

## Mohammad Reza NIKOO

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**Speaker**

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Wednesday, 15 January 2025 (۱۴۰۳ دی ۲۶)



14h30-15h30 (Tehran) | 11h00-12h00 (GMT) | 19h00-20h00 (Beijing)



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## Harnessing Oman's Coastal Wave Energy: A Pathway to a Sustainable Renewable Energy Future

### Abstract

Ocean wave energy offers immense potential as a sustainable renewable energy source, especially for regions like Oman with significant wave resources. This presentation explores how wave energy can be harnessed to provide clean, reliable power by leveraging Oman's unique climatic conditions. The high-energy waves driven by the southwest monsoon and Indian Ocean exposure make the country's coastal regions ideal for wave energy projects. The focus is on Wave Energy Converters (WECs), which utilize floating structures to optimize energy extraction. These systems are efficient and adaptable, but challenges such as the computational complexity of modeling persist. Advanced optimization strategies, including layout design and operational control frameworks, are crucial to enhancing energy capture while minimizing costs and structural wear. Current efforts aim to develop an AI-driven optimization framework for scalable deployment while addressing data gaps in wave energy potential. Field measurements using Acoustic Doppler Current Profilers (ADCP) are being conducted to identify optimal locations for wave energy harvesting along Oman's coast. Wave energy represents a promising opportunity to diversify Oman's energy portfolio, reduce greenhouse gas emissions, and support sustainable development. These efforts align with the country's net-zero emission targets, contributing to a cleaner, more resilient energy future.

### Biography

Dr. Mohammad Reza Nikoo, Associate Professor at Sultan Qaboos University (SQU) since 2021 and awarded as Elite by Iranian National Elites Foundation since 2008, is recognized for his contributions to water and sustainability. Listed among the world's top 2% scientists by Stanford in 2024 and ranked as Oman's top Civil Engineer, he received the Oman National Research Award 2024. Formerly an Associate Professor at Shiraz University (2017-2021), he earned multiple distinctions, including Top Young Researcher (2018, 2019 and 2020) and Iran's Eminent Young Scientist Award (2020). He has been an Honorary Visiting Fellow at the University of Technology Sydney (2022, 2023 and 2024). Dr. Nikoo has supervised 11 Ph.D. and 45 M.Sc. theses and published over 190 peer-reviewed journal papers, with 85% in Q1 journals. His research boasts 5373 citations and an H-index of 41. Since 2021, he has pioneered transformative projects in Oman, leading a HM Strategic Grant to enhance reservoir water quality at Wadi Dayqah Dam through innovative, interventions. As Co-Principal Investigator, he contributes to a Flash Flood Early Warning and Monitoring System in Al-Batina. He also collaborates with the FAO Oman on climate change impacts and promotes renewable coastal energy solutions. His expertise spans machine learning, data science, renewable energy, and integrated water management.

### Moderator

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