Coal as A Solution

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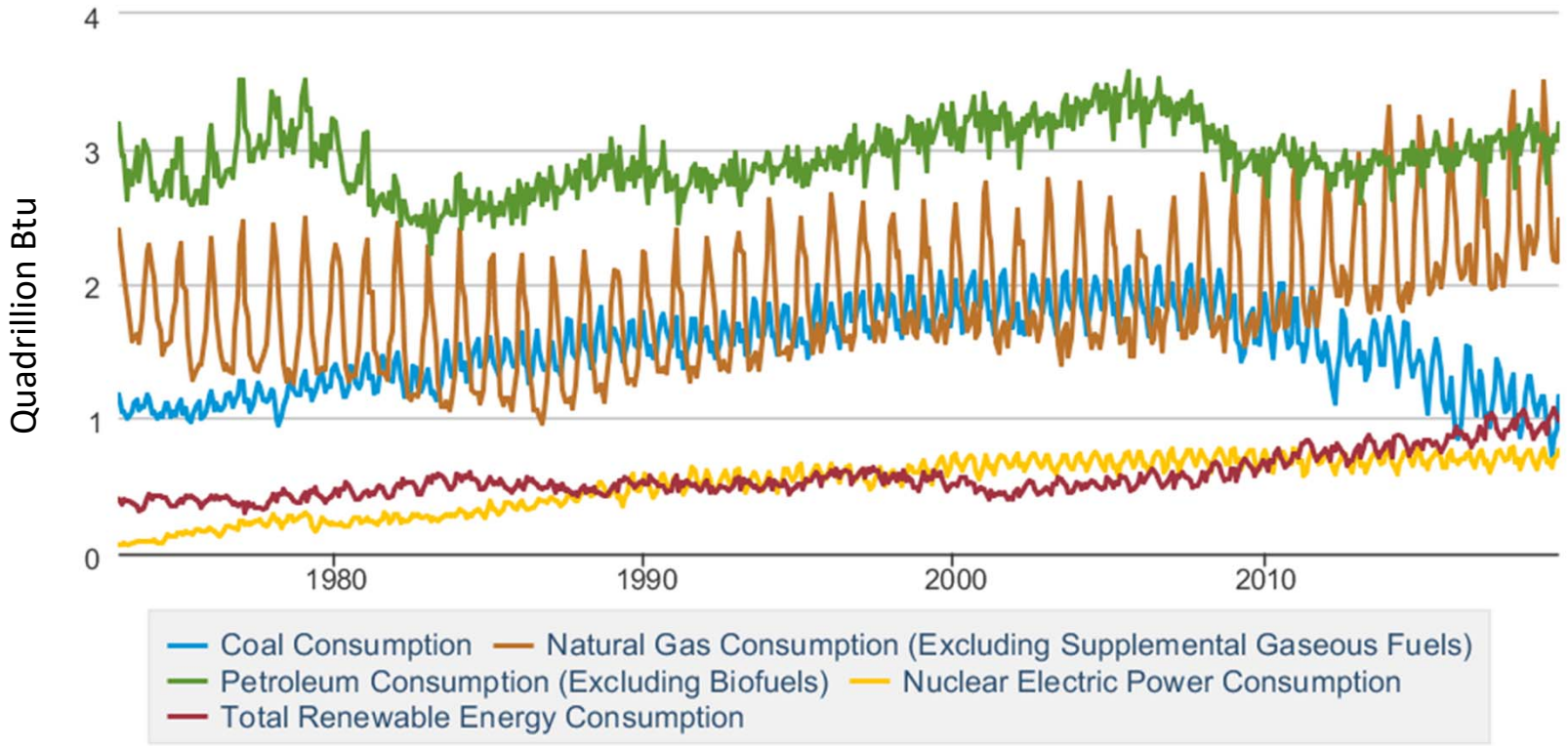
Moab, UT

