環境省
Ministry of the Environment

Japan's Progress on Climate Change Measures and International Cooperation

WGIA22 Phnom Penh, Cambodia

16th July 2025

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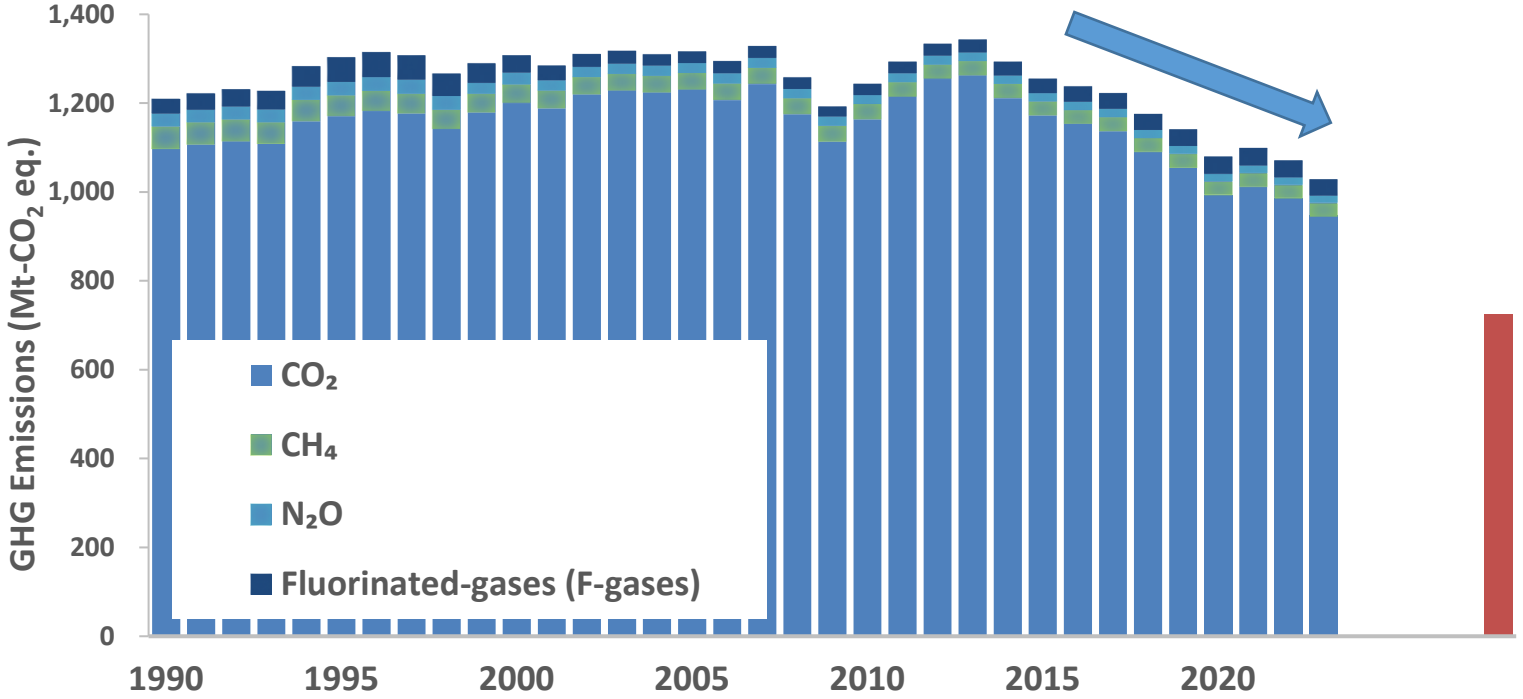
Greenhouse Gas Emissions & Trends

GHG Emissions

FY2023: **1,071 million** tonnes-CO_2 eq.

- ✓ Decrease by 4% from FY2022 mainly due to reduced energy consumption resulting from the decarbonization of power and a reduction in energy consumption due to decreased domestic production activity in the manufacturing sector.
- ✓ Decrease by 23.3% from FY2013 due to the reduced energy consumption and a decrease in CO_2 emissions from electricity production due to the wider use of low-carbon electricity.

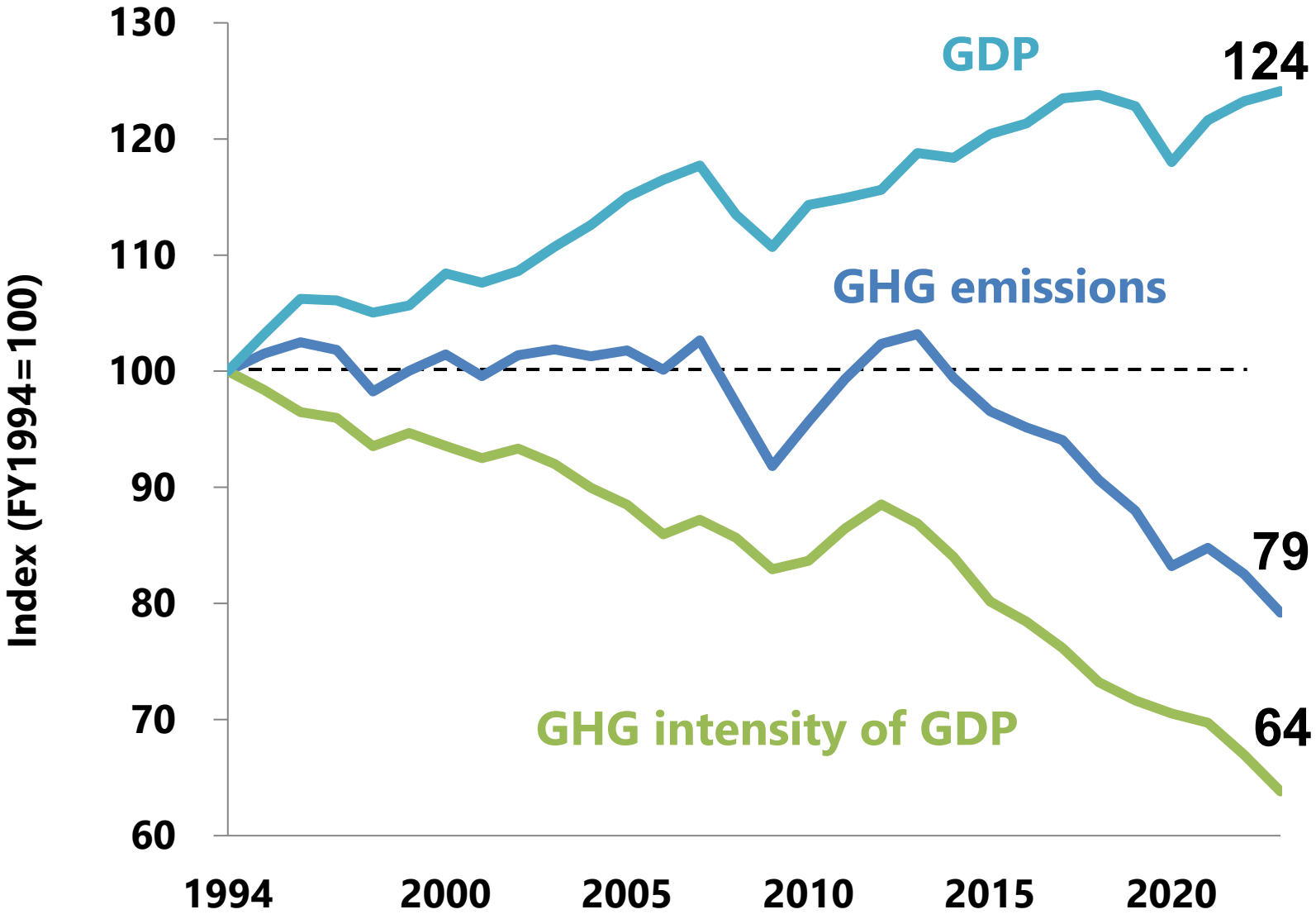


FY2030 target: 46% decline compared to FY2013 (continuing strenuous efforts to 50%)

Source: National Greenhouse Gas Inventory Document of Japan (April, 2025)

