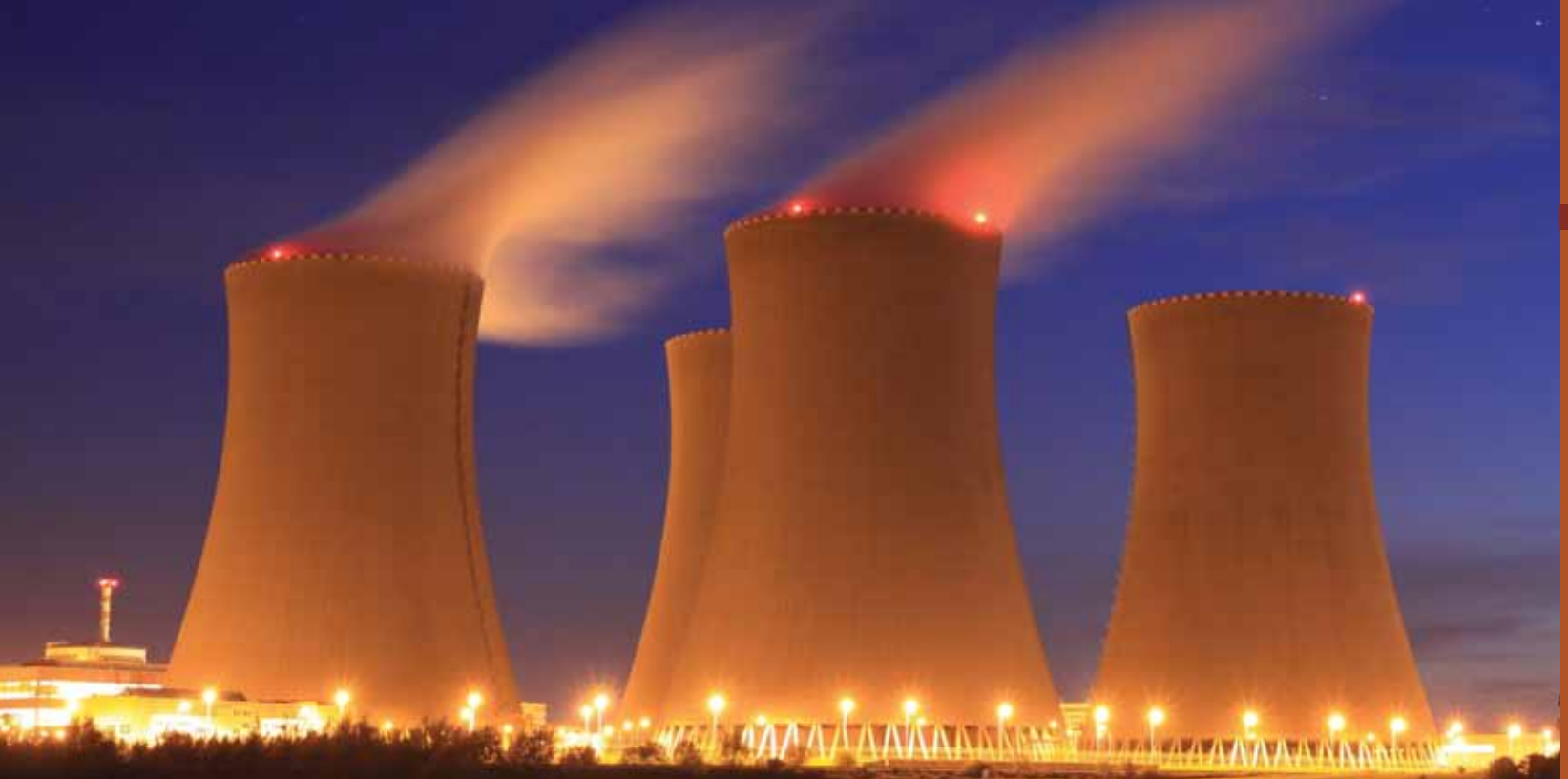
I-NEST




Institute for Nuclear Energy Science and Technology



What is I-NEST?

