



Consortium for Advanced Simulation of Light Water Reactors

A DOE Energy Innovation Hub for Modeling and Simulation of Nuclear Reactors

CASL is focused on three issues for nuclear energy: reducing cost, reducing the amount of used nuclear fuel, and safety. CASL core partners include DOE laboratories at Oak Ridge, Idaho, Los Alamos and Sandia; academic partners at Massachusetts Institute of Technology, North Carolina State, and Michigan; and industry partners, Westinghouse, Tennessee Valley Authority (TVA), and the Electric Power Research Institute (EPRI). Our partners are leaders in science, nuclear energy, nuclear engineering, and national security, providing CASL with a remarkable set of assets.

Tackling Tough Industry Challenges that Matter

CASL's mission is to apply existing modeling and simulation capabilities and to develop advanced capabilities to address three critical areas of performance for nuclear power plants:

- Reducing capital and operating costs by extending reactors' lifetimes and enabling them to run at higher power
- Reducing waste by enabling more efficient fuel use
- Advancing fuel and light water reactor (LWR) designs while enhancing safety

CASL's vision is to predict, with confidence, the safe, reliable performance of nuclear reactors, through comprehensive, science-based modeling and simulation technology that is deployed and applied broadly within the U.S. nuclear enterprise.

Executing a Compelling and Urgent Plan



CASL's team will create a modeling tool called the Virtual Environment for Reactor Applications (VERA). VERA will be used to simulate the performance of LWRs. This tool will incorporate

- Highly accurate models of LWR core operation
- A modern software system
- Validation against Westinghouse-designed TVA reactors
- Predictive models of pressurized light water reactor core operation
- Deployment with industry partners

Fostering Innovation Where It Is Most Needed

VERA will incorporate prediction of coolant chemistry, fuel performance, neutronics, thermal hydraulics, and structural mechanics; solution algorithms, and numerical methods for high-performance computing (HPC) systems; quantified uncertainties for operational and safety margins; and HPC-based multi-physics tools embedded in engineering reactor design and analysis workflows.

Virtual Office

CASL is taking advantage of a unique collaboration facility, called the Virtual Office, Community, and Computing (VOCC). Located at ORNL, the state-of-the-art facility supports scientific collaboration among scientists, engineers, and industry partners.



Delivering Industry Solutions through Simulation

Innovation at the speed of Insight

CASL's goals include providing insights into improving reactor performance and output; delivering cutting-edge simulation tools, such as VERA, to industry; promoting innovation and agility in the reactor design and analysis process; supplying more comprehensive information for the design and licensing of new reactors, and implementing an agile and flexible structure for successful public-private partnerships.

Point of Contact: Doug Kothe • CASL Director • 865-241-9392 • kothe@ornl.gov • www.casl.gov

