

# World Electricity Analysis

Preamble PyTorch



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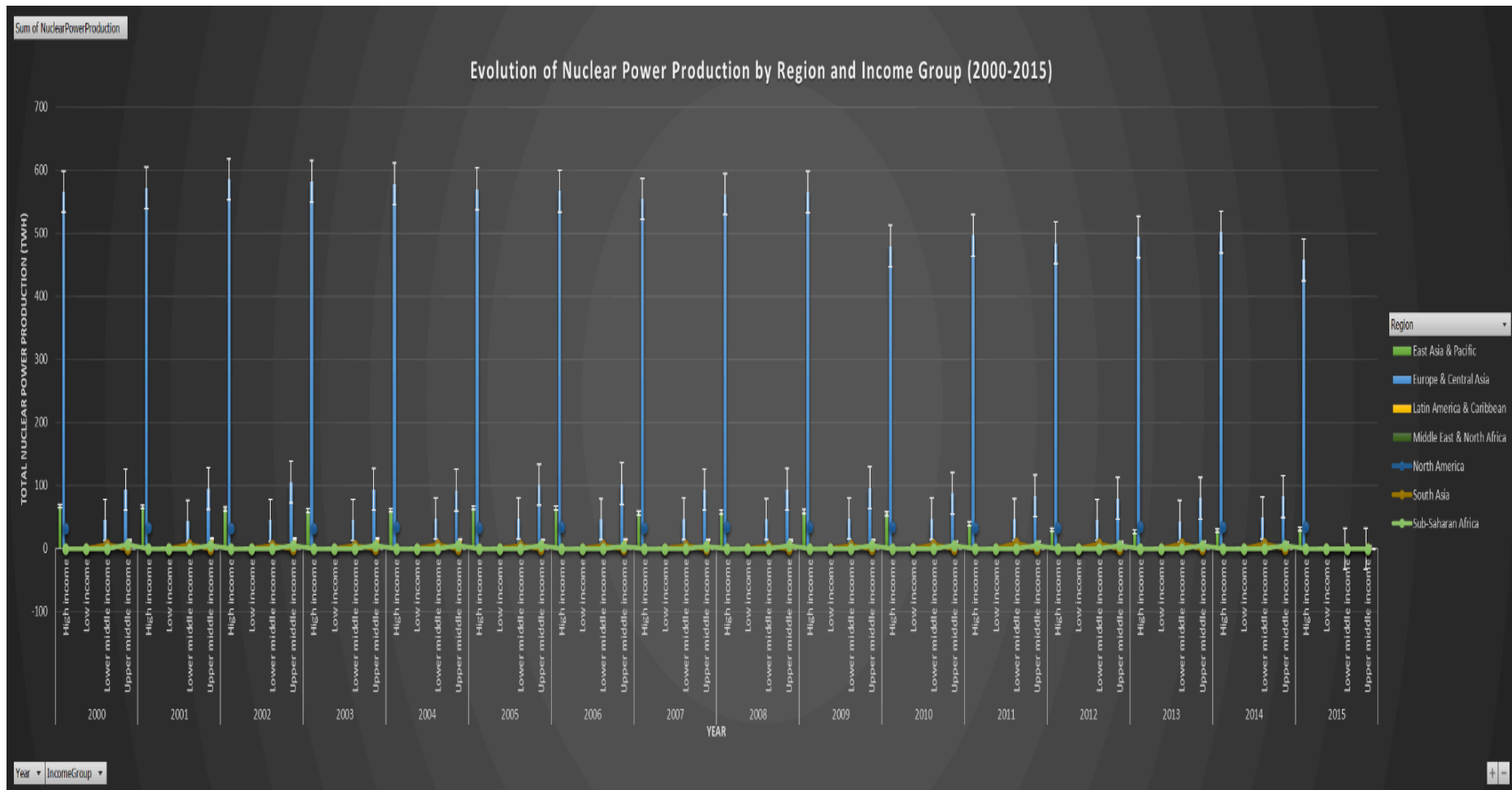
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## Evolution of Nuclear Power Presence: A Regional and Income Group Analysis (2000-2015)



## SQL Queries for Data Retrieval

```
SELECT
    Region,
    IncomeGroup,
    Year,
    SUM(NuclearPowerProduction) AS TotalNuclearPowerProduction
FROM aggregated_nuclear_power_production_2000_2015_long
GROUP BY Region, IncomeGroup, Year;
```

### Regional Trends in Nuclear Power Production:

From the data, it is evident that **Europe & Central Asia** consistently had the highest nuclear power production throughout the years, peaking at 735.54 TWh in 2002. This reflects Europe's significant investment in nuclear energy compared to other regions. In contrast, **Sub-Saharan Africa** showed minimal nuclear power production, with figures frequently approaching zero. This disparity highlights the varying levels of nuclear energy infrastructure and investment between developed and developing regions.

