REPORT TITLE: GLOBAL TRENDS IN ELECTRICITY ACCESS: PROGRESS AND CHALLENGES (2000–2022)

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FOR: TDI SQL CAPSTONE PROJECT

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INTRODUCTION

Electricity plays a vital role in poverty reduction, economic development, and overall well-being. Access to electricity is widely recognized as a key social and economic indicator, reflecting progress toward improved living standards. While there is no universally agreed-upon definition of "electricity access," it generally encompasses not only the availability of electricity but also safe energy use and a minimum level of consumption. The International Energy Agency (IEA) emphasizes that true access extends beyond supply—it requires households to meet minimum consumption thresholds that vary between urban and rural areas and evolve over time.

This analysis focuses on electricity access trends from 2000 to 2022, examining global and regional disparities, factors influencing access, and the correlation between electricity availability and socio-economic development. By unpivoting electricity access data for different countries and years, this study aims to provide insights into progress made, persistent challenges, and opportunities for expanding access to underserved populations.

Dataset Overview and Structure

For this analysis, I utilized six primary tables and one supplementary table:

1. **Primary Tables**:

The tables are structured as follows:

- **[elec-fossil-nuclear-renewables]**: This table provides data on electricity generation from various sources (renewables, nuclear, and fossil fuels) across different entities and years. Key columns include:
    - Electricity_from_renewables_TWh
    - Electricity_from_nuclear_TWh
    - Electricity_from_fossil_fuels_TWh
    - Entity
    - Code
    - Year
- **[change-energy-consumption]**: This table captures the annual changes in primary energy consumption. Important columns:
    - Annual_change_in_primary_energy_consumption
    - Entity
    - Code
    - Year
- **[electricity-generation]**: This table tracks total electricity generation across entities. Key column:
    - Electricity_generation_TWh

    - Entity
    - Code
    - Year
- **[primary-energy-cons]**: Contains data on primary energy consumption in terawatt-hours (TWh). Key column:
    - Primary_energy_consumption_TWh
    - Entity
    - Code
    - Year
- **[share-of-the-population-with-access-to-electricity]**: This table indicates the percentage of the population with access to electricity across different entities. Key column:
    - Access_to_electricity_of_population
    - Entity
    - Code
    - Year
- **[GDP-Per-Capita-usd]**: Contains GDP per capita data for various entities over different years. The data is in a wide format, with years as columns. The transformation was done to convert it into a long format using dynamic SQL. Key column:
    - GDP per Capita
    - Country
    - Code
    - Year

2. **Supplementary Table**:

- **[country_codes_and_continents]**: This supplementary table lists countries with their corresponding 3-digit codes and continents. Key columns:
    - Country,
    - Country_Code,
    - Continent

RESEARCH QUESTIONS AND METHODOLOGY

Research Questions:

The primary objective of this analysis was to explore the relationships between energy consumption, electricity generation, socio-economic factors, and access to electricity. The research was guided by the following key questions:

1. What is the trend of electricity generation per continent for the period considered?
2. How does the percentage of people with access to electricity correlate with electricity generation from renewables, nuclear, and fossil fuels?
3. What is the trend in electricity generation from renewables, nuclear, and fossil fuels over the years for each entity?
4. What are the top 10 countries with the highest electricity generation in 2022?
5. What is the relationship between GDP Per Capita (USD) and Electricity Generation (TWh)/Population Access for 2022?
6. How has the annual change in primary energy consumption impacted electricity generation from renewables, nuclear, and fossil fuels?

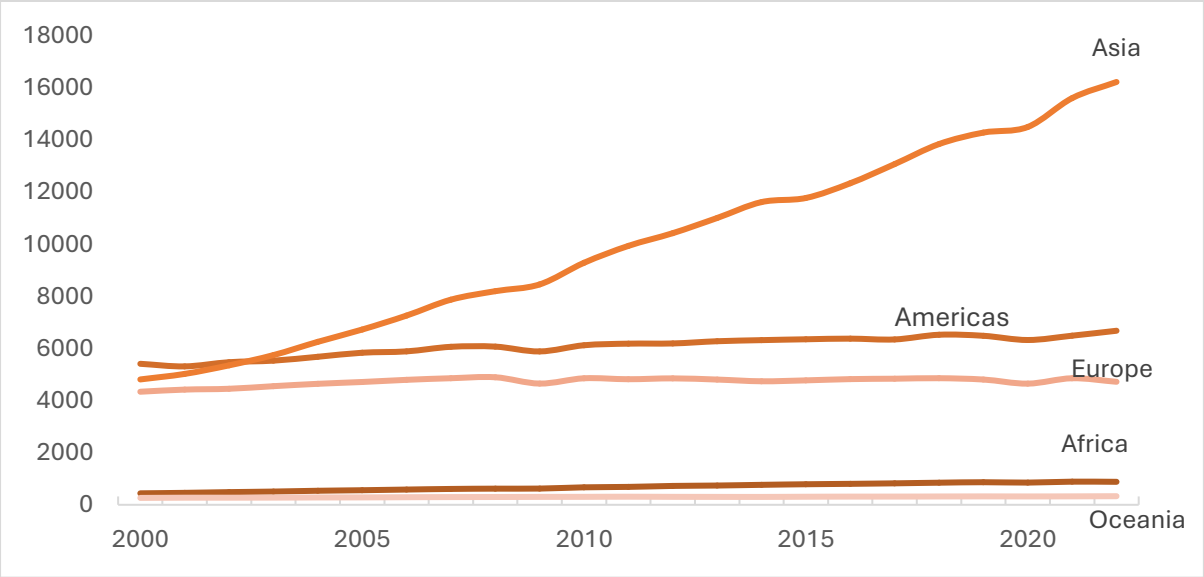
Methodology:

