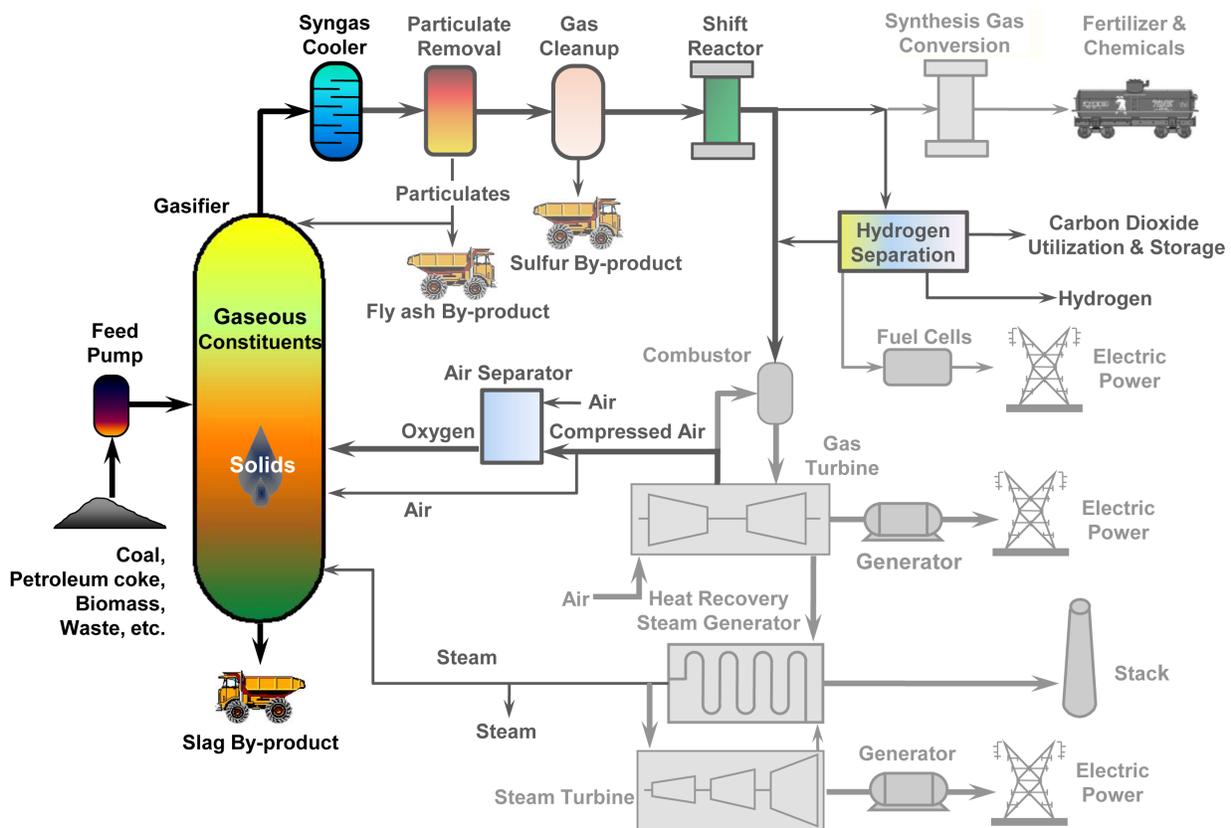


GASIFIER OPTIMIZATION

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 Gasifier Optimization research and development (R&D) area focuses on the development of technologies and models to improve the performance of advanced gasifiers, including high-pressure coal-feed pumps; low-rank coal utilization; new process instrumentation; improved reliability, availability, and maintainability (RAM); and advanced materials. 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 Gasifier Optimization R&D is decreased capital cost and improved RAM. The resulting benefit includes 0.8 percentage points of efficiency gain; \$7/kW reduction in total plant cost; and more than \$7.5/MWh reduction in cost of electricity. Subsequent to this study, recently awarded projects were selected to further reduce the cost of gasification with carbon capture. Both ongoing and new projects aim to improve gasifier performance and reduce costs by: improving RAM, expanding flexibility (especially low-rank coal), and increasing plant efficiency.



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



Improve Reliability

Several projects are actively seeking to improve gasifier refractory and to reduce syngas cooler fouling because their reliability is generally lower than other process equipment in the gasification island. Furthermore, recent gasification construction lessons learned are being leveraged to study how improvements can be made to reduce construction costs while maintaining or improving plant availability.

Expand Fuel Flexibility

Utilizing the Nation's large reserves of low-cost, low-rank coals in IGCC systems is currently limited because the most efficient advanced gasifiers tend to perform better on bituminous coal, and available coal feed systems have limited flexibility. Advancements in low-rank coal gasifier technologies have the potential to boost the economies of U.S. regions with low-rank coal reserves and to support industry growth across the U.S. Several projects were recently launched to reduce the cost of low-rank coal gasification, and ongoing work seeks to improve the effectiveness of mixing up to 15% woody biomass (mixed with coal) gasification.

Increase Efficiency

Increasing the efficiency of gasification results in more syngas, or power, produced per ton of coal, reducing the impact of coal contaminants, reducing costs and conserving U.S. coal reserves. Projects designed to increase efficiency include those that will improve control and uniformity of feed to gasifier systems, improve gasifier monitoring and control, and increase the understanding of gasifier operations through modeling. Several projects span the R&D areas described, but also include efficiency gains. For instance, projects aimed at improving syngas cooler reliability will also result in increased efficiency, and the two projects on high pressure dry feeding of coal to enable more efficient low-rank coal use are also expected to improve gasifier plant efficiency and reliability.

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/adv-gas/index.html>

Other Key R&D areas in the Gasification Systems Program are Gas Cleaning 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"**