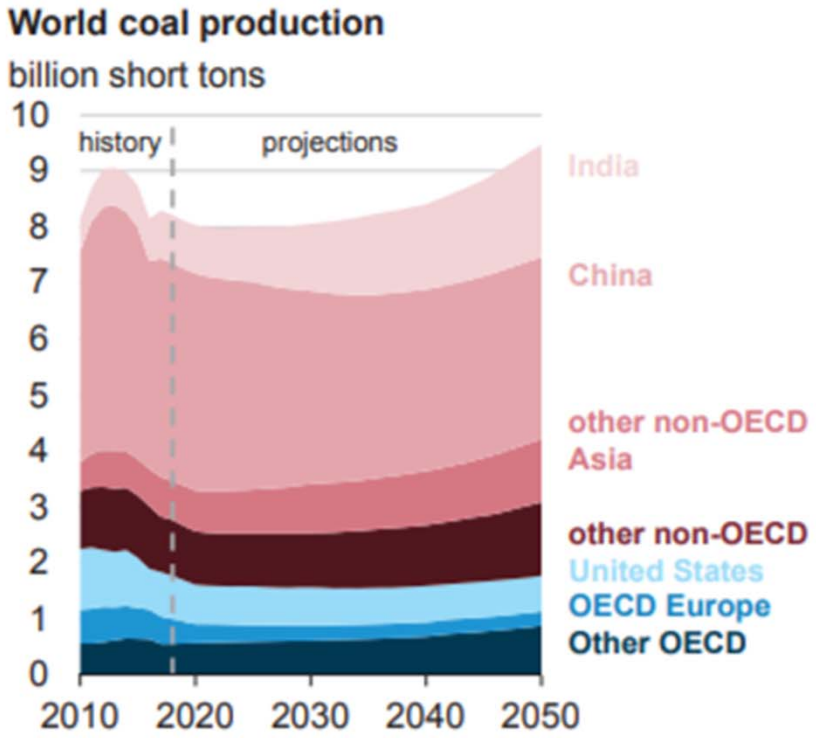
US Primary Energy Consumption by Source

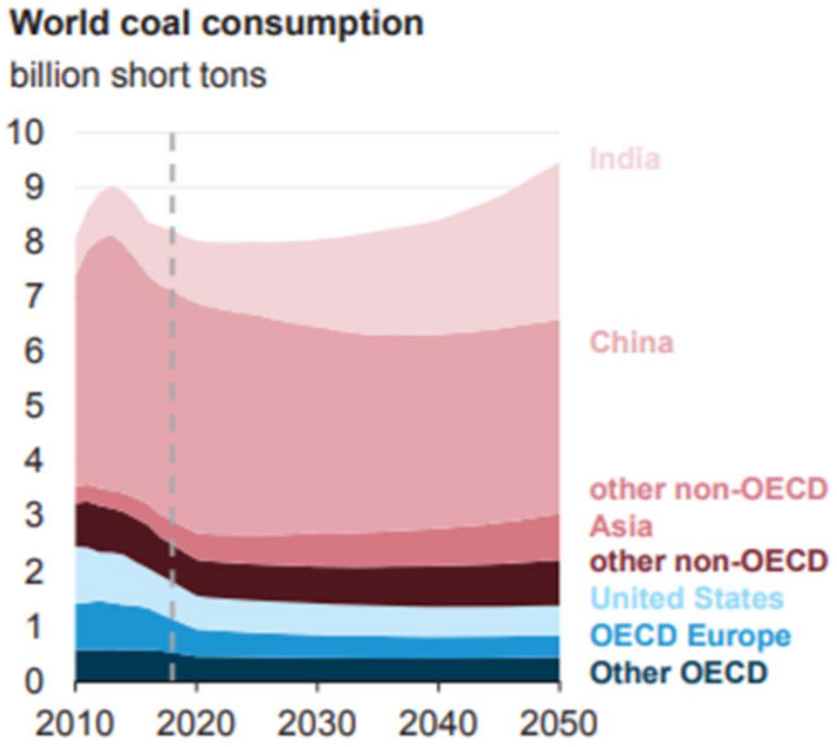
Source: US EIA (through July 2019) & BP Statistical Review of World Energy, 2019



