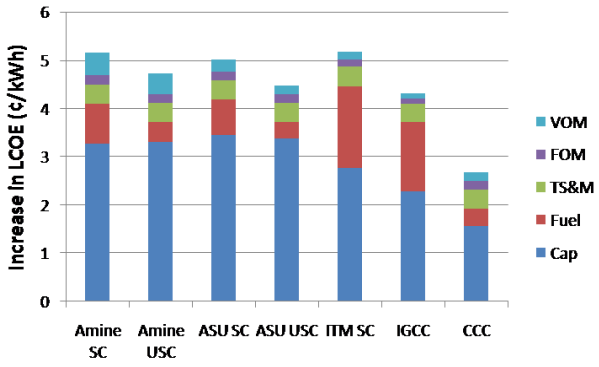
Cost Comparisons

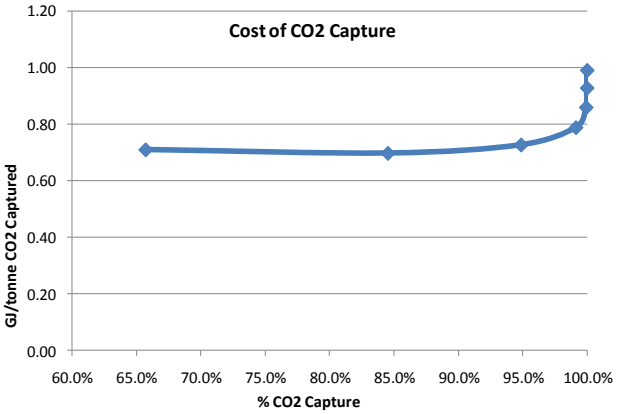
Levelized cost of energy (LCOE) is the total cost of power generation taking into account fuel, capital (Cap), fixed operating and maintenance (FOM), variable operating and maintenance (VOM), and transport storage and monitoring (TS&M) of CO_2 (See graph). The chart below shows potential increases to the LCOE at a new power plant using different carbon capture technologies. Conservative estimates were used where data given was insufficient for the CCC technology



DOE, NETL, (2007)

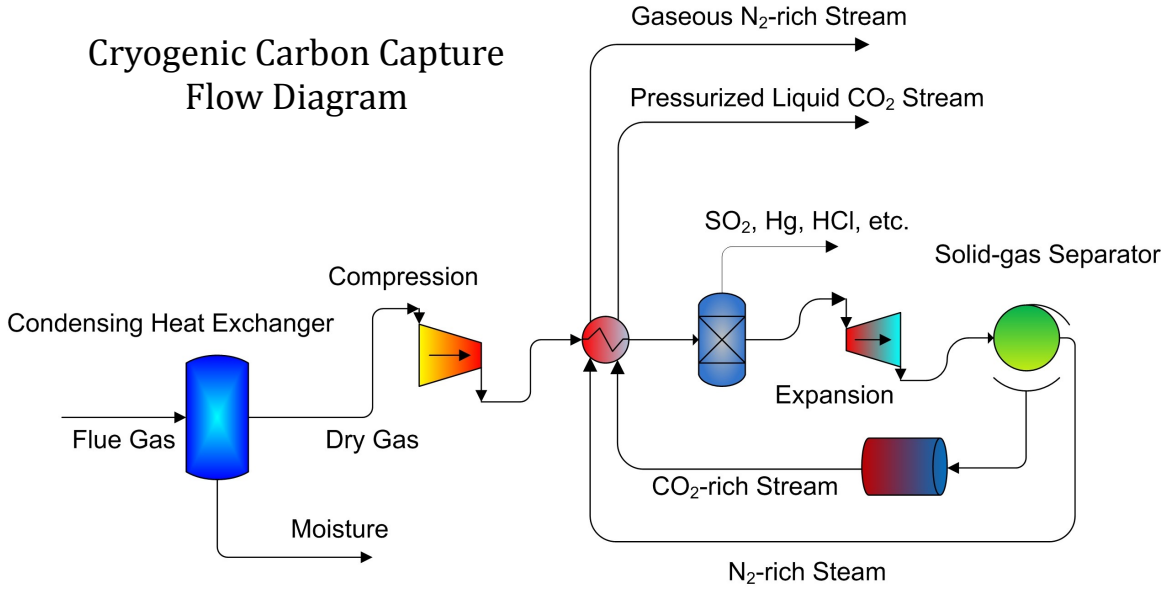
Energy Efficiency

kj/ton of CO_2 is a useful measure of the energy efficiencies of these competing carbon-capture processes. Advanced process modeling software was used to generate these numbers.



