



## EXECUTIVE SUMMARY

The IEA's Electricity Market Report 2023, released in February, marked the beginning of an ongoing global energy crisis. This crisis continues to affect various parts of the world, with higher energy commodity costs and economic slowdowns impacting electricity market trends worldwide. In this report, we present our latest data for 2022 and forecasts for global electricity demand, supply, and emissions through 2024. We also delve into recent developments in China, the United States, the European Union, and India. Furthermore, we provide a detailed analysis of wholesale electricity prices, which remain elevated in many regions compared to pre-2021 levels. This update includes a special focus on the evolving electricity demand in Europe and its drivers. We also cover the increasing impact of weather on electricity demand and supply through a dedicated analysis.

## ACKNOWLEDGMENTS

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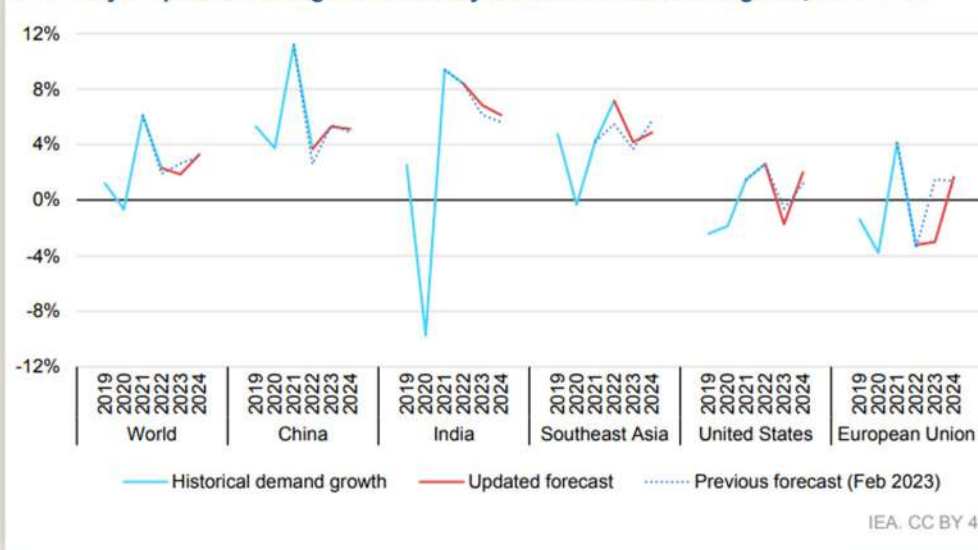
## ELECTRICITY MARKET OUTLOOK

The global electricity market grapples with the ongoing energy crisis, marked by soaring energy commodity prices and economic challenges. This report updates the electricity market outlook for 2023 and 2024, building on the IEA's Electricity Market Report 2023. Key findings include:

### 1. Falling Electricity Consumption in Advanced Economies:

- Global electricity demand growth is expected to ease in 2023 due to ongoing economic challenges and the energy crisis.
- Advanced economies, particularly the European Union, the United States, and Japan, are witnessing declining electricity demand.
- Europe's energy-intensive industries are significantly affected, experiencing substantial declines in electricity demand.

