Institute *for*
Policy Integrity
NEW YORK UNIVERSITY SCHOOL OF LAW

April 29, 2016

Dear NARUC Staff Subcommittee on Rate Design:

The Institute for Policy Integrity at New York University School of Law[1] ("Policy Integrity") respectfully submits the following comments on the Distributed Energy Resources Compensation Manual ("Manual"). Policy Integrity is a non-partisan think tank dedicated to improving the quality of government decisionmaking through advocacy and scholarship in the fields of administrative law, economics, and public policy. Policy Integrity has extensive experience advising stakeholders and government decisionmakers on the rational, balanced use of benefit-cost analysis, both in federal practice and in New York.

We are grateful for the Commission's consideration of these comments. Please do not hesitate to contact us if you have any further questions.

Sincerely,

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[1] No part of this document purports to present New York University School of Law's views, if any.

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## INTRODUCTION

As distributed energy resources ("DER") are becoming increasingly common, the debate on how customers with such systems should be compensated is intensifying. More states are undertaking initiatives to evaluate their current policies. As DER start playing a crucial role in grid modernization as well as clean energy policies, it is important to establish a socially desirable framework that can be used consistently in different states and in discussions of different distributed energy resources, not just distributed solar generation. Further, as resource choices that can balance demand and supply increase, and utility scale renewables become more common, a consistent formulation that could provide a true value comparison among different alternatives is needed. Therefore, we applaud the efforts of NARUC Staff Subcommittee on Rate Design ("Subcommittee") to develop a manual that could provide such a formulation, and their efforts to seek input from interested parties.

Below are detailed responses to the questions posed by the Subcommittee.

*1. What currently-used rate designs or methodologies should be explored in the context of the DER Compensation Manual (e.g., flat, inclining block, time-variable)? What examples of fully-implemented rate designs or methodologies exist?*

**The Manual should explore rate designs that accurately reflect the cost drivers, even if such designs are not currently widely implemented.**

The most commonly used residential rate design includes a flat, time-invariant per-kWh price that is set at a level designed to recover most of the system's costs, including the substantial share of costs that are fixed. As this per-kWh price does not reflect the incremental cost of providing electricity to the final customers, designs that rely on such volumetric prices lead to inefficiencies and create the possibility of cost shifting among different customer classes. The full value of distributed generation cannot be unlocked until such inefficiencies inherent in electricity pricing can be corrected. Therefore, the Subcommittee should explore designs that move closer to reflecting underlying costs based on the unit cost drivers such as time-variant pricing and coincident peak demand charges, even if such cost reflective designs are not widely implemented currently, and should move away from supporting designs that distort the true underlying cost of providing electricity, such as inclining block pricing.

If the tariffs are more cost-reflective so that the volumetric charges reflect only the volumetric social costs of providing energy at a particular location and time, and the full cost of externalities, then reimbursing distributed generation using this rate would not affect the cost recovery of a utility, solving any cost shifting concerns. Further, using this rate would properly reward distributed generation for the environmental and health benefits it provides due to avoided emissions, as well as for the avoided generation capacity investments.

If distribution network charges are based on each user's contribution to total system costs, overall system efficiency would be improved, even when net metering is used. For example, consider a network tariff in which network costs are recovered using a two-part tariff that includes a basic fixed charge for connected load[2] and a coincident peak demand charge per-kW that is based on a customer's maximum demand during the distribution network's peak period. Individual connected load charges allow the already incurred basic network costs to be distributed fairly across different customer classes based on the amount they contribute to the system costs.[3] A coincident peak maximum demand charge that is properly designed would provide incentives for customers to reduce their kW demands, especially during distribution system peak periods, giving customers more incentives to

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[2] Ahmad Faruqui, The Brattle Grp., The Global Movement Toward Cost-Reflective Tariffs, presentation at EUCI Residential Demand Charges Summit (May 14, 2015).

