

# STAT-404

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April 2025

## The Eastern Wind: China's Unexpected Dominance in the Global Renewable Energy Landscape

### 1 Introduction

Growing up in the 2000s, I always believed that Europe and the United States led the world in renewable energy production. This perception was shaped by the media I consumed, climate summits like the 2015 Paris Agreement, and climate activists like Greta Thunberg who became household names. It seemed logical to assume that the countries most vocal about climate change were also the ones taking the most action.

But as I began to explore the data for this project, I wanted to test this assumption. I used a dataset from Kaggle [D1] that tracks renewable energy production from 1970 to 2015, and I grouped countries into continents to see the broader trends. Initially, I combined Asia and Oceania into a single category since Oceania's contribution was relatively small and difficult to visualize on its own.

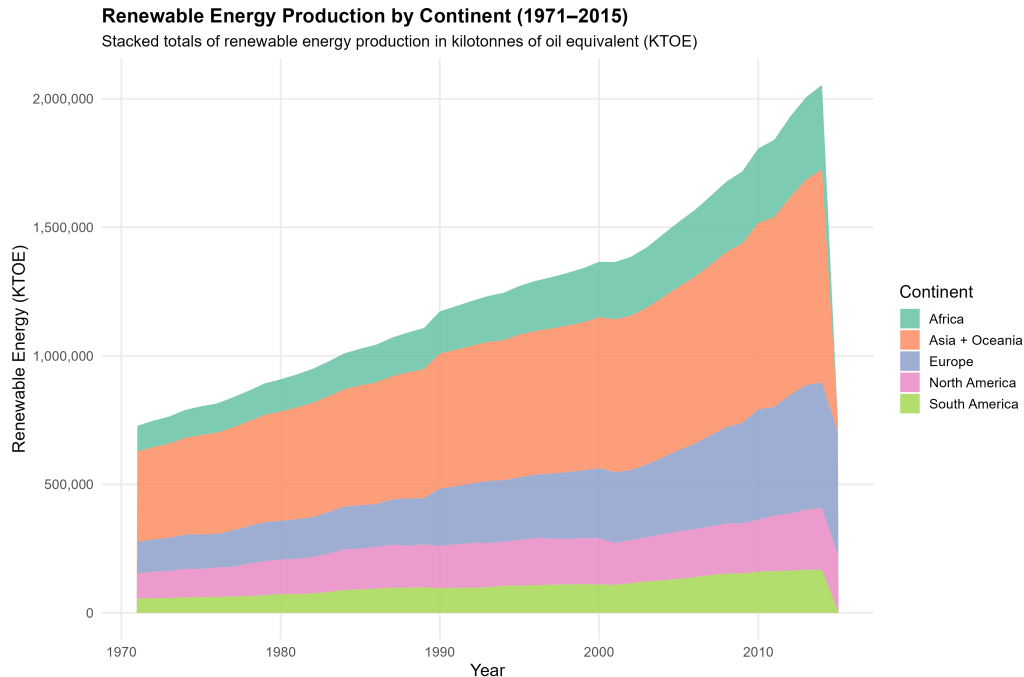


Figure 1: Continental comparison of renewable energy production (1970–2015). Asia leads globally, overturning common Western perceptions.[D1]

What I found genuinely surprised me. In Figure 1, it was not Europe or North America—but Asia—that emerged as the global leader in renewable energy production. This unexpected finding prompted me to

explore the data further, focusing on the top 20 countries by GDP (as listed by Wikipedia) [W1] to better understand the forces driving this trend.

Figure 2 offered an even more striking insight: China stood out as the top contributor, and none of the top five countries were European. This challenged my earlier assumptions. I had always believed that the nations most vocal about climate change were also the ones leading in renewable energy production—but the data told a different story.

