



INNOVATION.AUTOMATION**.ANALY**TICS****

PROJECT ON

MY SQL PROJECT

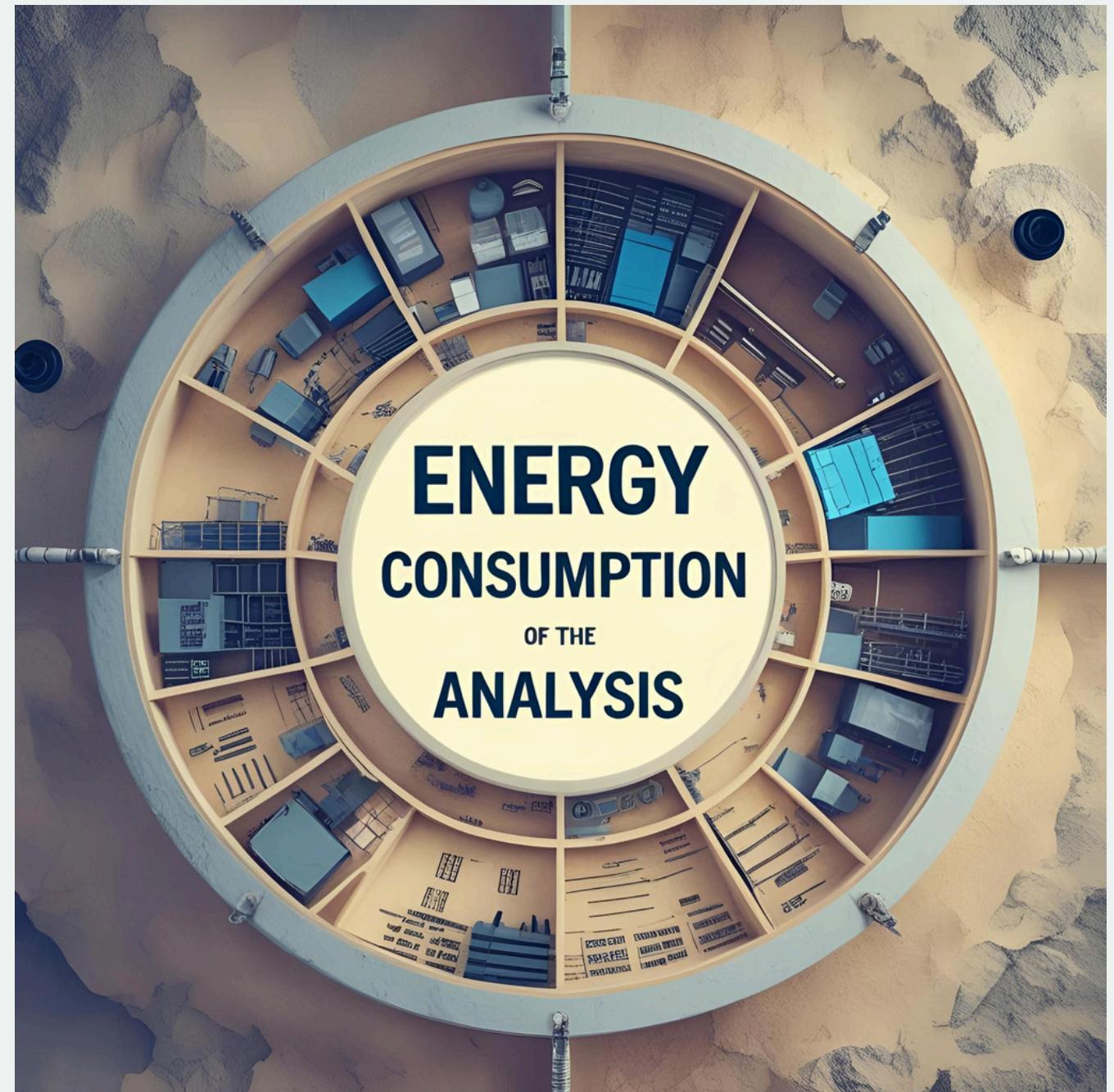


PROJECT TITLE:

