



# WORLD EVENTS & *CARBON EMISSIONS*

# (a bit of) CONTEXT ...

Carbon (CO<sub>2</sub>) 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

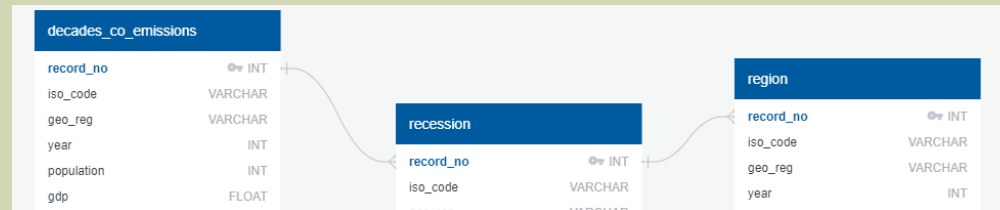
## SCHEMA

**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

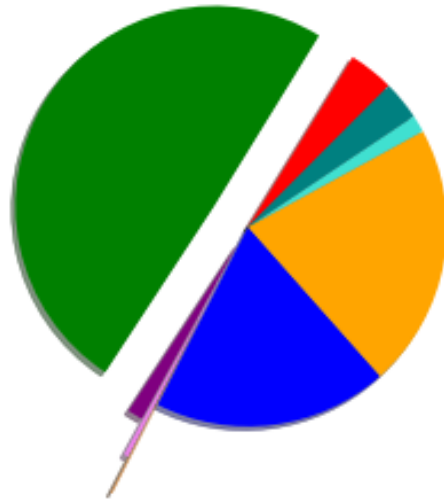
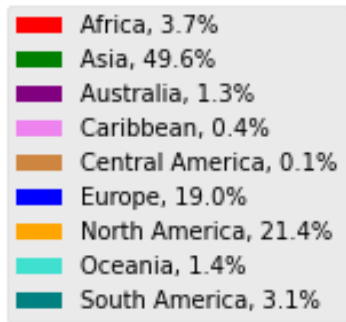
```
117
118 --
119 SELECT record_no, geo_reg, year, co2, co2_per_capita, coal_co2, coal_co2_per_capita FROM region;
120 --
121
```

	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

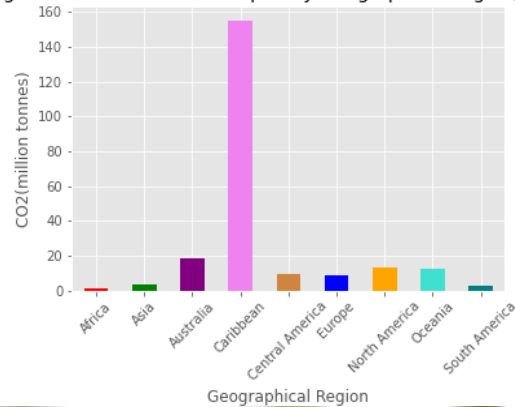


# FINDINGS

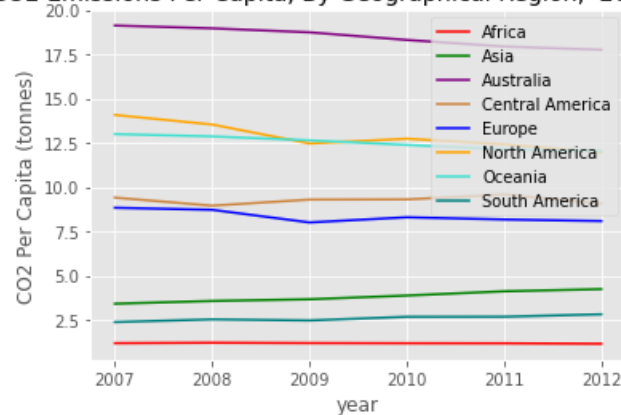
Asia, North America, and Europe ranked among the **Top 3 emitters** of Carbon Emissions

