

JORDAN D. KERN

Fitts-Woolard Hall
Raleigh, NC 27606
Campus Box 7906
Website: <http://kern.wordpress.ncsu.edu>

North Carolina State University
Dept. of Industrial and Systems Engineering
Email: jkern@ncsu.edu

EDUCATION

UNIVERSITY OF NORTH CAROLINA – CHAPEL HILL, NC

Ph.D. *Environmental Sciences and Engineering* **May 2014**
◦ *Advised by Dr. Greg Characklis*

M.S. *Environmental Sciences and Engineering* **May 2010**

B.S. *Environmental Science* **May 2007**

PROFESSIONAL EXPERIENCE

NORTH CAROLINA STATE UNIVERSITY – RALEIGH, NC

Assistant Professor, *Dept. of Industrial and Systems Engineering* **July 2023 - present**

Graduate Faculty, *Dept. of Civil, Construction, and Environmental Engineering* **Aug 2018 – present**

Graduate Faculty, *Operations Research* **Aug 2018 – present**

Graduate Faculty, *Dept. of Forestry and Environmental Resources* **Aug 2023 – present**

Assistant Professor, *Dept. of Forestry and Environmental Resources* **Aug 2018 – June 2023**

UNIVERSITY OF NORTH CAROLINA – CHAPEL HILL, NC

Adjunct Assistant Professor, *Dept. of Environmental Sciences and Engineering* **Aug 2018 – present**

Research Assistant Professor, *Institute for the Environment* **July 2015 – Aug 2018**

Post-doctoral Researcher, *Institute for the Environment* **June 2014 – June 2015**

PhD Student, *Dept. of Environmental Sciences and Engineering* **Jan. 2009 – May 2014**

BCS, INCORPORATED – WASHINGTON, DC

Research Associate **June 2007 – June 2008**

FUNDING

Totals: \$3.29 million directed to Kern Group out of \$73.20 million in collaborative awards.

(Collaborator) - **Bezos Center for Sustainable Protein** at NC-State (2024-2029). \$30,000,000 total award.

(Collaborator) – **DOE Water Power Technologies Office** – (2024-2025) “Value of flow forecasts to power system analytics.” \$85,000

(co-PI) – **DOE Digitizing Utilities** – (2024-2025) “Storm-Based Outage Prediction to Aid Crew Dispatch Decisions”. \$75,000 total award.

(co-PI) – **Alfred P. Sloan Foundation** – (2023-2025) “Reservoir dead pool in California: Understanding Sensitivities, Consequences, and Potential for Risk Mitigation”. \$49,000 (out of \$249,000 total award).

(co-PI) – **NSF Hydrologic Sciences** – (2023-2026) “CAS-Climate: Reservoir dead pool in the western United States: probability and consequences of a novel extreme event”. \$130,000 (out of \$800,000 total award).

(co-PI) – **DOE RACER** – (2023-2024) “Resilient Renewable Energy to Diminish Disaster Impacts on Communities”. \$1,000,000 total award.

(Collaborator) – **DOE Water Power Technologies Office** – (2023-2024) “Value of flow forecasts to power system analytics.” \$85,000

(PI) -- **NSF CAREER** – (2022-2027) “Navigating a Two-Front Challenge for the Power Grid: Extreme Weather and the Race to Decarbonization” \$503,897.

(co-PI) -- **NSF STC** – (2022-2027) “Science and Technologies for Phosphorus Sustainability (STEPS) Center” \$25,000,000 center award.

(co-PI) -- **DOE Office of Science** – (2021-2025) “Integrated Multisector, Multiscale Modeling (IM3), Phase 2.” \$431,000

(co-PI) -- **NSF Dynamics of Coupled Natural Human Systems (CNH2)** (2020-2023) “CNH2-L: The coupled, co-evolving roles of drought and electricity systems in humans' exposure to air pollution.” \$370,688 (out of \$1,600,000 total award)

(co-PI) -- **DOE Advanced Research Projects Agency – Energy (ARPA-E)** (2020-2023) “GRACE: A Grid that’s Risk Aware for Clean Electricity.” \$345,444 (out of \$2,400,000 total award)

(co-PI) -- **DOE Bioenergy Technologies Office** (2020-2023) “Agent-based Modeling for the Multi-objective Optimization of Energy Production Pathways.” \$300,000 (out of \$1,000,000 total award)

(co-PI) -- **Game-Changing Research Incentive Program for Plant Sciences Initiative (GRIP4PSI)** (2020-2023) “Harnessing (bio-)electrochemical technologies as sustainable sources for on demand precision agriculture.” \$250,281 total award

(co-PI) -- **North Carolina Policy Collaboratory** – (2019-2020) “Assessing Operational Flooding Risks for Substations and the Wider North Carolina Power Grid.” \$60,000

(Collaborator) -- **DOE Water Power Technologies Office** – (2019-2020) “Value of flow forecasts to power system analytics.” \$75,000

(Collaborator) -- **DOE Office of Science** – (2019-2020) “Integrated Multisector, Multiscale Modeling (IM3): Model Intercomparison to Inform the Development of Open Source, Grid Scale, Power System Simulation Tools.” \$73,756

(Collaborator) -- **NSF Innovations and the Nexus of Food, Energy and Water Systems (INFEWS) – Track 1** (2017-2021) “Scarcity Amid Abundance: Understanding Trade-offs in the Food-Energy-Water Nexus in the Willamette River Basin” \$312,000 (out of \$2,995,151 total award)

(co-PI) -- **DOE Productivity Enhanced Algae and Tool-Kits (PEAK)** (2017-2021)
“A comprehensive strategy for stable, high productivity cultivation of microalgae with controllable biomass composition.” \$120,682 (out of \$2,896,676 total award)

(co-PI) -- **NSF Innovations and the Nexus of Food, Energy and Water Systems (INFEWS) – Track 2** (2017-2021). “The sustainability-productivity tradeoff: Water supply vulnerabilities and adaptation opportunities in California’s coupled agricultural and energy sectors.” \$330,000 (out of \$2,958,000 total award)

AWARDS

GOODNIGHT EARLY CAREER INNOVATOR **2024-2025**

- Competitive internal NC State award established to support early career faculty excellence and to recognize faculty whose scholarship clearly and substantively contributes to innovation and advancement in STEM or STEM education.