[3] IGNACIO PEREZ-ARRIAGA & ASHWINI BHARATKUMAR, MIT CTR. FOR ENERGY AND ENVIRON. POLICY RESEARCH, A FRAMEWORK FOR REDESIGNING DISTRIBUTION NETWORK USE-OF-SYSTEM CHARGES UNDER HIGH PENETRATION OF DISTRIBUTED ENERGY RESOURCES: NEW PRINCIPLES FOR NEW PROBLEMS (Oct. 2014).

install distributed generation systems that would help with their load during such periods.[4] Such designs would help utilities recover their distribution network costs while rewarding distributed generation to the extent that it helps delays future distribution capacity expansions. It is crucial that such designs not be confused with un-nuanced increases in fixed charges that applied only to a subset of customers, which can indeed hurt the deployment of distributed energy resources. [5]

Well-designed cost-reflective pricing structures would improve economic efficiency. Such structures will ensure that customers take into account the true costs of electricity at that particular time and location when making decisions about electricity consumption. Hence, the observed market outcome will be a socially desirable one. Second, these new rate structures will ensure that market price is actually signaling the true value of electricity to society and therefore can guide investments to where they would be most valuable to society.[6] A cost-reflective tariff would compensate distributed generators at a higher price when it is costlier to generate electricity or at locations where the grid is congested, and would drive more targeted investment.

*2. What are the current rate design and compensation challenges for DER that should be explored in the writing of the Manual?*

**The Manual should list all benefit and cost categories borne by all parties, discuss methodologies to accurately value these categories, and address how these benefits and costs can be incorporated in new rate design.**

Economic efficiency defines the socially optimal outcome of a policy as the point at which its marginal social benefits—which include both private and external benefits—of a good equals its marginal social cost—which, similarly, includes both private and external costs. Therefore, it is important to first understand how interconnection of distributed generation systems affects the overall electric grid, as well as society as a whole, before discussing what a socially optimal pricing policy might look like. Once such value categories are established, they should be incorporated into the new rate design based on the way they are incurred. For example, costs that are incurred on a kWh basis should be recovered using a volumetric charge, and costs that are incurred on a kW basis should recovered

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[4] AHMAD FARUQUI & RYAN HLEDIK, THE BRATTLE GRP., SALT RIVER PROJECT, AN EVALUATION OF SRP'S ELECTRIC RATE PROPOSAL FOR RESIDENTIAL CUSTOMERS WITH DISTRIBUTED GENERATION 19 (2015).
[5] NAÏM R. DARGHOUTH ET AL., LAWRENCE BERKELEY NAT'L LAB., LBNL- 183185, NET METERING AND MARKET FEEDBACK LOOPS: EXPLORING THE IMPACT OF RETAIL RATE DESIGN ON DISTRIBUTED PV DEPLOYMENT at 16-20 (2015), available at HTTP://EMP.LBL.GOV/SITES/ALL/FILES/LBNL-183185_0.PDF.
[6] Severin Borenstein & James Bushnell, *The U.S. Electricity Industry After 20 Years of Restructuring*, 7 Ann. Rev. Econ. 437, 455–4457 (2015).

using a per-kW demand charge. Costs that do not vary with usage should be recovered using a fixed charge.

**The Manual should provide a technology-neutral framework that can be used to compensate different types of distributed energy resources, without favoring one technology over another *ex ante*, to ensure efficient allocation of society's resources.**

Overall, having the right price signals would direct distributed energy resources investments to where and when they are most needed, ensuring an efficient allocation of resources. Not all distributed energy resources are created equal, and they can provide different values at different times and locations. It is important that the Manual provides a framework that can consistently be used for all types of distributed energy resources, without favoring one over the other *ex ante.* Installing solar panels in specific areas that are closer to those areas requiring additional capacity can provide ten times more capacity value than installations averaged across a whole service territory.[7] Investing in wind turbines may be more valuable in areas where the demand is late peaking as that is when wind production also peaks.[8] Some distributed energy resources may not provide desired benefits in certain areas,[9] so reallocating funds to more effective resources in those areas may be necessary to achieve clean and reliable energy goals in the least-cost manner.