- **Data Cleaning and Preparation**: Handled missing values, removed duplicates, and ensured appropriate data types.
- **Data Transformation**: The GDP per capita data was in wide format, which required transformation into a long format using dynamic SQL.
- **Data Merging**: A cleaned dataset was generated by joining multiple tables (including energy consumption, electricity generation, GDP data, and population access).
- **Exploratory Data Analysis (EDA)**: Conducted initial analysis to understand data distribution and relationships.
- **SQL Queries**: Used SQL queries to answer the research questions and generate insights.
- **Visualization**: Microsoft Excel was used to graphically present trends, relationships, and insights.

KEY FINDINGS AND INSIGHTS

Key Findings:

1. **Trend of electricity generation per continent for the period considered:**
    - There is an increase in electricity generation for all continents for the years considered. However, Asia has been increasing its electricity generation over the years compared to other continents. This is majorly contributed by China and India.



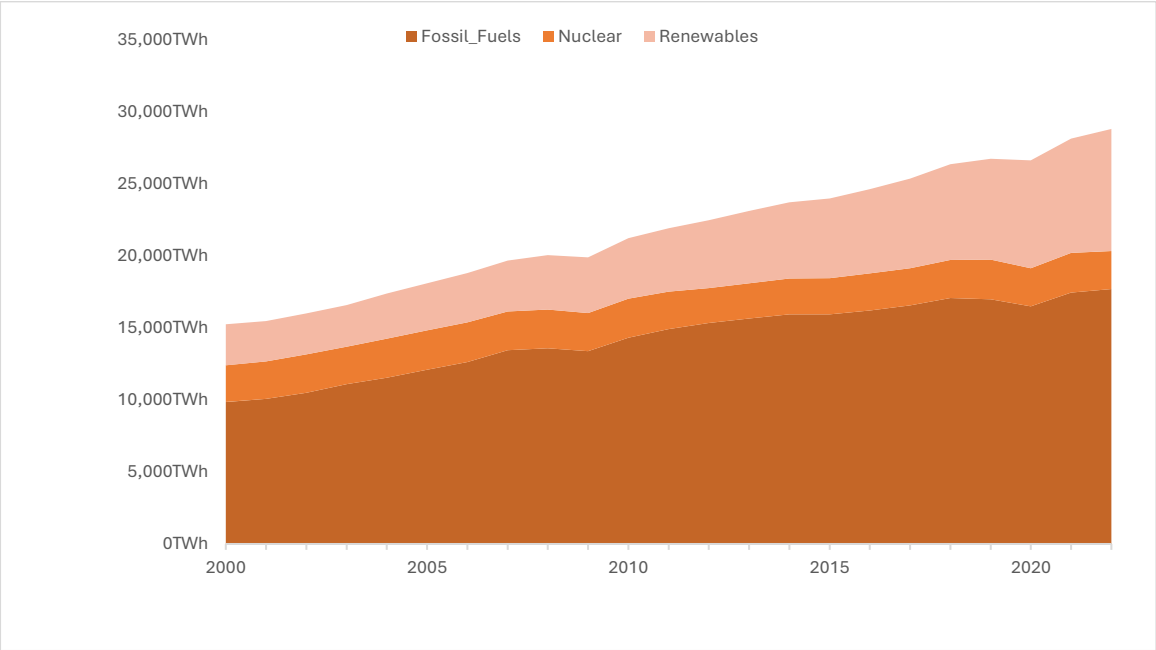
2. **Access to Electricity and Generation**:
    - Countries with higher access to electricity (especially those above 90%) tended to have higher electricity generation from renewables. This correlation is weaker in developing regions with lower access to electricity.

```sql
SELECT
    Country,
    Continent,
    Year,
    Electricity_from_renewables_TWh,
    Electricity_from_nuclear_TWh,
    Electricity_from_fossil_fuels_TWh,
    "Access_to_electricity_%_of_population",
    CASE
        WHEN "Access_to_electricity_%_of_population" > 90 THEN 'High Access'
        WHEN "Access_to_electricity_%_of_population" BETWEEN 50 AND 90 THEN 'Medium Access'
        ELSE 'Low Access'
    END AS Access_Level
FROM
    CleanedTable;
```