Global Coal History and Projections

source: EIA International Energy Outlook, Sept. 2019





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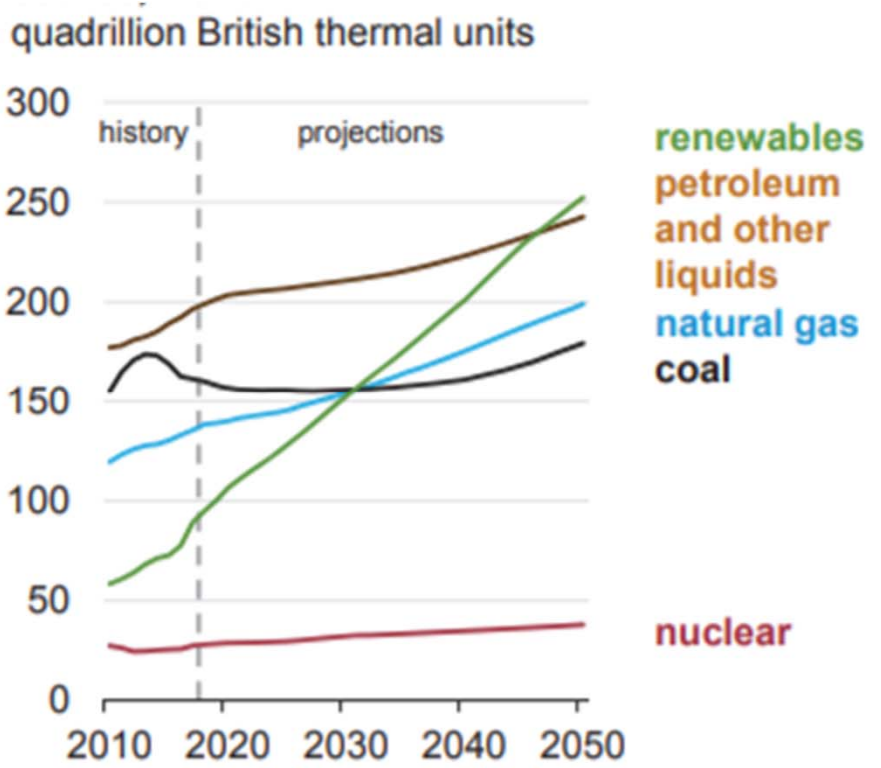
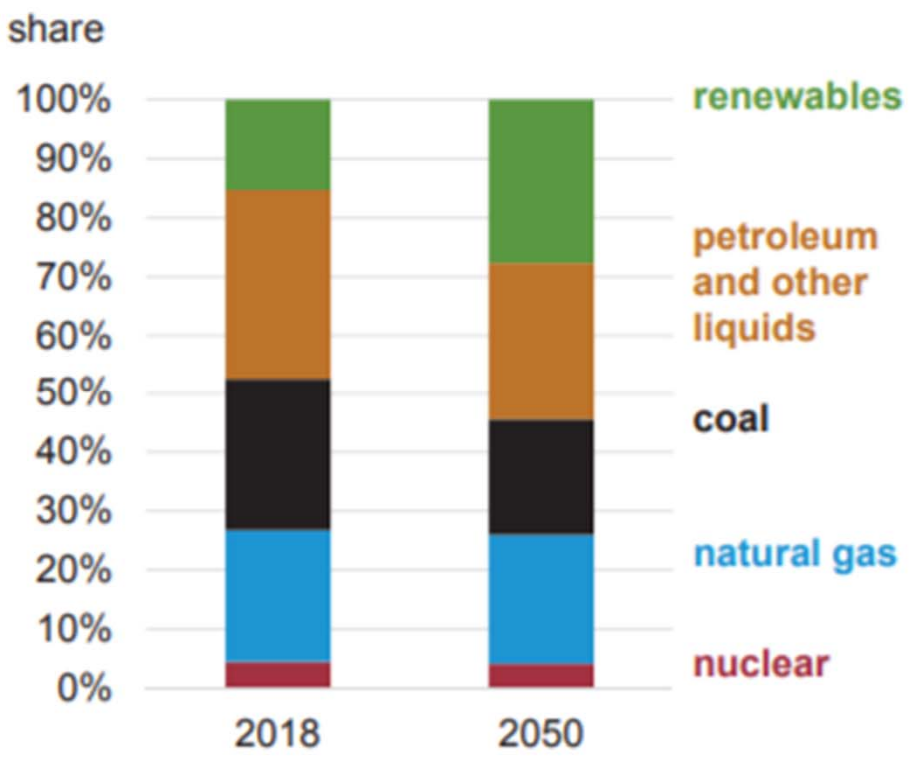
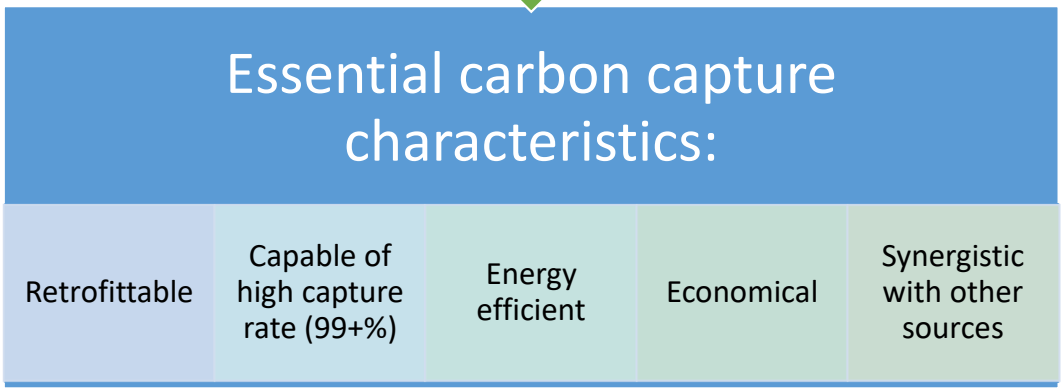




