

# Ningkun (Nik) Zheng

## EDUCATION

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- Columbia University, New York, NY** January 2021 – Present
- Ph.D. – Earth and Environmental Engineering
- Johns Hopkins University, Baltimore, MD** September 2018 – December 2019
- Master of Science - Environmental Health and Engineering
- Zhejiang University, Hangzhou, China** September 2014 – June 2018
- Bachelor of Science – Agriculture Resource and Environment

## INTERN & WORKING EXPERIENCE

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- Energy Systems and Infrastructure Analysis Division, Argonne National Laboratory** Lemont, IL  
Ph.D. Research Aid May 2022 - Aug 2022
- Weather-Dependent Probabilistic Resources Adequacy Model
- Proposed an optimization-based model framework for long-term resource adequacy analysis, which include weather information for generation unit outage rate assessment.

- Carnegie Mellon Electricity Industry Center, Carnegie Mellon University** Pittsburgh, PA  
Research Assistant May 2020 - December 2020  
PI: Prof. Jay Apt
- Market Power Mitigation Considerations for Storage and Hybrid Resources
- Developed the bi-level optimization model of energy storage in competitive electricity market in Pyomo
  - Wrote up mathematical formulation and linearization
  - Implemented new features in model, such as linearized relaxed unit commitment, hybrid resources type, two-settlement functionality
- Zonal Resource Adequacy Contribution of Storage and Hybrid Resources in MISO
- Data collection and processing, learned and summarized NREL's PRAS model

- Department of Environmental Health and Engineering, Johns Hopkins University** Baltimore, MD  
Research Assistant September 2019 – May 2020  
PI: Prof. Benjamin Hobbs
- Crediting Variable Renewable Energy and Energy Storage in Capacity Market: The Effects of Unit Commitment and Storage Operation
- Developed a resource adequacy model with unit commitment for capacity credit evaluation in AIMMS
  - Used the model to quantify the resulting loss of efficiency at equilibrium due to capacity credit distortion, in combination with renewable tax subsidies and generation portfolio standards
  - Explore the impact of unit commitment constraint, storage installation and coal plant retirement

- Department of Environmental Health and Engineering, Johns Hopkins University** Baltimore, MD  
Teaching Assistant for Environmental Health and Engineering Systems  
Teaching Assistant for Risk and Decision Analysis September 2019 – December 2019
- Graded homework and provided comments and suggestions to students during weekly office hours

- Energy Administration of Ningbo** Ningbo, China  
Intern June 2019 – September 2019
- Participated in the direct trading of Zhejiang electric power
  - Investigated city key energy-using enterprises to supervise the use of energy by enterprising and providing guidance in energy conservation
  - Attended Zhejiang electricity market design and implementation seminar, mastered market design details, and assisted market design implementation.

## **PUBLICATIONS**

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1. **N. Zheng**, X. Liu, Y. Shi Y. and B. Xu. "Energy Storage Price Arbitrage via Opportunity Value Function Prediction." in *2023 IEEE Power and Energy Society General Meeting (PESGM)*, pp. 1-5.
2. **N. Zheng**, X. Qin, D. Wu, G. Murtaugh, and B. Xu. "Energy Storage State-of-Charge Market Model." in *IEEE Transactions on Energy Markets, Policy and Regulation*, doi: 10.1109/TEMPR.2023.3238135.
3. U. Salman, S. Belaish, Z. Ji, D. Huang, **N. Zheng** and B. Xu, "Comparing the economic value of lithium-ion battery technologies in the nine wholesale electricity markets in North America," in *iEnergy*, vol. 1, no. 3, pp. 363-373, September 2022, doi: 10.23919/IEN.2022.0044.
4. J. Jaworski, **N. Zheng** and B. Xu, "Energy Storage Price Arbitrage via Opportunity Value Function Prediction." arXiv:2301.12041 [eess.SY] (Under review at IEEE Transactions on Transportation Electrification)
5. Y. Baker, **N. Zheng** and B. Xu, "Transferable Energy Storage Bidder." arXiv:2301.01233 [cs.LG] (Under review at IEEE Transactions on Power Systems)
6. Y. Bian, **N. Zheng**, Y. Zheng, B. Xu, and Y. Shi. "Demand response model identification and behavior forecast with OptNet: a gradient-based approach." Proceedings of the Thirteenth ACM International Conference on Future Energy Systems. 2022.
7. **N. Zheng** and B. Xu, "Impact of Bidding and Dispatch Models over Energy Storage Utilization in Bulk Power Systems," Proceedings of the Eleventh Bulk Power Systems Dynamics and Control Symposium, 2022.
8. **N. Zheng**, J. Jaworski, and B. Xu. "Arbitrating Variable Efficiency Energy Storage using Analytical Stochastic Dynamic Programming." in *IEEE Transactions on Power Systems*, vol. 37, no. 6, pp. 4785-4795, Nov. 2022, doi: 10.1109/TPWRS.2022.3154353.
9. L. Lavin, **N. Zheng**, and J. Apt, "Market power challenges and solutions for electric power storage resources," Carnegie Mellon Electricity Industry Center Working Paper CEIC-21-02.
10. S. Wang, **N. Zheng**, C. D. Bothwell, Q. Xu, S. Kasina, and B. F. Hobbs, "Crediting variable renewable energy and energy storage in capacity markets: Effects of unit commitment and storage operation," in *IEEE Transactions on Power Systems*, vol. 37, no. 1, pp. 617-628, Jan. 2022, doi: 10.1109/TPWRS.2021.3094408.

## **AWARDS**

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EGSC Professional Development Scholarship, 2022  
La Von Duddleson Krumb Fellowship, 2021  
Li Memorial Fellowship, 2021  
Zhejiang Rural Credit Union International Exchange Scholarship, 2017  
Scholarship for Outstanding Merits, 2017  
Scholarship for Outstanding Students, 2017  
Scholarship for Excellence in Special Major, 2017  
Annual Excellent Student, 2014 - 2016

## **PROFESSIONAL ENGAGEMENT**

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Reviewer for IEEE Transactions on Power Systems, IEEE Transactions on Energy Markets, Policy, and Regulation, IEEE Transactions on Smart Grid, and IEEE Transactions on Sustainable Energy

## **SKILLS**

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Julia, Python, MATLAB, PowerWorld, AIMMS, R, SQL, Microsoft Excel (VBA & Solver), ArcGIS, AutoCAD, PS, AI, PR, AE

Languages

- Mandarin (native speaker), English (fluent), Spanish (rudimentary)

Personal Interests

- Landscape and Portrait Photography, Snowboarding, Cooking