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The value of solar writ large: A modest proposal for applying 'value of solar' analysis and principles to the entire electricity market

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ABSTRACT

The essay sets out what electric markets might look like if the pricing proposed in value of solar studies were adopted for every resource.

Distributed solar generation corporate interests and their supporters are now producing, or calling for, reports assessing the "value of solar" and calling for pricing that is reflective not of costs or market circumstances, but rather of the "value(s)" claimed.[1] Such an approach, of course, runs contrary to a long history of disciplining electricity prices by either competition in the market, or, as has frequently been the case, where market failure occurs, by cost-based regulation. Until now, the only deviation from that history was in the late 1970s and early 1980s, when some states, in calculating "avoided costs" in the implementation of The Public Utilities Regulatory Practices Act (PURPA), applied exaggerated and creative theories of value to justify calculations that often inflated, but in other cases deflated, the calculations. That deviation was largely concluded when a number of states' calculations of "avoided costs" so distorted pricing that they caused adverse consequences for consumers, for the market, and for investors, problems that were finally corrected by the federal preemption mandating the deployment of competitive market mechanisms to restore efficient pricing. It also resulted in consumers being burdened with huge stranded asset costs, once the market structure was changed.

The proponents of "value" based pricing for rooftop solar implicitly presume that only their preferred resource, distributed solar, and not any other resource, should be compensated in a way that is reflective of their subjective claims about the "value" of their product.[2] In effect, they are suggesting that while competing sources of energy are compensated based on prices derived in the market or from cost based-regulation, rooftop solar should be compensated based upon claims or theories of value. In short, the argument amounts to a claim that, while the prices of all other resources, including other renewables, are subject to external disciplines, rooftop solar should be free of such disciplines and compensated based upon subjective assertions of value that, in theory, might be delivered.

Recently, however, this "value" argument is raising its head for other electricity resources as well—notably, nuclear, which is urging its own claims, based on avoided carbon emissions and fuel diversity. In some regions, even coal is getting into the game, as states try to preserve a coal industry and coal jobs threatened by competition from natural gas.

Setting aside the fact that many of the claimed values are more theoretical than real, often closer to fantasy than fact, and, in some cases, literally impossible, it is a useful exercise, given these trends, to take the logic of "value" pricing and apply it to the industry as a whole. After all, if the logic of prices based on "value" is so compelling, there is no reason to apply it only to one resource, to the exclusion of others. In short, assuming, as advocates of "value" based pricing do, that the disciplines of costs and/or market should not apply to pricing resources, let's contemplate what pricing, without regard to markets or costs, would be like for other resources used in the provision of electric service.

[1] To be fair, although most of the value-of-solar studies are authored by rooftop solar advocates or consultants highly sympathetic to distributed solar interests, not all of the studies are biased in that direction. Indeed, a few of them conclude that solar DG has little, or, in at least one case, has negative, value. Indeed, that diversity of conclusions bears witness to the extraordinary degree of subjectivity and arbitrariness inherent in such studies.

[2] It is not always clear whether advocates of value-of-solar" pricing are pushing for prices set by their claims of value, or are simply trying to claim that retail net metering, a method by which rooftop solar producers are compensated at the full retail rate for the energy they produce, does not constitute a substantial cross subsidy. Regardless of the objective, they are advocating for the use of subjective claims of value to the exclusion of the more rigorous price disciplines of competition or cost-based regulation.

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Indeed, the advocates have given us a list of criteria by which we can ascertain value. These criteria include:

1. Grid management benefits (e.g. dispatch, congestion, line losses, and ancillary services);
2. Grid capacity benefits;
3. Generation benefits (including generating capacity);
4. Carbon and other environmental benefits;
5. Jobs benefits;
6. Fuel and price hedge benefits.

