%》	0.02 《+0.9%》
Nitrogen trifluoride (NF <sub>3</sub> )	0.0 [0.0%]	1.6 [0.1%]	0.3 [0.0%]	0.4 [0.0%]	-1.2 《-76.5%》	0.04 《+12.8%》

Note: "0.0" are values less than 0.05.

(Unit: Mt-CO<sub>2</sub> eq.)

Table 2 Energy-related CO<sub>2</sub> emissions from each sector  
(after allocation of power and heat)

	FY1990 emissions [Share]	FY2013 emissions [Share]	FY2020 emissions [Share]	Emissions [Share]	FY2021	
					Amount of change 《Rate of change》	
					Compared to FY2013	Compared to FY2020
<b>Total</b>	1,068 [100%]	1,235 [100%]	967 [100%]	988 [100%]	-247.2 《-20.0%》	+20.8 《+2.1%》
<b>Industry (factories, etc.)</b>	503 [47.2%]	464 [37.5%]	354 [36.6%]	373 [37.8%]	-90.2 《-19.5%》	+19.1 《+5.4%》
<b>Transport (cars, etc.)</b>	208 [19.5%]	224 [18.2%]	183 [19.0%]	185 [18.7%]	-39.5 《-17.6%》	+1.4 《+0.8%》
<b>Commercial and other (commerce, service, office, etc.)</b>	131 [12.3%]	237 [19.2%]	184 [19.0%]	190 [19.3%]	-47.0 《-19.8%》	+6.0 《+3.3%》
<b>Residential</b>	129 [12.1%]	208 [16.8%]	167 [17.2%]	156 [15.8%]	-51.5 《-24.8%》	-10.5 《-6.3%》
<b>Energy transformation</b>	96.2 [9.0%]	103 [8.3%]	78.8 [8.2%]	83.7 [8.5%]	-	-
Power plants, oil refineries, etc.	96.2 [9.0%]	106 [8.6%]	82.0 [8.5%]	89.5 [9.1%]	-16.7 《-15.7%》	+7.4 《+9.1%》
Statistical discrepancy from power and heat allocation	-0.0 [-0.0%]	-3.5 [-0.3%]	-3.2 [-0.3%]	-5.8 [-0.6%]	-	-

Note: "0.0" are values less than 0.05.

(Unit: Mt)

"After allocation of power and heat" refers to the allocation of energy-related CO<sub>2</sub> emissions from power and heat generation to each sector based on the consumption of power and heat.

## Details of main increases/decreases as compared to FY2020

### 1) Energy-related CO<sub>2</sub> emissions (after allocation of power and heat)

- Industry sector (factories, etc.): 19.1 Mt (5.4%) increase
  - Energy consumption increased due to the increased production in manufacturing industries as a result of the economic recovery from the COVID-19 pandemic.
- Transport sector (cars, etc.): 1.4 Mt (0.8%) increase
  - The amount of freight traffic increased due to the economic recovery from the COVID-19 pandemic.
- Commercial and other sector (commerce, services, office, etc.): 6.0 Mt (3.3%) increase
  - Energy consumption increased due to the economic recovery from the COVID-19 pandemic.
- Residential sector: 10.5 Mt (6.3%) decrease
  - Energy consumption decreased due to less time spent at home since stay-at-home requests to prevent the spread of the COVID-19 were lifted.
- Energy transformation sector (power plants, oil refineries, etc.) (excluding statistical discrepancy from power and heat allocation): 7.4 Mt (9.1%) increase
  - Emissions from the manufacturing of oil products and coal products (coke) increased.

### 2) Emissions other than energy-related CO<sub>2</sub> (CO<sub>2</sub> eq.)

- CO<sub>2</sub> emissions not related to energy: 1.6 Mt (2.1%) increase
  - Emissions from the Industrial Processes and Product Use sector increased.
- Methane (CH<sub>4</sub>) emissions: 0.02 Mt (0.1%) decrease
  - Emissions from the Waste sector decreased.
- Nitrous oxide (N<sub>2</sub>O) emissions: 0.22 Mt (1.1%) decrease
  - Emissions from the Waste sector decreased.
- Hydrofluorocarbon (HFC) emissions: 1.4 Mt (2.6%) increase
  - Emissions from refrigerants increased.
- Perfluorocarbon (PFC) emissions: 0.35 Mt (9.9%) decrease
  - Emissions from semiconductor and liquid crystal display (LCD) manufacturing decreased.
- Sulfur hexafluoride (SF<sub>6</sub>) emissions: 0.02 Mt (0.9%) increase
  - Emissions from gas-insulated electrical equipment increased.
- Nitrogen trifluoride (NF<sub>3</sub>) emissions: 0.04 Mt (12.8%) increase
  - Emissions from semiconductor and LCD manufacturing increased.