

Value of “DER” to “D”: The role of distributed energy resources in local electric distribution system reliability

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Presentation to CPUC “Thought Leaders” Forum

April 21, 2016



Context: Multiple Lenses on the Value of DERs: Value to whom and for what?

**Retail
Electricity
Customer
with DERs**



**Electric
Distribution
Utility**

**Utility-Scale
Power
Supply and
Transmission**



**Society:
External
Impacts**

**The focus of this
discussion
(and Tierney white paper)**

Core questions to regulators relating to DERs for D:

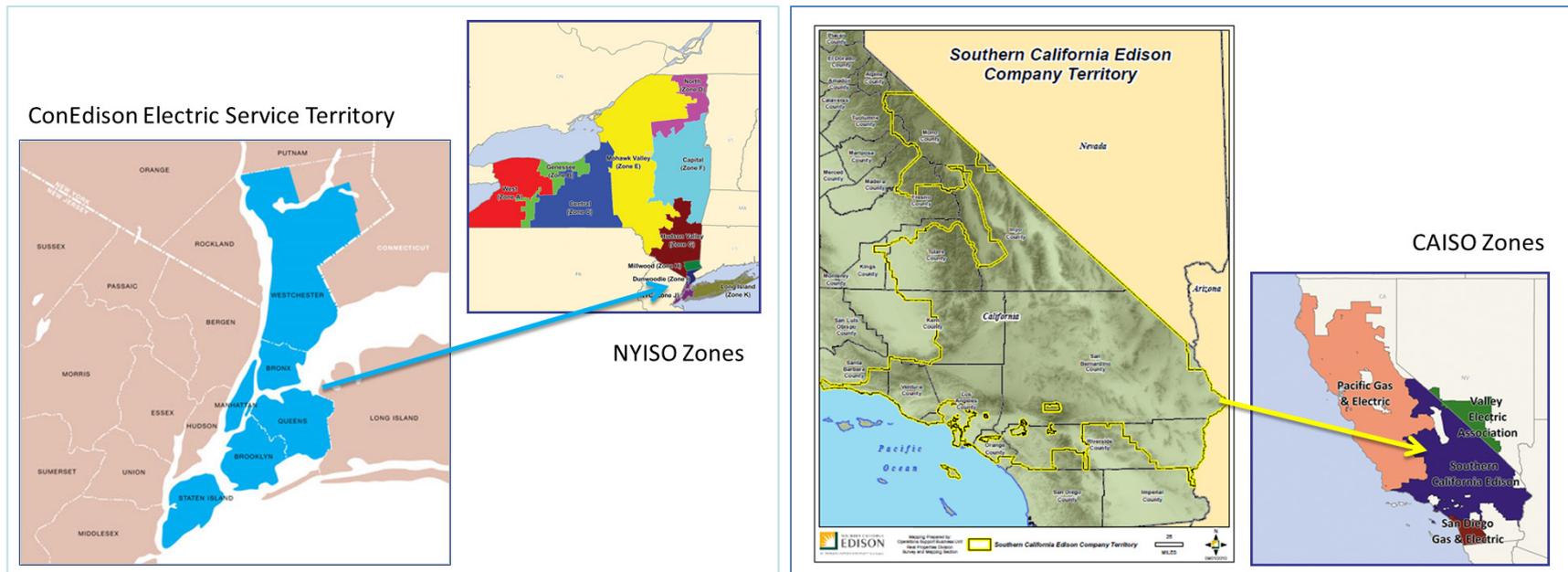
- How to think about the value of DER to *the distribution system* (“The Value of DER to D”)?
 - In light of differences among DERs’ characteristics
 - In light of differences across utility system configurations
- Given interactions of DERs and the local distribution system, what are implications for the following?
 - Distribution-system planning
 - DER procurements
 - Compensation to DER providers

Key findings

- **Different DER technologies have different attributes and different impacts on / contributions to the electric system**
- **The value of DERs to D depends on:**
 - **Their location on the distribution grid**
 - **Their having attributes that provide the needed characteristics of availability, dependability, and durability (sustainable supply)**
- **Most potentially avoidable distribution-related costs are tied to deferred capital investments**
- **Studies indicate the Value of DER to D is typically small relative to the Value of DER to Generation (G), Transmission (T), or Society (S)**