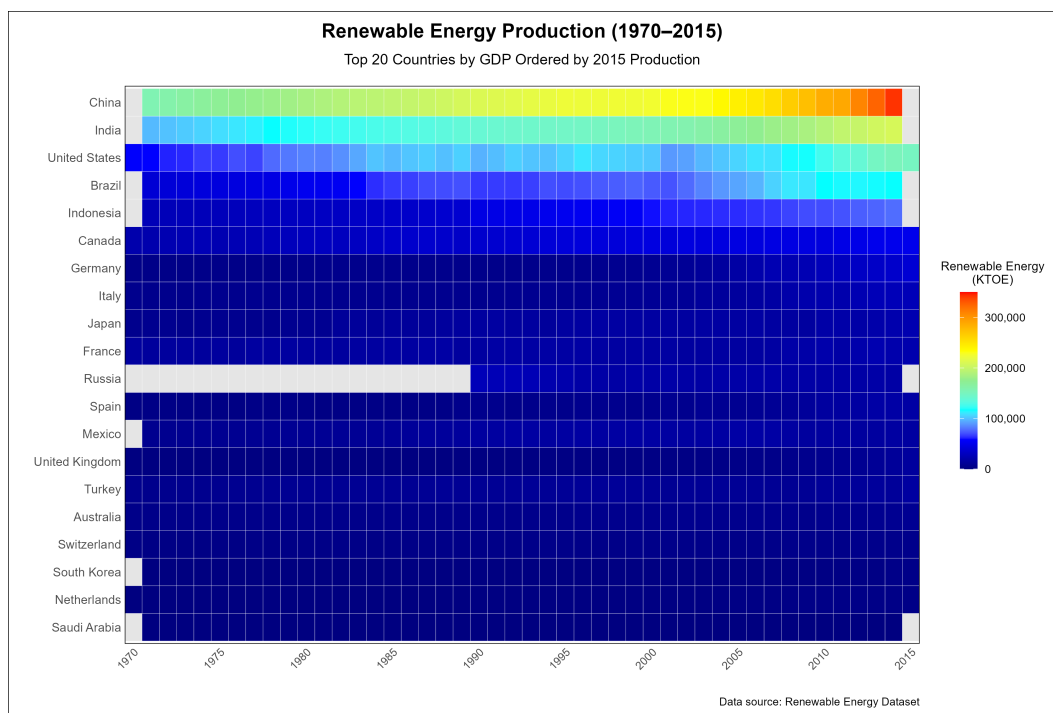


Figure 2: Heatmap showing the renewable energy production of the top 20 GDP countries. China emerges as a major contributor. [D1]

From that point on, I decided to investigate how China’s energy policies, economic growth, and geopolitical strategy have shaped its dominance in renewable energy production.

## 2 China’s Economic Policy

In Figure 3, a closer look at the data from 1971 to 2014 reveals a remarkable 119% growth in the production of renewable energy. Much of this increase can be attributed to China’s strategic policy changes and its evolving role in global environmental discussions.

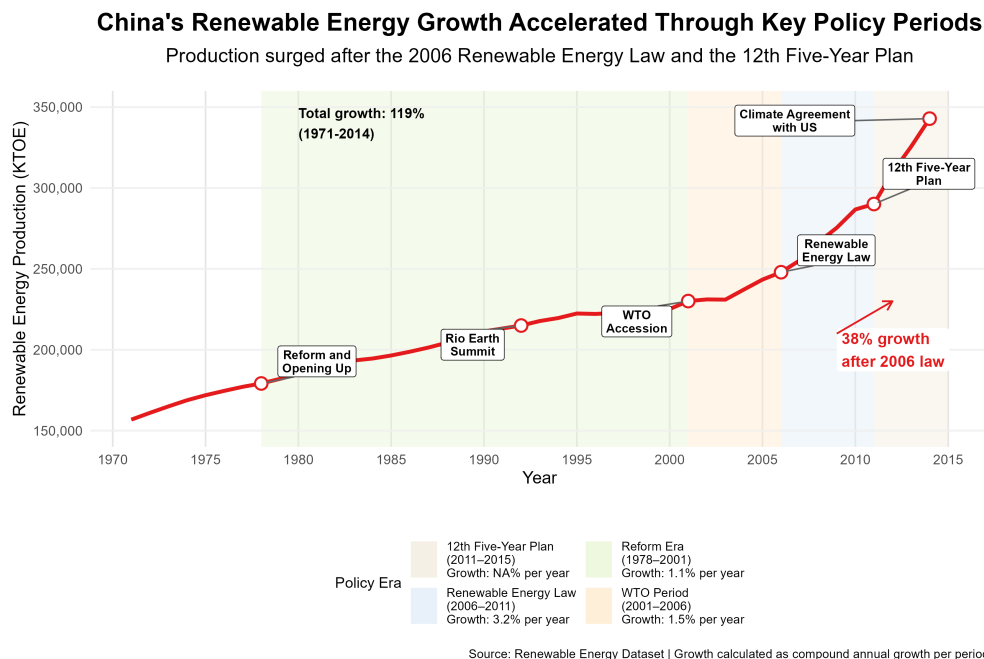


Figure 3: China's renewable energy production growth and key government policy milestones. [D1]

One major turning point was China's **Reforming and Opening Up** policy, initiated in the late 1970s. As the Cato Institute notes,

“Marketization and opening to the outside world—not industrial policy or protectionism—allowed China to make better use of its resources and widened the range of choices open to people.”

