Carbon Monitor

Global Near-real-time Daily CO$_2$ Emission Report

2025

The Carbon Monitor team

Carbon Monitor is a frequently updated daily CO_2 emission dataset, to monitor the variations of CO_2 emissions from fossil fuel combustion and industrial production processes since January 1st 2019 at the national level with near-global coverage.
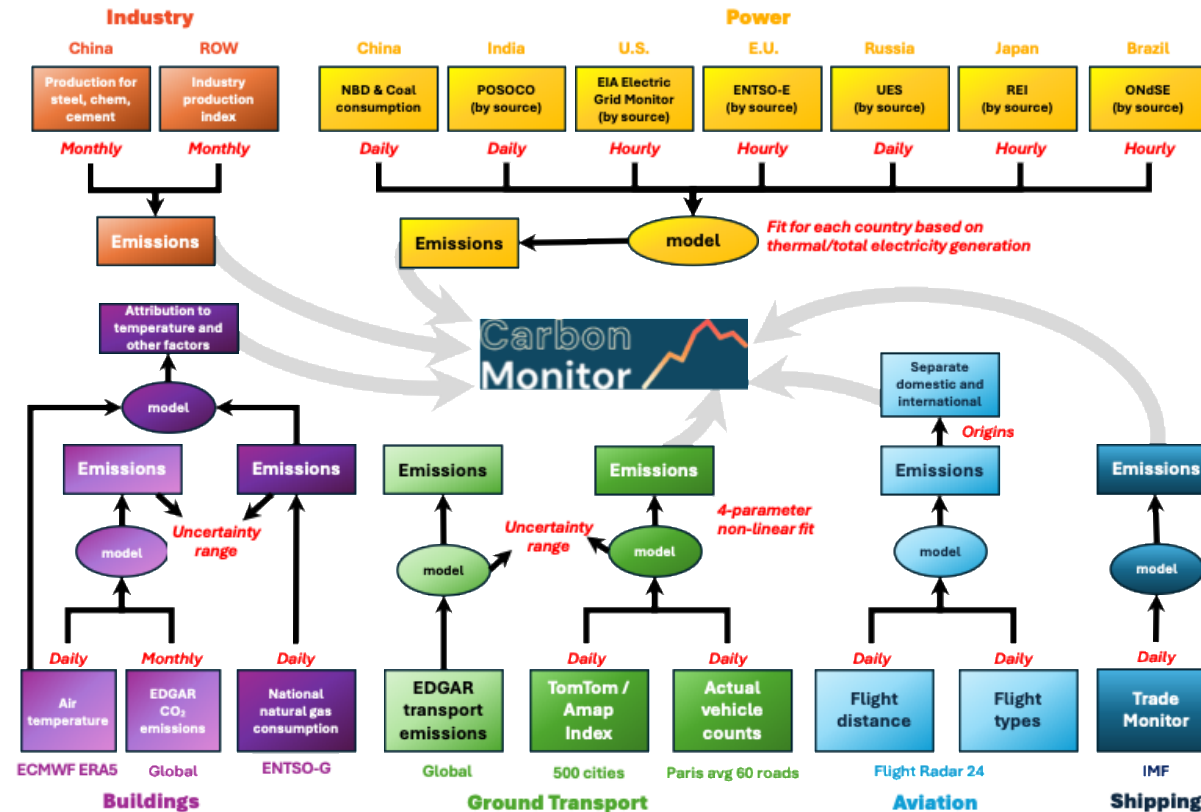
Daily CO_2 emissions are estimated from a diverse range of activity data, including: hourly to daily electrical power generation data of 56 countries, monthly production data and production indices of industry processes of 62 countries/regions, daily mobility data and mobility indices of road transportation of 500 cities worldwide. Individual flight location data and monthly data were utilized for aviation and maritime transportation sector estimates. In addition, monthly fuel consumption data corrected for daily air temperature were used to estimate emissions from commercial and residential buildings.

Data Notes

This report is based on the daily CO_2 emission dataset released by Carbon Monitor on November 1, 2025.

Coverage: 175,015 daily CO_2 emission records from January 1, 2019 to September 30, 2025, covering:

- **Energy-related and process-related emissions across 7 sectors:** Power, Industry[1], Ground Transport, Residential, Domestic Aviation, International Aviation, and International Shipping**;**

- **Global coverage with breakdowns for 9 regions:** China, United States, India, European Union (EU27), Russia, Japan, Brazil, United Kingdom, and Rest of the World (ROW).

Emission scope: Emissions include fossil fuel combustion and industrial process emissions, corresponding to the IPCC 2006 Guidelines categories 1 Energy and 2 Industrial Processes.

2025 full-year projection: Projections for 2025 CO_2 emissions are derived from historical daily data covering 2019–2025.

Data access and versioning: Up-to-date daily CO_2 emission data are available at https://carbonmonitor.org. Please note that ongoing updates to source datasets may lead to differences between the latest release and previously published versions.

[1] Including energy-related and process-related emissions.

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Highlights

Record-high global daily CO$_2$ emissions in 2025, with a slowing growth trend.

Daily CO$_2$ emissions from fossil fuel combustion and industrial processes, Mt CO$_2$ per day

Legend: ● Daily CO$_2$ emissions — Monthly average ◦ Annual average ▪ Uncertainty range of projections

Annotations on chart:
- 100.5 ▼0.1% (2019)
- 95.3 ▼5.2% (2020)
- 100.5 ▲5.5% (2021)
- 101.4 ▲0.9% (2022)
- 102.8 ▲1.5% (2023)
- 103.5 ▲0.7% (2024)
- 104.1 ▲0.6±1.6% (2025)
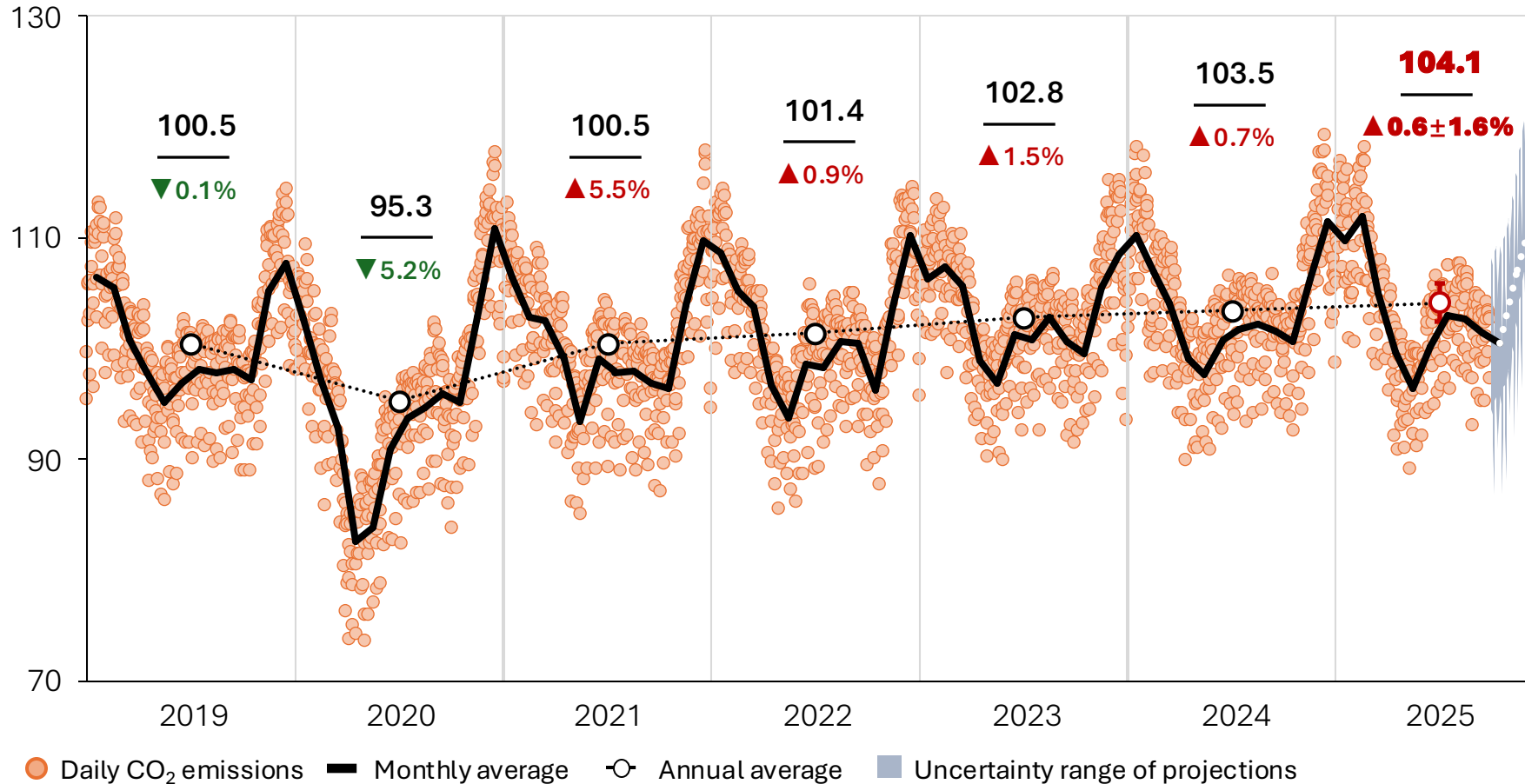
Daily CO$_2$ projections from 2025/10/1 to 2025/12/31 are estimated based on daily CO$_2$ emission data from 2019/1/1 to 2025/9/30

