

EXCELLENCE IN TECHNOLOGY TRANSFER

National Energy Technology Laboratory

Advanced Process Engineering Co-Simulator (APECS)

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The R&D100 award-winning **Advanced Process Engineering Co-Simulator (APECS)**, developed at the U.S. Department of Energy's (DOE) National Energy Technology Laboratory (NETL), is an important software tool that the process and energy industries will use to meet aggressive performance and environmental targets for their production plants while continuing to operate them profitably. APECS allows the industries to better understand and optimize overall plant performance with respect to complex thermal and fluid flow phenomena. The process and energy industries manage some of the most sophisticated and expensive plants in the world, spending on the order of \$600 billion annually in plant design, operation, and maintenance. These industries also face the challenge of designing next-generation plants to operate with unprecedented efficiency and near-zero emissions, while operating profitably amid cost fluctuations for raw materials, finished products, and energy. To achieve performance targets and at the same time reduce the number of costly pilot-scale and demonstration facilities, the designers of future plants must rely on high-fidelity computer simulations to design and evaluate virtual plants. The APECS software technology provides the necessary level of detail and accuracy essential for virtual plant co-simulation by combining best-in-class process simulation and computational fluid dynamics (CFD) with high-performance computing and interactive, immersive, 3D plant walk-through virtual engineering software. At NETL, system analysts are applying APECS to reduce the time, cost, and technical risk of developing high-efficiency, near-zero emissions power plants such as the coal-fired, gasification-based plant in the \$1 billion, 10-year DOE FutureGen R&D Initiative.

The tools used by NETL to transfer the APECS technology include a DOE-funded cooperative R&D project and agreement among NETL; Fluent, the world's leading supplier CFD software and services; Aspen Technology, a major supplier of process simulation software; West Virginia University; and Alstom Power, a major worldwide industrial player in equipment and services for power generation. The cooperative agreement assigned the commercialization rights to Fluent to ensure that the APECS software suite entered the market place as quickly as possible. Another important tool to assure successful commercialization is the close collaboration of Dr. Stephen Zitney of NETL's Office of Research & Development with Fluent on the development, marketing, and support of APECS for use by the process and energy industries, as well as academia, national laboratories, and other research entities. In addition to his ongoing collaborative involvement, Dr. Zitney led the initial technology transfer efforts.

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