Yijiao (Josephine) Wang

Phone: (608) 698-4448
Email: ywang303@jhu.edu
Address: 727 W 40th St APT 338, Baltimore, MD, 21211

Education

Ph.D. student, Environmental Science and Engineering, Johns Hopkins University, 2019.8 - Present

M.Eng., Applied Mathematics and Statistics, Johns Hopkins University, 2016.8 - 2018.5

B.B.A., Mathematics, University of Wisconsin-Madison, 2011.8 - 2016.5

Honors

Dean's List for Overall Major GPA (Top 10%)

Dean's List (Top 10%), Spring 2015

Dean's List (Top 10%), Spring 2014

Previous Research Field

Applied Mathematics

Research Project

Solar Forecasting (with Benjamin Hobbs, IBM's Thomas Watson Research Center, National Renewable Energy Laboratory, and University of Texas at Dellas)

Abstract: Traditional power suppliers have to predict how much power a region will need a day in advance, potentially overestimating or underestimating demand. The project aims to significantly improve solar forecasting accuracy, using artificial intelligence and bayesian analysis, so the nations grid operators know precisely, and in advance, how much power to produce for any given day and hour.

Energy Economics: Financial Mathematics to Identify Optimal Electricity Distribution Pricing under Risk, High Photovoltaics Penetration, and Consumer Aggregation (with Benjamin Hobbs and Maxim Bichuch)

Abstract: The research project analyzes a new electricity pricing mechanism by taking into account the use of renewable energy such as photovoltaics generation. The new mechanism allows utilities to cover its own operation cost as well as promotes the efficiency of energy use and distribution. The model assumes the demand for electricity consumption follows a mean-reverting stochastic process (Ornstein-Uhlenbeck). Monte-Carlo simulation is employed to capture the demand evolving process throughout the time. We further formulate the bulk generation prices in the form of a step function. Under the mathematical framework, we can derive the scale of the optimal photovoltaic installation for a representative consumer both in its closed form and by stochastic approximation. And based on the optimal installation scale, policy makers can further optimize the regulatory variables which are used to identify distribution tariff structures and actively meet the regulatory objectives.

Role of Large-Scale Energy Storage in Transmission Planning

Argonne National Laboratory

Abstract: The research project focuses on the consideration of Energy Storages as an Alternative Transmission Solution (ATS) for cost recovery purpose in regional Transmission Planning and associated cost allocations. For this purpose, the study investigates a few existing relevant projects including Western Grid and Oakland Clean Energy Initiative project. Based on the investigation, recommendations are provided for future Energy Storeage projects to consider.

Transportation Electrification: Agent-Based Transportation Energy Analysis Model

Argonne National Laboratory

Abstract: This project studies the application of Agent-Based Modeling (AMB) on the expansion of eletric vehicles (EV) and charging stations.The model focuses on the interaction between electric vehicles and supporting charging infrastructures in Chicago metropolitan area to gain better understanding of the spatial-temporal distribution of charging loads and the interaction between EV adoption and the evolution of charging infrastructures. Fuzzy C-means clustering is used for optimal charging station location allocation.

Publication

Energy Economics: Financial Mathematics to Identify Optimal Electricity Distribution Pricing under Risk, High Photovoltaics Penetration, and Consumer Aggregation (Under Review)

Role of Large-Scale Energy Storage in Transmission Planning - DOE Report (Under Review)

Agent-Based Transportation Energy Analysis Model: Methodology and Initial Results - DOE Report (Under Review)

Co-evolution of electric vehicle adoption and charging infrastructure expansion using agent-based modeling (Under Review)

Coordinated Ramping Product and Regulation Reserve Procurements in CAISO and MISO Area Using Multi-Scale Probabilistic Solar Power Forecasts (Working Paper)

Conference and Seminar Presentation

2018.5, Energy Seminar in the Department of Environmental Health and Engineering, Financial Mathematics to Identify Optimal Electricity Distribution Pricing under Risk, High Photovoltaics Penetration, and Consumer Aggregation

2017.10, Financial Mathematics Department Seminar, AMPS: Financial Mathematics to Identify Optimal Electricity Distribution Pricing under Risk, High Photovoltaics Penetration, and Consumer Aggregation

Teaching Assistant Experience

2017.8 - 2017.12, Financial Derivative, Professor David Audley

2018.1 - 2018.5, Interest Rate and Credit Derivative, Professor David Audley

Work Experience

Argonne National Laboratory, 2018.11 - 2019.07
Predoctoral Appointee, Energy System Division (CEEESA)

Argonne National Laboratory, 2018.07 - 2018.10
Research Aide, Energy System Division (CEEESA)

Haitong Securities, 2015 and 2016 3-months summer intern
Research Assistant, Financial Engineering Department

- For pair trading, modeled the log-return difference between a trading pair as a mean-reverting process.
- Tested the hypothesis that pair trading strategies perform better in market downturn by back-testing on 2008 high-frequency (five-minite) data.
- Tested the hypothesis that oil company stocks are driven by oil price by investigating 21 selected oil company stocks in 2008.
- Priced arithmetic Asian option on WTI crude oil future through Monte-Carlo simulation.
- Analyzed the liquidity risk and daily PNL associated with two major Calendar Spread arbitrage strategies: One based on the average velocity of price convergence and the other based on the time till maturities.

Programming Skills

Extremely proficient in Python, R, Java, Matlab, and MS Excel

Proficient in STATA, SQL, QGIS, LaTeX, and Repast Symphony

Last updated: January, 2020