Source: *Carbon Monitor* (https://carbonmonitor.org)

CO$_2$ emissions will decline in China and Russia, but grow in other emitters[1,2].

Year-over-year change in 2025, **% per year**

Daily CO$_2$ emissions (annual mean) during 1990-2025, **Mt CO$_2$ per day**

Projected change in 2025
Rest of world (ROW), **+1.6%**
China, **-1.2%**

United States (US), **+2.7%**

India, **+0.4%**
European Union (EU), **+0.9%**
Russia, **-1.0%**
Japan, **+0.8%**
Brazil, **+3.4%**
United Kingdom (UK), **+1.5%**

[1] CO$_2$ emissions from fossil fuel combustion and industrial processes;
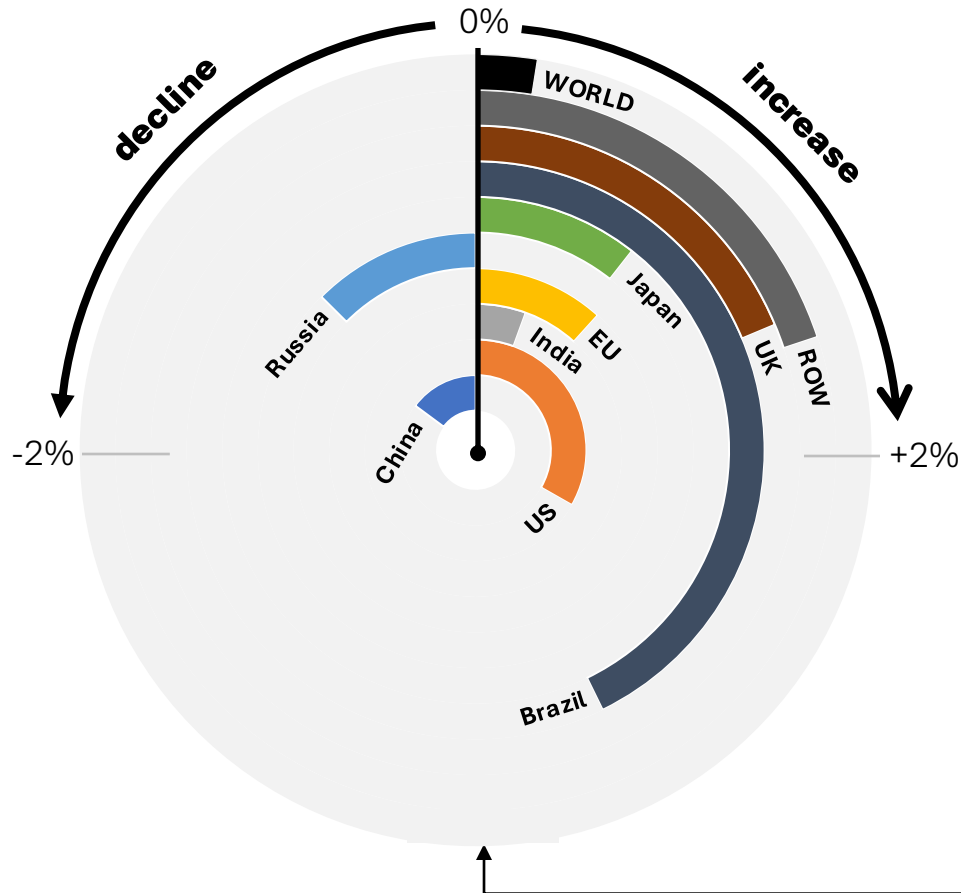[2] Full-year CO$_2$ projections in 2025 are estimated based on daily CO$_2$ emission data from 2019/1/1 to 2025/9/30.
Source: *Carbon Monitor* (https://carbonmonitor.org)
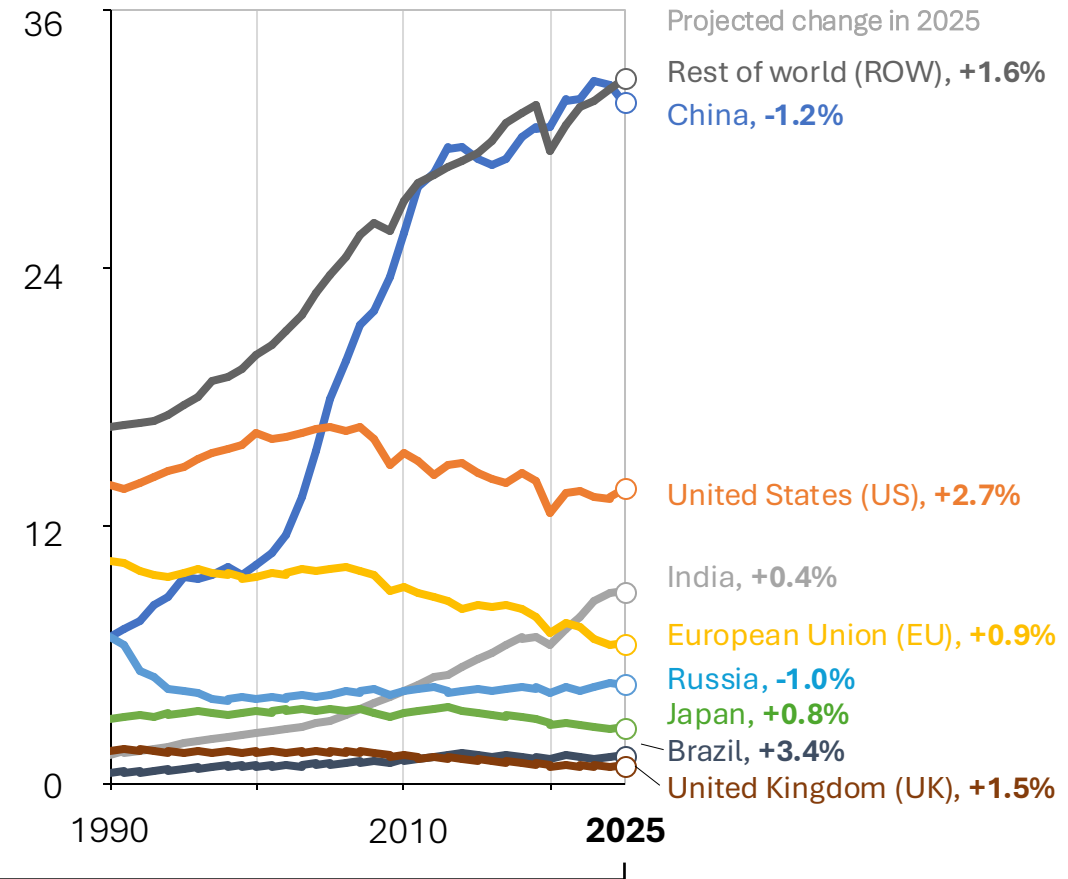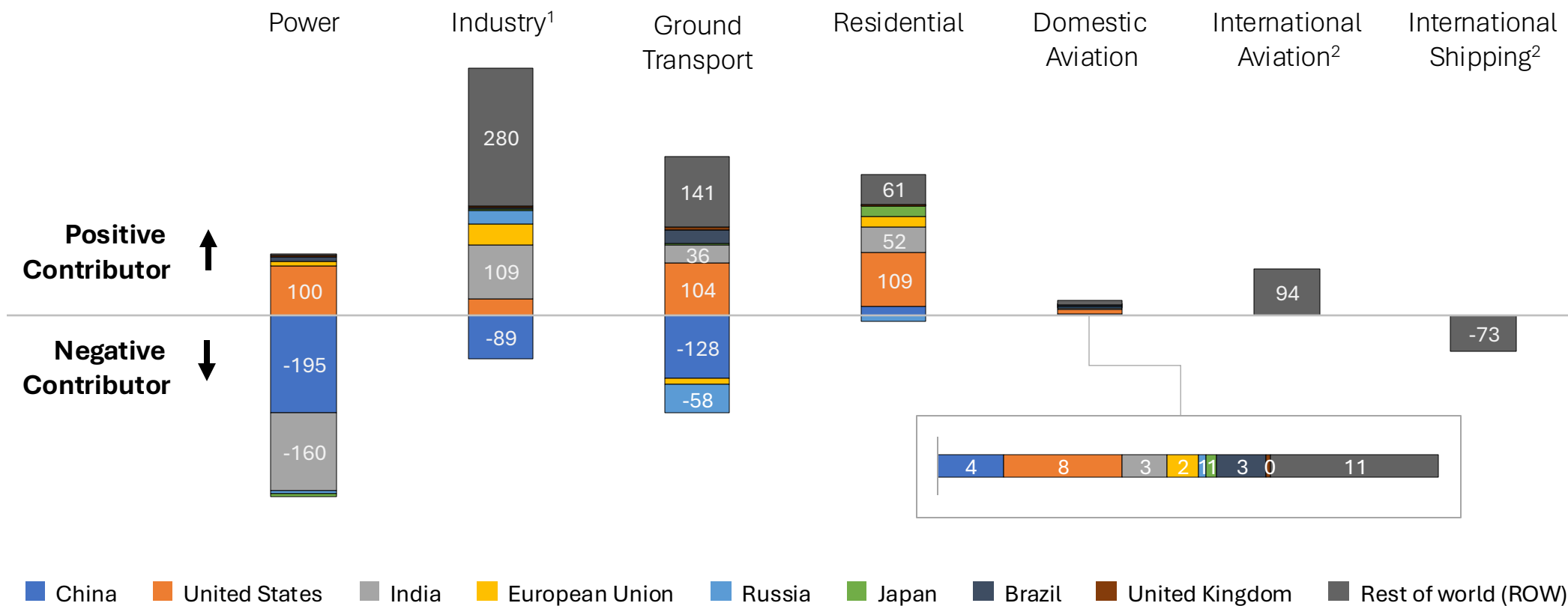
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China leads global emissions reductions in 2025, driven by declines across sectors.

