Synapse
Energy Economics, Inc.

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Staff Subcommittee on Rate Design
National Association of Regulatory Utility Commissioners
1101 Vermont Ave NW # 200, Washington, DC 20005

RE: Synapse Comments Regarding the NARUC Manual on Distributed Energy Resources Compensation

Dear Staff Subcommittee on Rate Design:

Thank you for the opportunity to review and offer comments on the draft NARUC Manual on Distributed Energy Resources Compensation. This is an extremely timely manual, as it addresses the foremost issue in rate design facing regulators today. We congratulate you on drafting a manual that succinctly summarizes the benefits and drawbacks that may accompany distributed energy resources (DERs), and that objectively explores a wide range of options available to regulators.

On the whole, the draft manual does an excellent job of providing useful information for regulators to consider. However, the manual would benefit from additional guidance to regulators regarding the purpose of rate design and how to balance the cost-effectiveness of DERs with the rate impacts on other customers.

At its essence, ratemaking requires a balancing of multiple interests. Regulators strive to protect the long-run interest of customers by overseeing the provision of reliable, low-cost energy, while also ensuring that rates are fair, just, and reasonable for customers. Distributed energy resources can pose a particularly difficult challenge for regulators, as in many cases, DERs can reduce system costs over the long run, but at the same time can result in rate increases for non-DER customers. Thus regulators must strike a balance between ensuring that cost-effective resources continue to be developed, while avoiding unreasonable impacts on non-DER customers. We recommend that this tension be fleshed out in more detail, with recommendations regarding the information and analyses that would assist regulators in this balancing act.

Below we offer a recommendation regarding the framing and analysis of these issues, as well as some additional comments regarding specific text.

STRIKING A BALANCE ACROSS RATE DESIGN OBJECTIVES

THE PURPOSE OF RATE DESIGN

When considering rate design modifications to address new challenges, it is critical to keep in mind the core objectives of rate design as a means to evaluate various options. In the second chapter, the manual discusses the purpose of rate design by quoting Professor James Bonbright's eight principles, as well as his distillation of these principles into the following three primary objectives:

> a) the revenue-requirement or financial-need objective, which takes the form of a fair-return standard with respect to private utility companies;
>
> b) the fair-cost-apportionment objective, which invokes the principle that the burden of meeting total revenue requirements must be distributed fairly among the beneficiaries of the service; and
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> c) the optimum-use or consumer-rationing objective, under which the rates are designed to discourage the wasteful use of public utility services while promoting all use that is economically justified in view of the relationships between costs incurred and benefits received.[1]

These objectives are still as relevant today as they were in 1961, with one modification. Customers are no longer only consumers, rather they are often also producers of a range of services such as energy generation, demand reduction, and even reliability. For this reason, the third objective need not be limited to encouraging customers to *consume* electricity efficiently, but also to *produce* electricity (and related services) efficiently. With this modification, Bonbright's third objective also includes the primary objective of resource planning, namely the cost-effective procurement of resources, including DERs.

Although the manual references these rate design objectives upfront, they are not clearly or consistently referenced throughout the manual. In particular, Chapter IV "Rate design and compensation considerations, questions, and challenges" addresses the question "What do you want to accomplish with the rate?" without specifically referencing the three fundamental objectives outlined by Bonbright. Instead, the discussion in Chapter IV largely focuses on Bonbright's second objective, the issue of fairness, with less emphasis on the other objectives.

There is no question that the fair apportionment of costs, and any cost-shifting resulting from DERs, is a central issue that must be addressed. However, the fairness principle is only one of three primary objectives of rate design, and is focused on fairly apportioning costs that have largely been accrued in the past. These historical costs must be recovered, and cannot be changed by rate design. Future costs, however, can be influenced by rate design. Thus we recommend that the focus on fairness be balanced

[1] Bonbright, J. 1961. *Principles of Public Utility Rates.* New York: Columbia University Press. Page 292.

with attention to Bonbright's third objective of efficiency, by ensuring that customers are provided with efficient price signals that reflect the long-run future costs to the utility system.

Because most of the capital costs related to DERs are borne by the DER customers themselves, DERs are often an extremely cost-effective resource from the utility system perspective. We are not aware of any cases where DERs *increase* the costs to the system, resulting in an increase in revenue requirements. Instead, DERs often reduce revenue requirements while also reducing sales, resulting in upward pressure on rates despite reducing total costs.[2] As such, regulators should focus on both the procurement of cost-effective DERs, as well as avoiding unreasonable impacts on non-DER customers.

ANALYSIS FRAMEWORK

To properly balance the principles of fairness and cost-effective resource procurement, regulators should first assess the following:

1. To what extent is continued growth of DERs likely to reduce costs over the long run?
2. What are the short-term and long-term rate impacts on non-DER customers?