Case studies:

Two distribution utilities engaged EPRI to analyze the goodness-of-fit of DERs to cost-effectively defer traditional distribution investment

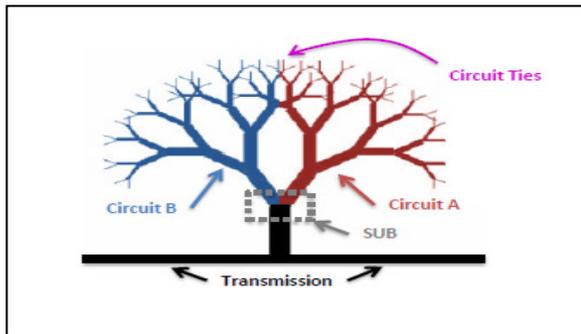


Case studies:

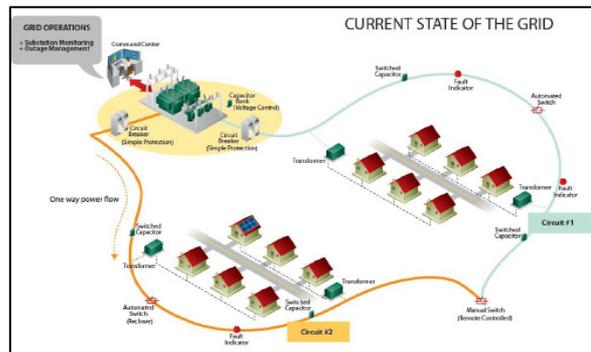
These utilities' distribution systems are very different



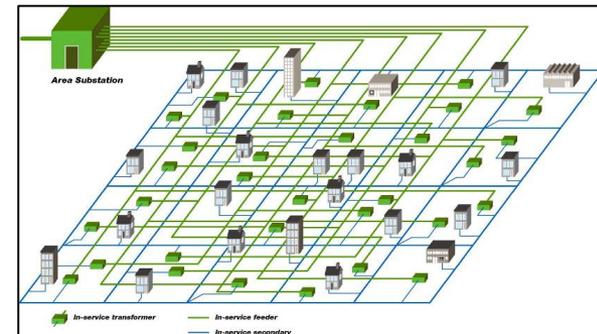
Its Radial Distribution System Resembles a Tree



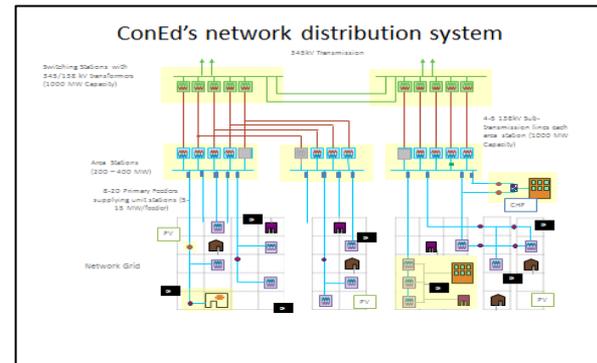
Customers are Served Off of the System's Branches



Its Network Distribution System Resembles a Mesh



Customers are Served Off of Interconnected Wires



Case studies: EPRI's preliminary results

- **Individual DERs (and portfolios of different DERs) have different and complex interactions with the electric system.**
- **To effectively defer/replace traditional distribution solutions, DERs need to have equivalent availability, dependability and durability.**
- **DER impacts can be either beneficial or adverse, depending on a wide variety of contextual circumstances. This makes it difficult to generalize.**

Insights: Integrating DERs into distribution planning

Utilities should integrate DERs into distribution planning to consider the potential for DERs to substitute for traditional utility investments

- Integrating DERs into local reliability planning and operations allows the opportunity for cost-effective local reliability solutions
- Planning with DERs needs to fit within the long lead times for most traditional fixes.



