

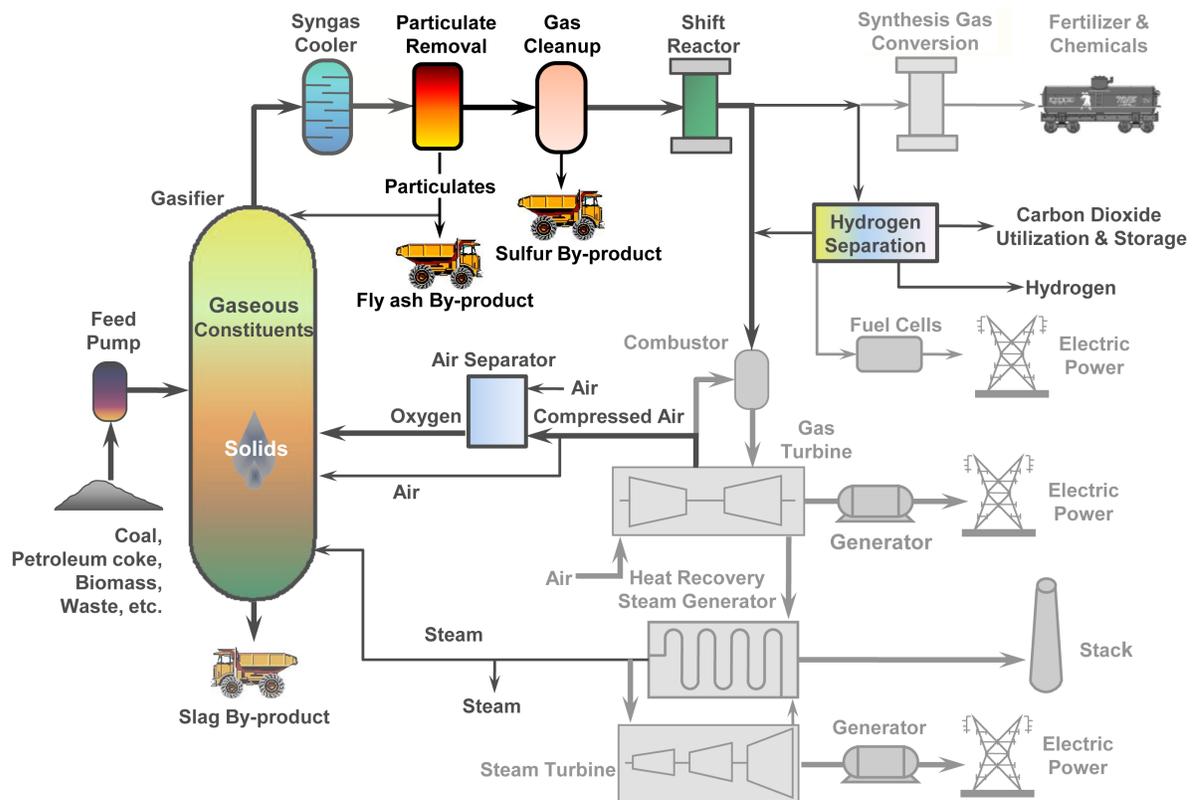
GAS CLEANING

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 Cleaning research and development (R&D) area focuses on reducing the cost of cleaning syngas, while simultaneously cleaning syngas to extremely clean levels—including particulates, sulfur, ammonia and mercury removal.

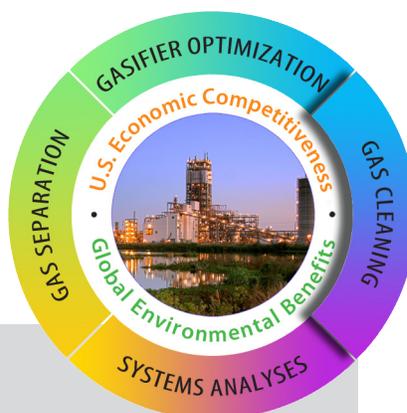
Conventional methods for removing sulfur and other contaminants from syngas typically rely on chemical or physical absorption processes operating at temperatures of 100 °F or less. When cooled to this level, nearly all of the steam present in the syngas condenses. After contaminant removal, the gas has to be reheated and additional steam often needs to be added for downstream hydrogen production. These process swings adversely impact the plant's thermal efficiency and cost. Economic analysis shows that gas-cleaning processes that are amenable to higher operating temperatures could significantly reduce this efficiency loss and improve the gasification plant's commercial viability. It is also critical that, while improving efficiency and reducing cost, the gas cleaning removes a wide variety of coal contaminants (including ammonia, hydrogen chloride, hydrogen sulfide, and carbonyl sulfide, as well as various forms of trace metals, including arsenic, mercury, selenium, and cadmium) to extremely low levels.



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



The Gas Cleaning R&D approach focuses on the development of high-efficiency processes that operate at moderate to high temperatures and provide multi-contaminant control to meet the highest environmental standards. A recent NETL systems analysis, "Current and Future Technologies for Gasification-Based Power Generation Volume 2: A Pathway Study Focused on Carbon Capture Advanced Power Systems R&D Using Bituminous Coal" (Pathways Study) shows that the primary benefit of warm gas cleanup is achieved when it is coupled with a hydrogen-CO₂ separation process that operates at a similar temperature. The resulting benefit includes 2.9 percentage points of efficiency gain, \$378/kW reduction in total plant cost, and \$12/MWh reduction in cost of electricity. The Gas Cleaning R&D area includes a 30–50 MWe scale project to test sulfur removal integrated with optimized water-gas-shift, carbon capture, and CO₂ sequestration; in-house research to monitor and remove mercury and other trace contaminants to extremely low levels; work at small pilot scale using industrially produced coal syngas; and a new project focused on the removal of contaminants from low-rank coal.



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-clean/index.html>

Other Key R&D areas in the Gasification Systems Program are Gasifier Optimization and Gas Separation. 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"**

