

Preparation of Japan's National Greenhouse Gas Inventory and Trends in GHG Emissions

What is a GHG Inventory?

An emission inventory is an accounting of the amount of emissions of specific substances (such as air polluting substances and harmful chemicals) during a certain period of time. A greenhouse gas (GHG) inventory is such an emission inventory. It reports the amount of emissions and removals of gases that cause global warming (GHGs) such as carbon dioxide (CO₂), by sources and sinks.

For GHG inventories, the emissions for each gas are calculated for each sector and source category (see Table 1), based on statistics rather than actual measurement data, as shown in Figure 1. These estimates are summarized in a Common Reporting Format (CRF), which, together with emission estimates and estimation methods documented in the National GHG Inventory Report (NIR), will become the official national GHG inventory.

Under the UNFCCC, an international environmental treaty to address global warming issues, developed countries and Eastern European countries including Russia (Annex I parties) are required to submit annual national GHG inventories to the UNFCCC Secretariat.

Table 1: Main GHG emission sources /removals

GHG Sector	Carbon dioxide (CO ₂)	Methane (CH ₄)	Nitrous oxide (N ₂ O)	F gases*3
Energy	Fuel combustion	Fugitive emissions from fuel, Fuel combustion	Fuel combustion	
IPPU*1	Cement production, Lime production	Chemical industry, Metal industry	Chemical industry, Semiconductor/Liquid crystal manufacturing	Refrigeration, Air conditioning equipment, Foam blowing, Semiconductor/Liquid crystal manufacturing, Solvent
Agriculture	Liming, Urea application	Rice cultivation (paddy fields), Enteric fermentation, Manure management	Agricultural soils, Manure management	
LULUCF*2	Removals by forests	Emissions from organic soils	Direct emissions from N mineralization/Immobilization (forests)	
Waste	Waste incineration	Solid waste disposal, Wastewater treatment, Composting, Waste incineration	Wastewater treatment, Waste incineration, Composting	

*1: Industrial processes and product use
*2: Land use, land-use change and forestry
*3: Hydrofluorocarbons (HFCs), Perfluorocarbons (PFCs), Sulfur hexafluoride (SF₆), Nitrogen fluoride (NF₃)



Figure 1: General calculation method

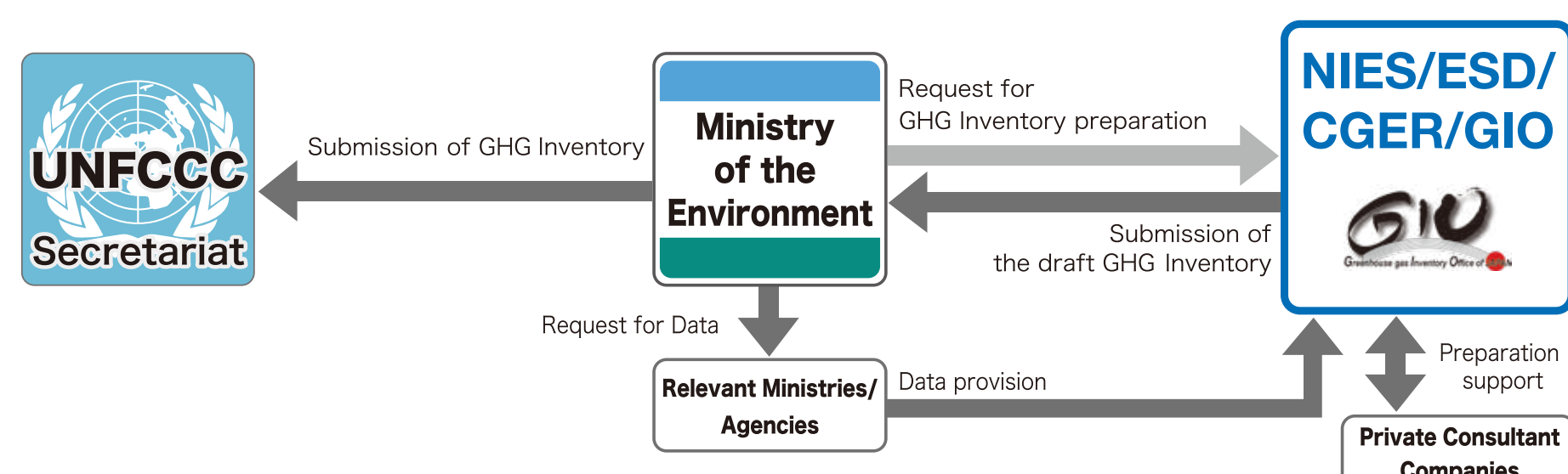


Figure 2: Japan's institutional arrangement for the national inventory preparation

Institutional arrangement for the GHG Inventory preparation

The Greenhouse Gas Inventory Office of Japan (GIO) develops the GHG inventory in cooperation with private consultant companies under a contract with the Ministry of the Environment (Figure 2). Before preparing GHG inventories, GIO collects data from relevant ministries,

agencies and organizations to estimate emissions and removals. Based on these data together with other data from different publications, GIO then compiles the GHG inventory.

