

Tao Sun

luke18@stanford.edu | Room 268, 473 Via Ortega, Stanford, CA 94305 | 650.609.8826
luke18.github.io

EDUCATION

Stanford University, Stanford, California, USA

Ph.D. in Civil and Environmental Engineering (Atmosphere/Energy)

Sep 2018 – Jun 2025

Thesis: The Climate-Power Nexus: Modeling Climate Risks, Power Outages, and End-User Adaptation
Committee: Ram Rajagopal, Arun Majumdar, Aditi Sheshadri, Ines Azevedo, Martin Fischer

Shanghai Jiao Tong University, Shanghai, China

M.Sc. in Electrical Engineering

Sep 2015 – Mar 2018

B.Sc. in Electrical Engineering (IEEE Honor Class)

Sep 2011 – Jun 2015

APPOINTMENT

Stanford University, Stanford, California, USA

Postdoctoral Scholar, Civil and Environmental Engineering

Jun 2025 – Present

PUBLICATIONS

JOURNALS

- J15 **T. Sun**, Y. Feng, C. Zanocco, J. Flora, A. Majumdar, R. Rajagopal. “Solar and battery can reduce energy costs and provide affordable outage backup for a majority of U.S. households.” in ***Nature Energy***, 2025.
- J14 **T. Sun**, Y. Feng, C. Zanocco, J. Flora, A. Majumdar, R. Rajagopal. “Solar and batteries are affordable options for US households.” in ***Nature Energy***, 2025.
- J13 **T. Sun**, C. Zanocco, J. Flora, A. Sheshadri, R. Rajagopal. “Unified 0.25-degree gridded infrastructure-critical extreme weather for the United States from 1979 to 2100.” in ***Scientific Data***, 2025.
- J12 **T. Sun**, C. Zanocco, J. Flora, S. Johnson, H. Soto, R. Rajagopal. “Cooling-related electricity consumption patterns for small and medium businesses in California: Current impacts and future projections under climate change.” in ***Energy and Buildings***, 2023.
- J11 G. Zuin, R. Buechler, **T. Sun**, C. Zanocco, F. Galuppo, A. Veloso, R. Rajagopal. “Extreme event counterfactual analysis of electricity consumption in Brazil: Historical impacts and future outlook under climate change.” in ***Energy***, 2023.
- J10 C. Zanocco, **T. Sun**, G. Stelmach, J. Flora, R. Rajagopal, H. Boudet. “Assessing Californians’ awareness of their daily electricity use patterns.” in ***Nature Energy***, 2022.
- J9 E. Buechler, S. Powell, **T. Sun**, C. Zanocco, N. Astier, J. Bolorinos, J. Flora, H. Boudet, R. Rajagopal. “Global changes in electricity consumption during COVID-19.” in ***iScience***, 2022.
- J8 D. Bergman, **T. Sun**, E. Buechler, C. Zanocco, R. Rajagopal. “The Grid Under Extremes: Pandemic Impacts on California Electricity Consumption.” in ***IEEE Power and Energy Magazine***, 2022.
- J7 **T. Sun**, L. Tong, D. Feng, “On the Dynamics of Distributed Energy Adoption: Equilibrium, Stability, and Limiting Capacity” in ***IEEE Trans. Automatic Control***, 2020.
- J6 Q. Zhou, M. Shahidehpour, **T. Sun**, etc., “Cooperative Game for Carbon Obligation Allocation among DSOs to Incentivize the Proliferation of Renewable Energy” in ***IEEE Trans. Smart Grid***, 2019.
- J5 L. Chen, **T. Sun**, Y. Zhou, etc. “Method of Carbon Obligation Allocation Between Generation Side and Demand Side in Power System.” in ***Automation of Electric Power Systems***, 2018.
- J4 D. Feng, **T. Sun**, C. Fang, Y. Shi, S. Xu. “Optimal Demand Contracting Strategy under Uncertainty and Its Implication for Advanced Pricing” in ***IEEE Trans. Smart Grid***, 2016.
- J3 S. Xu, D. Feng, **T. Sun**, etc. “Ontology-Based Semantic Multi-agent Framework for Micro-grids with Cyber Physical Concept” in ***Journal of Donghua University (Eng. Ed.)***, 2015.
- J2 Q. Zhou, D. Feng, C. Xu, C. Feng, **T. Sun**, “Methods for Allocating Carbon Obligation in Demand Side: a Comparative Study” in ***Automation of Electric Power Systems***, 2015.

- J1 Q. Zhou, D. Feng, C. Fang, **T. Sun**, etc. “An Incentive-based Nodal Pricing Method under Multiple Dual Solutions” in *Automation of Electric Power Systems*, 2014.

