CALERA®

Green Cement for a Blue Planet

All Energy'09 Australia

John Brewster

October, 2009

“Calera Corporation is dedicated to reversing global warming by capturing and storing greenhouse gases in the built environment”

World class team with international expertise in Energy, Geology, Water, and Building Materials

- Calera is a California based company
- Calera was founded in June 2007, by Brent R. Constantz, Ph.D.
- Calera has been funded by its unique investor Khosla Ventures

Top talent with credentials

- 75 people
- 18 PhD
- 16 MS
- 6 MBA
- 3 JD, 3 patent agents, 1 paralegal

Collective experience

- Collectively built large scale projects in 15 countries around the world
- Upwards of 100 SPE's
- 100+ patents

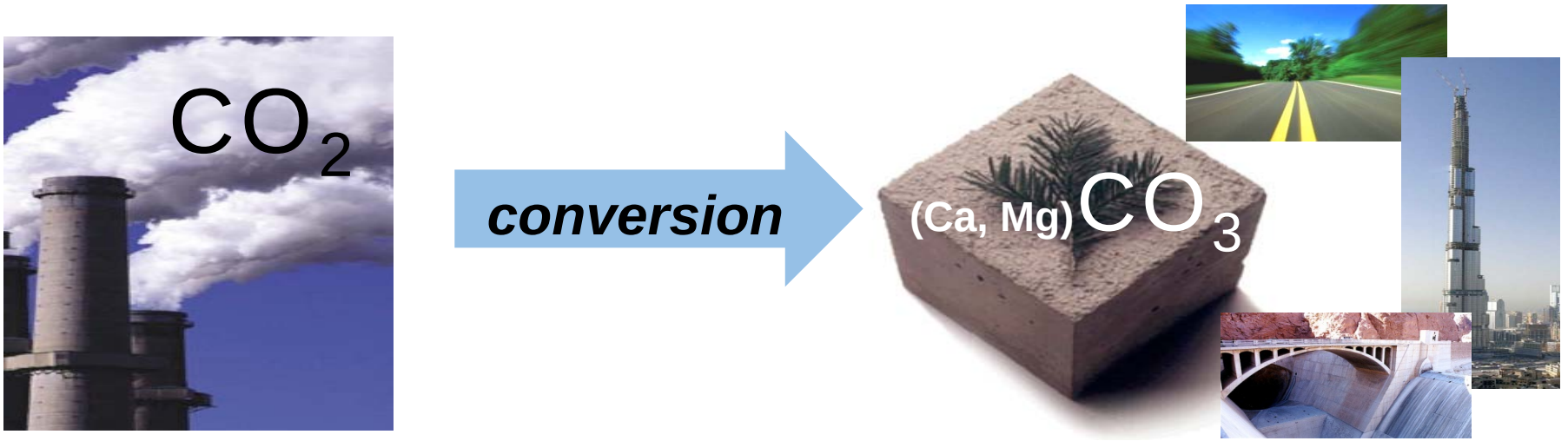
Management Team

- Successful entrepreneurs
- Public company execs
- Power, geology, water and building materials

Investors and Advisors

- Khosla Ventures
- Scientific Advisory Board
- Carbon Advisory Board
- Specialty Technical Advisory Board

Calera provides permanent CO_2 sequestration in the built environment



Problem: CO_2 emissions need to be reduced by 30 billion tons a year by 2050 in order to avoid dramatic climate change. There are few economically feasible options available.

Solution: Calera offers power providers and other large CO_2 emitters a cost effective, low risk solution to address increasingly stringent regulations. Further, Calera provides carbon negative building materials to meet the demand of end users.