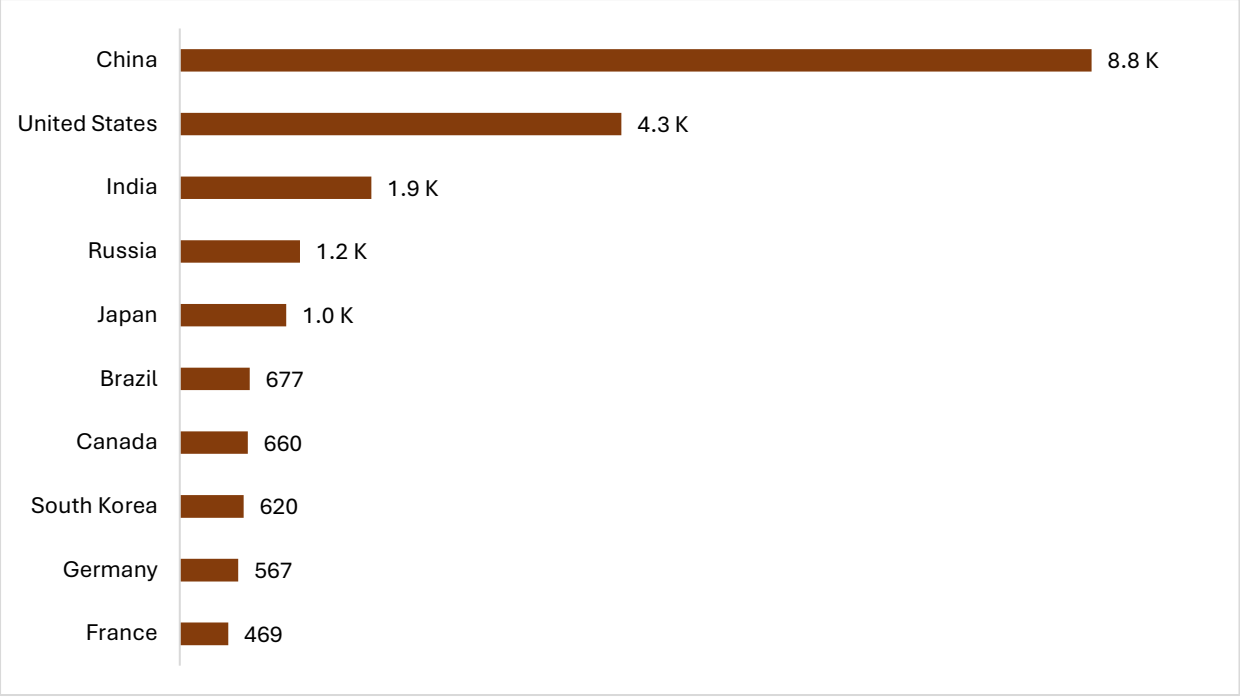
100 % Results Messages

	Country	Continent	Year	Electricity_from_renewables_TWh	Electricity_from_nuclear_TWh	Electricity_from_fossil_fuels_TWh	Access_to_electricity_%_of_population	Access_Level
1	Aruba	Americas	2000	0.00	0.00	0.78	91.70	High Access
2	Aruba	Americas	2001	0.00	0.00	0.81	100.00	High Access
3	Aruba	Americas	2002	0.00	0.00	0.82	100.00	High Access
4	Aruba	Americas	2003	0.00	0.00	0.84	100.00	High Access
5	Aruba	Americas	2004	0.00	0.00	0.87	100.00	High Access
6	Aruba	Americas	2005	0.00	0.00	0.91	100.00	High Access
7	Aruba	Americas	2006	0.00	0.00	0.91	100.00	High Access
8	Aruba	Americas	2007	0.00	0.00	0.94	100.00	High Access
9	Aruba	Americas	2008	0.00	0.00	0.91	100.00	High Access

3. **Trends in Electricity Generation**:
    - Over the years, there was a gradual increase in the share of electricity generated from renewable sources, with fossil fuels remaining dominant in many countries. Nuclear generation, however, showed little overall growth.

