



WORLD EVENTS & *CARBON EMISSIONS*

(a bit of) CONTEXT ...

Carbon (CO₂) Emissions | Key Global Warming contributor

The Paris Agreement | 2015 International Treaty on Climate Change

Current State of the World | Pandemic -- Coronavirus/COVID-19, since 2020



Silver Lining | Global Carbon Emissions are down by 6%, (International Energy Agency, (IEA))

Back To Reality | 2021: Global Carbon Emissions are set rebound at a record setting 5% (1.5 billion tonnes) as the World “re-opens”, (IEA)

Record Setting | 2010: Carbon Emissions increased by 5.9% (30 billion tonnes, (TIME, Reuters, IEA), at the turn of the Great Recession, 2007-2009



Is there a *link*
between Carbon
Emission
activity and
World Events?

FOCUS AREA(s):

- ❑ Carbon Emissions By Geographical Region
- ❑ Time Period: 2007 - 2012
- ❑ World Events:
 - ❑ Great Recession 2007-2009
 - ❑ Economic Crisis of 2012

(THE) PROCESS

RESEARCH

SOURCE DATA

EDA

FINDINGS

SOURCE DATA

Data Source | [Our World Data](#)

Initial Dataset | Over 20,000 rows , 60 columns

RESEARCH

Starting Point | Carbon Emission & Pandemic Information | Review of various articles/reports, data sources

Making Sense (of Research) | Formulate Questions, redefined/"flushed-out" topic specifics & analysis focus

(E)XPORATORY (D)ATA (A)NALYSIS

ETL (Extract – Transform - Load) | data clean-up, created schema, housed in SQL database,
Analysis Dataset: 4,000+ Rows, 29 Columns

Testing Code: Trail & Error |
Data Visualization |

Methods & Tools

pgAdmin4 v5, PostgreSQL 11 | Python, Python Libraries: Pandas, Matplotlib, SQLAlchemy, Psycopg2
QuickDBD | Microsoft Excel, PowerPoint | Jupyter Notebook | VS Code 1.54.3

(THE) PROCESS CON'T...

SCHEMA

ENTITY
RELATIONSHIP
DIAGRAM

IMPORT/LOAD DATA

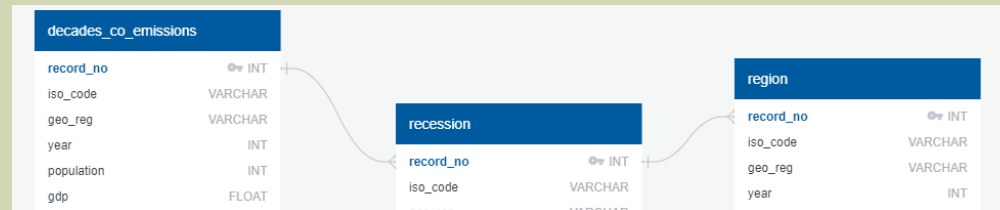
SCHEMA

Tables & Columns | Create tables, and columns with appropriate datatype, i.e., geo_reg: VARCHAR

```
CREATE TABLE "decades_co_emissions" (  
  "record_no" INT NOT NULL,  
  "iso_code" VARCHAR NOT NULL,  
  "geo_reg" VARCHAR NOT NULL,  
  "year" INT NOT NULL,  
  "population" INT NOT NULL,  
  "gdp" FLOAT NOT NULL
```

ENTITY RELATIONSHIP DIAGRAM

Find Relationships | Establishing “relationships” among the tables via primary & foreign keys



LOAD DATA

PostgreSQL | Data import via Pandas , 3 Tables

THE TABLES (DATABASE)

```

116 -- -- REFERENCES recession ( record_no ),
117
118 --
119 SELECT * FROM decades_co_emissions;
120 --
121

```

	record_no [PK] integer	iso_code character varying	geo_reg character varying	year integer	population integer	gdp double precision
1	0	AFG	Afghanistan	2000	20780000	16508834816
2	1	AFG	Afghanistan	2001	21607000	15574844416
3	2	AFG	Afghanistan	2002	22601000	25676800000
4	3	AFG	Afghanistan	2003	23681000	27805560832

```

117
118 --
119 SELECT record_no, geo_reg, year, co2, co2_per_capita, coal_co2, coal_co2_per_capita FROM region;
120 --
121

