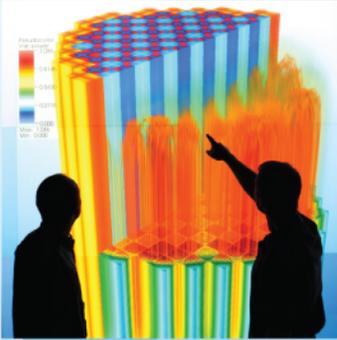


Power uprates
and plant life extension

CASL-U-2014-0358-000



Engineering design
and analysis



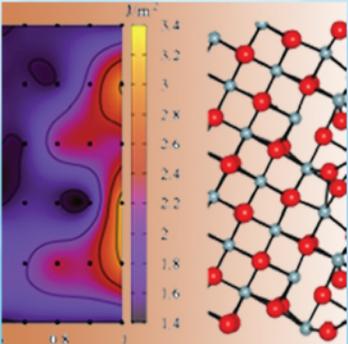
CASL - An Industry- National Laboratory- University Modeling and Simulation Partnership in Progress: TVA Perspective

Science-enabling
high performance
computing



Rose Montgomery
Tennessee Valley Authority

Fundamental science



February 25, 2014

Plant operational data



U.S. DEPARTMENT OF
ENERGY

Nuclear Energy



An Industry-National Laboratory -University Modeling and Simulation Partnership in Progress: Consortium for Advanced Simulation of Light Water Reactors (CASL)

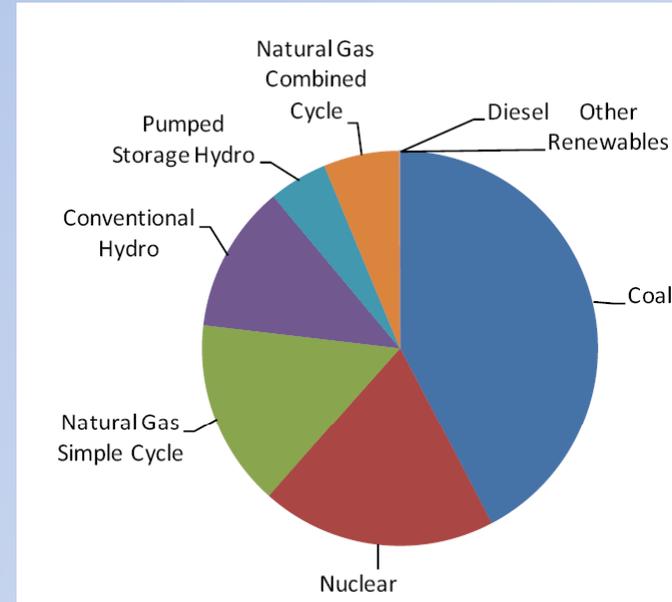
TVA Perspective

Rose Montgomery

*Sr. Project Manager, Tennessee Valley Authority
Consortium for Advanced Simulation of LWRs*



Tennessee Valley Authority



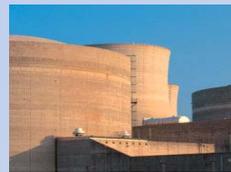
Fossil Plants



Combustion Turbines



Nuclear Plants



Hydroelectric Dams



Pumped-Storage



Green Power



Public power provider

- 7-state region
- 80,000 square miles
- 9 million people
- 650,000 businesses
- 155 distributors
- 57 direct-served customers





Nuclear at TVA



**Sequoyah 1 and 2,
2,320 MWe**



**Watts Bar 1,
1,170 MWe**

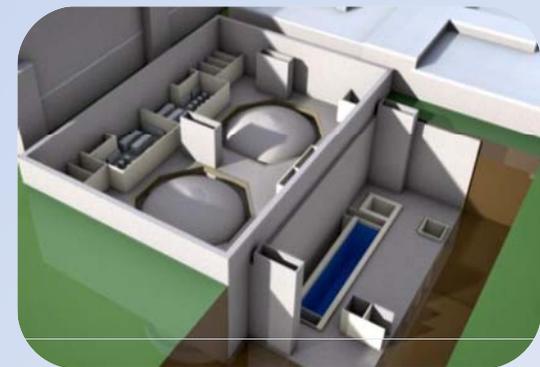
**Browns Ferry 1, 2 and 3
3,440 MWe**



**Watts Bar 2, 1,160 MWe
under construction**



**Bellefonte 1, 1,260 MWe
Engineering/Licensing**



**Clinch River SMR,
125 MWe per, Studies**



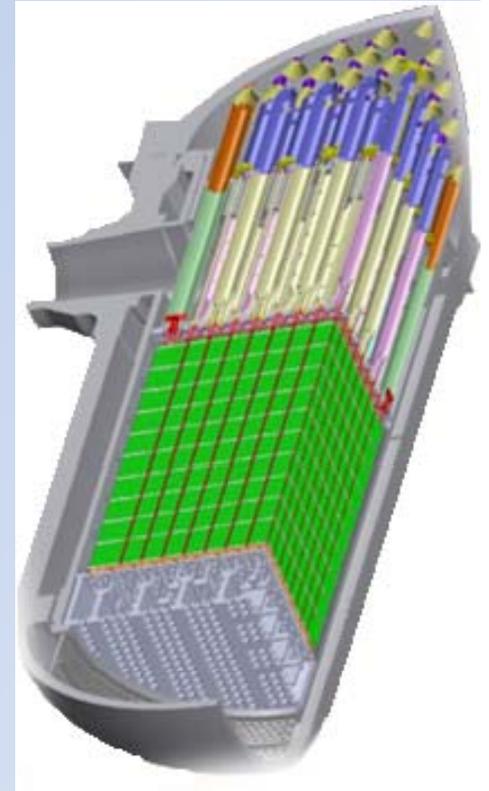
Why Participate in CASL?