MASON-MARYLAND ENERGY AND CLIMATE POLICY FELLOW **2024**

- Selected to attend an energy and climate-tech innovation policy “boot camp” for early career researchers funded by the Alfred P. Sloan Foundation, featuring discussions with key players shaping the energy and climate-tech policy landscape in Congress, the executive branch, international organizations, NGOs, and the private sector.

NSF CAREER **2022**

- The National Science Foundation's most prestigious awards in support of early-career faculty who have the potential to serve as academic role models in research and education.

JUNIOR FACULTY DEVELOPMENT AWARD

2015

- Competitive award (\$7,500) given by the office of the Executive Vice Chancellor & Provost based on proposal to integrate research and teaching in development of an upper level undergraduate/masters course in energy systems modeling and analytics

HYDROPOWER RESEARCH FOUNDATION

2010 – 2013

- PhD fellowship covering full tuition and living stipend awarded to outstanding early-career researchers pursuing research in hydropower; made possible by a grant from the Energy Efficiency and Renewable Energy Program of the U.S. Department of Energy

JOSEPH POGUE SCHOLARSHIP

2003 - 2007

- Merit-based scholarship for tuition, room and board, awarded to incoming undergraduate students at the University of North Carolina at Chapel Hill who demonstrate academic achievement and exhibit strong leadership potential

PUBLICATIONS

Peer Review Journals

M = masters student advised, P = PhD student advised

1. Amonkar, Y., Pahel-Short, C., ^P Zeighami, A., ^P Su, Y., Kern, J., Characklis, G. (in review). “A composite index-based instrument for managing the financial risk of variable hydrometeorology for electric utilities”. *Earth’s Future*.
2. Cuppari, R., Denaro, S., ^P Su, Y., Kern, J., Characklis, G. (in review). “Comparing alternatives for managing hydrometeorological financial risk for hydropower suppliers.” *Journal of Water Resources Planning and Management*.
3. ^P Akdemir, E., Kern, J., Limb, B., Smith, J., Quinn, J., Field, J. (under revision). “Multi-objective optimization of sustainable aviation fuel (SAF) production pathways in the U.S. Corn Belt.” *Biomass and Bioenergy*.
4. ^P Akdemir, K., Mongird, K., Kern, J., Oikonomou, K., Voisin, N., Burleyson, C., Rice, J., Zhao, M., Bracken, C., Vernon, C. (2024). “Investigating the Effects of Cooperation Level on Transmission Expansion Planning for Decarbonization” *Applied Energy*.
<https://doi.org/10.1016/j.apenergy.2024.124825>
5. Singh, S., Quinn, J., Kern, J., Cuppari, R., Characklis, G. “Exploring the benefits of integrated energy-water management in reducing economic and environmental tradeoffs” (2024). *Environmental Research: Energy*. <https://doi.org/10.1088/2753-3751/ad713d>
6. Alvear, C., Haas, J., Palma-Behnke, R., Peer, R., Medina, J., Kern, J. (2024). “Green hydrogen exports in New Zealand and Chile can improve electricity supply security if configured as local energy insurance.” *Energy*. <https://doi.org/10.1016/j.energy.2024.131930>

7. ^P Ssembatya, H., Kern, J., Oikonomou, K., Voisin, N., Burleyson, C., ^P Akdemir, K. (2024) “Dual Impacts of Space Heating Electrification and Climate Change Increase Uncertainties in Peak Load Behavior and Grid Capacity Requirements in Texas”. *Earth’s Future*. <https://doi.org/10.1029/2024EF004443>
8. ^P Prieto-Miranda, L., Kern, J. (2024). “High-resolution, open-source modeling of inland flooding impacts on the North Carolina bulk electric power grid”. *Environmental Research: Energy*. <https://doi.org/10.1088/2753-3751/ad3558>
9. ^P Akdemir, K., Oikonomou, K., Kern, J., Voisin, N., ^P Ssembatya, H., ^P Qian, J. (2024). “An Open-source Framework for Balancing Computational Speed and Fidelity in Production Cost Models.” *Environmental Research: Energy*. <https://doi.org/10.1088/2753-3751/ad1751>
10. ^P Akdemir, K., Robertson, B., Oikonomou, K., Kern, J., Voisin, N., Hanif, S., Bhattacharya, S. (2023). “Opportunities for wave energy in bulk electric power system operations”. *Applied Energy*, Vol. 352, December 2023. <https://doi.org/10.1038/s41467-023-37080-0>
11. ^P Zeighami, A., Kern, J., Yates, A., Weber, P., Bruno, A. (2023). “U.S. West Coast Droughts and Heat Waves Exacerbate Pollution Inequality and Can Undermine Emission Control Policies”. *Nature Communications*, 14, 1415. <https://doi.org/10.1038/s41467-023-37080-0>
12. ^M Kleiman, R., Characklis, G., Kern, J. (2022) “Managing Weather-Related Financial Risks in Algal Biofuel Production”. *Renewable Energy*. Volume 200, pages 111-124. <https://doi.org/10.1016/j.renene.2022.09.104>
13. Koh, R., Kern, J., Galelli (2022) “Hard-coupling water and power system models increases the complementarity of renewable energy sources”. *Applied Energy*. Vol. 321. <https://doi.org/10.1016/j.apenergy.2022.119386>
14. Denaro, S., Cuppari, R., Kern, J., ^P Su, Y., Characklis, G. (2022). “Assessing the Bonneville Power Administration’s Financial Vulnerability to Hydrologic Variability”. *Journal of Water Resources Planning and Management*. Vol. 148, Issue 10. doi: 10.1061/(ASCE)WR.1943-5452.0001590
15. ^M Akdemir, K., Kern, J., Lamontagne, J. (2022). “Assessing Risks for New England’s Wholesale Electricity Market from Wind Power Losses during Extreme Winter Storms.” *Energy*, Vol. 251, 15 July 2022. <https://doi.org/10.1016/j.energy.2022.123886>
16. ^M Wessel, J., Kern, J., Voisin, N., Oikonomou, K., Haas, J. (2022). “Technology pathways could help drive the U.S. West Coast grid’s exposure to hydrometeorological uncertainty.” *Earth’s Future*. Volume 10, Issue 1. <https://doi.org/10.1029/2021EF002187>