A consistent formula would lead to higher valuation for types of DER that are most needed in one location compared to other areas, which would in turn drive more investment for those kinds of DER. Further, the granular and the dynamic nature of this approach would allow it to be used consistently across all energy resources to provide the right signals for a socially desirable outcome—regardless of whether energy resources are centralized or distributed, small-scale or utility-scale, or emitting or non-emitting—and unlock the full value of all energy resources.

**The Manual should discuss how to value external benefits that DER provide, especially when there are other environmental policies in effect.**

If power plants do not fully internalize the external costs of greenhouse gas emissions (or costs of other externalities), then these costs are not reflected in the cost of generating electricity, and therefore are not reflected in retail electricity rates as currently structured.

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[7] Michael A. Cohen, Paul A. Kauzmann & Duncan S. Callaway, Economic Effects of Distributed PV Generation on California's Distribution System 16 (Energy Inst. At Haas, Working Paper No. 260, 2015), available at http://ei.haas.berkeley.edu/research/papers/WP260.pdf.
[8] Joseph Cullen, *Measuring the Environmental Benefits of Wind-Generated Electricity*, 5 AM. ECON. J.: ECON. POL'Y 107 (2013).
[9] Eduardo Porter, *Climate Change Calls for Science, Not Hope*, N.Y. TIMES (Jun. 24, 2015) http://www.nytimes.com/2015/06/24/business/combating-climate-change-with-science-rather-than-hope.html.

Thus, net metering does not provide the right incentives. Therefore, the remuneration for distributed generation should reflect the benefits associated with the net avoided emissions it provides, to the extent that the value of the marginal external damage is not fully internalized by existing policies.

While the value of the marginal external damage is exogenous, the portion of this external damage that is internalized depends on the existing policies. If there are other policies that lead fossil-fuel generators to internalize some of this damage, then the environmental benefit adder in remuneration of distributed energy resources should only include the "uninternalized" damages. For example, a socially optimal distributed generation policy in a state that is a part of the Regional Greenhouse Gas Imitative ("RGGI"), which is a regional cap-and-trade program,[10] should start with subtracting the per-ton allowance price from the SCC to derive the value of external damage of one ton of additional carbon emission that has not yet been internalized. But, to be accurate, this calculation would need to reflect *all* existing policies affecting the market, such as the Clean Power Plan or the federal subsidies for fossil fuels.[11]

**The Manual should discuss the proper level of granularity.**

As the current retail rates are not granular enough to reflect temporal and locational variation in costs of providing energy or environmental harm caused by fossil-fuel plants, policies such as net metering or other non-granular designs such as Value-of-Solar Tariffs are insufficient to accurately compensate distributed generation. If the retail rates do not reflect the temporal variation in energy costs, then DER should be compensated differently depending on the time they produce electricity. If retail rates do not reflect the locational variation in the capacity costs, then DER should be compensated differently for the capacity value they provide based on their location. If the retail rates do not fully internalize the external damage from greenhouse gas emissions, then DER should be rewarded for avoided emissions in an amount that reflects the portion of the damage that is not internalized in retail rates. Unless DER compensation is modified to reflect such benefits with proper granularity, not only will the level of DER penetration be inefficient, but price signals will be insufficient to guide investments to ensure efficient allocation of resources among different DERs.

Further, the distribution system peak may not coincide with the wholesale energy market peak. A design that is not granular enough to identify and differentiate such peaks would

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[10] *Program Overview*, REGIONAL GREENHOUSE GAS INITIATIVE, http://www.rggi.org/design/overview (last visited Feb. 16, 2016).

[11] *See* U.S. ENERGY INFO. ADMIN., DIRECT FEDERAL FINANCIAL INTERVENTIONS AND SUBSIDIES IN ENERGY IN FISCAL YEAR 2013 at 11-14 (2015), *available at* http://www.eia.gov/analysis/requests/subsidy/pdf/subsidy.pdf.

fail to achieve efficiency. This is especially important in restructured markets. Any savings associated with shaving generation peaks would be shared by customers and energy supply companies. However, if the underlying pricing structure is not well-designed, policies such as net metering would lead the distribution utilities to bear part of the costs.