Anatomy of a Solution

Carbon capture is essential to climate mitigation



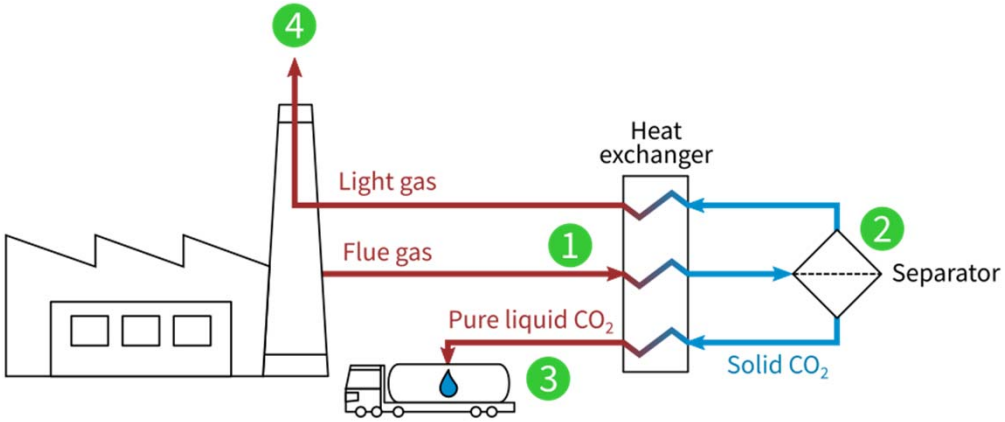
Coal Advantages

Global impact

Potential negative emissions

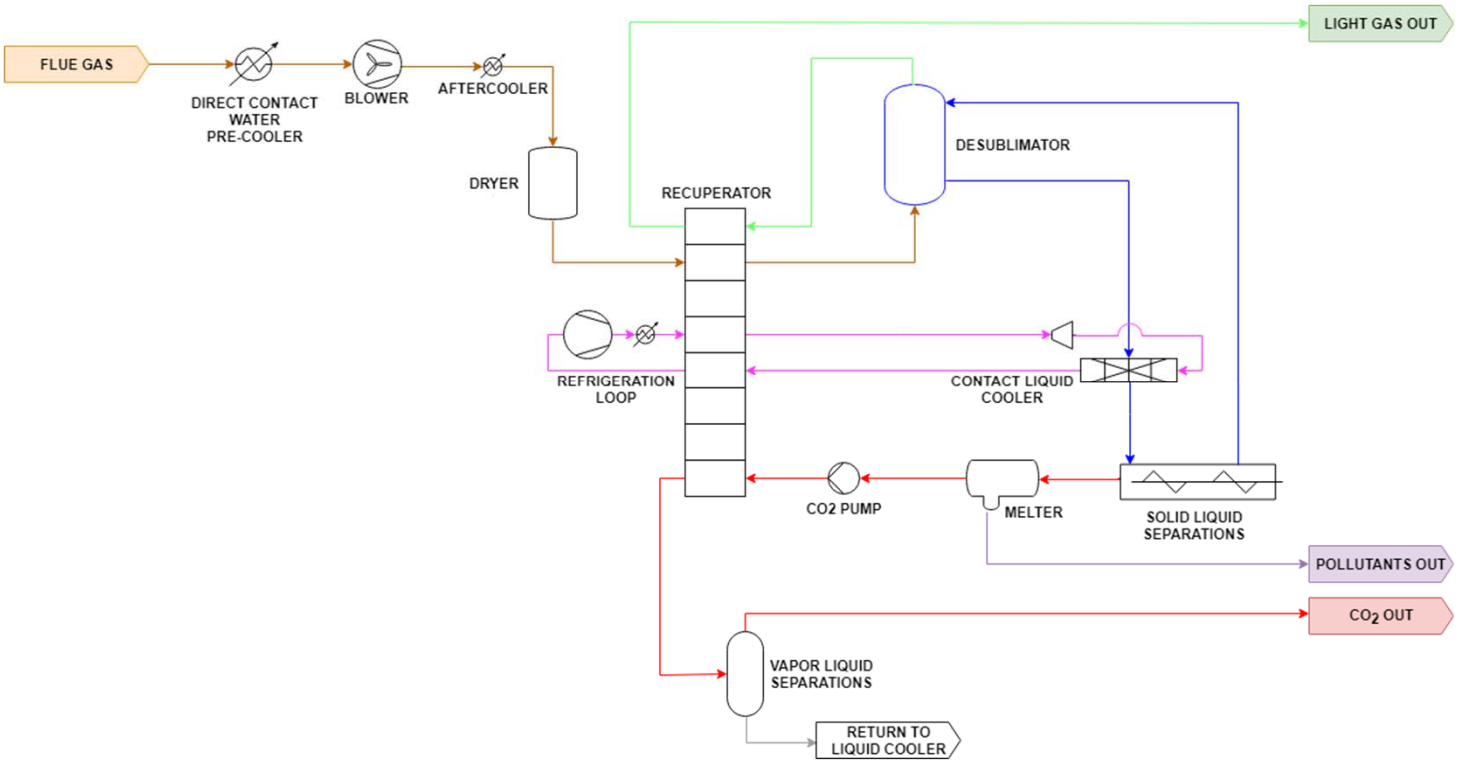
- Biomass
- Aggressive Capture

