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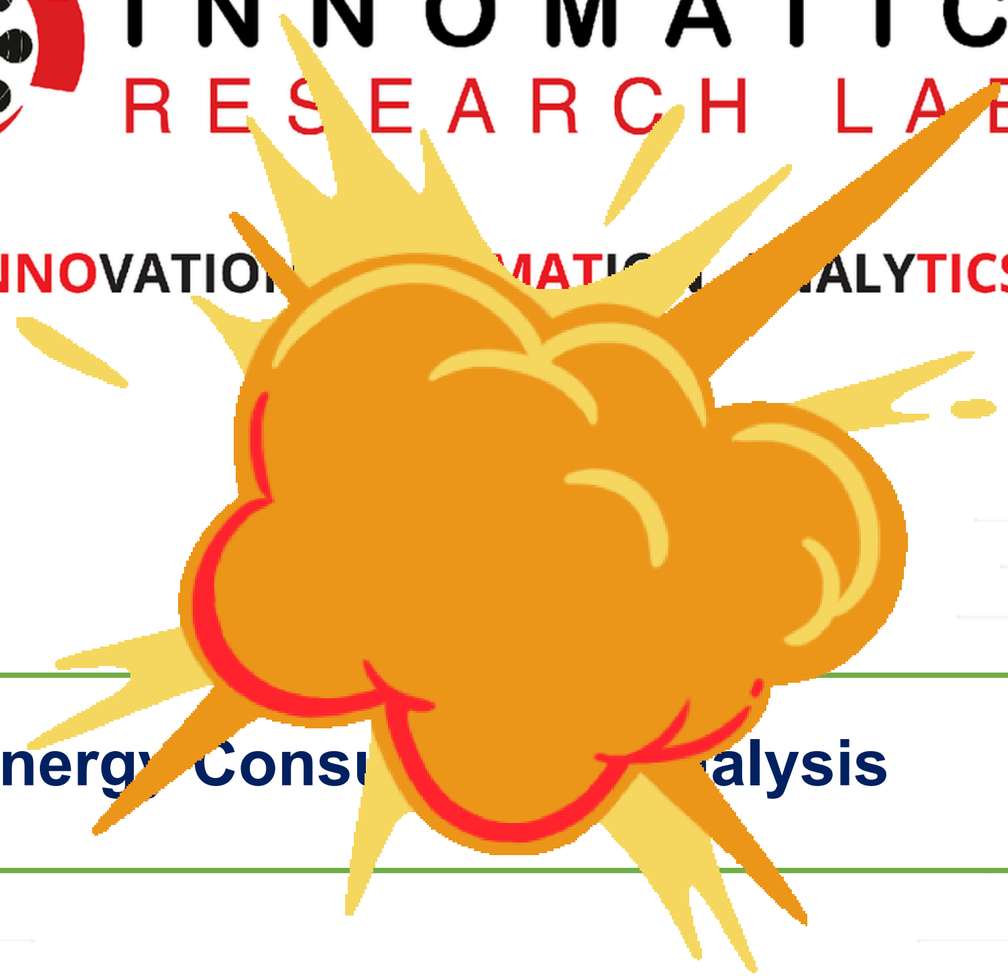

Energy Consu alysis

About me

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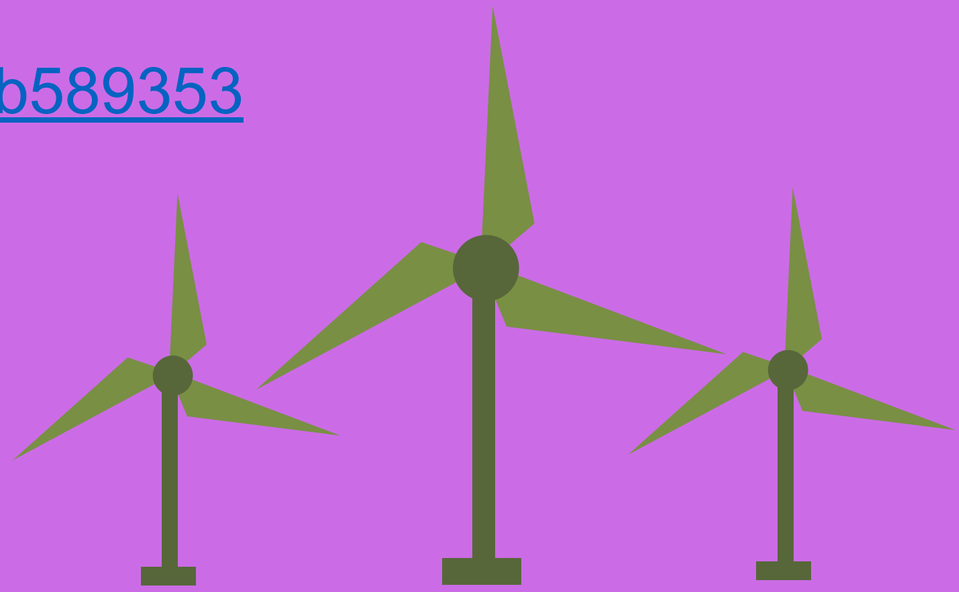