**The Manual should not be limited to types of rate designs that can be implemented with current technology, and should provide a vision for more dynamic and granular designs that can be used as enabling technology becomes available.**

Short-term applicability of provided solutions is clearly an important goal. However, short-term results should not be the sole goal of the Manual. The Manual should provide a framework that can be used as a long-term transition guide to fully unbundled and granular pricing that can be implemented as advanced metering and communication technologies, and other enabling technologies come online.

**The Manual should recommend the use of monetary credits instead of volumetric credits.**

A monetary credit is more appropriate to reflect the full value created by DER. If the accounting is not done on a monetary basis, the compensation that participating customers receive may not accurately reflect the actual value of their DER systems. For example, if a customer exports energy to the grid during a peak-hour time period, and receives a certain number of peak-kWh credits that can only be used during the same peak hours, she will not be able to reap the full benefits of her system if her peak-period consumption is low. Even if she is allowed to use these credits during other periods, she would be exchanging her higher-value energy production for lower-value energy import from the grid. Therefore, using kWh credits would not allow the customer to get the full value for the benefits their DER system has provided to the electric grid.

**The Manual should discuss transition policies.**

A discussion of a new regulatory policy should necessarily be coupled with a discussion of a transition policy. At one extreme, there is a transition policy that offers no special treatment to current owners of DERs; and at another extreme, there is a transition policy that offers a policy of permanent grandfathering of net energy metering to current owners of DERs, never applying the new regulatory regime to existing actors.[12] The Manual should discuss a framework that can be used by regulators to decide if and how transition relief should be provided.

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[12] See L. Kaplow, *An Economic Analysis of Legal Transitions*, 99 HARV. L. REV. 509, 584-87 (1986) (discussing grandfather provisions as an example of legal transition relief, and a detailed examination of different types of partial relief).

This framework should discuss two aspects of transition relief: efficiency and fairness.[13] While considerations of efficiency usually would point away from transition relief, concerns of fairness might justify some amount of transition relief.

In general, transition relief is inadvisable on efficiency grounds. Generally, societal actors who do not actively anticipate changes are not afforded public relief from change, even though private relief in the form of insurance might be available.[14] For example, a business that loses profits if it does not modernize its technology is not entitled to relief. As the possibility of a change in the policy regime is simply a subclass of the large set of risks that societal actors are subjected to, transition relief requires special justification.[15]

However, time-limited grandfathering may be desirable for some period of time where investments are durable.[16] If the investment decisions for existing DER projects were made in good faith reliance on the existing regulatory construct, fairness concerns may justify extending protection to societal actors for some reasonable period of time.[17] Investors who have already installed DER may be offered the opportunity to continue on net energy metering for a specified period of time, which is determined in advance based on the anticipated useful life of technology, before they are obligated to move to the final DER valuation methodology. Such a time-limited transition relief would be superior to indefinite grandfathering.[18]

*3. What DER compensation methodologies should be considered in the writing of the Manual (e.g., NEM, value of solar, services model, transactive energy)? Briefly explain examples of fully implemented DER compensation methodologies.*

**Net metering is insufficient to properly value distributed generation when accompanied by commonly used rate designs.**

The premise of net metering—compensating a product or a service at the prevailing retail price—is not economically unsound. In fact, that is what happens in perfectly competitive markets. If a new producer decides to sell one more unit of the product, the price that it

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[13] See J. Nash and R. Revesz, *Grandfathering and Environmental Regulation: The Law and Economics of New Source Review*, 101 NORTHWESTERN UNIV. L. REV. 1677 (2007) (providing an overview of the arguments for incentive effects and fairness) and R. Revesz, and A. L. Westfahl Kong, Allison L., *Regulatory Change and Optimal Transition Relief*, 105 NORTHWESTERN UNIV. L. REV. 1581 (2011) (providing an overview of the old view, which argues for transition relief on the grounds of settled expectations and fairness, and the new view, which argues against transition relief on the grounds of incentive effects and preferability of market-based solutions to government solutions).
[14] Nash and Revesz, *Id.,* at 46.
[15] *Id.*
[16] *Id.* at 48 (discussing time limited grandfathering in the context of New Source Review).
[17] *Id.* at 51.
[18] *Id.* at 48.

would get in a perfectly competitive market for that unit would be the prevailing market clearing price. In addition, given the nature of perfectly competitive markets, the prevailing retail price would be equal to the marginal cost of production. In other words, if the electricity market were a competitive market with no externalities and if the retail rates reflected the marginal social cost of providing electricity, net metering would be the correct policy to implement.

