Power Systems Engineering Research Center

# The Sharing Economy for the Smart Grid

**Kameshwar Poolla**
Electrical Engineering and Computer Sciences
UC Berkeley
poolla@berkeley.edu

PSERC Public Webinar
February 14, 2017
2:00-3:00 p.m. Eastern Time (11:00-12:00 p.m. Pacific)

**Description:** The sharing economy. It is all the rage. Going on vacation? Rent out your home for extra income! Not using your car. Rent it out for extra income! Companies such as AirBnB, VRBO, Lyft, and Uber have disrupted housing and transportation sectors. Their innovative business models are based on resource sharing that leverage underutilized infrastructure. They are enabled by peer-to-peer platforms that match eager sellers with willing buyers. Are there compelling sharing economy opportunities in the electricity sector? What products can be shared in tomorrow's Smart Grid? Could consumers trade electricity via online matching markets? In this paper, we begin by exploring sharing economy opportunities in the electricity sector. We discuss regulatory and technical challenges to these opportunities. We then study the specific problem of a collection of firms sharing their electricity storage. We show that the investment decision of the firms form a Nash equilibrium which supports the social welfare. We offer explicit expression for optimal storage investments and equilibrium prices for shared storage in a spot market. We discuss control technology platforms necessary for the physical exchange of power, and market platforms necessary to trade electricity storage. We close with synthetic examples to illustrate our ideas.

**Biography:** Kameshwar Poolla is the Cadence Distinguished Professor at UC Berkeley in EECS and ME. His current research interests include many aspects of future energy systems including economics, security, and commercialization. He also serves as the Founding Director of the IMPACT Center for Integrated Circuit manufacturing. Dr. Poolla co-founded OnWafer Technologies which was acquired by KLA-Tencor in 2007. He has served as a technology and mergers/acquisitions consultant for Cadence Design Systems. Dr. Poolla has been awarded a 1988 NSF Presidential Young Investigator Award, the 1993 Hugo Schuck Best Paper Prize, the 1994 Donald P. Eckman Award, the 1998 Distinguished Teaching Award of the University of California, the 2005 and 2007 IEEE Transactions on Semiconductor Manufacturing Best Paper Prizes, and the 2009 IEEE CSS Transition to Practice Award.