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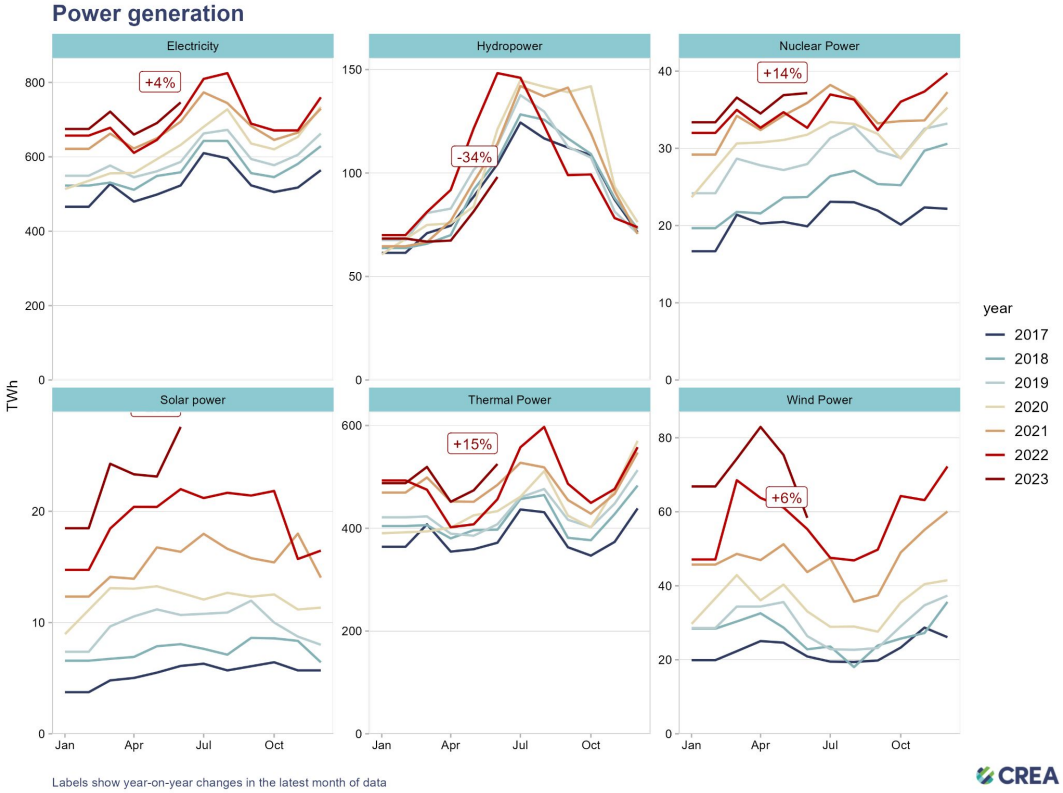
Centre for Research on Energy and Clean Air

China energy and emissions trends: July snapshot

Electricity demand growth slows but hydropower collapse drives coal power growth

- Electricity demand growth slowed down to 4% in June, with industrial demand just 2%, showing the weakness of the recovery.
- Solar and nuclear power registered sharp increases and record output levels, while wind had a relatively weak month due to variation in wind conditions.
- Hydropower output collapsed further (34% year-on-year in June) due to drought and pressure to save water for generation during peak demand season in July–August
- As a result of the hydropower collapse, coal and other thermal power increased sharply, by 14%.



