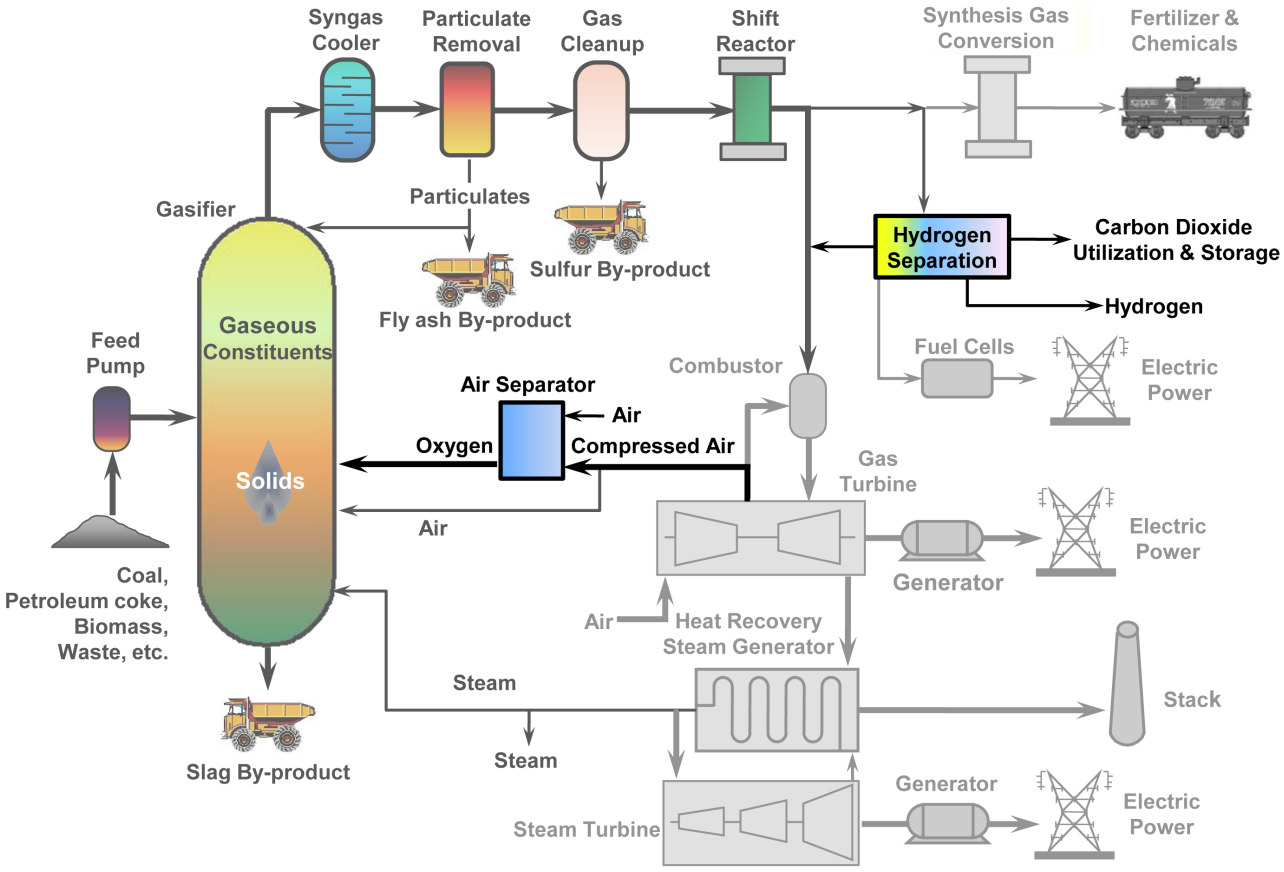
GAS SEPARATION

Part of the DOE Gasification Systems Program to

- Reduce gasification costs so coal can support U.S. economic growth
- Ensure excellent environmental performance for coal gasification

The Gas Separation research and development (R&D) area focuses on reducing the cost of two gas separation processes: (1) separation of oxygen from air for feed to oxygen-blown gasifiers; and (2) post-gasification separation of hydrogen from CO_2 following (or along with) the shifting of gas composition when CO_2 capture is required, or hydrogen is the desired product. Gas separation unit operations represent major cost elements in gasification plants.



Gasification Systems Program Research and Development Areas are in Color. Gas Separation R&D Areas are Brighter. Grey sections are part of other closely aligned DOE/NETL Research Technology Programs.

Oxygen Separation

An advanced air separation technology is being developed that can produce commercial-scale quantities of oxygen at lower cost than conventional cryogenic systems. The cryogenic air separation unit (ASU) in a conventional IGCC plant typically accounts for 12 to 15 percent of the overall capital cost of the plant; the technology being developed (Ion Transport Membrane or ITM) is projected to cost 25–33 percent less than an equivalent-sized state-of-the-art cryogenic ASU. In addition, ITM systems operate at elevated temperatures, thereby reducing the parasitic energy penalty associated with cryogenic oxygen production.

Hydrogen and CO_2 Separation

For effective integration with advanced gasification technologies, and to be able to realize the full advantages of high-temperature gas cleaning technologies, hydrogen and CO_2 separation must be accomplished at temperatures higher than conventional separation processes. Operation at higher process temperatures also offers the possibility of enhancing the water-gas-shift process through integration with advanced membranes, since both processes operate at similar temperatures. Technologies that are capable of producing both hydrogen and CO_2 at high pressure can avoid significant recompression costs that would further enhance the economics of these plants. The hydrogen transport membrane, which uses metal or metal alloy materials with surface exchange catalysts to separate hydrogen from CO_2, is being aggressively developed. Smaller scale work, more exploratory in nature, is being performed on two other non-membrane technologies integrated with the WGS.

For more information on this R&D Area, including project fact sheets, visit this section of our website:

http://www.netl.doe.gov/technologies/coalpower/gasification/gas-sep/index.html

Other Key R&D areas in the Gasification Systems Program are Gasifier Optimization and Gas Cleaning. More information on Gasification Systems Program R&D, on how systems analysis supports the program, on the benefits of gasification, and on individual projects can be found at the NETL website:

http://www.netl.doe.gov/technologies/coalpower/gasification/index.html

Or Google "Gasifipedia"

December 2011