Stepp Mayes

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ENERGY AND ENVIRONMENTAL ECONOMICS, INC. San Francisco, CA
Consultant

Stepp Mayes is a consultant in E3's Integrated Systems Planning practice area. He joined E3 after earning a doctorate in Environmental Engineering, where he led projects assessing the role of demand flexibility in mitigating emissions and enhancing grid reliability. Before pursuing his PhD, he worked at the Environmental Protection Agency as an ORISE Fellow, contributing to the EPA's Ports Initiative by developing metrics to assess the sustainability of U.S. ports. His research leverages machine learning and statistical modeling to evaluate grid emissions, optimize residential electricity use, and explore strategies for reducing peak demand.

University of Southern California Los Angeles, CA
Postdoctoral Researcher January 2024–December 2024

- Implement regression and classification techniques to analyze the relationship between residential electricity consumption and grid-level emissions and assess the potential to mitigate emissions through demand flexibility
- Evaluate the potential of aggregated demand-side management to reduce emissions and provide grid-reliability services in order to reduce infrastructure expansion needs

University of Southern California Los Angeles, CA
Graduate Research Assistant August 2019–December 2023

- Utilized machine learning and statistical methods to calculate and forecast demand-based marginal emissions factors improving granularity and accuracy over previous statistical methods
- Determined the efficacy of residential building precooling as a strategy to reduce building electricity costs, cooling-associated emissions, and peak electricity demand via EnergyPlus simulations

University of Southern California Los Angeles, CA
Graduate Teaching Assistant August 2019–December 2023
Courses: Energy and the Environment, Computational Methods, Sustainable Infrastructure Systems, Fluid Mechanics

- Lead discussion sessions and office hours to guide students through complex problems and projects
- Wrote and graded exams, quizzes, and HW assignments to assess student knowledge in engineering concepts

Environmental Protection Agency Washington, DC
ORISE Fellow December 2018–August 2019

- Developed a set of metrics and indicators used to score the environmental and sustainable practices of U.S. Ports
- Used ArcMap and census tract data to define port boundaries and identify populations vulnerable to port emissions

The Princeton Review Los Angeles, CA
MCAT Physics Instructor October 2018–July 2019

- Prepared and taught classes on mechanics, electricity, magnetism, heat, waves, light, and quantum mechanics for students preparing for the MCAT exam

Education

University of Southern California Los Angeles, CA
PhD in Environmental Engineering December 2023

University of Southern California Los Angeles, CA
MS in Green Technology December 2021

University of Michigan Ann Arbor, Michigan
BSE in Engineering Physics, Minor in Mathematics May 2018

Select Publications

1. Peplinski, M., Mayes, S, & Sanders, K. T. (2025). *Revealing spatial and temporal patterns of residential cooling in Southern California through combined estimates of AC ownership and use.* Applied Energy, 377, 124583.
2. Mayes, S, Peplinski, M., & Sanders, K. T. (2024). *Analyzing how the timing and magnitude of electricity consumption drive variations in household electricity-associated emissions on a high-VRE grid.* Environmental Research: Energy, 1(4), 045010.
3. Mayes, S, Klein, N., & Sanders, K. T. (2024). *Using neural networks to forecast marginal emissions factors: A CAISO case study.* Journal of Cleaner Production, 434, 139895.
4. Mayes, S, Zhang, T., & Sanders, K. T. (2023*). Residential precooling on a high-solar grid: impacts on CO2 emissions, peak period demand, and electricity costs across California.* Environmental Research: Energy, 1(1), 015001.
5. Zohrabian, A, Mayes, S, & Sanders, K. T. (2023). *A data-driven framework for quantifying consumption-based monthly and hourly marginal emissions factors.* Journal of Cleaner Production, 396, 136296.
6. Mayes, S & Sanders, K. T. (2022). *Quantifying the electricity, CO2 emissions, and economic tradeoffs of precooling strategies for a single-family home in Southern California.* Environmental Research: Infrastructure and Sustainability, 2(2), 025001.