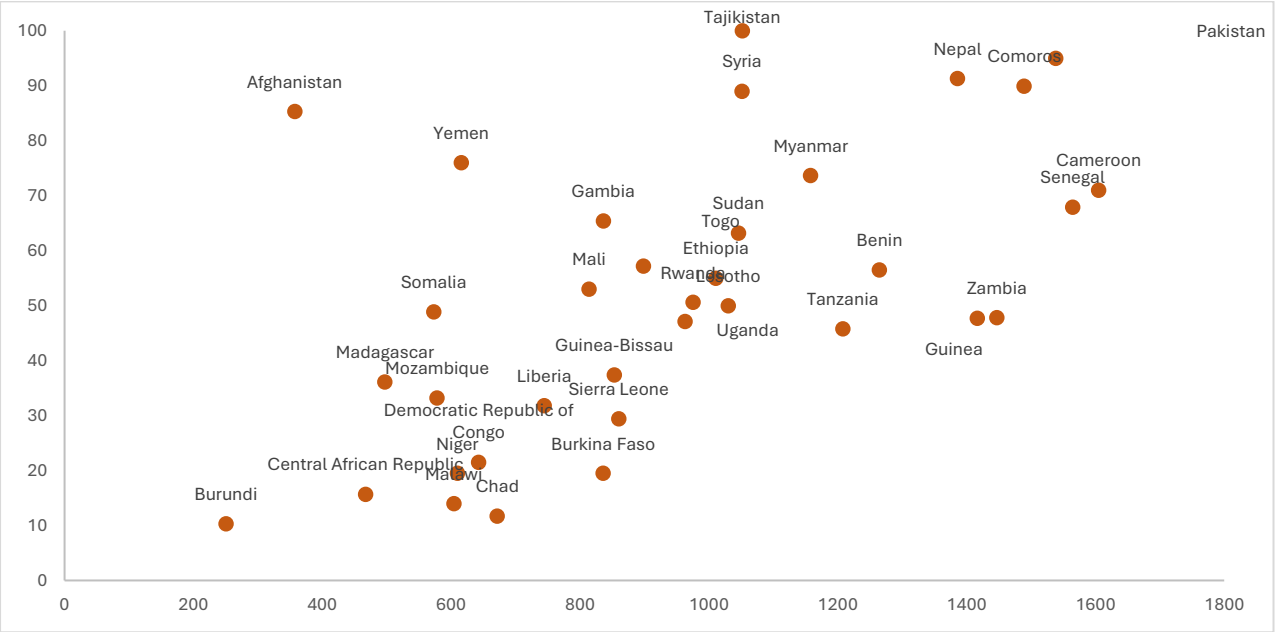


4. **Top 10 Countries by Electricity Generation**:
    - In 2022, the top countries by electricity generation were primarily industrialized nations, with China topping the list. However, emerging economies, especially in Asia and Africa, are expected to contribute more in the coming years.



5. **GDP Per Capita and Electricity Generation/Access**:

   - Higher GDP per capita was found to be positively correlated with higher access to electricity, especially from renewables, indicating that wealthier nations are investing more in clean energy technologies.



6. **Annual Change in Primary Energy Consumption**:

   - Countries with higher annual changes in primary energy consumption tended to increase their electricity generation across renewables and fossil fuels. However, nuclear energy generation showed less variability.

```
325
326 SELECT
327     Country,
328     Continent,
329     Year,
330     Electricity_from_renewables_TWh,
331     Electricity_from_nuclear_TWh,
332     Electricity_from_fossil_fuels_TWh,
333     Annual_change_in_primary_energy_consumption
334 FROM
335     CleanedTable;
336
337
```