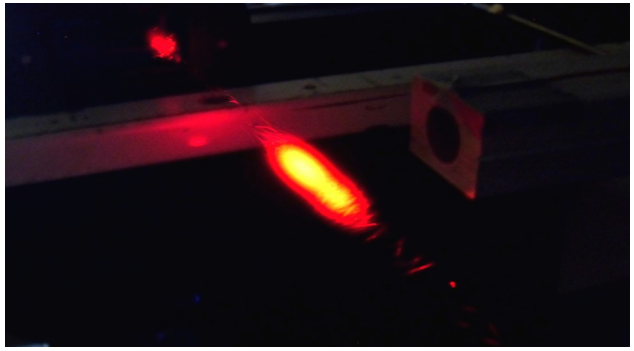
Cryogenic Carbon Capture

Cryogenic Carbon Capture (CCC) is a patent pending process developed by Dr. Larry Baxter at Brigham Young University. It is designed to separate a nearly pure stream of CO_2 from power plant flue gas. The CCC process is applied post combustion and is suitable for retrofitting existing power plants..



Process Description

The Cryogenic Carbon Capture (CCC) process dries and cools a flue gas stream, modestly compresses it, and cools it to slightly above the frost point of CO_2. The gas is then expanded, further cooling the stream and precipitating solid CO_2. The solid CO2 is separated from the flue gas and the pure CO_2 stream is pressurized. The cooled CO_2 and N_2 streams are then used in a heat exchanger to cool incoming flue gas. The final result is the CO_2 in a liquid phase and a gaseous nitrogen stream.

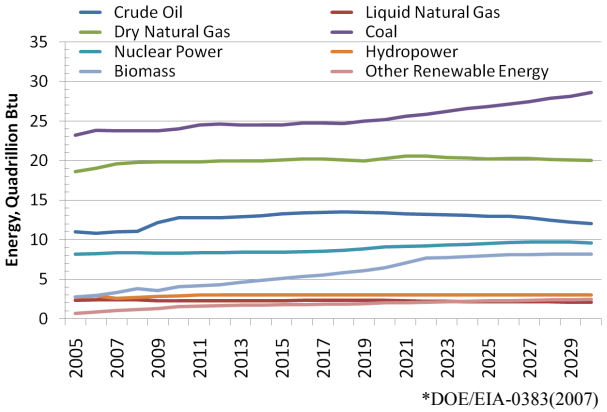


CO_2 Storage

SES has also developed an innovative geologic storage technology. This technology has the ability to store CO_2 in aquifers at quantities up to 20 times higher than is possible with existing methods. This technology also has the potential to eliminate the risk of a rapid release event.

Energy Projections

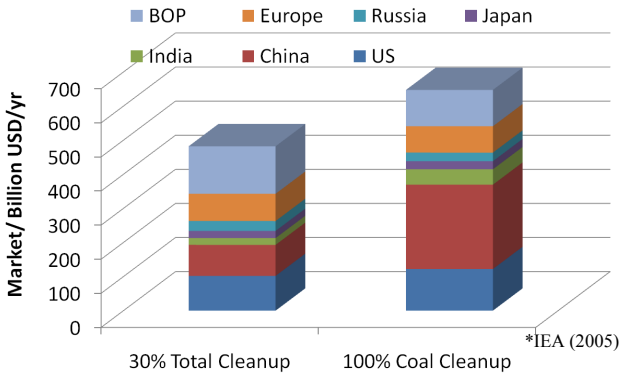
Energy projections over the next twenty years show an increase in demand for coal-based energy production (see graph). Carbon regulation, such as cap and trade, already exists in Europe and is expected to spread to the rest of the developed world soon. Given these two facts, carbon capture and storage (CCS) is an important area of research.



*DOE/EIA-0383(2007)

Carbon Capture Sequestration Market

Current cost estimates for competing CCS technologies average over $50 per ton of CO_2. Using these estimates, capturing 30% of world CO_2 emissions will cost about $400B. Capturing all the coal derived CO_2 emissions worldwide would cost over $650B (see graph). The Cryogenic Carbon Capture (CCC) process drastically reduces this cost, with estimates of around $33 per ton.



*IEA (2005)

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