Press release

China’s continued investment in coal will not save the country from power shortages: CREA & WaterRock Energy Economics

New investments in coal plants are neither economical nor in line with global climate goals, efficient operation of existing plants remains a challenge, CREA and WaterRock Energy Economics study shows

BEIJING, 13 June 2023 - Periodic power shortages in different parts of China have seen several provincial governments return to the solution they are familiar with: building even more coal-fired power plants. However, this simplistic approach neither addresses the root cause of the power shortages nor is it the most sustainable — ecologically or financially — analysis from the Centre for Research on Energy and Clean Air (CREA) and WaterRock Energy Economics reveals.

China's excess coal power capacity and outdated tariff policies have put a damper on efficient operations of existing power plants. A study of China's coal tariff policy, current operations vis-à-vis capacity, and the rapidly evolving renewable energy market show that investing in new coal power capacity and associated infrastructure risks creating stranded assets. At the national level, China’s firm generating capacity exceeds the highest peak load by 24%, much higher than the reserve margin target of 15%. Moreover, the average utilisation hours of coal power were around 4,600 in 2022, well below the target utilisation hours of 5,500.

“Despite rapid growth in coal capacity and having much more power plant capacity than needed to cover demand, China still faces seasonal power shortages. The rigid pricing system for electricity and for coal power don’t create incentives for efficient and flexible utilisation of existing capacity, making the power system unable to respond to weather extremes as well as to changes in supply and demand patterns,” said Liutong Zhang, Director at WaterRock Energy Economics and co-author of the report.

In 2015, China's coal overcapacity peaked with the reserve margin at 40%. This was a result of policy that encouraged investments in new coal and gas power plants but did not address the core reason behind power shortages.
“To curb inflation, the government has delayed raising power tariffs to reflect high coal fuel prices. This disincentivizes existing coal operators from ramping up generation during high demand. Furthermore, power plant owners have little financial incentive to ensure power plants are flexible in their operations. While the core issues remain unaddressed, building more coal power plants will most likely not suffice to prevent power shortages — and implementing the needed reforms would largely remove the need for those new plants,” said Xing Zhang, consultant for CREA and co-author of the report.

“To meet its CO2 peaking and carbon neutrality targets, China will have to resolve the issue of meeting electricity demand peaks without relying on ever-increasing coal power capacity. The faster this issue is resolved, the less wasteful investment goes into high-emitting power plants,” said Lauri Myllyvirta, Lead Analyst at CREA.

The root causes of China’s current power shortages despite adequate physical generation capacity are as follows:

- rigid power tariffs that aren’t high enough to cover marginal operating costs; no incentive for coal plant operators to increase generation to meet demand;
- lack of incentives to invest in flexible technologies that can meet the changing needs in a power system with high renewable penetration; and
- lack of flexible power trading due to inter-provincial bureaucracy.

The way forward

To evaluate the cost, benefits and risks associated with specific technologies while accounting for their sustainability and security, WaterRock Energy Economics developed a ‘Total Value Framework’ (TVF) in this report. The framework takes into account the changing energy and financing landscape, as well as near-term vs long-term cost benefits, while ensuring a just transition from coal. The report delves deep into each of these three parameters to give a holistic way forward to meet the country’s power system demands by efficient use of current technologies while future-proofing new investments.
The following table summarises the findings and recommends policy changes and other action plans, which are both climate-friendly and cost effective, to meet the country’s evolving power system needs.

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<thead>
<tr>
<th>Technologies</th>
<th>Actions/Aims</th>
<th>Policy/Regulatory Design</th>
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<tr>
<td>Existing coal and gas plants</td>
<td>- Incentivised to generate to meet peak load and provide back-up capacity.</td>
<td>- Remove the 20% tariff cap and introduce more efficient pricing mechanism to better remunerate peaking and back-up capacity.</td>
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<tr>
<td>Interiors (Import/Export)</td>
<td>- To encourage faster expansion of wind, solar and energy storage capacity.</td>
<td>- Enhance relevant regulation and policies to rightly price the green attributes and cost of emission of carbon and non-carbon air pollutants’ emission.</td>
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<tr>
<td>Utility-scale solar and wind</td>
<td>- To improve the efficiency and flexibility of inter-provincial power flow.</td>
<td>- Enhance scarcity or peaking price regime</td>
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<tr>
<td>Bulk energy storage (BEES and pumped hydro)</td>
<td>- To devise robust methodology to calculate the value contributions from new resource types.</td>
<td>- Enhance inter-provincial trading and planning.</td>
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<tr>
<td>Other low/zero carbon emission technologies</td>
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<tr>
<td>Controlable demand</td>
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<tr>
<td>Rooftop solar</td>
<td>- Grid firms to be more open for innovative solution from the end-users.</td>
<td>- Tariff de-regulation to provide more incentives for efficient consumption and investment.</td>
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<tr>
<td>Distributed storage</td>
<td>- Create enabling infrastructure to guide grid evolution.</td>
<td>- Encourage grid firms to proactively invest relevant grid infrastructure.</td>
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<td>Electric vehicles</td>
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<td>Demand response, smart devices etc</td>
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<td>Green PPAs</td>
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Note to editors

CREA closely follows China’s policies and investments in the energy market. All our research from China can be found here. All CREA publications can be found here.
About CREA

The Centre for Research on Energy and Clean Air (CREA) is an independent research organisation focused on revealing the trends, causes, and health impacts, as well as the solutions, to air pollution. CREA uses scientific data, research and evidence to support the efforts of governments, companies and campaigning organisations worldwide in their efforts to move towards clean energy and clean air. We believe that effective research and communication are the keys to successful policies, investment decisions and advocacy efforts. CREA was founded in 2019 in Helsinki, Finland and has staff in several European and Asian countries.

About WaterRock Energy Economics (HK) Ltd

WaterRock Energy Economics provides economic and commercial consulting services on the electricity and gas sector to governments and businesses in Asia. In the past five years, our clients have engaged us on a wide range of matters ranging from assessing opportunities and risks of investing in renewable, battery energy storage solutions and gas/LNG projects in Asia, to economic analysis and quantitative forecasting for renewable and flexible capacity in Asia and regulatory support on electricity market design in Singapore and China.