Change from annual average daily CO_2 emissions from 2024 to 2025, Kt CO_2 per day

Power Industry[1] Ground Transport Residential Domestic Aviation International Aviation[2] International Shipping[2]

Positive Contributor ↑

Negative Contributor ↓

Power: 100, -195, -160
Industry[1]: 280, 109, -89
Ground Transport: 141, 36, 104, -128, -58
Residential: 61, 52, 109
International Aviation[2]: 94
International Shipping[2]: -73

Inset: 4 8 3 2 1 1 3 0 11

Legend: ■ China ■ United States ■ India ■ European Union ■ Russia ■ Japan ■ Brazil ■ United Kingdom ■ Rest of world (ROW)

[1] Including energy-related and process-related emissions;
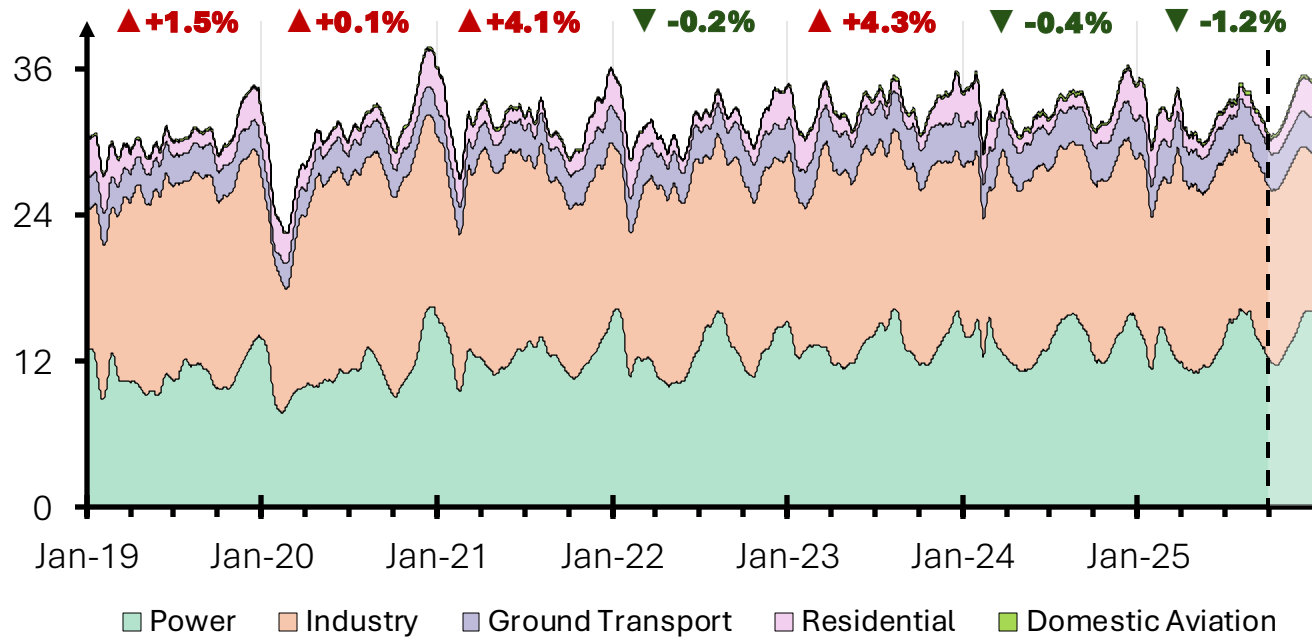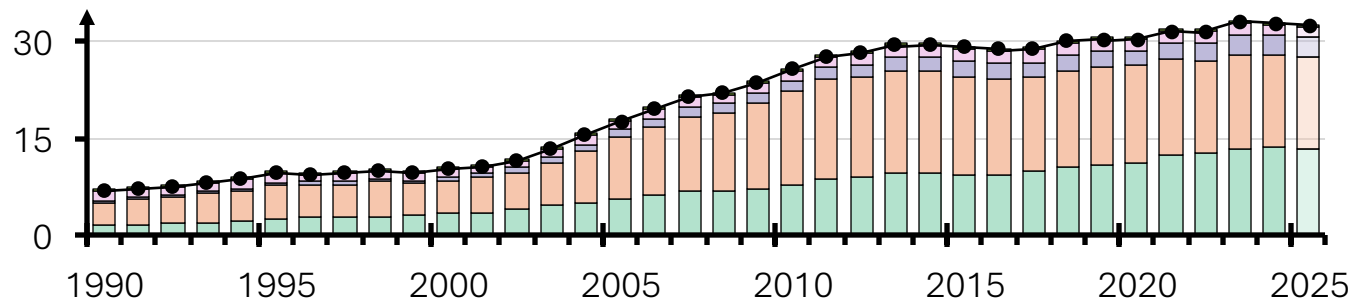[2] Following the IPCC guidelines, international bunkers are included in the global total and counted under ROW.

Source: *Carbon Monitor* (https://carbonmonitor.org)

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02
Country Profiles

China: daily CO_2 emissions, 2019/1/1 – 2025/12/31, Mt CO_2 per day

▲ +1.5%   ▲ +0.1%   ▲ +4.1%   ▼ -0.2%   ▲ +4.3%   ▼ -0.4%   ▼ -1.2%

Legend: Power, Industry, Ground Transport, Residential, Domestic Aviation

China: annual CO_2 emission trend, 1990-2025, Mt CO_2 per day

China: year-over-year CO_2 changes in 2025

Mt CO_2 per day	2024	2025	Change
Power	13.63	13.44	-1.4%
Industry[1]	14.37	14.28	-0.6%
Ground Transport	3.07	2.94	-4.2%
Residential	1.66	1.67	+1.0%
Domestic Aviation	0.25	0.25	+1.5%
Total	**32.97**	**32.58**	**-1.2%**

Source: *Carbon Monitor* (https://carbonmonitor.org)

[1] Including energy-related and process-related emissions.