Idaho National Laboratory (INL) has partnered with several leading U.S. universities to create the Institute for Nuclear Energy Science and Technology (I-NEST).

I-NEST's goal is to help define INL's long-term nuclear energy research and development strategy.

The institute is comprised of four Centers of Research and Education (COREs) that were selected to address some of the most difficult problems facing nuclear energy today: fuels and materials, space nuclear research, fuel cycle, and safety and licensing.

Research in these areas will provide the technical knowledge to help guide the nation's nuclear energy program and help extend the operating life of the current fleet of nuclear reactors.

Each CORE is led by a researcher from INL and one of the partner universities – Massachusetts Institute of Technology, North Carolina State University, Oregon State University, The Ohio State University, and University of New Mexico.

The intent is to collaborate with these universities to stimulate research innovation and maintain INL's position as a leader in nuclear energy research.

Fuel Cycle

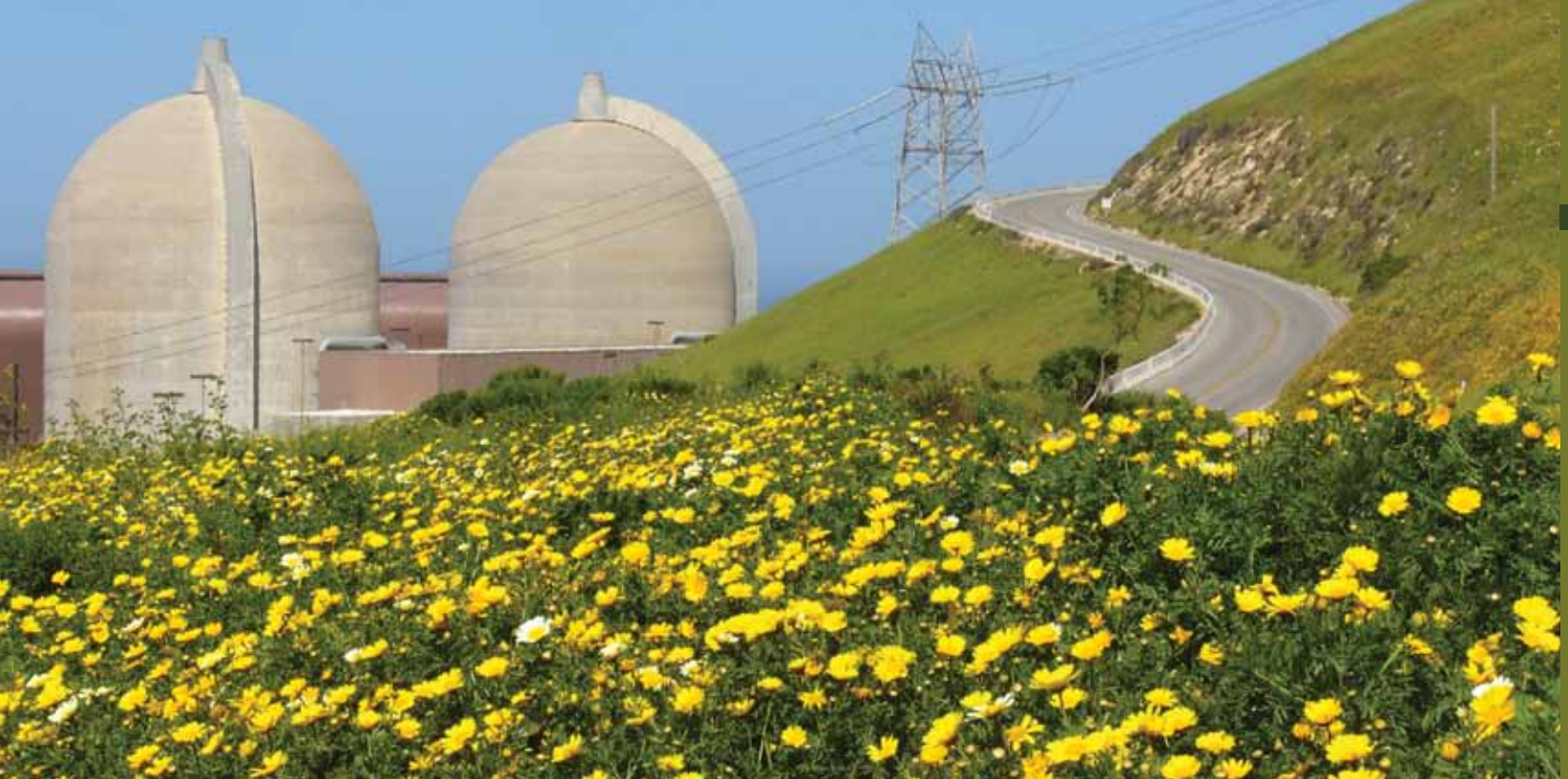
The Fuel Cycle CORE focuses on technology development and performance assessment of advanced fuel cycle systems applicable to domestic and global nuclear energy futures.