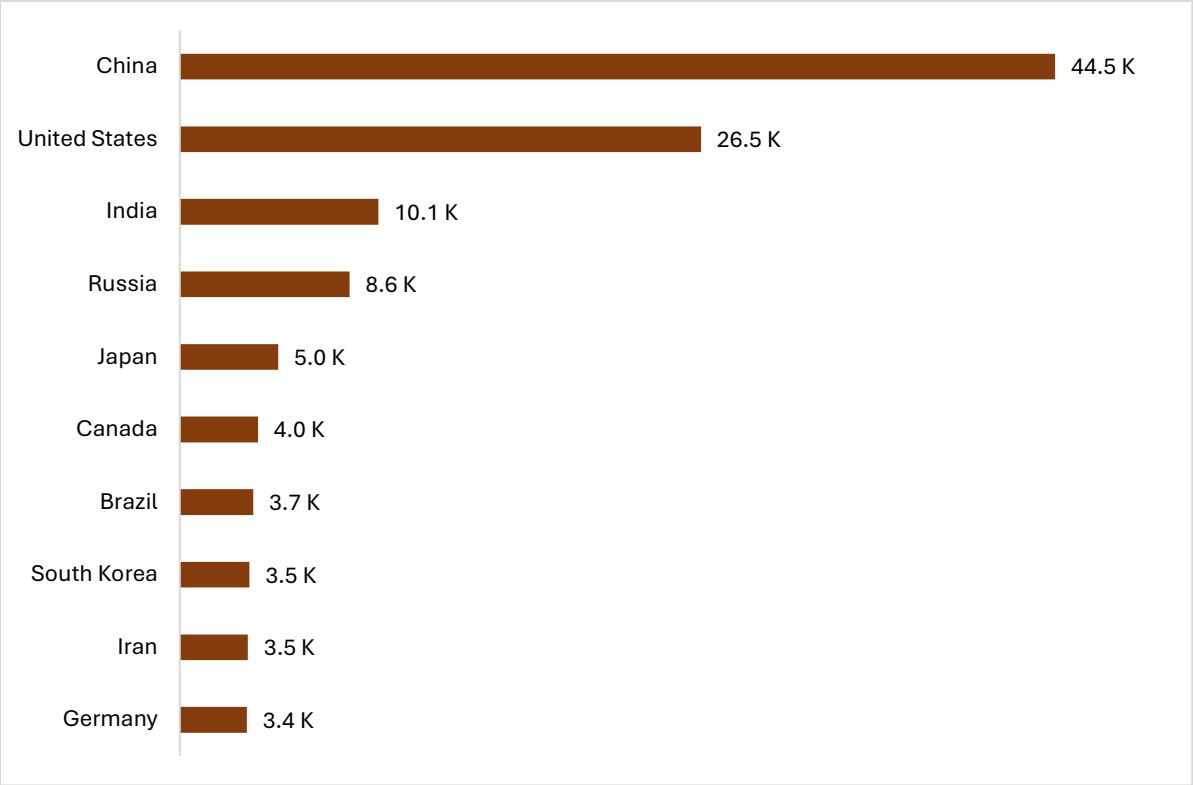
100 %

Results | Messages

	Country	Continent	Year	Electricity_from_renewables_TWh	Electricity_from_nuclear_TWh	Electricity_from_fossil_fuels_TWh	Annual_change_in_primary_energy_consumption
1	Aruba	Americas	2000	0.00	0.00	0.78	19.60
2	Aruba	Americas	2001	0.00	0.00	0.81	3.47
3	Aruba	Americas	2002	0.00	0.00	0.82	3.37
4	Aruba	Americas	2003	0.00	0.00	0.84	11.36
5	Aruba	Americas	2004	0.00	0.00	0.87	4.28
6	Aruba	Americas	2005	0.00	0.00	0.91	7.99
7	Aruba	Americas	2006	0.00	0.00	0.91	-0.19
8	Aruba	Americas	2007	0.00	0.00	0.94	3.05

Insights:

- Countries with larger GDP and access to electricity are more likely to adopt cleaner energy sources.
- Energy efficiency improvements are crucial in balancing demand with environmental concerns.
- Asia's electricity generation has been increasing more than any other continent for the time considered.
- Access to electricity is a significant determinant of economic and social development. Africa still has the lowest percentage of population with access to electricity, even after 22 years.
- The top 5 electricity consuming countries are same as the top 5 generating countries. China is also the leader here.



RECOMMENDATIONS

Based on the findings from the analysis, the following are recommendations:

1. **Impact of Annual Change in Primary Energy Consumption**:
    - There is a noticeable impact of annual changes in primary energy consumption on electricity generation from different sources.
    - **Recommendation**: Countries need to focus on policies that promote sustainable energy consumption to balance the energy mix.
2. **Relationship Between Primary Energy Consumption and Electricity Generation**:
    - Regions with higher primary energy consumption tend to have higher electricity generation from fossil fuels.
    - **Recommendation**: The adoption of renewable energy sources to reduce dependency on fossil fuels should be encouraged.
3. **Access to Electricity and Generation Sources**:
    - Countries with higher access to electricity tend to have a diversified energy mix.
    - **Recommendation**: Invest in infrastructure to improve access to electricity, especially in regions with low access.
4. **Trends in Electricity Generation**:
    - There is a gradual increase in electricity generation from renewables over the years.
    - **Recommendation**: Continue to support renewable energy projects to sustain this positive trend.
5. **Top 10 Countries in Electricity Generation (2022)**:
    - Countries with lower electricity generation need to analyze the energy policies of the countries with high generation to replicate successful strategies.
6. **GDP Per Capita and Electricity Generation**:
    - There is a positive correlation between GDP per capita and electricity generation.
    - **Recommendation**: Promote economic growth to enhance energy production capabilities.

CHALLENGES FACED AND SOLUTIONS APPLIED

In the course of the analysis, several challenges were encountered and were eventually resolved. Below is a summary of some of the major challenges and how they were resolved.

1. **Handling Missing Data**:
    - **Challenge**: Missing values in critical columns.
    - **Solution**: Filled missing values with appropriate defaults (e.g., 0 for numerical columns).
2. **Data Transformation**:
    - **Challenge**: Converting the GDP-Per-Capita-usd table from wide to long format.
    - **Solution**: Used dynamic SQL to unpivot the table.
3. **Removing Duplicates**:
    - **Challenge**: Identifying and removing duplicate rows.
    - **Solution**: Added an identity column and used DELETE statements to remove duplicates.
4. **Data Integration**:
    - **Challenge**: The analysis required joining multiple tables with different structures; some with missing values and different time spans.
    - **Solution**: A thorough data cleaning process was conducted before merging datasets, ensuring that null values did not disrupt the join logic. Also, I created views and used CTEs to streamline data integration.