**East Asia & Pacific** demonstrated a steady production rate with minor fluctuations, maintaining a significant presence in nuclear energy but not matching Europe's peak production. **North America** also showed stable nuclear power production, with a peak in 2004 at 34.68 TWh, aligning with its historically robust nuclear energy sector. Conversely, regions like **Middle East & North Africa** and **Latin**

## Comparative Analysis of Nuclear Power Generation

### Europe & Central Asia:

- **High Production Levels:** Europe & Central Asia has consistently demonstrated high nuclear power production levels throughout the period. For instance, the region peaked at **735.54 TWh** in 2002 and maintained substantial production in subsequent years, with notable levels such as **720.73 TWh** in 2003 and **718.47 TWh** in 2004.
- **Steady Contribution:** The region's contribution remained significant across the years, with production values averaging well above **700 TWh** during the early 2000s and gradually declining but still remaining high compared to other regions.

### Sub-Saharan Africa:

- **Minimal Production:** In stark contrast, Sub-Saharan Africa's nuclear power production was extremely low throughout the same period. The region's production often approached zero, with occasional minimal values, such as **6.26 TWh** in 2000 and a peak of **6.26 TWh** in 2004.
- **Negligible Contribution:** The data reflects that Sub-Saharan Africa's nuclear power production was negligible compared to Europe & Central Asia, highlighting the region's minimal investment in or capacity for nuclear energy.

**America & Caribbean** exhibited negligible nuclear production, indicating a lesser focus on nuclear energy within these regions

### Income Group Analysis:

The data reveals distinct patterns in nuclear power production across income groups. High-income countries dominate the nuclear power production landscape, contributing the majority of the global total. For instance, high-income countries accounted for the largest share of production in each year, with a peak of 671.35 TWh in 2001. This aligns with the expectation that high-income countries have more advanced infrastructure and technology for nuclear energy.

Upper middle-income countries have shown an increasing trend in their nuclear power production, reaching up to 127.6 TWh in 2002. However, the production figures for lower middle-income and low-income countries remained consistently low, indicating limited nuclear energy development in these economies. This discrepancy underscores the challenges faced by lower-income countries in investing in nuclear energy, often due to financial and infrastructural constraints.