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Objective Of The Analysis

The primary objective of this analysis is to gain deep insights into global energy usage, production, emissions, Population growth and economic performance(GDP) by country and year. The key goals include:

1. Analysing the relationship between **energy production/consumption and emissions**.
2. Identifying **top contributors to emissions** and **trends over time**.
3. Evaluating **GDP and population growth impacts** on energy demand and emissions.
4. Comparing **per capita metrics** and identifying **major economies energy behaviour**.
5. Measuring **the efficiency of energy usage relative to economic output**.
6. Highlighting global emission shares and identifying countries with positive or negative trends.
7. Supporting sustainable energy policy recommendations based on data-driven findings.

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About Tables

Emission Table

energy type	year	emission
Consumed natural gas (MMtonnes CO2)	2020	0
Consumed natural gas (MMtonnes CO2)	2020	0
Consumed natural gas (MMtonnes CO2)	2020	0
Consumed natural gas (MMtonnes CO2)	2020	0
Consumed natural gas (MMtonnes CO2)	2020	0
Consumed natural gas (MMtonnes CO2)	2020	0
Consumed natural gas (MMtonnes CO2)	2020	0
Consumed natural gas (MMtonnes CO2)	2020	0
Consumed natural gas (MMtonnes CO2)	2020	0
Consumed natural gas (MMtonnes CO2)	2020	0

Country Table

Country	CID
Country	CID
Afghanistan	Af0
Albania	Al1
Algeria	Al2
American Samoa	Am3
Angola	An4
Antarctica	An5
Antigua and Barbuda	An6
Argentina	Ar7
Armenia	Ar8

Population Table

countries	year	value
Afghanistan	2024	42647.49
Albania	2024	2791.765
Algeria	2024	46814.31
Angola	2024	37885.85
Antigua and Barbuda	2024	93.772
Argentina	2024	45696.16
Armenia	2024	2973.84
Aruba	2024	108.066
Australia	2024	27236.21
Austria	2024	9170.854

Production Table

untry	energy	year	productio
hanistan	Nuclear (quad Btu)	2020	0
ania	Nuclear (quad Btu)	2020	0
eria	Nuclear (quad Btu)	2020	0
erican Samoa	Nuclear (quad Btu)	2020	0
jola	Nuclear (quad Btu)	2020	0
arctica	Nuclear (quad Btu)	2020	0
igua and Barbuda	Nuclear (quad Btu)	2020	0
ba	Nuclear (quad Btu)	2020	0
tralia	Nuclear (quad Btu)	2020	0

Consumption Table

country	energy	year	consumption
Afghanistan	Nuclear (quad Btu)	2020	0
Albania	Nuclear (quad Btu)	2020	0
Algeria	Nuclear (quad Btu)	2020	0
American Samoa	Nuclear (quad Btu)	2020	0
Angola	Nuclear (quad Btu)	2020	0
Antarctica	Nuclear (quad Btu)	2020	0
Antigua and Barbuda	Nuclear (quad Btu)	2020	0
Aruba	Nuclear (quad Btu)	2020	0
Australia	Nuclear (quad Btu)	2020	0
Austria	Nuclear (quad Btu)	2020	0

