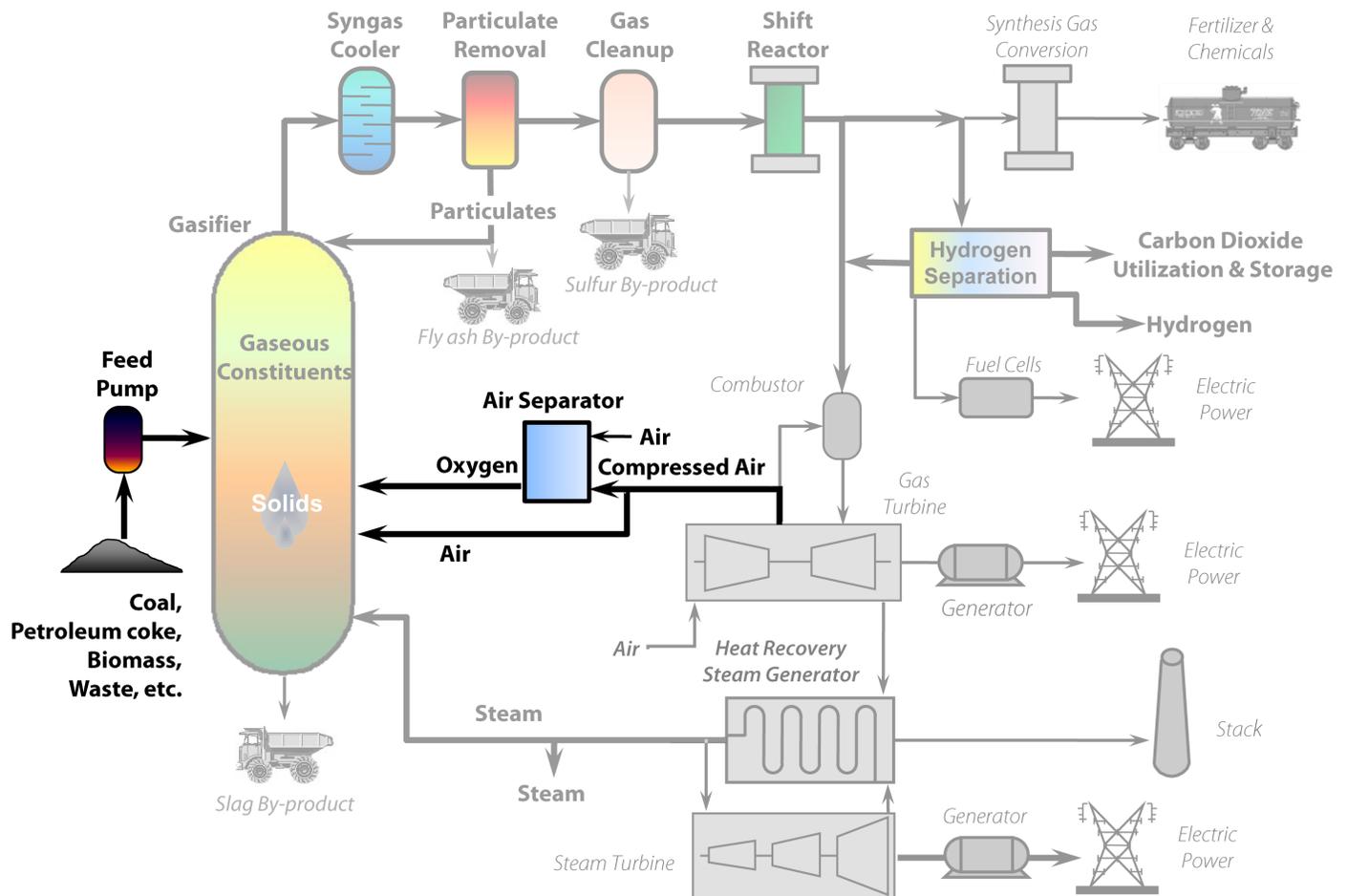


FEED SYSTEMS

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

Research on commercial gasifier feed systems is occurring in two primary areas of fuel feeding and air separation. Fuel feeding focuses on high-pressure solid feed systems to allow increased use of lower cost, abundant low-rank coals in dry feeding of high-pressure gasifiers, and co-feeding of coal with significant fractions of advantageous fuels such as woody biomass. Advanced air separation technologies are being developed to significantly lower cost of oxygen production and allow efficient integration of air separation processes with integrated gasification combined cycle (IGCC) power and co-production plants. Taken together, feed systems advances will have significant effect on reducing cost and increasing overall gasifier system efficiency.



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



Current research projects in this area include the following:

COAL-FEEDING TECHNOLOGY

Utilizing the Nation's large reserves of Western low-cost, low-rank coals in IGCC systems is currently limited because higher-efficiency gasifiers tend to require more expensive bituminous coal as feed, compounded by the limitations of available coal feeding methods consisting of coal-water slurry-based high-pressure injection or lower-pressure dry feed lock-hoppers. To overcome these limitations, high-pressure solid feed systems are being developed to enable use of low-cost, low-rank coals in dry feeding of high-pressure gasifiers, to enable co-feeding of coal with other advantageous fuels (such as biomass), and to encourage higher pressure (and therefore more efficient) operation of dry feed gasifiers.

Semi-scale tests have been completed for a new high-pressure solids feed pump, the 600-tpd prototype has been built and commissioning has begun. Two other scoping studies are ongoing to determine the potential benefit of other feed system concepts specifically for low-rank coals, one of which will use high-pressure CO₂ as the coal transport medium for slurry-fed gasifiers.

ADVANCED AIR SEPARATION TECHNOLOGY

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, and requires a large parasitic power load primarily to operate gas compressors. These high costs are the impetus for development of advanced air separation technology to produce commercial-scale quantities of oxygen at significantly lower cost than conventional cryogenic systems. The technology being developed (Ion Transport Membrane or ITM) is projected to cost one-quarter to one-third less than an equivalent-sized state-of-the-art cryogenic ASU in terms of capital cost. ITM systems afford the opportunity of integrated operation with turbines, and operate at elevated temperatures, thereby increasing efficiency/reducing parasitic energy penalty compared to conventional cryogenic oxygen production systems.

Specific recent activities in this area include preparation of systems analyses on a variety of gasification-based processes, which continue to show significant cost and efficiency advantages with the application of high-temperature membranes for oxygen production compared to conventional cryogenic technology. Also, membranes were fabricated that meet or exceed commercial flux targets. Full-scale modules have been fabricated and tested in a 5-ton-per-day (TPD) test system; construction is well underway on a 100-TPD oxygen production test facility.



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

<http://www.netl.doe.gov/research/coal/energy-systems/gasification/feed-systems>

Other Key R&D areas in the Gasification Systems program are Gasifier Optimization and Plant Supporting Systems and Syngas Processing Systems. 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/research/coal/energy-systems/gasification>

Or Google **"Gasifipedia"**