Year-on-year percent change in electricity demand in selected regions, 2019-2024



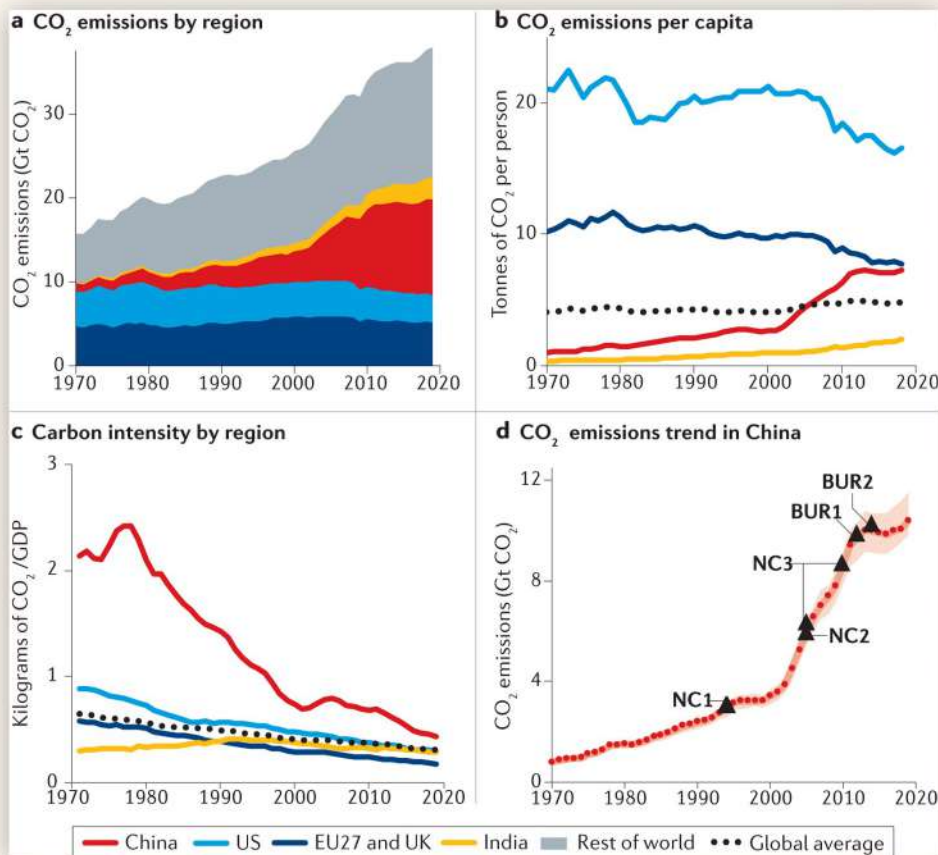


2. Structural Shift in Fossil-Fired Generation:

- Renewables are set to surpass coal as the leading source of electricity by 2024, driven by increased renewable capacity additions.
- Coal-fired generation is expected to decline in 2023 and 2024, offset by renewable growth.
- The decline in fossil-fired generation is no longer tied solely to economic crises, indicating a global shift toward cleaner energy sources.

3. Emissions Plateauing and Declining:

- While power generation emissions are rising in China and India, other regions, led by the European Union, are expected to see declines.
- This trend suggests that global power sector emissions will plateau or decline in the coming years.



4. Wholesale Electricity Prices and Flexibility:

- Wholesale electricity prices in some regions have declined but remain elevated compared to pre-2021 levels.
- Negative electricity prices are becoming more common, emphasizing the need for increased energy system flexibility.
- Regulatory frameworks must incentivize demand-side flexibility and storage.

5. Weather's Impact on Demand and Supply:

- Extreme weather events are driving increased electricity demand for cooling, particularly in emerging economies.
- Ensuring system reliability requires adequate backup generation, demand management, energy storage, grid investments, and fuel supply security.
- Global hydropower capacity is declining, posing challenges to electricity supply. This report underscores the importance of coordinated efforts to address the energy crisis, transition to cleaner energy sources, and adapt to the changing dynamics of the electricity market.



## THE FUTURE OF THE EU'S ENERGY-INTENSIVE INDUSTRY

The European Union's energy-intensive industry faces critical challenges and choices. Rising energy costs and the need to align with climate goals necessitate strategic decisions. In this 800-word synopsis, we explore key issues and options:

### CHALLENGES AND CROSSROADS:

The EU balances the needs of energy-intensive industries with climate and economic goals. Rising energy costs present a dilemma: how to support these industries while ensuring long-term sustainability.

**Option 1: Minimal Aid and Shift to High-Value Goods Economy:**

Providing minimal aid prompts industries to focus on high-value goods. While aligning with climate goals, it risks short-term job losses and economic instability.

**Option 2: Targeted Aid Strategy:**

A targeted aid strategy balances fiscal prudence with sector control. It enables a gradual transition while preserving jobs but demands careful planning.

