You are cordially invited to the Mechanical Engineering Seminar:

**Speaker:**
SCU Alum Michael Sizemore from Engie Storage North America

**Date:** January 22, 2020

**Time:** 4:00-5:00 p.m.

**Location:** Bergin 116

**Title:** The Grid Revolution: Renewable Energy and the Distributed Energy Resource Transition

**Abstract:**
There have been 2 major energy transitions over the past 20 years that pose great challenges for the next 20: (1) dispatchable fossil fuel generation to intermittent renewable energy production and (2) centralized to distributed generation. Both of these transitions pose large challenges for the effective operation and management of the grid.

In this talk, I review what these two transitions mean for the changing energy economy. 1995 the US had roughly 6,000 operational power plants. By 2025 that number will balloon to roughly 20 million. This has been driven by a multitude of technologies, but especially wind turbines and solar systems. Rooftop solar alone in America accounts for 2 million systems. Wind turbines are quickly approaching 100,000 in America and are in places never seen by the grid such as off-shore and farmland. In 2016 the US saw 5,000 installations of battery storage system. In 2019 that number grew to over 100,000. On top of all of this, certain load types are becoming more and more controllable. In 2017 the US installed roughly 2 million smart thermostats. This is the largest residential controllable load solution, but other solutions such as smart water heaters and lighting are also scaling up in the pipeline.

Distributed renewable energy asset management will require a full retrofitting of our current system design to adapt to our rapidly changing energy generation, storage, and load control profile. This system costs on the order of 10s of trillions of dollars and the retrofitting will be on the order of trillions of dollars. All of this change needs to happen while we keep the lights on across the country. Although we are starting to see rolling blackouts and brown-outs for the first time in decades, without proper solutions and strategy, these issues will only be exacerbated in the coming years.

I will discuss various levels of technology solution to this problem. I will review nano-grid solutions of the home, such as smart home technology. Micro-grid solutions are coming and pose various challenges. Transmission and distribution retrofitting will need to be adopted to adjust for the bi-directional flow of our new paradigm. I will also discuss the policy challenges to completing these solutions.

Overall, this talk will review the dynamic and complex challenges of our grid transition and potential approaches to solutions.

**Biography:**
Michael Sizemore is a Software Product Manager at Engie Storage North America. He received is BS and MS from Santa Clara University in Mechanical engineering in 2012 and 2014. He has worked on renewable energy product deployments from as small as 40 W solar installations in Nicaragua and India to 400 MW storage applications in North America. His specializations include data engineering software, artificial intelligence and machine learning as well as distributed renewable energy asset management.