```

	record_no [PK] integer	geo_reg character varying	year integer	co2 double precision	co2_per_capita double precision	coal_co2 double precision	coal_co2_per_capita double precision
1	7	Afghanistan	2007	2.269	0.084	0.749	0.028
2	8	Afghanistan	2008	4.2	0.151	1.077	0.039
3	9	Afghanistan	2009	6.74	0.237	1.513	0.053
4	10	Afghanistan	2010	8.398	0.288	2.246	0.077

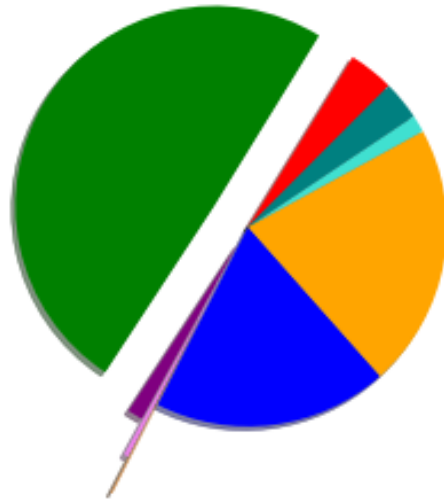
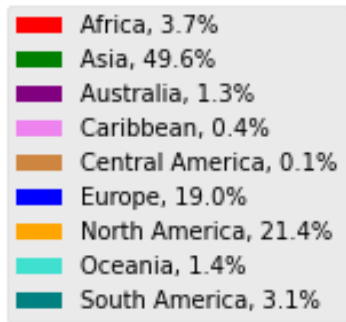
```

118 --
119 SELECT geo_reg, year, co2, co2_per_capita FROM recession;
120 --
121

```

	geo_reg character varying	year integer	co2 double precision	co2_per_capita double precision
1	Afghanistan	2007	2.269	0.084
2	Afghanistan	2008	4.2	0.151
3	Afghanistan	2009	6.74	0.237
4	Afghanistan	2010	8.398	0.288

Average of CO2 Emissions by Georgraphical Region, 2007-2012

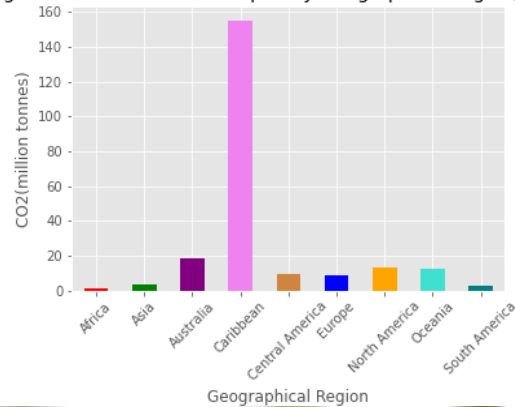


FINDINGS

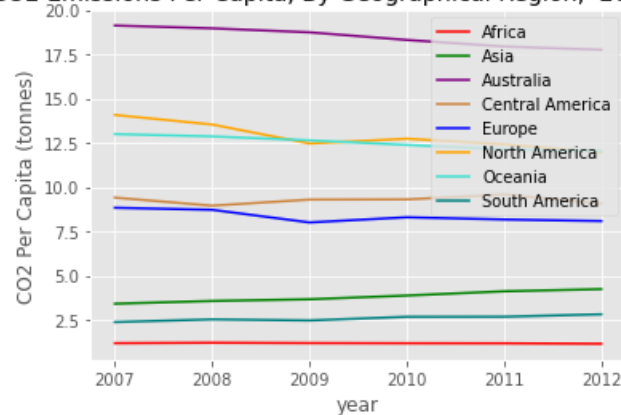
Asia, North America, and Europe ranked among the **Top 3 emitters** of Carbon Emissions

