

Abstract Submission  
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**"Resource Planning Under Technology, Market, and Regulatory Uncertainty:  
Practical Approaches to Valuing Flexibility"**

William Kemp, Managing Director-AVP, Black & Veatch  
and Natalie Rolph, Chief Economist, Black & Veatch

Utility analysis of long-term investments in supply or demand-side resources currently must take place in the context of unprecedented degrees of uncertainty across many major dimensions. The escalation in capital costs for existing generation technologies will be subject to the countervailing forces of continuing tight commodity and labor markets, vs. an expected increase in manufacturing capacity for generation equipment. New technologies such as advanced nuclear, IGCC, and coal with CCS have substantial cost uncertainties. Fuel costs are subject to great market uncertainties, with North American natural gas production rising but LNG also playing a larger role, and demands from the generation sector driving the gas market balance. Uranium prices and transmission projects are also wild cards in the market. The regulatory regime and price trajectory for greenhouse gas emissions poses perhaps the largest area of uncertainty for resource planners. And on the other side of the market, the cost-effectiveness threshold for emerging energy efficiency technologies and demand-side management programs is a moving target due to the uncertainties on the supply side.

Detailed regional analysis of resource options under these multiple and inter-related degrees of uncertainty is not practical with conventional integrated resource planning approaches. Even the most robust IRP models cannot reach a feasible solution with so many added major degrees of uncertainty. Intelligent constraints to the model logic are required. Dynamic stochastic approaches are too computer- and time-intensive to be practical for most firms. Scenario definitions up front can be used to capture the relevant range of future states that should be considered. Reasonable estimates of the real options value of better information or more time until investment commitments can then be developed. Robust near term and medium term investment paths can be defined.

This presentation will first review the major sources of uncertainty, and then lay out a comprehensive and integrated – but practical – approach to developing a robust firm-level plan. A realistic case study will be described, to illustrate the approach.