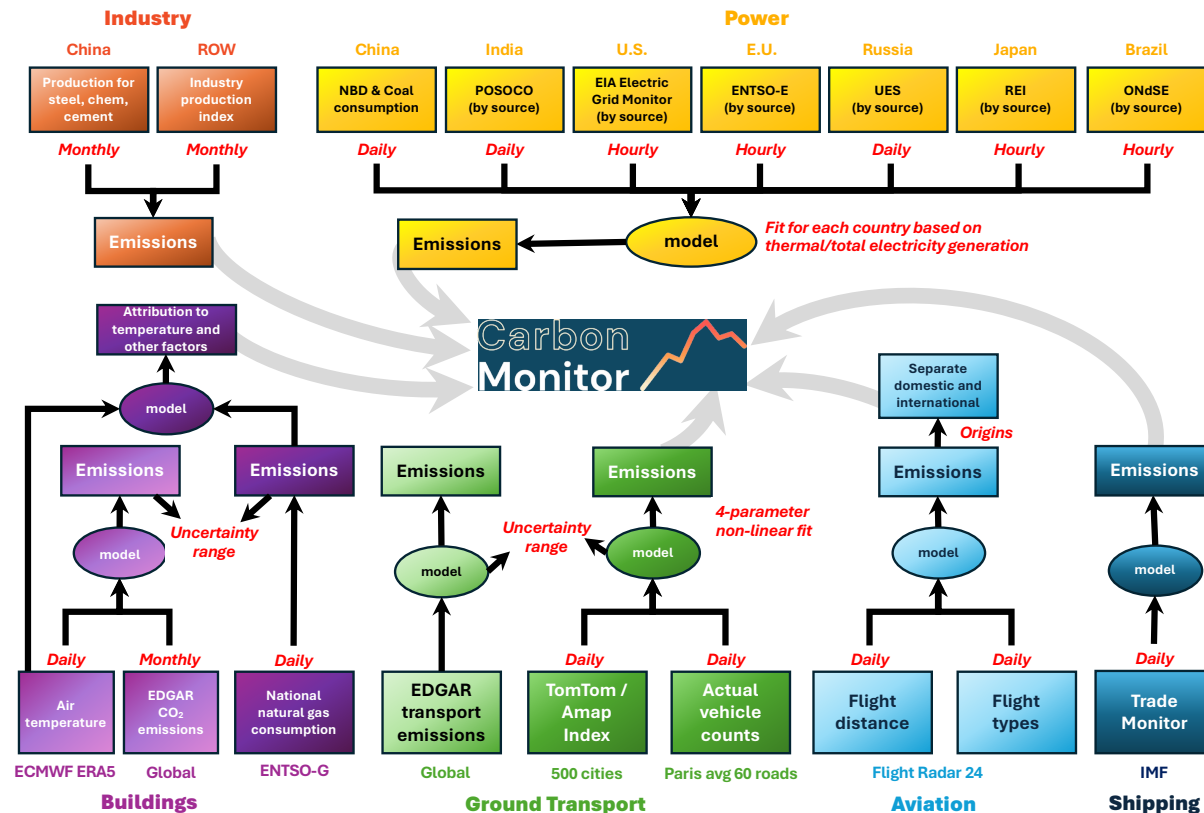


# Global Near-real-time Daily CO<sub>2</sub> Emission Report 2025

**Carbon Monitor** is a frequently updated daily CO<sub>2</sub> emission dataset, to monitor the variations of CO<sub>2</sub> emissions from fossil fuel combustion and cement production since January 1<sup>st</sup> 2019 at the national level with near-global coverage.



Daily CO<sub>2</sub> 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<sub>2</sub> emission dataset released by Carbon Monitor on November 1, 2025.

**Coverage:** 175,015 daily CO<sub>2</sub> emission records from January 1, 2019 to September 30, 2025, covering:

- **Energy-related and process-related emissions across 7 sectors:** Power, Industry<sup>1</sup>, 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<sub>2</sub> emissions are derived from historical daily data covering 2019–2025.

**Data access and versioning:** Up-to-date daily CO<sub>2</sub> 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.

<sup>1</sup> Including energy-related and process-related emissions.

## **Team Leaders**

- Zhu LIU, Tsinghua University, Beijing, China
- Philippe CIAIS, Laboratoire des Sciences du Climat et de l'Environnement (LSCE), Gif-sur-Yvette, France
- Steven J. DAVIS, Stanford University, Stanford, CA, USA

## **Authors**

- Zhu DENG, The University of Hong Kong, Hong Kong SAR, China
- Zi SHAO, The University of Hong Kong, Hong Kong SAR, China
- Jingyu ZHAN, Tsinghua University, Beijing, China
- Piyu KE, Tsinghua University, Beijing, China
- Xinyu DOU, Stanford University, Stanford, CA, USA
- Xiaoting HUANG, Tsinghua University, Beijing, China
- Duo CUI, The University of Hong Kong, Hong Kong SAR, China
- Biqing ZHU, International Institute for Applied Systems Analysis, Laxenburg, Austria
- Xuanren SONG, Tsinghua University, Beijing, China
- Tao LI, Tsinghua University, Beijing, China
- Lixing WANG, Tsinghua University, Beijing, China
- Olivier BOUCHER, Sorbonne Université/CNRS, Paris, France
- Xiaojuan LIN, Tsinghua University, Beijing, China

## **Supported by**

- National Key R&D Program of China (Grant No.2023YFE0113000)
- Research Grants Council-Strategic Topics Grant STG2/P-705/24-R
- Carbon Neutrality and Energy System Transformation (CNEST)
- Department of Earth System Science, Tsinghua University
- Institute for Carbon Neutrality, Tsinghua University
- The State Key Laboratory of Hydroscience and Engineering