GDP Table

Country	year	value
Afghanistan	2020	83.21645
Albania	2020	36.78752
Algeria	2020	531.9749
Angola	2020	215.9016
Antigua and Barbuda	2020	1.772876
Argentina	2020	866.9691
Armenia	2020	33.00228
Aruba	2020	2.584789

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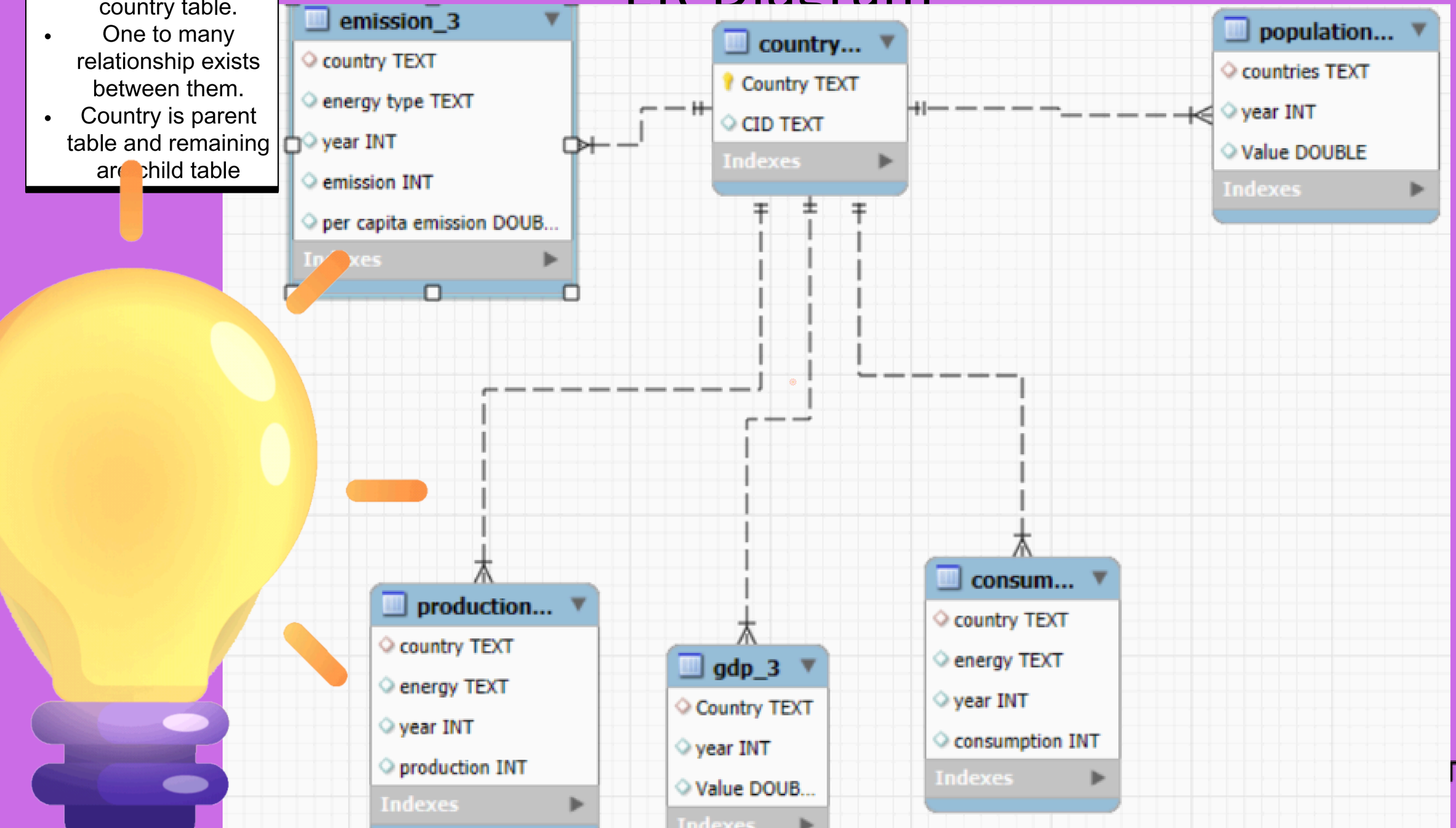
ER-Diagram

- All the tables are connected with country table.
- One to many relationship exists between them.
- Country is parent table and remaining are child table



1.What is the total emission per country for the most recent year available?