WORKING PAPERS

- W5 **T. Sun**, C. Zanocco, J. Flora, A. Majumdar, R. Rajagopal. “Long-term trends of power outages in the United States.” 2025.
- W4 C. Zanocco, **T. Sun**, J. Flora, R. Rajagopal, H. Boudet. “Power outage experience shapes support for grid reliability policy.” 2025.
- W3 M. Rasouli, **T. Sun**, R. Rajagopal. “Contracts with Aftermarket Substitution: Case of PG&E and Electricity Batteries.” Available at SSRN: <https://ssrn.com/abstract=3910974>, 2021.
- W2 M. Rasouli, **T. Sun**, C. Pache, P. Panciatici, J. Maeght, R. Johari, R. Rajagopal, “Cloud Storage for Multi-Service Battery Operation.” Available at SSRN: <https://ssrn.com/abstract=3848288>, 2021.
- W1 M. Rasouli, **T. Sun**, R. Rajagopal, “FedGAN: Federated Generative Adversarial Networks for Distributed Data.” Available at arXiv: <https://arxiv.org/abs/2006.07228>, 2020.

CONFERENCES

- C16 **T. Sun**, C. Zanocco, J. Flora, A. Majumdar, R. Rajagopal, “Rising U.S. power grid vulnerability to extreme weather: a multi-decadal analysis.” in *AGU Fall Meeting*, 2025.
- C15 Y. Lu, **T. Sun**, R. Rajagopal, “Vulnerability of U.S. Power Generation to Extreme Weather: A Data-Driven Analysis.” in *AGU Fall Meeting*, 2025.
- C14 Z. Wang, **T. Sun**, C. Zanocco, J. Flora, H. Boudet, R. Rajagopal, A. Majumdar, “Capturing Adaptive Human Responses to Extreme Weather Events with Large Language Models.” in *AGU Fall Meeting*, 2025.
- C13 S. Shreewastava, C. Zanocco, J. Flora, **T. Sun**, “Advancing High School Youth’s Energy Literacy Through Authentic Exploration of Household Energy Data.” in *AGU Fall Meeting*, 2025.
- C12 Y. Feng, **T. Sun**, Y. Zhou, D. Feng, Q. Liu, D. Lin, “Carbon Responsibility Allocation in Real-Time Electricity Market based on KernelSHAP.” in *IEEE PES General Meeting*, 2025. (**Best Paper Award**)
- C11 **T. Sun**, C. Zanocco, J. Flora, and R. Rajagopal, “Mapping the Depths: A Stocktake of Underground Power Distribution in United States.” in *IEEE PES General Meeting*, 2024.
- C10 **T. Sun**, C. Zanocco, G. Zuin, R. Buechler, J. Flora, F. Galuppo, H. Soto, A. Veloso, R. Rajagopal, “Assessing Climate Change Impacts on Electricity Consumption: Micro to Macro Perspectives from California’s Commercial Sector to Brazil’s National Grid.” in *AGU Fall Meeting*, 2023.
- C9 G. Zuin, R. Buechler, **T. Sun**, C. Zanocco, D. Castro, A. Veloso, R. Rajagopal. “Revealing the Impact of Extreme Events on Electricity Demand in Brazil: A Data-Driven Counterfactual Approach.” in *IEEE PES General Meeting*, 2022.
- C8 M. Rasouli, **T. Sun**, C. Pache, P. Panciatici, J. Maeght, R. Johari, R. Rajagopal, “Multi-Service Battery Operation with Cloud Electricity Storage.” in *IEEE PES General Meeting*, 2020.
- C7 **T. Sun** and L. Tong, “Killing death spiral softly with a small connection charge” in *Allerton Conference on Communication, Control, and Computing (Allerton)*, 2017.
- C6 Y. Shi, **T. Sun** and D. Feng, “The economic impact of electric vehicle routing and charging strategy on traffic-power integrated networks” in *IECON*, 2017.
- C5 L. Chen, **T. Sun**, Q. Zhou and D. Feng, “A Shapley value based method for allocating carbon obligation between generation side and demand side in power system” in *IECON*, 2017.
- C4 C. Fang, B. Fan, **T. Sun**, D. Feng and J. Chen, “Business models for demand response aggregators under regulated power markets,” in *CIREN*, 2017.
- C3 **T. Sun**, D. Feng, T. Ding, L. Chen, S. You. “Directed Graph Based Carbon Flow Tracing for Demand Side Carbon Obligation Allocation” in *IEEE PES General Meeting*, 2016.
- C2 **T. Sun**, D. Feng. “Economic Impact of Electric Vehicle Fast-Charging Routing on Power Systems” in *US-China Green Energy Summit*, 2016. (**Best Paper Award**)
- C1 Q. Zhou, **T. Sun**, T. Ding, etc. “Application of Carbon Intensity in Generation Expansion Planning: A Comparative Study,” *IEEE PES General Meeting*, 2015.

