



Powering through the heat

How 2024 heatwaves reshaped electricity demand

Thursday, 3 April 2025

Kostantsa Rangelova

EMBER



Key findings

01

Cooling accounted for an estimated **37%** of the increase in US electricity demand during April-September 2024 vs April-September 2023.

02

Cooling **doubled** the year-on-year increase of China's electricity demand in August and September

03

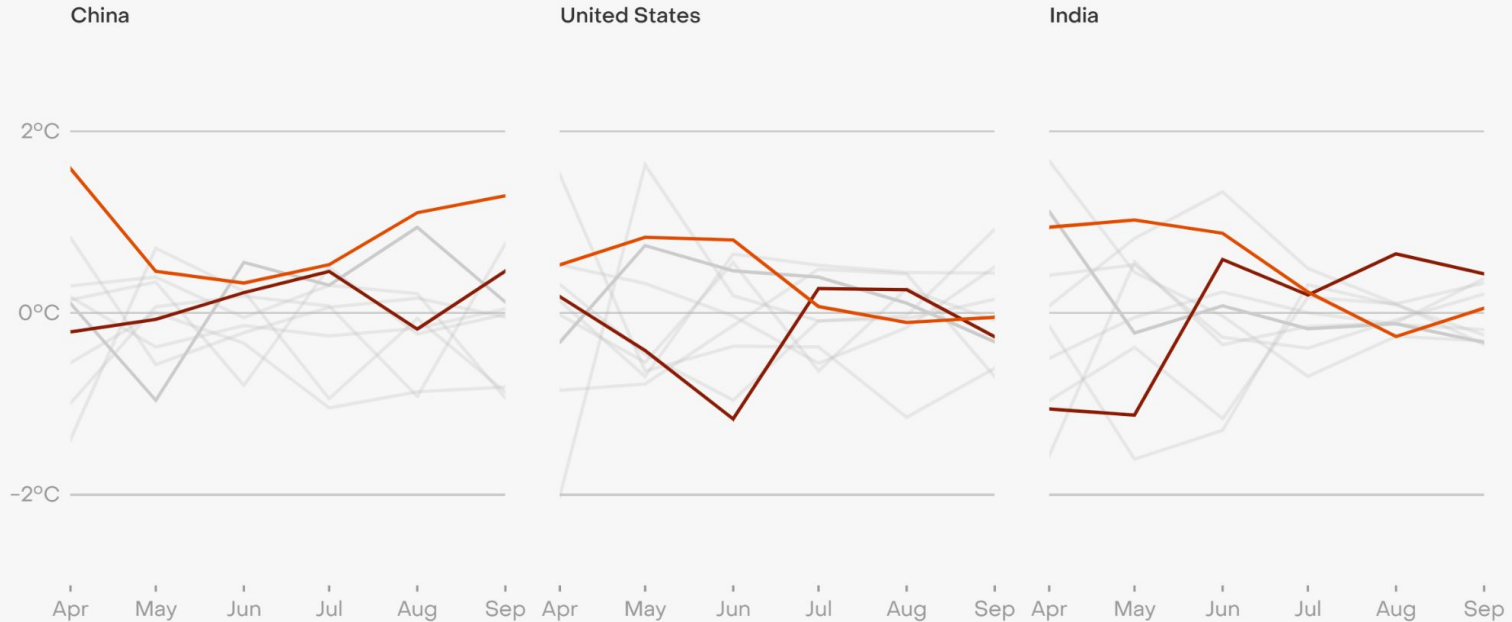
59% of China's annual coal generation growth occurred in just August and September, due to extreme cooling demand.

China, the US and India all experienced months with record heat during the summer of 2024

Temperature deviation from the 2015–2024 average

Grey lines show data for 2015–2022

■ 2024 ■ 2023

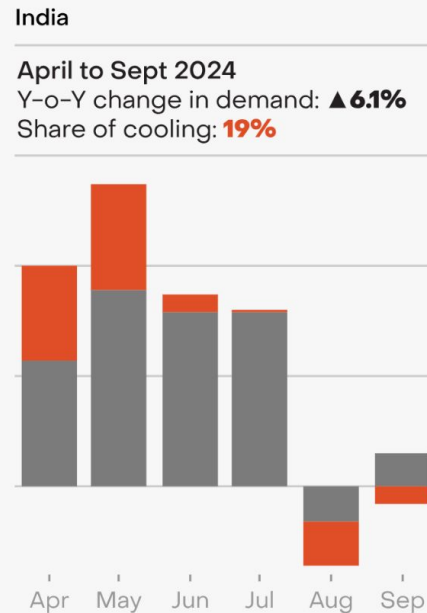
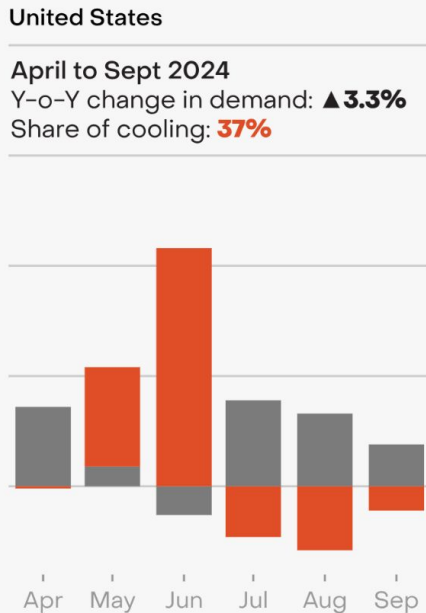
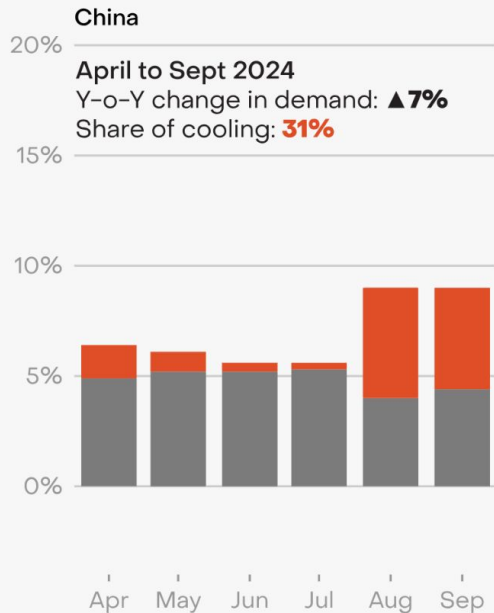


