

Climate TRACE – November 15, 2024 Release

Data Overview and Key Takeaways

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Overview

Inventory Overview

- **Climate TRACE’s expanded database now tracks GHG emissions from 662M assets**
 - **Includes capacity, capacity factor, activity, and emissions intensity for every single asset**
- **Covers 252 countries and territories**
- **New types of data available**
 - **Monthly**
 - **All sectors from 2015–2024**
 - **State/province-, county-, and local-level inventories**
 - **Complete, monthly inventories for all GHGs for over 9,000 urban areas**
 - **Complete, monthly inventories for all GHGs for every state/province, county, and country from 2021–2024**
 - **Non-GHG data**
 - **Carbon monoxide (CO), organic carbons (OC), black carbon (BC), non-methane volatile organic compounds (nmVOCs), sulfur dioxide (SO₂), particulate matter 2.5 (PM_{2.5}), nitrous oxide (NO_x), ammonia (NH₃)**

- Includes 10 sectors and 67 subsectors

Sector Breakdown

Below is a list of all sectors and subsectors covered by the dataset, in addition to information on the number of assets included in the latest release for each...

For more information on each sector or subsector and how they are defined, visit www.climatetrace.org/sectors.

Sector	Subsector	Number of Assets
Agriculture	Cropland Fires	640,827 25km x 25km grid cells
Agriculture	Enteric Fermentation Cattle Operation	77,728 confined cattle operations
Agriculture	Enteric Fermentation Cattle Pasture	949,031 10km x 10km grid cells
Agriculture	Manure Management Cattle Operation	77,728 confined cattle operations
Agriculture	Manure Applied to Soils	N/A
Agriculture	Crop Residues	N/A
Agriculture	Enteric Fermentation Other	N/A
Agriculture	Rice Cultivation	29,883,910 500m x 500m grid cells
Agriculture	Synthetic Fertilizer Application	903,145 10km x 10km grid cells
Agriculture	Manure Left on Pasture - Cattle	949,031

		10km x 10km grid cells
Agriculture	Manure Management - Other	N/A
Agriculture	Other Agricultural Soil Emissions	N/A
Buildings	Other Onsite Fuel Usage	N/A
Buildings	Non Residential Onsite Fuel Usage	3,324,092 1km x 1km grid cells
Buildings	Residential Onsite Fuel Usage	39,099,215 1km x 1km grid cells
Fluorinated Gases	Fluorinated Gases	N/A
Forestry and Land Use	Forest Land Clearing	10,304,840 1km x 1km grid cells
Forestry and Land Use	Net Wetland	15,745,833 1km x 1km grid cells
Forestry and Land Use	Shrubgrass Fires	6,812,434 1km x 1km grid cells
Forestry and Land Use	Forest Land Degradation	6,793,154 1km x 1km grid cells
Forestry and Land Use	Forest Land Fires	4,403,858 1km x 1km grid cells
Forestry and Land Use	Net Forest Land	95,870,762 1km x 1km grid cells
Forestry and Land Use	Net Shrubgrass	95,332,780 1km x 1km grid cells
Forestry and Land Use	Removals	83,208,339 1km x 1km grid cells
Forestry and Land Use	Water Reservoirs	7,034 Water Reservoirs
Forestry and Land Use	Wetland Fires	195,276 1km x 1km grid cells

Fossil Fuel Operations	Oil and Gas Production	286 Aggregated Oil & Gas fields
Fossil Fuel Operations	Other Fossil Fuel Operations	N/A
Fossil Fuel Operations	Solid Fuel Transformation	N/A
Fossil Fuel Operations	Coal Mining	3,788 Coal Mines
Fossil Fuel Operations	Oil and Gas Refining	707 Refineries
Fossil Fuel Operations	Oil and Gas Transport	286 Aggregated Oil & Gas fields
Manufacturing	Aluminum	218 Aluminum smelters
Manufacturing	Cement	2,241 cement plants
Manufacturing	Chemicals	N/A
Manufacturing	Other Manufacturing	398 manufacturing facilities
Manufacturing	Petrochemical Steam Cracking	234 plants
Manufacturing	Pulp and Paper	N/A
Manufacturing	Iron and Steel	866 steel plants
Manufacturing	Other Chemicals	439 facilities
Manufacturing	Glass	640 facilities
Manufacturing	Lime	1,609 plants
Manufacturing	Food, Beverage and Tobacco	48,884 facilities
Manufacturing	Wood and Wood Products	N/A
Manufacturing	Textiles, Leather and Apparel	12,829 facilities
Manufacturing	Other Metals	418 facilities