United States: daily CO_2 emissions, 2019/1/1 – 2025/12/31, Mt CO_2 per day

▼ -2.7%   ▼ -10.5%   ▲ +7.5%   ▲ +0.7%   ▼ -2.1%   ▼ -0.1%   ▲ +2.7%

Power · Industry · Ground Transport · Residential · Domestic Aviation
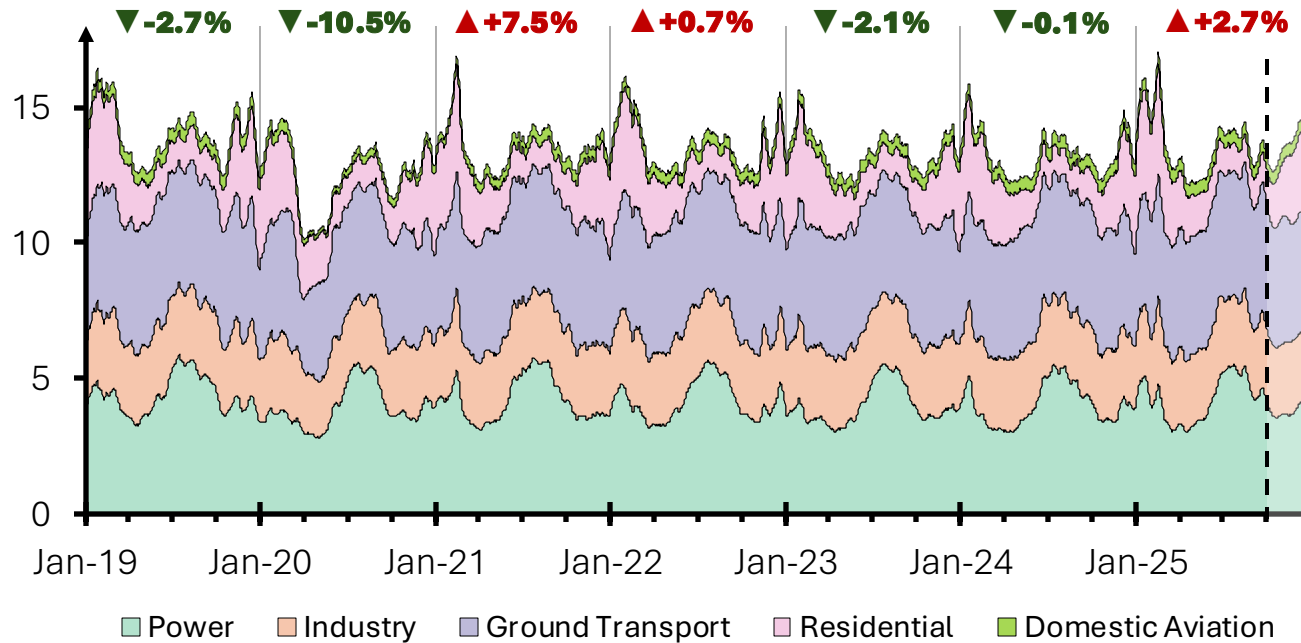
United States: annual CO_2 emission trend, 1990-2025, Mt CO_2 per day

Source: *Carbon Monitor* (https://carbonmonitor.org)
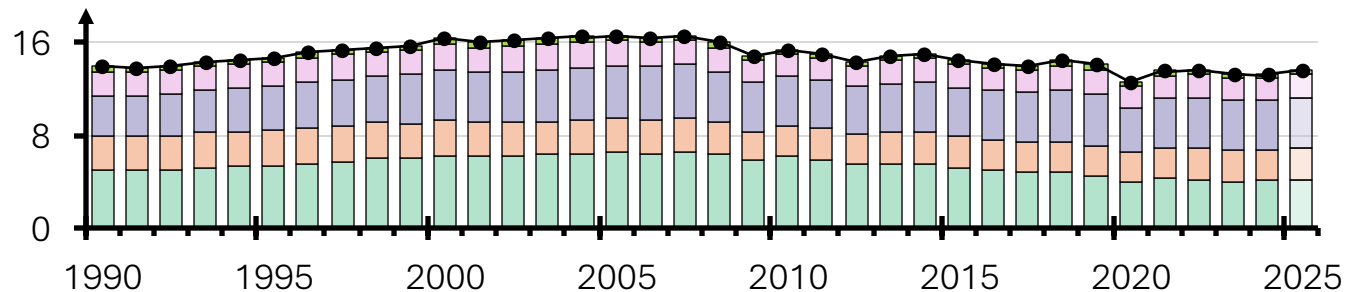
United States: year-over-year CO_2 changes in 2025

Mt CO_2 per day	2024	2025	Change
Power	4.04	4.14	+2.5%
Industry[1]	2.63	2.66	+1.3%
Ground Transport	4.32	4.43	+2.4%
Residential	1.90	2.01	+5.7%
Domestic Aviation	0.45	0.46	+1.7%
Total	**13.34**	**13.70**	**+2.7%**

[1] Including energy-related and process-related emissions.

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India: daily CO$_2$ emissions, 2019/1/1 – 2025/12/31, Mt CO$_2$ per day
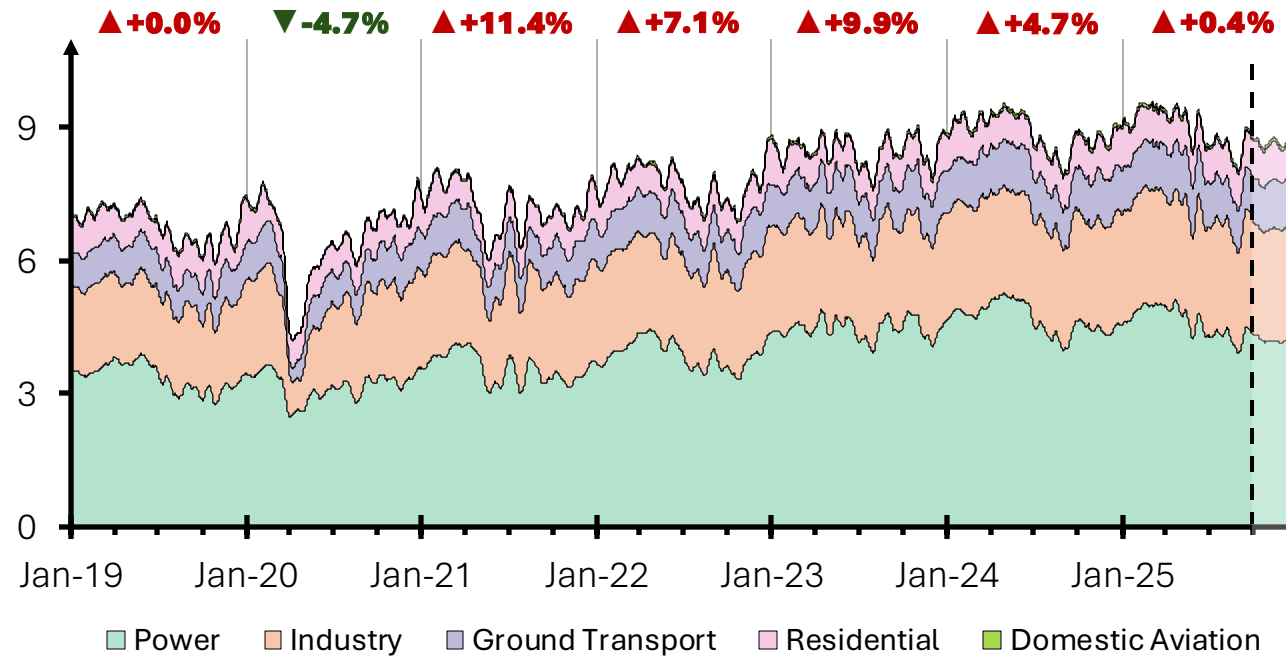
▲ +0.0% ▼ -4.7% ▲ +11.4% ▲ +7.1% ▲ +9.9% ▲ +4.7% ▲ +0.4%