ADDITIONAL FINDINGS, 2

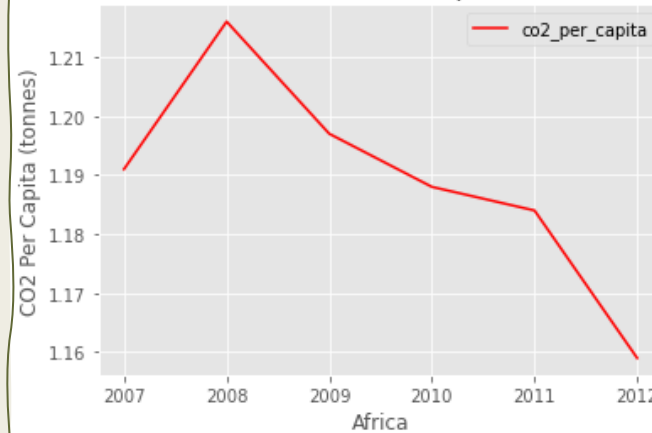
Average of CO2 Emissions Per Capita by Geographical Region, 2007-2012



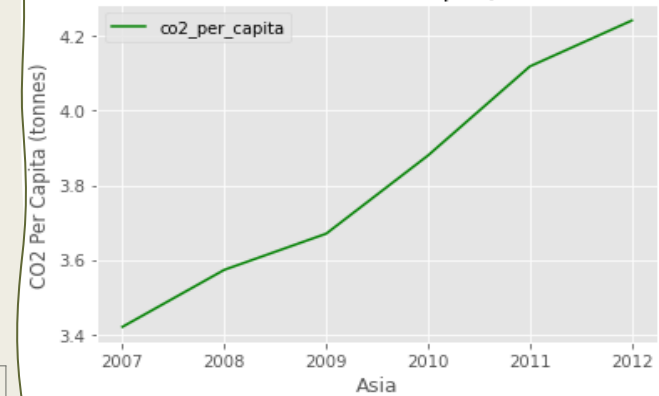
CO2 Emissions Per Capita, By Geographical Region, 2007-2012



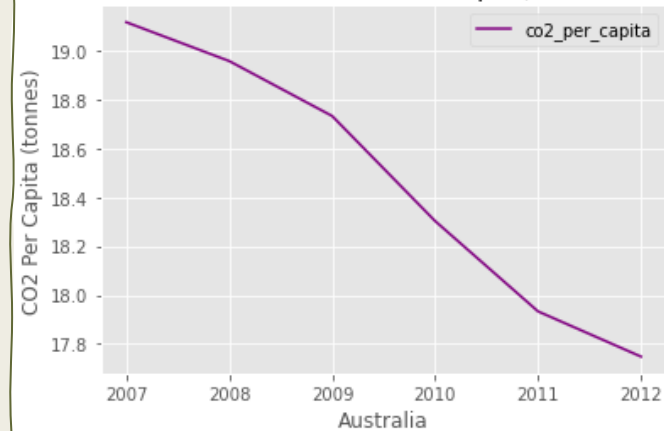
Africa CO2 Emissions Per Capita, 2007-2012



