Valuing and Reacting to Varied "Greenness" of Electricity in NYS Buildings

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ABSTRACT

New York State's goals for 70% of electricity generation from renewable energy sources by 2030 and 100% carbon free by 2040 require a fast evolution in both the grid providing the electricity and the buildings using it. In the next 10-20 years until those targets are achieved, is there a time-dependent valuation model that should be used to quantify grid-related emissions in New York?

Emissions are typically estimated for buildings or specific technologies using an annual average emission factor from EPA's Emissions & Generation Resource Integrated Database (eGrid). These baseload or non-baseload factors are each a single number for a state or grid region, averaged over an entire year, and are usually a year or two behind.

In practice, emission factors are time dependent. In this presentation, we will characterize how the mix of generation resources for New York's electric grid changes daily and seasonally; and how it has changed over the past five years using fuel mix data from the NY Independent System Operator (NYISO).

The impact of a time dependent valuation methodology for grid emissions on a practical application, we will examine example multifamily building electric load profiles in New York State. For those buildings we will quantify carbon cost using time dependent emission rates and compare with simpler calculations using eGrid emission factors.

Building load shapes will continue to evolve with growth in electrification markets. Using well-characterized heat pump performance, we will explore the impacts this could have

on emissions, specifically during peak winter load hours on the selected multifamily load profiles.

Finally, we will briefly touch on some possible future challenges associated with other emerging electrification technologies such as electric vehicles and induction cooking.

BIOGRAPHY

Nicholas Genzel leads monitoring and verification field installations on emerging energy technologies for Frontier Energy's Cazenovia office. His project teams install measurement and data logging equipment, and use collected data to evaluate and summarize energy performance and savings. Key technologies of deep expertise include ground source heat pumps, air source heat pumps, variable refrigerant flow units, energy storage, solar photovoltaic, combined heat and power, fuel cells, and anaerobic digester-to-gas systems.