This shift created a favorable environment for open markets, investment, and economic modernization, elements that were suppressed during the Mao Zedong era. As the Cato Institute notes, under Mao, private property was outlawed, entrepreneurs were criminalized, and Soviet-style central planning dominated the economy. After Mao's death, Deng Xiaoping rose to power and opened the market, guiding China toward a more market-oriented system. The Communist Party shifted its focus from class struggle to economic development, laying the foundation for large-scale infrastructure projects, including those in the energy sector. [W2]

China's participation in the 1992 Rio Earth Summit (also known as the Earth Summit) marked another critical milestone. The summit's goal was to produce

“a broad agenda and a new blueprint for international action on environmental and development issues.” [W10]

China's participation in international summits signaled its growing recognition of the importance of environmental sustainability, which would influence future domestic policies.

Perhaps the most impactful domestic policy was the passage of the 2006 **Renewable Energy Law**. According to the legislation, its purpose was to

“promote the exploitation of renewable energy, increase energy supply, improve the energy structure, ensure energy safety, protect the environment, and attain the sustainable development of the economy and society.” [W3]

Following this law, China saw a dramatic 38% increase in renewable energy production—a clear indication of how national policy can drive real-world outcomes.

This momentum continued in the following years. During the 12th Five-Year Plan (2011–2015), the Chinese government prioritized clean energy technologies, energy efficiency, and the reduction of carbon

intensity. [W4] These initiatives were further reinforced by China’s 2014 joint climate agreement with the United States, in which both countries committed to lowering their carbon emissions. [W5] This diplomatic milestone strengthened China’s resolve to expand its renewable energy efforts and helped further establish its role in clean energy production.

China’s rapid ascent in renewable energy is not merely the result of economic capacity—it reflects deliberate, long-term planning that aligns energy policy with both environmental goals and geopolitical strategy. These coordinated efforts have allowed China to reduce its reliance on foreign energy sources, paving the way toward greater national resilience.

This naturally leads to a broader question: beyond environmental benefits, what strategic value does renewable energy provide on the global stage? The answer lies in the concept of **energy security**—a crucial and often overlooked dimension of renewable investment. As recent global crises have shown, energy independence can significantly influence a nation’s political leverage, and economic stability.

### 3 Energy Security: A Wake-Up Call for Europe

A powerful example of the strategic importance of energy independence is the Russian invasion of Ukraine in 2022. Before the war, many European countries were heavily reliant on Russian energy exports—particularly natural gas. Germany, for instance, imported crude oil and natural gas worth 19.4 billion euros from Russia in 2021. This accounted for nearly 60% of all German imports from Russia and marked a 49.5% increase from the previous year, as reported by Destatis Statistisches Bundesamt. [W9]

Italy faced a similar situation. Prior to the war, nearly 40% of its gas supply came from Moscow, according to Reuters News. [W8] France, too, increased its dependence: between 2021 and 2023, imports of Russian liquefied natural gas (LNG) rose by 44%, while imports of Russian fertilizer surged by 86%, based on data from Razom We Stand. [W7]

Figure 2 highlights how deeply the European economy was tied to Russian energy exports. As prices spiked just months after the invasion began, it became clear that many European countries had not invested sufficiently in renewable energy production. This lack of diversification left them vulnerable when political tensions escalated.

As the war unfolded and diplomatic relations with Russia deteriorated, energy supply chains were severely disrupted. The result was a continent-wide energy crisis—markets saw unprecedented price spikes (Figure 4), and countries scrambled to secure alternative sources. In the short term, this often meant reverting to coal and other carbon-intensive energy supplies.

