Getting Real on Distributed Energy Resources (DER)

42nd Annual PURC Conference: Golden Egg or Scrambled Egg? Impacts of Decentralizing Utility Services

Amy L. Stein
University of Florida Levin College of Law
February 4, 2015

Can the Law Embrace “Disruptive” DERs?

- Part 1: Drivers of DERs
- Part 2: Impediments to Embracing DERs
- Part 3: Potential Regulatory Adjustments for a More Effective Integration of DER
Drivers of DERs
EPA’s Clean Power Plan

FEDERAL REGISTER

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Part II

Environmental Protection Agency

40 CFR Part 60
Carbon Pollution Emission Guidelines for Existing Stationary Sources:
Electric Utility Generating Units; Proposed Rule
Table 2

<table>
<thead>
<tr>
<th>Storage Grid Domain</th>
<th>2014</th>
<th>2016</th>
<th>2018</th>
<th>2020</th>
<th>Total</th>
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<td>Point of Interconnection</td>
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<tr>
<td>Transmission</td>
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<tr>
<td>Distribution</td>
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<td>Customer</td>
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<td>Subtotal SCE</td>
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<td>160</td>
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<td>Pacific Gas and Electric</td>
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<tr>
<td>Subtotal PG&amp;E</td>
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<td>200</td>
<td>270</td>
<td>363</td>
<td>490</td>
<td>1,325</td>
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</table>

Installed prices continued their precipitous decline in 2013

Median installed prices fell by $0.7/W (12-15%) from 2012-2013, across the three size ranges shown, and have fallen by an average of $0.5/W (6-8%) annually over the full historical period.
Impediments to Embracing DERs

1 - Reliability/Operational

Because the grid is so critical to all aspects of our society and economy, protecting its reliability and resilience is a core responsibility of everyone who works in the electric industry.”

FERC Chairman Cheryl LaFleur
3 - Increased Separation of Ownership and Control of DER: Storage 182/492 customer owned

4 - Lost Utility Revenues
5 - Consumer Impacts

Wholesale power prices increase across the country in 2014

Average wholesale (spot) electricity prices at major trading locations, 2014 vs 2013

Source: U.S. Energy Information Administration, based on EIA, Energy

2013 U.S. Average Electricity Retail Prices
(cents per kilowatt hour)
Different Regions Have Different Sources

6 - Jurisdictional Tensions

Energy Storage Classification
- Generator
- Transmission
- Distribution

Jurisdiction
- Wholesale Markets
- FERC Regulated
  - Order 890 (consider non-gen)
  - Order 755 (premium for fast acting)
  - Order 784 (speed and accuracy of regulation)
- State Regulated
7 – Imperfect Markets

Table 1

<table>
<thead>
<tr>
<th>Storage Grid Domains (Grid Interconnection Point)</th>
<th>Regulatory Function</th>
<th>Use-Case Examples</th>
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<tr>
<td></td>
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<td>(Stand-alone Energy Storage) Ancillary Services, Peaker, Load Following</td>
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<td>Transmission Reliability (FERC)</td>
<td>Voltage Support</td>
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<td>Distribution-Connected</td>
<td>Distribution Reliability</td>
<td>Substation Energy Storage (Deferral)</td>
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<td>Generation/Market</td>
<td>Distributed Generation + Energy Storage</td>
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<td>Dual-Use (Reliability &amp; Market)</td>
<td>Distributed Peaker</td>
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<tr>
<td>Behind-the-Meter</td>
<td>Customer-Sited Storage</td>
<td>Bill Mgt/Permanent Load Shifting, Power Quality, Electric Vehicle Charging</td>
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</tbody>
</table>

What Energy Storage Provides

- End-Use
  - Power Quality/Reliability
  - Peak Load Reduction
  - Distributed Generation & Smart Grid Support

- Renewable Penetration
  - Reduced Variability
  - Ramp rate control
  - Load time shifting
  - Reserve
  - Distributability

- Transmission and Distribution
  - Line and Transformer Deferral
  - Stability
  - Voltage/Frequency Regulation

- Generation
  - Spinning Reserve
  - Capacity Deferral
  - Voltage/Frequency Regulation
  - Load Leveling
8 – Imperfect Regulations

United States Court of Appeals
FOR THE DISTRICT OF COLUMBIA CIRCUIT

Argued September 23, 2013        Decided May 23, 2014

No. 11-1486

ELECTRIC POWER SUPPLY ASSOCIATION,
PETITIONER

v.

FEDERAL ENERGY REGULATORY COMMISSION,
RESPONDENT

MADISON GAS AND ELECTRIC COMPANY, ET AL.,
INTERVENORS

Consolidated with 11-1489, 12-1088, 12-1091, 12-1093

On Petitions for Review of Orders of the
Federal Energy Regulatory Commission

Potential Regulatory Adjustments for More Effective Integration of DERs
Recap: Eight Impediments

1. Reliability/Operational
2. Fragmented Authority and Structure
3. Increased Separation of Ownership and Control
4. Lost Utility Revenues
5. Consumer Impacts
6. Jurisdictional Tensions
7. Imperfect Markets
8. Imperfect Regulations

Potential Solutions

1. Reliability/Operational
2. Fragmented Authority/Structure
3. Increased Separation of Ownership and Control
4. Lost Utility Revenues
5. Consumer Impacts
6. Jurisdictional Tensions
7. Imperfect Markets
8. Imperfect Regulations

1. Capitalize on more flexible and accurate resources
2. Enhanced coordination
3. Reallocation of reliability responsibilities and visibility
4. Realign utility financial incentives and embrace innovation
5. Readjust expectations
6. Relax strict line-drawing
7. Amend to adjust for market failures
8. Focus on providing stable investment signals
Ask the difficult questions

- What should be the utility’s responsibility for developing a system that can accommodate DER?
- How should the utility’s responsibility be reconciled with that of the DER resource owners or customers’ responsibility?
- Does it require a shift from utilities providing commodities to providing more services?

Ask MORE difficult questions

- How can we best educate the consumers about the expenses facing the grid (regardless of whether we upgrade existing or replace with innovative technologies)?
- How can we ensure reliability?
- Who is best positioned to address these challenges?
- What are the implications for different ownership models for these new distributed resources?
Thank you

- Thoughts or questions?
- Amy L. Stein
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- stein@law.ufl.edu

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**Reported, Bottom-up, and Analyst-projected Average U.S. PV System Prices over Time**

- All methodologies show a downward trend in PV system pricing
- Reported pricing and modeled benchmarks historically had similar results, however have recently diverged in estimated pricing.