

Yufan Ji

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Profile

PhD researcher at The Ohio State University applying machine learning, causal inference, and statistical modeling to large-scale energy market and infrastructure datasets. Experienced in building Python/R pipelines and predictive models for 2M+ electricity market observations to analyze pricing dynamics, supplier behavior, grid resilience, and consumer decision-making. Interested in data science and applied research roles in energy, infrastructure, and resilience analytics.

Technical Skills

Programming: Python, R, SQL, MATLAB

Machine Learning: PyTorch, scikit-learn, graph neural networks, interpretable ML

Statistical Modeling: causal inference, time-series forecasting, uncertainty quantification, discrete choice modeling, Bayesian modeling

Data Engineering & Analysis: pandas, NumPy, large-scale data pipelines, panel data, NLP/text mining, geospatial-temporal data integration

Tools: Git/GitHub, Jupyter, LaTeX, Overleaf

Education

The Ohio State University, Columbus, OH

Ph.D. in Civil Engineering (Structural Engineering), Expected Dec 2027

Minor in Computer Science and Engineering

Advisor: Prof. Abdollah Shafieezadeh

National University of Singapore, Singapore

M.Eng. in Civil Engineering, Jun 2023

Thesis: Reliability Analysis of Offshore Structures (Advisor: A/Prof Ying Min Low)

Southeast University, Nanjing, China

B.Eng. in Civil Engineering, Jun 2022

Research & Data Science Experience

Electricity Price Forecasting

Jan 2025 – Feb 2026

- Developed a causal graph-informed temporal convolutional network (CG-TCN) for retail electricity price forecasting, achieving 3.08% MAPE.
- Built end-to-end Python pipelines integrating 10+ years of daily market data, 2M+ retail electricity offers, wholesale forward prices, and contract attributes.
- Produced interpretable insights into key drivers of price variation using causal feature representations and model diagnostics.

Retail Renewable Energy Premiums Analysis

Aug 2024 – Aug 2025

- Built a matching pipeline linking renewable and non-renewable retail electricity offers, creating 120k+ matched contracts to isolate renewable price premiums.
- Applied gradient boosting and SHAP to quantify drivers of renewable premiums across utilities, time periods, and contract attributes.
- Identified a 7.66% average renewable premium and a \$44/MWh wholesale price threshold associated with supplier margin compression.

AI Data Centers and Grid Resilience

Nov 2025 – Apr 2026

- Built a county-level panel dataset (2014–2025) across 67 Florida counties, integrating outage

records, hurricane exposure (17 events), socioeconomic data, and geocoded data center infrastructure.

- Engineered spatial-temporal features and applied causal inference (DiD, event study) to quantify impacts on peak outage rates and recovery duration under extreme weather.

Causal ML for Decision Optimization

Aug 2024 – Nov 2025

- Developed uncertainty-aware causal forest models for treatment optimization under heterogeneous effects.
- Designed evaluation frameworks improving decision performance over baseline methods.

Publications

- Dormady, N., Welch, W., **Ji, Y.**, Pedron, S., Shafieezadeh, A., Lamadrid, A., Hoyt, M., & Fox, S. (2025). Efficiency and Consumer Welfare Under Retail Electricity Deregulation. *Journal of Critical Infrastructure Policy*.
- **Ji, Y.**, Shafieezadeh, A. (2025). Robust Treatment Assignment with Uncertainty-Aware Causal Forests. *Expert Systems with Applications*.
- **Ji, Y.**, Dormady, N., Shafieezadeh, A., et al. (2026). Explainable Machine Learning Analysis of Retail Renewable Premiums. Under review.
- **Ji, Y.**, Shafieezadeh, A., Dormady, N. (2026). Causal Graph-Informed Temporal Convolution for Electricity Price Forecasting. Under review.

Presentations

- “Energy Affordability in Competitive Retail Electricity Markets: Evidence on Prices, Contract Design, and Consumer Outcomes”. Understanding and Addressing Energy Affordability in the United States Workshop, National Academies, Washington, DC, Feb 2026. *Selected and funded by the National Academies*.
- “Bridging Research and Community Action: Advancing Energy Justice in Retail Electricity Markets”. Ohio State Office of Outreach and Engagement Graduate Student Poster Competition, Columbus, OH, Nov 2025.
- “Renewable Premiums in Ohio’s Retail Electricity Market, 2014–2023: Matched-Offer Evidence and Explainable ML Insights”. APPAM Fall Research Conference, Seattle, WA, Nov 2025.
- “From Cause to Forecast: Causal Graph-Guided Temporal Convolutional Networks for Retail Electricity Price Prediction”. CEGE Graduate Research Expo, Columbus, OH, Oct 2025. *Best Communication Award*.
- “Interpretable Retail Electricity Price Forecasting with Causal Graph-Informed Temporal Convolutional Networks”. College of Engineering Graduate Research Symposium, Columbus, OH, Oct 2025. *Best Presentation Award*.
- “Enhancing Causal Inference: Reducing Uncertainty in Causal Forest Models through Cross-Validation”. American Causal Inference Conference, Detroit, MI, May 2025.
- “Consumer Welfare Effects in Restructured Electricity Markets”. USAEE/IAEE North American Conference, Baton Rouge, LA, Nov 2024.

Awards, Leadership & Service

- Sustainability Institute Student Grant \$5,000, The Ohio State University (2025)
- Student feature, Alfred P. Sloan Foundation Energy and Environment Newsletter (Apr 2025)
- Graduate Student Ambassador, CEGE department at OSU (Oct 2025 – Present)
- Advisor, International Undergraduate Future Orientation at OSU (Aug 2024–Present)
- Advisor, Research Experiences for Undergraduates (REU) Site, OSU (May–Jul 2024)
- Volunteer, Central Ohio Mini Bridge Competition in Franklin County, OH (2026)