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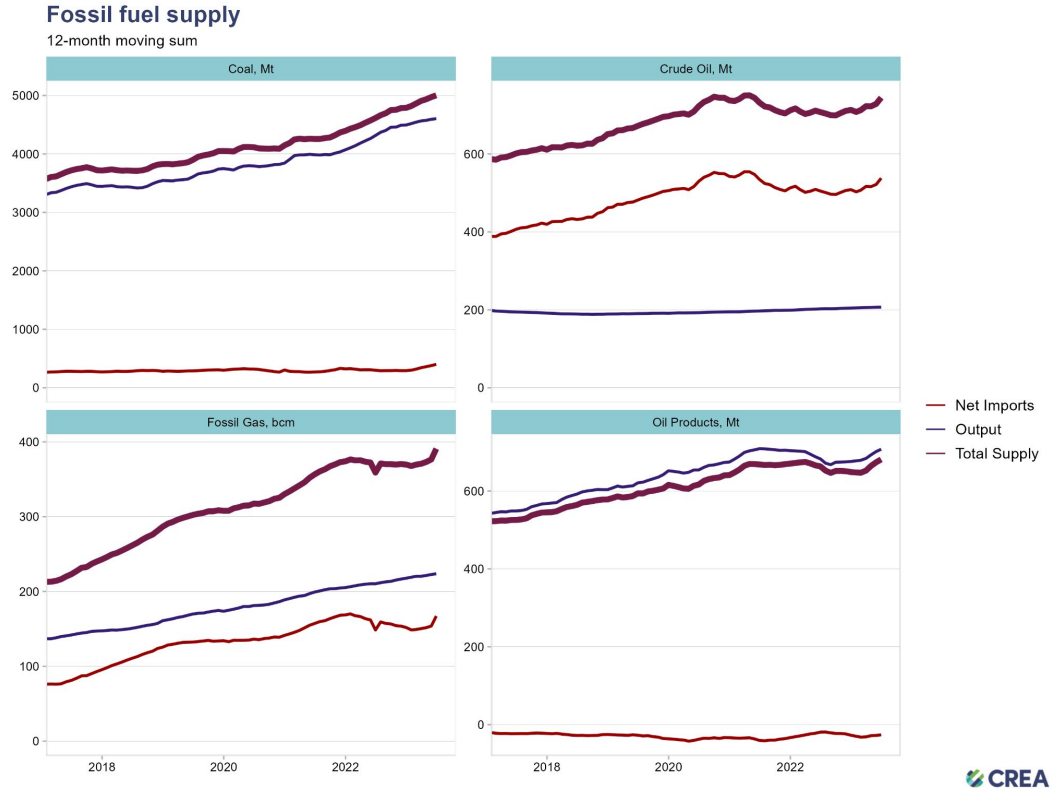
Coal mining boom runs out of steam, oil&gas imports jump

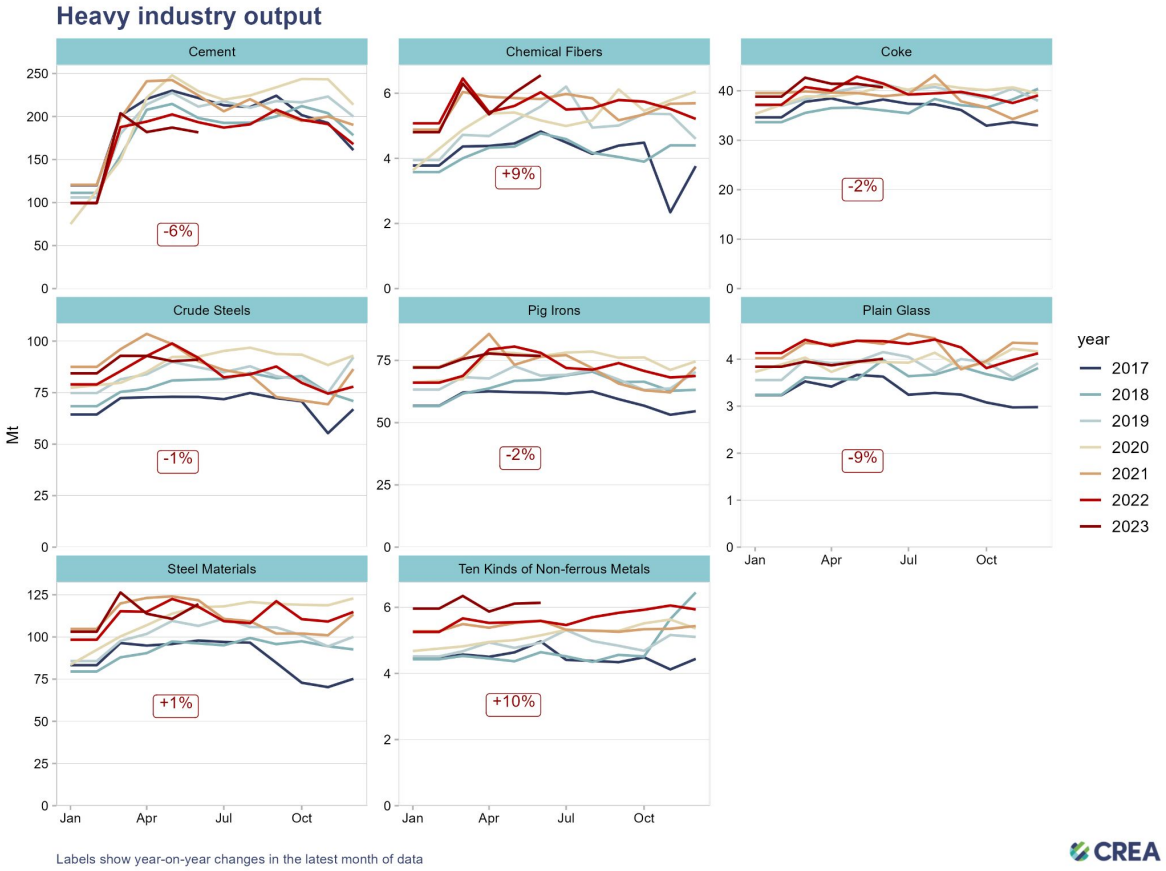
- While the sharp increase in coal power generation drove up demand, domestic coal output registered the weakest growth this year, 2.5%, and a significant slowdown from average growth of 9% in 2022, showing that the domestic coal mining push has run out of steam. Furthermore, domestic coal quality has declined, resulting in further demand for imports which jumped a whopping 110% in June.
- Crude oil and fossil gas imports jumped in June, driven by both restocking demand due to lower oil prices, and by an increase in oil products demand (re-opening of economy).