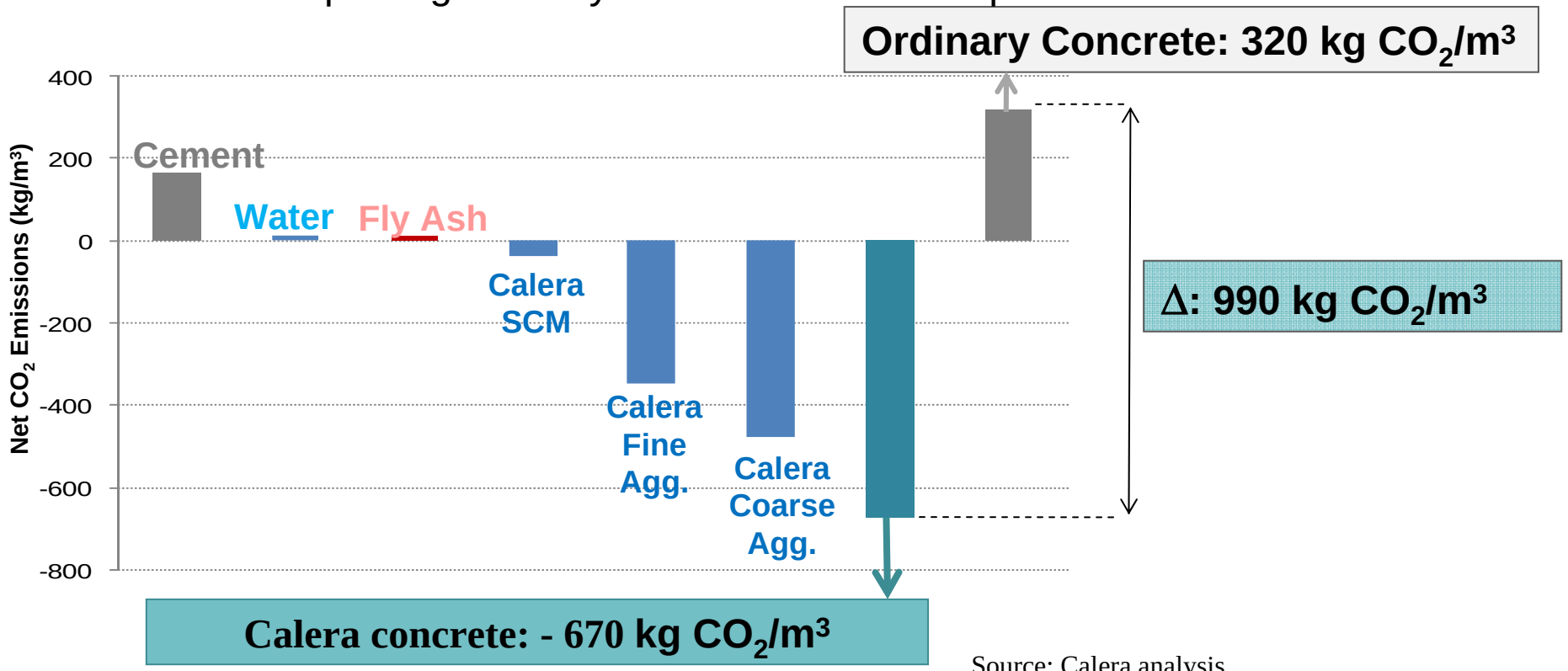
Calera is developing a line of carbon negative building materials being tested against existing industry standards for large markets

First 3 products:

Carbonate Mineral SCM (CM-SCM)	Synthetic Aggregate (SA)	Reactive Carbonate Pozzolan (RCP)
Footprint = - 0.5t CO_2/t • Cement Displacement • Up to 20% of cement blend • Testing against **ASTM C 1157** – Standard Performance Specification for Hydraulic Cement	**Footprint = - 0.5t CO_2/t** • Replaces all sand and aggregate • Adjustable particle size • Testing against **ASTM C 33** – Standard Specification for Concrete Aggregate	**Footprint = - 0.25t CO_2/t** **Mitigates fly ash** •High performance, high value concrete • Up to 50% of cement blend • Testing against **ASTM C 1157** – Standard Performance Specification for Hydraulic Cement
Worldwide market size: ~$25B	~$330B	~$25B

Calera's carbon negative concrete

1. An emission reduction by the conversion of CO_2 into carbonates
2. An offset displacing ordinary concrete carbon footprint



