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Unlocking Energy Information in Smart Meter Data for Demand Side Energy Management

by

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Venue : HG02

ABSTRACT

The rising energy costs and environmental concerns of increasing global energy consumption have led government agencies and utilities to seek policies that would reduce greenhouse gas emissions and favour more integration of renewable energy resources and implementation of demand side management (DSM) of energy consumption, and the same time, ensure reliable and sustainable operations of the electric grid. The idea of DSM has been employed to reduce peak load and provide demand curtailment during periods of shortfall in renewable generation. For utilities to achieve high yields (for example, high energy savings) in these energy programs, effective strategies need to be designed to identify and target the right customers, and quantify their response flexibility, availability and reliability. The design requires a systematic approach in modelling and understanding how various attributes might affect consumption behavior in response to utility signals or incentives. As utilities deploy large numbers of smart meters across their distribution grids, the availability of meter data allows a close examination of the customers' potential for an energy program. They are a massive set of data ("big data") and analytics need to be developed to decode the embedded energy information into meaningful measures that can help understand the dynamics on both sides of the meter. In this talk, we will discuss the consumer side analytics, but we emphasize that any energy decisions made on the consumer side (for example, demand response) need to also consider their impact on the power grid, thus allowing a full optimization on both the supply and demand sides. We will discuss results on modelling, algorithm and metric development that help understanding energy usage, temperature dependency, and defining customer segments that could be useful for demand response operations.

BIOGRAPHY

Dr. Chin-Woo Tan is the Director of the Stanford Smart Grid Lab at Stanford University. He is also with the Stanford Sustainability Systems Laboratory. His current research interests are in energy data analytics and applications to demand management, smart grid operations, distribution network modelling and analysis, and nonlinear dynamics in power systems. Before joining Stanford, he was a Project Manager for the Los Angeles Department of Water and Power Smart Grid Demonstration Project, a DOE-funded inter-disciplinary research project in collaboration with university partners at USC, UCLA and JPL. In that project, he led the Demand Response team in deploying emerging communication and information technologies at university micro-grids and throughout the city of Los Angeles to monitor how energy is being consumed, forecast demand, detect outages, seek ways to more efficiently manage energy consumption, and conduct empirical studies of consumption behavior. Dr. Tan was an Associate Professor with the Electrical Engineering Department at California Baptist University. Prior to that, he was a project manager and research engineer with the PATH Program at UC Berkeley for 10 years, working on intelligent transportation systems. He had also worked at PINC Solutions as a senior system engineer developing an RFID-based intelligent management system for tracking and managing assets in a yard in logistics and supply chain. He has taught electrical engineering courses at UC Berkeley, UC Davis, San Jose State University, Santa Clara University, and California Baptist University. Dr. Tan holds a Ph.D. and B.S. in Electrical Engineering, and a M.A. in Mathematics, all from the University of California, Berkeley.

ALL ARE WELCOME!