Applying the principles of value pricing to all resources is made much simpler by adhering to the following characteristics found in most, although perhaps not all, of the value of solar studies that have been conducted:

1. System costs, as well as social costs (e.g., job losses associated with higher prices for electricity, socially regressive rate-making), can be largely ignored or substantially diminished so as not to offset the "value" claimed.
2. The fact that many of the values claimed can be obtained, often at lower cost, or on a more cost-effective basis, from other sources, can simply be ignored.
3. The fact that value pricing provides little or no incentive for improving productivity and efficiency can be ignored.
4. Granularity of and precision in analysis (e.g. identifying which generators are actually displaced to accurately ascertain the amount of emissions reduction actually occurring, impact location of assets and times of operation) in assessing delivered value is unnecessary.
5. All values claimed need not be actually delivered, only theoretically possible.
6. Economic analysis of value should be done on a levelized basis over the anticipated life of the asset, and it should be assumed that long term energy and fuel price forecasts are correct, regardless of the fact that history has proven otherwise. It is not necessary to consider the fact that variations that are almost certain to occur during that time frame.
7. Levelized projections of value should be compared with current costs, neglecting any way in which costs may increase over time.
8. For purposes of setting prices for energy produced, it can be assumed that the simple provision of energy is entitled to the same compensation as is paid for the fully delivered price of electricity, without regard to whether the energy source being compensated did anything to actually deliver the energy.
9. The consideration of externalities is subject to the arbitrary inclusion of some and exclusion of others.
10. Distinguishing costs and benefits in terms of which are private and which are socialized is of no consequence and need not be considered.
11. The impact of value prices on competition or cost containment need not be considered.
12. Impact on other goods and services is of no consequence.
13. The impact on the efficient use of electricity need not be considered.
14. The only price discipline, if any, is the retail price of electricity, not the price of the product actually delivered. The fact that a product may not be capable of delivering retail electricity on its own is irrelevant.
15. Tax subsidies and other public assistance (e.g. REC markets) used to financially support particular assets should not be considered as costs that in any way affect the value calculation.
16. The fact that carbon emissions levels may be subject to state regulation (e.g. in RGGI states and in California) cannot be considered as internalizing carbon emissions. Indeed, the perverse economic consequences of superimposing resource preferences on a carbon trading regime are to be fully ignored. Moreover, sweeping generalizations are in order in calculating carbon emission reductions, as opposed to a granular, detailed look at what generation is actually being displaced.
17. The unintended consequences of poor and non-transparent price signals for energy and capacity efficiency and demand inherent in most "value" calculations are not worthy of mention.
18. Hedge premiums should be recognized and paid regardless of how the hedge is priced and without regard to whether or not the hedge is real or phantom. The question of whether the price of competing resources might in fact decline significantly should not be considered.
19. The risks of misallocating capital to less efficient resources, or failing to send price signals that incentivize energy and capacity efficiency should be disregarded.
20. All costs should generally be presumed to be variable, regardless of the fact that some costs are fixed and do not vary with use.
21. Cost causation is largely irrelevant to setting prices.

What follows below is a notional exploration of what the power sector would look like in a market whose prices were determined by subjective notions of "value." The discussion is not exhaustive; indeed, is not intended to be so, but it will serve to illustrate notable features of the application of value based pricing to the power sector writ large.

1. Grid management benefits

"Value of solar" advocates frequently claim additional value for rooftop solar based on its location on the distribution grid, arguing that, to the extent that this power stays at the distribution level, it reduces the amount of energy that must travel over the grid, resulting in less congestion and fewer line losses. This is theoretically possible, but the actual impact of DERs on grid congestion depends on the time, location of assets, and the particulars of energy flow on the grid at any given time.[3]

Just as it is possible (but not inevitable) that DERs can reduce congestion on the grid, so, too, it is possible (but not inevitable) that production from large-scale plants can reduce congestion—depending on where the additional power is added to the grid, it can reduce congestion in other places. All resources, of course, including solar DG, can also increase congestion, but given that most value of solar studies either ignore or discount such possible costs, any consideration of that can simply be disregarded.

Therefore, following the principles discussed above, "value" credit should be awarded to all resources for the potential to reduce grid congestion—large-scale wind, hydro, and solar, thermal, and nuclear plants can all potentially, in the right circumstances, provide grid management benefits and costs, just like rooftop solar, the only difference being that they have little in the way of distribution effects

Furthermore, additional value should be attributed to all kinds

[3] While it is certainly true that distributed resources, including solar, do not access the transmission system, that does not mean that existence of DG resources, *per se*, reduces congestion on the high voltage grid. It is possible that they do, but it is also possible that, for a variety of reasons, they might adversely, albeit perhaps indirectly, increase congestion. That could occur, for example, when less energy demand on a particular distribution node results in less energy being stepped down at the sub-station, or when there is a surge of energy through the sub-station when cloud cover appears over a particular distribution system. Large amounts of DG at a location could exceed demand and put additional power on the grid that is not helpful, as well as creating problems on the distribution system.