Trends of GHG Intensity of GDP

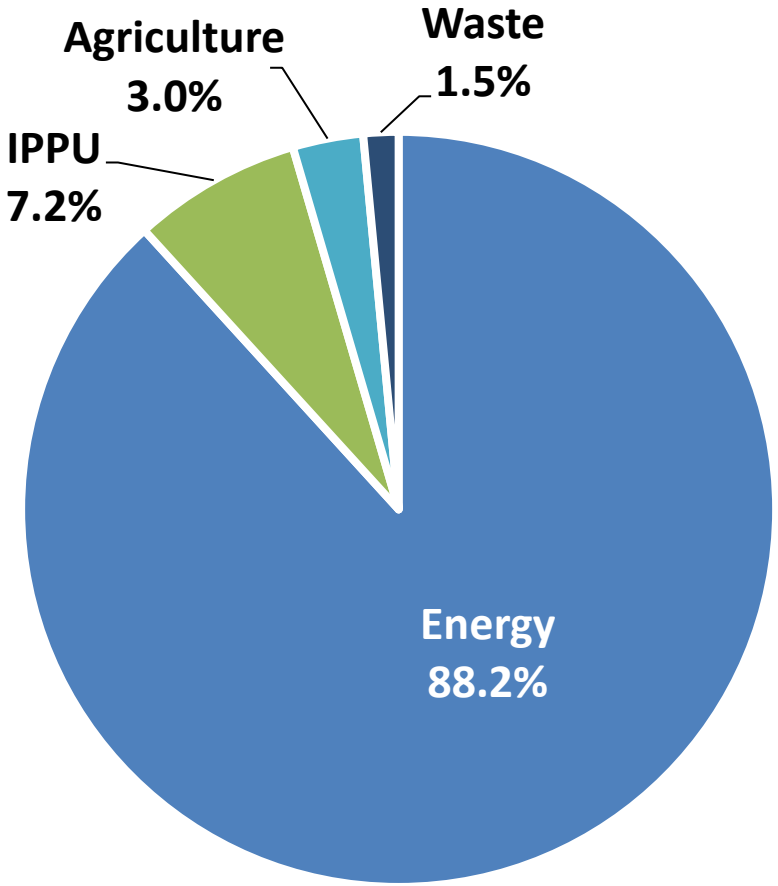
✓ **GHG intensity of GDP has been decreasing** for 11 consecutive years compared to FY2013.

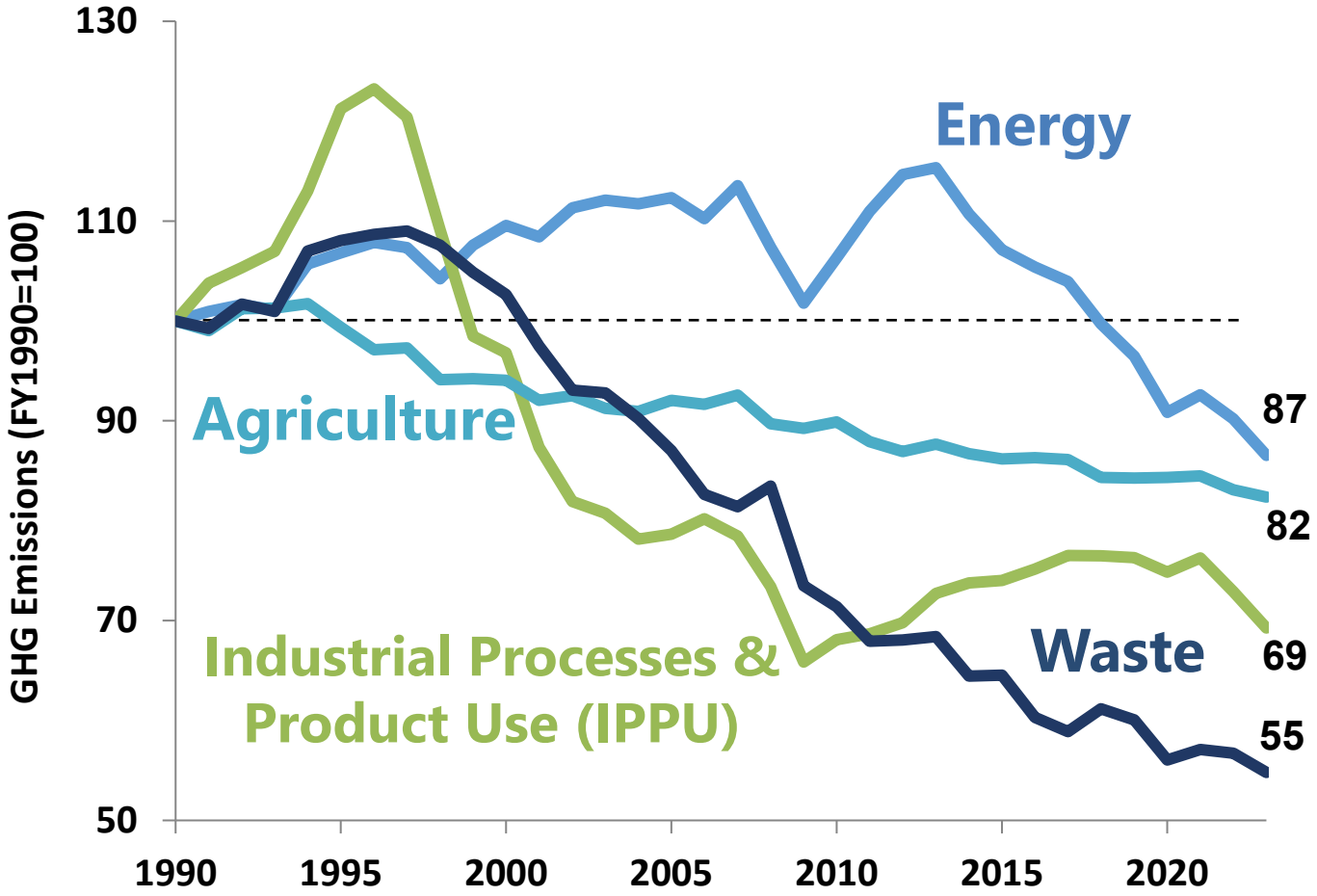


Source: National Greenhouse Gas Inventory Document of Japan (April, 2025), National Accounts of Japan (Cabinet Office)

GHG Emissions by Sector (excl. LULUCF)

- ✓ **Emissions from the energy sector**, the largest source, **decreased compared to FY2013** due to the progress in energy saving activities and the decrease in thermal power generation.