17. ^P Su, Y., Kern, J.D, Characklis, G. (2022). “The Effects of Retail Load Defection on a Major Electric Utility’s Exposure to Weather Risk” *Journal of Water Resources Planning and Management*. Volume 148, Issue 3.
18. ^M Hill, J., Kern, J.D, Rupp, D., Voisin, N., Characklis, G. (2021). “The Effects of Climate Change on Interregional Electricity Market Dynamics on the U.S. West Coast” *Earth’s Future*. Volume 9, Issue 12. <https://doi.org/10.1029/2021EF002400>
19. Oikonomou, K., Tarroja, B., Kern, J., Voisin, N. (2021). “Review of Core Process Representation in Power System Operational Models: Gaps, Challenges, and Opportunities for Multisector Dynamics Research.” *Energy*. Volume 238, Part C, 1 January 2022, 122049
20. ^M Lucy, Z., Kern, J. (2021). “Analysis of Fixed Volume Swaps for Hedging Financial Risk at Large-Scale Wind Projects.” *Energy Economics*. 103, 105603.
21. ^M Kleiman, R., Characklis, G., Kern, J., Gerlach, R. (2021). “Characterizing Weather-Related Biophysical and Financial Risk in Algal Biofuel Production”. *Applied Energy*. Vol. 294, 15 July 2021, 116960. <https://doi.org/10.1016/j.apenergy.2021.116960>
22. Boyle, C., Haas, J., Kern, J. (2021). “Development of an irradiance-based weather derivative to hedge cloud risk for solar energy systems”. *Renewable Energy*. Vol. 164, February 2021, p. 1230-1243. <https://doi.org/10.1016/j.renene.2020.10.091>
23. ^P Su, Y., Kern, J., Reed, P., Characklis, G. (2020). “Compound Hydrometeorological Extremes Across Multiple Timescales Drive Volatility in California Electricity Market Prices and Emissions”. *Applied Energy*. Vol. 276, 15 October 2020, 11554. <https://doi.org/10.1016/j.apenergy.2020.115541>
24. Kern, J., ^PSu, Y., ^MHill, J. (2020). “A retrospective study of the 2012-2016 California drought and its impacts on the power sector.” *Environmental Research Letters*. Vol. 15, Number 9.
25. ^P Su, Y., Kern, J., Denaro, S., ^MHill, J., Reed, P., Sun, Y., Cohen, J., Characklis, G. (2020). “An open source model for quantifying risks in bulk electric power systems from spatially and temporally correlated hydrometeorological processes”. *Environmental Modelling and Software*. Vol. 126, April 2020, 104667. <https://doi.org/10.1016/j.envsoft.2020.104667>
26. Chowdhury, AFM K., Kern, J., Dang, T., Galelli, S. (2020) “PowNet: a power systems analysis model for large-scale water-energy nexus studies”. *Journal of Open Research Software*. <https://doi.org/10.48550/arXiv.1909.12529>
27. Wang, X., Virguez, E., Kern, J., Chen, L., Patino-Echeverri, D., Wang, H. (2019) “Integrating wind, PV, and large hydropower during the reservoir refilling period.” *Energy Conversion and Management*. Volume 198, October 2019.