01

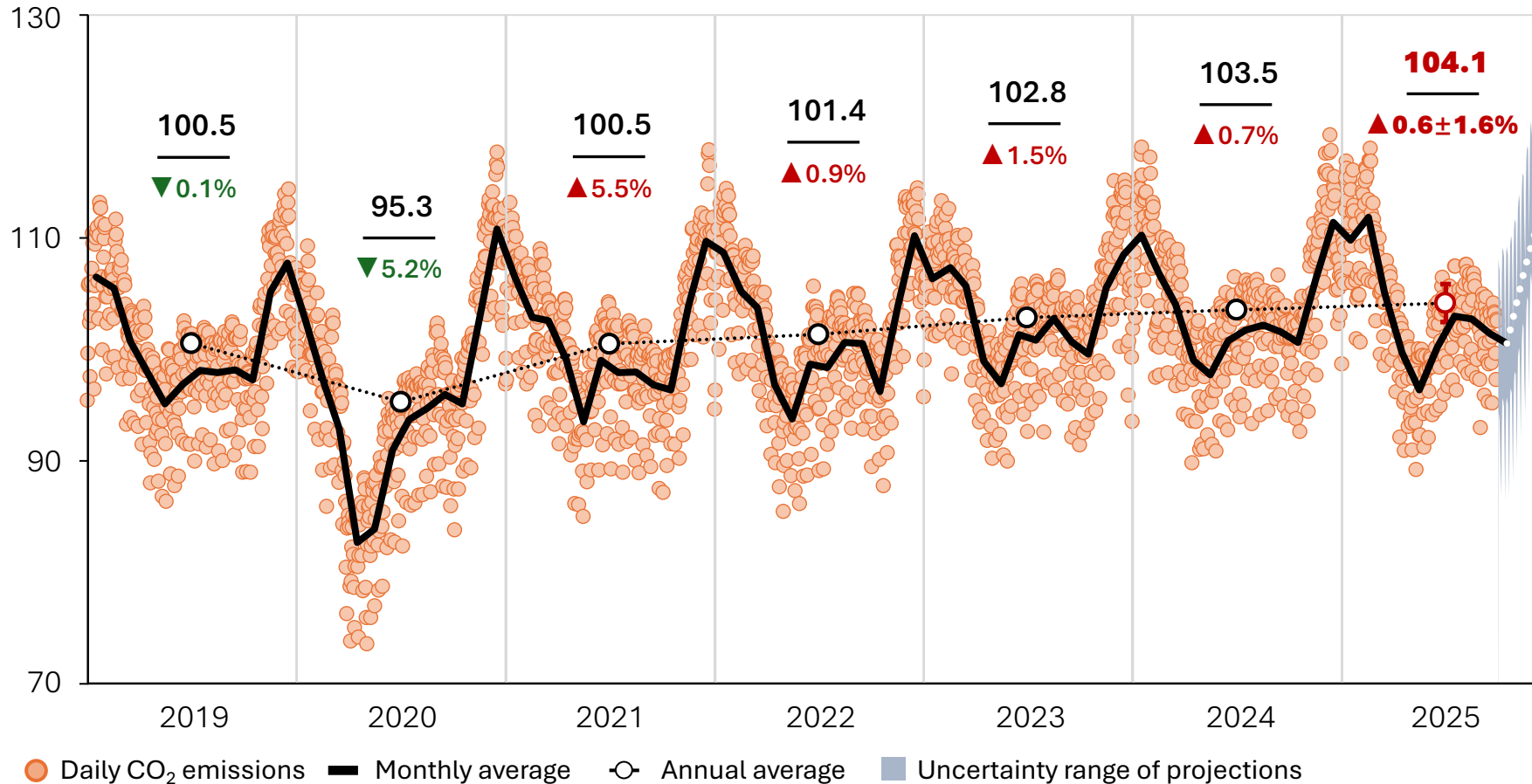
---

# Highlights

# 1.1 Global daily CO<sub>2</sub> emissions in near-real-time

## Record-high global daily CO<sub>2</sub> emissions in 2025, with a slowing growth trend.

Daily CO<sub>2</sub> emissions from fossil fuel combustion and industrial processes, Mt CO<sub>2</sub> per day



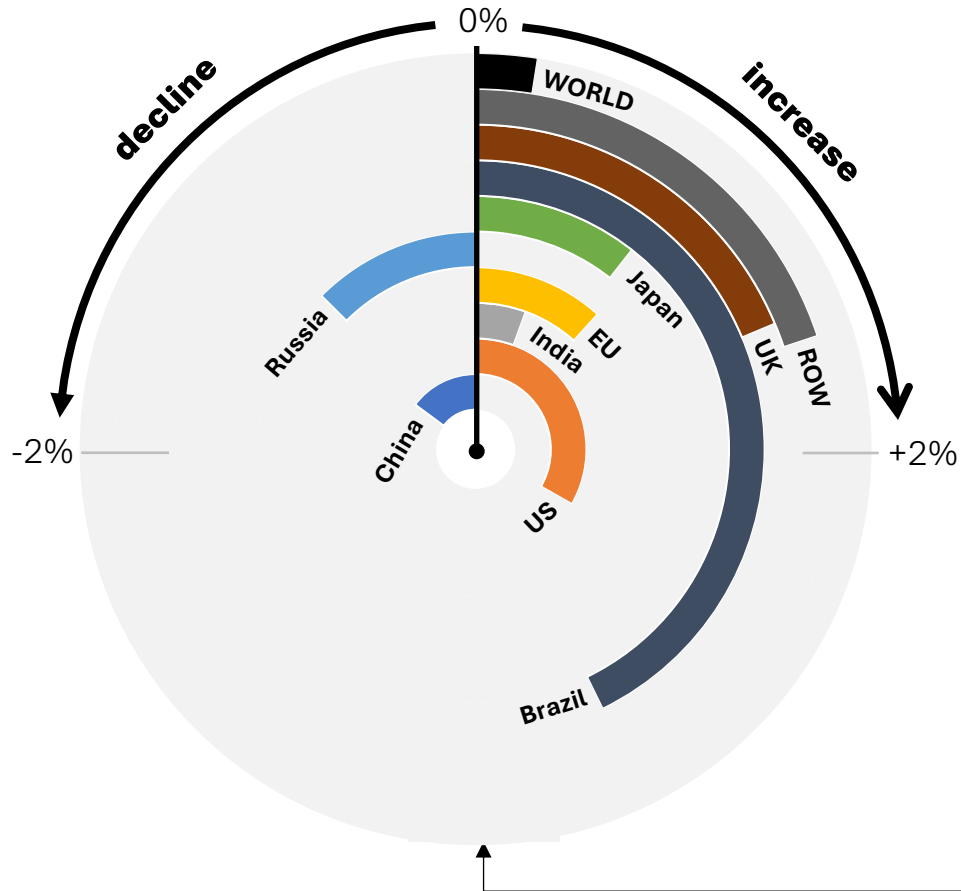
Daily CO<sub>2</sub> projections from 2025/10/1 to 2025/12/31 are estimated based on daily CO<sub>2</sub> emission data from 2019/1/1 to 2025/9/30

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

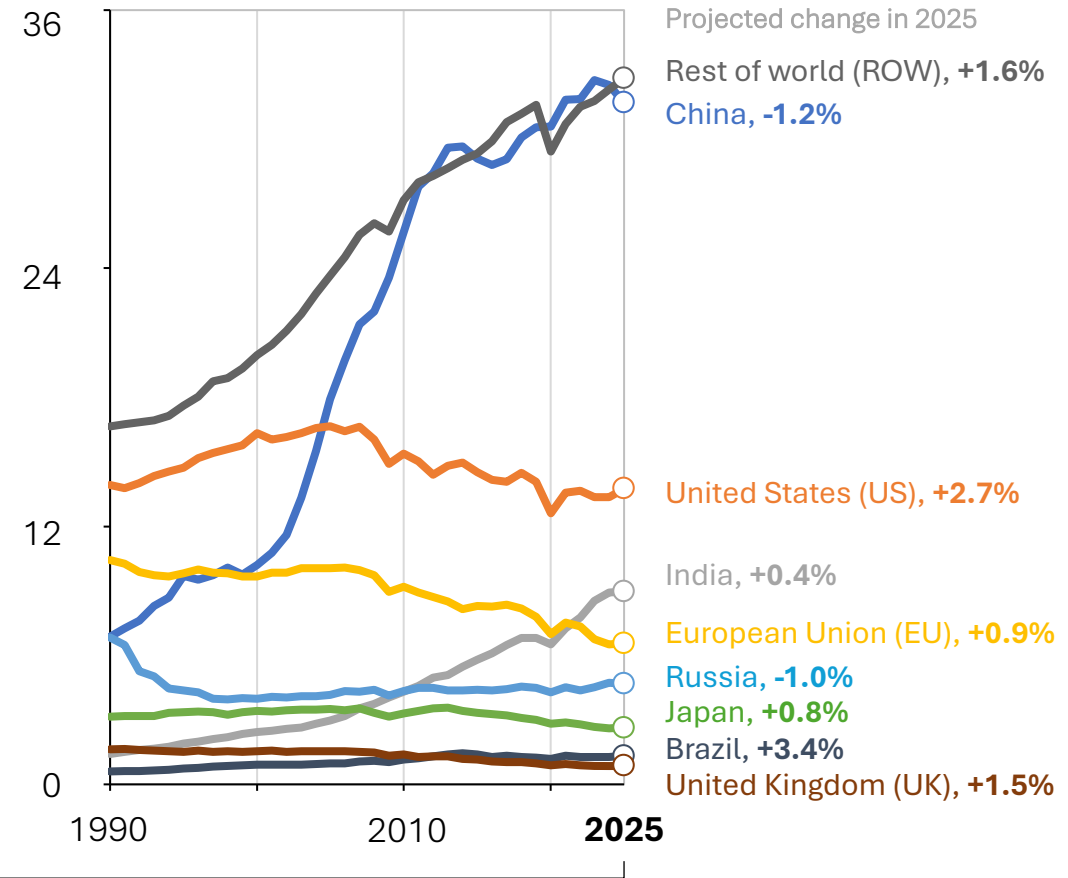
## 1.2 CO<sub>2</sub> emission trends across countries and regions

### CO<sub>2</sub> emissions will decline in China and Russia, but grow in other emitters<sup>1,2</sup>.

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



Daily CO<sub>2</sub> emissions (annual mean) during 1990-2025, Mt CO<sub>2</sub> per day