Source: Calera analysis

Calera's Process Steps

Calera's core technology: ***Formation of unique carbonate mineral polymorphs***

Basic Chemistry:

$$Ca^{+2} + 2OH^{-} + CO_2 \rightarrow CaCO_3 + H_2O$$
$$Mg^{+2} + 2OH^{-} + CO_2 \rightarrow MgCO_3 + H_2O$$

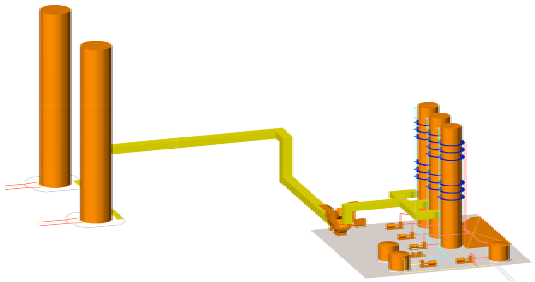
- Ability to locally source **Divalent Cations** allows for flexible site selection:
  - Coastal power plants can use seawater or brines
  - Inland power plants can use brines or dissolved minerals
  - Desalination/Demineralization retentate from desal or water demin treatment
- Ability to locally source **Alkalinity** adds additional environmental benefit:
  - Sub-surface Brines
  - Various classes of Fly Ash (Class F, Class C, others)
  - Other land filled base sources ($Mg(OH)_2$ waste tailings, red mud, etc.)
  - Manufactured caustic soda (electrochemically)

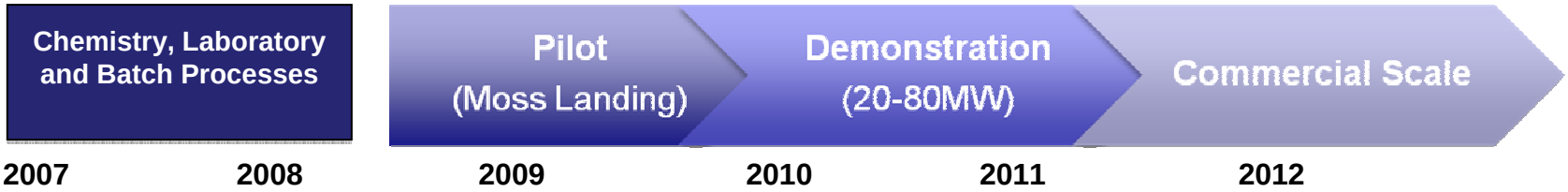
Calera technology moving to demo scale project

- **Laboratory, Small Batch and Large Batch Scale – 2007**
  - Capture and convert to mineral carbonate with seawater and waste base sources
  - 1 kg/day Low Energy Base production unit
  - 5 tons of product capturing 2.5 tons of CO_2 per single batch