Legend: Power · Industry · Ground Transport · Residential · Domestic Aviation

X-axis: Jan-19, Jan-20, Jan-21, Jan-22, Jan-23, Jan-24, Jan-25

India: annual CO$_2$ emission trend, 1990-2025, Mt CO$_2$ per day

X-axis: 1990, 1995, 2000, 2005, 2010, 2015, 2020, 2025

Source: *Carbon Monitor* (https://carbonmonitor.org)
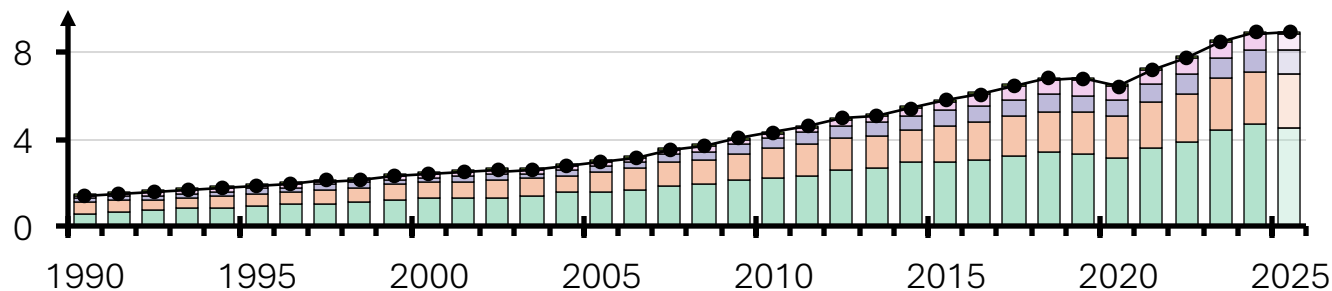
India: year-over-year CO$_2$ changes in 2025

Mt CO$_2$ per day	2024	2025	Change
Power	4.69	4.53	-3.4%
Industry[1]	2.42	2.52	+4.5%
Ground Transport	1.00	1.03	+3.6%
Residential	0.75	0.80	+6.9%
Domestic Aviation	0.07	0.07	+4.1%
Total	**8.93**	**8.97**	**+0.4%**

[1] Including energy-related and process-related emissions.

EU27: daily CO_2 emissions, 2019/1/1 – 2025/12/31, Mt CO_2 per day

▼-4.8%   ▼-10.0%   ▲+7.3%   ▼-2.4%   ▼-8.1%   ▼-3.4%   ▲+0.9%

Legend: ■ Power ■ Industry ■ Ground Transport ■ Residential ■ Domestic Aviation
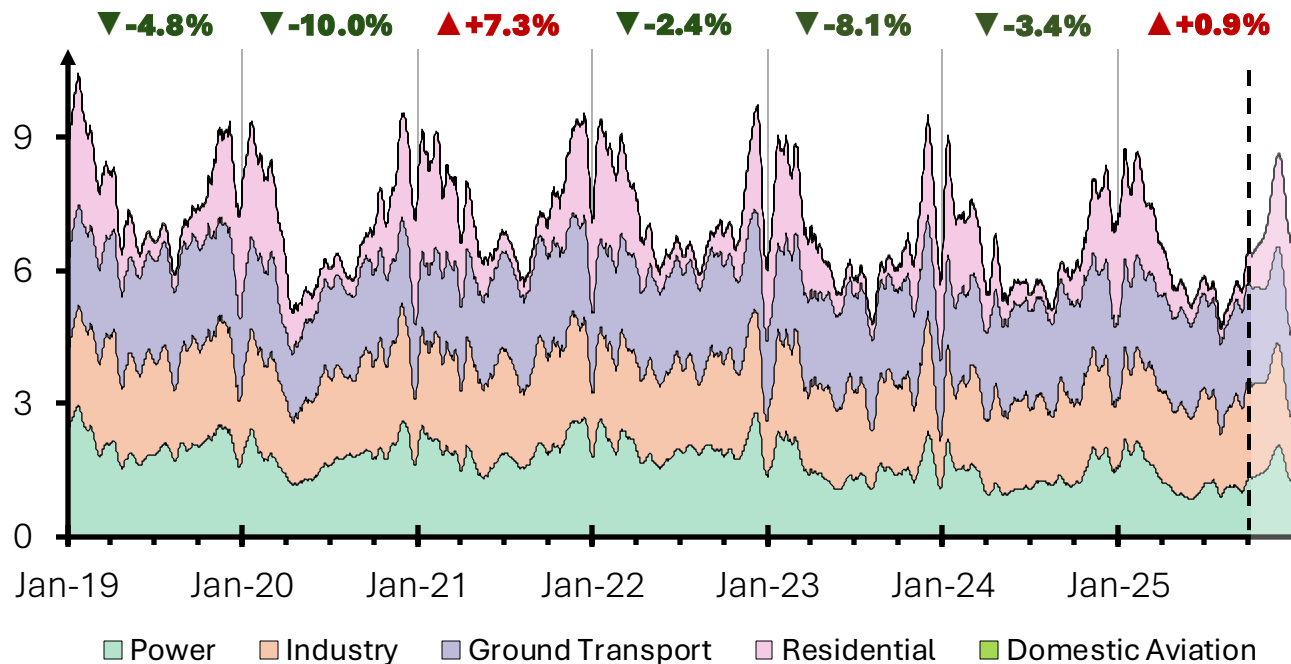
EU27: annual CO_2 emission trend, 1990-2025, Mt CO_2 per day
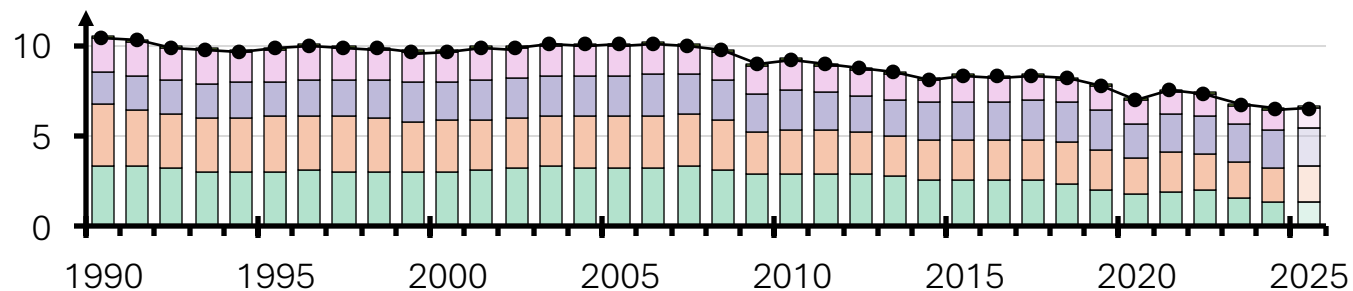
EU27: year-over-year CO_2 changes in 2025

Mt CO_2 per day	2024	2025	Change
Power	1.36	1.37	+0.6%
Industry[1]	1.92	1.96	+2.1%
Ground Transport	2.11	2.10	-0.5%
Residential	1.08	1.10	+1.9%
Domestic Aviation	0.04	0.04	+5.3%
Total	**6.51**	**6.57**	**+0.9%**

[1] Including energy-related and process-related emissions.