Cryogenic Carbon Capture™



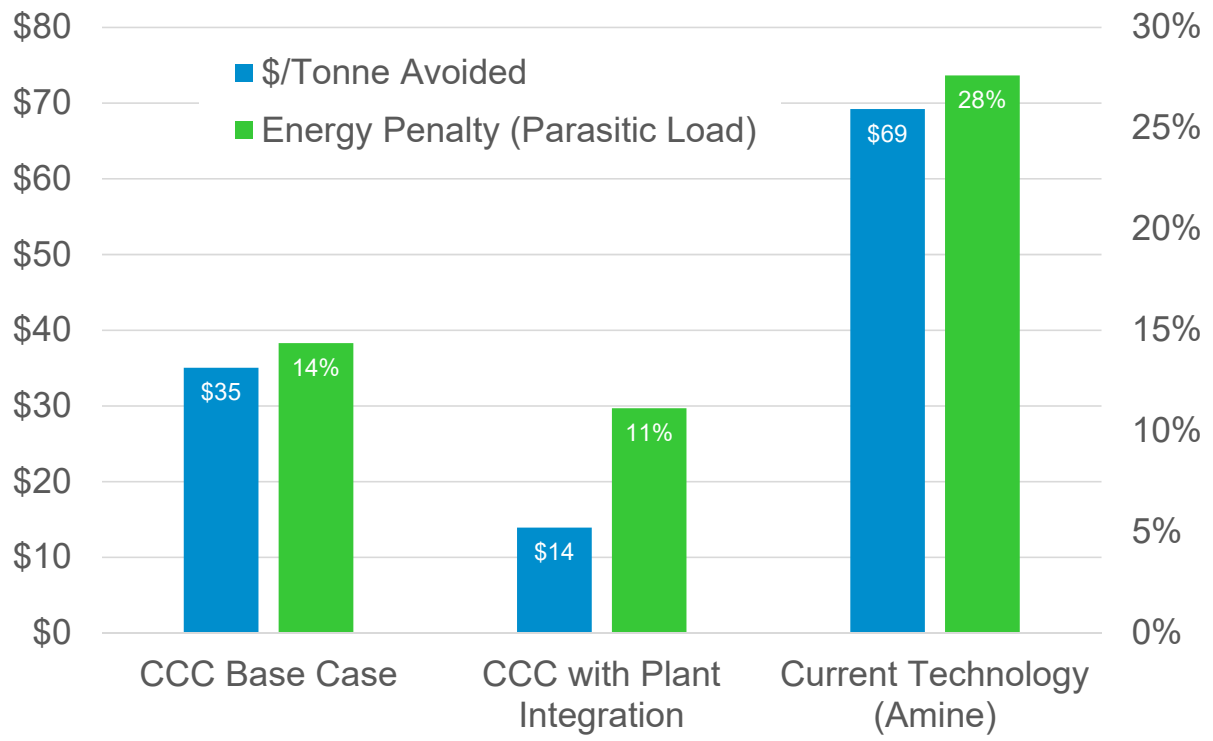
1. Flue gas is cooled
2. CO_2 is separated as a solid from the light gases
3. CO_2 is melted and prepared for transport
4. Light gases are reheated and released to atmosphere