INVITED TALKS

- T9 “Solar and Battery Can Reduce Energy Costs and Provide Affordable Outage Backup for US Households.” EcoFlow AI-Insight Seminar, Aug 2025.
- T8 “Grid Planning, Resilience and Reliability: Modeling Transmission Investments and Understanding Outage Occurrences.” EARNEST Consortium Seminar, May 2025.
- T7 “How climate change and extreme weather impact power outage?” Stanford DYEL Summer Seminar, June 2024.
- T6 “Assessing Climate Change Impacts on Electricity Consumption: Micro to Macro Perspectives from California’s Commercial Sector to Brazil’s National Grid.” Climate Action Research Lab, University of Freiburg, Nov 2023.
- T5 “Data-Driven Power Reliability Modeling under Climate Change.” Undergrounding Command Center, Pacific Gas & Electric Company, Oct 2023.
- T4 “Long-Term Trends of Power Outages in United States.” EARNEST Launch Meeting, Sep 2023.
- T3 “Extreme Weather, Climate Change, and Long-Term Power Reliability Modeling.” American Public Power Association, Mar 2023.
- T2 “Temperature Sensitivity of Electricity Demand in the Small and Medium Business Sector.” Stanford Energy Student Lectures, Aug 2022.
- T1 “Temperature Sensitivity of Electricity Demand in the Small and Medium Business Sector: Current Outlook and Projections Under Future Climate Change.” Shell USA, Jun 2022.

TEACHING & MENTORING

- Mentor**, EcoRAMP Undergraduate Research Assistant Oct 2025 – Present
- Mentor**, Stanford Summer Undergraduate Program on Energy Research June 2025 – Aug 2025
- Instructor**, Designing Your Energy Lifestyle (DYEL) 2023/24/25 Summer
Co-designed and taught a Stanford interdisciplinary summer program that engages high school students in energy data science to understand energy systems and sustainability.
- Course Project Mentor**, Modern Power Systems Engineering 2023/24/25 Spring
CEE 272R/ENERGY 272R taught by Ram Rajagopal at Stanford University. Mentored 15 PhD and MS students on their course research projects.
- Teaching Assistant**, Data Analytics for Urban Systems 2021 Fall
CEE 322 taught by Ram Rajagopal at Stanford University. Teach weekly sessions, hold office hours, grade homework, and contribute to course content development.
- Teaching Assistant**, Theory & Appl. of Optimization in Modern Power System Operation 2016 Fall
EE 26007 taught by Donghan Feng at Shanghai Jiao Tong University. Hold office hours, and grade homework.
- In addition to above, I am currently mentoring 2 PhD students and 1 MS student for their research.

SERVICE**Reviewer**

Journals: Proceedings of the National Academy of Sciences (PNAS), Joule, Nature Communications, Applied Energy, IEEE Transactions on Neural Networks and Learning Systems, IEEE Transactions on Smart Grid, IEEE Transactions on Sustainable Energy, Energy, Energy Policy, Energy and Buildings, Energy Research & Social Science, Sustainable Cities and Society, Sustainable Energy Technologies and Assessments, Utilities Policy, Heliyon, Process Integration and Optimization for Sustainability, Journal of Environmental Management, IEEE Access, Environmental Engineering and Management Journal, Frontiers of Information Technology & Electronic Engineering, Social Sciences & Humanities Open, World Development

Conferences: IEEE Power and Energy Society General Meeting (PESGM), International Conference on Industrial Engineering and Applications (ICIEA), International Conference on Mechanical, Electric and Industrial Engineering

MEDIA COVERAGE

- Stanford News**, “Buried power lines could cut weather-related outages” Nov 2025
- ABC7 News**, “Stanford study confirms savings, benefits for households that opt for solar” Sep 2025
- Center for Data Innovation**, “Forecasting Climate Impacts on Infrastructure” Sep 2025
- The Washington Post**, “Home batteries are saving America from blackouts” Aug 2025
- Forbes**, “Who’s Impacted And How To Still Go Green” Aug 2025

The Cool Down , “Backup power is increasingly critical for at-risk homes”	Aug 2025
Stanford News , “Households can save money and weather blackouts with solar plus storage”	Aug 2025
Stanford Energy , “Consumers misperceive electricity use at home”	Dec 2022
AZoCleantech , “Analyzing Effects of Better Awareness in Electricity Usage Patterns”	Dec 2022
Stanford News , “Decline and recovery of global electricity use in COVID’s first seven months”	Feb 2022
Oregon Public Broadcasting , “Shining a light on electricity declines during pandemic”	Jan 2022

PROFESSIONAL MEMBERSHIPS

Institute of Electrical and Electronics Engineers (IEEE)	2011 – Present
American Geophysical Union (AGU)	2023 – Present
American Society of Civil Engineers (ASCE)	2022 – Present

AWARDS & HONORS

Stanford Impact Labs Postdoctoral Fellowship, Stanford University	2025
OpenAI Researcher Access Grant, OpenAI	2025
Best Paper Award, IEEE PES General Meeting	2025
McGee and Levorsen Fellowship, Stanford University	2023
Best Paper Award, US-China Green Energy Summit	2016
Best Bachelor Thesis Award, Shanghai Jiao Tong University	2015
Undergraduate Research Grant, Shanghai Jiao Tong University	2014