Source: *Carbon Monitor* (https://carbonmonitor.org)

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Russia: daily CO_2 emissions, 2019/1/1 – 2025/12/31, Mt CO_2 per day

▼-1.3% ▼-4.5% ▲+5.4% ▼-3.3% ▲+3.3% ▲+4.6% ▼-1.0%

Legend: ■ Power ■ Industry ■ Ground Transport ■ Residential ■ Domestic Aviation
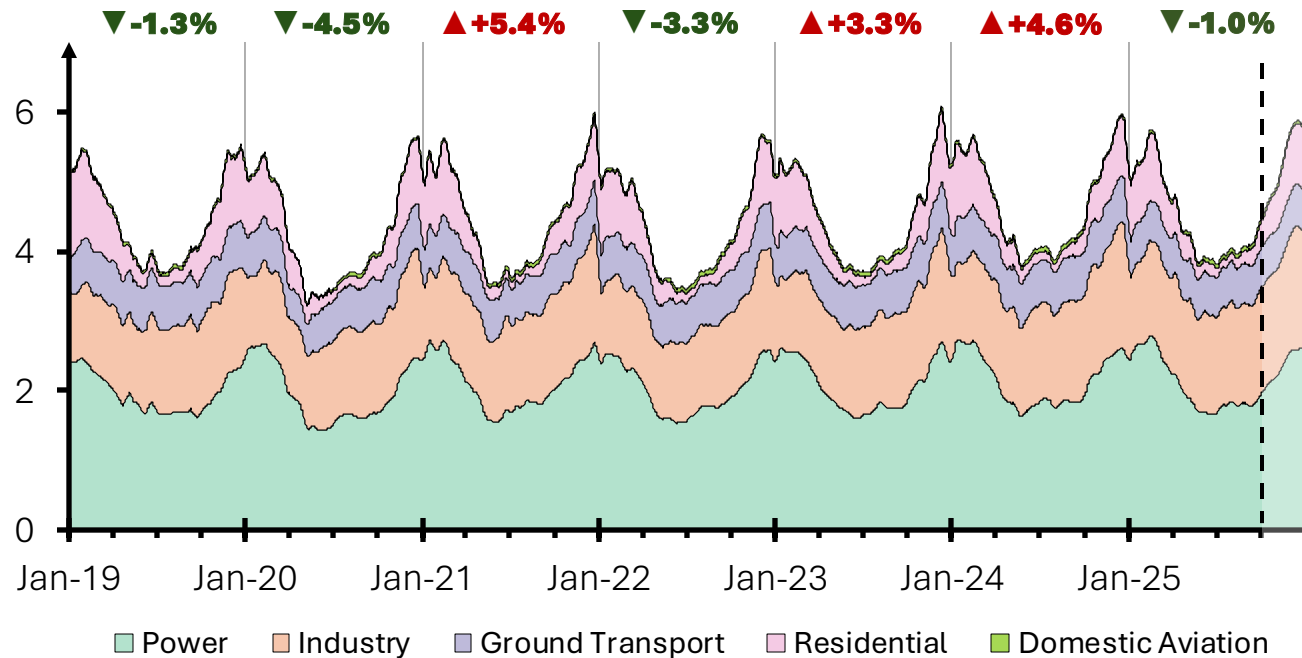
Russia: annual CO_2 emission trend, 1990-2025, Mt CO_2 per day
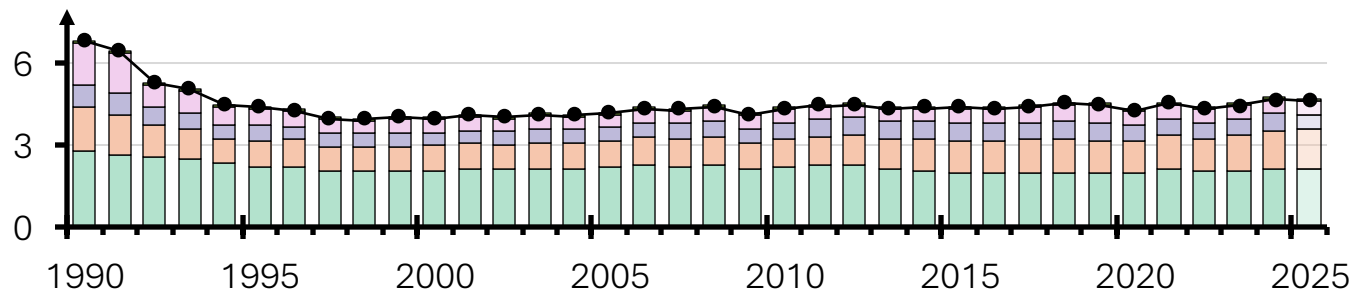
Russia: year-over-year CO_2 changes in 2025

Mt CO_2 per day	2024	2025	Change
Power	2.15	2.14	-0.2%
Industry[1]	1.40	1.43	+2.0%
Ground Transport	0.63	0.57	-9.2%
Residential	0.50	0.48	-2.7%
Domestic Aviation	0.05	0.05	+1.2%
Total	**4.73**	**4.68**	**-1.0%**

Source: *Carbon Monitor* (https://carbonmonitor.org)

[1] Including energy-related and process-related emissions.

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Japan: daily CO_2 emissions, 2019/1/1 – 2025/12/31, Mt CO_2 per day

▼-3.2% ▼-6.1% ▲+2.3% ▼-2.5% ▼-5.1% ▼-2.1% ▲+0.8%

Legend: Power · Industry · Ground Transport · Residential · Domestic Aviation

Japan: annual CO_2 emission trend, 1990-2025, Mt CO_2 per day
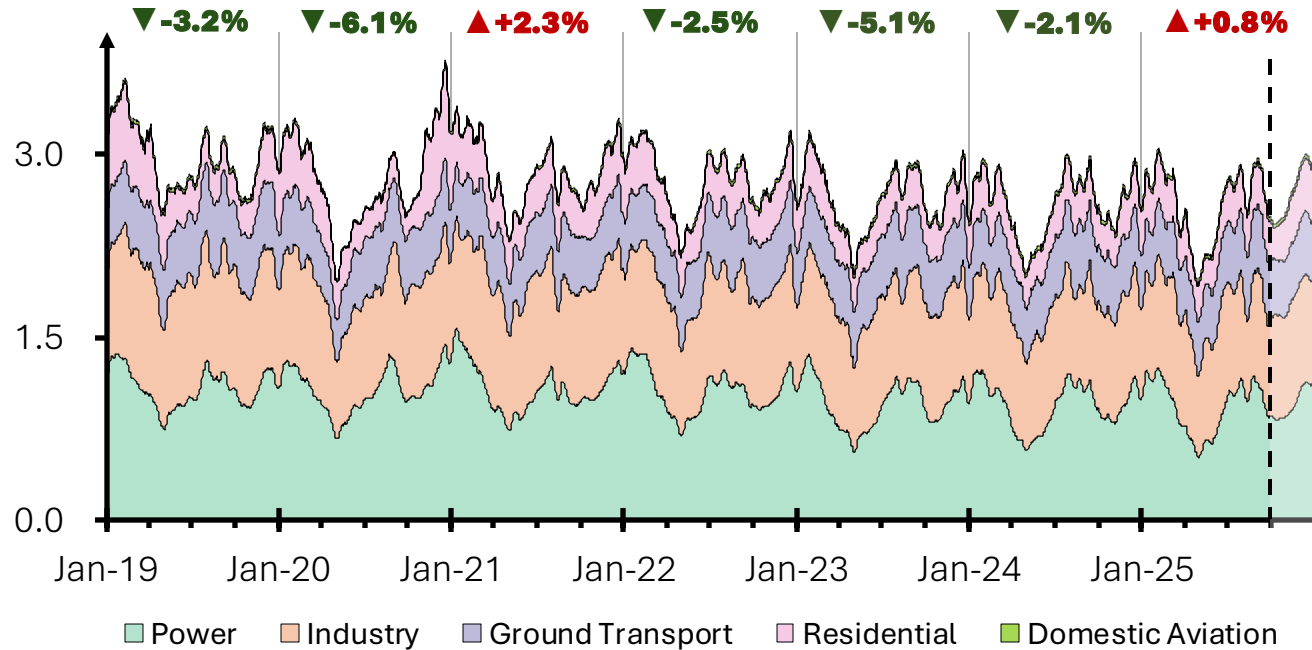
Source: *Carbon Monitor* (https://carbonmonitor.org)
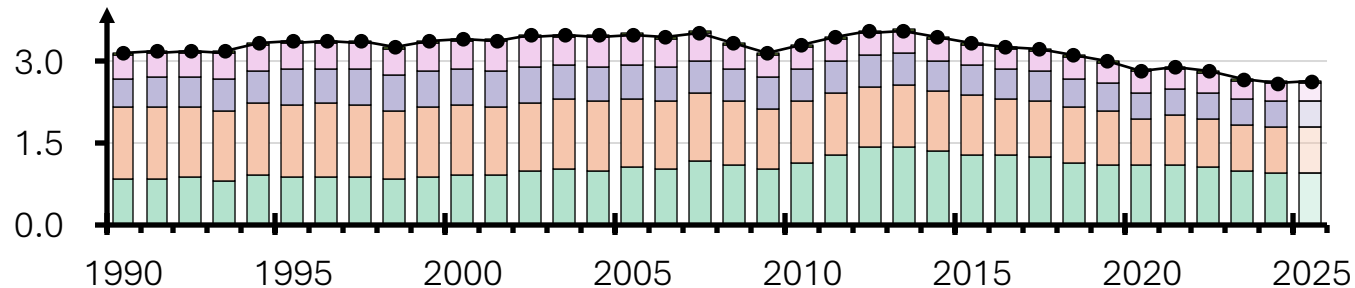
Japan: year-over-year CO_2 changes in 2025

Mt CO_2 per day	2024	2025	Change
Power	0.95	0.94	-0.7%
Industry[1]	0.85	0.85	+0.2%
Ground Transport	0.47	0.47	+0.9%
Residential	0.31	0.34	+7.0%
Domestic Aviation	0.03	0.03	+2.2%
Total	**2.60**	**2.63**	**+0.8%**

[1] Including energy-related and process-related emissions.

