

U.S. DEPARTMENT OF ENERGY
OFFICE OF FOSSIL ENERGY
NATIONAL ENERGY TECHNOLOGY LABORATORY



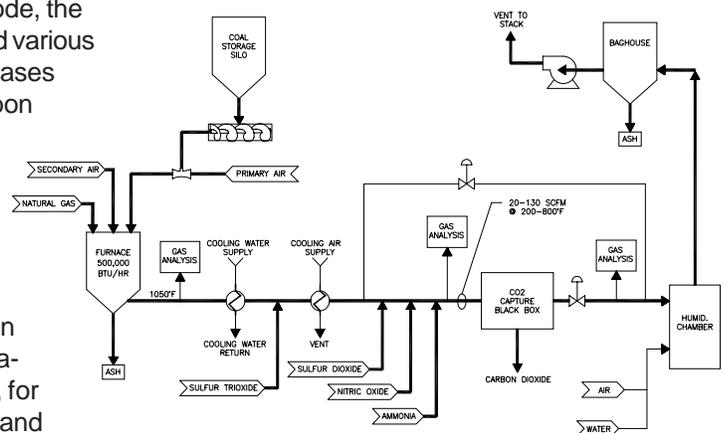
MODULAR CARBON DIOXIDE CAPTURE FACILITY

Capabilities

Carbon Sequestration is rapidly becoming accepted as a viable option to reduce the amount of carbon dioxide (CO₂) emitted from large point sources, while continuing to use our Nation's fossil fuels to produce affordable, clean energy. As a major step in a carbon sequestration scenario (storage being the other), the capture or separation of carbon dioxide represents a significant cost and energy penalty in the overall sequestration process. To accelerate the development of low-cost capture and separation technologies, NETL is implementing the design and construction of a modular, flexible CO₂ capture test facility. The facility will be able to test new capture technologies on coal combustion flue gas and, additionally, on process gas from advanced fossil-fuel conversion systems, such as coal gasification. Ultimately, a database for a particular capture technology will provide experimental information from which further engineering scale-up decisions can be formulated.

In the flue gas mode, the Modular Carbon Dioxide Capture Facility (MCCF) will mimic coal-fired combustion processes that produce electricity. The combustor can be fired with natural gas, coal, or a combination of the two; coal-burning of approximately 40 pounds of pulverized coal per hour results in a flue gas (110-scfm) laden with various pollutants. The versatility of a "black-box" design will permit the incorporation of a particular capture/separation technology anywhere along the flue gas path. If regeneration of the capture medium is required as part of the capture/separation process, this step can be readily integrated into the system.

In a fuel gas mode, the MCCF will blend various high pressure gases (hydrogen, carbon monoxide, water, carbon dioxide, and minor components) to simulate the gas composition found in gasification processes, for example IGCC and Vision 21 plants.



CO₂ Capture Facility – Flue Gas

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MODULAR CARBON DIOXIDE CAPTURE FACILITY

Again, a versatile design will permit installation of a capture technology, possibly including regeneration, along the fuel gas flow network.

By providing a means to evaluate the most promising capture/separation CO₂-abatement processes, the MCCF will help DOE meet its goal of developing point source cleanup systems that are more efficient, cleaner, and less costly than the current established techniques proposed for implementation in today's power generation plants.

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Opportunities

- The MCCF has evolved as a multipurpose, versatile research facility.
- Performance of a particular carbon dioxide-abatement process can be optimized in the MCCF to help achieve the extremely high emissions-control goals of the DOE Carbon Sequestration program. Operational performance standards for CO₂ capture will thus be established.
- The MCCF provides the ability to test capture and separation concepts on process streams that simulate advanced energy conversion systems.
- Side-by-side comparison of advanced capture and separation concepts can be conducted.
- The MCCF can be used to investigate the impact of gaseous components (SO₂, NO_x, H₂S, particulates, and/or air toxics emissions) and other parameters on the particular technology.
- The MCCF offers industry and other sequestration stakeholders the opportunity to further develop CO₂ capture/separation technologies through cooperative ventures with the government (NETL). Collaborations with CO₂ capture technology developers will be sought.

