

Stepp Mayes

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EDUCATION

University of Southern California, CA PhD, Environmental Engineering	December 2023
University of Southern California, CA MS, Green Technology	December 2021 3.93 GPA
University of Michigan, MI B.S.E., Engineering Physics Minor in Mathematics	May 2018 3.48 GPA

EXPERIENCE

Postdoctoral Researcher, University of Southern California	January 2024–Current
<ul style="list-style-type: none">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 flexibilityEvaluate the potential of aggregated demand-side management to reduce emissions and provide grid-reliability services in order to reduce infrastructure expansion needs	
Graduate Research Assistant, University of Southern California	August 2019–December 2023
<ul style="list-style-type: none">Utilized machine learning and statistical methods to calculate and forecast demand-based marginal emissions factors improving granularity and accuracy over previous statistical methodsDetermined the efficacy of residential building precooling as a strategy to reduce building electricity costs, cooling-associated emissions, and peak electricity demand via EnergyPlus simulations	
Graduate Teaching Assistant, University of Southern California	August 2019–Dec 2023
Courses: Energy and the Environment, Computational Methods, Sustainable Infrastructure Systems, Fluid Mechanics	
<ul style="list-style-type: none">Lead discussion sessions and office hours to guide students through complex problems and projectsWrote and graded exams, quizzes, and HW assignments to assess students knowledge in engineering concepts	
ORISE Fellow, Environmental Protection Agency	December 2018–August 2019
<ul style="list-style-type: none">Developed a set of metrics and indicators used to score the environmental and sustainable practices of U.S. PortsUsed ArcMap and census tract data to define port boundaries and identify populations vulnerable to port emissions	
MCAT Physics Instructor, The Princeton Review	October 2018–July 2019
<ul style="list-style-type: none">Prepared and taught classes on mechanics, electricity, magnetism, heat, waves, light, and quantum mechanics for students preparing for the MCAT exam	

ACTIVITIES AND MENTORSHIP

Sander's Sustainable Systems Group <i>Research Mentor</i>	2021-current
Develop project ideas and meet regularly with Master's level and undergraduate research students to provide guidance on research questions, data analysis challenges, and domain-specific electric grid analysis.	
USC Viterbi Link <i>Academic and Professional Mentor</i>	2021-2023
Provided support for newly enrolled graduate students in engineering at USC, including advice on classes, career planning, and extracurricular activities (4 students mentored).	
GSWOC-UAW <i>Bargaining Team Member</i>	2023
Worked with professional legal counsel to draft and negotiate a new contract for USC PhD students, including writing articles on wages, discipline and dismissal, and leaves, and participated in in-person legal negotiations.	
GSWOC-UAW <i>Departmental Steward</i>	2020-2023
Lead town halls and large meetings, planned and coordinated outreach events, and developed campaign strategy.	
USC Viterbi Green Technologies Program <i>Student Lead</i>	2022-2023
Collected student feedback and worked with USC faculty to redesign the program for the Master's degree in Green Technologies, including developing new focus areas and course listings.	
USC Sonny Astani <i>Secretary Chair</i>	2022
Organized location, materials, and programming for the first annual SoCal Research Symposium.	

HONORS AND AWARDS

Behavior, Energy, and Climate Change Conference: Student Fellowship	2023
Ershaghi Center for Energy Transition: Seed Funding Recipient	2022
SoCal Research Symposium Workshop: Best Pitch	2022
EPA OTAQ: Gasoline Engine Compliance Branch Employee of the Month	2017

PUBLICATIONS AND PRESENTATIONS

Journal Publications

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.

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.

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.

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.

Oral Presentations

Stepp Mayes. "Demand-Side Management of Electricity." Guest Speaker at Honors Colloquium- University of Southern California, Los Angeles, California. Feb., 2024

Joseph Ko, Yun Li, **Stepp Mayes**, McKenna Peplinski, Hannah Schlaerth, Pouya Vahmani, George A Ban-Weiss and K.T Sanders. "Modeling the Spatiotemporal Distribution and Meteorological Impacts of Anthropogenic Heat in Los Angeles." AGU Fall Meeting, San Francisco, California. Dec., 2023.

Stepp Mayes, Nicholas Klein, Natalia Ratner, Kelly Sanders. "The Social Value of Demand-Side Management." Behavior Energy and Climate Conference, Sacramento, California. Nov. 2023

Stepp Mayes. "Electricity End-Use and Environmental Impacts." Guest Speaker for Prospective Students- University of Southern California, Los Angeles, California. Mar., 2022

Poster Presentations

Stepp Mayes, Nicholas Klein, Natalia Ratner, K. T. Sanders. "Forecasting Marginal Emissions Factors with Neural Networks." AGU Fall Meeting, San Francisco, California. Dec., 2023.

McKenna Peplinski, **Stepp Mayes**, Kelly Sanders. "Improving AC Penetration Estimates for Demand Response." AGU Fall Meeting, San Francisco, California. Dec., 2023.

Stepp Mayes, Kelly Sanders. "Forecasting Marginal Emissions Factors." SoCal Research Symposium, Los Angeles, CA. 2023

Stepp Mayes, Kelly Sanders. "Calculating Marginal Emissions Factors for Demand-side Management on a High-Renewable Grid." American Geophysical Union, Chicago, IL. Dec., 2022

Stepp Mayes, Kelly Sanders. "The Emissions Impacts of Demand-Side Management on a High Renewable Grid." SoCal Research Symposium, Los Angeles, CA. 2022

Stepp Mayes, Kelly Sanders. "Achieving peak load and CO₂ emissions reductions by aligning AC usage with solar energy availability through residential precooling strategies." American Geophysical Union, New Orleans, LA. Dec., 2021

Stepp Mayes, Kelly Sanders. "Cooling our Homes with the Sun: Exploring Precooling Strategies to Reduce Greenhouse Gas Emissions." American Geophysical Union, Remote. Dec., 2020