

# Optimizing Innovative Process and Energy Systems of the Future

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Senior Fellow for Strategic Systems  
Analysis and Engineering



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11:00 a.m. - 12:00 p.m.

[Zoom Meeting](#)

## Biography

Dr. David C. Miller is the Senior Fellow for Strategic Systems Analysis and Engineering at the National Energy Technology Laboratory (NETL) where he leads the Institute for the Design of Advanced Energy Systems (IDAES), a collaboration among universities and national laboratories to develop and apply next-generation, multiscale modeling and optimization capabilities.

Previously, he served as the Technical Director of the Carbon Capture Simulation Initiative (CCSI), which pioneered new ways to maximize learning during pilot-scale testing to reduce technical risk during scale-up.

Dr. Miller is a recipient of the Arthur S. Flemming Award for Exceptional Federal Service, Applied Science, and Engineering. He earned his Ph.D. in chemical engineering from The Ohio State University.



## Abstract

Over the next two decades, hundreds of billions of dollars will be invested in new, 21st-century energy systems and industrial processes to meet 2035 and 2050 decarbonization goals. These processes will be more dynamic and interconnected than ever before, offering unprecedented opportunities for innovation and the development of novel integrated systems. Such systems will extend significantly beyond current experience making heuristic and evolutionary development approaches insufficient to identify the most promising technologies, designs, and operating characteristics. Instead, new approaches for the design and optimization of complex, interacting multiscale systems will be needed to ensure a holistic understanding of the opportunity space and to accelerate the development of the best technology options.

The Institute for the Design of Advanced Energy Systems Integrated Platform (IDAES) was developed as an open-source, fully equation-oriented platform to enable the direct optimization of new designs and dynamic operations while incorporating uncertainty to support process innovation at multiple scales, from process to enterprise. IDAES enables the discovery of the lowest cost, most environmentally sustainable solutions by solving across vast, complex design spaces that cannot be adequately searched using traditional approaches.

Thus, IDAES enables the design and optimization of complex integrated energy and industrial systems, accelerating their development and deployment to support rapid decarbonization of the energy and industrial sectors.