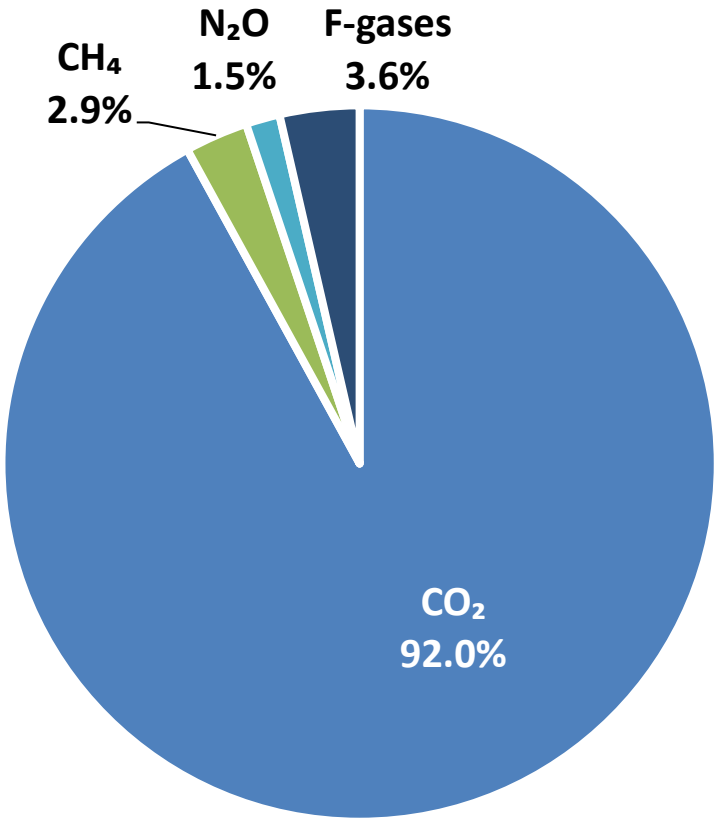


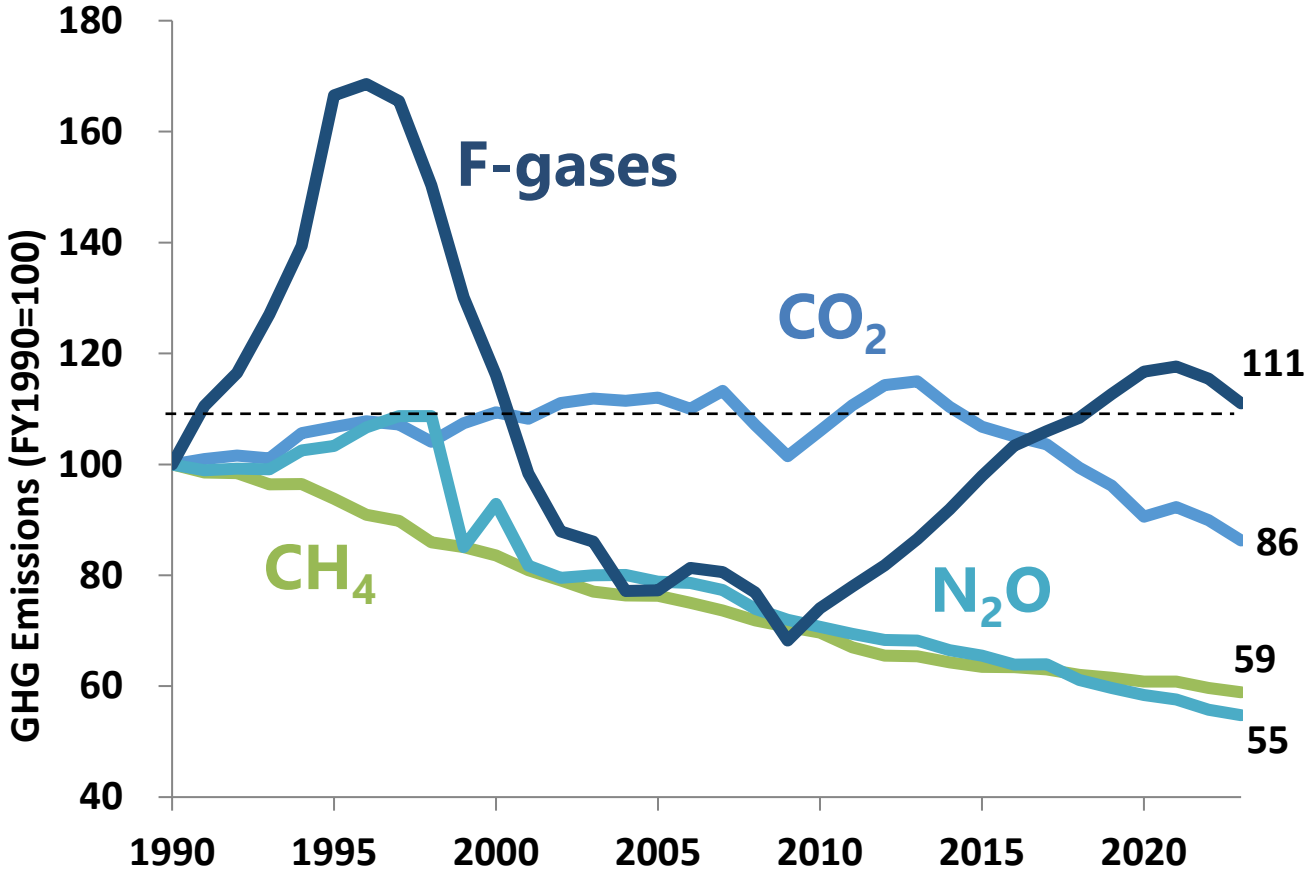


Source: National Greenhouse Gas Inventory Document of Japan (April, 2025)

GHG Emissions by Gas (excl. LULUCF)

- ✓ **F-gas emissions** have further declined compared to 2022, when F-gas emissions turned to a decrease for the first time since their increasing trend began in 2009. Five years have passed since the revised Act on Rational Use and Proper Management of Fluorocarbons came into effect in 2019, and necessary revisions will be made considering the implementation status of the revised Act.





Source: National Greenhouse Gas Inventory Document of Japan (April, 2025)