Asia CO2 Emissions Per Capita, 2007-2012



Australia CO2 Emissions Per Capita, 2007-2012

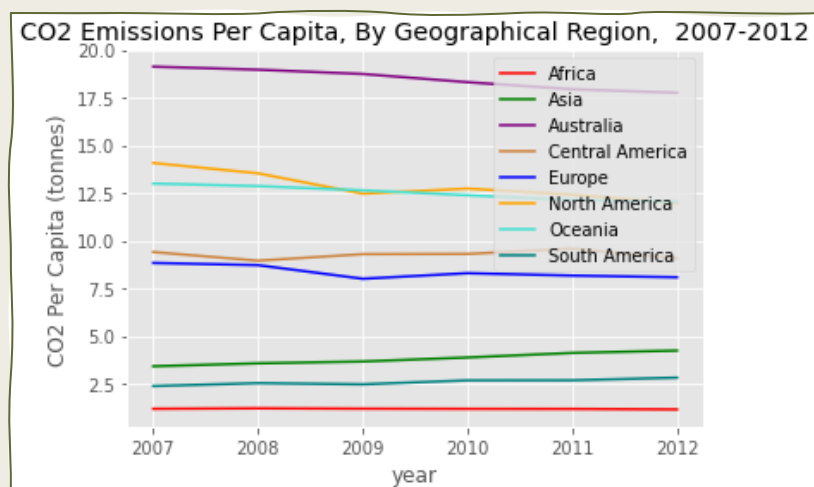
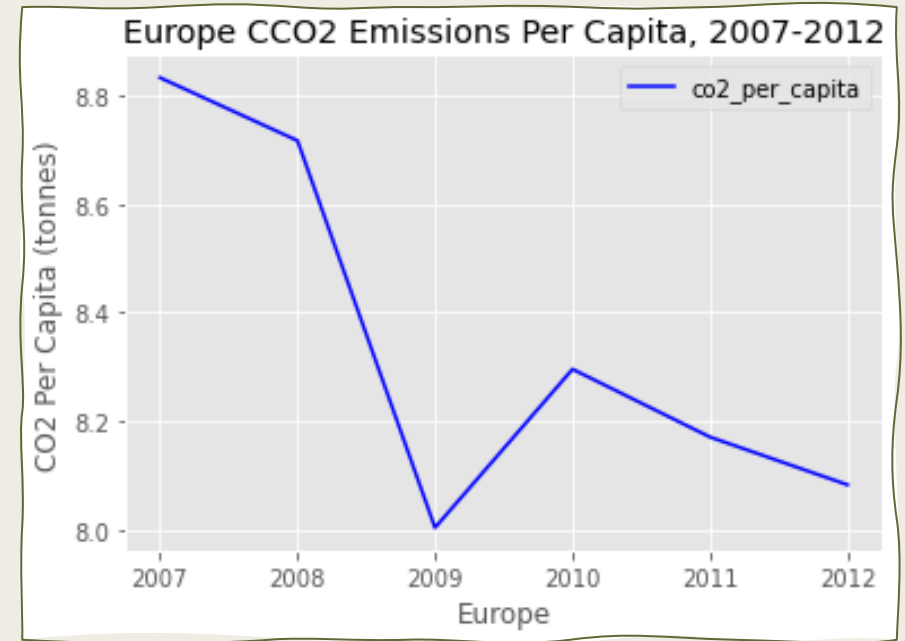
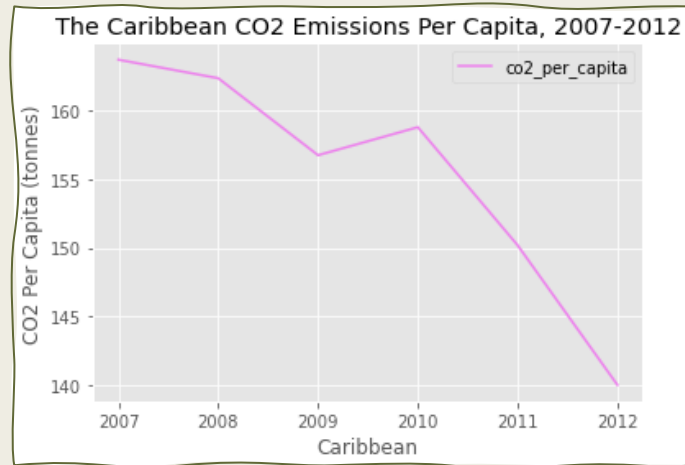