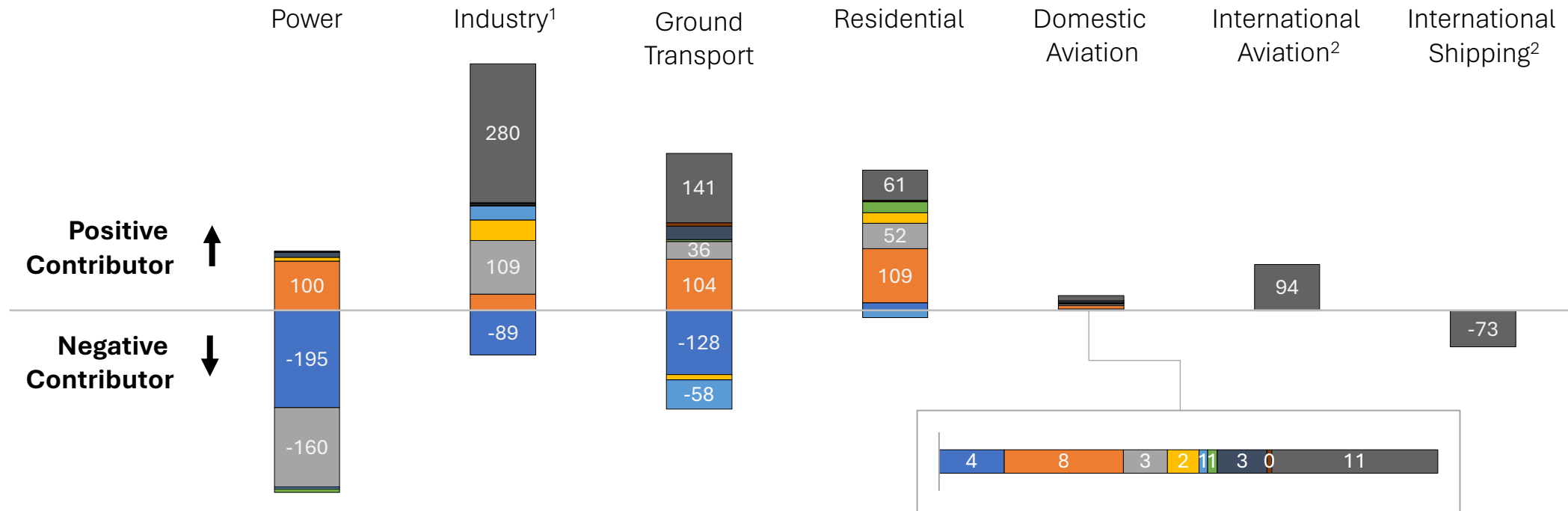
<sup>1</sup> CO<sub>2</sub> emissions from fossil fuel combustion and industrial processes;

<sup>2</sup> Full-year CO<sub>2</sub> projections in 2025 are estimated based on daily CO<sub>2</sub> emission data from 2019/1/1 to 2025/9/30.

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

## China leads global emissions reductions in 2025, driven by declines across sectors.

Change from annual average daily CO<sub>2</sub> emissions from 2024 to 2025, Kt CO<sub>2</sub> per day



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

<sup>1</sup> Including energy-related and process-related emissions;

<sup>2</sup> Following the IPCC guidelines, international bunkers are included in the global total and counted under ROW.

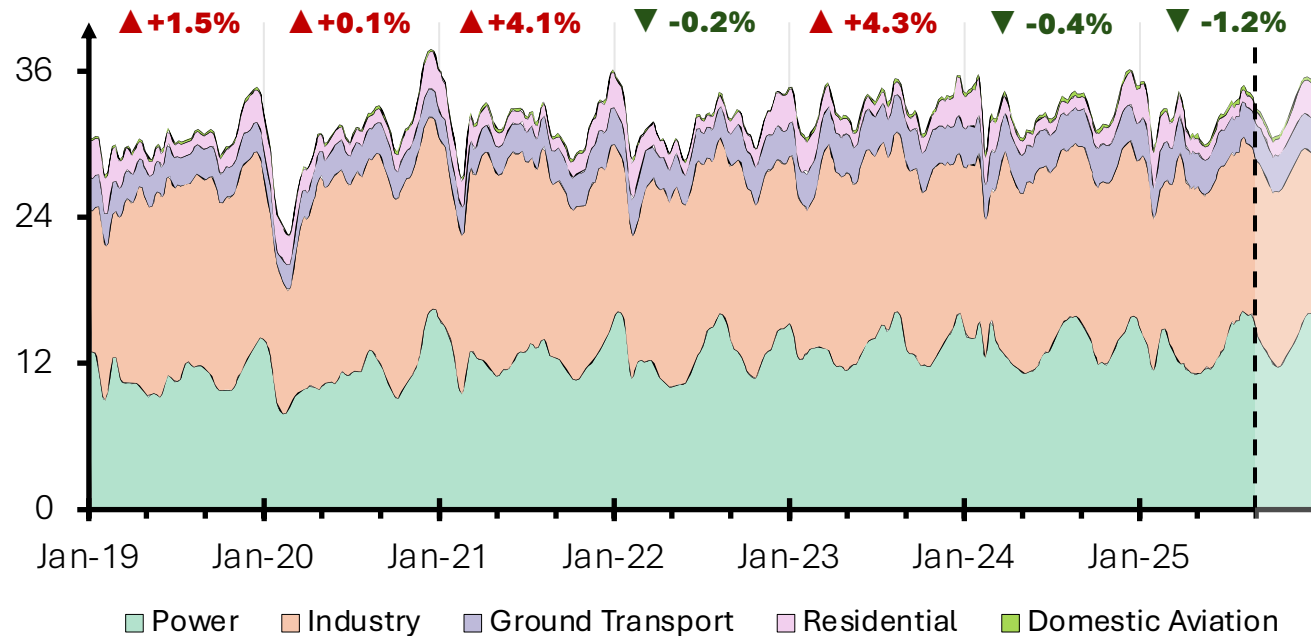
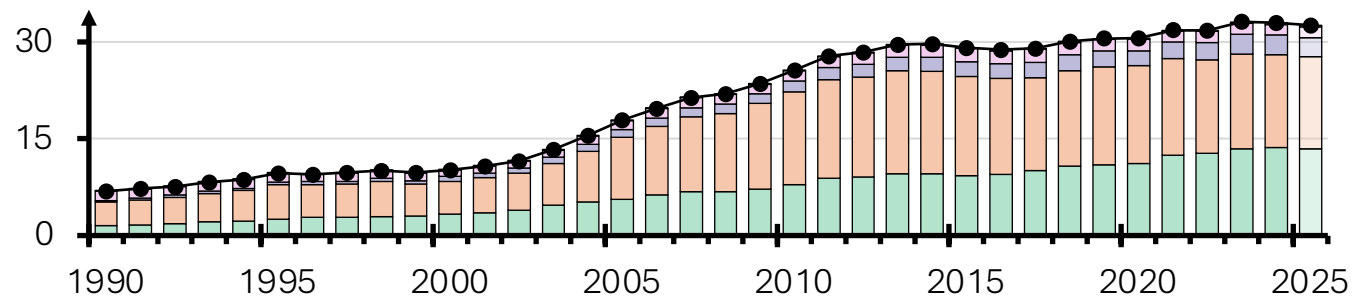
Source: **Carbon Monitor** (<https://carbonmonitor.org>)



