China’s Belt and Road Initiative: A Clean Energy Paradox

Cecilia Han Springer
Postdoctoral Fellow, Belfer Center, Harvard Kennedy School

Presentation for the HKS Energy Policy Seminar
January 27, 2019
Outline

• Background
  – What is the Belt and Road Initiative?
  – The BRI and the Global Energy Sector

• Motivation
  – The BRI, Coal, and Climate Change
  – Media Narratives of the BRI

• Empirical Analysis and Results

• Mechanisms of Impact
Background: China’s Belt and Road Initiative

Source: Beijing News 2014
Background: China’s Belt and Road Initiative
Background: China’s Belt and Road Initiative
Background: China’s Belt and Road Initiative

Source: Mercator Institute for China Studies.
Why is China investing heavily in the energy sector overseas via the BRI?

1. Access to resources
Background: BRI and Energy

• Why is China investing heavily in the energy sector overseas via the BRI?
  1. Access to resources
  2. Access to new markets
Why is China investing heavily in the energy sector overseas via the BRI?

1. Access to resources
2. Access to new markets
3. Geopolitical objectives
Thus far, by sector, the energy sector has received the largest share of BRI investment.
Thus far, by sector, the energy sector has received the largest share of BRI investment.
Motivation: The BRI and Climate Change

- Of China’s investments in new power plants overseas, about half of new capacity is coal-fired power plants
Motivation: The BRI and Climate Change

- Of China’s investments in new power plants overseas, about half of new capacity is coal-fired power plants.
Motivation: The BRI and Climate Change

- Of China’s investments in new power plants overseas, about half of new capacity is coal-fired power plants.
- China has invested in over 200 coal power plants overseas with a total generating capacity of around 250 GW, and has over 30 GW of planned overseas coal plants.
Of China’s investments in new power plants overseas, about half of new capacity is coal-fired power plants.

China has invested in over 200 coal power plants overseas with a total generating capacity of around 250 GW, and has over 30 GW of planned overseas coal plants.

Are China’s overseas coal investments compatible with the Paris Agreement?
Motivation: Global Phase-out of Coal Finance

Over 100 Major Financial Institutions Now Have Coal Finance Restrictions

To date, over 100 globally significant financial institutions including public development banks, national development finance institutions, export credit agencies, private banks and insurance companies have developed formal thermal coal mining and/or coal-fired power plant exclusion policies.

- World Bank announces first restrictions: No new project finance except in ‘rare circumstances’
- 2 Multilateral Development Banks, 9 Development Finance Institutions follow World Bank adopting coal finance restrictions
- Asian Infrastructure Investment Bank proposes coal restrictions
- AXA becomes first global insurer to restrict project underwriting and insurance for new projects
- ING first global bank to set phaseout date for coal in power sector by 2025

<table>
<thead>
<tr>
<th>2013</th>
<th>2014</th>
<th>2015</th>
<th>2016</th>
<th>2017</th>
<th>2018</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Norwegian Sovereign Wealth Fund divests: Companies generating 30% revenue from coal excluded; estimated $8 billion divested from coal</td>
<td>• First private bank coal restrictions announced by Bank of America</td>
<td>• Export Credit Arrangement coal restrictions cover 35 ECAs</td>
<td>• International Finance Corporation closes financial intermediary loopholes: 95% of lending “ringfenced” to avoid coal and promote clean energy</td>
<td>• Standard Chartered announces end to new coal plant investment</td>
<td>• Royal Bank of Scotland coal restrictions improved: tightens general lending to companies involved in coal</td>
</tr>
</tbody>
</table>

Source: IEEFA 2019
Motivation: Media Narratives of BRI

Rogue Aid
What's wrong with the foreign aid programs of China, Venezuela, and Saudi Arabia? They are enormously generous. And they are toxic.

Is China’s Belt and Road Initiative Undermining Human Rights?

China's Belt and Road Initiative Threatens to Pave the Planet
Research Questions

- Are coal plants that have Chinese involvement correlated with better or worse environmental outcomes than those without?
- Through what mechanisms can Chinese investment lead to differential environmental impact?
Figure 13: Map of Coal Plants in Asia (excluding China)
Data and Methodology

- World Electric Power Plants Database (2018)
- Global Coal Plant Tracker (2018)
Data and Methodology

- World Electric Power Plants Database (2018)
- Global Coal Plant Tracker (2018)
- Treatment variable: country of origin for parent, engineering, and construction companies
Data and Methodology

- World Electric Power Plants Database (2018)
- Global Coal Plant Tracker (2018)
- Treatment variable: country of origin for parent, engineering, and construction companies
- Outcome variables: emissions rate, energy efficiency, and air pollution control technology types (best available or not)
Data and Methodology

- World Electric Power Plants Database (2018)
- Global Coal Plant Tracker (2018)
- Treatment variable: country of origin for parent, engineering, and construction companies
- Outcome variables: emissions rate, energy efficiency, and air pollution control technology types (best available or not)