**Option 3: Extensive Support Through Energy Price Subsidies:**

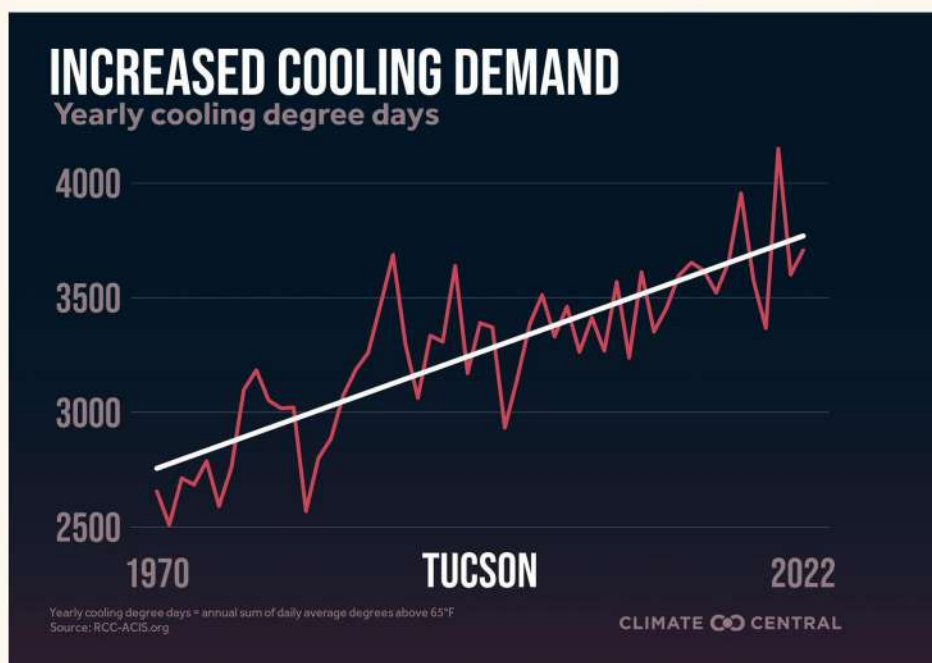
Extensive support through energy price subsidies preserves jobs but burdens consumers and taxpayers, potentially conflicting with climate goals.

**Option 4: Ramp-Up Decarbonization and Renewable Energy:**

Accelerating decarbonization and transitioning to renewable energy aligns with climate objectives but requires significant upfront investments and logistical challenges.

### IMPACT OF COOLING DEMAND ON POWER SYSTEMS:

Rising temperatures drive increased cooling demand, stressing power systems. Higher efficiency standards, grid investments, and demand management are crucial.