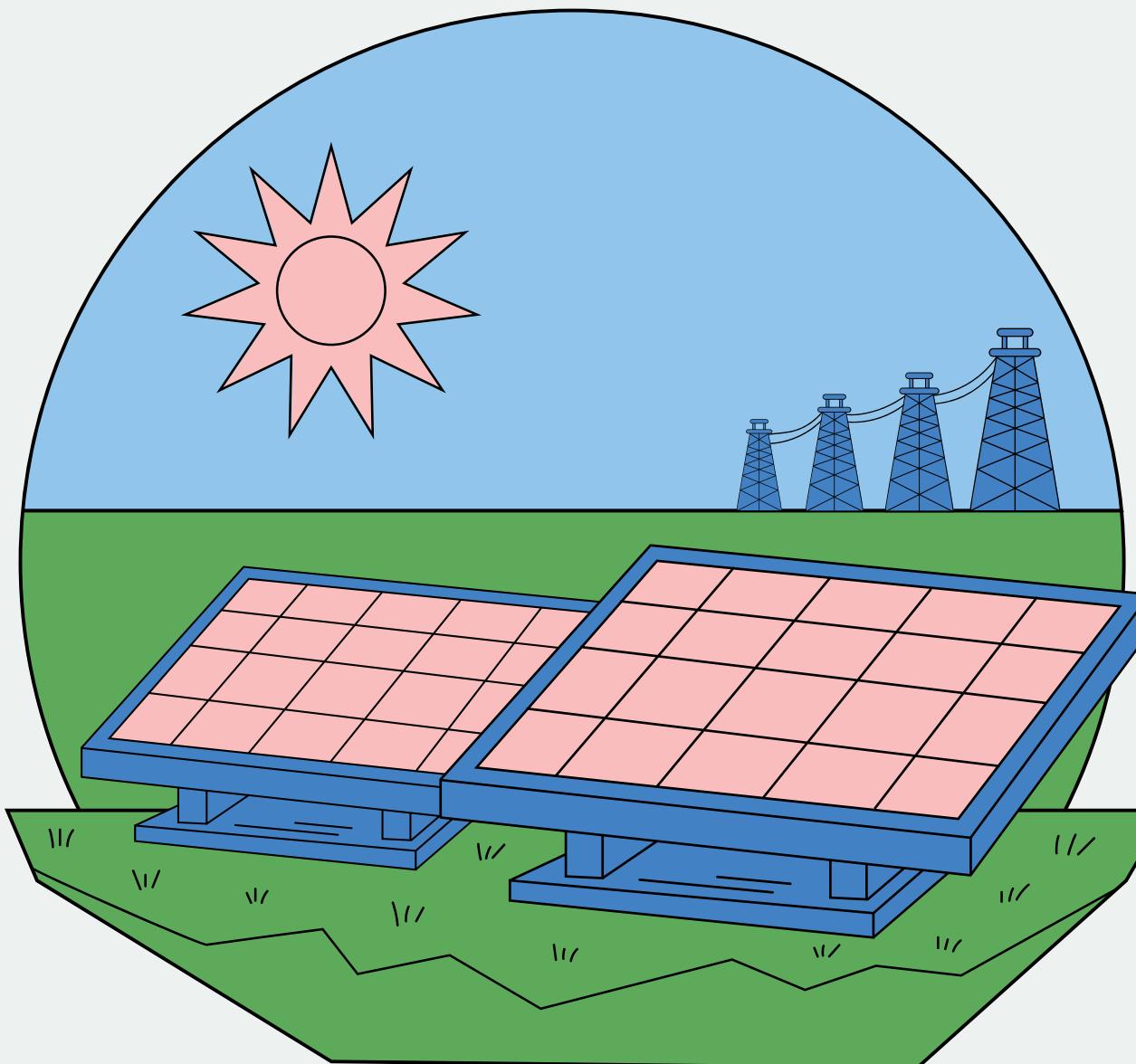
ENERGY CONSUMPTION ANALYSIS

TEAM MEMBERS:

- 1.SARWAN
- 2.LIPSA
- 3.AKSHAY
- 4.ANJAN KARTHIK



INTRODUCTION:



Purpose: Analyze and correlate energy consumption, population, GDP, and emissions across countries.

Tools Used: SQL, CSV, PowerPoint

Data Source: Internal CSV datasets

Table Descriptions

population_3 :Yearly population data by country

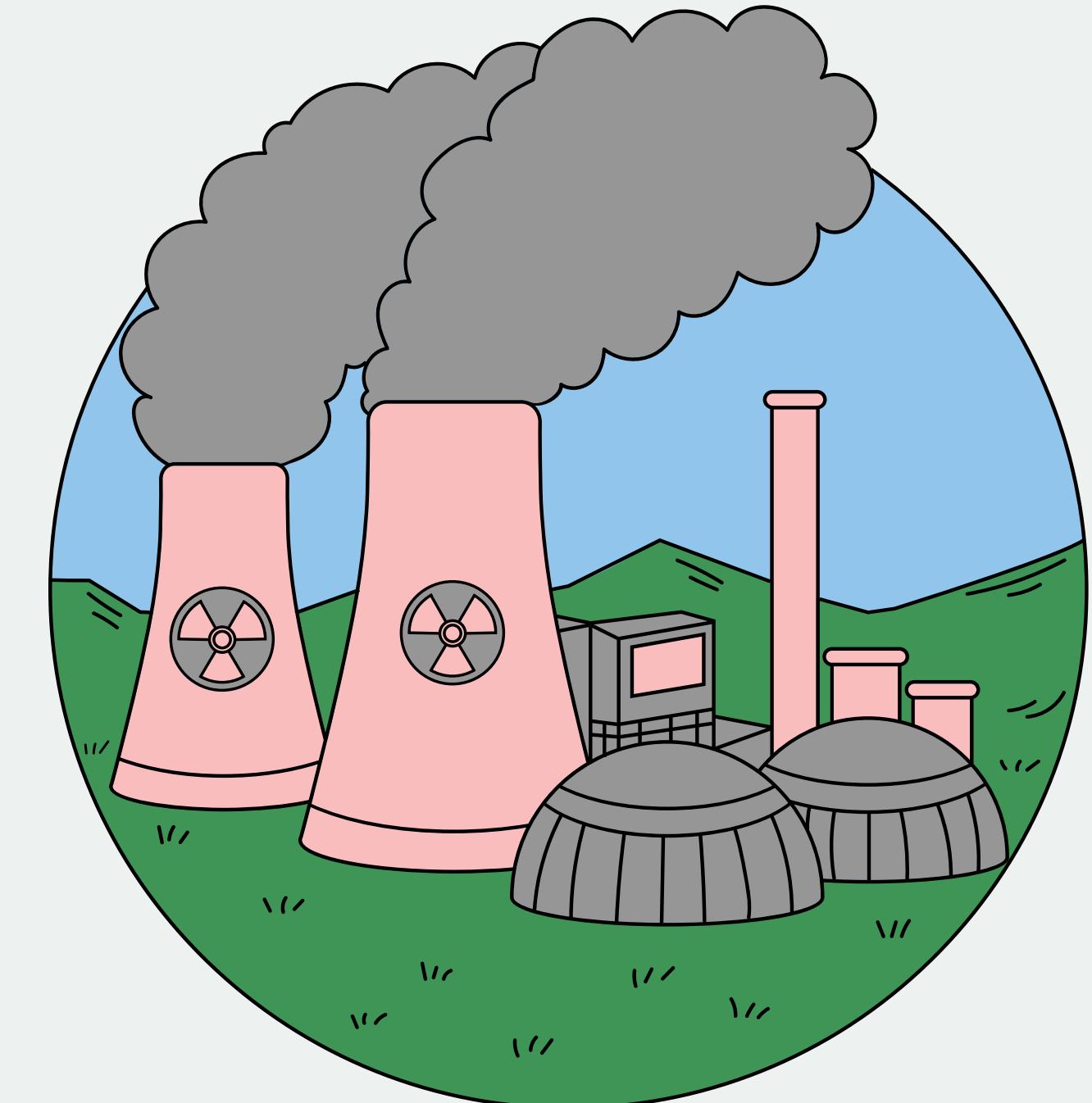
gdp_3 :GDP figures for each country and year

