

Angineh Zohrabian, Ph.D.

44 Montgomery Street, Suite 1500, San Francisco, CA 94104
angineh.zohrabian@ethree.com

ENERGY AND ENVIRONMENTAL ECONOMICS, INC.

San Francisco, CA

Senior Consultant

Dr. Zohrabian joined E3 in 2021, adding to E3's Integrated System Planning group her experience in electric power systems, water-energy nexus and greenhouse gas emissions mitigation strategies. Her work primarily focuses on California's electricity system planning by supporting capacity expansion modeling for grid planning as well as achieving net zero emissions policy targets. She continues contributing to integrate emerging technologies into long-term capacity expansion modeling decisions. In addition to California, her experience spans other jurisdictions including Pacific Northwest, Southwest and Canada.

Before E3, she graduated from the University of Southern California with a doctorate degree in environmental engineering. In her research, she explored the challenges and opportunities of the water-energy nexus in California in the context of decarbonization and climate change policies. She has published several papers in Applied Energy, Energy Policy, Energies, International Journal of Greenhouse Gas Control, and International Journal of Hydrogen Energy.

Notable E3 projects include:

Integrated Resource Planning, California Public Utilities Commission (CPUC), 2021-ongoing. As part of the E3 team, Angineh is continuously supporting the CPUC in its IRP process in a wide range of workstreams including input updates, modeling capacity expansion scenarios using E3's in-house tool RESOLVE, interpreting the results, preparing public releases for RESOLVE model packages and presentation slides. Particularly, her involvement has grown during 2022 IRP processes including the LSE filings and the 2023-2024 Transmission Planning Process (TPP).

2022 California Air Resource Board (CARB) Scoping Plan, 2021-2022: The Scoping Plan represents an important analysis underpinning economy-wide decarbonization pathways in California. Angineh performed the electric system capacity expansion modeling using the RESOLVE model, to unpack the resource needs for the state of California to achieve carbon neutrality by 2045.

The role and production of green hydrogen in a decarbonizing electric grid, confidential client, 2022: As the lead analyst, Angineh modeled and characterized a hydrogen plant integrated into an electricity system. Particularly, the distinguishing features were to integrate a hydrogen plant that must produce hydrogen using renewable energy and can flexibly curtail when electricity prices are too high or the grid is constrained. The project supported a project developer and a utility to better understand the unique features of their system and the costs and challenges of integrating a green hydrogen plant.

Lower Snake River dams power replacement, Bonneville Power Administration (BPA), 2022: This independent project aimed to evaluate the cost and resource needs for replacing the energy and capacity value of the Lower Snake River dams in the Northwest in the context of deep decarbonizing

scenarios. Angineh was the lead analyst on this study and performed the regional capacity expansion model for Northwest and contributed to the report writing.

Resource adequacy and reliability support for utilities in Arizona and Colorado, 2021-ongoing. Angineh has supported performing technical analysis using E3's loss-of-load probability model, RECAP, to explore the region's near-term and mid-term reliability needs considering a range of different climate, resource, and load uncertainties.

UNIVERSITY OF SOUTHERN CALIFORNIA

Graduate Teaching Assistant

Graduate Research Assistant

Los Angeles, CA

August 2017 - May 2021

August 2016 - May 2021

- Developed methods that integrate high temporal and spatial resolution data from EPA and EIA to understand emissions from marginal generators to quantify the emissions tradeoffs of demand-side management strategies
- Led a team of five students that reviewed electricity demand-side management opportunities in the water sector as well as water-related end-uses. In six months, wrote a white paper for Electric Power Research Institute by summarizing over 100 studies from various research entities such as national laboratories, consulting companies, and universities
- As part of the project that guided the Los Angeles Department of Water and Power sustainable energy roadmap, collaborated with the National Renewable Energy Laboratory, working in the load forecast team to estimate electricity demand for future water needs in Los Angeles, considering the city's Sustainability Plan

SEED CONSULTING GROUP

Consultant

Los Angeles, CA

September 2020 - December 2021

- In a team of 7, provided pro-bono business consulting to a sustainable agriculture non-profit

SHARIF ENERGY RESEARCH INSTITUTE

Research Associate

Tehran, Iran

December 2013 - February 2015

- Contributed to develop analytical and experimental methods for assessing regional air emissions from Iran's upstream oil industry.
- Performed process simulations and combustion reaction modeling

Education

University of Southern California

Ph.D., Environmental Engineering

Los Angeles, CA

2021

Sharif University of Technology

M.S., Energy Systems Engineering

Tehran, Iran

2014

University of Isfahan

B.S., Chemical Engineering – Process Design

Isfahan, Iran

2012

Publications

- **Zohrabian A.**, Sanders K.T. (2021). *Emitting less without curbing usage? Exploring greenhouse gas mitigation strategies in the water industry through load shifting*. Applied Energy, 298, 117194.
- **Zohrabian A.**, Plata S.L., Kim D., Childress A.E., Sanders K.T. (2021). *A review of demand response opportunities in water supply and wastewater systems*. WIREs (Wiley Interdisciplinary Reviews) Water, 8:e1510.
- **Zohrabian A.**, Sanders K.T. (2020). *The energy trade-offs of transitioning to a locally sourced water supply portfolio in the City of Los Angeles*. Energies, 13 (21), 5589.
- **Zohrabian A.**, Kelly T Sanders (2018). *Assessing the impact of drought on the emissions-and water-intensity of California's transitioning power sector*. Energy Policy, 123, 461-470.
- Soltanieh M., **Zohrabian A.**, Gholipour M.J., Kalnay E. (2016). *A review of global gas flaring and venting and impact on the environment: Case study of Iran*. Int. J. Greenh. Gas Control, 49, 488-509.
- **Zohrabian A.**, Mansouri M., Soltanieh M., Sattari S. (2016). *Techno-economic evaluation of an integrated hydrogen and power co-generation system with CO₂ capture*; Int. J. Greenh. Gas Control, 44, 94-103.
- Sari A., **Zohrabian A.**, *Simulation study of the effect of feed moisture on autothermal reforming in short contact time catalytic micro channels*. Int. J. Hydrog. Energy, 39 (7), 3269-3285.