EPRI | ELECTRIC POWER RESEARCH INSTITUTE

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President and
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September 2, 2016

The Honorable Travis Kavulla
President
NARUC
1101 Vermont Avenue, NW, Suite 200
Washington, D.C. 20005

Mr. Christopher R. Villarreal
Chairman
NARUC Staff Subcommittee on Rate Design
1101 Vermont Avenue, NW, Suite 200
Washington, D.C. 20005

Dear President Kavulla and Chairman Villarreal:

The Electric Power Research Institute (EPRI) appreciates the opportunity to provide the National Association of Regulatory Utility Commissioners (NARUC) written comments regarding its draft *Manual on Distributed Energy Resources Compensation* ("DER Manual"). EPRI commends NARUC's leadership and staff for this complex, important effort.

EPRI is an independent nonprofit corporation, established in 1972 to conduct research and development relating to the generation, delivery, and use of electricity for the benefit of the public. EPRI's mission is to advance safe, reliable, affordable, and environmentally responsible electricity for society through global collaboration, thought leadership, and science and technology innovation. EPRI submits these comments in furtherance of its public benefit mission.

In the context of distributed energy resources (DER), EPRI takes this opportunity to flag what we term the *Integrated Energy Network*. Using this conceptual pathway to decarbonizing the economy, we foresee the potential convergence of multiple energy sources and an integrated approach to electricity, gas, and water systems. Customers' diverse needs and new services will rely heavily on a cost-effective and environmentally-sustainable electric grid – with the potential for greater electrification of the economy. All of this depends on a cleaner portfolio of central and distributed energy resources.

EPRI's 2014 *Integrated Grid* framework[1] explores a future that will be increasingly distributed, digitized, and complex, and will require an electric grid that is flexible, resilient, connected, and customer-centric. To realize the benefits of an *Integrated Grid*, we need to value interconnected DER and grid connectivity accurately, transparently, and fully.[2,3] EPRI is pleased to offer the following comments for the Subcommittee's consideration as it prepares the DER Manual final draft.

[1] *The Integrated Grid: Realizing the Full Value of Central and Distributed Energy Resources*. EPRI, Palo Alto, CA: 2014. 3002002733.
[2] *Capacity and Energy in the Integrated Grid*. EPRI, Palo Alto, CA: 2015. 3002006692.
[3] DER Manual at 32-33.

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Our comments address five areas: 1) comprehensive and transparent DER valuation methodology, 2) time and locational impacts on DER value, 3) cost-effective use of DER to defer utility infrastructure, 4) the importance of an integrated approach to distribution planning, and 5) a technical update to EPRI's definition of DER referenced in the Manual.

1. Comprehensive, consistent, and transparent methods are necessary to assess the value of interconnected DER[4]

Valuation guidelines, such as EPRI's *Integrated Grid Benefit-Cost Framework*,[5,6] define tools and protocols necessary for objective, repeatable, and transparent analysis to quantify the value of DER. The framework considers those aspects of DER that provide a benefit, as well as those that may require upgrades or costs. Its methods are grounded in the fundamentals of power system engineering and economics and are applicable to all regions, systems, markets, and technologies. Benefit-cost analysis protocols trace impacts, spanning the power system from the DER-grid connection to bulk power system. When assessing and assigning monetary values, impacts are identified and categorized using common terms and values so that all benefits and costs can be considered without overlap or duplication. To the extent practical, externalities also should be categorized, measured, and assigned values to make them useful in net-benefit analyses.

2. Time and locational impacts are key determinants in valuing DER[7]

With respect to time and location impacts of DER,[8] EPRI research of hosting capacity[9] and integrating DER into the bulk power system points to complex parameters influencing the value that DER provides to the grid. These include: power system design (network or radial) and operation (seasonal and episode adjustments); DER size and location (who connects what); and the correlation of DER performance (power injection or demand offset) with system need. As an example, for DER located by the utility for local support, the value is determined by specifications and investment for infrastructure the utility otherwise would have undertaken. With respect to customers pursuing DER interconnections for private interests, evaluations focus on their impact to the distribution system that may involve accommodation costs and may (but not necessarily) provide local system value. Such complex interactions can be determined and measured only using a comprehensive evaluation framework. While assessing and assigning a monetary value at the distribution feeder-level may appear daunting, our research shows that the value of DER at the local system-level can vary widely. The localized value of DER should be considered and accounted for.