emission_3: Emissions and per capita emissions

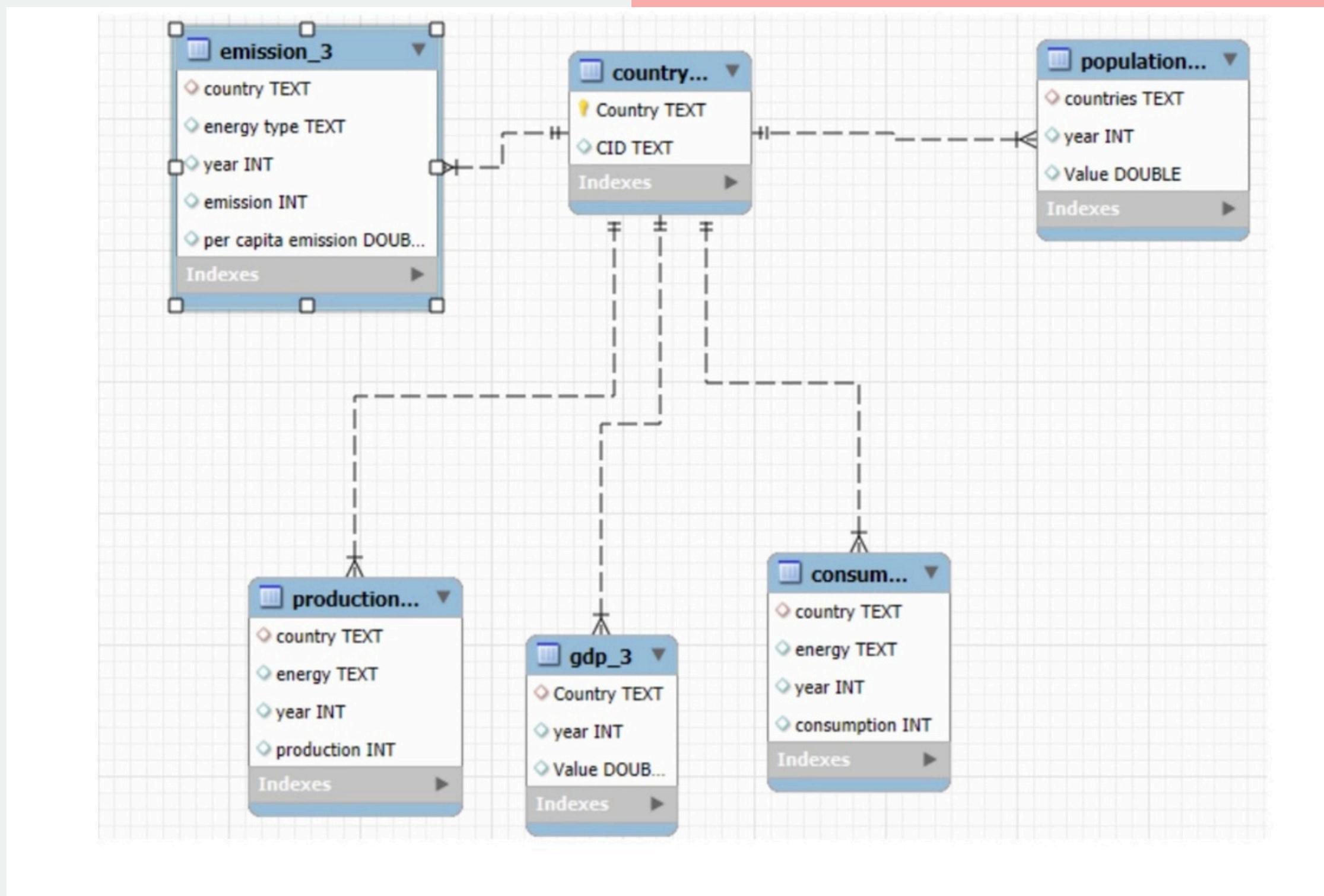
production_3 :Energy production values across sources

consumption_3: Energy consumption (Total + Sector wise)

country_3 : Master table with country metadata (region, code, etc.)

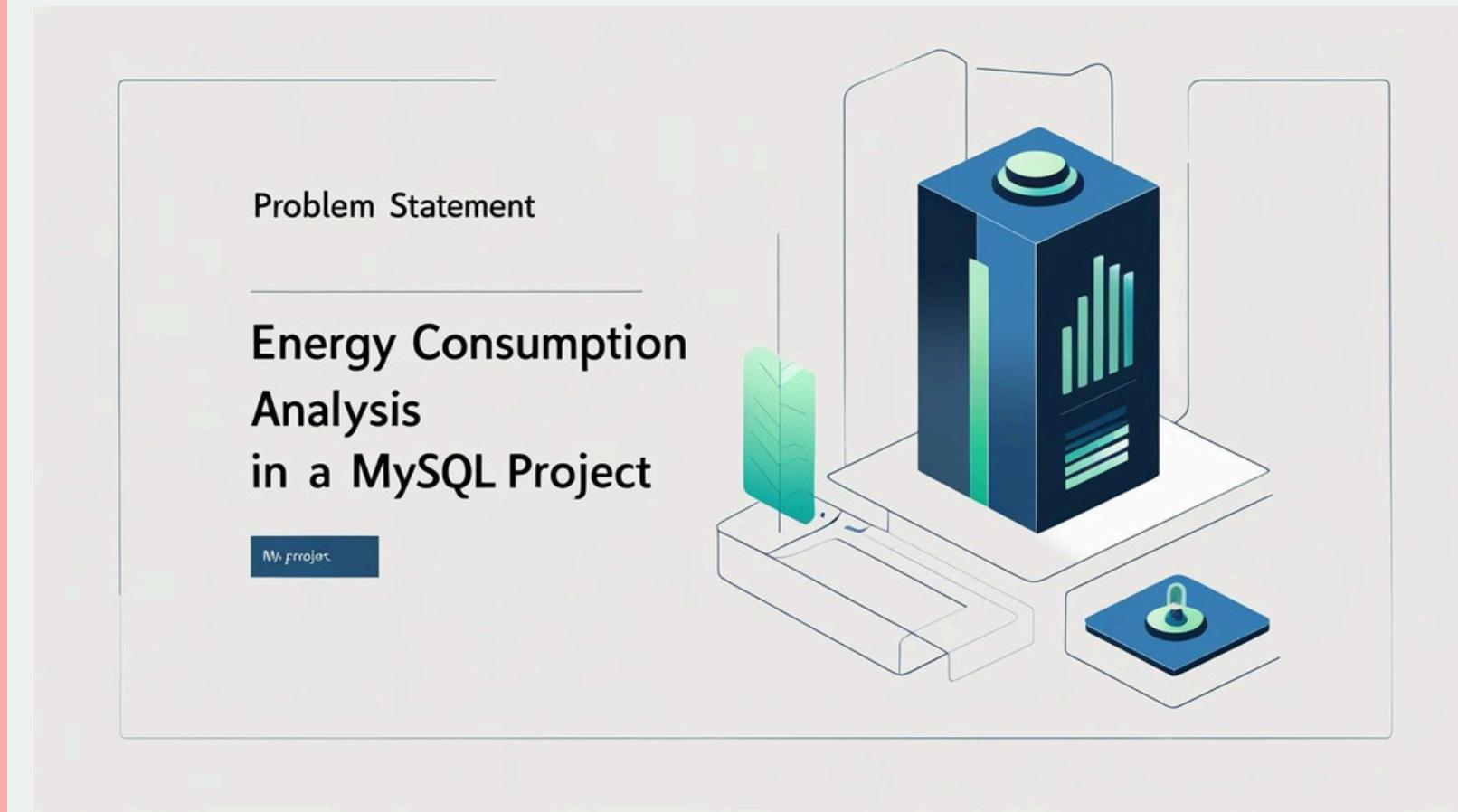


ER DIAGRAM:



PROBLEM STATEMENT:

1. How does energy consumption relate to GDP and population?
2. What countries are leading in energy efficiency?
3. Are emissions growing faster than population or GDP?
4. Which countries are at risk due to overconsumption?
5. Can we identify patterns for sustainable energy use?



