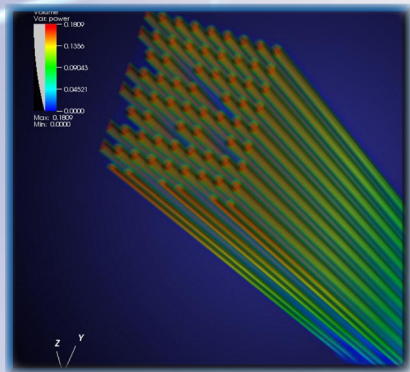


CASL expects selected analysis activities and decisions by nuclear power plant vendors and owners/operators supporting reactor operations such as core reload and new core design will be guided and informed by the CASL M&S technology and staff expertise. CASL technology is envisioned to become the leading nuclear energy industry M&S capability for supporting and furthering advanced nuclear steam supply system and nuclear fuel research, development, and deployment.

By making VERA available to the nuclear energy community, CASL's vision will demonstrate - through industry acceptance, adaption, and licensing - that its M&S technology proactively targets the right industry problems. CASL intends to address, key nuclear energy industry challenges to furthering power uprates, higher burnup, and/or lifetime extension while providing higher confidence in enhanced nuclear safety.



Simulated three-dimensional fission power distribution of a single 17x17 rod PWR fuel assembly



A partnership with unparalleled collective institutional knowledge, nuclear science and engineering talent, computational science leadership, and a record of LWR design and regulatory accomplishments!

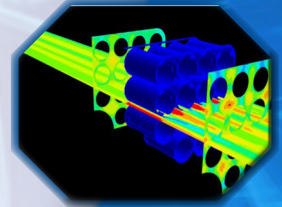
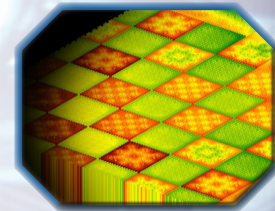
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Predicting the safe, reliable, and economically competitive performance of nuclear reactors, through comprehensive, science-based modeling and simulation technology



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



U.S. DEPARTMENT OF
ENERGY
 Nuclear Energy

CASL Mission

Provide forefront and usable modeling and simulation capabilities needed to address light water reactor operational and safety performance-limiting phenomena

The Consortium for Advanced Simulation of Light Water Reactors (CASL) is the first U.S. Department of Energy (DOE) Energy Innovation Hub, established in July 2010 for the modeling and simulation (M&S) of nuclear reactors. CASL applies existing M&S capabilities and develops advanced capabilities to create a usable environment for predictive simulation of light water reactors. This environment, designated the Virtual Environment for Reactor Applications (VERA), incorporates science-based models, state-of-the-art numerical methods, modern



Reduce capital and operating costs per unit of energy by increasing reactor capacity and extending plant lifetimes

computational science and engineering practices, and uncertainty quantification and validation against data from operating pressurized water reactors (PWRs), single-effect experiments, and integral tests. With VERA as its vehicle, CASL develops and applies models, methods, data, and understanding while addressing three critical areas of performance for nuclear power plants (NPPs):

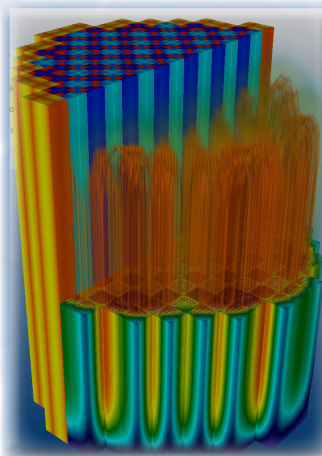
- Reducing capital and operating costs per unit of energy by enabling power uprates and lifetime extension for existing NPPs and by increasing the rated powers and lifetimes of new Generation III+ NPPs
- Reducing nuclear waste volume generated by enabling higher fuel burnup
- Enhancing nuclear safety by enabling high-fidelity predictive capability for component performance through the onset of failure

To accomplish its mission, CASL will:

- Develop, integrate, and couple a suite of robust, verified, and usable simulation tools within a common, multi-physics virtual environment for reactor applications designed to provide a number of problem- and user-dependent products
- Develop and evolve physics-based models and VERA software components for reactor core phenomena
- Develop and apply an overall methodology for validating, verifying, and assessing VERA, based on real-world data
- Demonstrate the applicability of VERA products to address essential industrial issues for achieving power uprates, lifetime extension, and higher fuel burn-up while ensuring that the fuel performance and safety limits are met



Reduce nuclear waste by burning a greater percentage of fuel

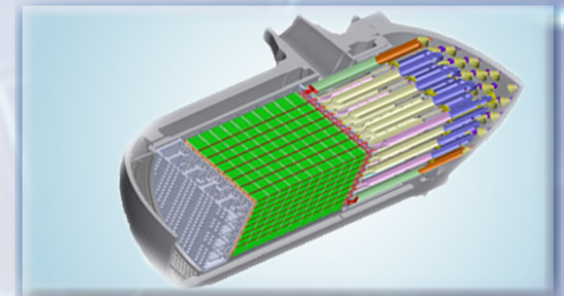


Assure nuclear safety throughout the life of the reactor

- Engage regulatory authorities to enable future application of the results

Virtual Office, Community, and Computing (VOCC) Laboratory

CASL's VOCC at Oak Ridge National Laboratory consists of a unique infrastructure integrated in a special way so as to promote collaboration and critical thinking that fosters insight and innovation. This is realized with a state-of-the-art physical and virtual scientific collaboration space for CASL research & development activities.



Quarter-core virtual geometry model of a PWR.

Innovation at the speed of Insight