Cooling in steel&cement continues

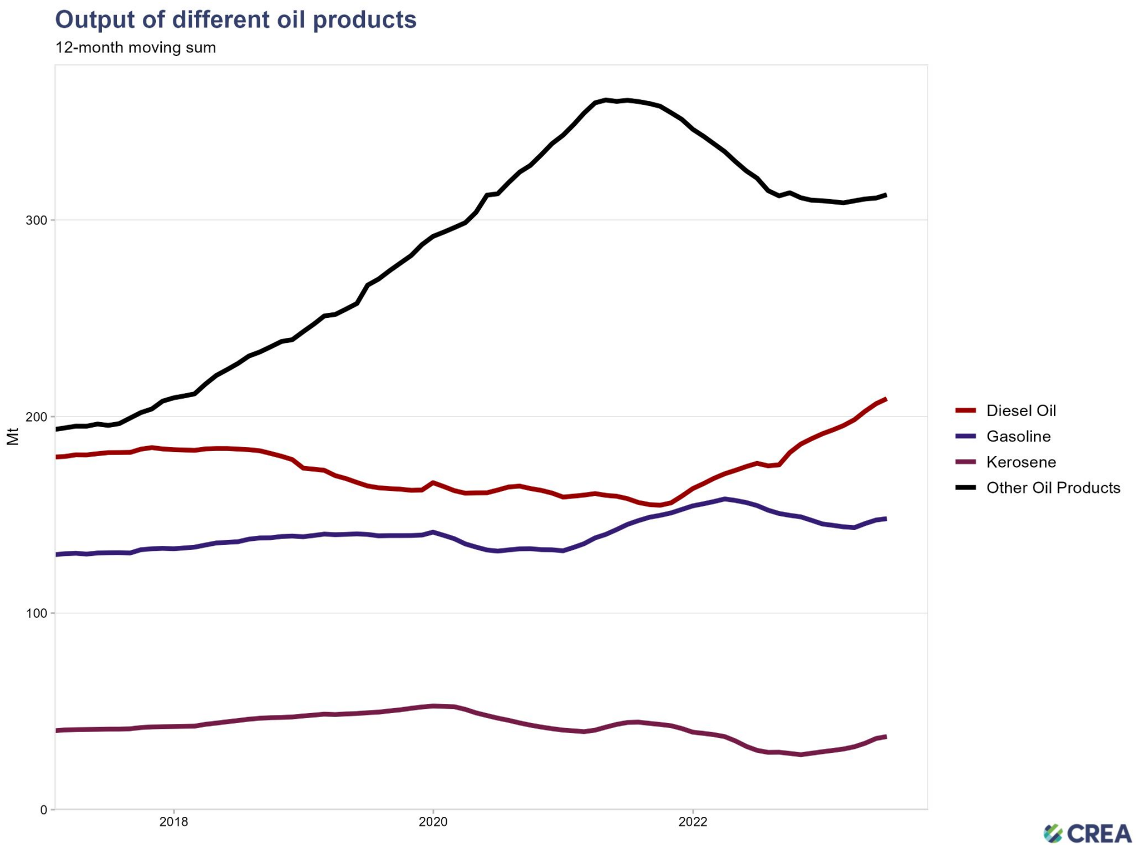
- Steel and cement output continued to cool down in June, with cement falling 1.5% year on year and crude steel registering zero growth.
- This indicates a weak recovery of real estate and other fixed asset investment, despite government loosening and stimulus measures.
- The government aims to limit full-year steel output below 2022 level.
- Cement output has been declining since 2020, leaving the industry with overcapacity.