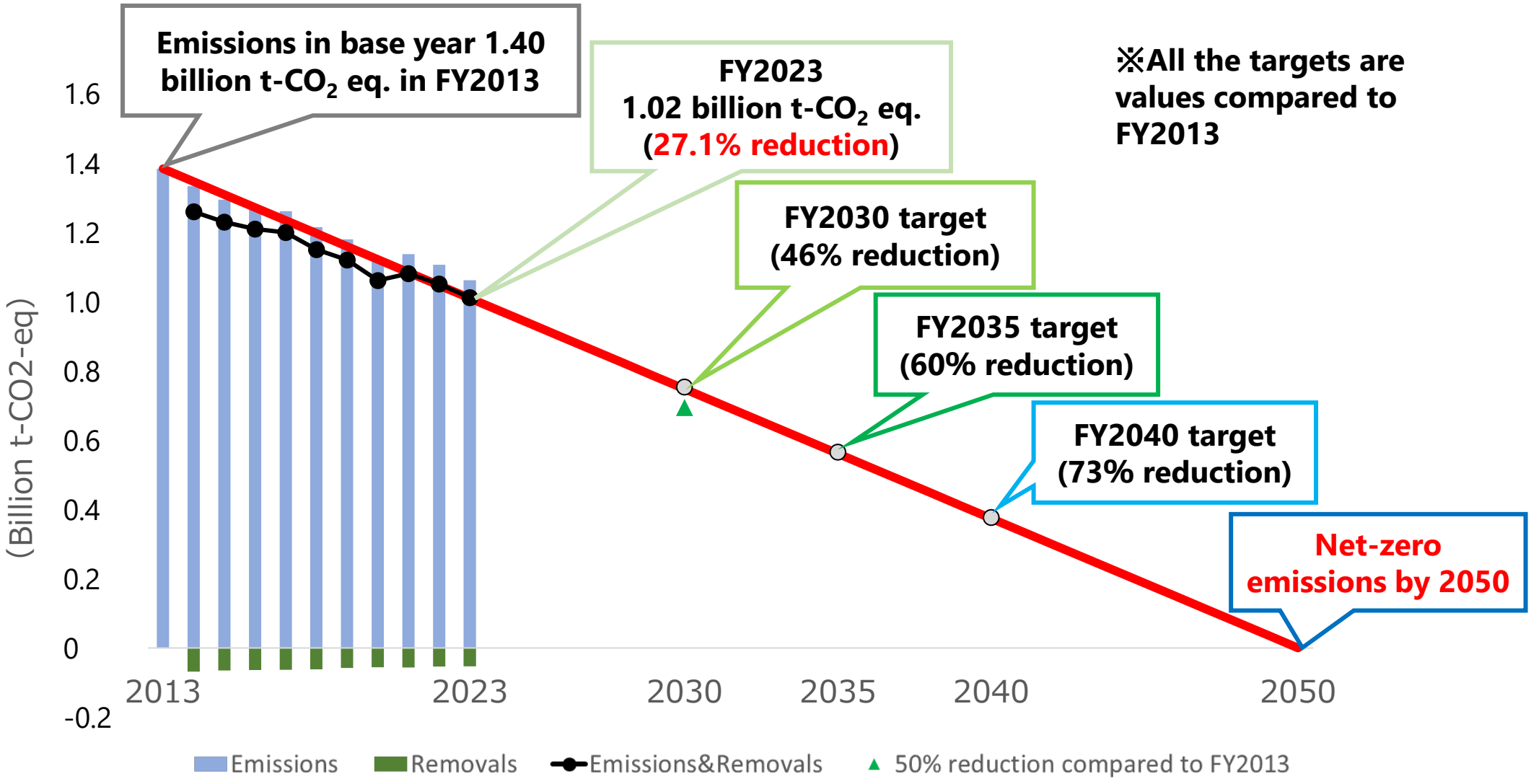
New Emission Reduction Targets

Estimated Emissions & Removals in FY2030

Greenhouse Gas Emissions and Removal (Unit: million t-CO_2)		2013 Emission※1	2023 Emissions sub-target※1	2023 Reduction rate	2030 Reduction rate sub-target※2
		1,395	1,017	▲27%	▲46%
Energy-derived CO_2		1,235	922	▲25%	▲45%
Sector	Industry	463	340	▲27%	▲38%
Sector	Business & others	235	165	▲30%	▲51%
Sector	Household	209	147	▲30%	▲66%
Sector	Transportation	224	190	▲15%	▲35%
Sector	Energy conversion	104	79.6	▲23%	▲47%
Non-energy-related CO_2		131	112	▲15%	▲14%
HFCs and other 4 gases (PFCs, SF_6, NF_3)		28.9	37.0	+28%	▲44%
Greenhouse gas removals		-	▲53.7	-	-
Joint Crediting Mechanism(JCM)		We aim to achieve international emission reductions and removal in 2030 through public-private partnership. The credits acquired by Japan will be counted appropriately to achieve Japan's NDCs.			

※1 Source：Japan's National Greenhouse Gas Emissions and Removals in FY2023　2 Source：The Plan for Global Warming Countermeasure

Trends in Japan's national GHG emissions and removals



<Source> Ministry of the Environment of Japan

Calculation of blue carbon ecosystem

- **<u>For the first time in the world, removals in seagrass meadows and seaweed beds were estimated and reported in April 2024 (approximately 0.34 Mt in FY2023).</u>**

- From FY2025, we began to study calculation and evaluation of the amount of blue carbon in <u>offshore areas</u> expected as a large carbon sink.

<Photos>
UNEP「Blue Carbon」：https://wedocs.unep.org/handle/20.500.11822/7772
MOE Japan：https://www.env.go.jp/nature/saisei/

Status of Reflection of Blue Carbon Ecosystems in Greenhouse Gas Inventories

Mangrove Forests

Reflected in inventory submitted in 2023

Seagrass and Macroalgae(seaweed)

Reflected in inventory submitted in 2024

Salt marshes and tidal flats

To be discussed in the future

Calculation of Environmentally Friendly Concrete

- Regarding Carbon Capture and Utilization (CCU) technologies such as CO_2-absorbing concrete, more technologies have been added to the list of CO_2-absorbing concrete, etc, and the removals (CO_2 fixation) in FY2023 were 121 tonnes.
- Consideration of J-credit accreditation for CO_2-absorbing concrete will be further accelerated from FY2025.

CO_2 Fixing Concrete During Manufacturing

Calculate the amount of CO_2 forcibly fixed inside concrete as calcium carbonates during manufacturing.

Concrete Using CO_2 -origin Material

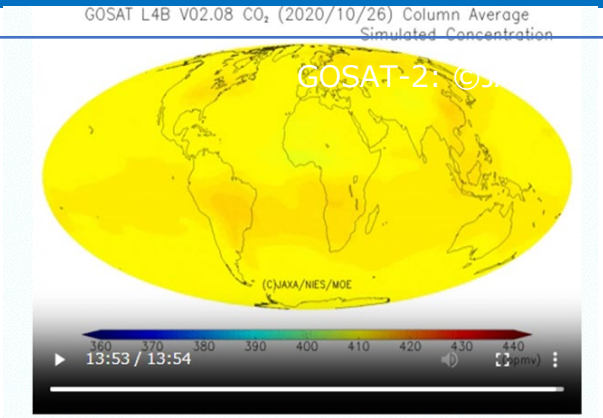
Calculate the amount of CO_2 fixed inside the concrete manufactured by using carbonate material that fixes CO_2.

Concrete Using Biochar

Calculate the amount of CO_2 fixed in concrete that stores carbon, by mixing in biochar made with carbonated woody biomass

1. Global Observation using GOSATs

- Observing a global GHGs since 2009 using satellites.
- New GOSAT-GW was launched successfully June 2025.
- 600 > papers (24 papers in the IPCC AR6 WG1 report).
- Long-term, Global GHG data for free of charge.



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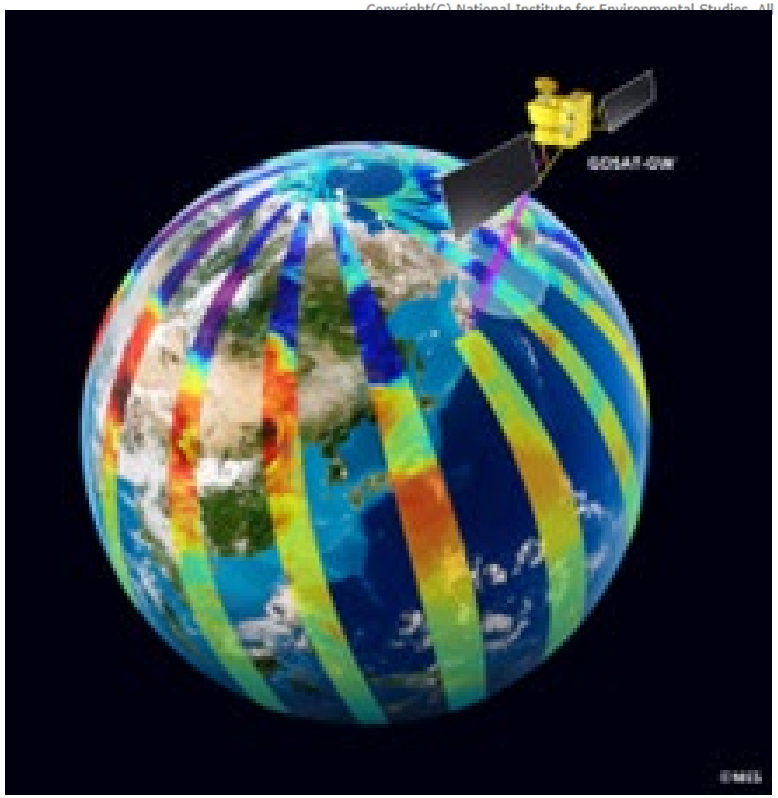

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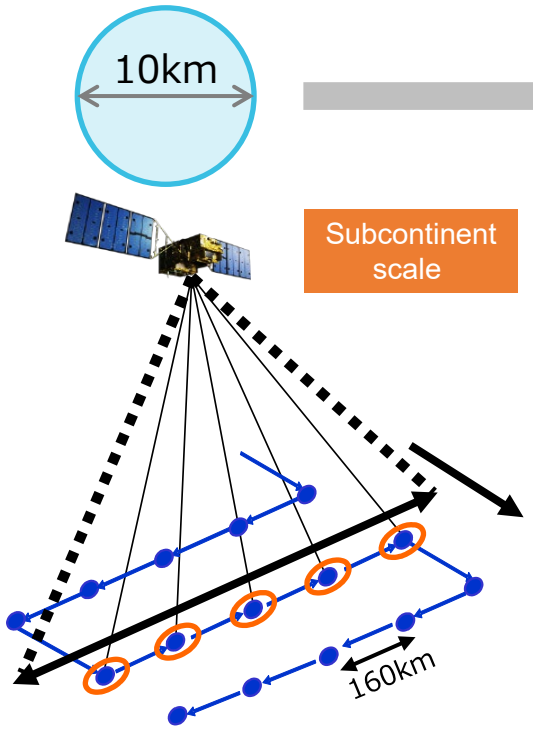
provide long-term, global observation

Global Observing Satellite for Greenhouse gases and Water cycle (GOSAT-GW)