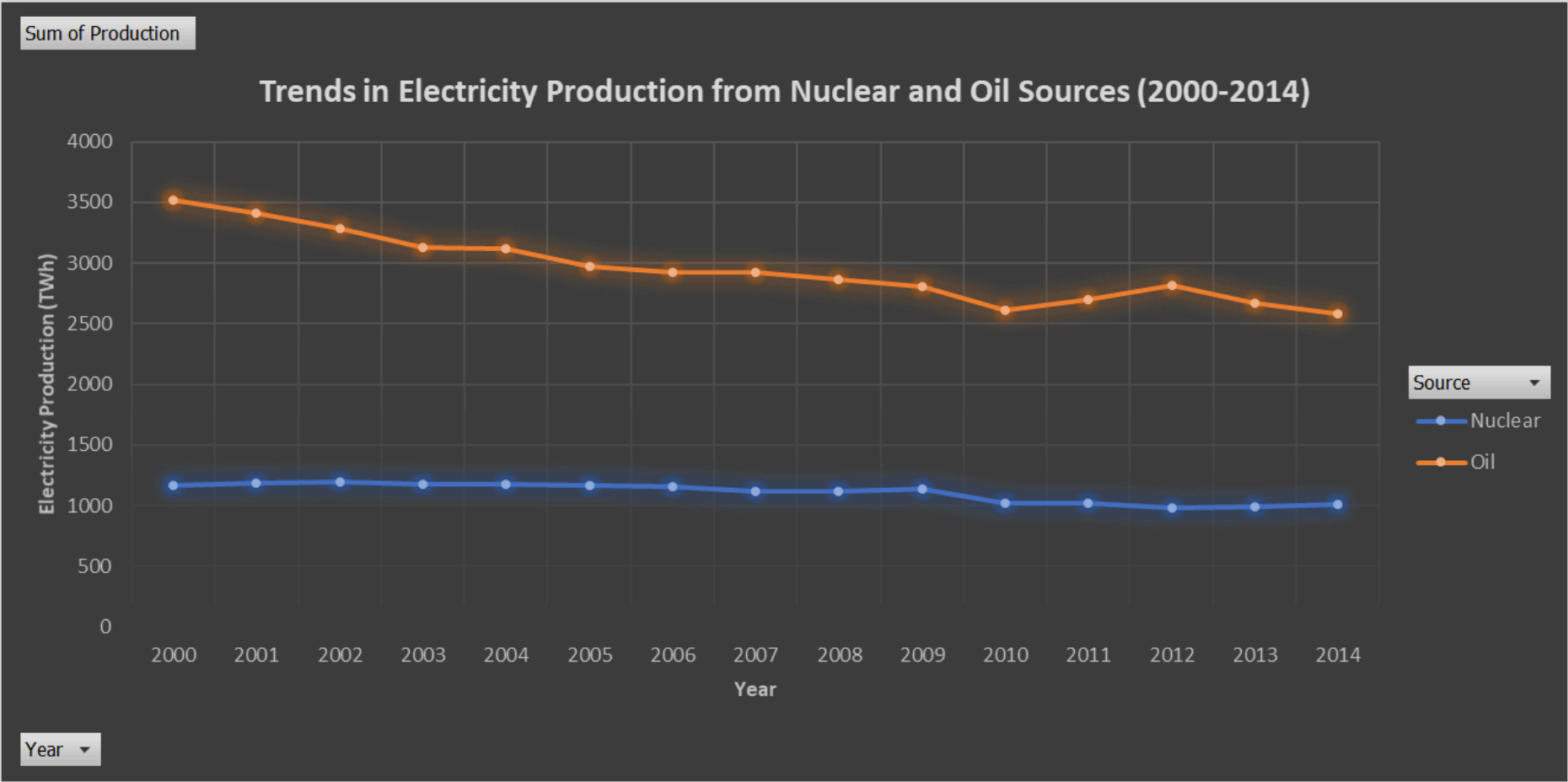
### Summary:

**Europe & Central Asia** has been a major player in nuclear power generation, with consistently high production levels throughout the years analyzed. The region's investment in nuclear infrastructure and technology has enabled it to maintain a leading position in global nuclear power production.

In contrast, **Sub-Saharan Africa** has shown extremely low levels of nuclear power production, reflecting limited or no significant investment in nuclear energy. This disparity underscores the substantial differences in nuclear energy capabilities and infrastructure between developed regions like Europe & Central Asia and developing regions such as Sub-Saharan Africa.

The vast difference in nuclear power generation between these regions highlights the significant global inequality in energy resources and infrastructure, with developed regions having a considerable advantage in nuclear energy production capabilities.

# Analysis of Electricity Production Across Different Sources (Nuclear and Oil) from 2000 to 2014





## SQL Queries for Data Retrieval

```
SELECT
    Year,
    SUM(CASE WHEN Source = 'Nuclear' THEN Production ELSE 0
END) AS Nuclear,
    SUM(CASE WHEN Source = 'Oil' THEN Production ELSE 0 END)
AS Oil
FROM
    combined_electricity_production_2000_2014
WHERE
    Year BETWEEN '2000' AND '2014'
GROUP BY
    Year
ORDER BY
    Year;
```

## Overview of Trends

The provided data offers a comprehensive view of electricity production from two primary sources, nuclear and oil, over the period from 2000 to 2014. A detailed analysis of this data reveals significant trends and shifts in production that can be linked to various global events, technological advancements, and policy changes.

## Nuclear Energy Production Trends

## Oil-Based Electricity Production Trends

In contrast to nuclear energy, oil-based electricity production shows a clear downward trend throughout the entire period. Starting from 3517 TWh in 2000, there is a consistent decline, with production falling to 2579.16 TWh by 2014. Several factors contribute to this decline, including the rising costs of oil, increased environmental regulations, and the global push towards renewable energy sources to combat climate change.

The early 2000s saw significant investments in renewable energy technologies, driven by both governmental incentives and the increasing competitiveness of alternative energy sources such as wind and solar power. As these technologies became more cost-effective and efficient, reliance on oil for electricity production decreased. Additionally, geopolitical events and fluctuations in oil prices may have further discouraged the use of oil for electricity generation.