# ADDITIONAL FINDINGS, 2

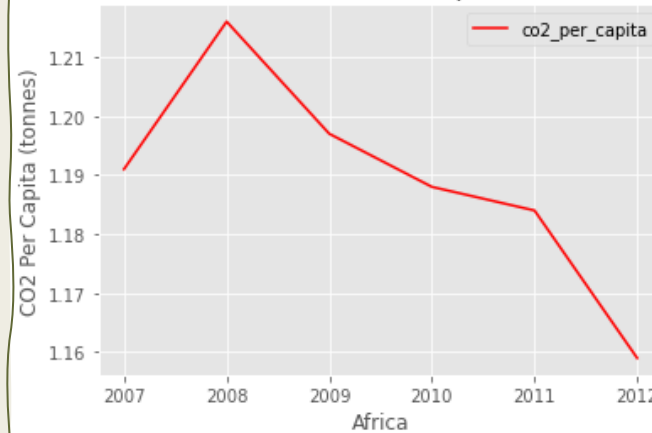
Average of CO2 Emissions Per Capita by Geographical Region, 2007-2012



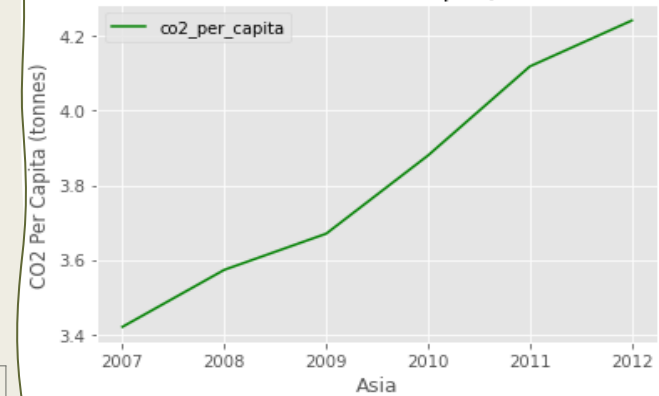
CO2 Emissions Per Capita, By Geographical Region, 2007-2012



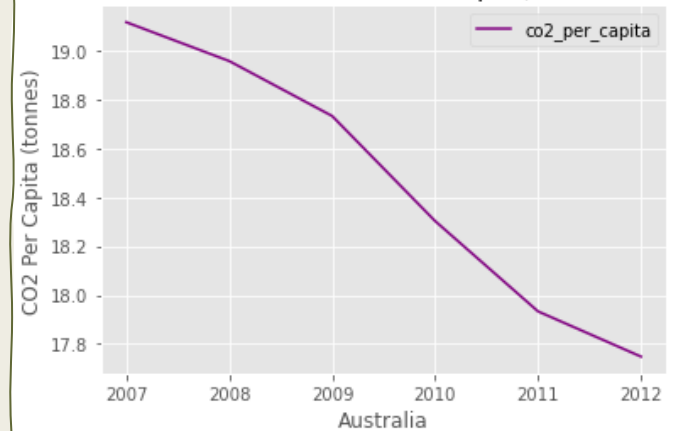
Africa CO2 Emissions Per Capita, 2007-2012