28. Anindito, Y., Haas, J., Olivares, M.A., Kern, J., Novak, W. (2019). "A new solution to mitigate hydropeaking? Batteries versus re-regulation reservoirs." *Journal of Cleaner Production*, 210(10), pp. 477-489.
29. Kern, J., Gorelick, D.E., Characklis, G.W., Macklin, C.M. (2019). "Multi-Objective Optimal Siting of Algal Biofuel Production with Municipal Wastewater Treatment in Watersheds with Nutrient Trading Markets." *Journal of Water Resources Planning and Management*, 145(2).
30. Kern, J., Characklis, G. (2017). "Evaluating the Financial Vulnerability of a Major Electric Utility in the Southeastern U.S. to Drought under Climate Change and an Evolving Generation Mix." *Environmental Science and Technology*, Aug 1;51(15):8815-8823. doi: 10.1021/acs.est.6b05460.
31. ^M Su, Y., Kern, J., Characklis, G. (2017). "The Impact of Wind Energy Growth and Hydrological Uncertainty on Financial Losses from Generation Oversupply in Hydropower Dominated Systems" *Applied Energy*. Vol. 194, pp. 172-183.
32. Kern, J., Hise, A.M, Characklis, G.W., Gerlach, R., Viamajala, S., Gardner, R. (2017) "Using Life Cycle Assessment and Techno-Economic Analysis in a Real Options Framework to Inform the Design of Algal Biofuel Production Facilities." *Bioresource Technology*. Vol. 225, pp. 418-428.
33. Kern, J., Characklis, G.W. (2017). "Low Natural Gas Prices and the Financial Cost of Ramp Rate Restrictions at Hydroelectric dams." *Energy Economics*. Vol. 61, pp. 340-350.
34. Hise, A., Characklis, G., Kern, J., Gerlach, R., Viamajala, S., Gardner, R., Vadlamani, A. (2016). "Evaluating the Relative Impacts of Operational and Financial Factors on the Competitiveness of an Algal Biofuel Production Facility." *Bioresource Technology*. Nov; 220. pp. 271-281
35. Kern, J., Characklis, G.W., Foster, B. (2015). "Natural Gas Price Uncertainty and the Cost Effectiveness of Hedging Against Low Hydropower Revenues Caused by Drought." *Water Resources Research*. Vol. 51, No. 4, pp. 2412-2427.
36. Foster, B., Kern, J., Characklis, G.W. (2015). "Mitigating Hydrologic Financial Risk in Hydropower Generation Using Index-Based Financial Instruments." *Water Resources and Economics*. Vol. 10, pp. 45-67.
37. Kern, J., Patino-Echeverri, D., Characklis, G.W. (2014). "An Integrated Reservoir-Power System Model for Evaluating the Impact of Wind Power Integration on Hydropower Resources." *Renewable Energy*, Vol. 71, November 2014, pp. 553-562.
38. Kern, J., Patino-Echeverri, D., Characklis, G.W. (2014). "The Impacts of Wind Power Integration on Sub-Daily Variation in River Flows Downstream of Hydroelectric Dams." *Environmental Science and Technology*. Vol. 48, No. 16, pp. 9844-9851.

39. Kern, J., Characklis, G.W., Doyle, M.D., Blumsack, S. and R.B. Whisnant (2012). “The Influence of Deregulated Electricity Markets on Hydropower Generation and Downstream Flow Regime,” *Journal of Water Resources Planning and Management*, Vol. 138, No. 4: pp. 342-355

Reports

Kern, J. (2014). “Analysis of Potential Policy Changes on the Financial Viability of Residential Solar in North Carolina.” UNC Chapel Hill Institute for the Environment.

News Media

Heatmap (October, 2024). "[Utilities Are Planning for the Wrong Kind of Hurricane.](#)"

ABC 11 (August, 2023). "[Sturdier, more weatherproof. Improvements being made to power grid to prevent prolonged outages.](#)"

LA Times (March, 2023). "[Droughts and heat waves could worsen air pollution for vulnerable communities.](#)"

The Post and Courier (January, 2023). "[Blackouts experienced during low temps last month are bound to happen again.](#)"

CBS 17 WNCN (January, 2023). "[Rolling blackouts can protect power grid from serious damage.](#)"

E&E News EnergyWire (September, 2022). "[What the Western drought reveals about hydropower.](#)"

TIME Magazine (September, 2022). "[Extreme Weather is Weakening U.S. Hydropower and Stressing Energy Grids](#)"

Vox (August, 2022). "[How the Western drought is pushing the power grid to the brink.](#)"

AP News (July, 2022). "[Officials investigate after fire, explosion at Hoover Dam](#)"

E&E News EnergyWire (May, 2022). "[Southwest megadrought pushes hydropower to the brink.](#)"

Renewable Energy World (February, 2022). "[Duke Energy aims to double renewable energy capacity by 2030.](#)"

Jefferson Public Radio (January, 2022). "[How global warming could further mess up electric power on the West Coast](#)"

The Hill (January, 2022). "[Climate change makes West Coast more susceptible to blackouts](#)"

Sun Herald (January, 2022). “[West Coast power grid at mercy of climate change — and prices may soar, study finds](#)”

ABC News (October, 2021). “[Hydropower decline adds strain to power grids in drought](#)”

The Weather Channel (August, 2021). “Water Supply Dropping in Western Reservoirs”

Wired Magazine (July, 2021). “[Extreme Heat Could Also Mean Power and Water Shortages](#)”

Los Angeles Times (July, 2021). “[Plummeting reservoir levels could soon force Oroville hydropower offline.](#)”

National Public Radio (July, 2021). “[Not Just Wildfire: The Growing Ripple Effects Of More Extreme Heat And Drought.](#)”

The Guardian (UK) (June, 2021). “[Less water means more gas’: how drought will test California’s stressed power grid.](#)”

National Public Radio (June, 2021). “[How Our Hydropower System Is Impacting The Drought Gripping The American West.](#)”

San Jose Mercury News (August, 2020). “[Decline in hydropower hampered by drought will impact utility costs.](#)”

Greensboro News & Record. Kern, J. (2014). “Solar: A Sound Investment.” Opinion editorial. December 14, 2014.