This compiled inventory is annually submitted to the UNFCCC Secretariat through the Japanese Government. This inventory serves as the official data which are reported internationally.

"Japan's National GHG Emissions in Fiscal Year 2020" shown below is the output of GIO's GHG inventory compilation work.

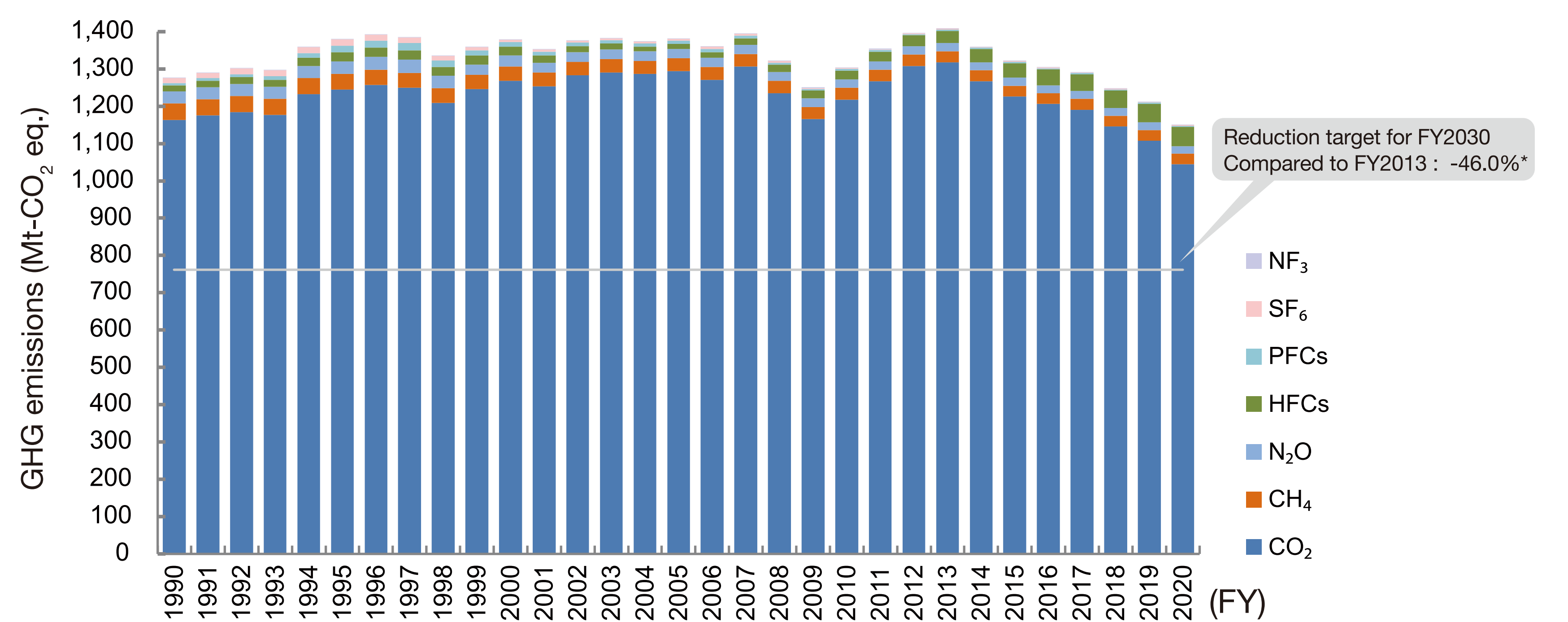
Japan's National Greenhouse Gas Emissions in Fiscal Year 2020

Japan's total GHG emissions in fiscal year* (FY) 2020 were 1,150 million tonnes of carbon dioxide equivalents (Mt CO₂ eq.) (Figure 3).

This is a decrease of 5.1% (62 Mt CO₂ eq.) compared to the FY2019 emissions (1,212 Mt CO₂ eq.). The main factor for the decrease in emissions in FY2020 as compared to FY2019 is the reduced energy consumption due to reduced production in manufacturing industries and decrease in the amount of passenger and freight traffic, etc., resulting from the spread of the coronavirus disease 2019 (COVID-19).

This also shows a decrease of 18.4% (259 Mt CO₂ eq.) compared to FY2013 emissions (1,409 Mt CO₂ eq.). The two main factors for the decrease in emissions in FY2020 as compared to FY2013 are the reduced energy consumption (due to improved energy conservation, the effects of the spread of COVID-19, etc.) and the decrease in CO₂ emissions from electricity production due to the wider use of low-carbon electricity (wider adoption of renewable energy, resumption of nuclear power plant operations).

In contrast, the emissions of hydrofluorocarbons that substitute for ozone-depleting substances as refrigerants are increasing every year.