Asia CO2 Emissions Per Capita, 2007-2012



Australia CO2 Emissions Per Capita, 2007-2012



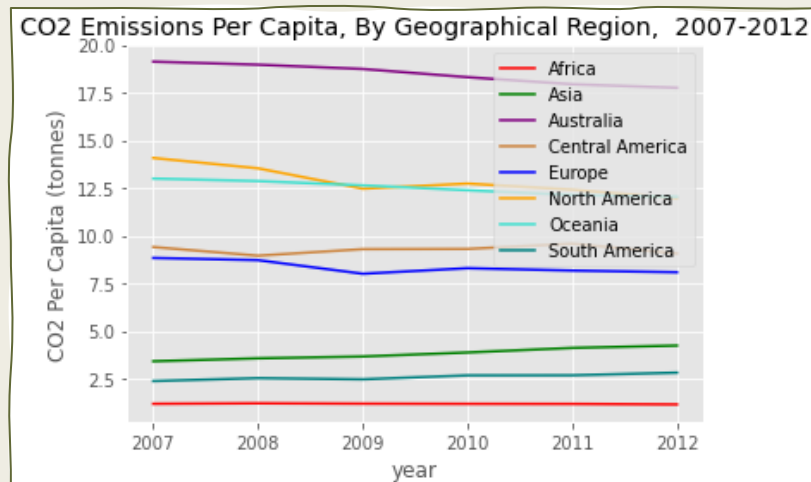
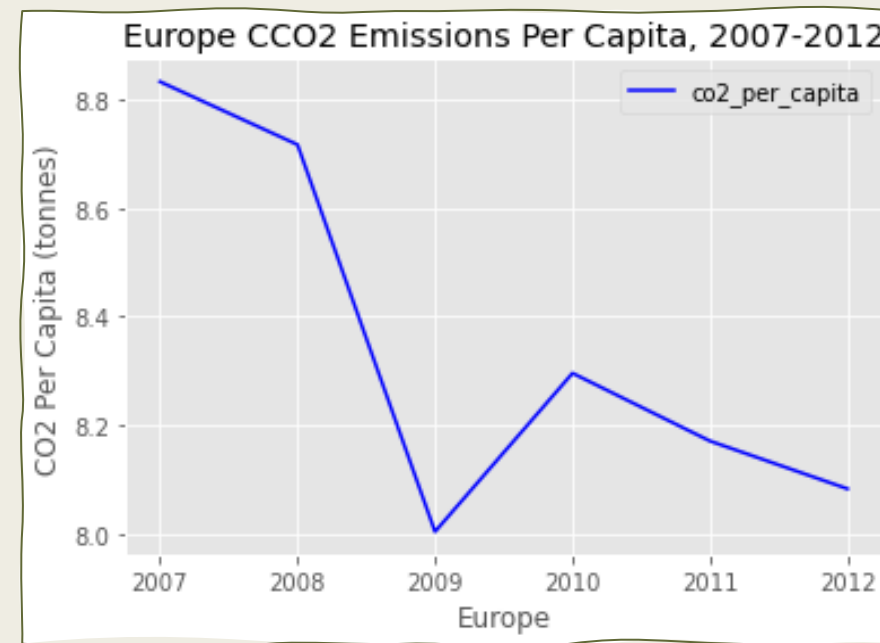
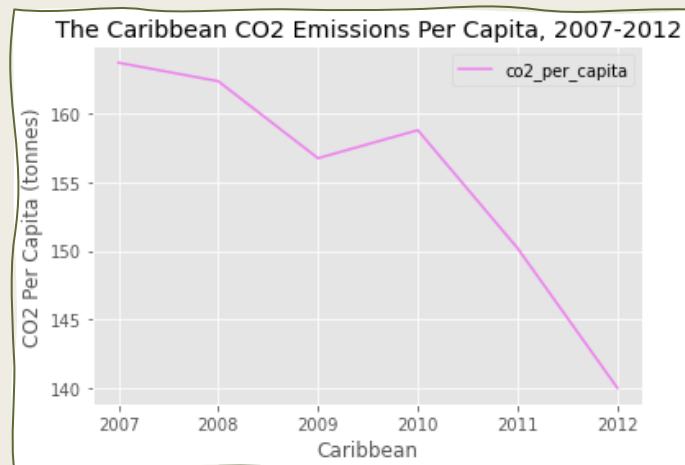
Africa's CO<sub>2</sub> output were *quite strong* in 2008