General & Comparative Analysis

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

```
select country, sum(emission) as Total_emission from emission_3  
group by country order by Total_emission desc limit 5;
```

country	Total_emission
China	92338
United States	38453
India	20223
Russia	14481
Japan	8137



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

- `select country, sum(value) as Toatal_gdp from gdp_3
group by country order by Toatal_gdp desc limit 5;`

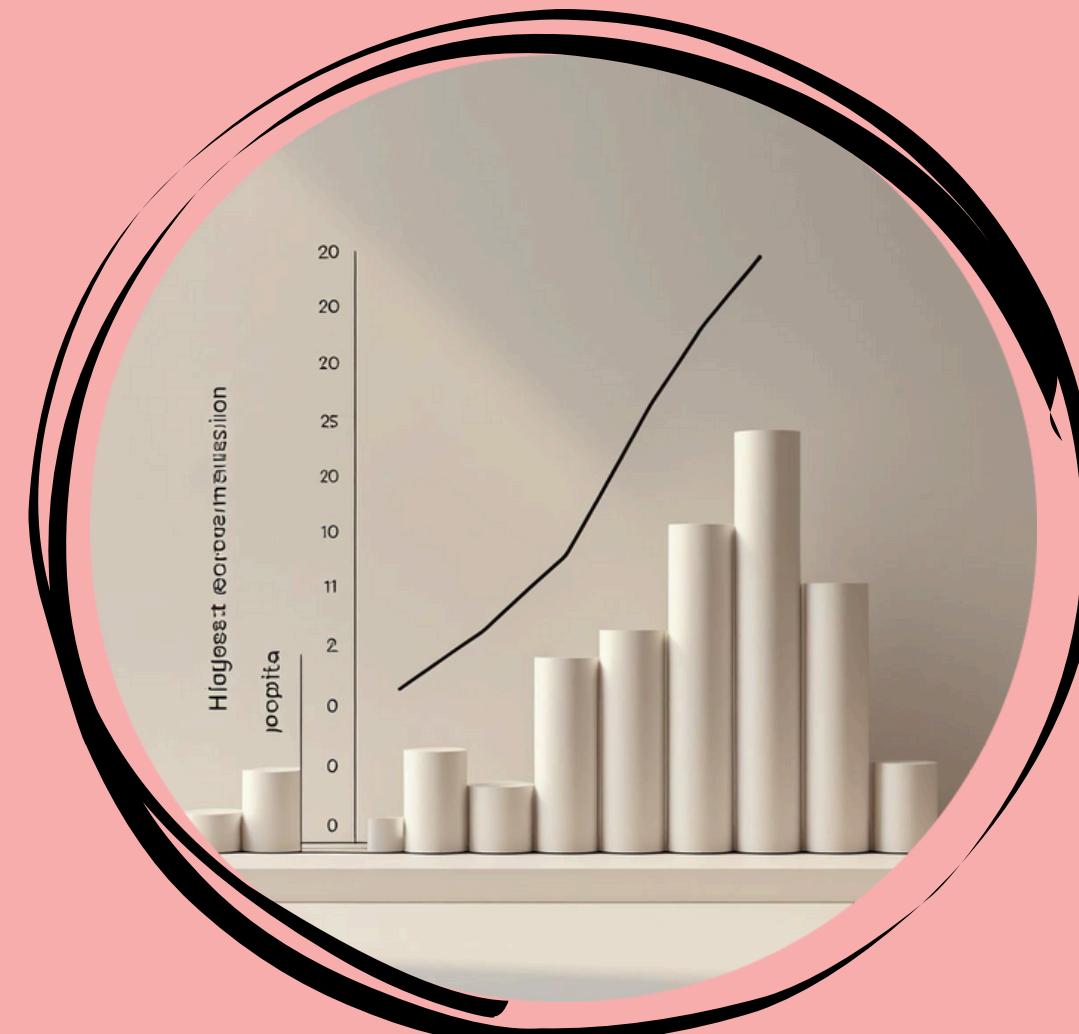


country	Toatal_gdp
China	130157.8
United States	106826.87
India	50604.869
Japan	25424.289000000004
Germany	22082.897

FIND THE YEAR WHEN United Kingdom HAD THE HIGHEST PER CAPITA EMISSION.

```
• SELECT YEAR, MAX(PER_CAPITA_EMISsION) AS Highest_Capita FROM EMISSION_3  
WHERE COUNTRY = "United Kingdom"  
GROUP BY YEAR;
```

2021	0.007126096
2023	0.007126096
2022	0.007126096
2020	0.007126096



Compare energy production and consumption by country and year.

```
select p.energy, c.country, c.year from consumption c inner join production p  
on c.country = p.country;
```



energy	country	year
Nuclear (quad Btu)	Afghanistan	2020
Nuclear (quad Btu)	Afghanistan	2021
Nuclear (quad Btu)	Afghanistan	2022
Nuclear (quad Btu)	Afghanistan	2023
Nuclear (quad Btu)	Afghanistan	2020
Nuclear (quad Btu)	Afghanistan	2022
Nuclear (quad Btu)	Afghanistan	2020
Nuclear (quad Btu)	Afghanistan	2021
Nuclear (quad Btu)	Afghanistan	2023
Nuclear (quad Btu)	Afghanistan	2022
Nuclear (quad Btu)	Afghanistan	2020
Nuclear (quad Btu)	Afghanistan	2021
Nuclear (quad Btu)	Afghanistan	2023

Which energy types contribute most to emissions across all countries?

```
select country, energy_type, sum(emission) as total_emission from emission_3  
group by country, energy_type order by total_emission desc limit 1;
```

country	energy_type	total_emission
China	CO2 emissions (MMtonnes CO2)	46169



Trend Analysis Over Time

How have global emissions changed year over year?

```
select * from emission_3;  
select year, sum(emission) as change_emission from emission_3  
group by year;
```