Africa's CO₂ output were *quite strong* in 2008

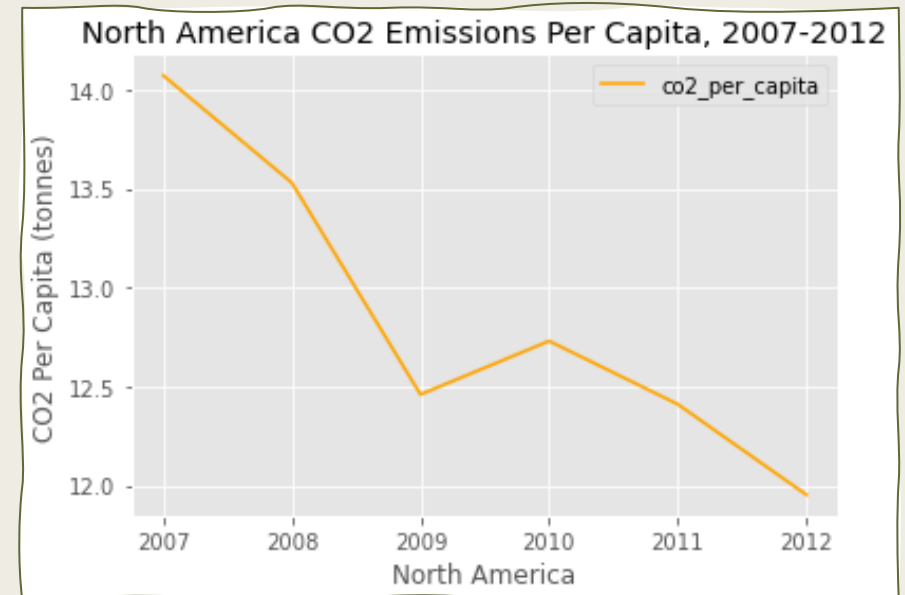
Asia had a *slight dip* in 2009

While high levels on record, Australia too, has seen *carbon emissions decline*

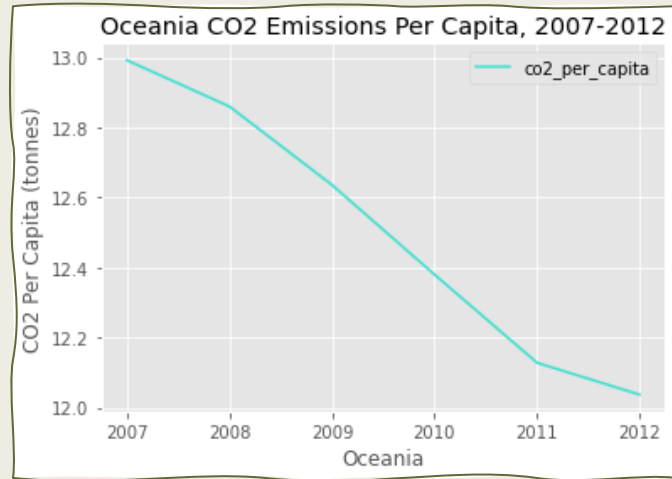
ADDT'L FINDINGS, 3



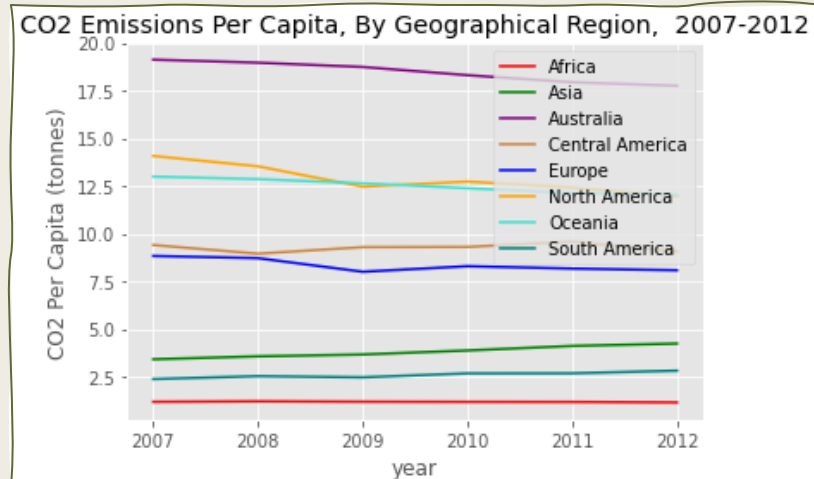
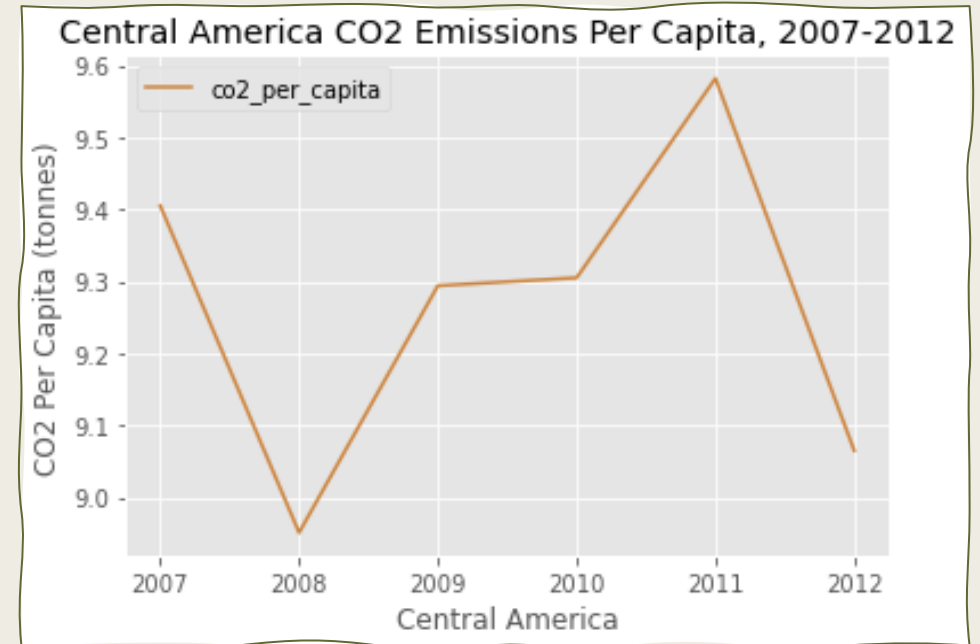
The Caribbean, North America & Europe, *peaked* emissions in 2010, but showed steady decline the following year



