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RENEWABLE AND SUSTAINABLE ENERGY INSTITUTE

BIG energy seminar series

Addressing global energy challenges in scale and complexity.

Advancing systems modeling to support the transition to a deeply decarbonized energy system

Dharik Mallapragada

Principal Research Scientist at the MIT Energy Initiative (MITEI)

Date: February 14th, 11-12pm

Location: SEEC Building, N224
(light snacks and beverages will be served)
Zoom: https://cuboulder.zoom.us/j/97004369138

Abstract:

Economy-wide decarbonization efforts are expected to heavily rely on wind and solar-based electricity generation to reduce emissions from the electric power sector as well as widespread electrification of many end-uses across transport, buildings and industry. Both these strategies will increase the spatial and temporal variability in energy supply and demand that complicates system operations and necessitates technological and market innovations to ensure reliable and cost-effective supply of low-carbon electricity. At the same time, for end-uses where electrification is currently impractical, there is a need to identify flexible and scalable processes for enabling electricity use or alternative emissions reduction strategies that can complement grid decarbonization efforts, such as low-carbon, low-cost production and utilization of hydrogen. In this talk, Dr. Mallapragada will present research contributions from his group at MIT, around modeling to support low-carbon energy systems planning and operations as well as development of enabling technologies. First, he will describe new approaches for representing spatial and temporal variability in wind and solar supply and other time-varying input data in models used for process and energy system design in a computationally tractable manner. Second, he will highlight the applicability of such foundational tools to inform technology development using two examples: a) Process design for electrified ammonia production and b) Coordinated planning of electricity and hydrogen infrastructure for deep decarbonization.

BIO:

Dharik S. Mallapragada is a Principal Research Scientist at the MIT Energy Initiative (MITEI), where he leads the Sustainable Energy Transitions Group. Dr. Mallapragada's research focuses on planning and operating resilient, low-carbon energy systems as well as conceptualization, design and integration of emerging energy technologies. At MIT, he has pursued research in these topics while securing funding from government, industry and philanthropic sources and establishing collaboration with multiple principal investigators across MIT and other institutions. Recently, he led the systems modeling effort for the *Future of Energy Storage study*, an interdisciplinary MIT project exploring the role for storage in future low-carbon grids. Prior to MIT, Dr. Mallapragada spent nearly five years in the energy industry working on a range of sustainability-focused research topics. He recently served as a member of the Massachusetts Commission on Clean Heat, and serves on the advisory committee for the Open Energy Outlook project , a multi-institution effort to create open-source energy systems models and data sets. He also co-leads systems thrust activities at the Center for Decarbonizing Chemical Manufacturing using Sustainable electrification (DC-MUSE). Dr. Mallapragada holds a M.S. and Ph.D. in Chemical Engineering from Purdue University and a B.Tech. in Chemical Engineering from the Indian Institute of Technology, Madras, India.

Link to campus map for SEEC Building

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