The steel and cement industries are the largest CO2 emitters in China, when emissions from their electricity use are included. They are also bellwethers of real estate, infrastructure and other fixed asset investment which play an outsize role in China's emissions and economy.



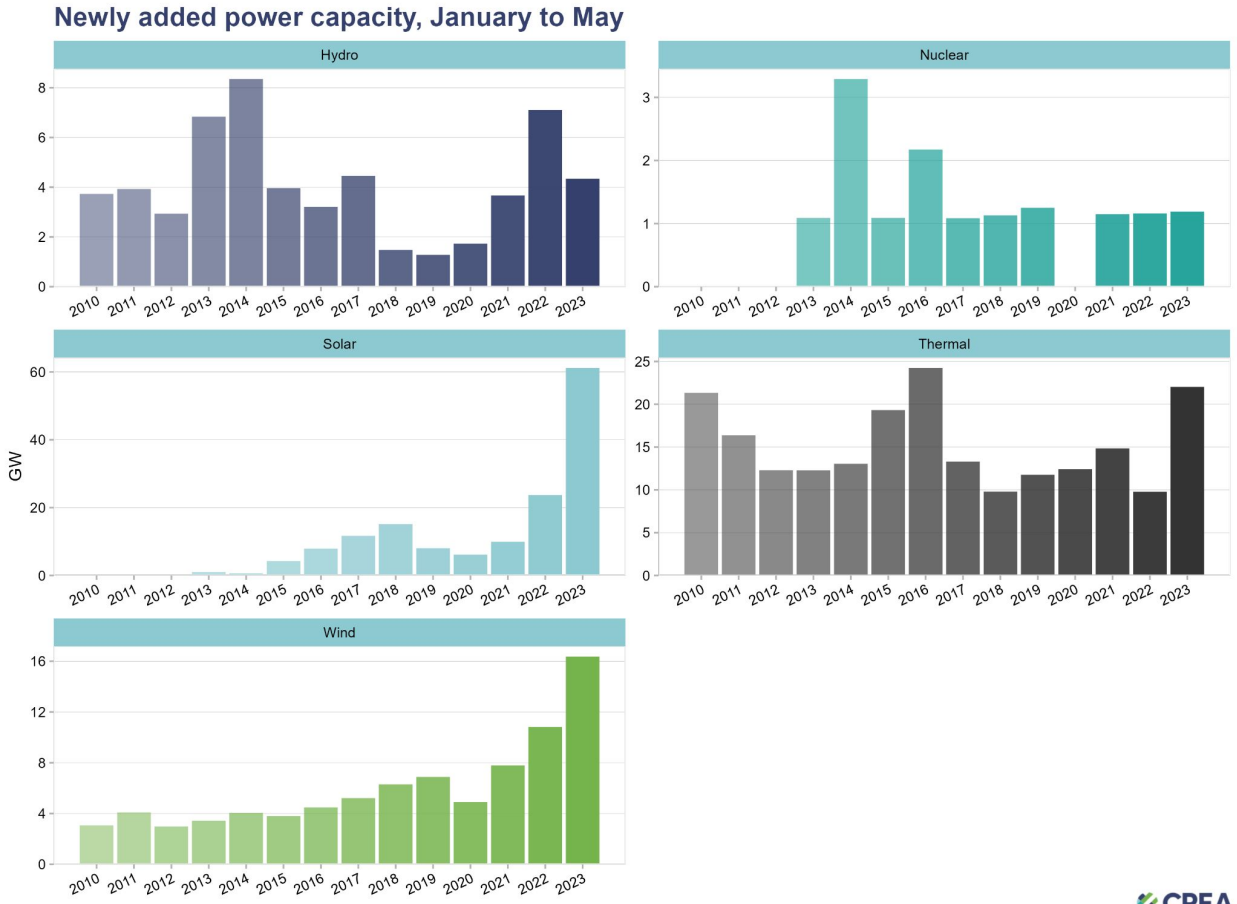
Diesel leads rebound in oil demand

- The increase in output of oil products has been mostly driven by diesel.
- Gasoline and kerosene have shown a modest rebound due to the re-opening of the economy.



Record solar&wind additions

- **Strong wind and solar installations continue, with a whopping 60 GW of solar and 16 GW of wind installed in January–May.**
- **Commissioning of thermal (coal) power plants accelerated in May, with a January–May seeing the largest thermal capacity increase since 2016.**
