Advanced Research Projects Agency • ENERGY

IMPACCT PROJECT

MIT

CO_2 CAPTURE USING ELECTRICAL ENERGY

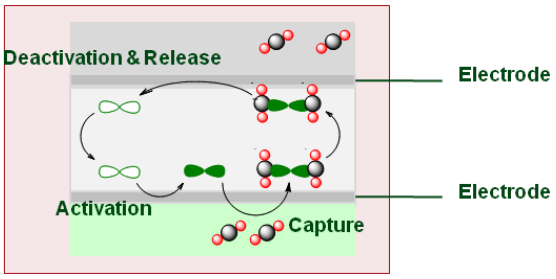
PROJECT TITLE:	Electrochemically Mediated Separation for Carbon Capture and Mitigation		
ORGANIZATION:	Massachusetts Institute of Technology (MIT)	LOCATION:	Cambridge, MA
PROGRAM:	IMPACCT	ARPA-E AWARD:	$1,000,000
TECH TOPIC:	Carbon Capture	PROJECT TERM:	7/16/10 – 7/15/12
WEBSITE:	www.arpa-e.energy.gov/ProgramsProjects/IMPACCT.aspx		

CRITICAL NEED

Coal-fired power plants provide nearly 50% of all electricity in the U.S. While coal is a cheap and abundant natural resource, its continued use contributes to rising carbon dioxide (CO_2) levels in the atmosphere. Capturing and storing this CO_2 would reduce atmospheric greenhouse gas levels while allowing power plants to continue using inexpensive coal. Carbon capture and storage represents a significant cost to power plants that must retrofit their existing facilities to accommodate new technologies. Reducing these costs is the primary objective of the IMPACCT program.

PROJECT INNOVATION + ADVANTAGES

MIT and Siemens Corporation are developing a process to separate CO_2 from the exhaust of coal-fired power plants by using electrical energy to chemically activate and deactivate sorbents, or materials that absorb gases. The team found that certain sorbents bond to CO_2 when they are activated by electrical energy and then transported through a specialized separator that deactivates the molecule and releases it for storage. This method directly uses the electricity from the power plant, which is a more efficient but more expensive form of energy than heat, though the ease and simplicity of integrating it into existing coal-fired power plants reduces the overall cost of the technology. This process could cost as low as $31 per ton of CO_2 stored.



IMPACT

If successful, MIT's method would use electrical energy to store CO_2 at lower cost than current technologies, limiting the increased cost of carbon capture and storage for coal-fired power plants.

- SECURITY: Enabling continued use of domestic coal for electricity generation will preserve the stability of the electric grid.
- ENVIRONMENT: Carbon capture technology could prevent more than 800 million tons of CO_2 from being emitted into the atmosphere each year.
- ECONOMY: Improving the cost-effectiveness of carbon capture methods will minimize added costs to homeowners and businesses using electricity generated by coal-fired power plants for the foreseeable future.
- JOBS: Retrofitting coal-fired power plants to capture and store carbon dioxide could create jobs in the U.S. manufacturing, construction, and engineering sectors.

CONTACTS

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