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[4] Ibid. at 25.
[5] *The Integrated Grid: Realizing the Full Value of Central and Distributed Energy Resources*. EPRI, Palo Alto, CA: 2014. 3002002733.
[6] *The Integrated Grid: A Benefit-Cost Framework*. EPRI, Palo Alto, CA: 2015. 3002004878.
[7] Ibid. at 22, 24, 25, and 45-46.
[8] *Time and Locational Value of DER: Methods and Applications.* EPRI, Palo Alto, CA: 2016. 3002008410.
[9] *Distribution Feeder Hosting Capacity: What Matters When Planning for DER?.* EPRI, Palo Alto, CA: 2015. 3002004777.

3. It takes a portfolio of DER to meet system and customer needs and to defer traditional assets cost-effectively[10]

EPRI research[11] demonstrates that to defer traditional distribution assets cost-effectively,[12] DER must provide services at least comparable in value, with respect to such parameters as availability, dependability, and durability – and with specificity to time and location. Rather than a single resource, a portfolio of DER may better address locational supply needs, even while acknowledging that customers will have different inclinations about adopting DER measures.

4. Realizing the full potential of DER begins with an integrated approach to distribution planning[13]

EPRI believes that distribution planning[14] must change to account for the significantly greater detail, uncertainty, and data needed to understand and factor the physical impacts of DER – whether individually or as part of a portfolio. Also, EPRI anticipates that customer behavior will change from a passive to an active element of planning. As a consequence, planners will need the ability to forecast naturally-occurring DER adoption rates and what is required to induce strategic DER adoption at the circuit level. Research is urgently needed to develop DER adoption forecasting methods applicable to distribution circuits. Closer coordination of distribution and bulk power system planning addresses the impacts of DER that radiate from customers to central generation.

5. Technical correction/update, EPRI's definition of DER

EPRI acknowledges the Manual's reference to EPRI's definition of DER.[15] For the Manual's final version, we encourage the Subcommittee to reference this current definition, from page 19 of the *Integrated Grid: A Benefit-Cost Framework:*[16]

Distributed Energy Resources (DER) are electricity supply sources that fulfill the first criterion, and one of the second, third, or fourth criteria:

1. *Interconnected to the electric grid, in an approved manner, at or below IEEE medium voltage (69 kV).*
2. *Generate electricity using any primary fuel source.*
3. *Store energy and can supply electricity to the grid from that reservoir.*
4. *Involve load changes undertaken by end-use (retail) customers specifically in response to price or other inducements or arrangements.*

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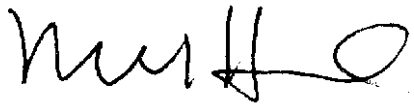
[10] Ibid. at 30-31, 34, and 45-46.
[11] *Time and Locational Value of DER: Methods and Applications.* EPRI, Palo Alto, CA: 2016. 3002008410.
[12] Ibid. at 30-31.
[13] Ibid. at 34, 60, and 66.
[14] *Integration of Hosting Capacity Analysis into Distribution Planning Tools*. EPRI, Palo Alto, CA: 2016. 3002005793.
[15] Ibid. at 16-17.
[16] *The Integrated Grid: A Benefit-Cost Framework*. EPRI, Palo Alto, CA: 2015. 3002004878.

Summary

For the DER Manual, EPRI recommends that it support and draw upon the need for comprehensive distribution analyses and tools, both traditional and emerging. This will be critical to the Manual's effectiveness with respect to an expanding range of situations and market conditions. With respect to the value of DER, "getting it right" requires a comprehensive, transparent, and repeatable methodology that accounts for end-to-end system impacts, and that is agreed upon by stakeholders. As customers and technologies place new requirements on the grid, it remains necessary to optimize performance and provide traditional and new benefits to customers and society. This, in turn, requires investment in new technology (e.g., communications, automation, sensing, analytics, and cybersecurity); upgrades of existing equipment; and an integrated approach to utility planning.[17] Hands-on experience through demonstration projects will be needed to evaluate the capability of DER in different field conditions and configurations, including specifying the type and location of resources to deliver the greatest benefit to the system and to customers.

Thank you for your attention to and consideration of EPRI's comments as you move the DER Manual to completion.



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[17] Ibid. at 62-63.