FINAL DASHBOARD

REFERENCES/DATA SOURCES

https://data.worldbank.org/indicator/NY.GDP.PCAP.CD

https://ourworldindata.org/energy-production-consumption

https://ourworldindata.org/energy-access

https://ourworldindata.org/worlds-energy-problem

APPENDIX: SQL QUERIES

```
use TDI

-- For this analysis, I have 6 primary tables
select * from [elec-fossil-nuclear-renewables]  -- This is our main table
select * from [change-energy-consumption]
select * from [electricity-generation]
select * from [primary-energy-cons]
select * from [share-of-the-population-with-access-to-electricity]
select * from [GDP-Per-Capita-usd]

-- This is a supplementary table, it contains list of all countries in the
world
--with their 3-digit codes and their continents
select * from [country_codes_and_continents]


--DATA CLEANING AND PREPARATION
-- 1. Handle Missing or Inconsistent Data
-- Fill missing values with appropriate defaults or remove rows with critical
missing data

-- First for our main table - elec-fossil-nuclear-renewables table
UPDATE [elec-fossil-nuclear-renewables]
SET
Electricity_from_renewables_TWh_adapted_for_visualization_of_chart_elec_fossi
l_nuclear_renewables = 0
WHERE
Electricity_from_renewables_TWh_adapted_for_visualization_of_chart_elec_fossi
l_nuclear_renewables IS NULL;

UPDATE [elec-fossil-nuclear-renewables]
SET
Electricity_from_nuclear_TWh_adapted_for_visualization_of_chart_elec_fossil_n
uclear_renewables = 0
WHERE
Electricity_from_nuclear_TWh_adapted_for_visualization_of_chart_elec_fossil_n
uclear_renewables IS NULL;

UPDATE [elec-fossil-nuclear-renewables]
SET
Electricity_from_fossil_fuels_TWh_adapted_for_visualization_of_chart_elec_fos
sil_nuclear_renewables = 0
WHERE
Electricity_from_fossil_fuels_TWh_adapted_for_visualization_of_chart_elec_fos
sil_nuclear_renewables IS NULL;

-- For our second table
UPDATE [change-energy-consumption]
SET Annual_change_in_primary_energy_consumption = 0
WHERE Annual_change_in_primary_energy_consumption IS NULL;

-- For our third table
```

```sql
UPDATE [electricity-generation]
SET Electricity_generation_TWh = 0
WHERE Electricity_generation_TWh IS NULL;

-- For our fourth table
UPDATE [primary-energy-cons]
SET Primary_energy_consumption_TWh = 0
WHERE Primary_energy_consumption_TWh IS NULL;

-- For our fifth table
UPDATE [share-of-the-population-with-access-to-electricity]
SET Access_to_electricity_of_population = 0
WHERE Access_to_electricity_of_population IS NULL;

-- For our Sixth table
--I have to do some transformations on the GDPpercapita table
--because the table is in wide format (the years data are in columns),
--I need to convert it to long format (years in rows instead of columns)
-- Step 1: Declare variables for dynamic SQL
DECLARE @sql NVARCHAR(MAX);
DECLARE @columns NVARCHAR(MAX);

-- Dynamically get all year columns
SELECT @columns = STRING_AGG(QUOTENAME(name), ', ')
FROM sys.columns
WHERE object_id = OBJECT_ID('[GDP-Per-Capita-usd]')
  AND (name LIKE '19%' OR name LIKE '20%');

-- Build dynamic unpivot query
SET @sql = '
    -- Create the table to store unpivoted data
    CREATE TABLE GDPData (
        Country NVARCHAR(255),
        Code NVARCHAR(255),
        Year NVARCHAR(4),
        [GDP per Capita] DECIMAL(18, 2)
    );

    -- Insert unpivoted data into the table
    INSERT INTO GDPData (Country, Code, Year, [GDP per Capita])
    SELECT
        Country,
        Code,
        Year,
        COALESCE(TRY_CONVERT(DECIMAL(18, 2), REPLACE(TRIM([GDP per Capita]),
'',',', ''.'')), 0) AS [GDP per Capita]
    FROM
        [GDP-Per-Capita-usd]
    UNPIVOT (
        [GDP per Capita] FOR Year IN (' + @columns + ')
    ) AS unpvt;
';

-- Execute the dynamic SQL to create the table
EXEC sp_executesql @sql;

-- Query the new table
```

```sql
SELECT * FROM GDPData;


-- For our supplementary table
DELETE FROM [country_codes_and_continents]
WHERE Continent IS NULL;


--2. Remove Duplicates
-- Remove duplicate rows based on primary key (Entity, Code, Year)
-- For the first table
ALTER TABLE [elec-fossil-nuclear-renewables]
ADD id INT IDENTITY(1,1) PRIMARY KEY; -- First, I add a new id column to
uniquely identify each row

DELETE FROM [elec-fossil-nuclear-renewables]
WHERE id NOT IN (
    SELECT MIN(id)
    FROM [elec-fossil-nuclear-renewables]
    GROUP BY Entity, Code, Year
);


-- For the second table
ALTER TABLE [change-energy-consumption]
ADD id INT IDENTITY(1,1) PRIMARY KEY; -- First, I add a new id column to
uniquely identify each row

DELETE FROM [change-energy-consumption]
WHERE id NOT IN (
    SELECT MIN(id)
    FROM [change-energy-consumption]
    GROUP BY Entity, Code, Year
);


-- For the third table
ALTER TABLE [electricity-generation]
ADD id INT IDENTITY(1,1) PRIMARY KEY; -- First, I add a new id column to
uniquely identify each row

DELETE FROM [electricity-generation]
WHERE id NOT IN (
    SELECT MIN(id)
    FROM [electricity-generation]
    GROUP BY Entity, Code, Year