Query

```
SELECT country,sum(emission) as total_emi sion
from emission_3
WHERE year=
(SELECT max(year)as recent_year
from emission_3)
group by country
order by total_emission desc;
```

Output

country	total_emission
China	24392
United States	9590
India	5642
R ia	3688
Japan	1920
Indonesia	1659
n	1646
di Arabia	1313
uth Korea	1288
Germany	1200
Canada	1171

Top 3 co2 emitter countries are China, US d India.

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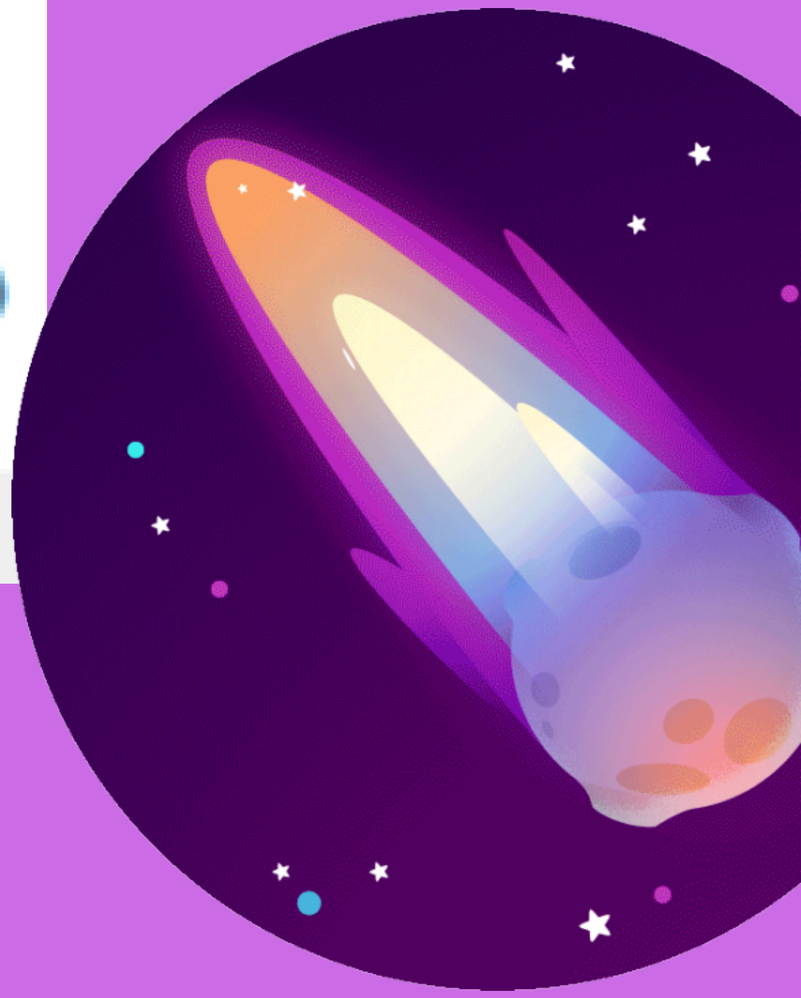
2.What are the top 5 countries by GDP in the most recent year?

Query

```
SELECT country, value, year
FROM gdp_3
WHERE year = (SELECT MAX(year) FROM gdp_3)
ORDER BY value DESC
LIMIT 5;
```



Output

country	value	year
China	28673.24	2024
United States	22679.47	2024
India	11660.21	2024
Japan	5179.704	2024

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3.Compare energy production and consumption by country and year.

Query

```
SELECT
  p.country,
  p.year,
  p.energy,
  c.consumption,
  p.production
FROM production_3 AS p
JOIN consum_3     AS c
  ON p.country = c.country
  AND p.year    = c.year
  AND p.energy  = c.energy
ORDER BY p.production DESC;
```

Output

country	year	energy	consumption	production
China	2023	Coal (quad Btu)	100	94
China	2022	Coal (quad Btu)	96	93
China	2021	Coal (quad Btu)	95	93
China	2020	Coal (quad Btu)	92	90
United States	2023	Natural gas (quad Btu)	34	39
United States	2022	Natural gas (quad Btu)	33	38
United States	2021	Natural gas (quad Btu)	32	36
United States	2020	Natural gas (quad Btu)	32	35
United States	2023	Petroleum and other liquids (quad Btu)	37	35
United States	2022	Petroleum and other liquids (quad Btu)	37	33
United States	2021	Petroleum and other liquids (quad Btu)	37	31

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4.Which energy types contribute most to emissions across all countries?