Mineral Extraction	Bauxite Mining	264 mines
Mineral Extraction	Copper Mining	673 mines
Mineral Extraction	Iron Mining	722 mines
Mineral Extraction	Other Mining and Quarrying	N/A
Mineral Extraction	Rock Quarrying	N/A
Mineral Extraction	Sand Quarrying	N/A
Power	Electricity Generation	8,706 power plants
Power	Other Energy Use	N/A
Power	Heat Plants	N/A
Transportation	Domestic Shipping	570,441 ships
Transportation	Domestic Aviation	4,910 airports
Transportation	International Aviation	4,910 airports
Transportation	International Shipping	214,355 ships
Transportation	Road Transportation	380,000,000 road segments
Transportation	Other Transport	N/A
Transportation	Railways	N/A
Waste	Incineration and Open Burning of Waste	N/A
Waste	Biological Treatment of Solid Waste and Disposal	N/A
Waste	Domestic Wastewater Treatment and Discharge	53,855 treatment plants
Waste	Industrial Wastewater Treatment and Discharge	1,276 treatment plants

Waste	solid-waste-disposal	9,625 landfills or dumpsites
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Key Data Insights

Global Insights

- **2023 global emissions total: 61.2 billion tonnes CO₂e**
 - Increased 0.7% from 2022 total of 60.7 billion tonnes CO₂e
 - Increased 9.2% from 2015 total of 56 billion tonnes CO₂e (year of the Paris Agreement)
- **2023 global methane emissions total: 391.2 million tonnes CH₄**
 - Increased 0.2% from 2022 total of 390.5 million tonnes CH₄
 - Increased 9.3% from 2015 total of 358 million tonnes CH₄

Country-level Insights

- **Top 10 emitters in 2023: All GHGs (CO₂e)**
 1. **China: 17,213,372,656.0 tonnes of CO₂e in 2023**
 2. **USA: 6,675,758,935.0 tonnes of CO₂e in 2023**
 3. **India: 3,959,509,478.0 tonnes of CO₂e in 2023**
 4. **Russia: 3,522,020,093.0 tonnes of CO₂e in 2023**
 5. **Brazil: 1,684,826,982.0 tonnes of CO₂e in 2023**
 6. **Indonesia: 1,476,726,335.0 tonnes of CO₂e in 2023**
 7. **Japan: 1,355,297,807.0 tonnes of CO₂e in 2023**
 8. **Iran, Islamic Republic of: 1,262,387,739.0 tonnes of CO₂e in 2023**
 9. **Canada: 1,076,020,362.0 tonnes of CO₂e in 2023**
 10. **Saudi Arabia: 985,056,155.0 tonnes of CO₂e in 2023**
- **Top 10 emitters in 2023: Methane (CH₄)**
 1. **China: 79,512,952.0 tonnes of CH₄ in 2023**
 2. **India: 29,368,945.0 tonnes of CH₄ in 2023**
 3. **USA: 28,185,370.0 tonnes of CH₄ in 2023**
 4. **Russia: 26,843,669.0 tonnes of CH₄ in 2023**
 5. **Brazil: 18,630,529.0 tonnes of CH₄ in 2023**
 6. **Indonesia: 13,599,675.0 tonnes of CH₄ in 2023**
 7. **Iran, Islamic Republic of: 9,673,614.0 tonnes of CH₄ in 2023**
 8. **Mexico: 8,676,375.0 tonnes of CH₄ in 2023**