);


-- For the fourth table
ALTER TABLE [primary-energy-cons]
ADD id INT IDENTITY(1,1) PRIMARY KEY; -- First, I add a new id column to
uniquely identify each row

DELETE FROM [primary-energy-cons]
WHERE id NOT IN (
    SELECT MIN(id)
```

```
    FROM [primary-energy-cons]
    GROUP BY Entity, Code, Year
);


-- For the fifth table
ALTER TABLE [share-of-the-population-with-access-to-electricity]
ADD id INT IDENTITY(1,1) PRIMARY KEY; -- First, I add a new id column to
uniquely identify each row

DELETE FROM [share-of-the-population-with-access-to-electricity]
WHERE id NOT IN (
    SELECT MIN(id)
    FROM [share-of-the-population-with-access-to-electricity]
    GROUP BY Entity, Code, Year
);


-- For the sixth table
ALTER TABLE GDPData
ADD id INT IDENTITY(1,1) PRIMARY KEY; -- First, I add a new id column to
uniquely identify each row

DELETE FROM GDPData
WHERE id NOT IN (
    SELECT MIN(id)
    FROM GDPData
    GROUP BY Country, Code, Year
);


-- For the supplementary table, I would not do this operation as all rows are
unique with no duplicates


--3. Format and Structure Data
-- Ensure all columns have appropriate data types
-- For [elec-fossil-nuclear-renewables] table
ALTER TABLE [elec-fossil-nuclear-renewables]
ALTER COLUMN
Electricity_from_renewables_TWh_adapted_for_visualization_of_chart_elec_fossi
l_nuclear_renewables DECIMAL(18, 2);

ALTER TABLE [elec-fossil-nuclear-renewables]
ALTER COLUMN
Electricity_from_nuclear_TWh_adapted_for_visualization_of_chart_elec_fossil_n
uclear_renewables DECIMAL(18, 2);

ALTER TABLE [elec-fossil-nuclear-renewables]
ALTER COLUMN
Electricity_from_fossil_fuels_TWh_adapted_for_visualization_of_chart_elec_fos
sil_nuclear_renewables DECIMAL(18, 2);

-- For [change-energy-consumption] table
ALTER TABLE [change-energy-consumption]
ALTER COLUMN Annual_change_in_primary_energy_consumption DECIMAL(18, 2);
```

```sql
-- For [electricity-generation] table
ALTER TABLE [electricity-generation]
ALTER COLUMN Electricity_generation_TWh DECIMAL(18, 2);

-- For [primary-energy-cons] table
ALTER TABLE [primary-energy-cons]
ALTER COLUMN Primary_energy_consumption_TWh DECIMAL(18, 2);

-- For [share-of-the-population-with-access-to-electricity] table
ALTER TABLE [share-of-the-population-with-access-to-electricity]
ALTER COLUMN Access_to_electricity_of_population DECIMAL(18, 2);

-- For [GDP-Per-Capita-usd] table
-- The [GDP Per Capita] is already in Decimal format;

-- For [country_codes_and_continents] table
-- No numeric columns to alter, as it contains only text (Country,
Country_Code, Continent)



-- Define Relationships
--Primary Key: Our primary keys are Entity, Code, Year in the [elec-fossil-
nuclear-renewables] table
--Foreign Keys: Entity and Year are the foreign keys in the other tables,
--except the [country_codes_and_continents] table where the primary keys are
Country and Country_Code.


-- Some Exploratory Data Analysis
WITH CleanedData AS (          -- creating a CTE for single use
    SELECT
        e.Entity,
        e.Code,
               cc.Continent,
        e.Year,

e.Electricity_from_renewables_TWh_adapted_for_visualization_of_chart_elec_fos
sil_nuclear_renewables AS Electricity_from_Renewables,

e.Electricity_from_nuclear_TWh_adapted_for_visualization_of_chart_elec_fossil
_nuclear_renewables AS Electricity_from_Nuclear,

e.Electricity_from_fossil_fuels_TWh_adapted_for_visualization_of_chart_elec_f
ossil_nuclear_renewables AS Electricity_from_Fossil_Fuels,
        c.Annual_change_in_primary_energy_consumption,
        g.Electricity_generation_TWh,
        p.[GDP Per Capita] AS GDP_Per_Capita_USD,
        t.Primary_energy_consumption_TWh,
        s.Access_to_electricity_of_population
    FROM
        [elec-fossil-nuclear-renewables] e
    LEFT JOIN
        [change-energy-consumption] c ON e.Code = c.Code AND e.Year = c.Year
    LEFT JOIN
        [electricity-generation]  g ON e.Code = g.Code AND e.Year = g.Year
    LEFT JOIN
```

```
        GDPData p ON e.Code = p.Code AND e.Year = p.Year
    LEFT JOIN
        [primary-energy-cons] t ON e.Code = t.Code AND e.Year = t.Year
    LEFT JOIN
        [country_codes_and_continents] cc ON e.Code = cc.Country_Code
    LEFT JOIN
        [share-of-the-population-with-access-to-electricity] s ON e.Code =
s.Code AND e.Year = s.Year
    WHERE
        e.code IS NOT NULL AND
               e.Year BETWEEN 2000 AND 2022 --I want to analyze data from
2000 to 2022

)

SELECT
    Year,
    AVG(Electricity_from_Renewables) AS Avg_Electricity_from_Renewables,
    AVG(Electricity_from_Nuclear) AS Avg_Electricity_from_Nuclear,
    AVG(Electricity_from_Fossil_Fuels) AS Avg_Electricity_from_Fossil_Fuels,
    AVG(Annual_change_in_primary_energy_consumption) AS Avg_Annual_Change,
    AVG(Electricity_generation_TWh) AS Avg_Electricity_Generation,
    AVG([GDP_Per_Capita_USD]) AS Avg_GDP_per_capita_USD,
    AVG(Access_to_electricity_of_population) AS Avg_Access_to_Electricity