Query

```
SELECT
`energy type`, sum(emission) AS total_emission
FROM emission_3
GROUP BY `energy type`
ORDER by total_emission DESC;
```

Output

energy type	total_emission
CO2 emissions (MMtonnes C	14[illegible]723
Coal and coke (MMtonn	63945
Petroleum and other liquid es CO2)	47297
Consumed natural gas (M 2)	31469

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5.How have global emissions changed year over year?

Query

```
SELECT
year, sum(emission) AS total_emission
FROM emission_3
GROUP BY year
ORDER BY year DESC;
```

As we see total emission increasing over the year

Output

year	total_emission
2023	74161
2022	72445
2021	70976
2020	67852

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6.What is the trend in GDP for each country over the given years?

Query

```
SELECT
country, year, value AS gdp
FROM gdp_3
ORDER BY gdp desc,year;
```

Output

country	year	gdp
China	2024	28673.24
China	2023	27313.92
China	2022	25910.6
China	2021	25123.27
China	2020	23136.77
United States	2024	22679.47
United States	2023	22062.56
United States	2022	21443.41
United States	2021	20917.86
United States	2020	19723.57
India	2024	11660.21

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7.How has population growth affected total emissions in each country?

Query

```
SELECT
p.countries,
p.year,
sum(e.emission) AS total_emission,
p.value AS population
FROM population_3 p
JOIN emission_3 e
ON p.countries = e.country
AND p.year = e.year
GROUP BY p.countries, p.year, p.value
ORDER BY countries,year;
```

Output

countries	year	total_emission	population
Afghanistan	2020	18	39068.98
Afghanistan	2021	20	40000.41
Afghanistan	2022	18	40578.84
Afghanistan	2023	16	41454.76
Albania	2020	6	2871.954
Albania	2021	8	2849.635
Albania	2022	9	2827.608
Albania	2023	7	2811.655
Algeria	2020	284	44042.09
Algeria	2021	304	44761.1
Algeria	2022	317	45477.38
Algeria	2023	328	46164.22
Angola	2020	29	33451.13

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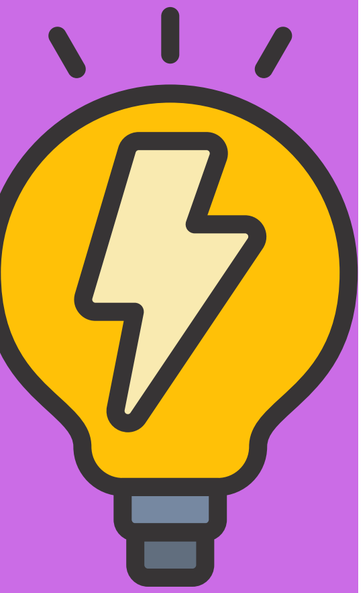
8.Has energy consumption increased or decreased over the years for major economies?

Query

```
SELECT
  me.country,
  c.year,
  SUM(c.consumption) AS total_consumption
FROM consum_3 AS c
JOIN (SELECT
country,SUM(value) AS total_gdp
  FROM gdp_3
  GROUP BY country
  ORDER BY total_gdp DESC
  LIMIT 5
) AS me
  ON c.country = me.country
GROUP BY c.year,me.country
ORDER BY c.year DESC,me.country;
```



Output

country	year	total_consumption
China	2023	177
Germany	2023	11
India	2023	38
Japan	2023	19
United States	2023	111
China	2022	168
Germany	2022	11
India	2022	36
Japan	2022	19
United States	2022	112
China	2021	165
Germany	2021	13
India	2021	33

Indias energy consumption across year 2021-33,2022-36,2023-38

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9.What is the average yearly change in emissions per capita for each country?