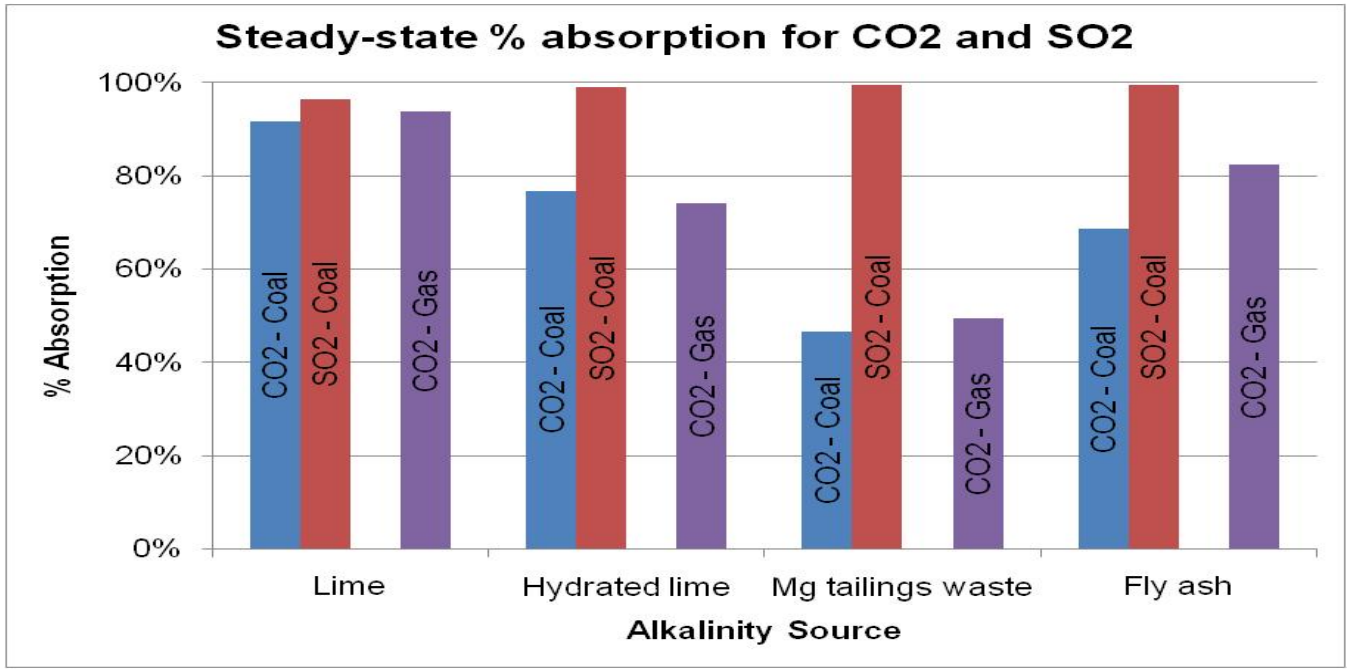
- **Pilot – Started up April 2009**
  - Continuous 5 tons per day of product (2.5 ton of $CO_{2)}$
  - Testing efficiency and integration of individual process technologies
  - Testing on coal flue gas and site specific conditions and materials
  - 1 ton/day Low Energy Base production unit

- **Multiple Demos**
  - Will treat flue gas from 10MW to 80MW of host plant
  - Optimize design and operating data for larger scale projects
  - Scales up in segments / modular design