**02**

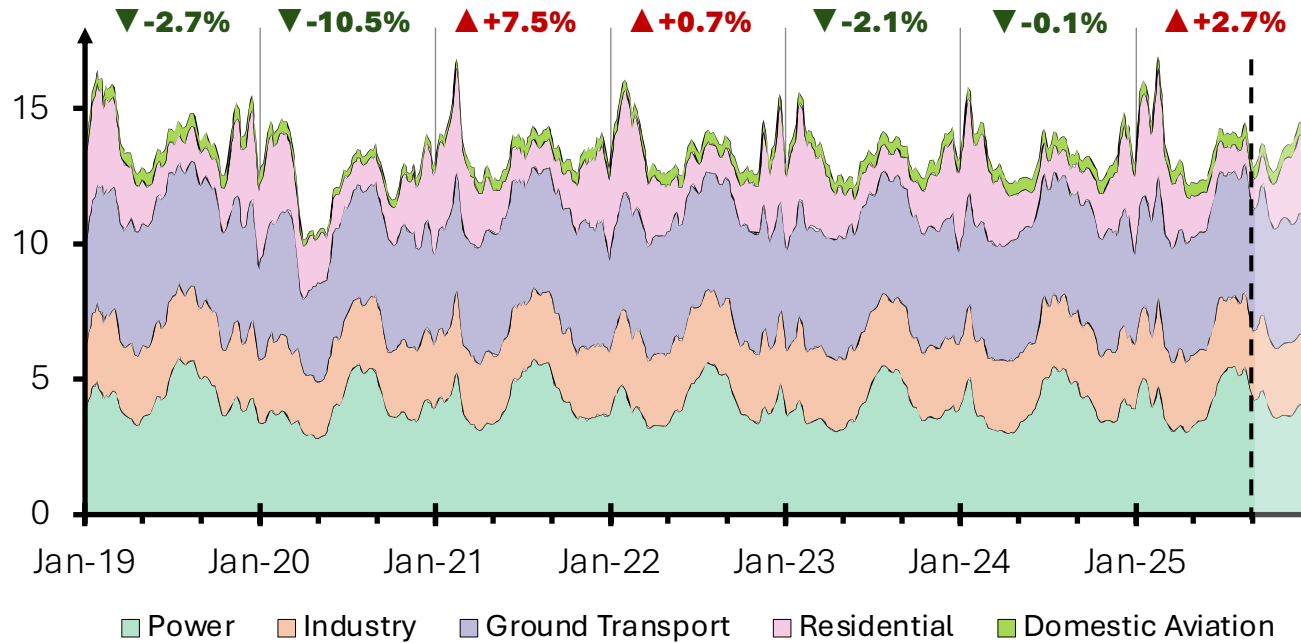
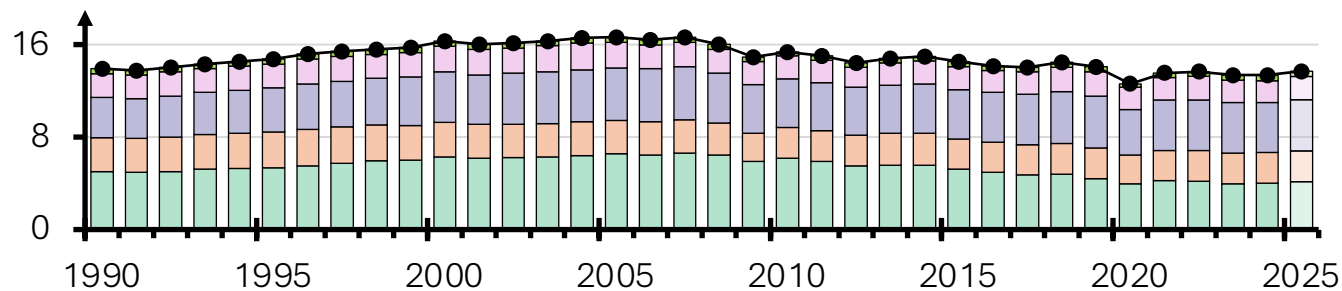
---

# **Country Profiles**

**China:** daily CO<sub>2</sub> emissions, 2019/1/1 – 2025/12/31, Mt CO<sub>2</sub> per day**China:** annual CO<sub>2</sub> emission trend, 1990-2025, Mt CO<sub>2</sub> per daySource: **Carbon Monitor** (<https://carbonmonitor.org>)**China:** year-over-year CO<sub>2</sub> changes in 2025

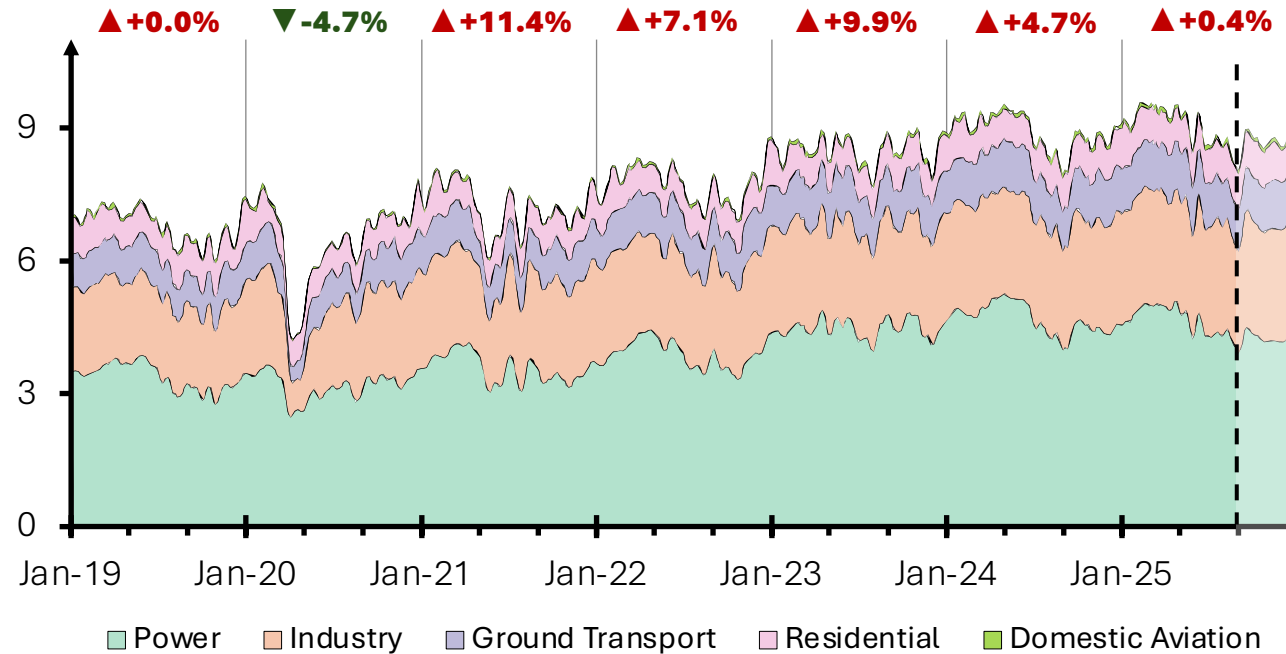
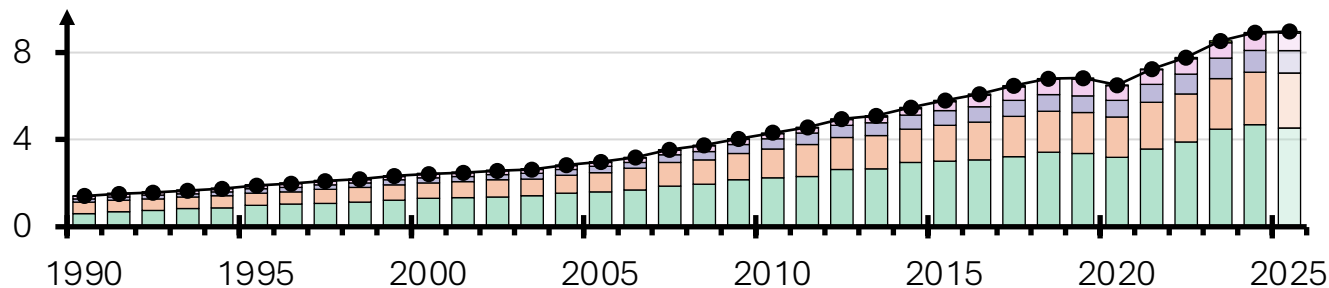
Mt CO <sub>2</sub> per day	2024	2025	Change
Power	13.63	13.44	-1.4%
Industry <sup>1</sup>	14.37	14.28	-0.6%
Ground Transport	3.07	2.94	-4.2%
Residential	1.66	1.67	+1.0%
Domestic Aviation	0.25	0.25	+1.5%
<b>Total</b>	<b>32.97</b>	<b>32.58</b>	<b>-1.2%</b>

<sup>1</sup> Including energy-related and process-related emissions.

