United States House of Representatives
Select Committee on the Climate Crisis

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"Solving the Climate Crisis: Ramping Up Renewables"

Questions for the Record

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The Honorable Garret Graves

1. There was a lot of discussion about cost competitiveness of renewables. But I also heard in the same breath, production tax credit, investment tax credit, carbon tax, renewable portfolio standards, procurement preferences, and other things that somewhat distort price.

   Can you talk a little bit just about cost competitiveness and what that looks like in terms of taxpayer investment quickly, please?

Thank you for the question, Ranking Member Graves. First, electric generation assets (power plants) are dispatched (given orders to produce power) most economically when the grid operator or local balancing authority/utility can follow "security constrained economic dispatch." That technique relies on two inputs, operating characteristics and price. Power plants are "stacked" according to these two attributes and then are given orders to produce power by the grid operator based on the amount of demand that needs to be met. This is would be dispatch "in merit order." When grid operators deviate from this efficient approach customers can face higher and more opaque costs in the form of locally higher rates, uplift charges, and a higher tax burden that does not necessarily fund power supplies they use.[1]

Some emissions – such as sulfur dioxide (SO_2)[2] and nitrogen oxides (NO_X)[3] – have trading and credit markets with transparent prices that are readily incorporated into the power plant's price. We would argue that these emissions-oriented policies do not "distort" prices, but integrate those nationally applicable policies into generation asset price profiles.

However, state-level and regional policies that focus on increasing renewable energy deployments or non-price preferences for lower carbon resources can "distort" prices when they operate outside the electricity market algorithms that set dispatch merit order. This has led to several iterations of price formation and market reform proceedings at the Federal Energy Regulatory Commission to address "out of market" policies adopted by states who regulate the market participants, primarily in New England the PJM Interconnection regions.

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[1] https://www.sciencedirect.com/science/article/pii/S0960148115300343
[2] https://www.epa.gov/airmarkets/acid-rain-program
[3] https://www.epa.gov/airmarkets/phase-ii-acid-rain-program

Renewable portfolio standards/procurement practices and production/investment tax credits can make it more difficult for the market operator to follow security constrained economic dispatch because the costs of these policies isn't well reflected in market prices. For example, RPS programs and renewable energy tax credits have fostered the entry of power generation assets that do not follow dispatch.[4] Wind farms produce power when the wind blows and solar when the sun shines, not when the grid operator directs them. This means that the grid operator often must accommodate those resources first, even though they may not be the first to dispatch from an operational characteristics basis, and deploys other assets to complement them.

Depending on the time of day, this accommodation may require that the grid operator ask other generators to back down their production by charging them to produce power instead of paying them for it (negative pricing), or dispatching higher-priced, but more flexible capacity that can provide power in small increments until the full capacity of a larger (baseload) asset can be accommodated at its lower price. Wind's production tax credit, worth as much as $23/MWh for many existing facilities, means that these assets have $23/MWh of "headroom" relative to other generators, buffering them from the adverse impacts of lower prices. Even as the tax credit has declined ahead of expiration, deployments remain robust.[5, 6]

To be clear, tax-preferred resources with no fuel costs (such as wind/solar) can and do lead to lower wholesale prices in the hours when they are plentiful, something that does benefit consumers. However, these cost decreases can be offset by increases elsewhere on the system. Structurally lower wholesale market prices, in particular for baseload energy (often provided by coal and nuclear plants), can lead to power plant retirements, and in some areas, may have adverse impact on the ability to maintain system stability and power delivery at high demand (peak) or emergency periods. Some of those retirements do not adversely impact ratepayers financially, however some do. If an asset is retired before it is fully recovered in retail rates, customers may still be obligated to pay off most, if not all, of the remaining value of the asset, if the plant's construction had been approved by regulators. These costs could offset the savings from the lower prices of the newer market entrants.[7]

In addition, incremental transmission and distribution system investments may be required to handle retirements, shifts in power flows. These are occasioned when renewable assets must be located where nature provides the best opportunity, and that may not necessarily be the most optimal location.[8] Further, the power grid has been substantially constructed to flow power one direction – from generation resources to customers.[9] However, when customers produce more energy than they can use they become "pro-sumers" and power may flow the other direction on the distribution system.

