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## Development of a Multi-Purpose Dynamic IGCC Model for an Energy-Intensive Industry Clusters

**Background and rationale:** Achieving the maximum energy efficiency potential of advanced power generation systems, such as IGCC, advanced combustion/gasification hybrid systems, and IGCC-fuel cell hybrids, requires a much higher degree of integration – and thus complexity – than in conventional generation plants. In addition, the integration of an advanced power generation plant with a cluster of energy-intensive industrial users would add another degree of complexity. A conceptual feasibility study of a modern, coal-based plant providing electricity, heat, and chemical feedstocks to an existing industry cluster in northern West Virginia and eastern Ohio is currently in progress. The ability to model the dynamic response of the generation plant to user-driven demand changes will be critical to determining both the operational and economic feasibility of such a project.

The Computational and Basic Sciences Focus Area at NETL has developed static computational models of IGCC plants using Aspen Plus® software. Dynamic models of some IGCC components, such as fluid bed gasifiers, are also available or under development. However, auto-

matic export of unit operations involving solids, such as the gasifier, from Aspen Plus® to Aspen Dynamics™ is not currently supported. An overall dynamic IGCC model that builds on this foundation will be developed. Such a model will be a powerful tool for both operational and economic feasibility studies. The ultimate goal of this project is to provide NETL with new dynamic modeling capabilities that will accelerate deployment of advanced power generation technologies by reducing the risk associated with the increased complexity of these systems, particularly when closely coupled with the varying demands of a cluster of industrial customers.

**Project objectives:** During the first year of this proposed project, a dynamic IGCC computational model will be developed using Aspen Dynamics™. This model will subsequently be used to evaluate specific generation cases that have been selected in the energy-intensive industry cluster feasibility study. System dynamics for overall generation, the ability to respond to anticipated demand variations, and the economic impact of demand variability will ultimately be investigated.