**United States:** daily CO<sub>2</sub> emissions, 2019/1/1 – 2025/12/31, Mt CO<sub>2</sub> per day**United States:** annual CO<sub>2</sub> emission trend, 1990-2025, Mt CO<sub>2</sub> per daySource: **Carbon Monitor** (<https://carbonmonitor.org>)**United States:** year-over-year CO<sub>2</sub> changes in 2025

Mt CO <sub>2</sub> per day	2024	2025	Change
Power	4.04	4.14	+2.5%
Industry <sup>1</sup>	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%

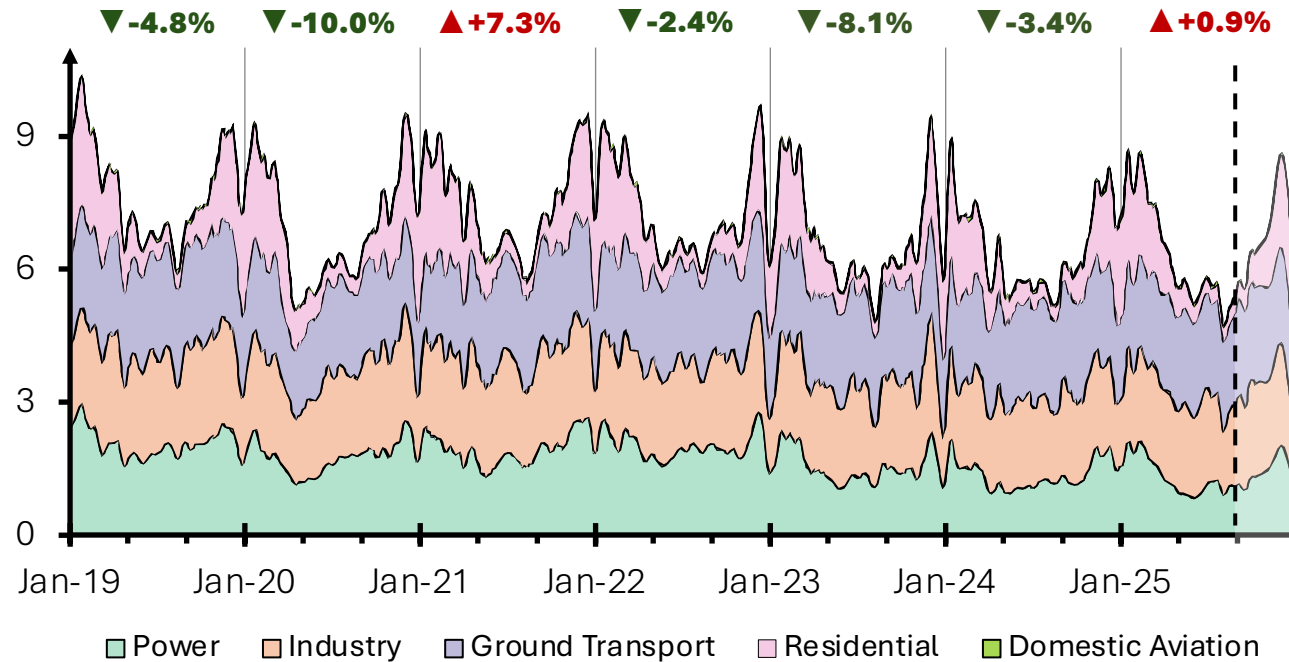
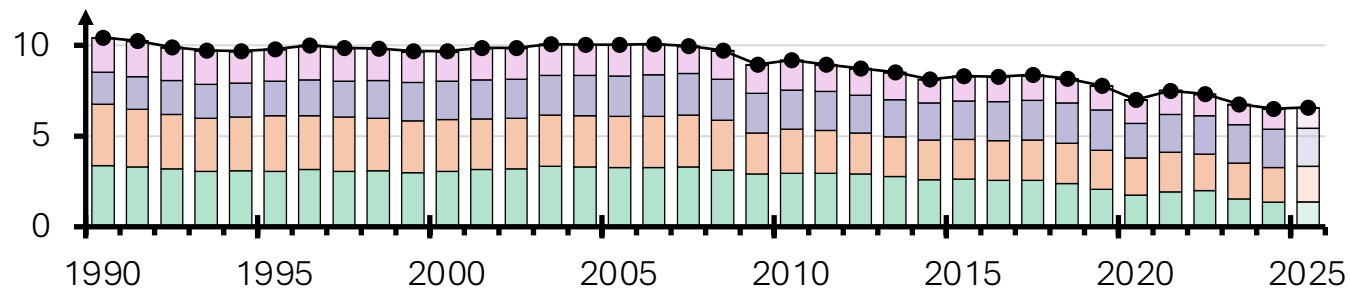
<sup>1</sup> Including energy-related and process-related emissions.

**India:** daily CO<sub>2</sub> emissions, 2019/1/1 – 2025/12/31, Mt CO<sub>2</sub> per day**India:** annual CO<sub>2</sub> emission trend, 1990-2025, Mt CO<sub>2</sub> per daySource: **Carbon Monitor** (<https://carbonmonitor.org>)**India:** year-over-year CO<sub>2</sub> changes in 2025

Mt CO <sub>2</sub> per day	2024	2025	Change
Power	4.69	4.53	-3.4%
Industry <sup>1</sup>	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%

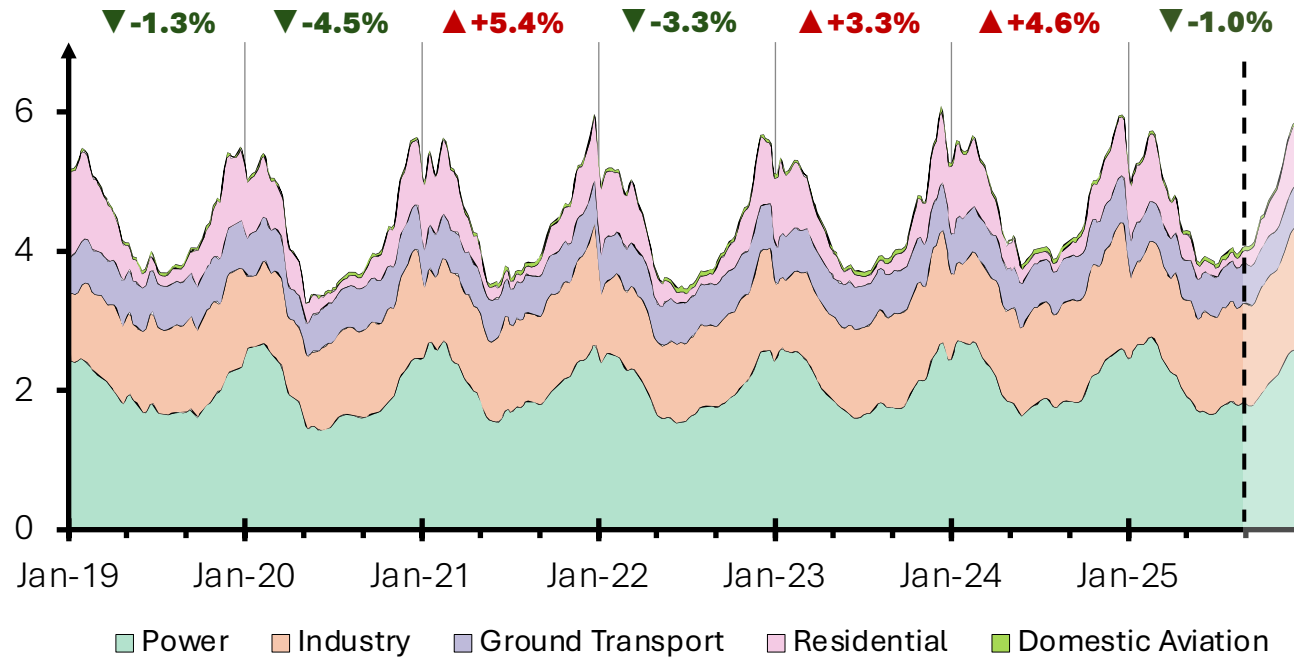
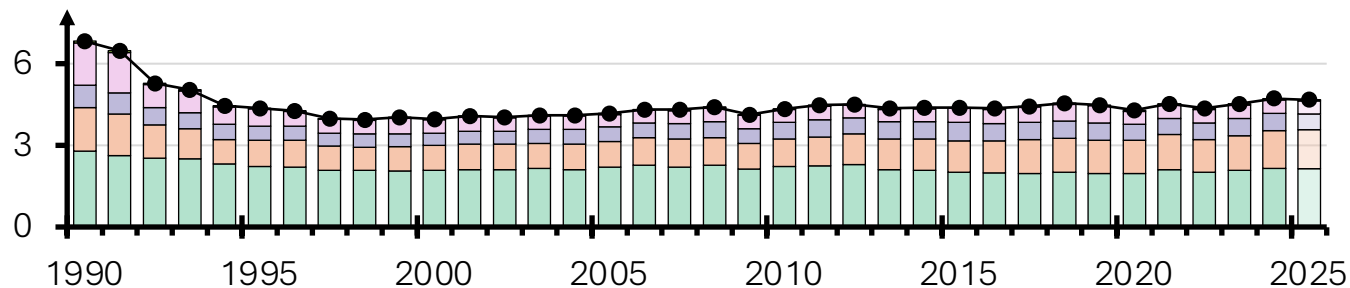
<sup>1</sup> Including energy-related and process-related emissions.