Insights:

Evolve compensation for DERs to D to be more value-based

Current benefit/cost frameworks are only the beginning of the process of determining whether DERs are net beneficial

New methods for valuing DERs for D should be built on the timeless regulatory principles so as to create value for all customers on the local systems.

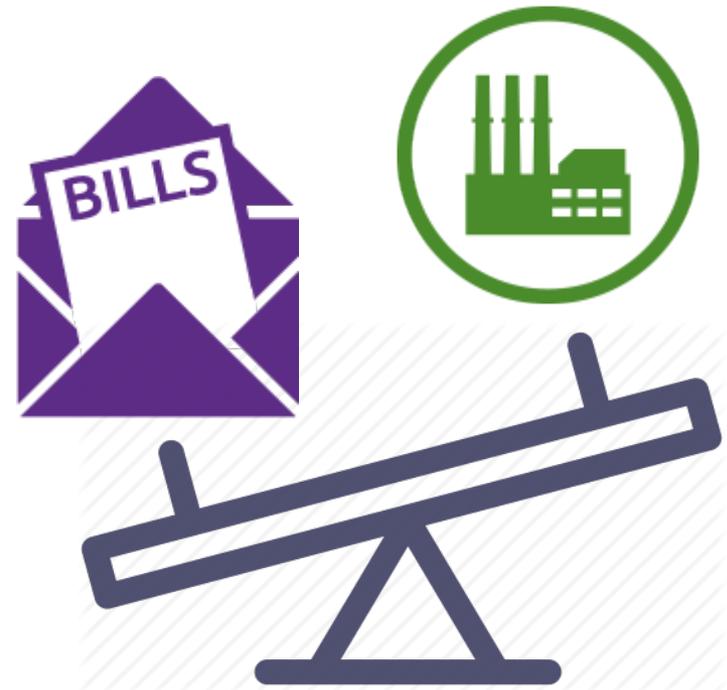
- **Efficiency & fairness principles should be core to efforts attempting to create value for all customers on the distribution system.**

Insights:

Lessons from PURPA can inform the evolution

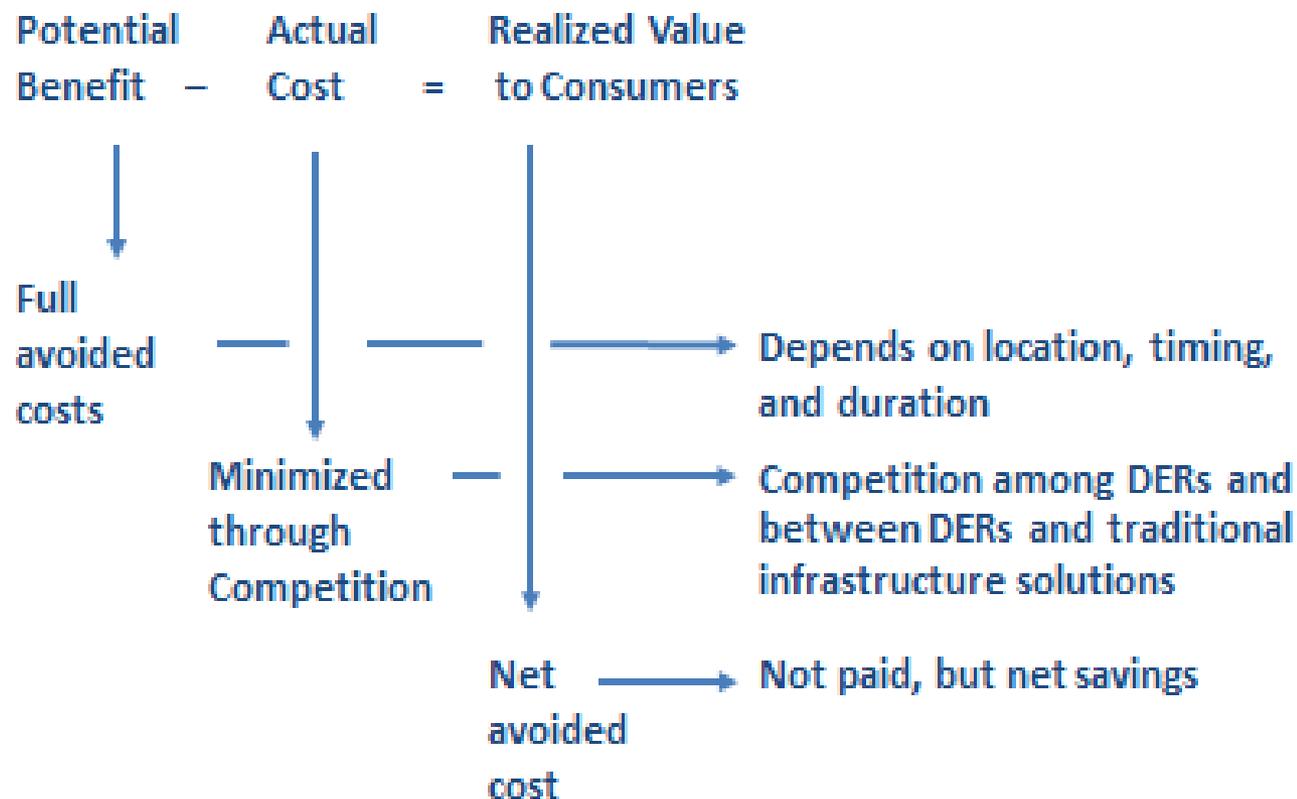
Prior PURPA experience teaches that market-based mechanisms led to greater value to customers:

- Early PURPA implementation (with standard offers, administratively determined prices) helped start the small-power-producer market, but with later costs associated with above-market contracts
- Subsequent PURPA implementation evolved to competitive solicitations to reveal the portfolio of contracts consistent with the utility's needs and at market-based prices



Insights: Competition will create value to consumers

Value of “DER” to the D System



Conclusions:

Insights for further consideration of the Value of DERs to D

- Rely on time-tested ratemaking principles of efficiency and fairness
- Pay attention to the differences among DER technologies and their contributions to the local grid in calculating their potential value to D
- Transition distribution-system planning to incorporate DERs
- Move beyond conceptual benefit/cost frameworks that identify potential net benefits of DERs to D, to payment structures that take advantage of competition

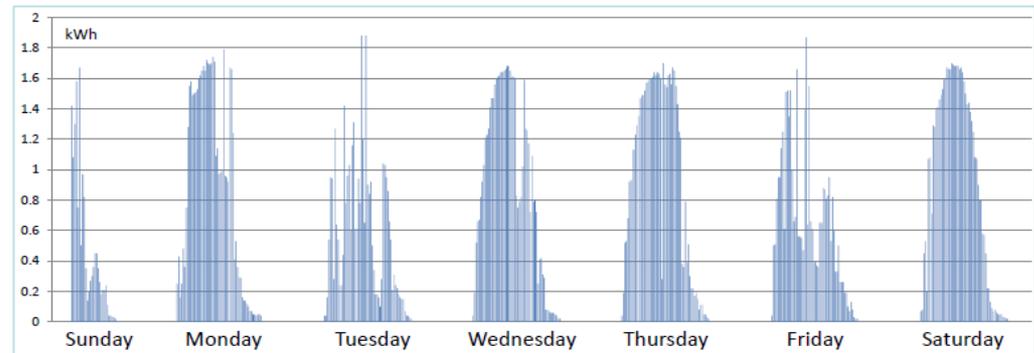
Conclusions:

Insights for further consideration of the Value of DERs to D

- Recognize that there may be a misalignment between funding for DERs' based on their full value (to distribution, generation, transmission, society), and the portion of value attached to D
- Build upon PURPA experience that market-based mechanisms provide value to customers compared to administratively determined avoided costs
- Start with forward contracting for DER capacity before focusing on operational/transactional DER markets
- Affirmatively address financial incentives to utilities and missing money issues
- Consider pilots as a good way to test out new concepts

Thank you

Energy Produced from the Solar PV Panels on Tierney Roof In 15-minute Intervals (kWh) During All Hours in a 7-day period (Sunday-Saturday) in July 2015



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