Greenhouse Gas Observation Sensor（TANSO-3）Mission

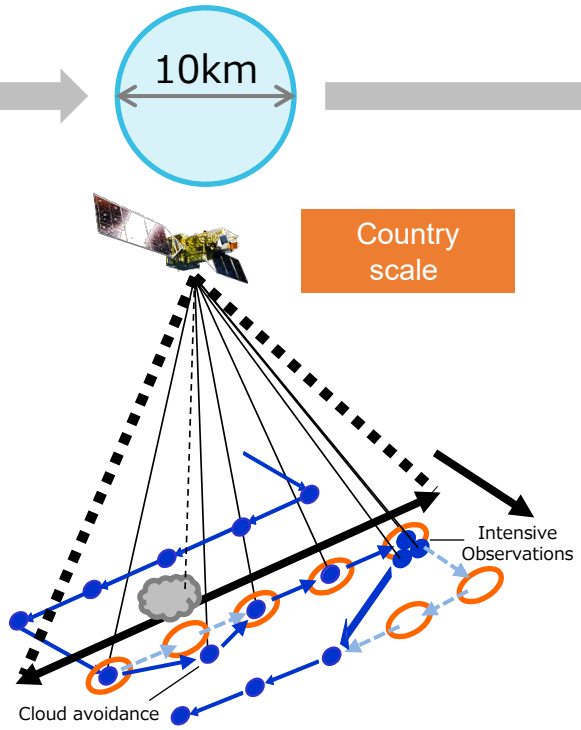
1. Monitoring of monthly average concentrations of atmospheric GHGs
2. Verification of anthropogenic GHG emissions by country
3. Monitoring of large emission sources, etc.

GOSAT（TANSO）



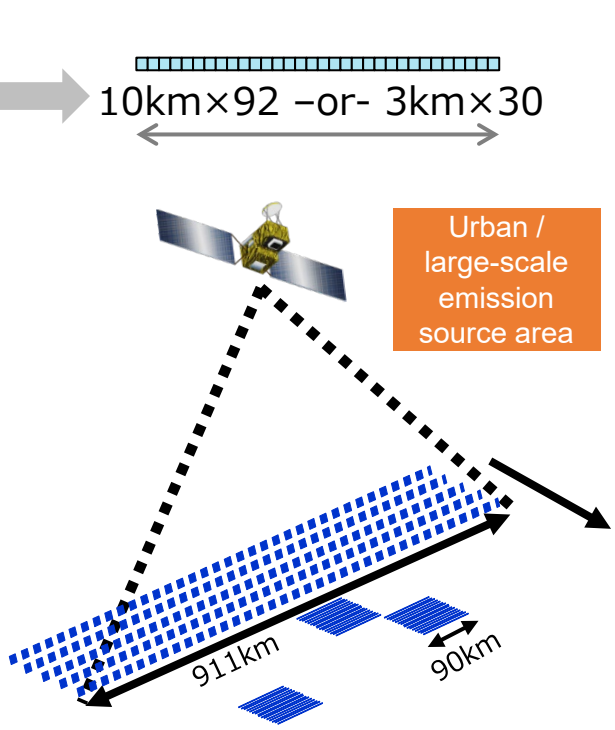
One sensor (10-km diameter field of view) observed at 160-km grid intervals. GHG concentration calculation not possible if clouds in the field of view.

GOSAT-2（TANSO-2）



One sensor (10-km diameter field of view), but can observe a specified point. Sensor automatically detects clouds and avoids them.

GOSAT-GW（TANSO-3）



Normal global observations with 10-km spatial resolution or intensive observation of a specified area (90-km wide) with 3-km spatial resolution

GOSAT in NC3 of India

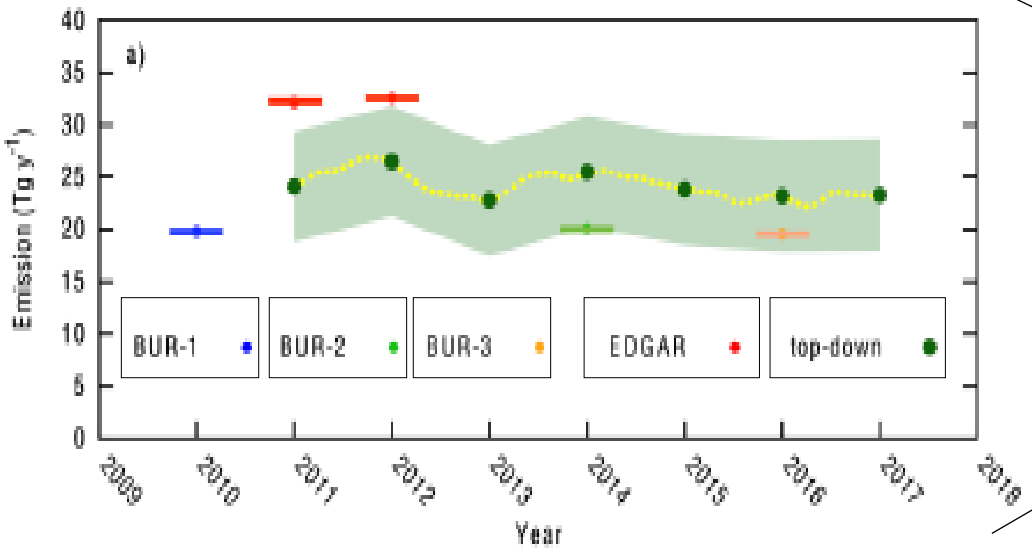
India's Third National Communication (December 2023) :

Study using GOSAT data is closer to estimation of India's BURs than EDGAR, widely used emission database.

【NC3 of India: https://unfccc.int/documents/636235 】
【Janardanan et al.(2020)】

Country-level CH_4 emission estimate in India

Top-down study using GOSAT data estimated emission that is 19.2% higher than India's BUR3. However, EDGAR, widely used emission database, is 39% higher.



5.11 Estimation of CH_4 Fluxes During 2011-2017 Using Top-down Modeling and Observations

A top-down modeling study (inversion) is being carried out for the estimation of country-wise methane (CH_4) fluxes during 2011-2017 (Janardanan et al., 2020). It uses GOSAT satellite and surface observations (including surface observations from four different sites in India as Sinhagad by Indian Institue of Tropical Meteorology (IITM) Pune, Cape Rama Goa, Port Blair, and Pondicherry), a high-resolution inverse model NIES-TM-FLEXPART-VAR (NTFVAR) that couples a Lagrangian Particle Dispersion Model FLEXPART, with a global Eulerian model NIES-TM. Optimization was applied to natural (wetland) and anthropogenic emissions on a bi-weekly time step and the results were analyzed on a country scale. For the base scenario, the study used EDGAR anthropogenic CH_4 emission inventory scaled to match the national reports to the UNFCCC. The application of an inversion system, based on high-resolution transport with the combination of surface and satellite observations, enabled to study the natural and anthropogenic methane emissions over a spatial scale and to evaluate the national methane emission reports. The top-down study estimates India's CH4 emission as 24.2±5.3 Tg yr^{-1}, which is 19.2% higher than India's CH_4 emission estimated by the BUR-3 (19.55 Tg yr^{-1}) (this report). However, India's CH_4 emission estimated by EDGAR (v4.3.2-2012) (32.6 Tg yr^{-1}) is approximately 39% higher than the emissions reported by India's BUR-1 (19.8 Tg yr^{-1}), BUR-2 (20.05 Tg yr^{-1}), and BUR-3 (19.55 Tg yr^{-1}) (Figure 5.17).

The inversion result for India validated against the CH_4 profiles observed by the aircraft over two north Indian urban regions. The posterior fit to the observations showed a clear improvement, especially in the boundary layer (Figure 1b). The aircraft observations were conducted under the CAIPEEX project 2014, 2015, by the Indian Institute of Tropical Meteorology (IITM), Ministry of Earth Sciences, Govt. of India. Overall, the validation with the surface stations used in the inversion and the aircraft observations used for validation only, the posterior simulations showed a better fit to the observations than the prior forward model.