However, the complex structure of electricity markets and the inefficiently designed retail pricing make the implementation of basic economic principles more complicated. As long as the retail rates underlying net metering do not accurately reflect the incremental social cost of providing electricity—private costs plus external costs—net metering will lead to economic inefficiency. Therefore, the Manual should not suggest that either a flat or inclining block rates be used as the rate design underlying net metering.

**The Manual should discuss the "Avoided Cost plus Social Benefit" framework.**

In order to ensure economic efficiency, the market price of electricity that is used at a particular time and location should align with the true marginal social cost of production—the private cost of providing one more unit of electricity, plus the value of any associated externalities.[19] Such efficient price signals are especially important for the owners of distributed generation systems, who are making both consumption and production decisions. So the challenge is not only to ensure efficiency in consumption, but also efficiency in production.

An "Avoided Cost plus Social Benefit" approach that compensates distributed generation for all the net avoided costs that the bulk system no longer has to incur as a result of lower demand, and for the net social benefits that distributed generation provides by replacing dirtier generation, is needed until fully unbundled and granular retail rate designs can be implemented. This approach would catalogue all the benefits and costs of distributed generation, and reward distributed generation according to these categories. Thus distributed generation would only be compensated for the particular system benefits it actually provides. This approach considers the additional costs imposed by distributed generation and rewards distributed generation only for costs it truly avoids, so it eliminates utilities' concerns about recovering costs of existing infrastructure. Even if this approach may not be as easy to implement as common net metering policies, especially at the level of granularity that is ideal, it is necessary to avoid further inefficiencies caused by retail rates as distributed generation continues to grow.

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[19] *Id. See also, e.g.*, JIM LAZAR ET AL., REGULATORY ASSISTANCE PROJECT, PRICING DO'S & DON'TS: DESIGNING RETAIL RATES AS IF EFFICIENCY COUNTS (2011).

However, the Manual should recognize and emphasize that such an approach can only be a stop-gap measure until a comprehensive retail electricity reform can take place. Cost-recovery and cost-shifting problems are unintended consequences of the current inefficient retail rate designs, and should not be blamed on net metering polices. The first-best solution to the problems caused by net metering is to correct the inefficiencies of the retail rates.

Below are some examples of designs that are currently implemented or are being discussed that are consistent with the "Avoided Cost plus Social Benefit" concept.

### a. Value of Solar Tariffs

The value of solar tariff is an example of a design that is consistent with the "Avoided Cost plus Social Benefit" concept. As it incorporates external value components such as avoided greenhouse gas emissions, it already is better than current net metering policies in valuing DER systems. However, it is important to note that value of solar tariffs provide compensation based on system averages, and hence fail to provide price signals that are granular enough to drive efficient DER investment. Further, it is a value of *solar* tariff, and hence cannot be used for compensating other types of DER. This highlights the importance of providing a framework than can be used for all types of DER instead of having to formulate a new tariff every time a new DER becomes widely available.

### b. LMP + D + E

Another rate design that is consistent with the "Avoided Cost plus Social Benefit" framework is currently being discussed in New York State. During the Reforming the Energy Vision proceedings, the New York State Public Service Commission introduced the concept of "LMP + D" to value DER, where "D" is the distribution-level value of DER systems. The Commission further stated that the value of D can include other values "not directly related to the distribution system," such as capacity and avoided emissions. During the stakeholder process, parties suggested that this concept should be further refined as "LMP+D+E" where "E" refers to environmental values provided by the distribution level resource.[20] Different DER have different external benefits, which are independent of the value of their benefits to the distribution system, and these benefits therefore need to be separately considered and valued in an "E" value that varies depending on the characteristics of the DER technology. As this approach can value DER more granularly and

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[20] Proceeding In the Matter of the Value of Distributed Energy Resources and Options Related to Establishing an Interim Methodology, Case 15-E-0751, Filing No. 12, Comments of Environmental Defense Fund and the Institute for Policy Integrity at New York University School of Law at 25-27 (April 18, 2016); Case 15-E-0751, Filing No. 7, Solar Progress Partnership Comments at 6-8 (April 18, 2016).

can be used consistently for more than one type of DER, it is preferable to value of solar tariffs, or common net metering policies.