TEACHING

Undergraduate

- (NCSU) ES 300 – Energy and the Environment
- (UNC) ENEC 307 – Energy and Material Flow through the Environment and Society
- (NCSU) ISE 437 – Data Analytics for Industrial and Systems Engineers

Undergraduate/Graduate

- (UNC) ENEC 490 – Energy Systems Modeling and Analytics

Graduate

- (UNC) ENVR 755 – Analysis of Water Resource Systems (co-taught)
- (UNC) ENVR 890 – Managing Environmental Financial Risk (co-taught)
- (NCSU) ISE 601/801 – Departmental Graduate Seminar

JOURNAL EDITOR

Earth's Future (*Associate Editor*), 2022 – present

Current Sustainable/Renewable Energy Reports (*special section editor*), 2022 – present

JOURNAL REVIEWER

Applied Energy

Current Sustainable/Renewable Energy Reports

Energy and Climate Change

Energy Economics

Energy Strategy Reviews

Environmental Modelling and Software

Environmental Research: Energy

Environmental Research: Infrastructure and Sustainability

Environmental Research Letters

International Journal of Electric Power and Energy Systems

Journal of Cleaner Production

Journal of CO₂ Utilization

Journal of Hydrology

Journal of Water Resources Planning and Management

Nature Energy

Nature Sustainability

River Research and Applications

Science

Water Biology and Security

Water Research

Water Resources Research (*outstanding reviewer 2022*)

PROFESSIONAL MEMBERSHIPS

Association of Environmental Engineering and Science Professors (AEESP)

American Geophysical Union (AGU)

American Society of Civil Engineers (ASCE)

Institute for Operations Research and the Management Sciences (INFORMS)

Institute for Industrial and Systems Engineers (IISE)

SERVICE ACTIVITIES

INFORMS Annual meeting session chair, Seattle, WA October 2024

National Academies Committee on DOE Regional Energy-Water Demonstrations, 2024-2025

IISE Annual meeting session chair, Montreal, Canada, May 2024

White House Office of Science and Technology Policy, Climate and AI round table, February 2024

INFORMS Annual meeting session chair, Phoenix, AZ, October 2023

ASCE EWRI Environmental Water Resource Systems Committee, Chair, 2022-2023

National Science Foundation Panel Reviewer, CAREER Alexandria VA, December 2023

U.S. House of Representatives Committee on Energy and Commerce expert witness, June 2023

National Science Foundation Panel Reviewer, EPSCoR Alexandria VA, October 2022

ASCE EWRI Environmental Water Resource Systems Committee, Vice Chair, 2022-2023

National Science Foundation Panel Reviewer, STC Alexandria VA, May 2022

National Science Foundation Panel Reviewer, URoL Alexandria VA, May 2022

ASCE EWRI Environmental Water Resource Systems Committee, Secretary, 2021-2022

Steering Committee Track Chair, Algal Biomass Summit, Orlando, FL. October 2019

National Science Foundation Panel Reviewer, INFEWS, Alexandria, VA. February, 2019.

Steering Committee Track Chair, Algal Biomass Summit, The Woodlands, TX. October 2018

Steering Committee Track Chair, Algal Biomass Summit, Salt Lake City, UT. October 2017

Z. Smith Reynolds Foundation Strategic Assessment, Durham, NC, Fall 2016

GRADUATE STUDENT ADVISING

M = masters student advised, P = PhD student advised, 1 = primary adviser, 2 = thesis/dissertation committee

^{M1}Troy Wibowo, North Carolina State University (in progress)

^{P1}Duc-Huy Pham, North Carolina State University (in progress)

^{P1}Diesta Maftuhah, North Carolina State University (in progress)

^{P1}Veronica Diaz Pacheco, North Carolina State University (in progress)

^{P1}Cameron Lisy, North Carolina State University (in progress)

^{P1}Henry Ssembatya, North Carolina State University (in progress)

^{P1}Luis Prieto Miranda, North Carolina State University (in progress)

^{P1}Ece Akdemir, North Carolina State University (in progress)

^{P1}Jingwei Qian, North Carolina State University (in progress)
^{P2}Jethro Ssengonzi, North Carolina State University (in progress)
^{P2}Xiaodong Zhang, Duke University (in progress)
^{P2}Samarth Singh, University of Virginia (in progress)
^{P2}Minhazul Islam, Arizona State University (in progress)
^{P2}Rosa Cuppari, University of North Carolina – Chapel Hill (in progress)
^{P1}Amir Zeighami, North Carolina State University (2024)
^{P2}Andrew Hutchens, North Carolina State University (2024)
^{M2}Sarah Puls, North Carolina State University (2024)
^{P1}Kerem Akdemir, North Carolina State University (2024)
^{M1}Annie McElvenny, North Carolina State University (2024)
^{M2}Thu Ho, North Carolina State University (2023)
^{P2}Aditya Keskar, North Carolina State University (2023)
^{M1}Kerem Akdemir, North Carolina State University (2021)
^{M1}Jake Wessel, North Carolina State University (2021)
^{M1}Zach Lucy, North Carolina State University (2021)
^{P1}Yufei Su, University of North Carolina – Chapel Hill (2020)
^{M1}Joy Hill, University of North Carolina – Chapel Hill (2020)
^{M1}Rachel Kleiman, University of North Carolina – Chapel Hill (2020)
^{M2}Colin Boyle, University of Stuttgart (GER) (2020)

