Back to the Future:
Re-integrating Resource Planning with Open-Access Software

Paul Meier, Energy Institute, UW-Madison

Introduction

This poster presents the methodology for cost-benefit analysis of energy efficient technologies using a simple integrated resource model. The idea of evaluating demand side measures within simplified production models is not new. In the 1980s, "integrated" planning models substituted less-detailed analysis of both supply and demand side processes for the formerly onerous coupling of detailed end-use and production models. Industry restructuring resulted in practical challenges for estimating the avoided production and capacity costs displaced by energy efficiency. Efficiency programs were not effectively integrated within the expansion planning process and regional market operation complicated the estimation of avoided production costs.

Summary

It is challenging to assess the grid-integrated impact for demand-side technologies within a supply-side system which changes throughout the installed technology lifetime. In the absence of state-of-the-art modeling capabilities, program administrators use screening metrics to select technology end-uses for various program objectives. This poster presents the methodology for cost-benefit analysis of energy efficient technologies which are "fully integrated" within the electric utility system using an integrated resource model.

The work presented characterizes the performance of multiple energy efficient technology examples. Avoided electrical generation is estimated in four time periods peak and off-peak seasons, and peak and off-peak hours. The benefits are estimated by evaluating an efficient scenario against a baseline scenario.

The baseline scenario is a pre-determined supply-side expansion plan which will characterize generation costs using a load duration curve and market price duration curve. The baseline scenario is compliant with planning criteria for a Wisconsin investor owned utility, including supply-side investments required to maintain a planning reserve margin, compliance with pending emissions limitations, and renewable portfolio standards. Uncertainty in demand growth, fuel prices, and carbon prices is considered. The benefits of the efficient scenarios include avoided fuel and operating costs, deferred capacity additions, avoided market purchases, and emission reductions.

The poster will consider the cost and benefits from the end-user, IOU, and societal perspective and will discuss the technical challenges and limitations of the assessment, including data availability and characterization of wholesale electricity markets.