**EU27:** daily CO<sub>2</sub> emissions, 2019/1/1 – 2025/12/31, Mt CO<sub>2</sub> per day**EU27:** annual CO<sub>2</sub> emission trend, 1990-2025, Mt CO<sub>2</sub> per daySource: **Carbon Monitor** (<https://carbonmonitor.org>)**EU27:** year-over-year CO<sub>2</sub> changes in 2025

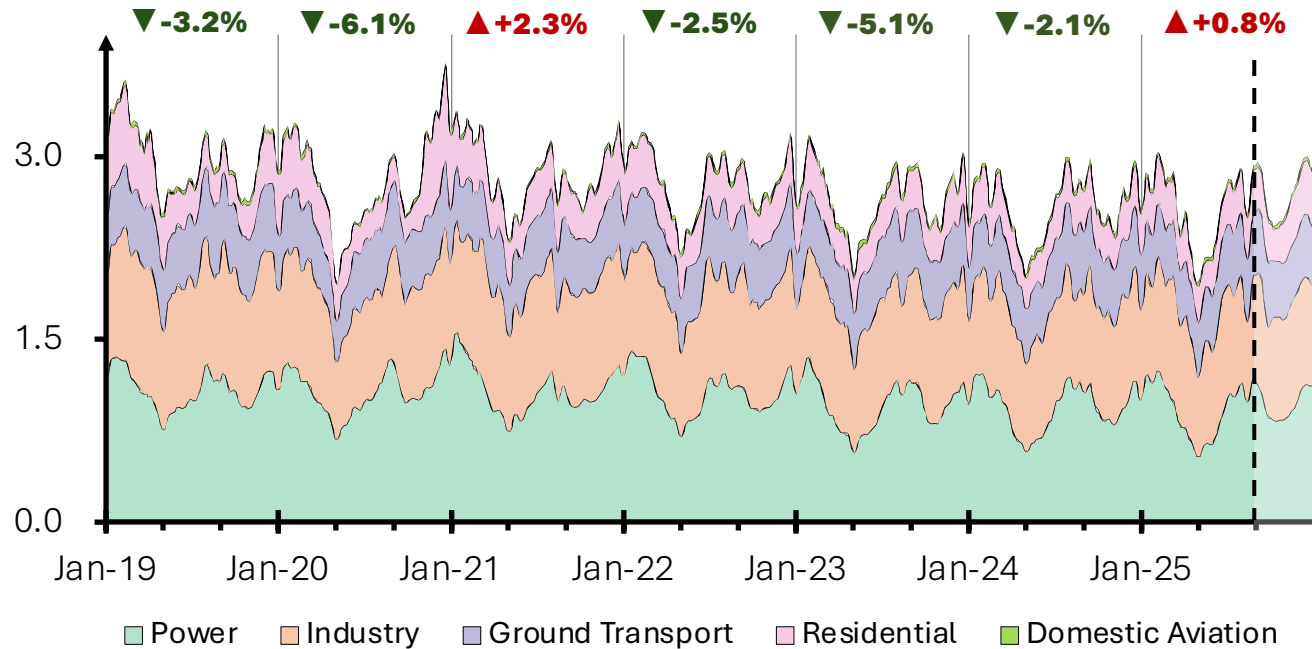
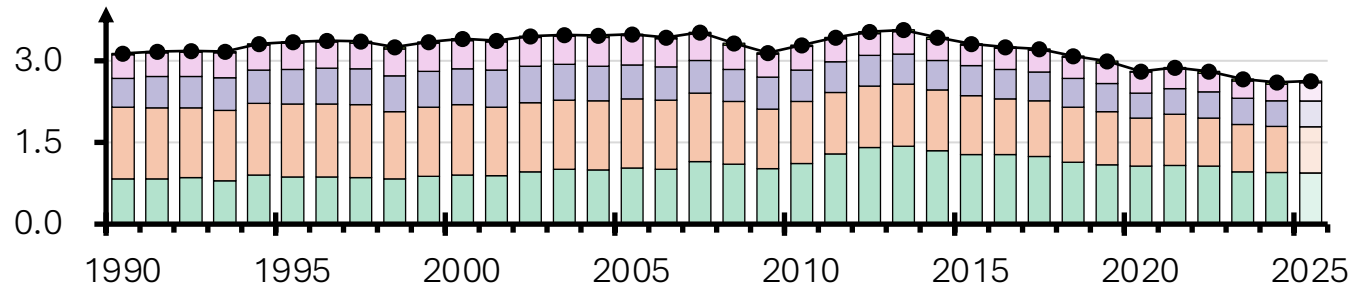
Mt CO <sub>2</sub> per day	2024	2025	Change
Power	1.36	1.37	+0.6%
Industry <sup>1</sup>	1.92	1.96	+2.1%
Ground Transport	2.11	2.10	-0.5%
Residential	1.08	1.10	+1.9%
Domestic Aviation	0.04	0.04	+5.3%
Total	6.51	6.57	+0.9%

<sup>1</sup> Including energy-related and process-related emissions.

**Russia:** daily CO<sub>2</sub> emissions, 2019/1/1 – 2025/12/31, Mt CO<sub>2</sub> per day**Russia:** annual CO<sub>2</sub> emission trend, 1990-2025, Mt CO<sub>2</sub> per daySource: **Carbon Monitor** (<https://carbonmonitor.org>)**Russia:** year-over-year CO<sub>2</sub> changes in 2025