### Table 1: Summary Statistics

<table>
<thead>
<tr>
<th></th>
<th>Parent Company</th>
<th>Eng./Con. Company</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Chinese</td>
<td>Non-Chinese</td>
</tr>
<tr>
<td>Capacity (MW)</td>
<td>445.4</td>
<td>265.0</td>
</tr>
<tr>
<td>Steam pressure (bar)</td>
<td>206.0</td>
<td>124.4</td>
</tr>
<tr>
<td>Steam temperature (°C)</td>
<td>554.7</td>
<td>520.1</td>
</tr>
<tr>
<td>Heat rate (btu/kWh)</td>
<td>10,226</td>
<td>11,988</td>
</tr>
<tr>
<td>Observations</td>
<td>87</td>
<td>4,173</td>
</tr>
</tbody>
</table>
Results

- Plants with Chinese parent companies have around 10-13% lower emissions intensity than plants with non-Chinese parent companies
Results

- Plants with Chinese parent companies have around 10-13% lower emissions intensity than plants with non-Chinese parent companies.
- There is a similar effect, but lower in magnitude, for plants with Chinese engineering and construction companies.
Results

- Plants with Chinese parent companies have around 10-13% lower emissions intensity than plants with non-Chinese parent companies.
- There is a similar effect, but lower in magnitude, for plants with Chinese engineering and construction companies.
- Plants with Chinese engineering and construction companies have higher energy efficiency than plants with non-Chinese engineering and construction companies.
Results

- Plants with Chinese parent companies have around 8-15% lower emissions intensity than plants with non-Chinese parent companies.
- There is a similar effect, but lower in magnitude, for plants with Chinese engineering and construction companies.
- Plants with Chinese engineering and construction companies have higher energy efficiency that plants with non-Chinese engineering and construction companies.
- Plants with Chinese parent companies are more likely to have best available sulfur dioxide control technologies.
Hypothesized Mechanisms

A Chinese-backed power plant under construction in 2018 in the desert in the Tharparkar district of Pakistan's southern Sindh province.

Rizwan Tabassum/AFP/Getty Images
Hypothesized Mechanisms

- Company roles: parent, engineering, and construction companies
Hypothesized Mechanisms

- Company roles: parent, engineering, and construction companies
- Top Chinese parent companies: China Hongqiao Group, Huadian, Datang, Gezhouba, CIIDG Erdos Hongjun Electric Power
Hypothesized Mechanisms

- Company roles: parent, engineering, and construction companies
- Top Chinese parent companies: China Hongqiao Group, Huadian, Datang, Gezhouba, CIIDG Erdos Hongjun Electric Power
- Top Chinese engineering/construction companies: Northeast Electric Power Design Institute, Shandong Electric Power Construction Corporation, China Harbour Engineering Company
Hypothesized Mechanisms

- Company roles: parent, engineering, and construction companies
- Hypothesis 1: China’s huge financial resources lead to exceptional conditions
Hypothesized Mechanisms

- Company roles: parent, engineering, and construction companies
- Hypothesis 1: China’s huge financial resources lead to exceptional conditions
  (+) Can afford better coal or technology
Hypothesized Mechanisms

- Company roles: parent, engineering, and construction companies
- Hypothesis 1: China’s huge financial resources lead to exceptional conditions
  (+) Can afford better coal or technology
  (--) Dis-incentivizes efficiency
Hypothesized Mechanisms

- Company roles: parent, engineering, and construction companies
- Hypothesis 1: China’s huge financial resources lead to exceptional conditions
  (+) Can afford better coal or technology
  (--) Dis-incentivizes efficiency
- Hypothesis 2: Chinese plants receive special treatment due to political status
Company roles: parent, engineering, and construction companies

Hypothesis 1: China’s huge financial resources lead to exceptional conditions
(+): Can afford better coal or technology
(--) Dis-incentivizes efficiency

Hypothesis 2: Chinese plants receive special treatment due to political status
(+): Chinese-funded plants held to higher environmental standards due to political sensitivity
Hypothesized Mechanisms

• Company roles: parent, engineering, and construction companies
• Hypothesis 1: China’s huge financial resources lead to exceptional conditions
  (+) Can afford better coal or technology
  (--) Dis-incentivizes efficiency
• Hypothesis 2: Chinese plants receive special treatment due to political status
  (+) Chinese-funded plants held to higher environmental standards due to political sensitivity
  (--) Environmental regulations not enforced due to host country trying to please Chinese partners
Conclusion

- China’s BRI clean energy paradox
  - China is trying to curb coal domestically, but shows no signs of restricting finance for coal abroad
  - China’s overseas coal plants may have relatively better environmental performance, but any kind of coal plant may be incompatible with the Paris climate goals
Conclusion

• China’s BRI clean energy paradox
  – China is trying to curb coal domestically, but shows no signs of restricting finance for coal abroad
  – China’s overseas coal plants may have relatively better environmental performance, but any kind of coal plant may be incompatible with the Paris climate goals

• Key takeaways
  – The importance of considering the additionality and relative impact of Chinese finance
  – The role of parent, engineering, and construction companies in determining environmental performance
  – The importance of host countries in choosing energy sources and determining the companies that will help them
Thank you!

chspringer@hks.harvard.edu