Cryogenic Carbon Capture™ Concept

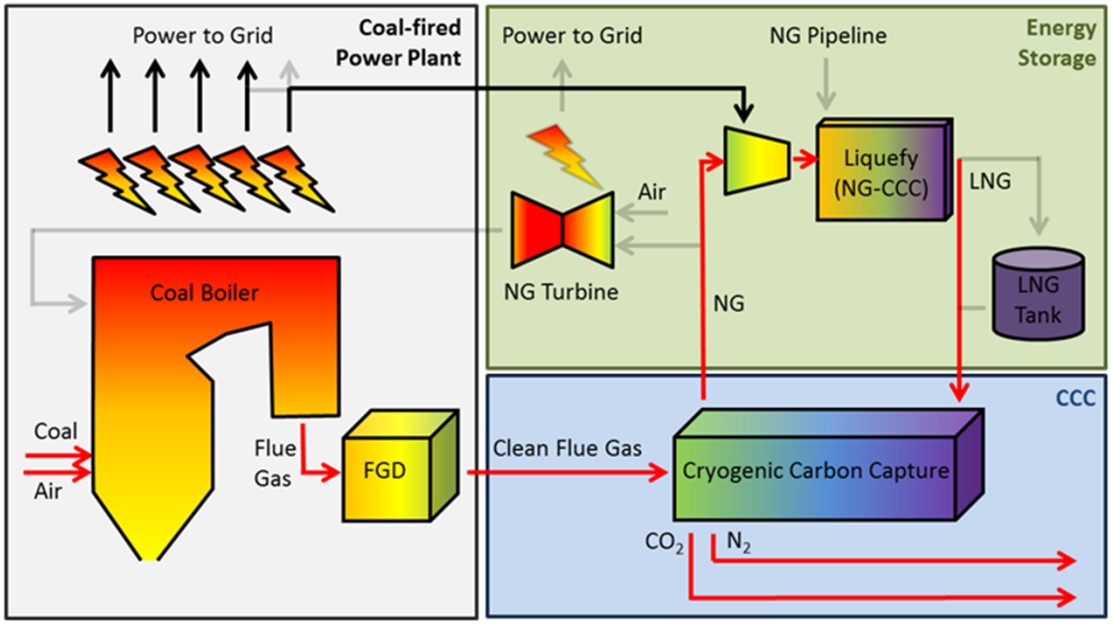


CCC Dramatically Decreases Energy and Cost

- -Numbers based on NETL 2013 net 550 MW super critical pulverized coal plant
- -Integration includes energy and cost savings from steam cycle improvements and offsetting cost and energy requirements for SO_X, NO_X, and Mercury controls.
- -Additional value and revenues could be gained from CO_2 sales and energy storage.



Energy Storage



CO_2 captured from cement

January 22, 2018

CO_2 used in concrete

February 6, 2018

Acknowledgements

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BYU Students

SES Employees (10 mechanical, chemical, & industrial engineers, 1 economist/MBA)