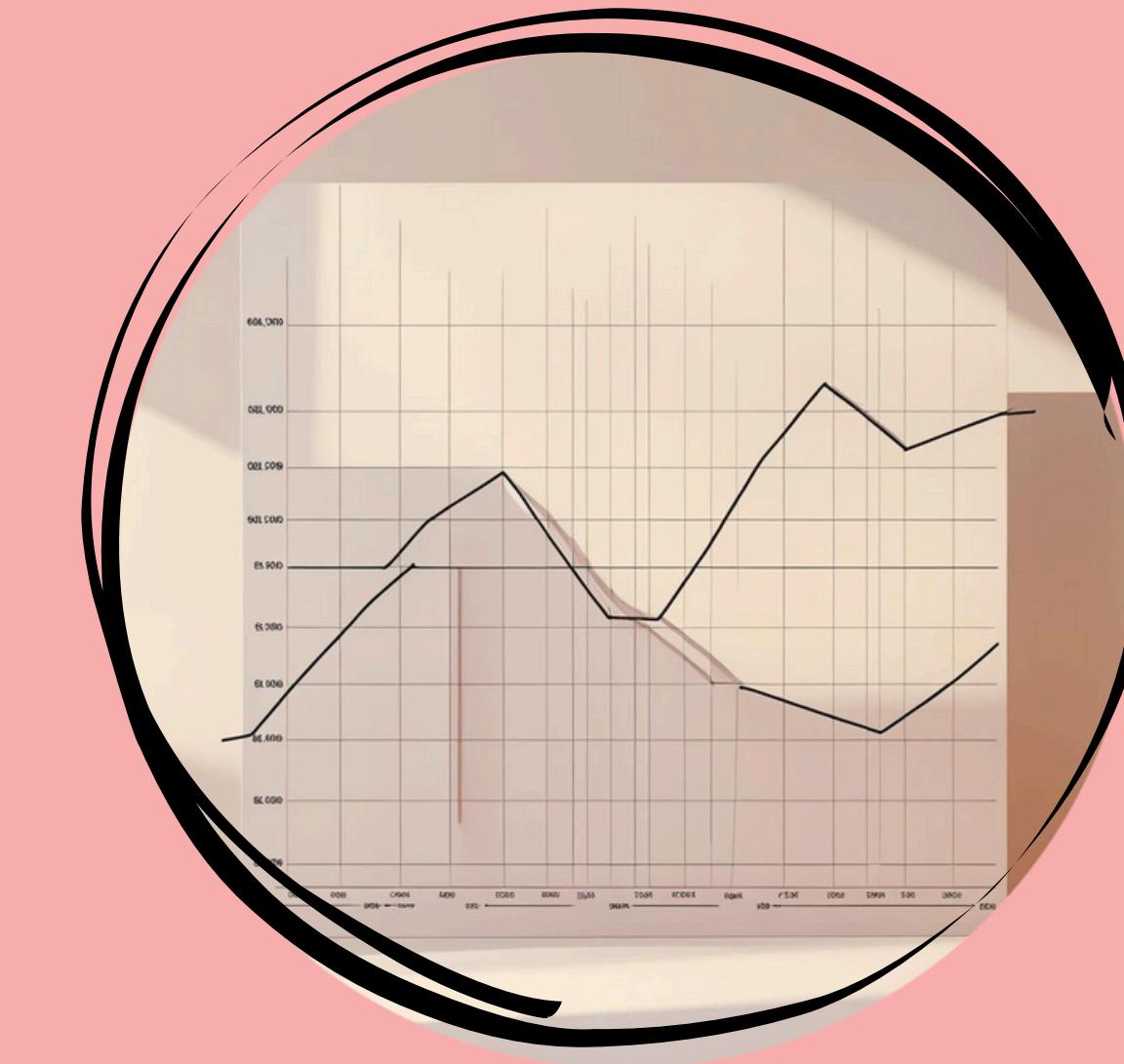


year	change_emission
2020	67852
2021	70976
2022	72445
2023	74161

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

```
select * from gdp_3;  
select country ,year, sum(value) as change_value from gdp_3  
group by country, year;
```

country	year	change_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
Australia	2020	1219.307
Austria	2020	453.2275
Azerbaijan	2020	140.3826
Bahrain	2020	71.83838
Bangladesh	2020	922.9937
Barbados	2020	3.962201
Belarus	2020	176.2621
Belgium	2020	553.6443
Belize	2020	2.958894
Benin	2020	40.03826



How has population growth affected total emissions in each country?

```
select p.countries, round(sum(p.value),2) as Total_growth, sum(e.emission) as Total_emission  
from population p  
inner join emission_3 e on p.countries = e.country  
group by country order by Total_growth desc;
```