9. Pakistan: 8,259,186.0 tonnes of CH₄ in 2023

10. Australia: 8,007,301.0 tonnes of CH₄ in 2023

- **Greatest absolute increases in emissions 2022–2023 (CO₂e)**

1. China increased by 374,600,374.9 tonnes

2. India increased by 96,747,338.7 tonnes

3. Iran increased by 39,410,836.6 tonnes

4. Vietnam increased by 27,056,257.2 tonnes

5. Brazil increased by 20,126,314.6 tonnes

6. Canada increased by 17,900,199.0 tonnes

7. Venezuela increased by 17,263,198.7 tonnes

8. Laos increased by 17,127,858.7 tonnes

9. Mexico increased by 11,976,350.3 tonnes

10. Saudi Arabia increased by 11,192,380.7 tonnes

- **Greatest absolute reductions in emissions 2022–2023 (CO₂e)**

1. US decreased by -61,886,693.5 tonnes

2. Russia decreased by -56,518,771.2 tonnes

3. Germany decreased by -42,908,565.2 tonnes

4. Japan decreased by -33,247,009.2 tonnes

5. Poland decreased by -17,894,869.1 tonnes

6. Pakistan decreased by -15,527,068.6 tonnes

7. Spain decreased by -10,023,671.2 tonnes

8. Netherlands decreased by -9,682,401.2 tonnes

9. Italy decreased by -7,706,386.2 tonnes

10. United Kingdom decreased by -7,379,283.0

- **Greatest absolute increases in emissions 2015–2023 (CO₂e)**

1. China, mainland increased by 3,021,928,955.3 tonnes

2. India increased by 763,200,869.3 tonnes

3. Iran, Islamic Republic of increased by 237,793,420.5 tonnes

4. Indonesia increased by 212,891,550.0 tonnes

5. Russia increased by 195,197,598.9 tonnes

6. Vietnam increased by 151,463,283.5 tonnes

7. Pakistan increased by 135,219,688.6 tonnes
8. Iraq increased by 134,014,614.0 tonnes
9. Turkey increased by 112,651,250.3 tonnes
10. Canada increased by 93,039,101.6 tonnes

- **Greatest absolute reductions in emissions 2015–2023 (CO₂e)**

1. Venezuela decreased by -331,167,159.7 tonnes
2. Japan decreased by -250,994,205.1 tonnes
3. Germany decreased by -200,962,930.4 tonnes
4. Unknown decreased by -107,810,735.0 tonnes
5. United Kingdom decreased by -91,154,571.7 tonnes
6. US decreased by -83,541,107.0 tonnes
7. Netherlands decreased by -52,343,391.4 tonnes
8. Ukraine decreased by -50,902,957.1 tonnes
9. South Africa decreased by -43,550,807.0 tonnes
10. Spain decreased by -29,950,991.9 tonnes

Subnational Insights

- **Top emitting cities in 2023 (CO₂e)**

1. Shanghai 256 million tonnes
2. Tokyo 250 million tonnes
3. New York 160 million tonnes
4. Houston 150 million tonnes
5. Seoul 142 million tonnes

- **States/provinces with more than a billion tonnes of emissions (CO₂e) in 2023**

1. Shandong, China: 1.28 billion tonnes
2. Hebei, China: 1.17 billion tonnes
3. Shanxi, China: 1.15 billion tonnes
4. Nei Mongol, China: 1.13 billion tonnes
5. Jiangsu, China: 1.10 billion tonnes
6. Texas, USA: 1.09 billion tonnes
7. Guangdong, China: 1.06 billion tonnes

Sector-level Insights

- **Highest emitting subsectors in 2023 (CO₂e/100yr)**
 1. **Electricity generation with 13,404,044,579.9 tonnes; 21.9% of global emissions**
 2. **Road transportation with 6,508,724,127.9 tonnes; 10.63% of global emissions**
 3. **Oil and gas production with 3,844,539,162.3 tonnes; 6.28% of global emissions**
 4. **Iron and steel with 3,492,451,493.4 tonnes; 5.71% of global emissions**
 5. **Residential onsite fuel usage with 3,408,802,403.4 tonnes; 5.57% of global emissions**
 6. **Cement with 2,274,151,901.7 tonnes; 3.72% of global emissions**
 7. **Oil and gas transport with 1,965,733,623.7 tonnes; 3.21% of global emissions**
 8. **Coal mining with 1,873,073,233.7 tonnes; 3.06% of global emissions**
 9. **Other energy use with 1,774,674,897.9 tonnes; 2.9% of global emissions**
 10. **Other manufacturing with 1,724,705,998.9 tonnes; 2.82% of global emissions**