## Comparative Analysis and Real-World Implications

The contrasting trends between nuclear and oil-based electricity production highlight the dynamic nature of the global energy landscape. The initial stability and subsequent decline in nuclear energy production underscore the impact of catastrophic events on public perception and regulatory environments. However, the slight recovery towards the end of the period indicates a potential resurgence in nuclear energy's role in the global energy mix, driven

Nuclear energy production shows a relatively stable pattern from 2000 to 2008, with slight fluctuations. Production peaked in 2002 at 1199.48 TWh and generally maintained a high level until 2009. However, a noticeable decline is observed from 2010 onwards, with the lowest production in 2012 at 977.1 TWh. This drop can be attributed to several factors, including the Fukushima Daiichi nuclear disaster in 2011, which led to increased regulatory scrutiny and the shutdown of several nuclear reactors worldwide for safety checks and decommissioning.

Despite the decline post-2011, nuclear production began to recover slightly towards the end of the period, reaching 1008.85 TWh in 2014. This recovery may be linked to advancements in nuclear safety technology and the resumption of operations in some reactors after rigorous safety upgrades.

by its low greenhouse gas emissions and advancements in reactor technology.

On the other hand, the steady decline in oil-based electricity production reflects a broader shift towards cleaner energy sources. This shift is crucial for addressing global climate change goals and reducing dependence on fossil fuels. The data suggests that countries are increasingly adopting policies that favor renewable energy, which is likely to continue shaping the energy sector in the coming decades.

In conclusion, the analysis of electricity production data from nuclear and oil sources between 2000 and 2014 provides valuable insights into the evolving energy landscape. The trends observed are a result of complex interactions between technological advancements, regulatory changes, economic factors, and societal preferences. Understanding these trends helps policymakers, industry stakeholders, and researchers to make informed decisions that balance energy needs with environmental and safety considerations.

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## Regional and country groupings

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### Latin America & Caribbean

Antigua and Barbuda, Argentina, Aruba, Bahamas, Barbados, Belize, Bolivia, Brazil, Chile, Colombia, Costa Rica, Cuba, Dominica, Dominican Republic, Ecuador, El Salvador, Grenada, Guatemala, Guyana, Haiti, Honduras, Jamaica, Mexico, Nicaragua, Panama, Paraguay, Peru, Saint Kitts and Nevis, Saint Lucia, Saint Vincent and the Grenadines, Suriname, Trinidad and Tobago, Uruguay, Venezuela

### Africa Eastern and Southern

Botswana, Comoros, Djibouti, Eritrea, Eswatini, Ethiopia, Kenya, Lesotho, Madagascar, Malawi, Mauritius, Mozambique, Namibia, Seychelles, Somalia, South Sudan, Tanzania, Uganda, Zambia, Zimbabwe

### South Asia

Afghanistan, Bangladesh, Bhutan, India, Maldives, Nepal, Pakistan, Sri Lanka

### Europe & Central Asia

Albania, Andorra, Armenia, Austria, Azerbaijan, Belarus, Belgium, Bosnia and Herzegovina, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Georgia, Germany, Greece, Hungary, Iceland, Ireland, Italy, Kazakhstan, Kosovo, Latvia, Liechtenstein, Lithuania, Luxembourg, Malta, Moldova, Monaco, Montenegro, Netherlands, North Macedonia, Norway, Poland, Portugal, Romania, Russia, San Marino, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey, Ukraine, Uzbekistan

### North America

Canada, Mexico, United States

### Oceania

Australia, Fiji, Kiribati, Marshall Islands, Micronesia, Nauru, New Zealand, Palau, Papua New Guinea, Samoa, Solomon Islands, Tonga, Tuvalu, Vanuatu

## Sub-Saharan Africa

Angola, Benin, Burkina Faso, Burundi, Cameroon, Cape Verde, Central African Republic, Chad, Congo, Dem. Rep., Congo, Rep., Côte d'Ivoire, Equatorial Guinea, Gabon, Gambia, Ghana, Guinea, Guinea-Bissau, Liberia, Mali, Mauritania, Niger, Nigeria, Rwanda, São Tomé and Príncipe, Senegal, Sierra Leone, Togo

## Middle East and North Africa

Algeria, Bahrain, Egypt, Iran, Iraq, Israel, Jordan, Kuwait, Lebanon, Libya, Morocco, Oman, Palestine, Qatar, Saudi Arabia, Syria, Tunisia, United Arab Emirates, Yemen

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## Acknowledgements, Contributors, and Credits

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