CONERENCE PRESENTATIONS

M = masters student advised, P = PhD student advised

1. Akdemir, K., Mongird, K., Ahsan, H., Binsted, M., Bracken, C., Burleyson, C., Oikonmou, K., Patel, P., Snyder, A., Thurber, T., Vernon, C., Voisin, N., Wild, T., Zhao, M., Rice, J. “Evaluating Grid Stress and Reliability under a Range of Future Climate, Emissions, and Socioeconomic Scenarios in the U.S. Western Interconnection”. AGU Annual Meeting, December 2024.
2. Mongird, K., Ahsan, H., Akdemir, K., Bracken, C., Burleyson, C., Kern, J., Oikonomou, K., Thurber, T., Vernon, C., Wild, T., Zhao, M., Rice, J. “High Resolution Power Plant Siting Projections Under Alternative Climate and Socioeconomic Scenarios”. AGU Annual Meeting, December 2024.
3. Singh, S., Quinn, J., Cuppari, R., Kern, J., Characklis, G. “Exploring the Benefits of Integrated Energy-Water Management in reducing Economic and Environmental Tradeoffs”. AGU Annual Meeting, December 2024.

4. Rahman, M., Quinn, J., ^PQian, J., Oikonomou, K., Kern, J., Loth, E. “Assessing the Value of Integrating Wind and Pumped Storage Hydropower (PSH) in Mountainous Regions for Achieving a Sustainable and Reliable Energy Future”. AGU Annual Meeting, December 2024
5. ^PDiaz-Pacheco, V., Kern, J. “Assessing the Vulnerability of Power Systems in Decarbonized Power Grids: A Network Interdiction Study”. INFORMS Annual Meeting, October 2024.
6. ^PPham, D., Kern, J. “A Universal Synthetic Weather Data Generator for Use in Power System Resource Adequacy, Short-term Optimization, and Control”. INFORMS Annual Meeting, October 2024.
7. Kern, J. “Balancing computational speed and fidelity in weather and climate stress testing bulk power system operations”. IISE Annual Meeting, May 2024.
8. Quinn, J., Singh, S., Wessel, J., Kern, J., Herman, J. “Exploring How Changing Hydropower Operations Can Facilitate Renewable Energy Transitions and Sustainable Climate Change Adaptation”. INFORMS Annual Meeting, October 2023.
9. ^PLisy, C., Kern, J. “Synchronous Stochastic Simulation of U.S. Bulk Electric Power and Natural Gas Markets”. INFORMS Annual Meeting, October 2023.
10. ^PSsembatya, H., Kern, J. “How the Combination of Space Heating Electrification and Climate Change Could Impact Seasonal Peaking and Reliability of the Texas Power Grid”. INFORMS Annual Meeting, October 2023.
11. Mongird, K., Vernon, C., Rice, J., Khan, Z., ^PAkdemir, K., Oikonomou, K., Kern, J. “A Multi-Model Integrated Framework for Harmonized Energy System Transitions, Grid Operations, and Power Plant Siting”. INFORMS Annual Meeting, October 2023.
12. ^PAkdemir, K., Kern, J., Voisin, N., Oikonomou, K. “An open-source framework for customizing grid operations models to balance computational speed and fidelity in weather and climate stress testing.” EWRI Annual Meeting, May 2023.
13. ^PAkdemir, E., Kern, J., Quinn, J. “Using Multi-Objective Optimization to Design Low Carbon and Weather Resilient Biofuel Supply Chains.” EWRI Annual Meeting, May 2023.
14. Broman, D., Voisin, N., Kern, J., Steinschneider, S., ^PSsembatya, H., Wi, S., Turner, S. “How Hydropower Operations Mitigate Flow Forecast Uncertainties to Maintain Grid Services in the Western US”. European Geophysical Union Annual Meeting, April 2023.
15. ^PAkdemir, E., Kern, J., Quinn, J. “Using Multi-Objective Optimization to Design Low Carbon and Weather Resilient Biofuel Supply Chains.” AGU Annual Meeting, December 2022.

16. ^PAkdemir, K., Kern, J., Voisin, N., Oikonomou, K. “An open-source framework for customizing grid operations models to balance computational speed and fidelity in weather and climate stress testing.” AGU Annual Meeting, December 2022.
17. ^PSsembatya, H., Kern, J. “The dual impacts of heating electrification and climate change on seasonal peaking and reliability of the Texas power grid.” AGU Annual Meeting, December 2022. **(poster)**.
18. Voisin, N., Kern, J., Steinschneider, S., Turner, S., Ssembatya, H., Wi, S. “Value of medium range inflow forecast for hydropower scheduling flexibility.” AGU Annual Meeting, December 2022.
19. ^PPrieto-Miranda, L., Kern, J. “Impacts of inland flooding from major hurricanes on the dynamic behavior of the North Carolina power grid.” ASCE EWRI Annual Meeting, June 2022.
20. ^PZeighami, A., Kern, J. “The Effects of Drought and Heatwaves on the West Coast Grid and Health Impacts from Power Plant Emissions” ASCE EWRI Annual Meeting, June 2022.
21. Koh, R., Kern, J., Galelli, S. “Hard-coupling of water and power system models increases the complementarity of renewable energy sources”. European Geophysical Union Annual Meeting, May 2022.
22. ^PAkdemir, K., Kern, J., Lamontagne, J. “Do Winter Storms Pose Hidden Risks for Offshore Wind and the New England Grid?” AGU Annual Meeting, December 2021.
23. ^PAkdemir, K., Kern, J., Lamontagne, J. “Do Winter Storms Pose Hidden Risks for Offshore Wind and the New England Grid?” AGU Annual Meeting, December 2021.
24. ^PCuppari, R., Denaro, S., ^PSu, Y., Kern, J., Characklis, G. “New financial instruments for managing hydrometeorological risk for hydropower producers.” AGU Annual Meeting, December 2021.
25. Singh, S., Quinn, J., Lamontagne, J., Kern, J., ^PSu, Y., Denaro, S., Cuppari, R., Characklis, G. “Exploring the benefits of integrated energy-water management in reducing economic and ecological tradeoffs.” AGU Annual Meeting, December 2021. **(poster)**
26. DeCarolis, J., Kern, J. “Open Source Modeling to Inform Resilient, Low Carbon Electricity for North Carolina” NC State Energy Conference, April 2021.
27. ^PKoh, R., Kern, J., Chowdhury, AFM, Galelli, S. “Valuing feedback mechanisms between water and energy systems in hydropower networks”. EGU Annual Meeting, April 2021