CO_2 and SO_2 Absorption at Continuous Pilot Scale

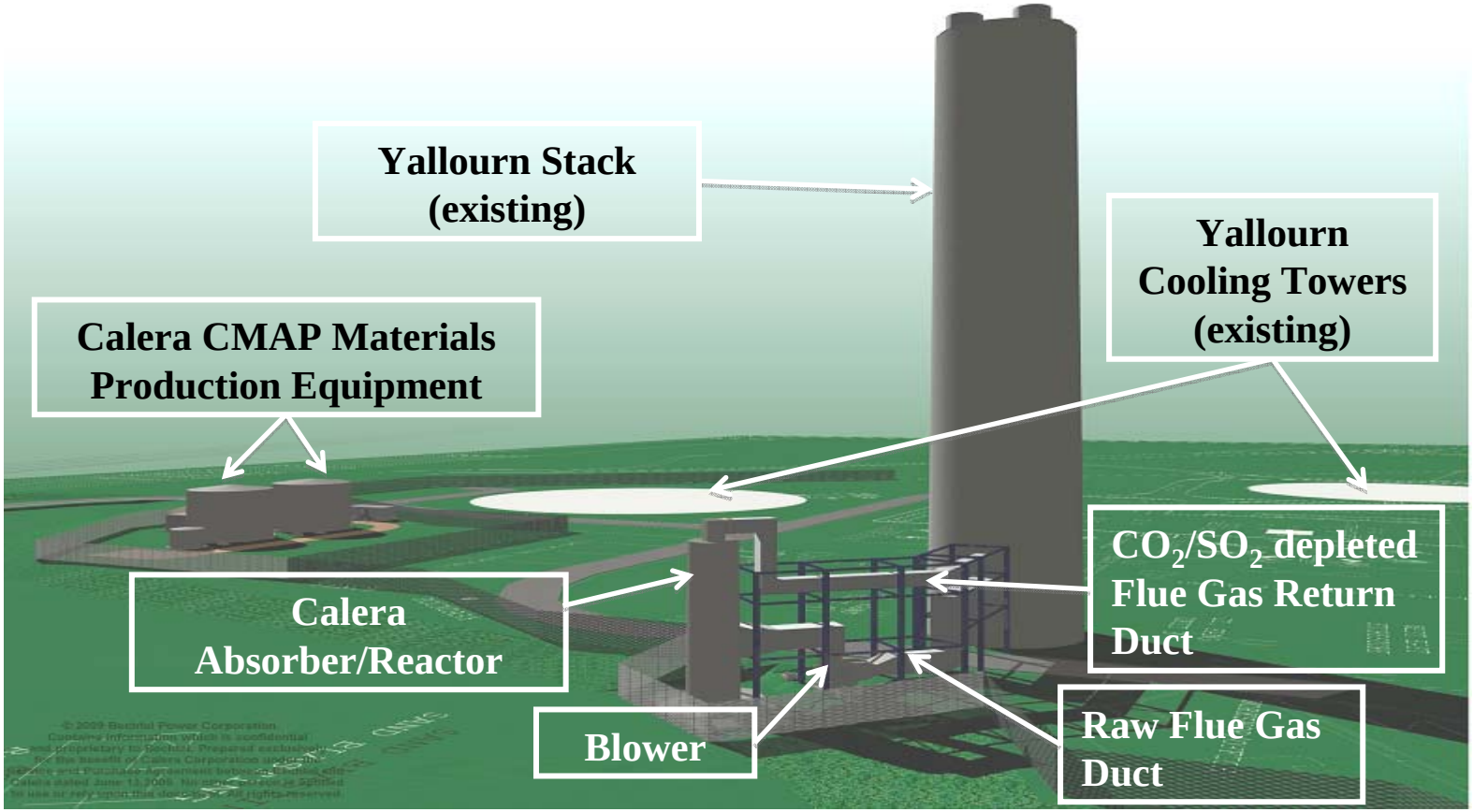


One unique advantage of the CMAP process is the ability to capture and stabilize a number of pollutants in addition to CO_2 - near 100% capture of SO_2 at the pilot plant.

Calera Yallourn Project Summary

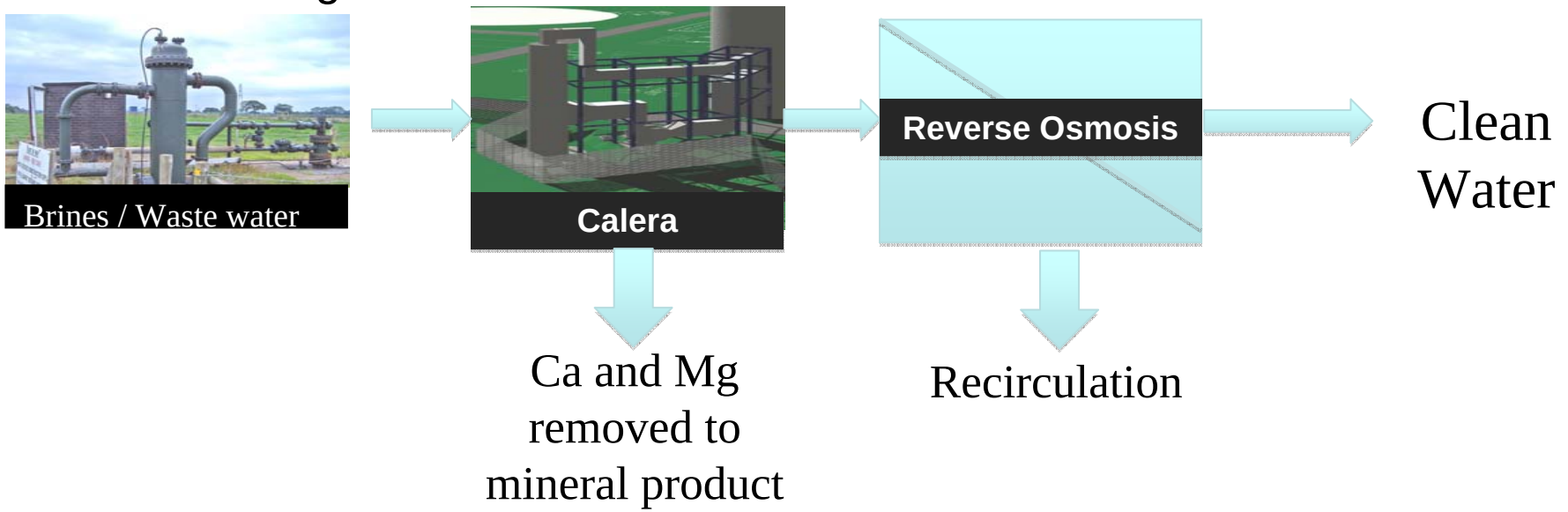
- 50 MW demonstration at TRUenergy Yallourn Brown Coal 1,480 MW plant in the Latrobe Valley
- Team: Calera Yallourn, TRUenergy, Bechtel, Univ of Melbourne, EPRI
- Objective:
  - Design, build, and operate a carbon dioxide capture and conversion facility that produces saleable building materials
  - Provide critical performance information and economic data that will enable Calera Yallourn to quickly commercialize the technology
  - Generate sufficient data to allow development of guarantees and warranties for commercial projects