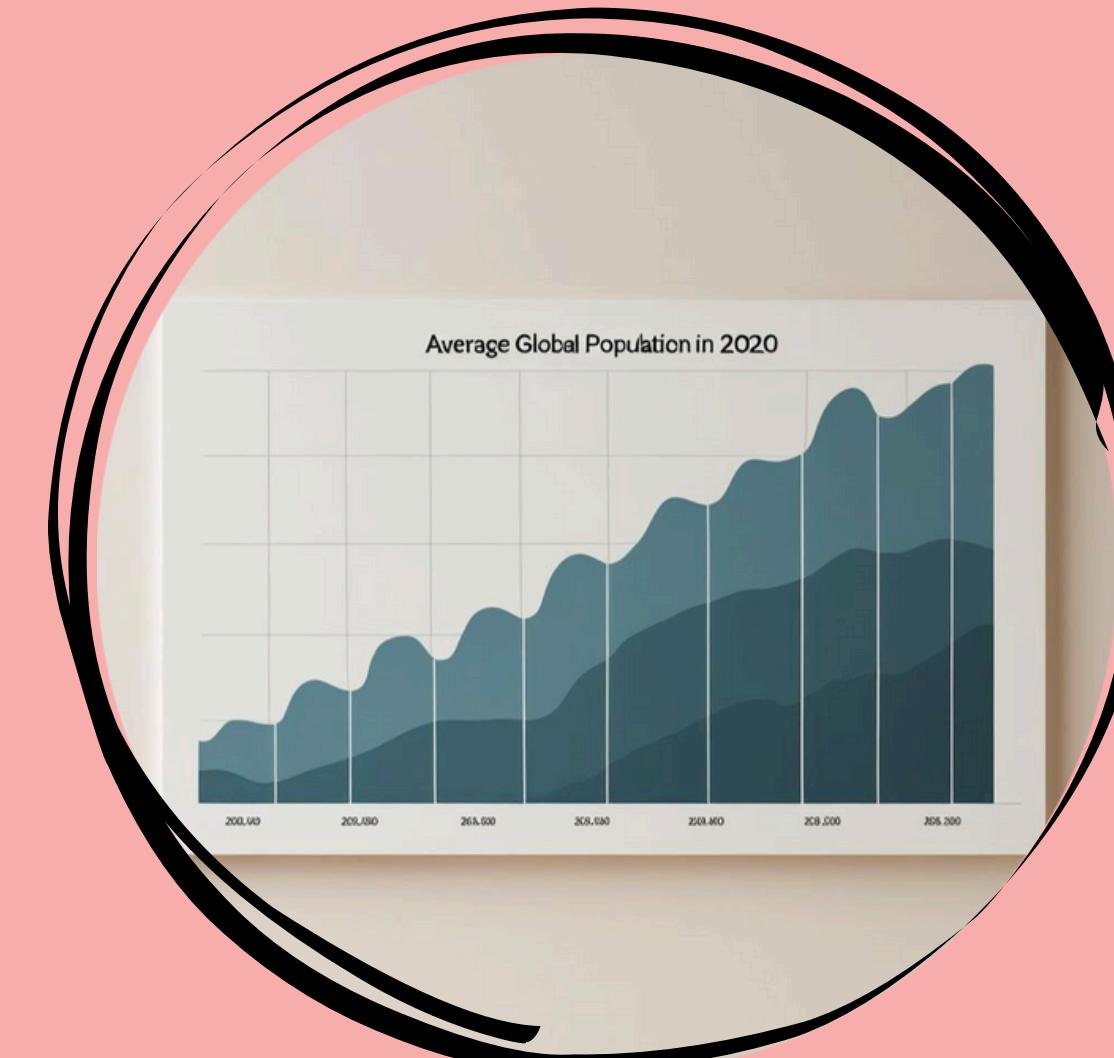


countries	Total_grow...	Total_emission
India	114100016	101115
China	113914064	461690
United States	26773419.2	192265
Indonesia	22321305.6	26565
Pakistan	19471264	8200
Nigeria	17859820.8	4370
Brazil	16826508.8	17025
Bangladesh	13573939.2	4470
Russia	11648772.8	72405
Mexico	10298576	17080
Ethiopia	10035073.6	625
Japan	10001686.4	40685
Philippines	9118102.4	5590
Egypt	9023432	9155
Congo-Kins...	8201630.88	190
Vietnam	7968555.84	11480
Iran	7166073.6	29830
Turkiye	6953291.84	15665
Germany	6710406.96	25705

WHAT IS THE AVEARGE POPULATION IN 2020

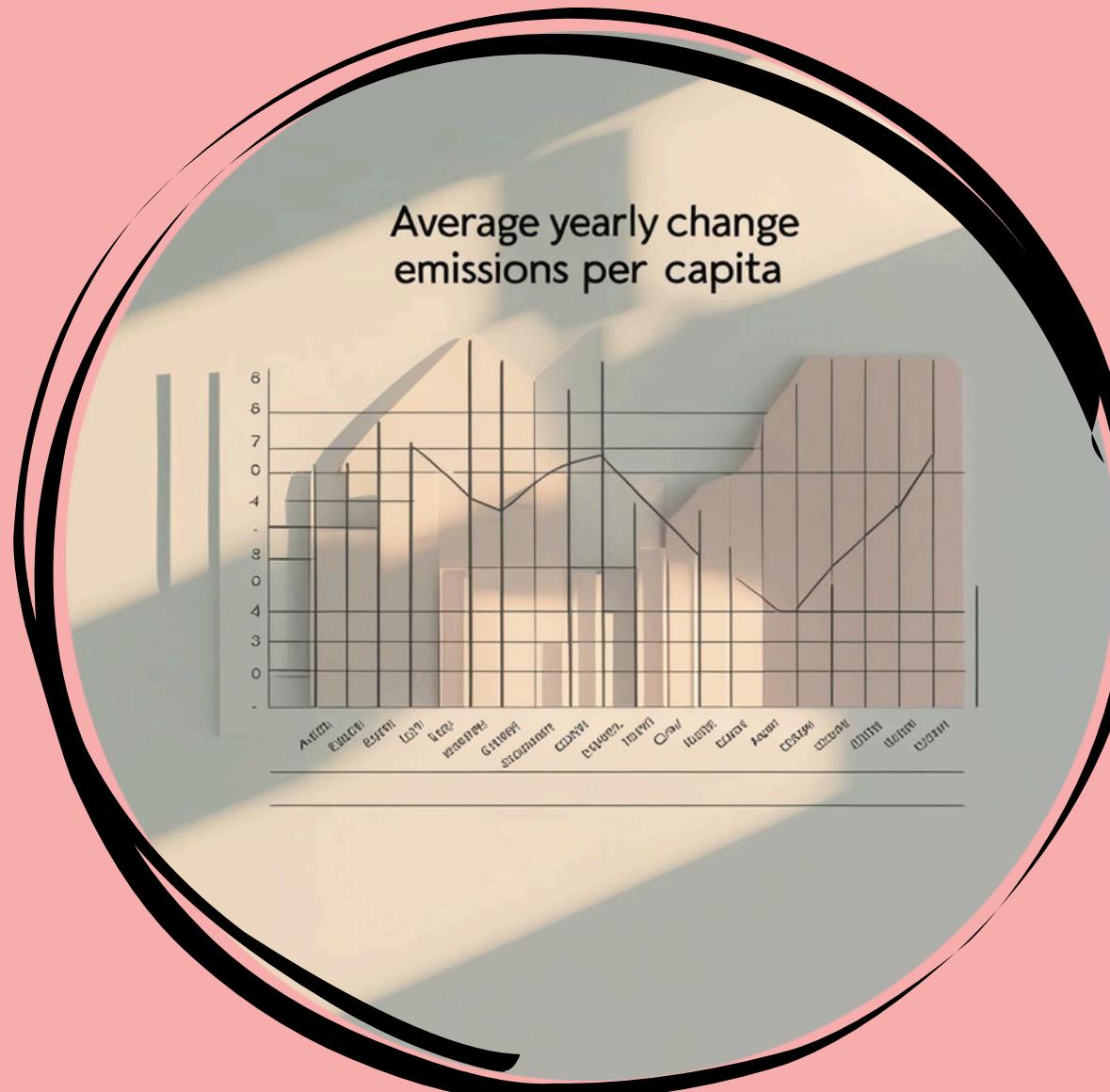
```
SELECT ROUND(AVG(VALUE),2) AS AVG_POPULATION  
FROM POPULATION  
WHERE YEAR = 2020;
```