Query

```
WITH emissionchanges AS (
  SELECT country,year,`per capita emission`,
 LAG(`per capita emission`) OVER (PARTITION BY country ORDER BY year) AS pre_year_em
  FROM emission_3
)
SELECT country,ROUND(AVG(`per capita emission` - pre_year_emission), 2) AS avg_year_
FROM emissionchanges
WHERE pre_year_emission IS NOT NULL
GROUP BY country
ORDER BY avg_year_percapita_change DESC;
```

country	avg_year_percapita_change
Afghanistan	0
Albania	0
Algeria	0
American Samoa	0
Angola	0
Antarctica	0
Antigua and Barbuda	0
Argentina	0
Armenia	0
Aruba	0
Australia	0
Austria	0
Azerbaijan	0

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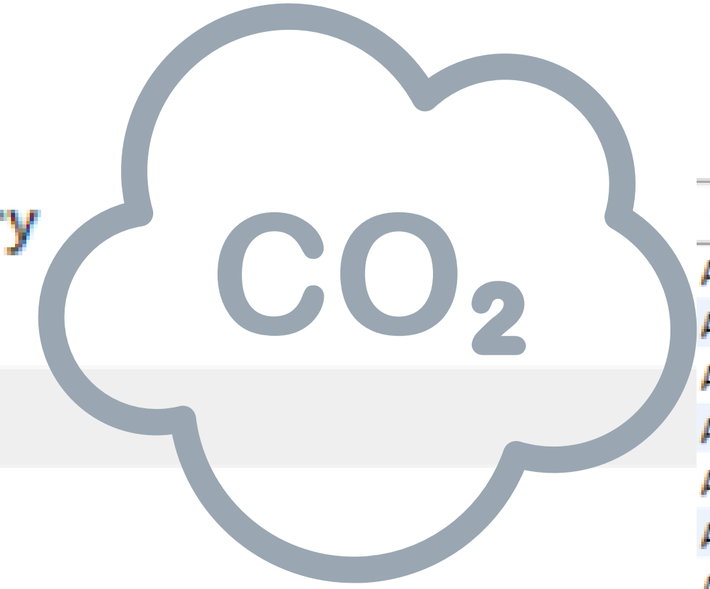
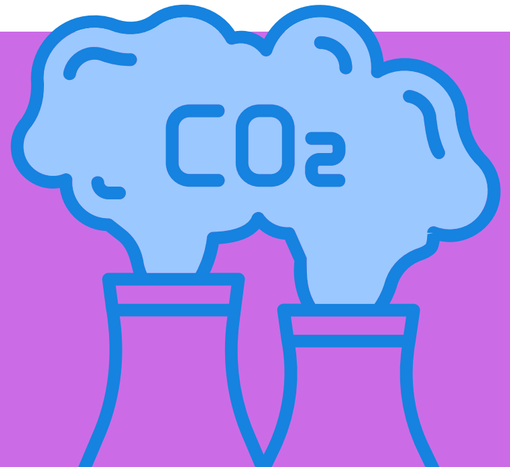
10.What is the emission-to-GDP ratio for each country by year?

Query

```
SELECT e.country, e.year,
round((sum(e.emission)/sum(g.value)), 4) AS emission_gdp_ratio
FROM emission_3 e
JOIN gdp_3 g
ON e.country = g.country
AND e.year = g.year
group by country, year
order by country,year;
```





Output

country	year	emission_gdp_ratio
Afghanistan	2020	0.0541
Afghanistan	2021	0.1011
Afghanistan	2022	0.097
Afghanistan	2023	0.0905
Albania	2020	0.0408
Albania	2021	0.0499
Albania	2022	0.0536
Albania	2023	0.0401
Algeria	2020	0.1335
Algeria	2021	0.1375
Algeria	2022	0.1384
Algeria	2023	0.1376
Angola	2020	0.0336