FROM
    CleanedData
GROUP BY
    Year
ORDER BY
    Year;



-- KEY QUESTIONS FOR MAIN ANALYSIS

--(1) What is the trend of electricity generation per continent for the
period considered?
--(2) How does the percentage of people with access to electricity correlate
--with electricity generation from renewables, nuclear, and fossil fuels?
--(3) What is the trend in electricity generation from renewables,
--nuclear, and fossil fuels over the years for each entity?
--(4) What are the top 10 countries with the highest electricity generation
in 2022
--(5) What is the relationship between GDP Per Capita (USD) and Electricity
Generation (TWh)/Population Access for 2022
--(6) How has the annual change in primary energy consumption impacted
electricity generation
--from renewables, nuclear, and fossil fuels?

-- First, I create a view for reuse in answering the questions
CREATE VIEW CleanedTable AS
    SELECT
        e.Entity AS Country,
        e.Code,
               cc.Continent,
        e.Year,
```

```
e.Electricity_from_renewables_TWh_adapted_for_visualization_of_chart_elec_fos
sil_nuclear_renewables AS Electricity_from_Renewables_TWh,

e.Electricity_from_nuclear_TWh_adapted_for_visualization_of_chart_elec_fossil
_nuclear_renewables AS Electricity_from_Nuclear_TWh,

e.Electricity_from_fossil_fuels_TWh_adapted_for_visualization_of_chart_elec_f
ossil_nuclear_renewables AS Electricity_from_Fossil_Fuels_TWh,
        COALESCE(c.Annual_change_in_primary_energy_consumption,0) AS
Annual_change_in_primary_energy_consumption,
        g.Electricity_generation_TWh,
        COALESCE(p.[GDP Per Capita],0) AS GDP_Per_Capita_USD,
        t.Primary_energy_consumption_TWh,
        COALESCE(s.Access_to_electricity_of_population, 0) AS
"Access_to_electricity_%_of_population"
    FROM
        [elec-fossil-nuclear-renewables] e
        INNER JOIN
        [country_codes_and_continents] cc ON e.Code = cc.Country_Code
    LEFT JOIN
        [change-energy-consumption] c ON e.Code = c.Code AND e.Year = c.Year
    LEFT JOIN
        [electricity-generation]  g ON e.Code = g.Code AND e.Year = g.Year
    LEFT JOIN
        GDPData p ON e.Code = p.Code AND e.Year = p.Year
    LEFT JOIN
        [primary-energy-cons] t ON e.Code = t.Code AND e.Year = t.Year
    LEFT JOIN
        [share-of-the-population-with-access-to-electricity] s ON e.Code =
s.Code AND e.Year = s.Year
    WHERE
        e.Code IS NOT NULL AND
                e.Year BETWEEN 2000 AND 2022; --I want to analyze data from
2000 to 2022



--(1) What is the trend of electricity generation per continent for the
period considered?
SELECT
    Year,
        Continent,
        sum(Electricity_generation_TWh) as Electricity_generation_TWh
FROM
    CleanedTable
Group by Year, Continent
Order by Year;


--(2) How does the percentage of people with access to electricity correlate
--with electricity generation from renewables, nuclear, and fossil fuels?
SELECT
    Country,
        Continent,
    Year,
```

```
    Electricity_from_renewables_TWh,
    Electricity_from_nuclear_TWh,
    Electricity_from_fossil_fuels_TWh,
    "Access_to_electricity_%_of_population",
        CASE
        WHEN "Access_to_electricity_%_of_population" > 90 THEN 'High Access'
        WHEN "Access_to_electricity_%_of_population" BETWEEN 50 AND 90 THEN
'Medium Access'
        ELSE 'Low Access'
    END AS Access_Level
FROM
        CleanedTable;

--(3) What is the trend in electricity generation from renewables,
--nuclear, and fossil fuels over the years for each entity?
SELECT
    Year,
    sum(Electricity_from_renewables_TWh) as Electricity_from_renewables_TWh,
    sum(Electricity_from_nuclear_TWh) as Electricity_from_nuclear_TWh,
    sum(Electricity_from_fossil_fuels_TWh) as
Electricity_from_fossil_fuels_TWh
FROM
        CleanedTable
Group by Year
Order by Year;


--(4) What are the top 10 countries with the highest electricity generation
in 2022

SELECT TOP 10
        Country,
        Electricity_generation_TWh,
        "Access_to_electricity_%_of_population"
FROM
        CleanedTable
WHERE
        Year = '2022'
ORDER BY Electricity_generation_TWh DESC;

--(5) What is the relationship between GDP Per Capita (USD) and Electricity
--Generation (TWh)/Population Access for 2022
SELECT
    Country,
        Continent,
    Year,
    Electricity_generation_TWh,
        "Access_to_electricity_%_of_population",
    GDP_Per_Capita_USD
FROM
        CleanedTable
WHERE
        Year = '2022'
ORDER BY GDP_Per_Capita_USD DESC;

--(6) How has the annual change in primary energy consumption impacted
electricity generation
```

```sql
--from renewables, nuclear, and fossil fuels?

SELECT
    Country,
        Continent,
    Year,
    Electricity_from_renewables_TWh,
    Electricity_from_nuclear_TWh,
    Electricity_from_fossil_fuels_TWh,
    Annual_change_in_primary_energy_consumption
FROM
        CleanedTable;
```