AVG_POPULATION
39362.84



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

```
select * from emission_3;  
select country ,year, round(avg(per_capita_emission),5) from emission_3  
group by country, year;
```



country	year	round(avg(per_capita_emission),5)
Antigua and Barbuda	2020	0.00713
Aruba	2020	0.00713
Belize	2020	0.00713
Bermuda	2020	0.00713
Bhutan	2020	0.00713
Botswana	2020	0.00713
British Virgin Islands	2020	0.00713
Burkina Faso	2020	0.00713
Burundi	2020	0.00713
Cabo Verde	2020	0.00713
Cambodia	2020	0.00713
Cayman Islands	2020	0.00713
Central African Rep...	2020	0.00713
Chad	2020	0.00713
Comoros	2020	0.00713
Congo-Kinshasa	2020	0.00713
Cook Islands	2020	0.00713
Costa Rica	2020	0.00713

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

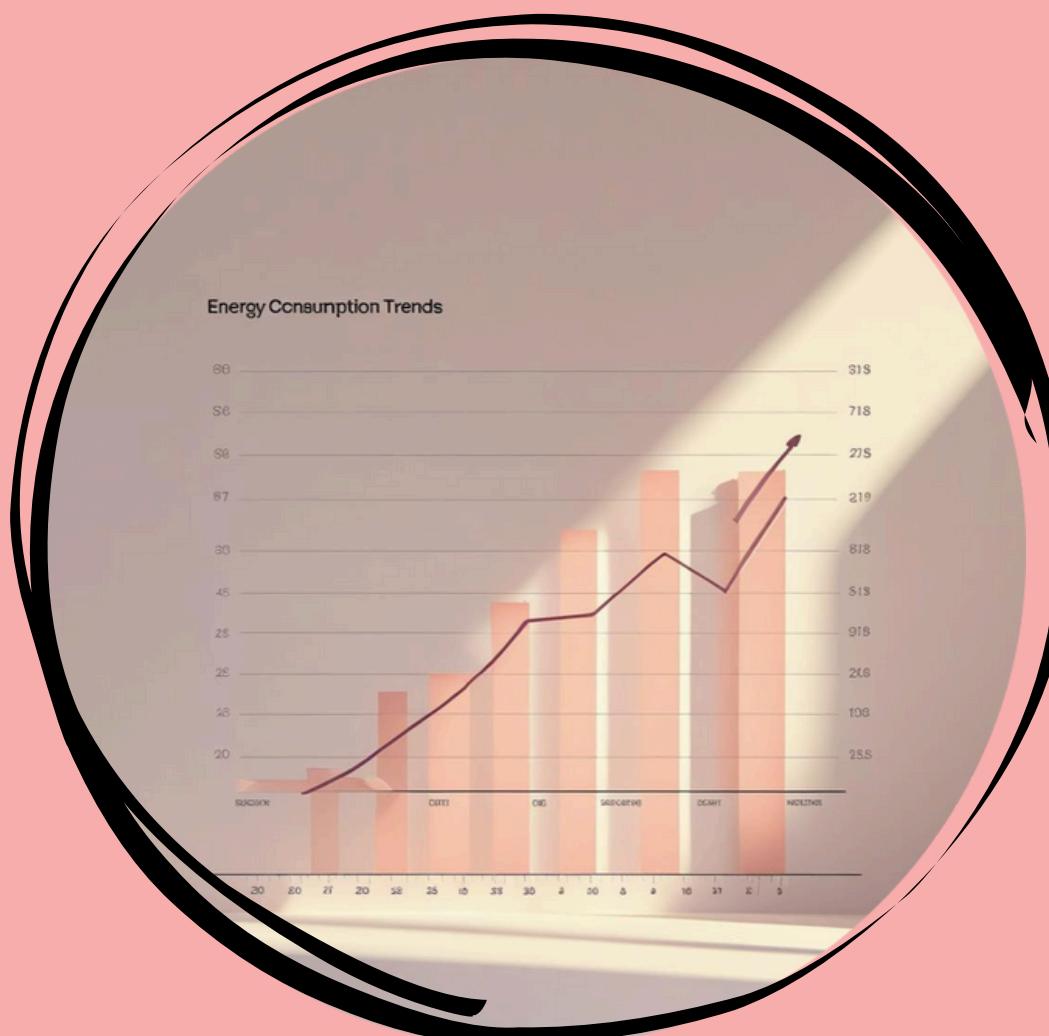
```
select g.year , round(sum(g.value),2) as total_economy , sum(c.consumption) as total_consumption  
from gdp_3 g  
inner join consumption c on g.country = c.country  
group by year order by total_economy desc;
```

countries	Total_grow...	Total_emission
India	114100016	101115
China	113914064	461690
United States	26773419.2	192265
Indonesia	22321305.6	26565
Pakistan	19471264	8200
Nigeria	17859820.8	4370
Brazil	16826508.8	17025
Bangladesh	13573939.2	4470
Russia	11648772.8	72405
Mexico	10298576	17080
Ethiopia	10035073.6	625
Japan	10001686.4	40685
Philippines	9118102.4	5590
Egypt	9023432	9155
Congo-Kins...	8201630.88	190
Vietnam	7968555.84	11480



WHAT IS THE TOTAL ENERGY CONSUMED IN 2023

```
SELECT SUM(CONSUMPTION) AS TOTAL_CONSUMPTION_2023
FROM CONSUMPTION
WHERE YEAR = 2023;
```



