

Nuclear Energy: Perceptions, Research Frontiers, and Global Outlook

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With Guest Lecturer Dr. Harold McFarlane

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Abstract:

In 1974 Congress abolished the Atomic Energy Commission. Under a new agency, the robust government-sponsored nuclear research proceeded in parallel with a burgeoning commercial industry that had some 250 commercial reactor orders. At the same time a surprise “peaceful” nuclear explosion occurred in India, which forever changed our nuclear policy. At the peak of the U.S. commercial nuclear deployment in 1990, 112 nuclear units operated, producing about 20% of the nation’s electricity. Today some 100 plants still operate, producing 20% of US electricity and more than 60% of emission-free energy. The U.S. research into advanced reactors and completing the fuel cycle continued at about a billion dollars a year in the early 1980’s, and then gradually sank to zero in 1998. Concerns about greenhouse gas emissions and surety of electricity supply revived the U.S. nuclear R&D effort after the turn of the century. Today 70 new nuclear plants are under construction worldwide. While many of the research challenges remain the same as they were 40 years ago, the context has changed dramatically. This seminar will discuss, (1) today’s challenges for nuclear energy; (2) how new tools are making research breakthroughs possible, (3) the federal roadmap for nuclear R&D; and (4) the state of U.S. leadership in this highly competitive global enterprise.



Dr. Harold McFarlane

Abridged Biography:

Dr. McFarlane’s experience includes management positions with responsibility for developing advanced systems for nuclear power plants, nuclear fuel cycle, and space nuclear power. He was the site manager for a large, remote R&D complex with high-hazard nuclear facilities. He has served as interim Associate Laboratory Director for Nuclear Science and Technology at INL and Assistant Laboratory Director at Argonne National Laboratory. From 1972 to 1990, Dr. McFarlane was a member and leader of a small team that tested 14 zero-power advanced reactors. From 1991 through 2004, he led technology development projects for nuclear waste management, as well as overseeing the team that built and tested the nuclear batteries for solar system exploration. As the senior technical advisor to the Assistant Secretary for Nuclear Energy in the Department of Energy in 2010-2011, he coordinated the DOE national laboratories’ technical support following the Fukushima nuclear accident. Dr. McFarlane acquired international knowledge and experience by leading three global organizations. He was president of the American Nuclear Society, chairman of the International Nuclear Energy Academy, and is currently the Chief of Staff for the Generation-IV International Forum, a multinational research framework for developing advanced nuclear reactors. Dr. McFarlane holds a PhD in engineering science from the California Institute of Technology, as well as a bachelor’s degree in physics from the University of Texas, and master’s degree in business administration from the University of Chicago.



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