It will identify potentially "transformative" systems that optimize enhanced proliferation resistance, simplify operations, and minimize waste.

Examples that will be investigated include:

- Approaches that address management of used fuel inventories from light water reactors with the minimization of material separation and recovery requirements
- Technologies designed to meet the needs of material management issues (fissile material recovery, waste management, and disposal) associated with advanced reactors for hydrogen production, waste transmutation, etc.
- Strategies and technologies associated with implementation of smaller, modular reactors having long-refueling intervals
- Systems and technologies designed to allow "a priori" optimization of proliferation resistance and "safeguards by design."

INL Leads: Terry Todd, Patricia Paviet-Hartmann
University Lead: Ed Arthur, New Mexico State University



Fuels and Materials

The Fuels and Materials CORE is developing a research portfolio that advances the science of fuels and materials in nuclear systems.

The initial research and education programs focus on light water reactor technology, but much of the knowledge developed is expected to be broadly applicable to INL's nuclear science and technology missions.

This CORE is concentrating initially on three strategic areas:

- Stress corrosion cracking in light water reactor environments
- Mitigation of degradation mechanisms in Zr-alloy fuel cladding
- Property changes in uranium dioxide base fuels including thermal transport and associated microstructural changes.

INL Lead: Todd Allen
University Lead: KL Murty, North Carolina State Univesity

Safety and Licensing

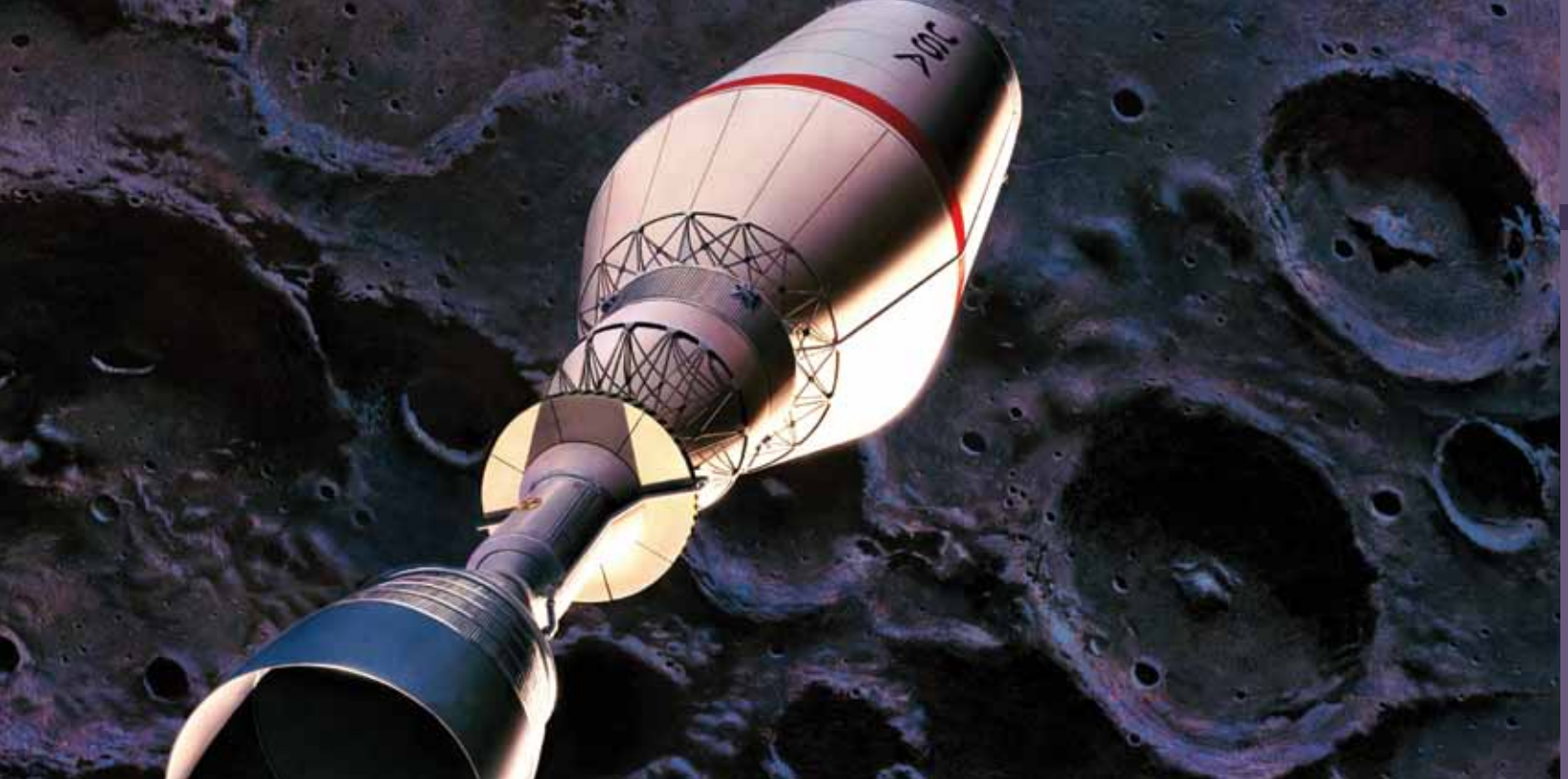
Sustaining the current nuclear renaissance underway in the U.S. requires finding ways to extend the life of existing nuclear power plants and to safely bring new plants online. The principal barriers to doing this are associated with safety and licensing.