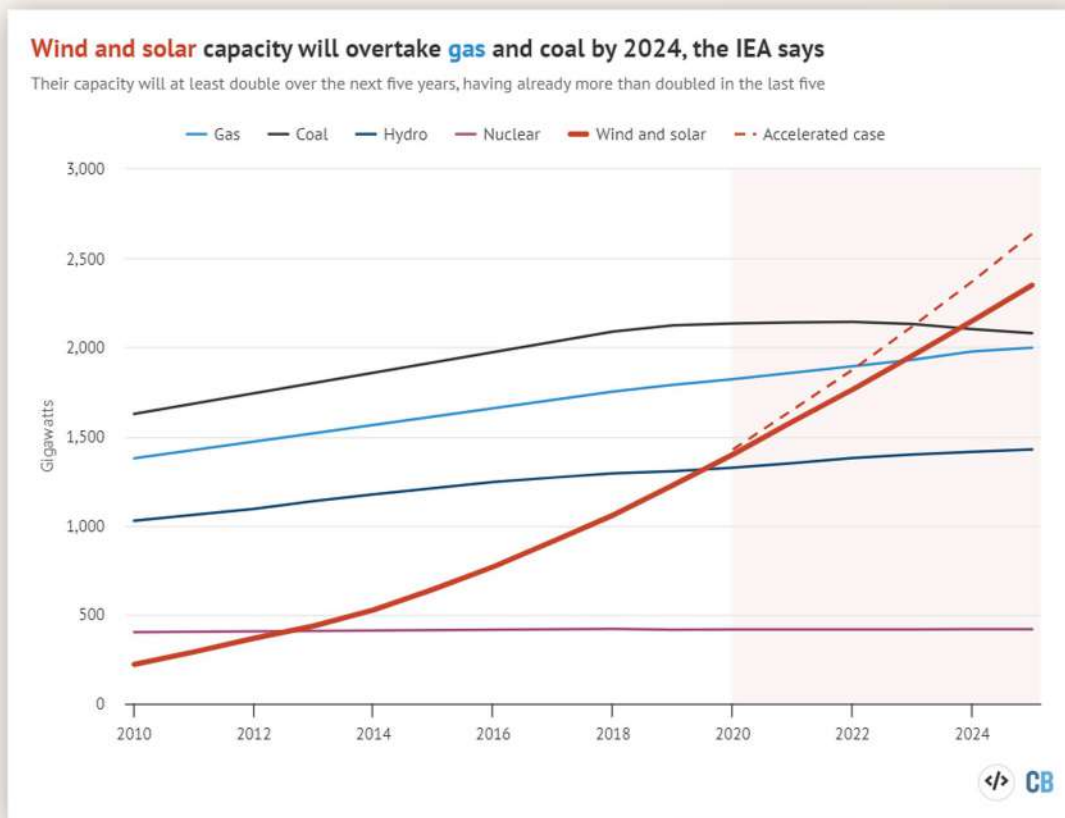


## GLOBAL POWER SYSTEM STRESS TEST:

Various regions face power system stress tests due to increased demand, highlighting the importance of grid reliability and resource planning.

## RENEWABLES OVERTAKING COAL:

Renewables are set to surpass coal as the primary electricity source by 2024, driven by renewable capacity growth. Fossil-fired generation is on a structural decline.



## HYDROPOWER CHALLENGES AND REGIONAL DIFFERENCES:

Hydropower faces challenges globally due to changing weather patterns. Declining hydropower capacity necessitates additional dispatchable energy sources. In conclusion, the EU's energy-intensive industry faces crucial choices to balance economic, environmental, and energy security concerns. Addressing cooling demand and ensuring grid reliability are essential as the EU navigates a changing energy landscape towards renewables and decarbonization.

## EVOLVING DYNAMICS OF THE ENERGY SECTOR

Recent years have witnessed significant changes in the global energy landscape, driven by multiple factors, including Variable Renewable Energy (VRE) sources, climate change, and emissions patterns. These dynamics influence hydropower plants and emissions trends. This synopsis explores these evolving dynamics:



**Hydropower Flexibility and Climate Change:**

Hydropower plants, particularly hydro reservoirs, adapt to integrate VRE sources into the grid. This flexibility reduces capacity factors, influenced by additional objectives like flood control, irrigation, recreation, or navigation.

**Climate Change Impacts on Hydropower:**

Climate change affects hydropower differently by country and plant type, emphasizing the need for climate-resilient planning for efficient hydro resource use.

**EMISSIONS TRENDS:**

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Global emissions from electricity generation rebounded in 2021 but are expected to record slight declines in 2023 and 2024, primarily due to reduced coal-fired generation.

**REGIONAL VARIATION:**

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Emissions are projected to rise in China and India, offset by declines in other regions. The European Union leads emissions reduction through reduced fossil fuel-based generation.

**EMISSION INTENSITY:**

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Power generation emission intensity is set to fall at a faster pace, with the European Union experiencing the fastest rate of decline among major energy-consuming regions.

**WHOLESALE ELECTRICITY PRICES:**

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Wholesale electricity prices exhibit fluctuations, remaining elevated in Europe due to factors like tightening gas markets and nuclear uncertainties in France.

**NEGATIVE PRICES AND GRID FLEXIBILITY:**

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Negative wholesale electricity prices, especially in Europe, underline the need for enhanced grid flexibility, emphasizing demand-side flexibility, digitalization, and energy storage.

The global energy landscape rapidly evolves, with hydropower adapting to VRE integration and climate change. Emissions trends indicate a shift from fossil fuels, and negative electricity prices highlight the need for grid flexibility and energy storage. Adapting to these changes is essential for a sustainable and efficient energy future.