A Preliminary Cost Curve Assessment of Carbon Dioxide Capture and Storage Potential in China

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Research Goals

Examine the opportunity for carbon dioxide capture and storage (CCS) technologies to deploy in China in support of global climate change mitigation.

- China is undergoing rapid economic growth driving large increases in energy use and resulting emissions.
- Global efforts to reduce CO_2 emissions and stabilize atmospheric concentrations of greenhouse gases will require a portfolio of options, including CCS where applicable and cost effective.
- The focus of this research is to prepare a first-order assessment of the potential for CCS technologies to be deployed in various regions of China, providing a critical first step towards a more comprehensive understanding of China's potential opportunities to utilize CCS as a means of cost-effectively controlling CO_2 emissions.

Technical Approach

- Catalog large anthropogenic CO_2 point sources and identify and estimate capacity and other key characteristics of candidate geologic CO_2 storage formations in China.
- Estimate costs associated with CO_2 transport and storage, including site characterization and MMV of stored CO_2 (costs associated with CO_2 capture and compression were intentionally excluded at this time).
- Apply a proven source-reservoir matching methodology to assess proximity and costs for large CO_2 point sources seeking access to candidate storage capacity, and develop cost curves for CO_2 transport and storage.

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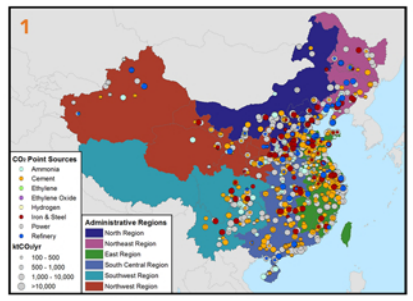
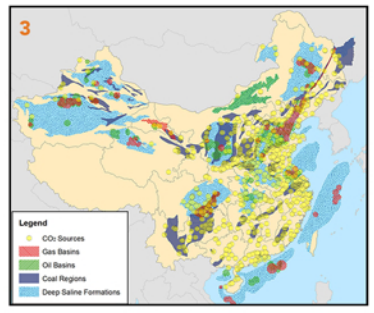
Key Findings





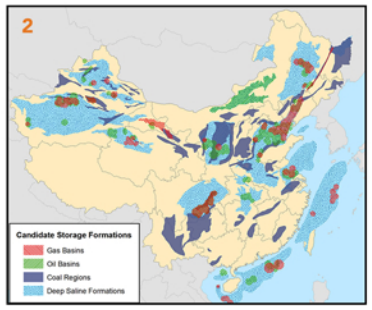
1 There are over 1,620 large stationary CO_2 point sources in China that each emit at least 0.1 $MtCO_2$/yr with a combined annual emissions estimated at over 3,890 $MtCO_2$. Power plants account for 73% of these emissions. The highrst concentrations of sources occur along the more heavily industrialized coastal zones of China.

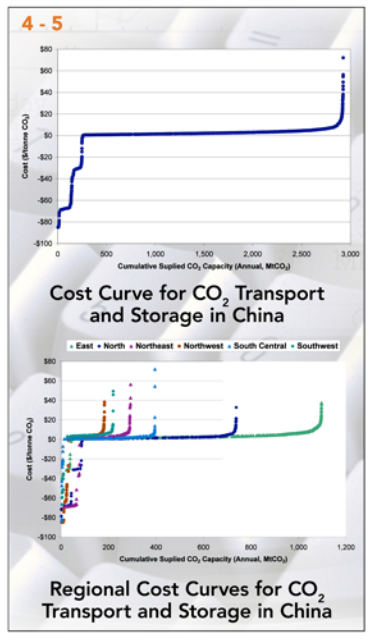
2 China has a large theoretical and geographically dispersed deep geologic CO_2 storage capacity in excess of 2,300,000 $MtCO_2$ in onshore basins. Deep saline-filled sedimentary basins account for over 99% of the total calculated storage capacity.

3 91% of China's large CO_2 point sources have a candidate deep geologic CO_2 storage formation within 100 miles (161 km); 83% have at least one storage formation within 50 miles (80 km).

4 The resulting preliminary cost curves indicate that the majority of emissions from China's large CO_2 point sources can be stored in the large, high capacity deep saline formations at estimated transport and storage costs of less than \$10/tCO_2; nearly 90% of the CO_2 stored in the analysis – from sources able to locate an available storage target – gets stored into one of the large deep saline formations.

5 Regional cost curves highlight the variation in demand and costs for CO_2 storage across six regions of mainland China. They also indicate that many CO_2 sources in the more heavily industrialized coastal areas of China have limited or no access to nearby onshore candidate CO_2 storage formations; offshore storage options may be important for sources in these areas.





Summary

- There is strong potential for CCS technologies to offer significant emissions reductions in China; at costs of up to about \$10/tCO_2 for transport and storage.
- Additional research is needed to further expand and refine this assessment, including, but not limited to:
  - Incorporating capture and compression cost estimates into curves;
  - Updating CO_2 source database and including additional emerging sources;
  - Performing economic assessment of near offshore storage basins.
- This work and following research will be critical to helping define global energy and climate-related policy agendas, understand opportunities as well as potential challenges for CCS, and coordinate pilot projects leading towards possible commercial-scale deployment of CCS technologies.

Select References

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