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Brazil: daily CO_2 emissions, 2019/1/1 – 2025/12/31, Mt CO_2 per day

▼ -1.2%   ▼ -4.3%   ▲ +12.5%   ▼ -4.8%   ▼ -1.1%   ▲ +1.9%   ▲ +3.4%

Legend: Power, Industry, Ground Transport, Residential, Domestic Aviation
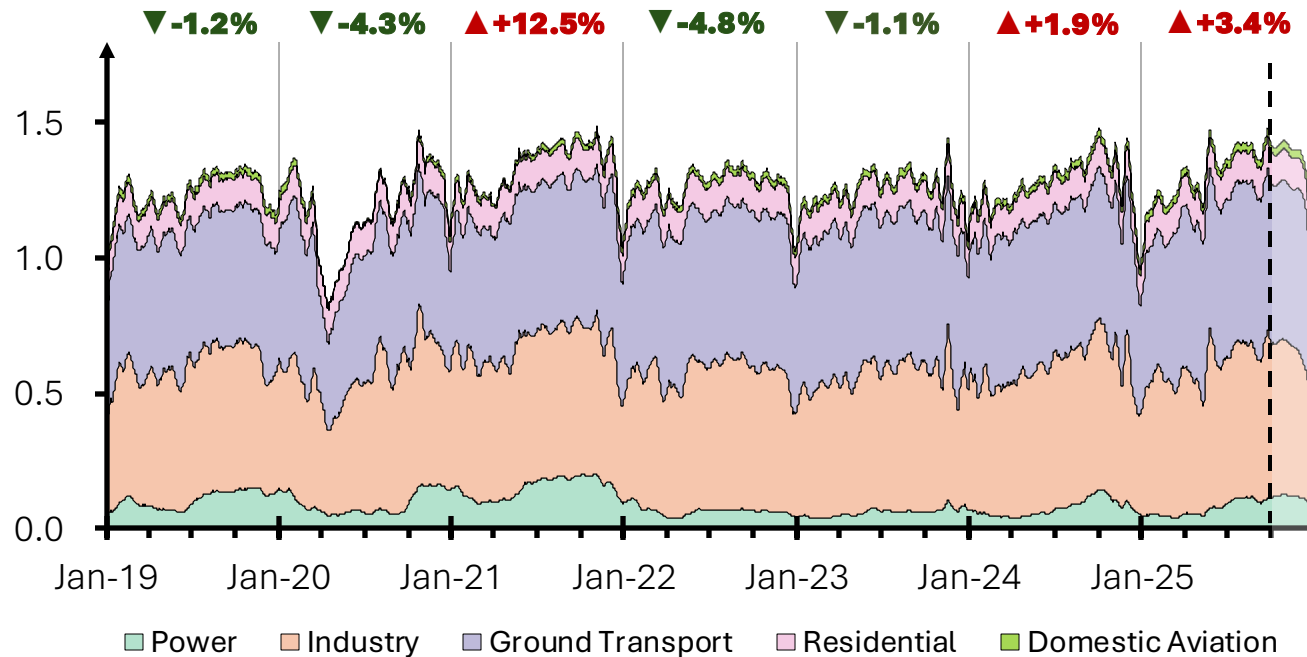
Brazil: annual CO_2 emission trend, 1990-2025, Mt CO_2 per day
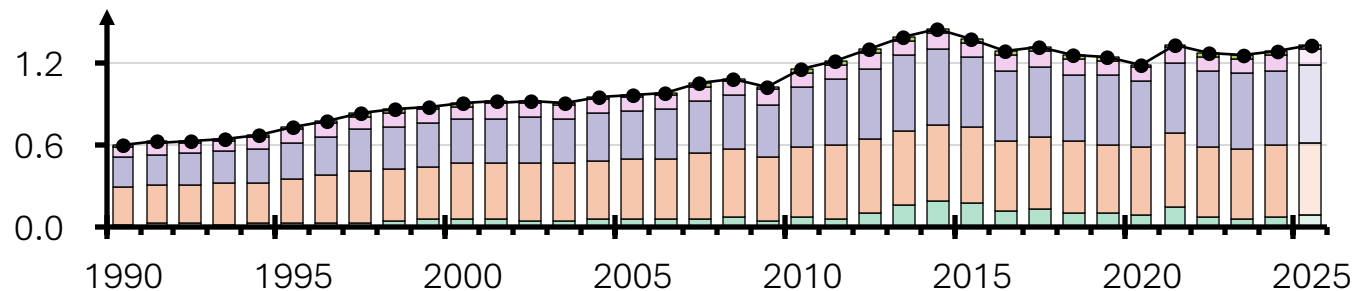
Brazil: year-over-year CO_2 changes in 2025

Mt CO_2 per day	2024	2025	Change
Power	0.07	0.08	+12.4%
Industry[1]	0.53	0.53	+0.6%
Ground Transport	0.54	0.57	+5.0%
Residential	0.11	0.11	+0.8%
Domestic Aviation	0.02	0.03	+12.6%
Total	**1.28**	**1.33**	**+3.4%**

Source: *Carbon Monitor* (https://carbonmonitor.org)

[1] Including energy-related and process-related emissions.

Carbon Monitor

United Kingdom: daily CO_2 emissions, 2019/1/1 – 2025/12/31, Mt CO_2 per day

▼-3.6% ▼-10.9% ▲+6.1% ▼-3.7% ▼-3.0% ▼-2.1% ▲+1.5%

Power Industry Ground Transport Residential Domestic Aviation

United Kingdom: annual CO_2 emission trend, 1990-2025, Mt CO_2 per day

Source: *Carbon Monitor* (https://carbonmonitor.org)

United Kingdom: year-over-year CO_2 changes in 2025

Mt CO_2 per day	2024	2025	Change
Power	0.10	0.10	+1.3%
Industry[1]	0.22	0.22	+0.9%
Ground Transport	0.30	0.31	+2.1%
Residential	0.23	0.24	+1.2%
Domestic Aviation	0.00	0.01	+5.9%
Total	**0.85**	**0.86**	**+1.5%**

[1] Including energy-related and process-related emissions.

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ROW: daily CO_2 emissions, 2019/1/1 – 2025/12/31, Mt CO_2 per day