Retooling the nation's grid to accommodate this new capability won't happen without investment (in other words, money from ratepayers). We would argue adoption of incrementally lower greenhouse gas emitting resources are not neutral to ratepayers, and in some cases may result in rate increases to cover investments ahead of potential savings realized over the longer term.

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[4] https://blogs.ei.columbia.edu/2018/03/16/how-much-do-renewables-actually-depend-on-tax-breaks/
[5] https://www.eia.gov/todayinenergy/detail.php?id=39472
[6] https://fas.org/sgp/crs/misc/R43453.pdf
[7] https://www.economist.com/leaders/2017/02/25/wind-and-solar-power-are-disrupting-electricity-systems, https://www.forbes.com/sites/michaelshellenberger/2019/05/27/we-shouldnt-be-surprised-renewables-make-energy-expensive-since-thats-always-been-the-greens-goal/#45a506224e6d
[8] https://blog.friendsofscience.org/2018/03/22/examining-the-claim-that-renewable-energy-will-soon-replace-fossil-fuels/
[9] https://pages.bv.com/SDR-SmartUtilities-Download.html

Incremental investment in both the transmission and distribution systems is generally socialized across all grid users, not paid for by the owner of the renewable generation resource. We'd agree that these investments in "grid modernization" do have benefits beyond renewables integration, but the cost impact of renewables deployment can be opaque to the consumer given that these investments are not reflected in the wholesale prices offered by renewable energy assets to the wholesale market.

This ratemaking reality can make the cost of new renewables assets more opaque. Further, pro-sumers seek to be paid for "excess" energy their systems may be able to produce relative to their load. Initial rate designs in this area have been so beneficial to these pro-sumers that many states have been making incremental reforms to their rate design to reduce and eventually eliminate cross-subsidization between customer classes.

In addition, the excess gross supply of power generation assets and low market prices have undermined the ability of flexible units to make reasonable returns to stay in the market (the experience of natural gas plants in California provides an extreme example). This leads to calls for incremental charges for reliability must run (RMR) contracts to be struck (and paid by customers) or very high, and volatile peak pricing schemes to prevent the closure of these power plants, too. These less transparent costs can eat into the notional "cost savings" of lower wholesale market prices, and potentially offset them altogether.

Therefore, at the end of the day, electricity customers pay for power generated and delivered to them over the nation's grid. They pay taxes, too. Customers can face higher electricity rates that support procurements to preserve reliability arising from local or regional needs – whether to retain coal-fired or nuclear baseload plants or natural gas mid-merit and peaking facilities – and increased investment in the grid to accommodate the renewables capability their taxes also support.

A quick word about carbon taxes or carbon prices. While this policy would not be without cost it has the potential to be more transparent (much like SO_2 and NOx credits) and easier to integrate into restructured market algorithms.

Further, if adopted as part of a holistic, national policy decision, Congress would have the opportunity to direct some of the revenues raised from a greenhouse gas limitation program to the areas of the country facing the largest transition challenges if needed. This may be appropriate to reflect two important realities. First, some areas of the country have more renewables or low carbon generation resources available than others.[10]

Second, the nation's environmental, energy and industrial policies in place 40-50 years ago differ dramatically from those adopted over the last decade and under discussion today. Many regions that are still carbon-intensive in power generation are facing other economic challenges, including de-industrialization as well as economic reliance on the production of the natural resources a national policy that would limit GHG emissions could constrain or eliminate altogether over time.

Policy proposals that reflect these two realities would appear to be the most likely to be adopted nationally. Policy proposals that advantage one region of the country at the expense of others (particularly those that purport to "reward" areas that are deemed "first movers") and do not consider ameliorating the potential adverse consequences of a rapid transitions have not succeeded to date, and appear unlikely to in future.

[10] http://archives.maproomblog.com/2008/03/us_atlas_of_renewable_resources.php