Calera Yallourn Demonstration Layout (Bechtel)



Fresh Water Generation

- Calera Mineralization process removes hardness from brines and waste water allowing more efficient use of desalination



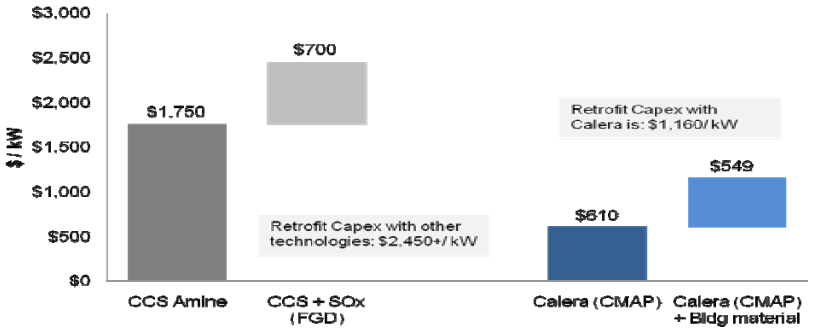
Project Benefits (Demonstration Phase)

- Total operating hours: 2,800
- Greater than 70% **CO_2 removal** with minimal energy requirements
- Greater than 95% **SO_2 removal** without additional equipment
- **Purify water** with significantly lower energy demand and carbon footprint than regular desalination
- Produce building materials (aggregates and supplementary cementitious material)
- **Remediate waste fly ash** and other waste products into the output materials

Comparison for commercial plants in Australia (200 MW)

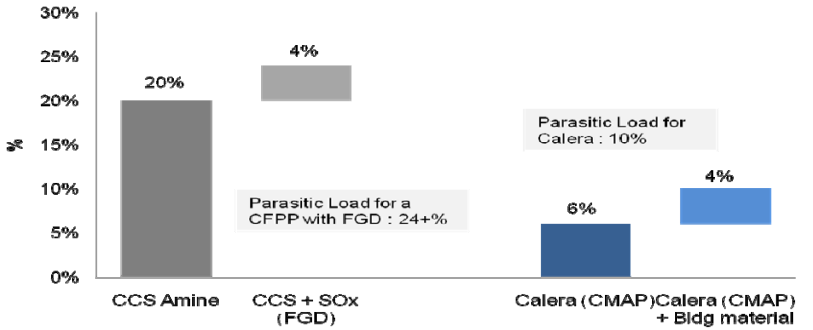
Retrofit Capex for a brown coal fired power plant ($/kW)