ADDT'L FINDINGS, 4

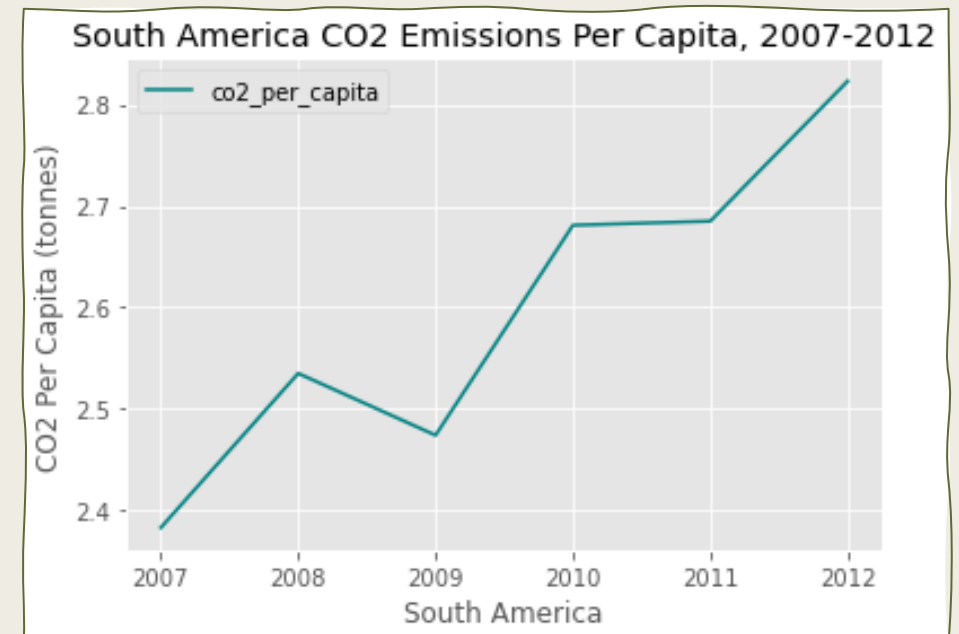


Oceania has showcased a *steady decline*, since 2007



Central America's emissions *increased in 2009*, and remained in 2010

While South America presented a *step-shaped progression* between 2009 - 2011



NEXT *ITERATION OF ANALYSIS*

FOCUS *AREA(s)*:

- ☐ Carbon Emissions By Geographical Region
 - ☐ By Carbon Emissions Type
- ☐ Time Period: 2007-2012
- ☐ World Events:
 - ☐ Great Recession 2007-2009
 - ☐ Economic Crisis of 2012

MACHINE *LEARNING MODEL*

- ☐ Predict “Popularity” By Carbon Emissions Type (By Region)
 - ☐ Top CO₂ Emitters
 - ☐ Regression – Based
- ☐ Carbon Emissions Type (with current dataset):
 - ☐ Coal
 - ☐ Oil
 - ☐ Trade
 - ☐ Gas
 - ☐ Consumption
 - ☐ Flaring
 - ☐ Cement
 - ☐ Industry

... REWIND

World Events Impacting Carbon Emissions | Carbon Emissions are dependent on human behavior. If there is an event that alters the former, human activity, positively or negatively, Carbon Emission will, too, become affected.

Old Habits Die Hard | Many industries and countries still rely heavy on traditional sources of energy for production, trade, and consumption.



Is there a *link*
between Carbon
Emission
activity and
World Events?

