Winter Committee Meetings

Staff Subcommittee on Rate Design
WE ARE UNDERUSED: HOW DER COMPENSATION AND VALUE IDENTIFICATION AFFECTS THE UTILIZATION OF DER

NARUC Winter Meetings 2017

Benjamin Stafford,
Manager, State Policy
Advanced Energy Economy
The Power of Many to Transform Policy

Leadership Council

Members
### What is Advanced Energy?

#### Electricity Generation
- Hydropower
- Gas turbines
- Solar
- Wind
- Geothermal
- Marine
- Waste
- Biomass
- Nuclear
- Other DG

#### Electricity Delivery & Management
- Transmission
- Distribution
- AMI
- Micro-grids
- EV Charging Infrastructure
- Energy Storage
- Enabling IT

#### Fuel Production
- Ethanol & Butanol
- Biodiesel
- Biogas
- Synthetic Diesel & Gasoline
- Bio-oil
- CNG & LNG
- Hydrogen

#### Fuel Delivery
- Fuel Transportation Infrastructure
- Fueling Stations

#### Buildings
- Building Design
- Building Envelope
- HVAC
- District Energy, CHP, CCHP
- Water Heating
- Lighting
- Appliances & Electronics
- Enabling IT

#### Transportation
- Propulsion Systems
- Vehicle Design & Materials
- Freight Logistics
- Land Use & Infrastructure Design
- Enabling IT

#### Industry
- Manufacturing Machinery & Process Equipment
- Industrial Combined Heat & Power
The lack of appropriate accounting and valuation of new services affects the adoption of resources.

- Valuing performance and fostering innovation must be part of thoughtful rate design.
- Determining the benefits and costs of resources and technologies is vital.
- Regulators have a toolbox outside of traditional rate design to address issues.
- There are widespread examples of alternative rate design already being implemented or considered.
Rate design directly impacts the deployment of technologies.

- AEE believes the adoption of relevant technology is foundational for deployment of resources and technologies.
- We support the creation of programs, products, services and rates that will ultimately transform how customers, utilities, and third party service providers interact with the modern grid.
- Designing rates involves assessing costs and benefits of technologies
Benefits from DERs may be broad, quantifiable, and within regulatory responsibilities.

**Customers Benefits**
- Load Reduction & Avoided Energy Costs
- Demand Reduction & Avoided Capacity Costs
- Avoided Compliance Costs
- Ancillary Services
- Utility Operations
- Market Efficiency
- Risk Reduction

**Participant Benefits**
- Participant Non-Energy Benefits
- Participant Resource Benefits

**Societal Benefits**
- Public Benefits
- Environmental Benefits
Regulators have a toolbox outside of traditional rate design to address issues.

- **Performance metrics** and output-oriented incentives align utility behavior with public good.
- Some jurisdictions allowing **return on investments for procured services** allow for options akin to capital investments.
- **Integrated distribution system planning** can allow utilities to see technologies as an asset that they actively want to promote.
- **Demonstration projects**, with third-party involvement, allow for limited and appropriate test of technologies and business models.
There are examples of alternative rate design already in practice or under consideration.

| Rates                     | California - residential rate design (R1206013)  
|                         | Arizona – time varying rates  
|                         | Massachusetts – time varying rates (14-04)  
|                         | Illinois – real-time pricing and bill savings |
| Distribution System     | New York – Value of Distributed Energy Resources proceeding (15-E-0751)  
| Planning/DER            | Minnesota - Value of Solar Tariff  
|                         | NARUC - Distributed Energy Resources Manual  
|                         | Rhode Island Investigation Into the Changing Electric Distribution System |
| Performance Based       | AEE Institute – PBR for Pennsylvania Whitepaper  
| Regulation              | Massachusetts Energy Efficiency Programs  
|                         | Discussions in MN, MO, IL, MI, NH |
| Wholesale Markets        | FERC – Electric Storage Participation in Regions with Organized Wholesale Electric Markets - No. AD16-20-000 |
Join us in creating an Advanced Energy Economy

Benjamin Stafford, Manager, State Policy
bstafford@aeec.net
Staff Subcommittee on Rate Design
What’s the challenge?

• Provide fast regulation to stabilize the grid

• Integrate much higher percentages of renewable electricity
Grid Interactive Electric Thermal Storage
Aggregate Group

MW\textsubscript{(electric)} Charge Rate
Coupled to the real-time needs of grid

MW\textsubscript{(thermal)} Discharge
Delivery of hot water

MWh\textsubscript{(thermal)} State of Charge
## Individual GETS Water Heater

### End Point Details

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control Strategy</td>
<td>Aggregate Balancing Control</td>
</tr>
<tr>
<td>Override Conditions</td>
<td>No overrides</td>
</tr>
<tr>
<td>Error Status</td>
<td>No errors</td>
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<tr>
<td>Device Status</td>
<td>Active</td>
</tr>
<tr>
<td>Control Signal</td>
<td>0</td>
</tr>
<tr>
<td>Locked Charge Level</td>
<td>124</td>
</tr>
<tr>
<td>Actual Power</td>
<td>4,888 Watts</td>
</tr>
<tr>
<td>Available Power</td>
<td>4,888 Watts</td>
</tr>
<tr>
<td>Stored Energy</td>
<td>10,088 Wh</td>
</tr>
<tr>
<td>Available Energy Storage</td>
<td>4,462 Wh</td>
</tr>
</tbody>
</table>

### Selected Temperatures, Power and Energy

- **Top Temp**
- **Average Temp**
- **Bottom Temp**
- **Element on Percent**
- **Total Wh**
- **Individual Water Heater Power**

Data from the last 4 days
Hawaii
Fast Signal + Sun Following

Putting it all together in a “real” deployment:
The Maritimes
Wind Absorption

http://powershiftatlantic.com/
Alaskan Village Micro grid
Wind integration
Car vs GETS vs Battery

**Nissan Leaf**
- 9.5 kWh / day
- $30,000

**Steffes Hydro Plus**
- 10 kWh/day
- $1500

**Tesla Battery**
- 7 kWh
- $6,500
Steffes – North Dakota

“COMMITMENT TO INNOVATION”

John Diem
Steffes Corporation
3050 North Highway 22
Dickinson, ND 58601
701 483 5400
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