Asia had a *slight dip* in 2009

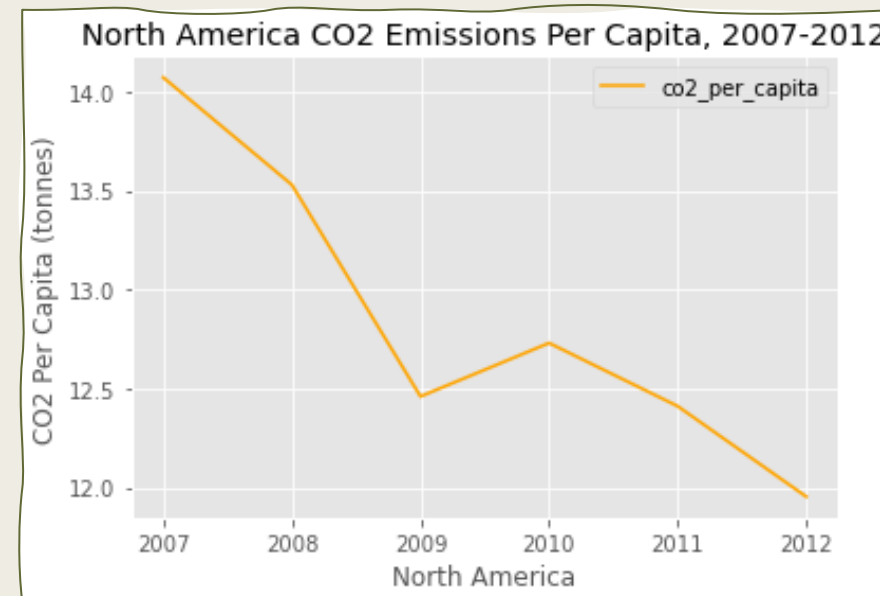
While high levels on record, Australia too, has seen *carbon emissions decline*



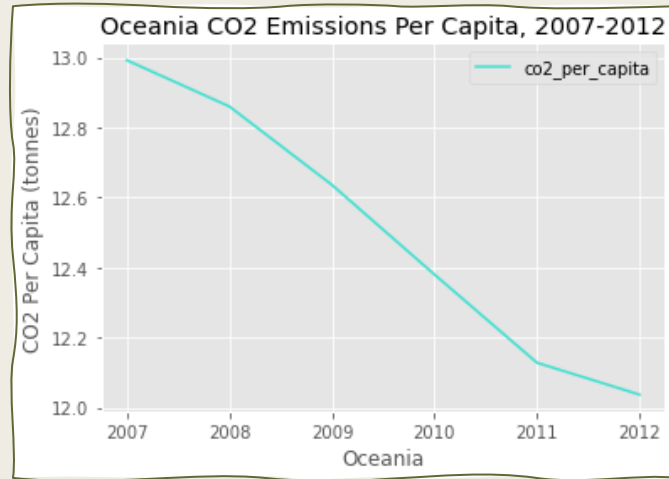
# ADDT'L FINDINGS, 3



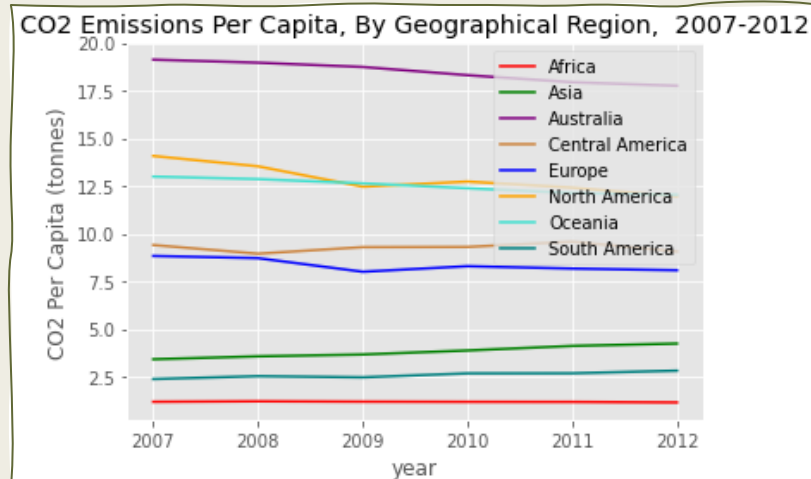
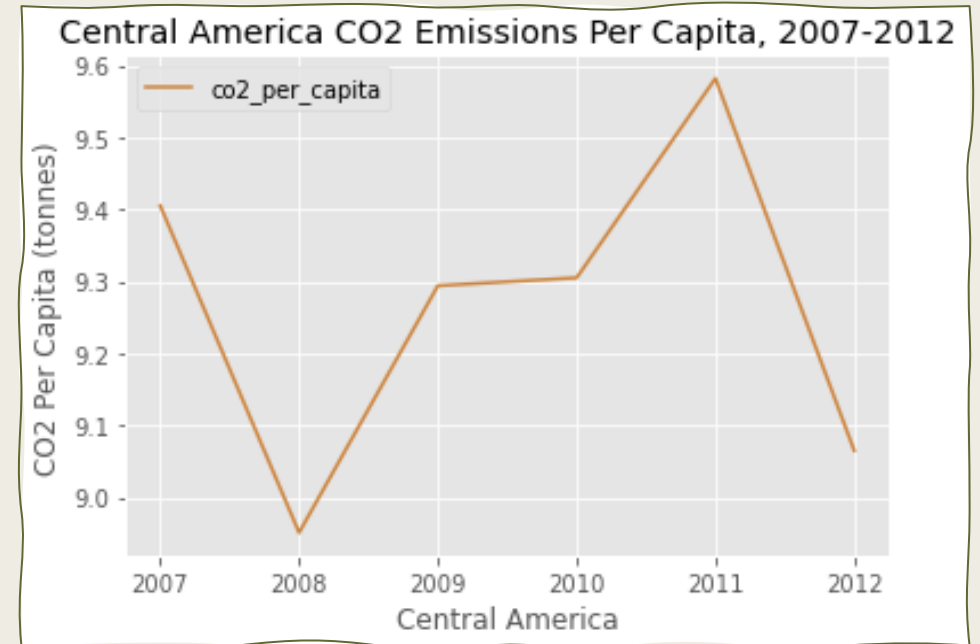
The Caribbean, North America & Europe, *peaked* emissions in 2010, but showed steady decline the following year



