

The Department of Civil and Environmental Engineering at the University of Houston presents...

CIVE 6111 Graduate Seminar

New market mechanisms to ensure reliable power supply with large renewable penetration



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2:45pm-3:45pm

Classroom Business Building (CBB) – Room 118

Abstract

The traditional framework of the power grid is built around tailoring production from reliable generators to meet inflexible demand. Due to both environmental and economic reasons, renewable penetration in the grid has been increasing rapidly. However, renewable sources are intermittent and not well-forecasted at the time scales of interest to the existing energy markets. Thus, new market mechanisms are required to ensure reliable power supply in the presence of renewables.

In the first part of the talk, we propose a framework for trading real options through which flexible sources are incentivized to mitigate the effect of renewable intermittence. We show that such options can increase renewable penetration while ensuring the delivery of reliable power and guaranteeing that no market participants are worse-off. In the second part of the talk, we propose a framework for incentivizing demand to be reduced at times of power imbalance. We point out the problem of phantom demand response that can arise with simplistic incentive mechanisms and provide a contract to resolve the problem.

Bio

Vijay Gupta is a Professor in the Department of Electrical Engineering at the University of Notre Dame, having joined the faculty in January 2008. He received his B. Tech degree at Indian Institute of Technology, Delhi, and his M.S. and Ph.D. at California Institute of Technology, all in Electrical Engineering. Prior to joining Notre Dame, he also served as a research associate in the Institute for Systems Research at the University of Maryland, College Park. He received the 2018 Antonio Ruberti Award from IEEE Control Systems Society, the 2013 Donald P. Eckman Award from the American Automatic Control Council and a 2009 National Science Foundation (NSF) CAREER Award. His research and teaching interests are broadly at the interface of communication, control, distributed computation, and human decision making.