*4. What are the most important state and federal cases, orders, judgments, research, papers and other resources that should be considered in the writing of the Manual?*

The research papers, state proceedings, and other resources cited in the other answers in our detailed comments should be considered in the writing of the manual. As noted in question 3, New York is taking steps through its Reforming the Energy Vision proceeding that warrant special consideration.

Relevant documents to date in the New York proceeding include:

- Staff White Paper on Ratemaking and Utility Business Models (July 28, 2015)[21]
- The Commission's Notice Soliciting Comments and Proposals on an Interim Successor to Net Energy Metering and of a Preliminary Conference, Case No. 15-E-0751 (Dec. 23, 2015)[22]

*5. Please provide any other information, including links to documents, that could assist in the drafting of the Manual.*

The comments provided here are based on Revesz and Unel (2016).[23] The article provides a discussion of the history of net metering and a background analysis for the Avoided Costs plus Social Benefit approach discussed in these comments. More importantly, it discusses the limitations of such approaches, and provides detailed explanations as to why a move towards more dynamic and granular rate structures is needed for a socially optimal DER policy.

Brown and Sappington (2015a) show that if regulators lack the ability to set a different rate for distributed generation than the retail rate and, thus, are required to use net metering, the result would be suboptimal.[24] The authors also show that a socially optimal

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[21] Available at http://documents.dps.ny.gov/public/Common/ViewDoc.aspx?DocRefId={48954621-2BE8-40A8-903E-41D2AD268798}

[22] Available at http://documents.dps.ny.gov/public/Common/ViewDoc.aspx?DocRefId={72C65039-EC54-497A-8D4A-FD0636512C10}

[23] Richard L. Revesz & Burcin Unel, (2016) Managing the Future of the Electricity Grid: Distributed Generation and Net Metering 60-65 (Institute for Policy Integrity, Working Paper No. 2016/1, 2016), *Harvard Environmental Law Review, Vol. 41, No. 1, 2017 forthcoming,* available at http://policyintegrity.org/publications/detail/managing-future-electricity-grid.

[24] For a review of relevant economic literature, see David P. Brown & David E. M. Sappington, *On the Design of Distributed Generation Policies: Are Common Net Metering Policies Optimal?* (U.S. Ass'n

distributed generation price when the regulators are not restricted by net metering should account for externalities, and that the environmental adder should depend on the net avoided emissions which can vary substantially with the prevailing generation mix.[25] Compared to net metering, this approach leads to higher social welfare and better distributional consequences.

Brown and Sappington (2015b) show that the socially optimal distributed generation policy depends on a variety of parameters that may vary significantly from state to state, such as regulators' ability to set all prices, including capacity prices, efficiently, and the nature of the distributed generation technologies.[26] Thus, a "one-size-fits-all" policy such as net metering, which does not allow for any variation based on prevalent technologies, is not an economically desirable policy.

Perez-Arriaga and Bharatkumar (2014) discuss the cost drivers of distribution networks and provide a framework that can be used to design distribution network use-of-system charges.[27]

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Energy Econ. Working Paper No. 16-234, Oct. 2015), *available at* http://papers.ssrn.com/sol3/papers.cfm?abstract_id=271990 .

[25] *Id.* at 22.

[26] David P. Brown & David E. M. Sappington, *Optimal Policies to Promote Efficient Distributed Generation of Electricity* 27 (U.S. Ass'n Energy Econ. Working Paper No. 16-236, Dec. 2015), *available at* http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2719920.

[27] Perez-Arriaga & Bharatkumar, *supra* note 3.