- Lower Capex
- Multi-pollutant capacity
- Building materials option with strong revenue potential



Parasitic Load for a brown coal fired power plant (%)

- Lower energy requirements imply lower costs, lower associated emissions and lower pressure on the grid capacity

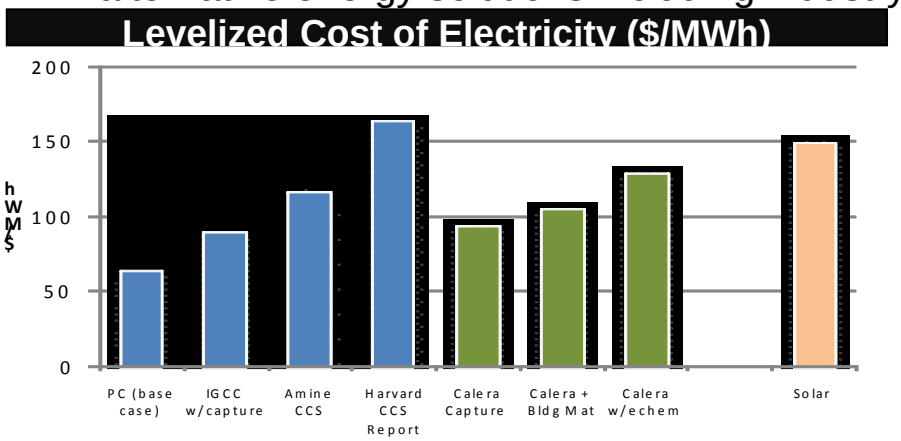


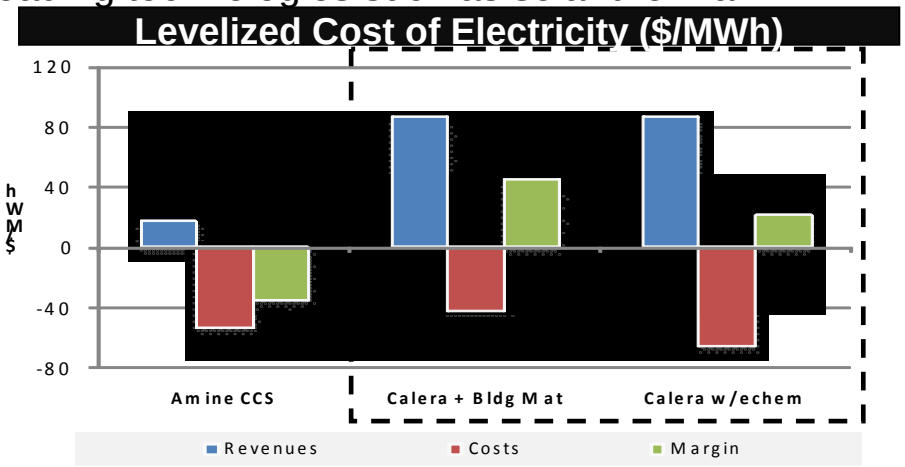
Sources

CCS : DOE/NETL, 2007. Carbon Dioxide Capture from Existing Coal-Fired Power Plants, November.
SOx: Sargent and Lundy, 2007. Flue Gas Desulfurization Technology Evaluation, Report Prepared for the National Lime Association, March.
NOx: Black & Veatch and CH2MHill, 2007. Boardman Plant Best Available Retrofit Technology (BART) Analysis. November.
Mercury: NETL/DOE.

Calera Can Make Coal The Most Cost Effective Green Energy Source

- Calera will enable coal to continue to be the cheapest and most abundant energy source in the world despite greenhouse gas regulations and carbon credit taxes
- Calera is the only carbon capture solution that can potentially increase profits for coal power plant operators while standard CCS technology will only increase costs of coal power
- In conjunction with Calera's plant, coal is the cheapest clean energy solution compared to alternative energy solutions including industry leading technologies such as solar thermal





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