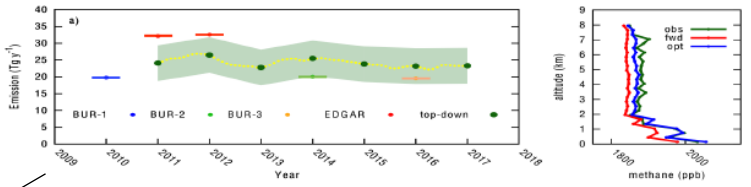


Figure 5.17: The average anthropogenic methane emission (2011-2017) for India (top-down) along with the emissions reported in BUR-1, BUR-2, BUR-3, and EDGAR. (b) The vertical profiles of forward simulations using prior fluxes and optimized fluxes compared with the aircraft methane observations over India averaged over 300m altitudes.

Project with Private Sector (1. GHGSAT, MUFG etc.)

■GOSAT-GW data to be used by Project lead by Japanese Bank in collaboration with GHGSat etc. ➡ wide-area observation helps pinpoint obs.

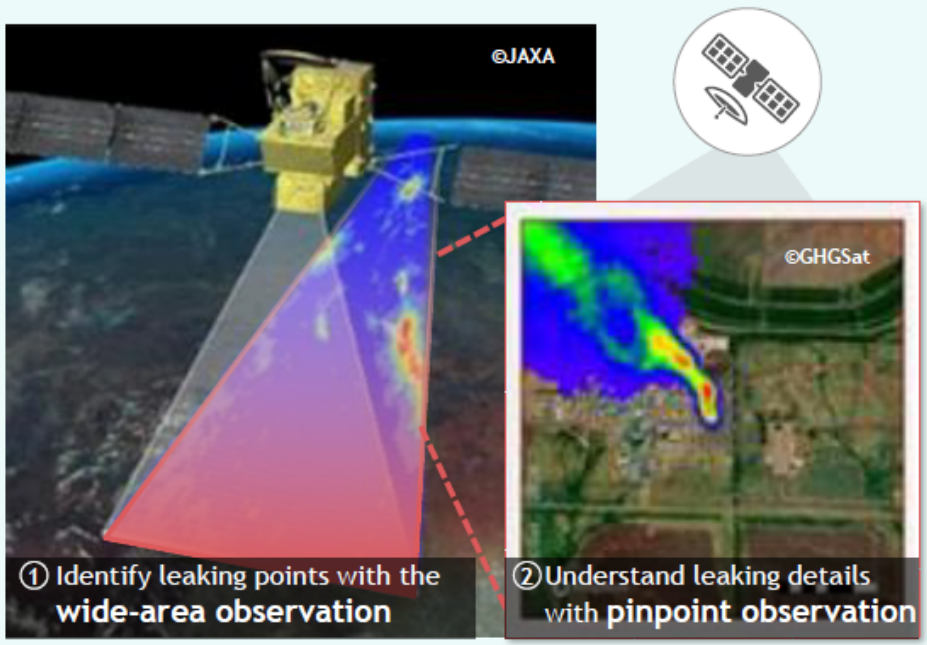
Source: Presentation by MUFG and GHGsat at COP29

Emitted?

2 Visualization of "Emission"

GHG emission monitoring of LNG plants/pipelines

- Linking Japan's core large satellites with small commercial satellites from overseas to ① wide-area observation and ② pinpoint observation



Trends in methane emissions management

External factors

- International discussions/initiatives underway to manage methane emissions in LNG value chain

UN environment programme
MMRV[1] framework in OGMP[2] 2.0 etc.

JP-Korea collaboration in LNG value chain

Issues

- Earth Observation is attracting global attention including COP28 as one of the objective observation methods
- Need for Japan to actively participate in building a mechanism based on international collaboration

1. Measurement, Monitoring, Reporting and Verification; 2. Oil Gas Methane Partnership
Source: Collaborative demonstration of Mitsubishi Electric Corp., SDS, GHGSat, MOE, JAXA, and MUFG

International Cooperation

Japan's Contributions for a Decarbonization in Asia

- MOE Japan supports **decarbonization in the ASEAN and Indo-Pacific region.**
- The **private sector, public sector and academia** work on various levels.

【Pathway to decarbonization with partner countries】

Policy Dialogue → Strategy, Plan, and Regulation → Project Formulation → Joint Crediting Mechanism

City to City collaboration

Promoting inter-city cooperation in and out of Japan,
Transferring experience and know-how abroad etc.

Policy Cooperation

Objective

NDC (every 5 years)

Development and implementation of NDC and Long-Term Strategy

Development and implementation of facility level Measurement and Reporting framework for GHG emissions with engagement of state and non-state actors

Reporting

BTR (every 2 years)

Development of Biennial Transparency Report (BTR) including inventory

GOSAT (observing global GHG by Satellite)

Enhancement of ambition Under Paris Agreement

*globally

Reviewing

GST (every 5 years)

Developing NDC and LTS/LT-LEDS by using Asia integrated Model (AIM)

■ The Asia-Pacific Integrated Model (AIM) is a large-scale computer simulation model developed since 1990 by Japanese institutions, which can assess **policy options for stabilizing the global climate**, with the objectives of reducing greenhouse gas emissions and avoiding the impacts of climate change. (AIM has been used in making the Japan's LTS under the Paris Agreement published in October 2021.)

■ We conduct capacity building of AIM through training or WS, so that **local researchers** of other countries can **develop national long-term strategies/city-level decarbonization scenarios**.

Thailand

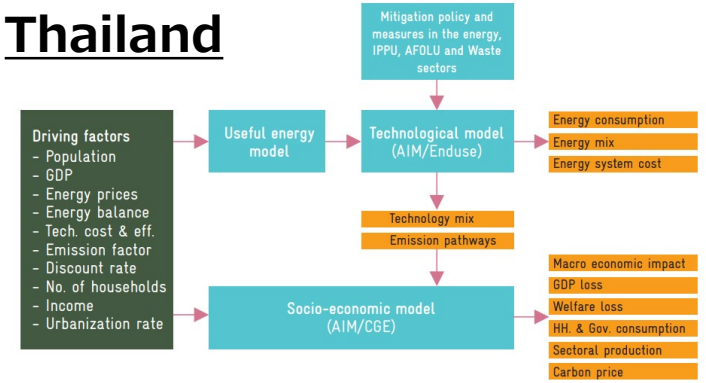


Figure 3-1 Framework of Thailand's LT-LEDS

Indonesia

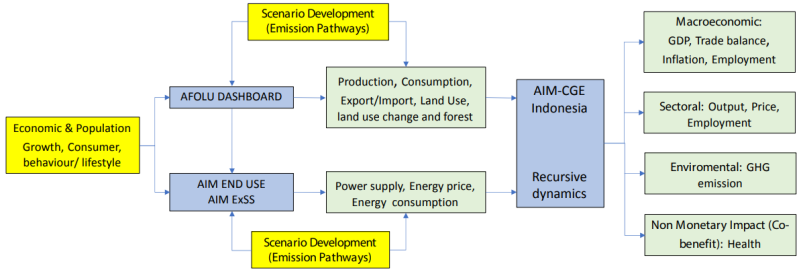


Figure 3. Models for developing emission pathways in Indonesia

Improving corporate transparency through PaSTI
(PaSTI: Partnership to Strengthen Transparency for co-Innovation)