- TVA believes the Consortium's products, if realized, can provide substantial benefits to the commercial nuclear fleet
 - TVA's CASL objective is to facilitate power uprates, enhance safety and efficiency
 - Extremely focused activities are required
 - Guidance by industry can ensure benefit
- Although Industry is progressing towards similar coupled-physics technologies, progress is limited by company/industry funding and the majority of the science is engineering scale
 - CASL can provide a higher fidelity solution in a shorter time
- TVA believes that early industry involvement is essential to successfully deploy CASL products
 - Foster use of the products by industry
 - Create bridges from the DOE research island to industry mainland
 - Provide experience to ensure products can be licensed by NRC



Benefits of the Consortium

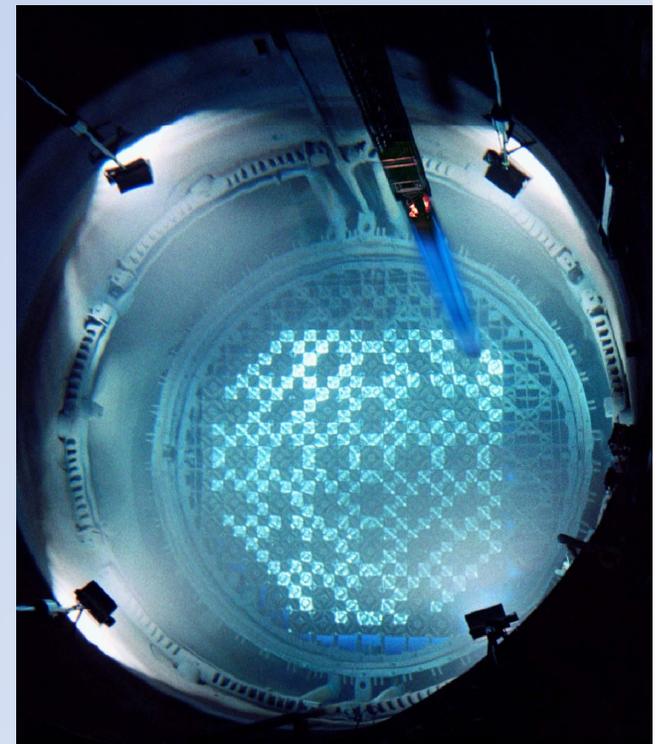
- The team brings together an integrated team of experts
 - Industry provides application-specific expertise and experience
 - National Labs & academia provide broad science expertise
- The Consortium approach provides a focused mission that is structured to ensure benefit to the entire domestic fleet
 - Mission to utilize non-proprietary codes and technologies ensures benefit to all vendors and utilities





Benefits of the Consortium

- The Consortium has adopted a requirements-based problem solving approach to provide detailed, concrete goals that have applications for all partners
- Focus on development of a versatile general tool (the virtual reactor) along with solutions and demonstrations for current industry issues provides immediate payoff with long-term benefits
 - Opportunity to dramatically advance understanding of reactor performance
 - Potential efficiency improvements
 - Potential design tool for future
 - Enhanced safety





Lessons Learned

For the Consortium in particular:

- Intellectual property issues are extremely challenging
 - Protecting proprietary and export-controlled information
 - Ensuring staff that needs information can get it
 - Producing products that can be distributed without proprietary restrictions
- Some elements can be addressed by establishing some general guidance as a starting point
 - Technology control guidance
 - Non-disclosure agreement guidance

DOE should establish basic IP expectations for future Consortiums

Lessons Learned



- A large dispersed team can lead to unfocused efforts
 - The team's objectives should be detailed in time-bound concrete terms as early in the project as possible
 - Distractions and scope change discussions should be minimized

Team objectives must provide intermediate, realistic (but challenging) objectives as well as idealistic stretch goals



Lessons Learned

- Cultural Differences
Industry versus National Labs
versus Academia
 - Git 'er done or science project?
 - Rigid & detailed schedules or agility?
 - Task teams & action items
or Workshops & reports?
- One representative from each Consortium partner should be stationed at a participating National Lab
- An industry/DOE exchange program could be very beneficial to promote collaborations



Both Industry and research community must move out of their comfort zones to achieve a functional team



Opportunities for Future Collaboration

- Within CASL
 - Boiling Water Reactors
 - Small Modular Reactors
 - Advanced Reactor Concepts
 - Simulation of advanced fuel system performance
- Suggestion for a Consortium on Advanced nuclear fuel systems
 - Materials research, testing and screening
 - Potentially different accident scenarios
 - Manufacture commercial test prototypes
 - Test in existing commercial power reactors
 - NRC Licensing of new fuel systems
 - Industry roll out of higher enriched commercial fuels

