



# PSERC WEBINAR

## Analysis of Power System Operational Uncertainty from Gas System Dependence

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Electricity generation increasingly relies on natural gas as older units are retired, because of the usually low fuel costs, considerably lower CO<sub>2</sub> emissions and the capability of gas-fired units to start up, shut down or change generation levels quickly. The competing demands for gas by other users who may have higher priority, the lack of coordination between gas and electricity markets, and extreme weather events all pose risks to systems with high dependence on gas. When gas supply is limited, high wholesale electricity prices may result from the generators procuring gas at high spot prices and the system operators taking various actions, including redispatch, to maintain reliability. To assess this economic risk we approximate the probability distribution for the electric energy purchase costs to meet the demand by conducting Monte Carlo simulations of dispatch. The risk is quantified in terms of metrics for the difference between the purchase cost distributions generated with and without gas price uncertainty. We demonstrate how such risk quantification metrics can be used to evaluate alternative risk-mitigation strategies at the system level.

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**Sarah M. Ryan** is Joseph Walkup Professor of Industrial & Manufacturing Systems Engineering at Iowa State University. Her research concerns the planning and operation of manufacturing and electric power systems under uncertainty. Her work has been supported by the National Science Foundation, including a CAREER award, an AT&T Industrial Ecology Faculty Fellowship, and the Department of Energy under an ARPA-e project, as well as by PSERC.

Dr. Ryan is a Senior Member of IEEE and a Fellow of the Institute of Industrial & Systems Engineers. She is a past Editor of the IEEE Transactions on Power Systems and current Editor-in-Chief of The Engineering Economist.