- **There are some early signs that regulators might be reining in renewables growth:**
  - SASAC banned state-owned enterprises outside of the power and energy sectors from investing.
  - Guangdong halted registration of centralized PV and onshore wind power projects due to “insufficient available land”.
  - It has become more common that wind&solar projects are required to build onsite electricity storage, to make up for shortcomings of the power grid.
  - These developments could be just reining in the excesses of a fast-growing market, but worth keeping an eye on.



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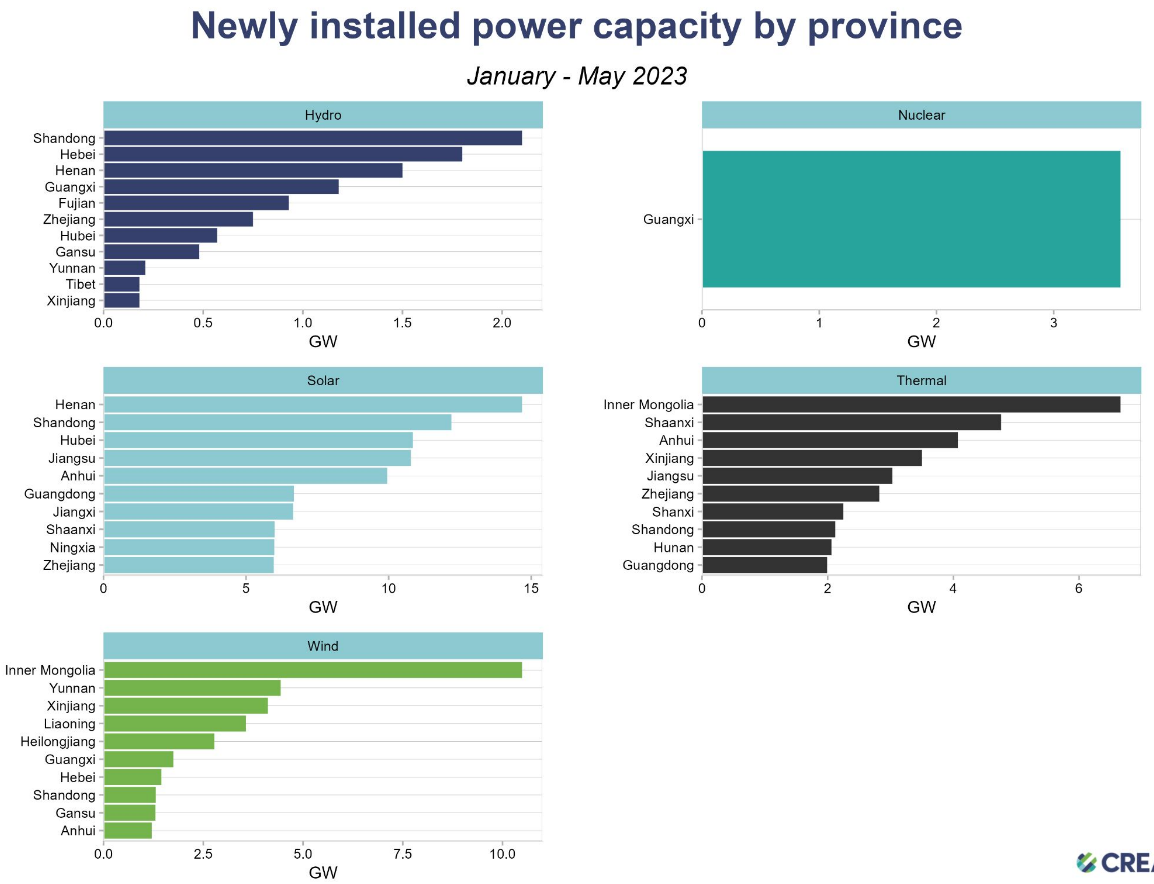
Distributed solar and centralized wind boom