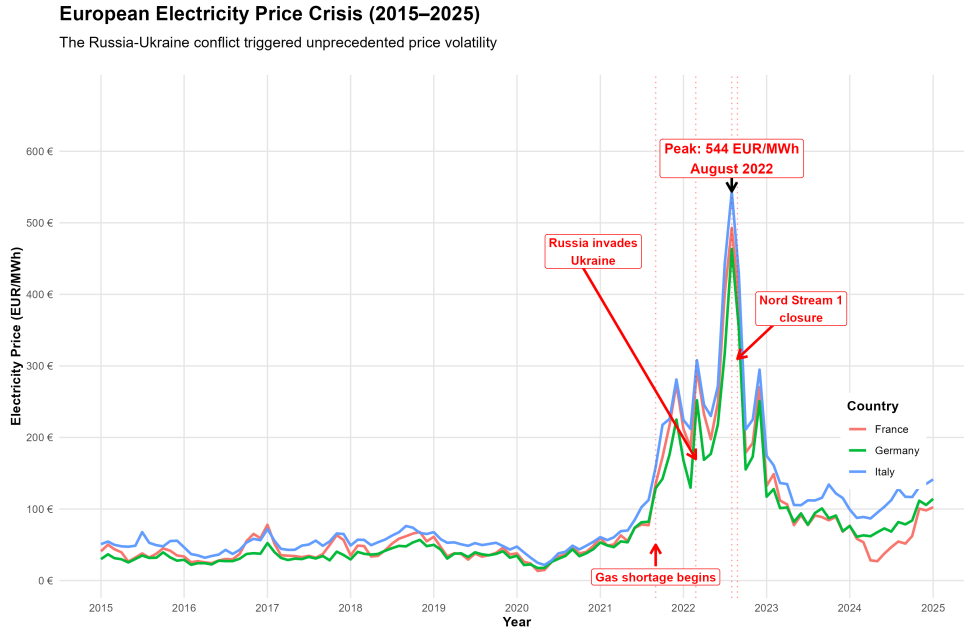


Figure 4: European energy price spikes following the Russia-Ukraine war.[D2]

To counteract the crisis, the European Union launched the **REPowerEU** plan in May 2022. This initiative was designed to reduce dependence on Russian fossil fuels and included three major pillars: saving energy, diversifying energy supplies, and producing more clean energy. According to the European Commission, the plan helped shield citizens and businesses from energy shortages, accelerate the transition to renewables, and stabilize energy prices. In their words, “Putin’s attempt to divide Europe by weaponising energy supplies has failed.” [W6]

The aftermath of the energy crisis revealed a key vulnerability in Europe’s energy strategy: dependence on foreign fossil fuels not only endangers national security but also directly impacts economic stability. Countries hit hardest by the energy shock also experienced significant economic slowdowns as illustrated in Figure 5.

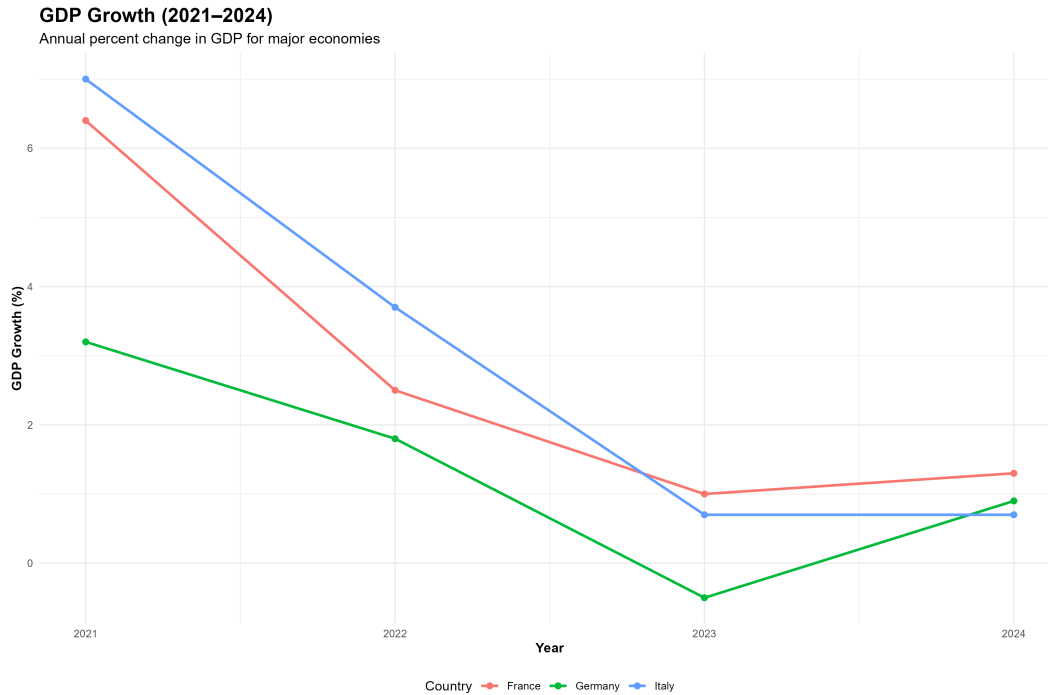


Figure 5: GDP growth trends for major European economies, 2021–2023.[D4]

As shown in Figure 5, many countries began to recover economically after the COVID-19 pandemic. However, the onset of the energy crisis led several European nations to underperform, highlighting the significant impact that energy disruptions had on growth and productivity during 2022–2023.

