

Advanced Sensors and Instrumentation

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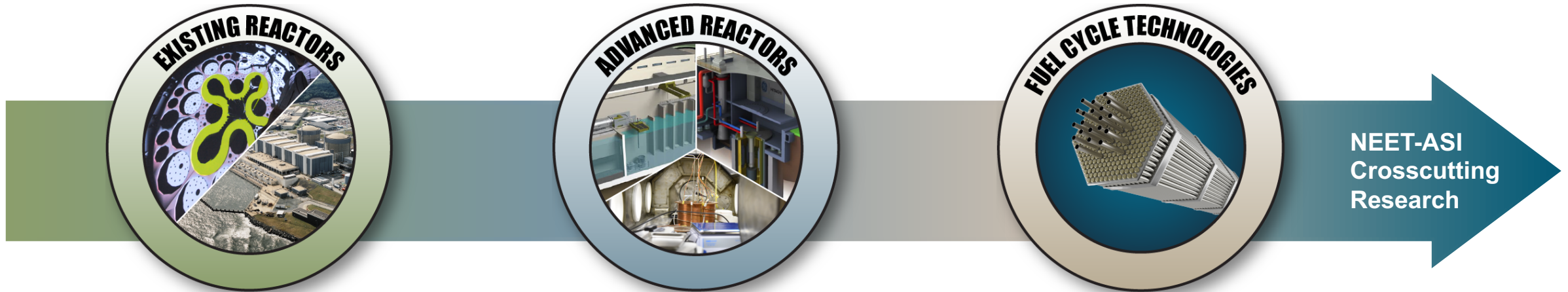
Mission, Vision, Goals and Strategic R&D

Mission

Develop advanced sensors and I&C that address **critical technology gaps** for monitoring and controlling existing and advanced **reactors** and supporting **fuel cycle** development

Vision

NEET ASI research results in advanced sensors and I&C technologies that are qualified, validated, and ready to be adopted by the nuclear industry



Mission, Vision, Goals and Strategic R&D (Cont.)

Goals

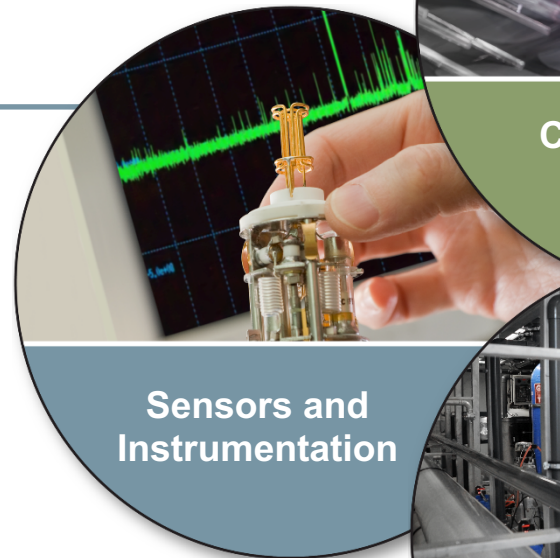
- Support **DOE-NE R&D** programmatic needs
 - Fuel and material studies, integral tests
- Provide **new capabilities** for measurement, control, and operation
 - Sensors for harsh environments, advanced control capabilities, semi-autonomous and fault-tolerant operation, and predictive analytics
- Address R&D needs for **successful deployment**
 - Digital technology and instrumentation qualification



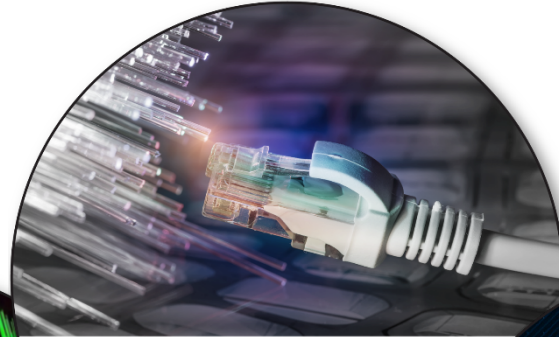
Mission, Vision, Goals and Strategic R&D (Cont.)

Strategic R&D Areas

Reliable, cost-effective, real-time, accurate, and high-resolution measurement of the performance of existing and advanced reactors core and plant systems



Sensors and Instrumentation



Communication

Resilient and enable real-time transmission of sufficient data for online monitoring and advanced data analytics



Big Data, Machine Learning, Artificial Intelligence

Machine learning and artificial intelligence processes to enable semi-autonomous operations and maintenance by design



Advanced Control Systems

Enable near real-time control of plant or experimentation process variables to enhance plant thermal performance

CT-5: ADVANCED SENSORS AND INSTRUMENTATION

(ELIGIBLE TO LEAD: UNIVERSITIES ONLY) (UP TO 3 YEARS AND \$800,000)

Challenge: The Advanced Sensors and Instrumentation (ASI) program seeks applications to develop dynamic measurement systems for structural health monitoring of advanced reactors. Advanced reactors of interest are those defined in section A.2.2 Reactor Concepts Research, Development and Demonstration (RC RD&D) Program and related items in Appendix A. The proposal should demonstrate an adequate level of knowledge of the targeted application.

Objectives:

- In alignment with the crosscutting nature of ASI activities the proposal should seek to develop technologies that are applicable to multiple reactor concepts and can operate in a broad range of conditions. Proposals can target one or more plant systems and components, including the reactor core, the reactor vessel and other in-vessel components, primary and secondary cooling circuits in order to define the range of expected operating conditions, including temperature, pressure, radiation field and limitations in terms of material compatibility. The proposal should clearly identify the application, the target operating range and the criteria that will be used to assess the proposed technology feasibility. The potential impact of the technology should be discussed in relation to its benefit in terms of reduction of operating and maintenance cost or increased functionality/efficiency.
- The outcome of the proposed work should be the feasibility demonstration of a complete measurement system, including and not limited to sensing elements, hardware and software tools for interrogation, data acquisition system and data analytics. The use of technologies leading to high data throughput and the integration of advanced tools for data analysis compatibility with integration in real time control systems is highly encouraged.

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To learn more about the current progress of ASI projects and gain access to the newsletter, visit the website in the below QR code



<https://www.energy.gov/ne/nuclear-energy-enabling-technologies/advanced-sensors-and-instrumentation>