# ADDT'L FINDINGS, 4

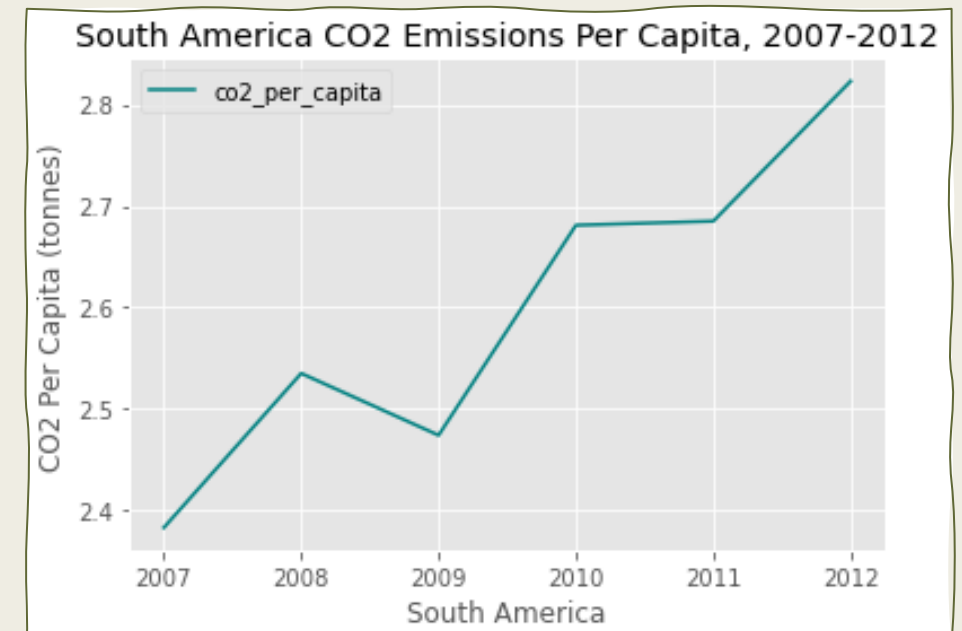


Oceania has showcased a *steady decline*, since 2007



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 CO<sub>2</sub> Emitters
- ☐ 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](https://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](https://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](https://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](https://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](https://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](https://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](https://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](https://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](https://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](https://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](https://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](https://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](https://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](https://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](https://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](https://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](https://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](https://unsplash.com/photos/pB4bgMgcgWI?utm_source=unsplash&utm_medium=referral&utm_content=creditShareLink).