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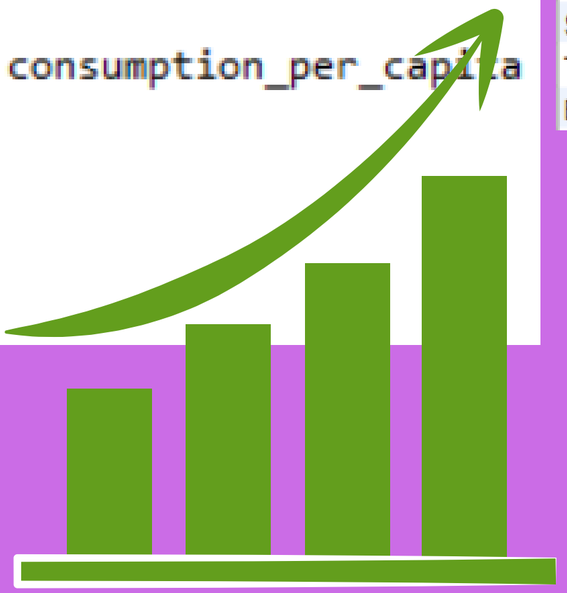
12.What is the energy consumption per capita for each country over the last decade?

Query

```
with recent_years AS (
 SELECT max(year) AS max_year FROM consum_3),
 consumption_data AS (
 SELECT c.country, c.year,c.consumption, p.value AS population
 FROM consum_3 c
 JOIN population_3 p
 ON c.country = p.countries AND c.year = p.year
 WHERE c.year >= (SELECT max_year - 9 FROM recent_years)
 )SELECT country,year,
 ROUND(sum(consumption)/sum(population), 4) AS consumption_per_capita
 FROM consumption_data
 GROUP BY country,year
 ORDER BY consumption_per_capita desc;
```

Output

country	year	consumption_per_capita
Qatar	2023	0.0002
Bahrain	2020	0.0001
Kuwait	2020	0.0001
Qatar	2020	0.0001
Saudi Arabia	2020	0.0001
Singapore	2020	0.0001
Trinidad and Tobago	2020	0.0001
Bahrain	2021	0.0001
Kuwait	2021	0.0001
Qatar	2021	0.0001
Saudi Arabia	2021	0.0001
Singapore	2021	0.0001
Trinidad and Tobago	2021	0.0001
Bahrain	2022	0.0001



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13.How does energy production per capita vary across countries?

Query

```
 SELECT
   p.countries,
   ROUND(SUM(p1.production) / SUM(p.value), 4)
   AS production_percapita
FROM population_3 AS p
JOIN production_3 AS p1
   ON p.countries = p1.country
   AND p.year     = p1.year
GROUP BY p.countries
ORDER BY production_percapita DESC;
```

Output

countries	production_percapita
Qatar	0.0006
Kuwait	0.0003
Norway	0.0003
United Arab Emirates	0.0002
Australia	0.0001
Bahrain	0.0001
Kazakhstan	0.0001
Libya	0.0001
Mongolia	0.0001
Oman	0.0001
Saudi Arabia	0.0001
Trinidad and Tobago	0.0001
Turkmenistan	0.0001
Canada	0.0001

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14.Which countries have the highest energy consumption relative to GDP?

Query

```
SELECT
c.country,
ROUND(sum(consumption)/sum(g.value),4) AS relative_consumption_for_gdp
FROM consum_3 c
JOIN gdp_3 g
ON c.country = g.country
AND c.year = g.year
GROUP BY country
ORDER BY relative_consumption_for_gdp desc;
```

country	relative_consumption_for_gdp
Trinidad and Tobago	0.0051
North Korea	0.0045
Turkmenistan	0.0034
Bahrain	0.0022
Kuwait	0.0017
Iran	0.0017
Qatar	0.0015
Russia	0.0015
Kazakhstan	0.0014
Ukraine	0.0014
Iraq	0.0013
Canada	0.0012
United Arab Emirates	0.0012
Oman	0.0011

Output

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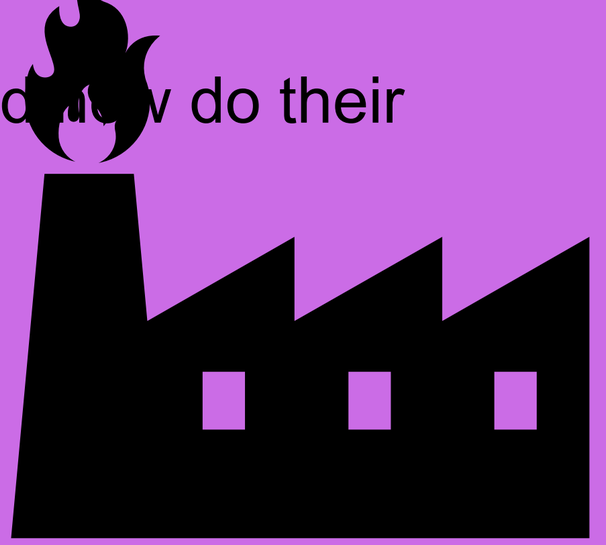
15.What are the top 10 countries by population and how do their emissions compare?



