

# Achieving Net-Zero through Nuclear: Innovating Holistic Scalable Clean Energy Solutions

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**Background/Objectives:** In April 2021, INL committed to achieving net-zero emissions in 10 years, aligning their clean energy research, development, and demonstration mission activities with operations to become a national carbon neutral prototype. Since making this commitment, INL is prepared to start sharing lessons learned, best practices, and how it is overcoming challenges necessary to meet our objective.

As DOE's foremost nuclear research laboratory, INL is demonstrating how nuclear integrates with renewables to create safe, secure, and resilient 24/7 carbon-pollution free electricity (CFE) that can be used to both power institutions like INL as well as underserved populations and remote areas.

Nuclear energy is a necessary component in our nation's plans to decarbonize. Given that many experts are concerned the solar and wind industries will not be able to keep pace with the projected 400% increase in demand due to resource and labor shortages, ensuring nuclear resources are the grid will be critical to meeting growing energy demands with carbon-pollution free electricity.

**Approach/Activities:** Idaho National Laboratory (INL) has committed to net-zero by 2031—an audacious goal given the size and complexity of our campuses—that we will achieve through nuclear innovations and integrated systems. INL's operations include more than 5,400 employees, 600 vehicles, and 300 buildings spread over nearly 900 square miles, complete with over 140 miles of transmission and distribution lines, roads, a wastewater treatment plant, a landfill, and fire stations. In many ways, the laboratory is like a small city, which makes INL highly relevant for proving economical and durable net-zero solutions.

As DOE's lead nuclear laboratory, INL is also working to demonstrate scaling nuclear-enabled microgrids. Utilizing expertise in nuclear development and deployment, integrated energy systems, and critical infrastructure protections, INL is uniquely positioned to demonstrate working nuclear enabled microgrids on-site, leveraging DOE microreactor programs and serving as a test bed for microreactor developers. The microgrids will show how areas can be islanded from the main grid in the instance that there is a power outage on the greater grid, or how a nuclear-enabled microgrid can be used to power remote areas or operations with 24/7 stable energy and/or process heat.

Beyond reaching net-zero at INL, we are also demonstrating how the solutions used at INL can be applied to other DOE laboratories, government installations, and beyond. These solutions could be extended to underdeveloped regions, remote mining operations,

**Results/Lessons Learned:** INL has made exceptional progress in the pursuit of both on-site net-zero and the demonstrations showing net-zero through nuclear. This presentation will focus on best practices to establishing a Net-Zero Program, talk about lessons learned, and discuss the most challenging net-zero activities that we all face and how to overcome them.