28. Voisin, N., Kern, J., Yan, Hongxiang, Turner, S., Wood, A., Mosier, T. “Valuing Streamflow Forecasts in Centrally Controlled Power Systems”. EGU Annual Meeting, April 2021
29. Voisin, N., Kern, J.D, Mosier, T., Wood, A. “Value of flow forecasts to power system analytics.” AGU Annual Meeting, December, 2020.
30. Voisin, N., Tidwell, V., Cohen, S., Kern, J., Dyreson, A., Oikonomou, K., Tarroja, B., Turner, S. “Advances and gaps on propogating the impact of climate change on future water availability through the energy planning process: a Western U.S. Case Study. AGU Annual Meeting, December 2020.
31. Singh, S., Quinn, J., Lamontagne, J., Kern, J. “Exploring the benefits of integrated energy-water management in reducing economic and ecological tradeoffs.” AGU Annual Meeting, December 2020.
32. ^MKleiman, R., Characklis, G., Kern, J., Gerlach, R. “Managing Weather and Market-Related Financial Risk in Algae Production for Biofuel and Co-Products.” AGU Annual Meeting, December 2020. (**poster**)
33. Voisin, N., Kern, J., Mosier, T., Wood, A. “Value of flow forecasts to power system analytics.” INFORMS Annual Meeting, November 11, 2020.
34. Kern, J. “Hydrometeorological extremes in wholesale electricity markets”. Water Resources Research Institute. Raleigh, NC, March 2020.
35. Denaro, S., ^MHill, J., ^PSu, Y., Kern, J., Characklis, G. “Designing Strategies to Jointly Manage the Financial Risk of Wet and Dry Periods for Hydropower Generators in a Changing Market”. American Geophysical Union Annual Meeting, December 2019.
36. Voisin, N., Kern, J., Mosier, T., Wood, A. “A preliminary evaluation framework to assess the value of flow forecasts to power system analytics”. American Geophysical Union Annual Meeting, December 2019. (poster)
37. ^MKleiman, R., Characklis, G. Kern, J. “Characterizing and managing weather-related financial risk in algal biofuel production.” Algal Biomass Summit, September 2019.
38. Kern, J., ^PSu, Y. “Quantifying risks from spatially and temporally correlated hydrological and meteorological processes in wholesale electricity markets”. European Geophysical Union. Vienna, Austria, April, 2019.
39. Kern, J., Zeff, H., Herman, J., Reed, P., Characklis, G., Medellin-Azuara, J., Pavelsky, T. “Challenges and opportunities in modeling cross-scale, cross-sector feedbacks to inform critical decision-making in food-energy-water systems”. American Geophysical Union Fall Congress. Washington, DC, December 2018.

40. Nolin, A., Higgins, C., Drake, S., Conklin, D., Kern, J., Characklis, G., Hulse, D. “Modeling Future Scenarios of Snow, Forests, Wildfire, and Hydropower Within the Food-Energy-Water Nexus”. American Geophysical Union Fall Congress. Washington, DC, December 2018.
41. ^PSu, Y., Kern, J. “Modeling spatiotemporal covariance in wind and water as a driver of extreme events on the California grid”. Environmental and Water Resources Institute Annual Congress, Minneapolis, MN, June 2018.
42. Kern, J., Gorelick, D.E., Characklis, G.W., Macklin, C.M. “Multi-Objective Optimal Siting of Algal Biofuel Production with Municipal Wastewater Treatment in Watersheds with Nutrient Trading Markets.” Algal Biomass Summit. Salt Lake City, UT. October 2017.
43. ^MSu, Y., Kern, J., Characklis, G. “The Impact of Wind Energy Growth and Hydrological Uncertainty on Financial Losses from Generation Oversupply in Hydropower Dominated Systems”. Environmental and Water Resources Institute Annual Congress, Sacramento, CA, June 2017.
44. Kern, J., “Using Life Cycle Assessment and Techno-Economic Analysis in a Real Options Framework to Inform the Design of Algal Biofuel Production Facilities.” Algal Biomass Summit. Phoenix, AZ. October 2016.
45. Kern, J., "Financial Vulnerability of the Electricity Sector to Drought, and the Impacts of Changes in Generation Mix." American Geophysical Union Annual Meeting, San Francisco, CA, December 2015.
46. Kern, J., “Natural Gas Price Uncertainty and the Cost Effectiveness of Hedging Against Low Hydropower Revenues Caused by Drought,” Environmental and Water Resources Institute Annual Congress, Portland, OR, June 2014.
47. Kern, J. D., “The Impacts of Wind Power Integration on Sub-Daily Variation in River Flows Downstream of Hydroelectric Dams,” Water Resources Research Institute Annual Meeting, Raleigh, NC. March, 2013.
48. Kern, J. D., “The Impacts of Wind Power Integration on Sub-Daily Variation in River Flows Downstream of Hydroelectric Dams,” American Geophysical Union Annual Meeting, San Francisco, CA. December, 2012. (**poster**)
49. Kern, J. D., “Influence of Deregulated Electricity Markets on Hydropower Generation and Downstream Flow Regime,” European Geosciences Union Annual Meeting, Vienna, Austria. April, 2011.
50. Kern, J. D., “Influence of Deregulated Electricity Markets on Hydropower Generation and Downstream Flow Regime,” Water Resources Research Institute Annual Meeting, Raleigh, NC. March, 2010.