Neither of these analyses are simple, nor are the results transferable across jurisdictions. Once the results of the cost-effectiveness analysis and rate impact analysis are available, regulators can evaluate their policy options.[3] Of those policy options, rate design is particularly powerful, since it can impact both the rate of adoption of DERs, as well as the magnitude of any rate impacts on non-DER customers.

ASSESSING COST-EFFECTIVENESS

To assess whether DERs are cost-effective, all relevant costs and benefits should be quantified to the extent possible and included in a cost-benefit analysis. Where costs and benefits are difficult to quantify, reasonable approximations should be used until more detailed information is available.

Ideally, the cost-effectiveness of DERs should be assessed from a variety of perspectives. In resource planning, decisions regarding the procurement of electricity resources are generally made by comparing the present value of revenue requirements associated with various resource options. DERs should be treated the same as any other resource when evaluating its impact on the utility system. This perspective is the equivalent of the "Utility Cost Test" often used for analyzing the cost-effectiveness of energy efficiency.[4] From this perspective, DERs are often very cost-effective because the individual DER customer—rather than ratepayers as a whole—pays for the hardware and installation costs. Distributed

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[2] The draft manual alludes to the possibility of higher system costs due to greater ramping of existing generators (pages 43-44). While such ramping may reduce the cost-effectiveness of DERs, it is very unlikely to actually increase total system costs.

[3] This analytical framework will be discussed in more detail in a forthcoming Synapse report: *Show Me the Numbers: A Framework for Assessing Solar Distributed Generation Policies*, forthcoming November 2016.

[4] This test is also referred to as the "Program Administrator Cost Test."

energy resources also reduce line losses and can help defer infrastructure investments if located in areas where the grid is stressed. In some cases, however, integration costs can significantly reduce the benefits of DERs to the system. Any cost-effectiveness analysis should be based on detailed utility distribution system and resource planning documents that are designed to identify these specific impacts.

Regulators may also wish to analyze cost-effectiveness from the perspective of society as a whole. This perspective includes broader environmental benefits and sometimes also job impacts. However, this perspective also includes the cost incurred by customers to purchase and install DER technologies. Thus from this perspective, it is less clear whether DERs will provide net benefits to society when compared to other alternatives (such as utility-scale solar), since DERs lack the economies of scale of larger resources, and may also impose substantial integration costs at high penetrations.

Benefits and costs occurring in future years should be properly discounted, and the sum of these discounted costs and benefits should then be used to compute the net present value (or "net benefit") and the benefit/cost ratio.

If the utility benefits outweigh the utility costs, customers as a whole will benefit over the long term due to reduced revenue requirements. If the societal benefits outweigh the societal costs, society as a whole will benefit over the long term due to reduced revenue requirements and reduced societal costs.

Importantly, however, a cost-effectiveness analysis does not evaluate *which* customers benefit. Such questions must be addressed through a rate impact analysis.

Assessing Rate Impacts

Distributed energy resources may impact the bills of non-DER customers by causing rates to change, thereby raising equity concerns. In their most simplified form, electricity rates are set by dividing the utility's revenue requirement (in millions of dollars) over its sales (typically measured in kilowatt-hours).

$$Rates = \frac{Revenue\ Requirement}{Sales}$$

Thus rate impacts are primarily caused by two factors:

1. Changes in costs. Holding all else constant, if a utility's revenue requirement decreases, rates will decrease. Conversely, if a utility's revenue requirement increases, rates will increase.

2. Changes in sales. If a utility has to recover its revenues over fewer sales, rates will increase.

Whether DERs increase or decrease rates will depend on the magnitude and direction of each of these factors. It is important to recognize that higher rates may occur even if DERs reduce total utility system costs, due to the simultaneous decrease in sales, as well as the timing of any cost reductions. That is, some cost reductions from DERs are likely to occur over the utility's longer-term planning horizon, rather than occurring immediately. In the short term, the utility will still have to recover its sunk costs—the investments that the utility made in the past and amortized over many years. These sunk costs will not be reduced by DERs, but will continue to be recovered through the utility's revenue requirement until they have been fully depreciated, which can lead to higher rates.

The magnitude of rate impacts is also determined by the manner in which revenues are collected, that is, by the rate design in place. The draft manual's thorough discussion of various rate options is very useful in this regard, but we recommend that it be accompanied by recommendations regarding how to properly analyze the causes and magnitude of any rate impacts of DERs.

A thorough analysis of rate impacts would include both the long-term change in customer rates as well as the year-to-year impacts. The results of a rate impact analysis should be presented in meaningful terms, such as the percent change in rates, as well as the annual and monthly bill impacts (in dollars).

If DERs are cost-effective but result in significant rate increases, regulators must strike a balance between reducing overall long-run costs and preventing unreasonable rate impacts to non-DER customers.