The Safety and Licensing CORE is guiding strategic investments that will enable INL to support the Department of Energy's nuclear energy research and development programs to address critical issues in nuclear power safety and licensing.

The goal is to help position INL to make the advances in research and technology development over the next decade that will lead to the resolution of key safety and licensing issues. Research collaborations will focus on:

- The safety case for plant life extension
- Testing new licensing paradigms
- Influencing licensing regulations for next generation nuclear power plants
- Addressing safety and licensing concerns for Generation IV reactors
- Establishing new standards for siting and licensing of nuclear power plants.

INL Lead: Nam Dinh
University Lead: Rich Denning, The Ohio State University



Space Nuclear

The Space Nuclear CORE is developing the technology and people needed to implement space nuclear power and propulsion applications and to position INL to become a major player in this field of research.

This CORE is concentrating on:

- Developing the material fabrication and diagnostic technology so tungsten cermets can be used as a radioisotope encapsulation for a heat source material and a nuclear reactor fuel for space propulsion and electrical power system applications
- Designing a Mars Hopper from the conceptual stages through electrically heated prototype for testing at INL
- Building a workforce with the skills to pursue fuel fabrication, ground testing, and design of nuclear thermal rockets.

INL Lead: Steve Howe of the Center for Space Nuclear Research
University Lead: Andy Klein, Oregon State University

For more information, contact:
Dr. Marsha Lambregts
I NEST Deputy Director
(208) 526-1336
Marsha.Lambregts@inl.gov

INEST
Institute for Nuclear Energy
Science and Technology

10-GA50831