Source: Ember analysis of temperature data from ERA5 reanalysis data
Temperature data is population-weighted using NASA's Gridded Population of the World, Version 4 (GPWv4) dataset

Heatwaves in the US, China and India led to higher year-on-year electricity demand growth in summer 2024

Electricity demand change in 2024 vs 2023 by contributing factor, %

■ Additional cooling demand
 ■ Other demand change

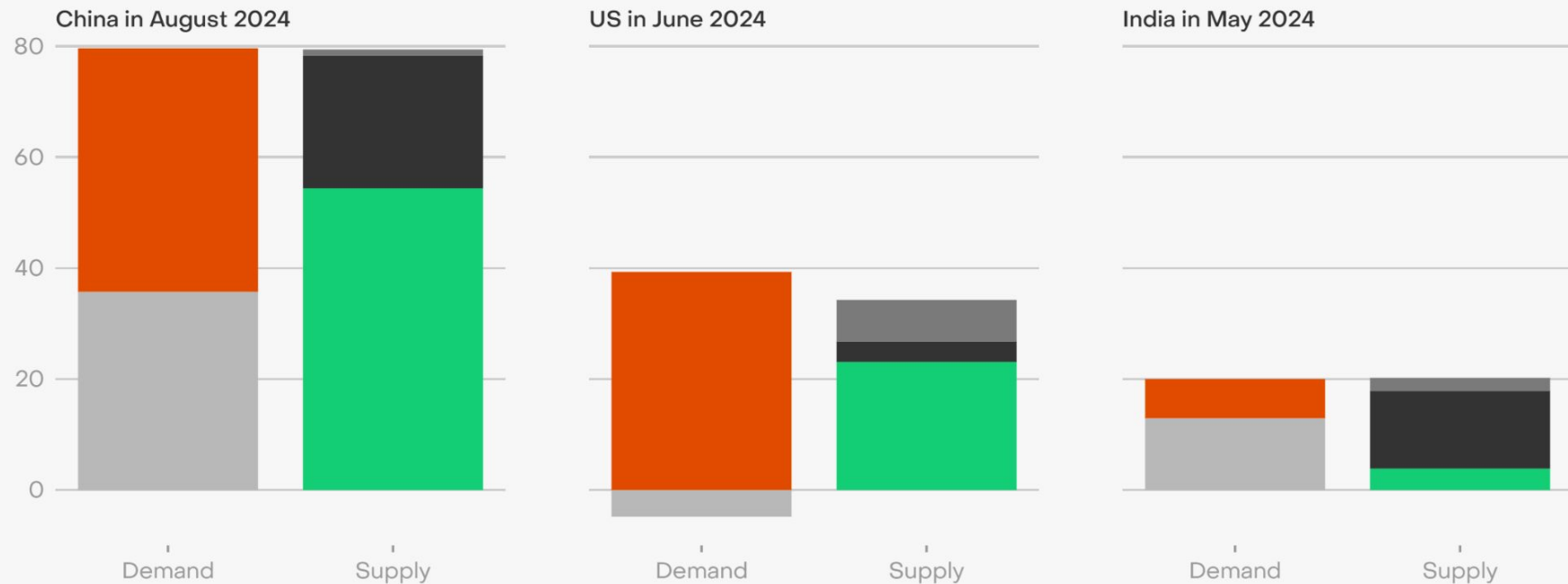


Source: Monthly electricity data, Ember; Ember analysis of temperature effects on electricity demand
 January and February data in China are reported together by the CEC. Demand changes are split equally over both months

Higher cooling demand led to more fossil fuel supply

Difference in 2024 vs. 2023, TWh

Cooling demand Other demand Clean generation Coal generation Gas generation



Source: Monthly electricity data; Ember analysis of temperature effects on electricity demand

The growing impact of heatwaves

- Heatwaves are becoming more frequent and intense
- Cooling demand is surging and access to affordable and sustainable cooling is a key challenge
- Three Key Solutions
 - **Energy-Efficient ACs** – Incentives to promote high-efficiency models
 - **Rooftop Solar** – Reduces grid reliance and supports affordable cooling
 - **Smart Pricing** – Lower daytime rates, demand alerts to prevent blackouts





Thank you!

Kostantsa Rangelova



EMBER

EMBER

DATA INTO ACTION