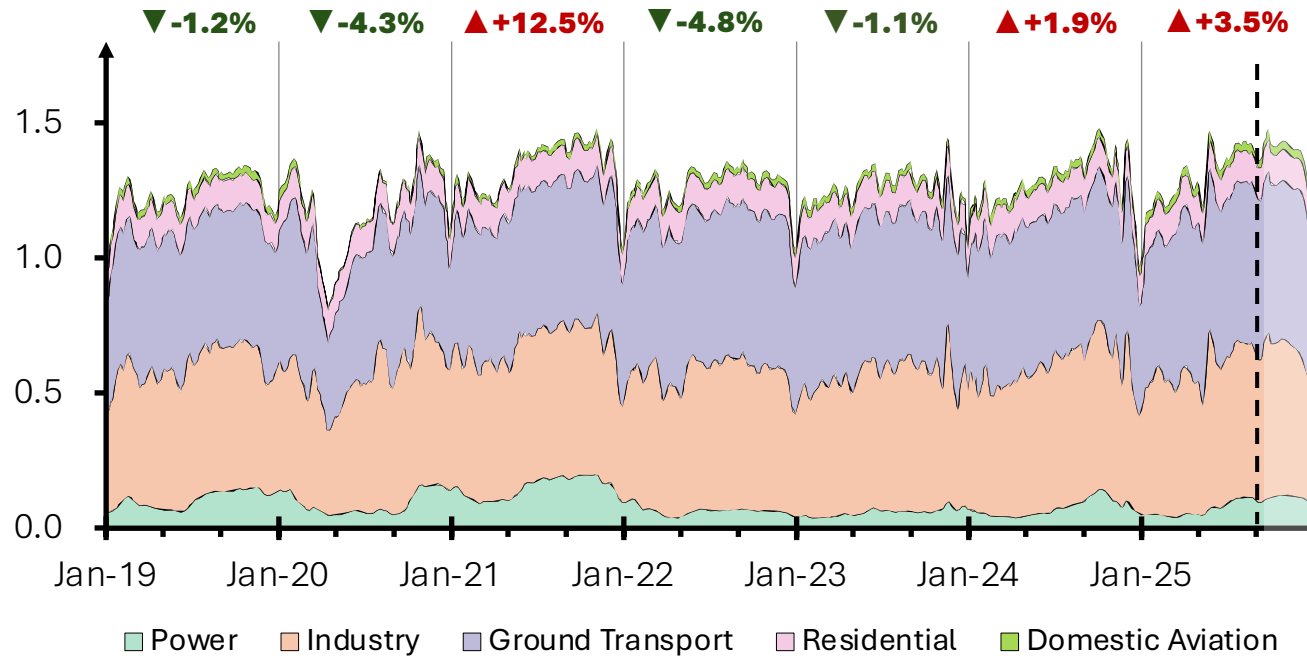
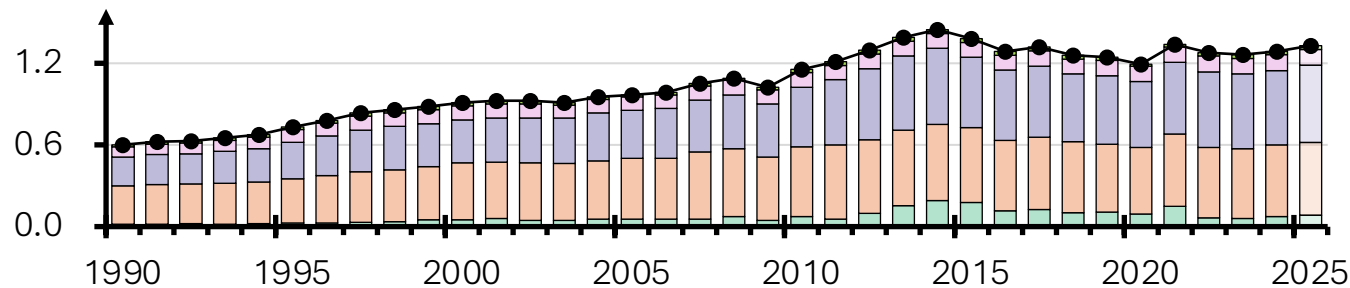
Mt CO <sub>2</sub> per day	2024	2025	Change
Power	2.15	2.14	-0.2%
Industry <sup>1</sup>	1.40	1.43	+2.0%
Ground Transport	0.63	0.57	-9.2%
Residential	0.50	0.48	-2.7%
Domestic Aviation	0.05	0.05	+1.2%
<b>Total</b>	<b>4.73</b>	<b>4.68</b>	<b>-1.0%</b>

<sup>1</sup> Including energy-related and process-related emissions.

**Japan:** daily CO<sub>2</sub> emissions, 2019/1/1 – 2025/12/31, Mt CO<sub>2</sub> per day**Japan:** annual CO<sub>2</sub> emission trend, 1990-2025, Mt CO<sub>2</sub> per daySource: **Carbon Monitor** (<https://carbonmonitor.org>)**Japan:** year-over-year CO<sub>2</sub> changes in 2025

Mt CO <sub>2</sub> per day	2024	2025	Change
Power	0.95	0.94	-0.7%
Industry <sup>1</sup>	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%
<b>Total</b>	<b>2.60</b>	<b>2.63</b>	<b>+0.8%</b>

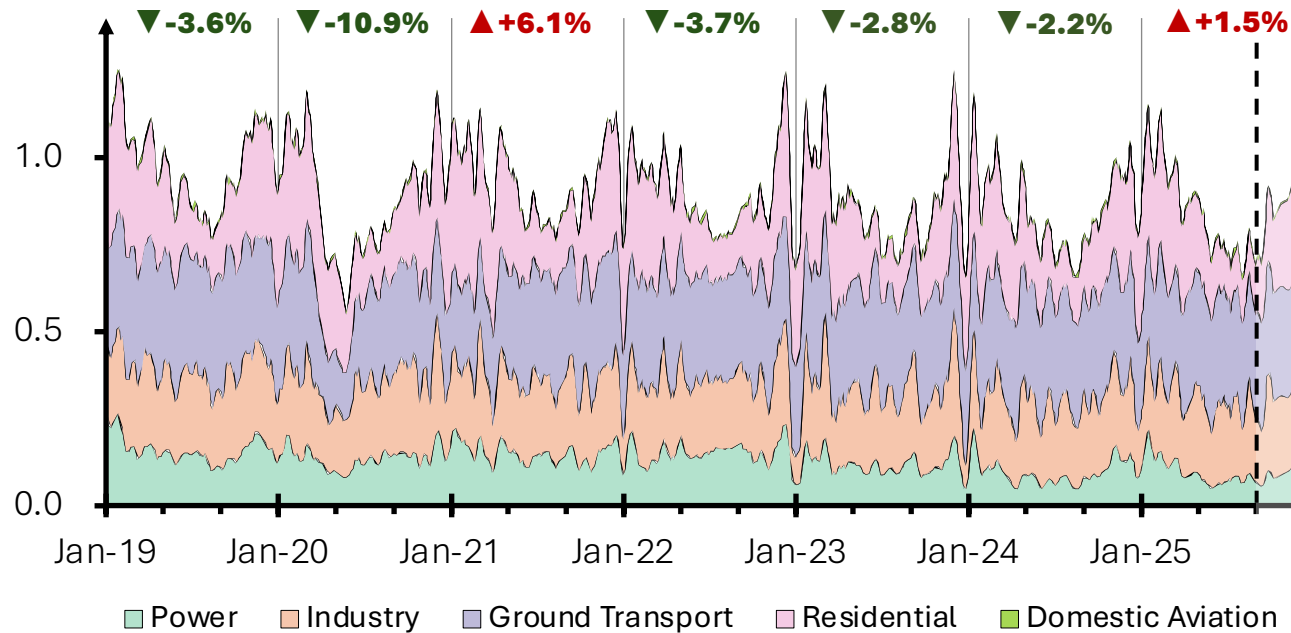
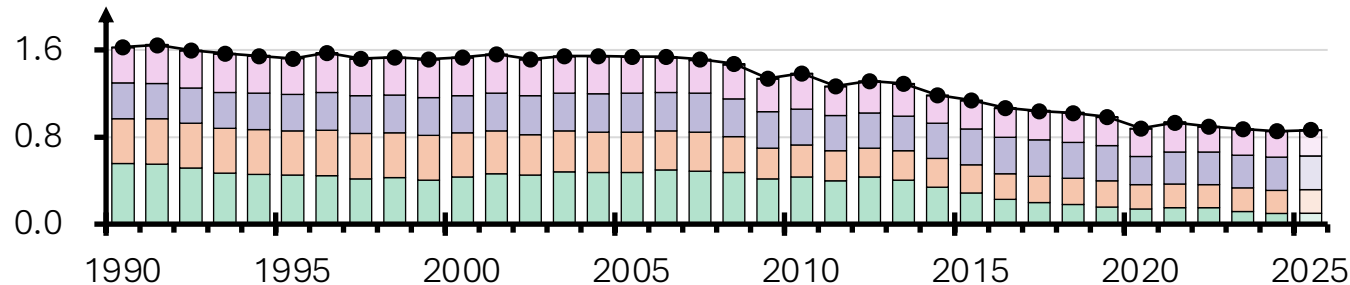
<sup>1</sup> Including energy-related and process-related emissions.