- Solar power installations are led by Henan, Shandong, Hubei, and Jiangsu, which have ambitious rooftop solar policies (known as “whole-county distributed solar”), striving to meet rooftop solar installation targets by the end of 2023.
- Inner Mongolia leads in wind development, aiming for full operation of its large-scale clean energy bases by year-end.
- Wind Power has become the second-largest source of electricity in Yunnan, second only to hydropower.
- Liaoning’s strong capacity additions are notable because they include multiple offshore wind farms.



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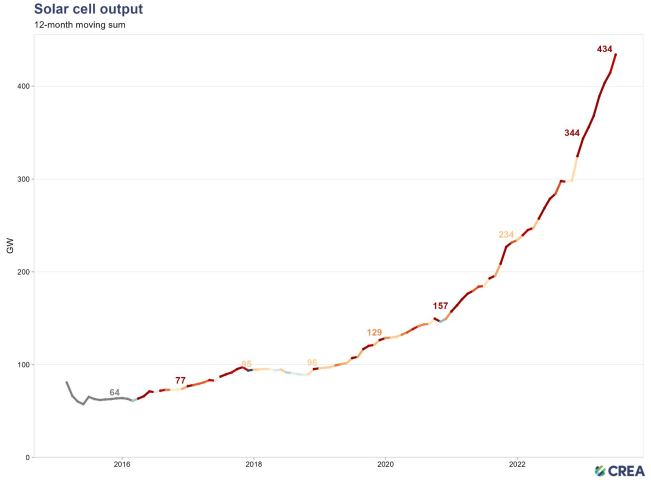
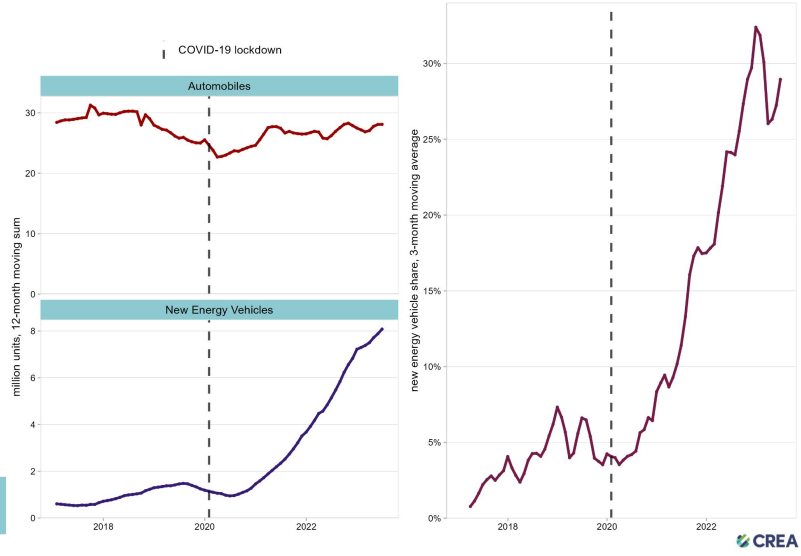
Record solar cell and electric vehicle output

- Solar cell production in the past 12 months reached 434 gigawatts, growing explosively and predicting rapid growth in global solar power installations
- EV production continues to grow rapidly, with over 8 million vehicles produced in the past 12 months, representing almost 30% of all vehicles produced
- China's export volume of EV continues to soar, securing its position as global leader
- Local governments issued a new round of policies supporting EV industry; central government rolled out EV promotion policy in rural areas



