

**Position:** Post-doctoral researcher

**Institution:** North Carolina State University, College of Natural Resources, Department of Forestry and Environmental Resources

**Start date:** Fall 2020 (exact date is flexible)

**Adviser:** Jordan Kern (<https://kern.wordpress.ncsu.edu>)

**Description:** The Kern group at NC State is looking for a post-doctoral researcher to conduct innovative research on hydrometeorological risks in future electric power systems dominated by variable renewable energy. Research responsibilities will mostly focus around a new project funded by the U.S. Department of Energy's ARPA-E. (<https://arpa-e.energy.gov/?q=news-item/department-energy-announces-25-million-grid-management-systems-and-risk-assessment-systems>). The project is a collaboration with other researchers at Duke University (lead institution), Dartmouth College, Princeton University, and Pacific Northwest National Laboratory, as well as industry partners at Duke Energy and PJM Interconnection.

**Responsibilities:** Primary research tasks for NCSU/post doctoral researcher will involve development of synthetic ensembles of hydrometeorological records and synthetic forecast traces, translation to relevant power system variables (asset performance), and construction of a library of scenarios for use in stochastic optimization algorithms that make use of probabilistic information to more efficiently schedule power plants and allocate operating reserves ("back-up" capacity). Although it is expected that most of the post doctoral researcher's time would be spent on the new ARPA-E project, there are also several other opportunities in the group to publish, help advise graduate students, and gain experience in power systems analysis and risk management.

**Requirements:** A PhD in engineering, statistics, operations research, and or earth systems science is required. Applicants must have substantial experience in computer programming (e.g., Matlab, Python, R, C++, etc.) and statistics. Experience in power systems analysis, hydrology/meteorology, time series analysis/modeling, probability, simulation/optimization are encouraged. We're looking for people that will be kind, respectful group members while contributing their own unique perspectives and strengths to the team. Students from underrepresented groups (women, minorities) are especially encouraged to apply.

**Compensation:** 3 years of support are available at the base rate of \$50,000 per year (salary is negotiable based on experience), with additional funds guaranteed for travel, computational resources. There are also opportunities to gain teaching experience and earn additional salary by serving as a TA, though this is optional and entirely up to the post doctoral researcher.

**More about the group:** Our research is broadly focused, bridging electric power systems and water resource systems analysis, environmental science, and finance/economics. We use computational modeling, operations research, and a wide range of analytical and statistical tools to build ‘systems’ level models of infrastructure (especially bulk electric power systems/markets) that can provide assessments of associated physical, environmental and financial risk to decision makers. Our group has a strong interest in power systems’ exposure to uncertainty in meteorological and hydrologic processes and associated extreme events (e.g., hydrological droughts, extremely windy periods), which can alternatively create extreme levels of scarcity or overabundance of renewable energy on the grid. Much of our work is ultimately aimed at supporting real-world decision-making regarding management of/ investment in natural resources and critical infrastructure, and we frequently interact with and collaborate with real stakeholders (e.g., electric power utilities, water managers). We aim to provide students with modeling and analytical skills and sector-specific knowledge, as well as a professional network spanning academia, government, and the private sector, which collectively could be leveraged to pursue a range of post-graduate employment opportunities.

**To Apply:** If interested, please send an email to Jordan Kern (jkern@ncsu.edu) with a letter of introduction, CV, and statement of research interests.