**Brazil:** daily CO<sub>2</sub> emissions, 2019/1/1 – 2025/12/31, Mt CO<sub>2</sub> per day**Brazil:** annual CO<sub>2</sub> emission trend, 1990-2025, Mt CO<sub>2</sub> per daySource: **Carbon Monitor** (<https://carbonmonitor.org>)**Brazil:** year-over-year CO<sub>2</sub> changes in 2025

Mt CO <sub>2</sub> per day	2024	2025	Change
Power	0.07	0.08	+12.4%
Industry <sup>1</sup>	0.53	0.53	+0.6%
Ground Transport	0.54	0.57	+5.1%
Residential	0.11	0.11	+0.8%
Domestic Aviation	0.02	0.03	+12.6%
<b>Total</b>	<b>1.28</b>	<b>1.33</b>	<b>+3.4%</b>

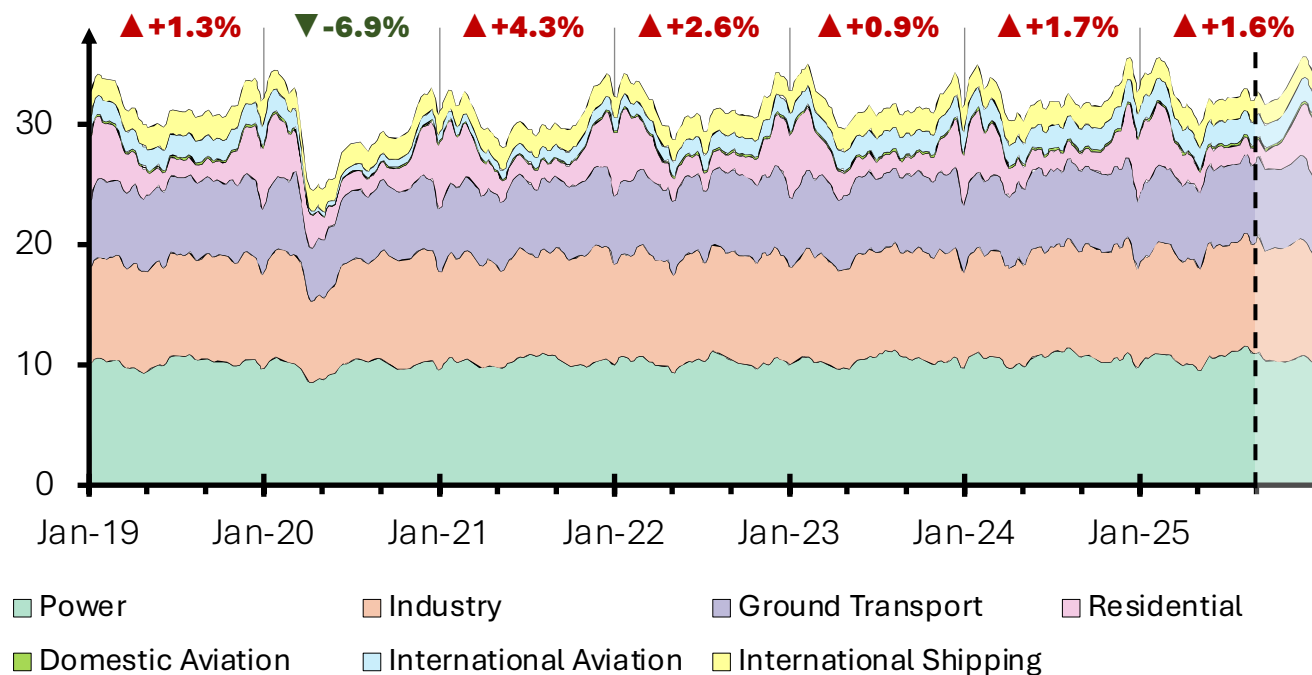
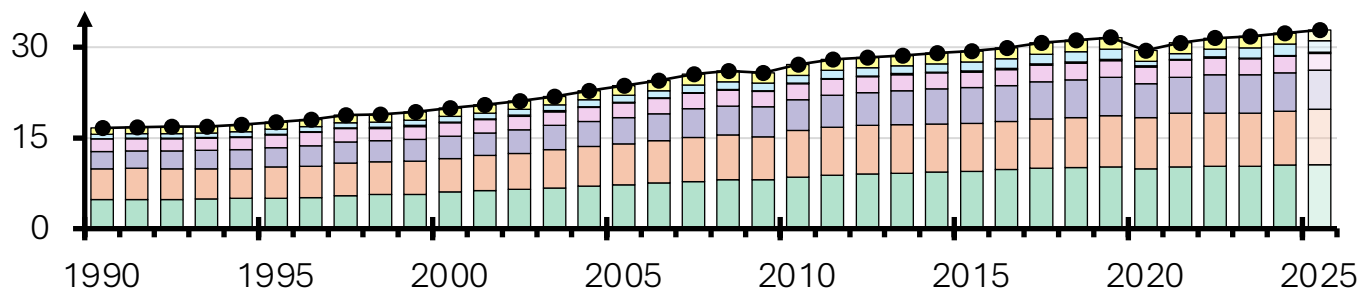
<sup>1</sup> Including energy-related and process-related emissions.



**United Kingdom:** daily CO<sub>2</sub> emissions, 2019/1/1 – 2025/12/31, Mt CO<sub>2</sub> per day**United Kingdom:** annual CO<sub>2</sub> emission trend, 1990-2025, Mt CO<sub>2</sub> per daySource: **Carbon Monitor** (<https://carbonmonitor.org>)**United Kingdom:** year-over-year CO<sub>2</sub> changes in 2025

Mt CO <sub>2</sub> per day	2024	2025	Change
Power	0.10	0.10	+1.3%
Industry <sup>1</sup>	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%

<sup>1</sup> Including energy-related and process-related emissions.

**ROW:** daily CO<sub>2</sub> emissions, 2019/1/1 – 2025/12/31, Mt CO<sub>2</sub> per day**ROW:** annual CO<sub>2</sub> emission trend, 1990-2025, Mt CO<sub>2</sub> per daySource: **Carbon Monitor** (<https://carbonmonitor.org>)**ROW:** year-over-year CO<sub>2</sub> changes in 2025

Mt CO <sub>2</sub> per day	2024	2025	Change
Power	10.56	10.56	+0.0%
Industry <sup>1</sup>	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%
<b>Total</b>	<b>32.31</b>	<b>32.83</b>	<b>+1.6%</b>

<sup>1</sup> Including energy-related and process-related emissions.

# 03

---

# Appendix

### ➤ Daily CO<sub>2</sub> emission estimates

We calculate daily CO<sub>2</sub> emissions since January 2019, drawing on hourly datasets of electricity production and CO<sub>2</sub> 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](#).

### ➤ 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<sub>2</sub> 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);  $\varepsilon$  is the error item, representing stochastic variability not explained by the above components.

Historical daily CO<sub>2</sub> 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.

### ➤ 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



### Near-real-time daily CO<sub>2</sub> datasets:

- **Carbon Monitor:** Global daily CO<sub>2</sub> emissions, <https://carbonmonitor.org>
- **Carbon Monitor - China:** Daily CO<sub>2</sub> emissions over 30 provinces in China, <https://cn.carbonmonitor.org>
- **Carbon Monitor - Europe:** National daily CO<sub>2</sub> 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<sub>2</sub> emissions in cities, <https://cities.carbonmonitor.org>
- **GRACED:** Global daily CO<sub>2</sub> 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<sub>2</sub> 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<sub>2</sub> 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<sub>2</sub> emissions from fossil fuel and cement production.** *Scientific Data* **7**, 392 (2020).

Carbon  
Monitor



[Click](#) or scan to access  
up-to-date daily CO<sub>2</sub> emission data

Global Near-real-time Daily CO<sub>2</sub> Emission Report 2025