Evaluating Rate Design Options

The choice among rate design options presented in the draft manual should be based on an analysis of three separate components: (1) the cost-effectiveness of DERs; (2) the impact of an alternative rate design on customer payback periods and adoption rates of DERs; and (3) the magnitude of rate impacts on non-DER customers. A change in rate design could lengthen the payback period to an unreasonable amount of time, leading to lower investments in a cost-effective resource than is optimal, or a modified rate design could encourage too much investment in DERs, leading to unreasonable rate impacts. For this reason, we recommend that regulators review policy options by considering all three pieces of information across various rate design options. The quantified results of such an analysis could be presented in a tabular format to assist in comparisons:

	DER Payback Period	DER Cost-Effectiveness		DER Rate Impacts
		Utility	Societal	
Rate Design 1				
Rate Design 2				
Rate Design 3				
Rate Design 4				

ADDITIONAL COMMENTS

Cost-Shifting Versus Cross-Subsidies

We note that the term "cross-subsidization" is used frequently in the manual, often in the context of determining whether rates are fair. We urge the authors to use this term carefully. While it is often the case that some "cost-shifting" will occur with DERs, it is not clear that "cross-subsidization" is necessarily occurring. The distinction here is largely due to the fact that rates are based on historical, embedded costs, while DERs are avoiding current and future costs.

The term "cross-subsidization" implies that DER owners are not paying their fair share. In some cases, however, the value of DERs may be higher than the compensation received by DER owners. Where this is the case, there could still be a near-term cost-shift, as the benefits of DERs may not be experienced immediately, while the utility must still recover all of its historical, embedded costs over fewer sales, leading to higher rates in the near-term, and a cost-shift to non-DER customers. Thus a cost-shift does not necessarily imply cross-subsidization, and any rate impacts should be analyzed together with a cost-effectiveness analysis to understand how DERs will affect utility revenue requirements over time.

Separate Rate Class for DER Customers

In Chapter IV, the draft manual discusses creating a separate class of customers for DER customers. While a separate rate design for DER customers may be warranted, and could be implemented through a rider, we caution against creating a separate class for DER customers for several reasons.

First, while DER costs to the utility may be relatively easy to quantify and allocate to a DER class, the benefits are often not as simple to allocate. For example, if DERs help to avoid a substation upgrade, how would such benefits be translated into the revenue allocation for a DER class? How would reduced wholesale market prices be translated into the revenue allocation for a DER class?

Second, as discussed above, a balance should be struck between reducing system costs over the long run and avoiding unreasonable rate impacts. Some cost-shifting may be tolerated in order to reduce total system costs over the long run. The creation of a separate rate class would protect non-DER customers from cost-shifting, but in doing so could destroy the incentive to implement DERs. An example may be useful to demonstrate.

Suppose that a utility service territory has 150,000 residential customers, of which 3,000 are DER customers. The reduction in sales from these 3,000 DER customers causes the utility's revenue requirement to be spread over fewer billing determinants, which increases rates. This rate increase results in non-DER customers now paying $750,000 more than they otherwise would have, for a monthly bill impact of $0.42 per customer. Such a rate impact might be deemed reasonable if the DER customers are reducing future utility revenue requirements, thereby providing a benefit to the system as a whole. However, if this $750,000 were not spread across all 150,000 customers but were instead allocated solely to the 3,000 DER customers, each DER customer would be required to pay nearly $21 per month. Such an outcome could occur if DER customers are assigned to a separate rate class.

A fee of $21 per month would have a significant impact on DER adoption rates, and would undermine the procurement of a cost-effective resource, and thus the ability of customers as a whole to benefit from lower utility system costs. Further, such fees on DER customers could lead to uneconomic bypass, in which customers with distributed generation and storage defect from the grid altogether. This situation would leave fewer customers to bear the costs of maintaining the grid, and raise rates for remaining customers.

The Requirement to Serve the Full Needs of DER Customers

The draft manual states that a utility "has an obligation to serve and that includes the full needs of DER customers. However, DER customers supply most, if not all, of their own needs annually, but not necessarily daily, and so chronically are under compensating the utility under traditional NEM rate design for the generation, transmission, and distribution investments made on behalf of the DER customer."[5]

This statement implies that a utility should construct sufficient transmission, distribution, and generation infrastructure to supply its customers as though they did not possess any DERs. In effect, this would mean that a utility should not reduce its load forecasts to account for any energy efficiency, demand response, distributed solar, combined heat and power, or other technologies on its system. Such an approach would lead to the utility vastly overbuilding its system, and is widely regarded as poor utility planning practice.

Instead, the effects of DERs should be studied and incorporated into utility load forecasts. DERs are often discounted to reflect uncertainty and their intermittent nature, but should not be ignored altogether.

CONCLUSIONS

In sum, we commend the Staff Subcommittee on Rate Design for a highly informative manual on compensation for DERs. We appreciate this opportunity to offer our suggestions regarding the provision of a framework for balancing competing rate design objectives, as well as comments on other specific aspects of the manual.

Should you have any questions regarding these comments, please don't hesitate to contact us.

Sincerely,

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[5] Draft manual, page 36.