Vehicle production



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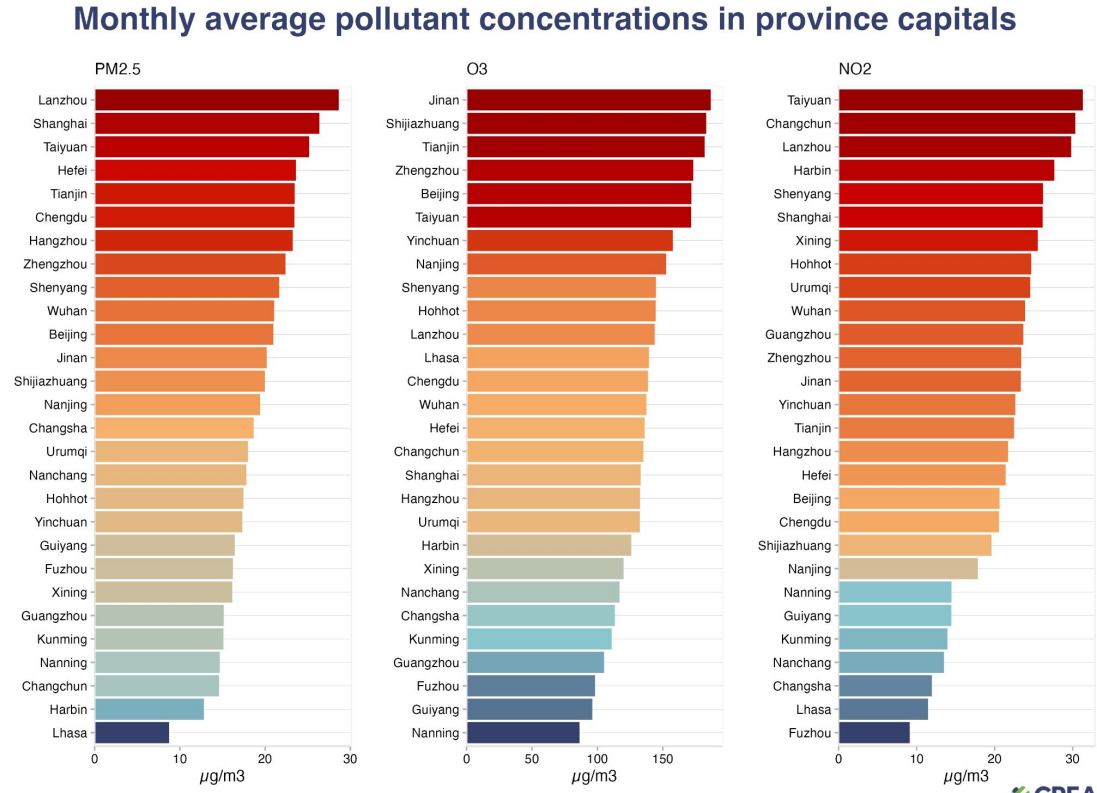
Shanghai faces PM2.5 pollution in June while the Beijiing region suffers from high ozone levels

