ANALYSIS OF STATE POLICY INTERACTIONS WITH ELECTRICITY MARKETS IN THE CONTEXT OF UNECONOMIC EXISTING RESOURCES: A CRITICAL ASSESSMENT OF THE LITERATURE

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September 28, 2018

Executive Summary

After nearly a century of regulating electric utilities in the U.S. as natural monopolies, many regions have moved to a wholesale market approach for electricity generation beginning in the 1990s. The market-based approach was intended to improve economic efficiency and shift risks away from consumers, based on two fundamental principles from economic theory:

1. **Prices perform a signaling function; they rise and fall to reflect resource scarcity or surplus**. Low market prices signal excess supply and the need to reduce output through the exit of uncompetitive producers. Exit is a natural part of the market process, and allowing uncompetitive producers to exit lowers overall costs in the long run.

2. **Market systems confront investors with the financial consequences of their decisions, shifting the risk away from consumers**. In a market system, investment decisions are made by producers, who can best manage the costs and risks of that investment.

The prospect of retirement by large baseload generation facilities has recently induced actions in several states to provide out-of-market compensation to financially distressed generation resources. Some nuclear plants have requested and been awarded subsidies through "Zero Emission Credits" or similar mechanisms, and the federal government has repeatedly proposed direct involvement in wholesale electricity markets to support both coal and nuclear resources. Subsidies that prevent the exit of uneconomic resources are fundamentally inconsistent with the two foundational principles of market design described above. Specifically, subsidies to a generator in a competitive market are problematic for three reasons:

1. **Subsidies are among the least efficient means to achieve emission reductions.** Economic studies have long shown that pricing activities that internalize negative externalities in ways that are consistent with market competition (via emission taxes or tradeable permit systems) tends to be the most efficient mechanism to penalize pollutant emissions. In contrast, subsidies to specific participants or technology types have been shown to be among the least efficient means to achieve emission reductions, leading to higher costs and lower benefits to society.

2. **Subsidies shift investment risk to consumers.** Electricity restructuring is premised on private investors being able to manage investment risk at the lowest cost. In contrast, subsidies shift the risk of investment in uneconomic generation resources back to the consumers, who ultimately pay the costs of the subsidies.

3. **Subsidies can beget further subsidies.** Subsidies create a precedent whereby firms become more likely to make inefficient investments because they will not ultimately bear the costs for uneconomic decisions. Handing a subsidy to one firm or technology type signals to other market participants that they could receive similar treatment.

A number of recent studies on the impacts of subsidies to existing generation units, particularly nuclear plants, ignore this basic economic logic and conclude erroneously that subsidies will lead to lower overall electricity costs. This report describes how modeling and data choices influence outcomes and policy recommendations from a number of recent analyses. We identify three key modeling fallacies and offer suggestions to the analytical community for correcting these fallacies.

Fallacy 1: An increase (or decrease) in prices in one electricity market (energy, capacity or ancillary services) implies that overall electricity costs will increase (or decrease). Markets for energy, capacity and ancillary services products are highly interconnected, and all three influence overall electricity costs. Outcomes in the energy and capacity markets are particularly interconnected, and we show how price suppression in the spot energy market can lead to higher fixed costs.

Fallacy 2: Retirement decisions occur all at once or not at all, a static analysis comparing these two cases is appropriate, and ignoring market dynamics is acceptable. The interactions between market outcomes and entry/exit decisions are dynamic and evolve over time under conditions of substantial uncertainty. A rigorous assessment of the impacts of subsidies for uneconomic generation resources must account for the dependence of entry and exit decisions on subsequent decisions by other players in the market.

Fallacy 3: If a negative externality is present and can be quantified, a subsidy of the same magnitude is the best politically feasible mechanism for restoring market efficiency. Several studies quantify the air emission impacts of losing nuclear power as a zero-emission resource (including carbon and criteria pollutants). This is an important piece of information, but the magnitude of the externality itself does not suggest that a subsidy is the best mechanism for correcting the externality, even among the politically easier choices.

We complete our report by proposing a tractable analytical framework with well-defined questions and elements that we believe should be included in any analysis of state-level interventions to provide appropriate insights to policy-makers. These necessary elements include accounting for interdependencies between markets, recognizing that entry and exit represent a dynamic process, and comparing alternate options to internalize environmental externalities under uncertain future conditions. Our framing of the state intervention problem, while more complex than existing analyses, can be implemented with current computational methods.

We have not performed our own detailed analysis to be able to sufficiently argue that subsidies for existing uneconomic generators either are or are not warranted. However, our review of the literature to date leaves us concerned that existing subsidy programs are based on an incomplete analysis. The actual cost-benefit calculus to ratepayers and taxpayers in these states may be very different than what existing studies would suggest. In particular, the prevention of exit by uneconomic generation resources through the use of subsidies will likely increase the long-run costs of achieving sustainability and reliability in electric power service.