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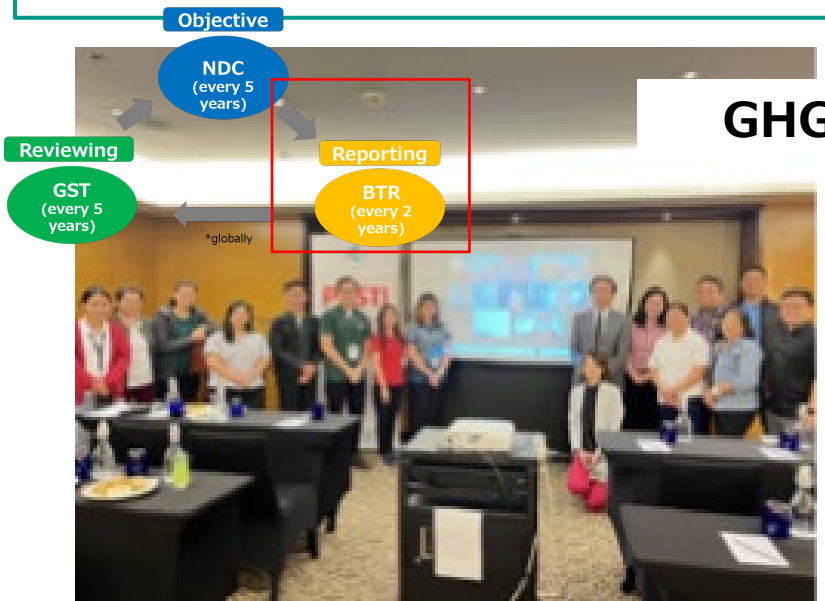
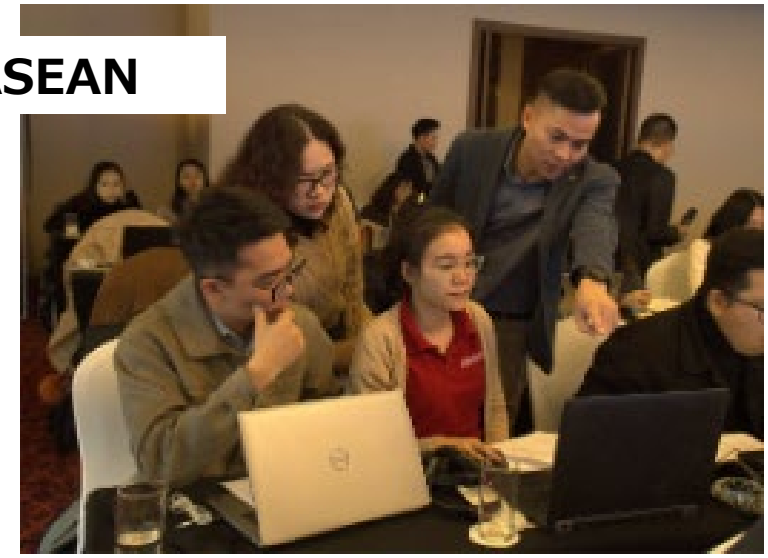
- The PaSTI support to improve facility level GHG emission MRV and promoting GHG reduction by companies in Asia region.
- Through the establishment of system to promote fairness and transparency in each country, we will enhance the comprehensiveness of the evaluation of national emission reduction efforts. Thereby contributing to the achievement of the global goas of the Paris Agreement and achievement of NDCs.
- Some global companies will be required the transparency of supply chain and disclosure of sustainability information which includes the Scope 1, 2 and 3 GHG emission (e.g. SSBJ*1, CSRD*2). Some companies start to think the estimate the GHG emission of SCOPE 3. The necessity of harmonizing transparency regulations is being considered through PaSTI.



GHG MRV workshop in ASEAN



Development of Biennial Transparency Report (BTR) including inventory/ Cooperation to contribute to GST

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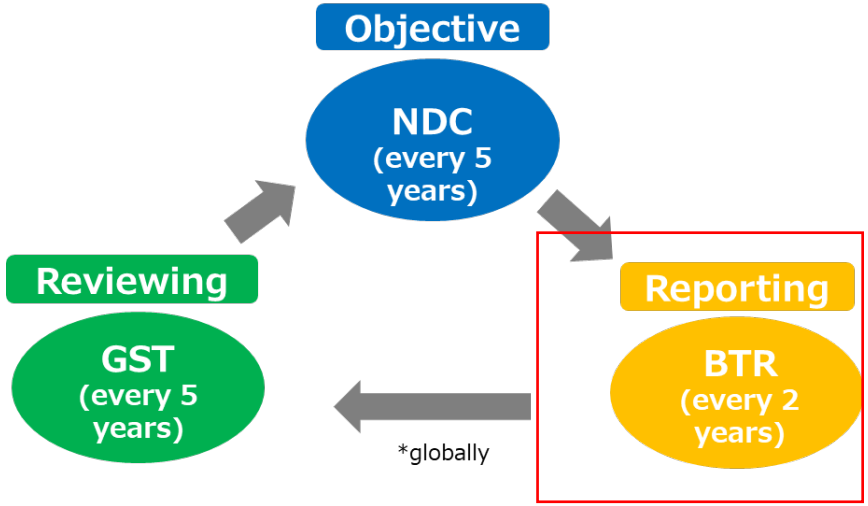
BTR and inventory

- To improve the accuracy of GHG inventories in the Asia region, the Workshop on Greenhouse Gas Inventories in Asia (WGIA) has been organized since 2003.
- Biennial Transparency Report (BTR) workshop was held to learn BTR with interesting countries.

WGIA 21 (2024)



City-to-City Collaboration Program

■ Support city-to-city collaboration between cities in Japan and abroad to promote sharing of knowledge and experience for decarbonization in partnership with private solution providers.

<Cooperation activities>

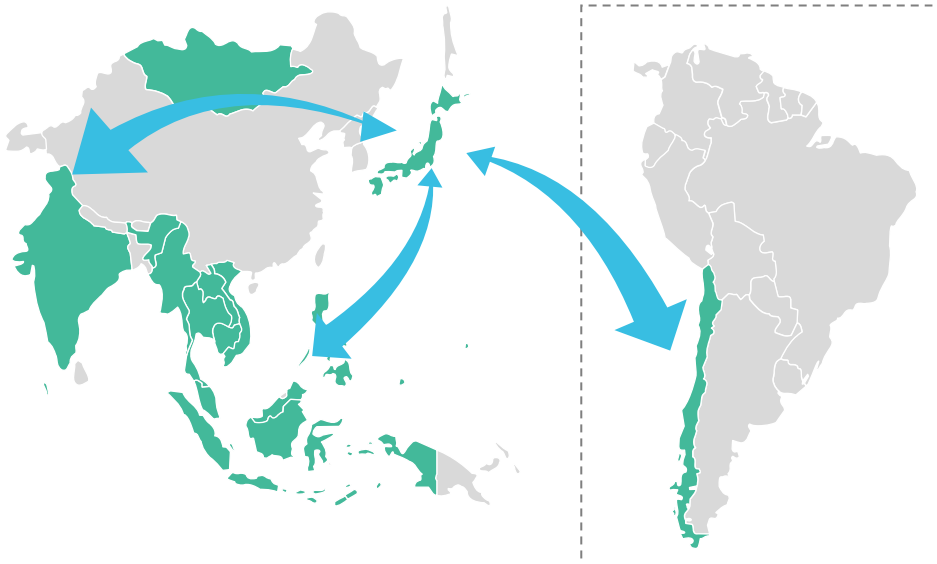
- Co-create low-carbon projects
- Support developing policies and plans to promote climate actions
- Build capacity for government staff
- Raise awareness of stakeholders

<Expected outcomes>

- Deliver net-zero commitment
- Deploy decarbonized technologies/infrastructure
- Develop action plans and regulations

Partnering 25 Japanese cities with 67 cities/regions in 14 countries

C3P City-to-City Collaboration Program



Policy Dialogue → Strategy, Plan, and Regulation → Project Formulation → Joint Crediting Mechanism

Cities taking part in the City-to-City Collaboration Program (FY2013～2025)

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Partnering 25 Japanese subnational governments with 67 subnational governments in 14 countries

Red: Ongoing projects in FY2025

Maldives

Partner city	Japanese city
Malé City	Toyama City

India

Partner city	Japanese city
Bangalore City	Yokohama City
Telangana State	Kitakyushu City
Maharashtra State	Osaka City
Tamil Nadu State	Ehime Prefecture

Myanmar

Partner city	Japanese city
Yangon Region	Kitakyushu City
Yangon City	Kawasaki City
Ayeyarwady Region	Fukushima City
Sagaing Region	Fukushima City
Mandalay City	Kitakyushu City
Yangon City	Fukuoka City