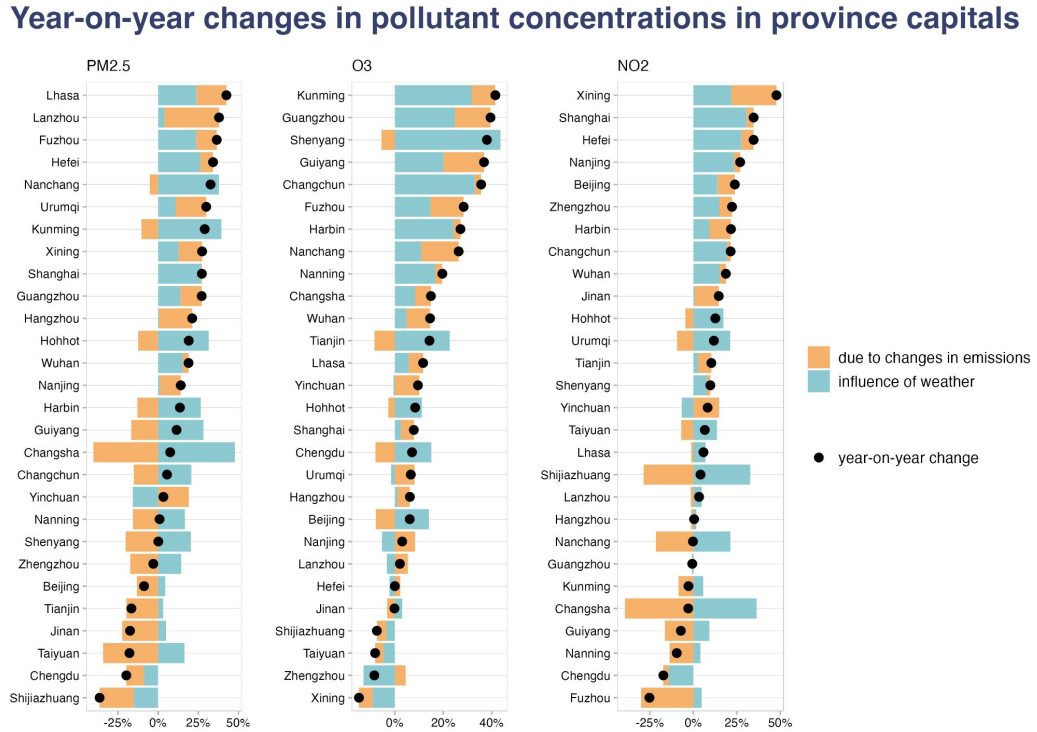
- Shanghai had the second-worst PM2.5 levels among China's provinces in June, only topped by Lanzhou in western China. The coal capital of Taiyuan in Shanxi rose to the third spot.
- The worst ozone levels were measured in the capitals of Shandong, Hebei, Tianjin, Henan, Beijing and Shanxi, all in the Beijing key air pollution control region.
- Taiyuan also ranked worst in NO2 levels.



PM2.5 levels rebound year-on-year both due to higher emissions and less favorable weather

- Kunming, Guangzhou and many other southern cities saw increases in ozone-forming emissions
- The rebound in NO2 emissions in Shanghai, Beijing region continued
- The worst ozone episodes in June all occurred in the Beijing air pollution control region (Beijing, Hebei and Shandong)

Our analysis projects the influence of weather conditions on air pollution levels using a machine-learning model trained on actual data for each city. The variation that cannot be explained by weather conditions is attributed to changes in emissions.



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Worst 7-day air pollution episodes by pollutant

PM2.5 (excluding sandstorms)

city	province	dates	average concentration	highest daily concentration
Kashi	Xinjiang	Jun 08 – Jun 14	46	82
Jinhua	Zhejiang	May 30 – Jun 05	44	58
Tangshan	Hebei	May 26 – Jun 01	43	54
Beijing	Beijing	May 26 – Jun 01	41	68
Linfen	Shanxi	Jun 01 – Jun 07	41	58

Ozone

city	province	dates	average concentration	highest daily concentration
Langfang	Hebei	Jun 12 – Jun 18	229	290
Dezhou	Shandong	Jun 11 – Jun 17	223	252
Beijing	Beijing	Jun 14 – Jun 20	222	275
Liaocheng	Shandong	Jun 11 – Jun 17	221	253
Baoding	Hebei	Jun 12 – Jun 18	220	288

Sandstorms ($PM_{2.5}$)

city	province	dates	average concentration	highest daily concentration
Hotan	Xinjiang	Jun 23 – Jun 29	183	380
Wuwei	Gansu	Jun 14 – Jun 20	31	158
Zhongwei	Ningxia Hui	Jun 25 – Jul 01	30	77
Zhangye	Gansu	May 26 – Jun 01	21	88
Jinchang	Gansu	Jun 14 – Jun 20	18	79

NO_2

city	province	dates	average concentration	highest daily concentration
Chongqing	Chongqing	Jun 07 – Jun 13	44	58
Lanzhou	Gansu	Jun 05 – Jun 11	41	49
Changchun	Jilin	Jun 13 – Jun 19	40	44
Xianyang	Shaanxi	Jun 09 – Jun 15	40	43
Yangquan	Shanxi	Jun 11 – Jun 17	38	41

Unit: μg/m³

Data sources

- Industrial output, power generation and power capacity additions, as well as fuel imports and exports are based on Chinese government data, through Wind Financial Terminal. Some of the data is not included in public releases.
- Measured air quality data is compiled from Chinese government air quality monitoring stations. Weather-controlled air quality is derived from CREA's deweathering algorithm.