INVITED TALKS

-
1. Kern, J. “Optimal design and management of low carbon energy systems in a time of emerging vulnerabilities.” University of Virginia Department of Systems and Information Engineering, April 2024.
 2. Kern, J. “U.S. West Coast Droughts and Heat Waves Exacerbate Pollution Inequality and Can Undermine Emission Control Policies.” Mt. Sinai Health System, NYC, November 2023.
 3. Kern, J. “Modeling the multi-scale, multi-variate uncertainties that impact electricity system dynamics under global change.” AGU Annual Meeting, December 2022.
 4. Kern, J. “Market and operational weather risks in the U.S. western power grid”. AGU Annual Meeting. December, 2021.
 5. Kern, J. “Power Systems Analysis for Assessing Physical and Financial Risks from Extreme Weather”. Google X Speaker Series. November, 2021.
 6. Kern, J. “Weather Risk and Power Markets”. Energy Infrastructure Resilience and National Security Workshop, October 2021.
 7. Kern, J. “Weather Risk and the Grid.” UNC Chapel Hill Dept. of Environmental Sciences and Engineering Centennial Seminar Series. January, 2021.
 8. Kern, J., West, J., Yates, A., Pavelsky, T., Skiles, M., Bowden, J., Characklis, G. “Drought Can Take Your Breath Away.” North Carolina Museum of Natural Science, Science Café. October, 2020.
 9. Kern, J., West, J., Yates, A., Pavelsky, T., Skiles, M., Bowden, J., Characklis, G. “Drought Can Take Your Breath Away.” Sigma Xi. January, 2021.
 10. Kern, J. “Quantifying risks from spatially and temporally correlated hydrological and meteorological processes in wholesale electricity markets”. Pacific Northwest National Laboratory, June, 2019.
 11. Kern, J. “Quantifying risks from spatially and temporally correlated hydrological and meteorological processes in wholesale electricity markets”. University of Stuttgart. Stuttgart, Germany, April, 2019.
 12. Kern, J.D, Zeff, H., Herman, J., Reed, P., Characklis, G., Medellin-Azuara, J., Pavelsky, T. “Challenges and opportunities in modeling cross-scale, cross-sector feedbacks to inform critical decision-making in food-energy-water systems”. European Geophysical Union. Vienna, Austria. April, 2019.
 13. Kern, J.D, “Challenges and opportunities in modeling cross-scale, cross-sector feedbacks to inform critical decision-making in food-energy-water systems”. Tufts University, Seminar Series in the Dept. of Civil and Environmental Engineering, Boston, MA. March, 2019.

14. Kern, J. "Addressing Complex, Emergent Risks in 21st Century Natural-Engineered Systems". Lake Johnson Community Center, Raleigh, NC. October, 2018.
15. Kern, J.D, "Challenges and opportunities in modeling cross-scale, cross-sector feedbacks to inform critical decision-making in food-energy-water systems". North Carolina State University, Seminar Series in the Dept. of Civil, Construction and Environmental Engineering. Raleigh, NC. October, 2018.
16. Kern, J. "Addressing Complex, Emergent Risks in 21st Century Natural-Engineered Systems". BioQUEST Summer Workshop, Harvey Mudd College. June 21, 2018.
17. Kern, J. "Addressing Complex, Emergent Risks in 21st Century Natural-Engineered Systems". Oregon State University, Dept. of Biological and Ecological Engineering. June 1, 2018.
18. Kern, J. "Sustainable Energy Infrastructure Systems in an Age of Interconnection, Uncertainty, and Innovation." Duke University Nicholas Institute for Environmental Policy Solutions. June, 2017.
19. Kern, J. "Environment, Economy, Entrepreneurship: Is Clean Energy Good Business?" A Town Hall Discussion, North Carolina Museum of Natural Sciences, July 2016.\
20. Kern, J. "Weather and Climate Risk in the Electric Power Sector." Federation of Earth Science Information Partners Summer Meeting, Durham, NC. July 2016.
21. Kern, J. "Implications of a More De-coupled Water-Energy Future." National Science Foundation and Association of Environmental Engineering and Science Professors Grand Challenges Workshop, Washington, DC. May 19-20, 2016.
22. Kern, J. "Environmental Financial Risk in the Electric Power Sector". North Carolina State University, Department of Civil and Environmental Engineering. Seminar Series, October 2015.
23. Kern, J., "Is Solar the Answer?" North Carolina Museum of Natural Science, Raleigh, NC, July 2015.
24. Kern, J. D., "Can Fracking Lead to Less Expensive Achievement of More Natural River Flows?" American Geophysical Union Annual Meeting, San Francisco, CA, December 2014.
25. Kern, J., "Water, Energy, Finance and the Environment: an Electric Power Perspective." UNC-Chapel Hill Institute for the Environment Energy and Environment Lunch Series, December 2014.