This turning point underscored that energy policy is no longer solely an environmental issue—it has become a cornerstone of national resilience. Investing in domestic, renewable energy sources is not only essential for reducing emissions, but also for protecting economic and geopolitical stability in an increasingly unpredictable world.

## 4 Conclusion

The data tells a story that challenges my held assumptions. While much of the Western world has led the charge in climate activism and environmental discourse, the actual numbers reveal a different picture: China, often seen as a latecomer to environmental reform, has become the world’s largest producer of renewable energy.

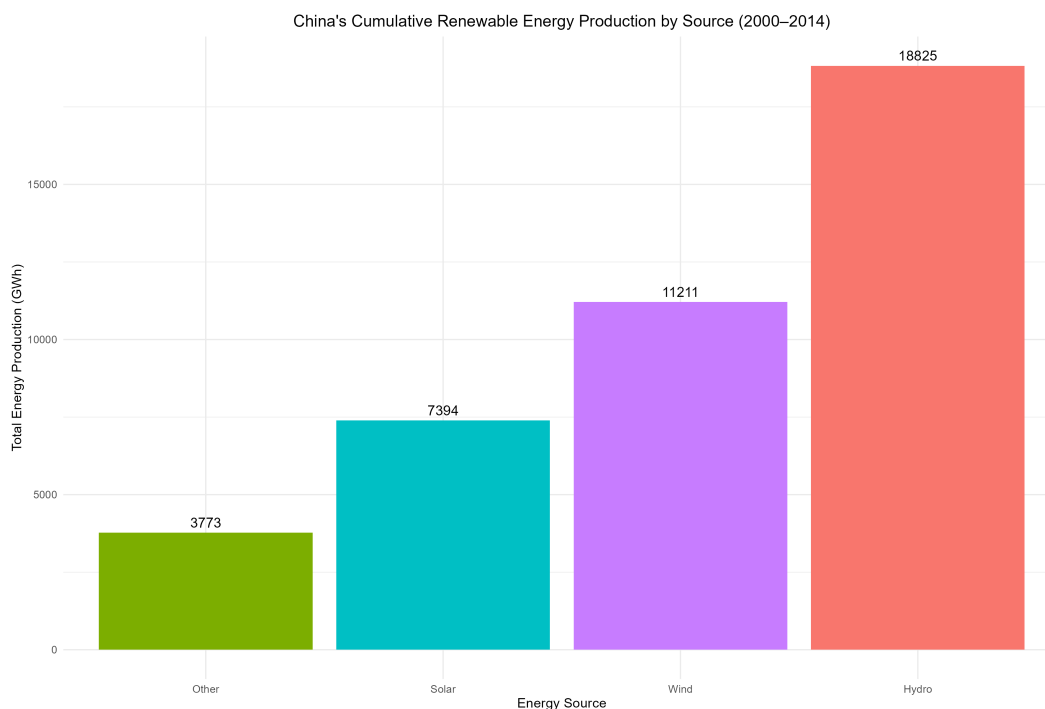


Figure 6: China’s cumulative renewable energy production by source (2000–2014). Hydropower leads, followed by wind and solar.[D3]

As shown in Figure 6, China’s renewable portfolio is not only massive in scale but also diverse. Hydropower dominates with over 18,000 GWh, followed by wind and solar. This reflects a deliberate and strategic diversification, fueled by clear national policy, consistent long-term investment, and a deep alignment of energy goals with economic planning.

Throughout this analysis, we’ve seen how China’s rise in renewable energy has been shaped by a combination of internal reforms, global engagement, and geopolitical foresight. Policies like the Renewable Energy Law and major Five-Year Plans show how central planning can accelerate transformation at scale. In contrast, Europe’s overreliance on Russian fossil fuels—exposed by the Ukraine war—highlights the risks of insufficient investment in domestic clean energy alternatives.

This underscores a key takeaway: renewable energy is not just about climate; it is about resilience. It is about independence. China’s leadership in this area reflects more than just environmental concern—it demonstrates an understanding of how energy security, economic stability, and geopolitical strength are tightly intertwined.

In the end, the data analysis revealed a reality that challenges popular perception. While Western nations often dominate the headlines, it is the East—particularly China—that emerged as the true powerhouse in the global renewable energy landscape in 2014, according to the Kaggle dataset [D1].

As the title of this report suggests, The Eastern Wind is blowing stronger than many had realized.

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