▲ +1.3% ▼ -6.9% ▲ +4.3% ▲ +2.6% ▲ +0.9% ▲ +1.7% ▲ +1.6%

Legend:
- Power
- Industry
- Ground Transport
- Residential
- Domestic Aviation
- International Aviation
- International Shipping
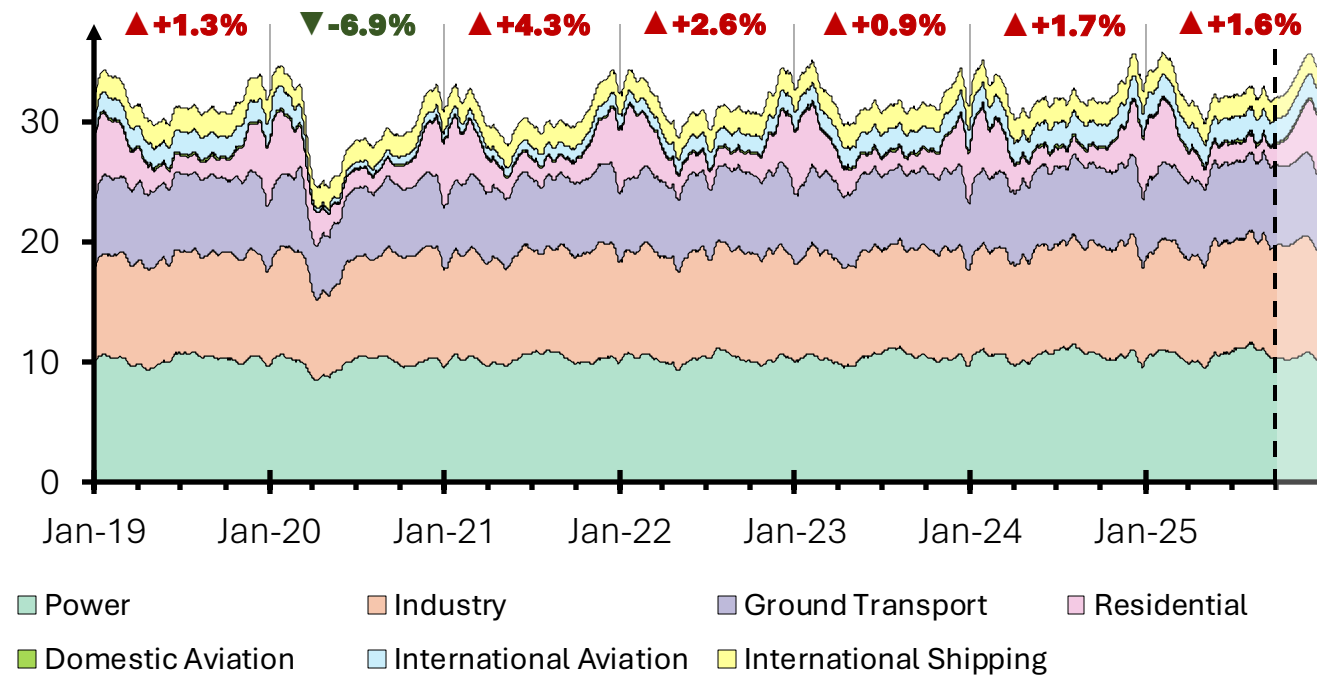
ROW: annual CO_2 emission trend, 1990-2025, Mt CO_2 per day
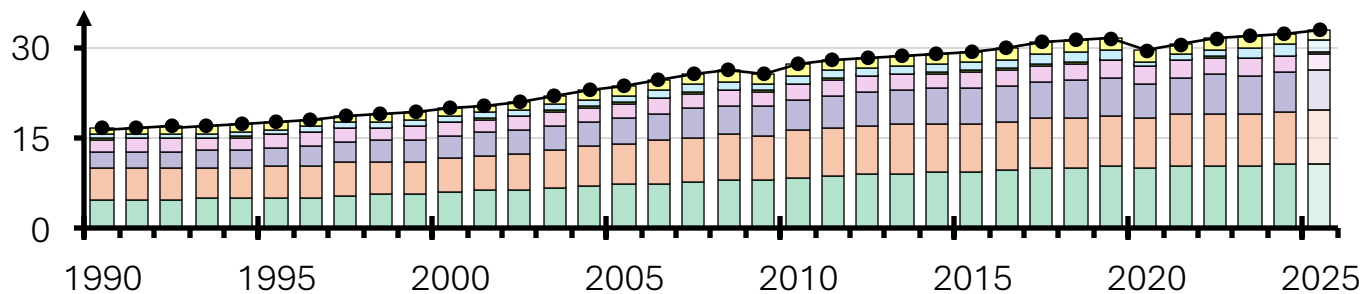
ROW: year-over-year CO_2 changes in 2025

Mt CO_2 per day	2024	2025	Change
Power	10.56	10.56	+0.0%
Industry[1]	8.86	9.14	+3.2%
Ground Transport	6.34	6.48	+2.2%
Residential	2.71	2.77	+2.2%
Domestic Aviation	0.17	0.18	+6.0%
International Aviation	1.82	1.92	+5.1%
International Shipping	1.84	1.77	-3.9%
Total	**32.31**	**32.83**	**+1.6%**

Source: *Carbon Monitor* (https://carbonmonitor.org)

[1] Including energy-related and process-related emissions.

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Appendix

➤ Daily CO_2 emission estimates

We calculate daily CO_2 emissions since January 2019, drawing on hourly datasets of electricity production and CO_2 emissions in 56 countries (including the substantial variations in carbon intensity associated with electricity production), three different indexes of daily vehicle traffic/mobility in 500 cities worldwide, monthly production data for cement, steel and other energy-intensive industrial products in 73 countries, daily aircraft transportation activity data and proxies for residential building emissions.

Details about the estimation of sectoral emissions can be accessed here.

➤ Sector classification mapping between Carbon Monitor and IPCC guidelines

IPCC Sector	CM Sector
1.A.1.a. Public electricity and heat production	Power
1.A.1.b. Petroleum refining	Industry
1.A.1.c. Manufacture of solid fuels and other energy industries	Industry
1.A.2. Manufacturing industries and construction	Industry
1.A.3.a. Domestic aviation	Domestic Aviation
1.A.3. Transport (excluding 1.A.3.a)	Ground Transport
1.A.4. Other sectors	Residential
1.A.5. Other	Residential
2. Total industrial processes	Industry

➤ Short-term projection by the end of 2025

We used a time series forecasting model based on an additive decomposition framework to predict the full-year CO_2 emissions in 2025. The model separates the emission dynamics into four structural components:

$$y(t) = g(t) + s(t) + h(t) + \varepsilon$$

where $g(t)$ is the trend function, capturing long-term directional changes in emissions; $s(t)$ represents the temporal patterns, e.g. seasonality; $h(t)$ denotes the holiday effects, encoding country-specific public holidays and major events that disrupt normal activity (e.g., Spring Festival holidays in China, COVID-19 lockdowns); ε is the error item, representing stochastic variability not explained by the above components.

Historical daily CO_2 emissions data from Carbon Monitor, spanning January 1, 2019 to September 30, 2025, are used as input. Data are disaggregated by country and sector to capture heterogeneous emission patterns. Each country–sector series is modeled independently to preserve unique structural dynamics. The fitted models generate daily predictions for October 1 to December 31, 2025, which are then aggregated to produce annual projections at both the national and global levels.

Near-real-time daily CO_2 datasets:

- **Carbon Monitor**: Global daily CO_2 emissions, https://carbonmonitor.org

- **Carbon Monitor - China**: Daily CO_2 emissions over 30 provinces in China, https://cn.carbonmonitor.org

- **Carbon Monitor - Europe**: National daily CO_2 emissions over 30 European countries, https://eu.carbonmonitor.org

- **Carbon Monitor - Power:** Global daily type-specific power generation data, https://power.carbonmonitor.org

- **Carbon Monitor - Cities:** Daily CO_2 emissions in cities, https://cities.carbonmonitor.org

- **GRACED**: Global daily CO_2 emission maps, https://carbonmonitor-graced.com

Related papers:

- Deng, Z., Zhu, B., Davis, S.J. *et al*. **Global carbon emissions and decarbonization in 2024**. *Nature Reviews Earth & Environment* **6**, 231–233 (2025).

- Liu, Z., Deng, Z., Davis, S.J. *et al*. **Global carbon emissions in 2023**. *Nature Reviews Earth & Environment* **5**, 253–254 (2024).

- Liu, Z., Deng, Z., Davis, S. *et al*. **Monitoring global carbon emissions in 2022**. *Nature Reviews Earth & Environment* **4**, 205–206 (2023).

- Liu, Z., Deng, Z., Zhu, B. *et al*. **Global patterns of daily CO_2 emissions reductions in the first year of COVID-19.** *Nature Geoscience* (2022).

- Davis, S.J., Liu, Z., Deng, Z. *et al*. **Emissions rebound from the COVID-19 pandemic**. *Nature Climate Change* **12**, 412–414 (2022).

- Liu, Z., Deng, Z., Davis, S.J. *et al*. **Monitoring global carbon emissions in 2021**. *Nature Reviews Earth & Environment* **3**, 217–219 (2022).

- Liu, Z., Ciais, P., Deng, Z. *et al*. **Near-real-time monitoring of global CO_2 emissions reveals the effects of the COVID-19 pandemic**. *Nature Communications* **11**, 5172 (2020).

- Liu, Z., Ciais, P., Deng, Z. *et al*. **Carbon Monitor, a near-real-time daily dataset of global CO_2 emissions from fossil fuel and cement production**. *Scientific Data* **7**, 392 (2020).

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