Query

```
SELECT
p.countries,
sum(p.value) AS total_population,
sum(e.emission) AS total_emission
FROM population_3 p
JOIN emission_3 e
ON p.countries = e.country
AND p.year = e.year
GROUP BY p.countries
ORDER BY total_population desc
limit 10;
```

Output

countries	total_population	total_emission
China	22801232	92338
India	22721260	20223
United States	5334912.8	38453
Indonesia	4446374.8	5313
Pakistan	3862739.1999999997	1640
Nigeria	3534237.1999999997	874
Brazil	3358632.7999999993	3405
Bangladesh	2699235.1999999997	894
Russia	2332911.5999999996	14481
Mexico	2051199.9999999998	3416

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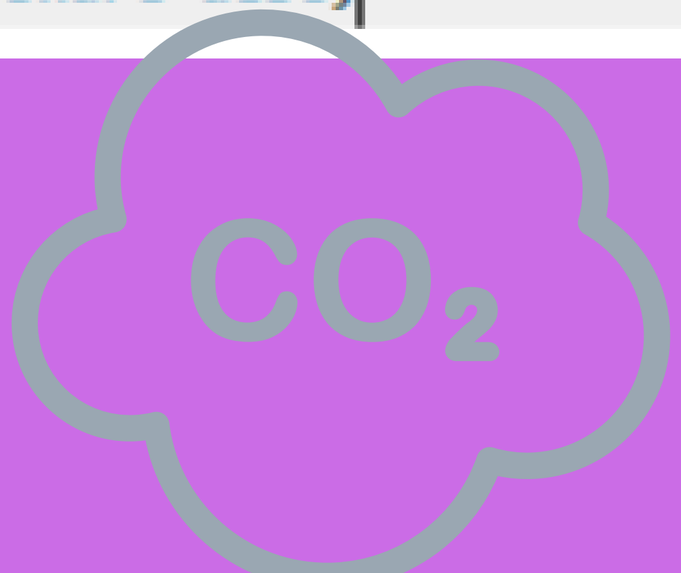
16.What is the global share (%) of emissions by country?

Query

```
with total_emission_percountry as (
select country,sum(emission) AS total_emission
FROM emission_3 group by country)
SELECT country,round(total_emission*100/(select sum(emission)from emissio
from total_emission_percountry
order by share desc;
```

Output

country	share
China	32.3500
United States	13.4718
India	7.0850
Russia	5.0733
Japan	2.8507
Iran	2.0902
Indonesia	1.8614



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Conclusion

1.**Top Emitting Countries**: Nations like **China, the USA, and India** consistently rank highest in total emissions due to their large populations and industrial energy demands.
2. **High Emission Energy Types**: Fossil fuels (especially coal and oil) are the primary contributors to global emissions, highlighting the urgent need for cleaner alternatives.
3**. Per Capita Insights**: Some countries have high total emissions but low per capita emissions due to large populations. Others, mainly developed nations, show higher per capita emissions, though several have reduced theirs over the past decade.
4**. Energy Production vs. Consumption**: Countries like the USA and China show both high production and consumption, while others consume more than they produce, relying on imports.
5**. Energy Efficiency**: Countries with lower emission-to-GDP and consumption-to-GDP ratios demonstrate better energy efficiency, often due to cleaner energy policies and technologies. 6. **Global Emission Distribution**: A small number of countries account for a major share of global emissions, revealing uneven responsibility and opportunity for leadership in climate action.
7. **Population Impact**: Emissions generally rise with population growth, but countries that have invested in clean energy have successfully decoupled emissions from population increases.
8. Global Averages: Yearly averages show gradual changes, with global GDP and energy demand increasing, while emissions per capita show mixed trends depending on the region

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THANK YOU

The end

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