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SCHOOL OF
**MECHANICAL AND
AEROSPACE ENGINEERING**
College of Engineering, Architecture and Technology

MAE SEMINAR SERIES

Beyond Conventional Ground Source Heat Pumps: Integrated Approaches to Sustainable Building Energy Systems

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Saqib Javed is a Mechanical Engineering Researcher at the Center for Applied Research for Communities in Extreme Environments at NREL. He previously served as an Associate Professor at Lund University and as a Senior Researcher at Chalmers University of Technology, both located in Sweden.

With more than 25 years of experience, Saqib specializes in geothermal energy and heat pump systems, building and district energy systems, thermal energy supply and storage, HVAC systems, and the design of energy-efficient and plus-energy buildings. His expertise covers the entire technology lifecycle, including design, installation, research and development, operations and management, and sales and marketing.

He has led and coordinated over 50 technical and research projects, and has served as an evaluator, advisor, and consultant to national and international government agencies, multinational corporations, and research and innovation programs.

Saqib has authored more than 100 peer-reviewed publications, book chapters, and technical reports, with a focus on science and policy topics related to the built environment and thermal energy systems.



ABSTRACT

Ground source heat pump (GSHP) systems have long been recognized for their efficiency and sustainability in building energy applications. Their potential, however, extends far beyond conventional heating and cooling strategies. This seminar explores how integrated approaches that combine building design, system optimization, and networked applications can unlock new horizons for GSHP technology.

The presentation will showcase applied research examples that demonstrate new pathways for system optimization. Key themes include:

- Balancing ground loads through building envelope adjustments to ensure long-term thermal stability.
- Optimizing performance by selecting temperature lift strategies that enhance efficiency while reducing operational costs.
- Leveraging passive cooling techniques to minimize mechanical cooling demand and significantly cut electrical consumption.
- Integrating geothermal systems into district-scale networks, enabling resource sharing, load balancing, and resilience across multiple buildings.

The seminar will emphasize integrated methods that expand the role of GSHPs beyond conventional applications, presenting practical strategies and perspectives that highlight their potential as dynamic components of sustainable energy infrastructures.