- **Highest emitting subsectors in 2023 for methane (CH₄)**
 1. **Coal Mining with 62,232,500.8 ch4 emissions, 15.91% of global ch4 emissions**
 2. **Oil and Gas Production with 56,848,722.6 ch4 emissions, 14.53% of global ch4 emissions**
 3. **Solid Waste Disposal with 49,468,681.6 ch4 emissions, 12.65% of global ch4 emissions**
 4. **Enteric Fermentation Cattle Pasture with 40,737,955.9 ch4 emissions, 10.41% of global ch4 emissions**
 5. **Enteric Fermentation Cattle Operation with 36,526,084.5 ch4 emissions, 9.34% of global ch4 emissions**
 6. **Enteric Fermentation Other with 28,407,526.3 ch4 emissions, 7.26% of global ch4 emissions**
 7. **Rice Cultivation with 27,085,216.0 ch4 emissions, 6.92% of global ch4 emissions**
 8. **Other Fossil Fuel Operations with 17,501,256.2 ch4 emissions, 4.47% of global ch4 emissions**

9. Domestic Wastewater Treatment and Discharge with 17,138,638.4 ch4 emissions, 4.38% of global ch4 emissions

10. Oil and Gas Transport with 13,086,517.1 ch4 emissions, 3.35% of global ch4 emissions

- **Sectors with greatest % increases from 2022 to 2023 (CO₂e/100yr)**

- 1. International aviation increased by 27.9%**
- 2. Copper mining increased by 26.4%**
- 3. Domestic aviation increased by 10.0%**
- 4. Other metals increased by 4.4%**
- 5. Petrochemical steam cracking increased by 4.1%**

- **Sectors with greatest absolute increase (CO₂e/100yr)**

- 1. Electricity generation increased by 166,115,561.6 tonnes**
- 2. International aviation increased by 115,688,119.2 tonnes**
- 3. Oil and gas production increased by 87,040,014.8 tonnes**
- 4. Road transportation increased by 68,553,623.4 tonnes**
- 5. Other chemicals increased by 38,865,388.8 tonnes**

- **Sectors with greatest % decreases from 2022 to 2023 (CO₂e/100yr)**

- 1. Iron mining decreased by -15.5%**
- 2. Aluminum decreased by -7.9%**
- 3. Bauxite mining decreased by -7.1%**
- 4. Chemicals decreased by -6.5%**
- 5. International shipping decreased by -3.2%**

- **Sector with greatest absolute decrease from 2022 to 2023 (CO₂e/100yr)**

- 1. Oil and gas transport decreased by -43,809,452.2 tonnes**
- 2. Chemicals decreased by -38,865,388.8 tonnes**
- 3. Aluminum decreased by -34,474,331.1 tonnes**
- 4. Other energy use decreased by -29,727,821.5 tonnes**
- 5. International shipping decreased by -21,733,379.9 tonnes**

- **Top emitting countries for power sector in 2023 (CO₂e/100yr)**

- 1. China, mainland, 5,130,179,100.0 tonnes**
- 2. US, 1,472,846,213.43 tonnes**
- 3. India, 1,316,867,980.0 tonnes**
- 4. Russia, 615,171,560.0 tonnes**
- 5. Japan, 438,972,380.0 tonnes**

- **Top emitting countries for oil and gas sector overall in 2023 (CO₂e/100yr)**

- 1. Russia, 1,220,073,269.65 tonnes**
- 2. US, 1,076,636,737.79 tonnes**
- 3. Iran, 542,059,630.57 tonnes**
- 4. Canada, 438,889,713.59 tonnes**
- 5. China, mainland, 406,998,819.49 tonnes**

- **Top emitting countries for road transportation in 2023 (CO₂e/100yr)**

- 1. US, 1,455,472,102.1 tonnes**
- 2. China, mainland, 642,749,503.65 tonnes**
- 3. Brazil, 322,004,108.35 tonnes**
- 4. Japan, 262,709,123.81 tonnes**
- 5. Russia, 259,764,214.23 tonnes**