TOTAL_CONSUMPTION_2023

612

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

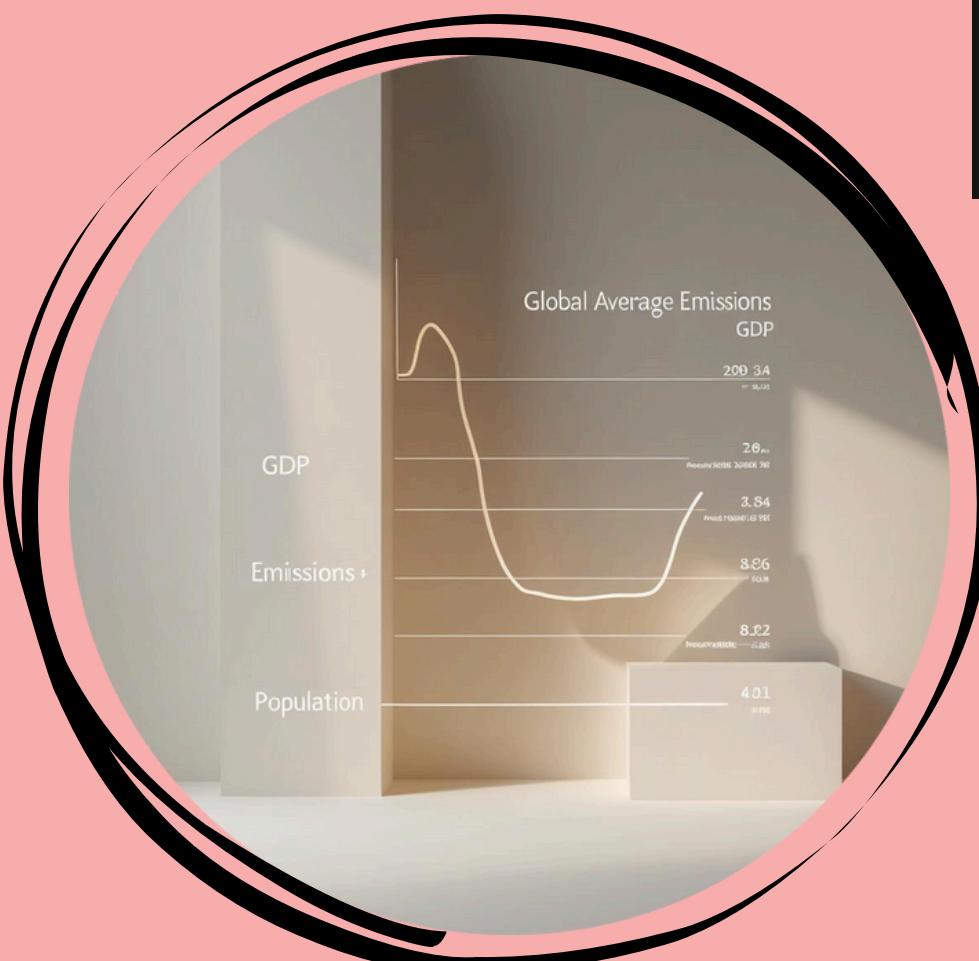
```
SELECT * FROM EMISSION_3;  
SELECT COUNTRY, YEAR, ROUND(AVG(PER_CAPITA_EMISISSION), 5) AS TOTAL_ECONOMY  
FROM EMISSION_3  
GROUP BY COUNTRY, YEAR ORDER BY TOTAL_ECONOMY DESC;
```

COUNTRY	YEAR	TOTAL_ECONOMY
Angola	2020	0.00713
Antigua and Barbuda	2020	0.00713
Aruba	2020	0.00713
Belize	2020	0.00713
Bermuda	2020	0.00713
Bhutan	2020	0.00713
Botswana	2020	0.00713
British Virgin Islands	2020	0.00713
Burkina Faso	2020	0.00713
Burundi	2020	0.00713
Cabo Verde	2020	0.00713
Cambodia	2020	0.00713
Cayman Islands	2020	0.00713
Central African Rep...	2020	0.00713
Chad	2020	0.00713
Comoros	2020	0.00713
Congo-Kinshasa	2020	0.00713
Djibouti	2020	0.00713
Egypt	2020	0.00713
El Salvador	2020	0.00713
Gabon	2020	0.00713
Greece	2020	0.00713
Honduras	2020	0.00713
Iceland	2020	0.00713
India	2020	0.00713
Indonesia	2020	0.00713
Iran	2020	0.00713
Iraq	2020	0.00713
Ivory Coast	2020	0.00713
Jamaica	2020	0.00713
Kazakhstan	2020	0.00713
Kenya	2020	0.00713
Lao PDR	2020	0.00713
Lebanon	2020	0.00713
Liberia	2020	0.00713
Maldives	2020	0.00713
Mali	2020	0.00713
Mauritania	2020	0.00713
Morocco	2020	0.00713
Niger	2020	0.00713
Nigeria	2020	0.00713
Pakistan	2020	0.00713
Rwanda	2020	0.00713
Saint Lucia	2020	0.00713
Saint Vincent and the Grenadines	2020	0.00713
Saudi Arabia	2020	0.00713
Singapore	2020	0.00713
Sri Lanka	2020	0.00713
Togo	2020	0.00713
Tunisia	2020	0.00713
Uganda	2020	0.00713
Yemen	2020	0.00713
Zambia	2020	0.00713
Zimbabwe	2020	0.00713



What is the global average GDP, emission, and population by year?

```
SELECT
    g.year,
    ROUND(AVG(g.value), 2) AS avg_gdp,
    ROUND(AVG(e.emission), 2) AS avg_emission,
    ROUND(AVG(p.value), 2) AS avg_population
FROM
    gdp_3 g
JOIN
    emission_3 e ON g.country = e.country AND g.year = e.year
JOIN
    population p ON g.country = p.countries AND g.year = p.year
GROUP BY g.year ORDER BY g.year;
```



year	avg_gdp	avg_emission	avg_population
2020	629.03	85.40	39656.2
2021	671.04	89.44	39986.57
2022	694.6	91.29	40345.81
2023	717.93	93.46	40711.66

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

```
SELECT country,
       ROUND(SUM(emission) * 100.0 / (SELECT SUM(emission) FROM emission_3), 2) AS emission_share_pct
  FROM emission_3
 GROUP BY country
 ORDER BY emission_share_pct DESC limit 5;
```

country	emission_share...
China	32.35
United States	13.47
India	7.09
Russia	5.07
Japan	2.85



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

```
3 • SELECT
4     c.country,
5         SUM(p.value) AS total_population,
6         SUM(e.emission) AS total_emission
7     FROM
8         population p
9     JOIN
10        emission_3 e ON p.countries = e.country AND p.year = e.year
11    JOIN
12        country c ON p.countries = c.country
13    GROUP BY
14        c.country
15    ORDER BY
16        total_population DESC
17    LIMIT 10;
```

country	total_population	total_emission
China	22801232	92338
India	22721260	20223
United States	5334912.8	38453
Indonesia	4446374.800000001	5313
Pakistan	3862739.200000007	1640
Nigeria	3534237.199999997	874
Brazil	3358632.800000007	3405
Bangladesh	2699235.199999993	894
Russia	2332911.599999996	14481
Mexico	2051200	3416

CONCLUSION:

1. SQL enabled comprehensive analysis of global datasets.
2. Uncovered valuable insights: top energy users, GDP-emission trends, per capita consumption.
3. Demonstrated the power of SQL in solving real-world sustainability questions.
4. Future work: Extend analysis using Python/Power BI for forecasts and dashboards.

THANK
YOU