Short answer
-- *yes!*

- “Air Quality during Coronavirus.” *Dohbesp.Nyc.Go*, 2020, a816-dohbesp.nyc.gov/IndicatorPublic/Closerlook/covidair.
- Boselli, Muriel. “IEA Sees Record CO2 Emissions in 2010.” *U.S.*, 30 May 2011, www.reuters.com/article/us-ia-co2-idUSTRE74T4K220110530.
- bp global. “Year in Review | Energy Economics | Home.” *Bp Global*, 2020, www.bp.com/en/global/corporate/energy-economics/statistical-review-of-world-energy/year-in-review.html.
- “Carbon Emissions Are Going to Balloon as the World Exits the Pandemic and Returns to Normal.” *Fortune*, 20 Apr. 2021, fortune.com/2021/04/20/carbon-emissions-rising-global-covid-pandemic-energy.
- Chow, Denise. “Carbon Emissions Dropped 17 Percent Globally amid Coronavirus.” *NBC News*, 19 May 2020, www.nbcnews.com/science/environment/carbon-emissions-dropped-17-percent-globally-amid-coronavirus-n1210331.
- “CO2 and Greenhouse Gas Emissions: We Just Launched Our New Data Explorer, Country Profiles and Complete Dataset.” *Our World in Data*, 2020, ourworldindata.org/new-co2-data-explorer.
- “Economic Impacts of Covid-19 – Global Energy Review 2021 – Analysis.” *IEA*, 2021, www.iea.org/reports/global-energy-review-2021/economic-impacts-of-covid-19#2021-a-year-of-global-economic-recovery.
- ET EnergyWorld. “Global Carbon Emissions Set for Second-Biggest Increase in History: IEA.” *ETEnergyworld.Com*, 27 Apr. 2021, energy.economictimes.indiatimes.com/news/power/global-carbon-emissions-set-for-second-biggest-increase-in-history-ia/82268023.

- “Global Carbon Emissions to Rise by 1.5 Billion Tonnes in 2021; Record Second-Largest Annual Increase Ever: IEA | The Weather Channel - Articles from The Weather Channel | Weather.Com.” *The Weather Channel*, 21 Apr. 2021, weather.com/en-IN/india/environment/news/2021-04-21-global-carbon-emissions-to-rise-by-15-billion-tonnes-in-2021.
- “Global Energy Review: CO2 Emissions in 2020 – Analysis.” *IEA*, 2020, www.iea.org/articles/global-energy-review-co2-emissions-in-2020.
- NBC Universal. “Recession Blessing: CO2 Emissions Fell in '08.” *NBC News*, 20 May 2009, www.nbcnews.com/id/wbna30853232.
- Nugent, Ciara. “Global Carbon Emissions Set for Second-Largest Annual Increase in History in 2021 Despite COVID-19 Restrictions.” *Time*, 20 Apr. 2021, time.com/5956410/carbon-emissions-increase-2021.
- Smith, Patrick. “Carbon Emissions in 2021 to Pass Pre-Pandemic Levels, Report Warns.” *NBC News*, 20 Apr. 2021, www.nbcnews.com/science/environment/carbon-emissions-2021-pass-pre-pandemic-levels-report-warns-n1264591.
- Staff, Science. “Pandemic Brings Record Fall in Global Carbon Emissions.” *Phys*, 22 Mar. 2021, phys.org/news/2021-03-pandemic-fall-global-carbon-emissions.html.
- Worland, Justin. “How the Recession Accidentally Helped the Planet.” *Time*, 22 July 2015, time.com/3966553/recession-emissions-decline.

Images

- Girardet, Etienne. “Photo by Etienne Girardet On.” *Unsplash*, uploaded by Etienne Girardet, 1 Mar. 2021, unsplash.com/photos/fti002hQCCA?utm_source=unsplash&utm_medium=referral&utm_content=creditShareLink.
- Hooper, Edwin. “Red and White UNKs Restaurant.” *Unsplash*, uploaded by Edwin Hooper, 27 Mar. 2020, unsplash.com/photos/Q8m8cLkryeo?utm_source=unsplash&utm_medium=referral&utm_content=creditShareLink.
- Peterson, Zachary. “Photo of LED Neon Open Signboard.” *Unsplash*, uploaded by Zachary Peterson, 24 Aug. 2018, unsplash.com/photos/pB4bgMgcgWI?utm_source=unsplash&utm_medium=referral&utm_content=creditShareLink.