BALANCING WILDFIRE RISK AND POWER SYSTEM RELIABILITY: PRE-EMPTIVE POWER SHUT OFFS AND PROACTIVE RESTORATION PLANNING

~ by ~

DR. LINE ROALD

Assistant Professor

University of Wisconsin--Madison

Tuesday, February 23 • 11:00 AM – Noon (PT) • TEAMS ONLY

[Link to TEAMS meeting]

OVERVIEW

Electric grid faults can be the source of catastrophic wildfires, particularly in regions with high winds and low humidity. In short-term operations, electric utilities have few options to mitigate the risk of wildfire ignitions, leading to use of disruptive measures such as proactive de-energization of equipment, frequently referred to as public safety power shut-offs. Decisions of which lines to turn off and how to bring them back on again has significant impacts on customers, who lose access to electricity in an attempt to protect them from fires.

This talk discusses two complementary aspects of this problem. First, we will discuss the question of how to optimally balance the negative impacts of both wildfire risk and power outages, before describing how we model this trade-off in our proposed optimal power shut-off problem, an optimization model to support operational decision making in the context of extreme wildfire risk. We will demonstrate that accounting for the size of power outages when deciding which lines to turn off can reduce the size of the power shut-offs compared with simple threshold-based models. Next, we will discuss algorithms for proactive restoration planning that can help re-energize the system faster. These problems are computationally challenging, and we will discuss the impact of different power flow formulations and heuristics on the resulting outage times. Interestingly, we find that the most accurate models do not always give the best results.

BIO

Line Roald is an Assistant Professor and Grainger Institute Fellow in the Department of Electrical and Computer Engineering in University of Wisconsin—Madison. She received her Ph.D. degree in Electrical Engineering (2016) from ETH Zurich, Switzerland. Prior to joining UW Madison, she was a postdoctoral research fellow with the Center of Non-Linear Studies at Los Alamos National Laboratory. Her research interests center around modeling and optimization of energy systems, with a particular focus on managing uncertainty and risk from renewable energy variability and component failures.