*Reference :the Plan for Global Warming Countermeasures (Cabinet approved on October 22, 2021)

Figure 3: Trends in GHG emissions (FY2020)

CO₂ emissions in FY2020 were 1,044 million tonnes. This is a decrease of 5.8% (63.9 Mt) and 20.8% (273.7 Mt) compared to FY2019 and FY2013. The CO₂ emissions from the industries sector (factories, etc.) show the largest decrease compared to FY2019 and FY2013 (Figure 4).

The main factor for the decrease in CO₂ emissions from the industries sector (factories, etc.) in FY2020 as compared to FY2019 is the reduced energy consumption due to the decrease in production in manufacturing industries owing to sluggish demand, etc., resulting from the effects of the spread of COVID-19.

The two main factors for the decrease in CO₂ emissions from the industries sector (factories, etc.) in FY2020 as compared to FY2013 are the reduced energy consumption due to the decrease in production in manufacturing industries in FY2020, etc., resulting from the effects of the spread of COVID-19, and the improved CO₂ emission intensity of electricity (CO₂ emissions per electricity consumption).

*Japan's fiscal year is from April 1 to March 31.

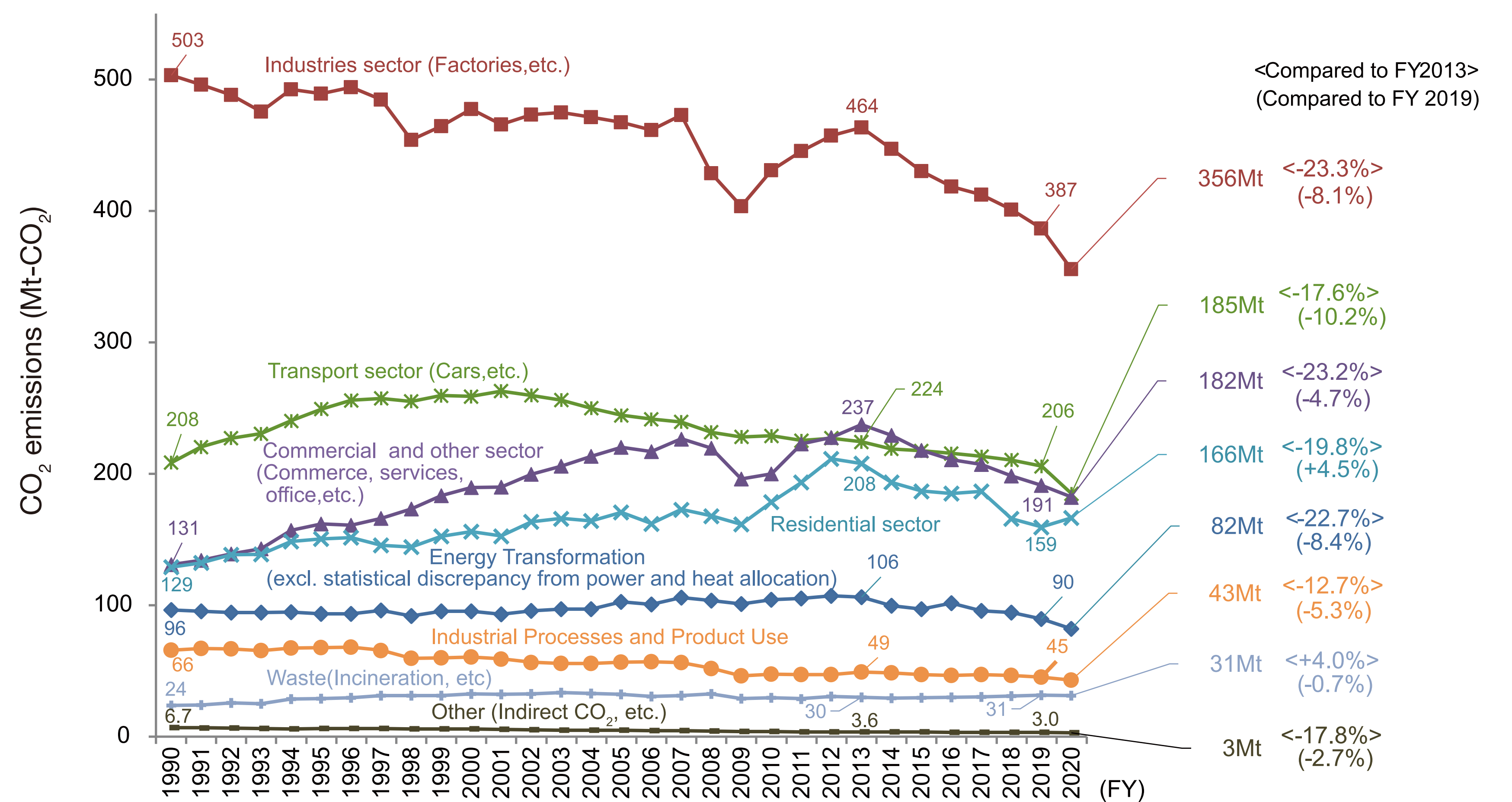


Figure 4: Trends in Allocated CO₂ emissions by sector (FY2020)