

Demand Response Can Improve the Emission Benefits of Wind

Seyed Hossein Madaeni, Ramteen Sioshansi_
*Department of Integrated Systems Engineering,
The Ohio State University,
1971 Neil Avenue, Columbus, OH 43210,
United
States of America*

Abstract

Although wind generation is emissions- and cost-free, real-time output can be variable and uncertain. This can require additional conventional capacity to be committed. Because the efficiency of generators and their emissions controls can depend on generator loading, this provision of additional capacity can increase generator emissions rates. Another method of accommodating wind is using demand response, which has system loads more closely follow supply. Using a case study based on the Texas power system, we examine the emissions and cost impacts of using these two strategies to accommodate wind. While we find that wind decreases generator loading and increase their emissions rates, we find that wind yields net emissions savings. We also find that while demand response reduces some of the emissions benefits of wind, combining wind and demand response provides more cost-effective emissions abatement than wind alone.

Keywords: Wind generation, power system emissions, demand response