Mongolia

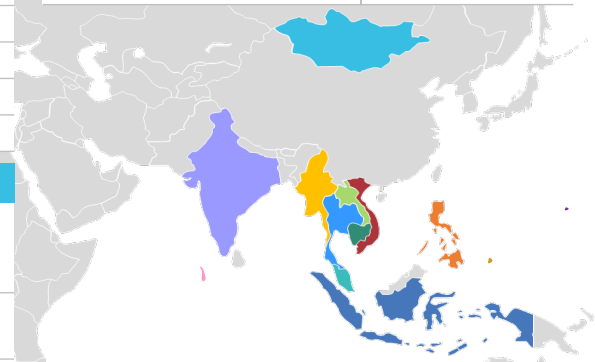
Partner city	Japanese city
Ulaanbaatar City	Sapporo City・Hokkaido Government
Ulaanbaatar City・Tuv aimag Prefecture	Sapporo City
Ulaanbaatar City	Sapporo City

Lao PDR

Partner city	Japanese city
Vieng chan City	Kyoto City

Vietnam

Partner city	Japanese city
Hai Phong City	Kitakyushu City
Da Nang City	Yokohama City
Ho Chi Minh City・Thu Duc City	Osaka City
Kiên Giang Province	Kobe City
Can Tho City	Hiroshima Prefecture
Soc Trang Province	Hiroshima Prefecture
Hanoi City	Fukuoka Prefecture
Quang Ninh Province	Shiga Prefecture
Ba Ria-Vung Tau Province・Southern Vietnam Area	Sakai City・Osaka City
Ben Tre Province	Ehime Prefecture
Dong Nai Province	Kobe City
Thuan Hoa District・Hue City	Shizuoka City
Da Nang City	Sakai City
Hai Phong City	Kobe City



Palau

Partner city	Japanese city
Koror Province	Kitakyushu City
Airai Province	Urasoe City

Thailand

Partner city	Japanese city
Bangkok Metropolitan Administration	Yokohama City
Rayong Prefecture	Kitakyushu City
Chiang Mai Prefecture	Kitakyushu City
Eastern Economic Corridor (EEC)	Osaka City
Ubon Ratchathani Province・Warin Chamrap Town Municipality・Pibun Mangsahan Towm Municipality	Kitakyushu City
Pattaya City・Rayong City	Osaka City

Cambodia

Partner city	Japanese city
Phnom Penh Capital Administration	Kitakyushu City
Siem Reap Province	Kanagawa Prefecture

Malaysia

Partner city	Japanese city
Iskandar Development Area	Kitakyushu City
Iskandar Development Area・Kota Kinabalu City	Toyama City
Penang State	Kawasaki City
Kuala Lumpur City	Tokyo・Saitama City
Iskandar Development Area	Toyama City

Micronesia

Partner city	Japanese city
Pohnpei State	Ama Town

Indonesia

Partner city	Japanese city
Denpasar City	Clean Authority of Tokyo
Surabaya City	Kitakyushu City
Batam City	Yokohama City
Semarang City※	Toyama City
Bandung City	Kawasaki City
Special Capital Territory of Jakarta	Kawasaki City
Bali Province*	Toyama City
Rokan Hulu Prefecture, Riau Provice・Pekanbaru City	Kawasaki City
Gorontalo Province	Ehime Prefecture
Banten Province・West Java Province	Kitakyushu City
Makassar City	Maniwa City
Makassar City	Yokohama City
Gianyar Regency	Osaki town
Badung Regency	Toyama City
Bandung Regency	Kameoka City

*

Philippines

Partner city	Japanese city
Quezon City	Osaka City
Davao City	Kitakyushu City
Metro Cebu Area （Cebu City, Mandaue City, Danao City）	Yokohama City

Chile

Partner city	Japanese city
Renca Municipality, Santiago City,	Toyama City

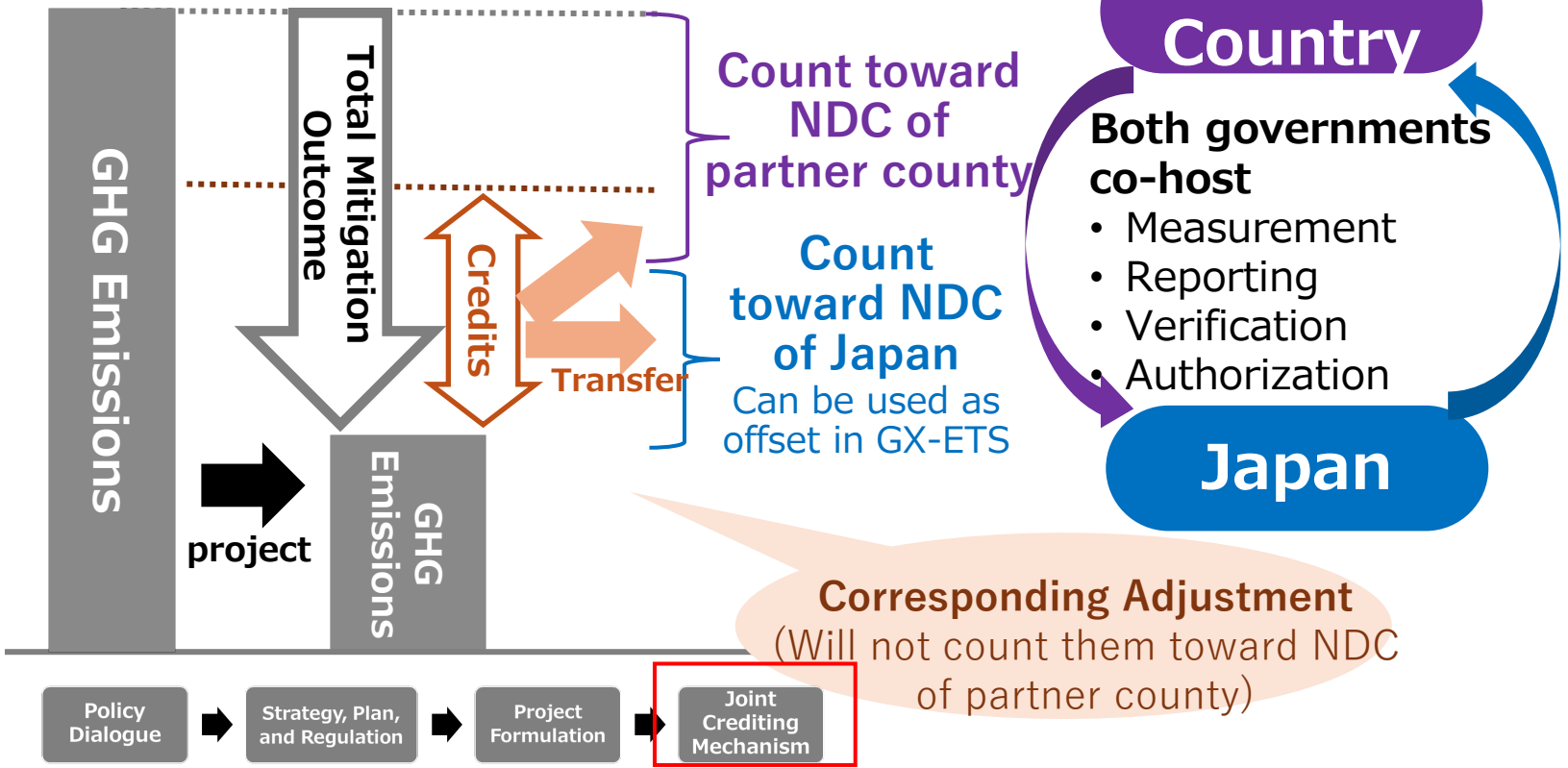
Policy Dialogue → **Strategy, Plan, and Regulation** → **Project Formulation** → **Joint Crediting Mechanism**

Overview of Joint Crediting Mechanism (JCM)

JCM THE JOINT CREDITING MECHANISM

- **JCM is a carbon market tool** where **Japanese companies and government cooperate with mitigation activities in partner countries** (30 as of Today).
- Among total mitigation outcomes, both governments **conservatively calculate, authorize and share JCM credits** between the companies/countries in proportion to their contributions, in line with **Article 6 of Paris Agreement**.
- **JCM incentivizes Japan's investment** in decarbonization projects bringing various benefits including achievement of NDC and sustainable development.

Mitigation outcome and its transfer



Decarbonization projects invested by Japan


Renewable


Energy Saving


Waste


Forestry


Agriculture※


CCS※

※ under development phase

Thank you for your kind attention

Strengthening support for national inventories

Ministry of the Environment