Facts on the Ground
FTC Distributed Solar Generation Workshop

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June 21, 2016
Solar Growth, Utility Response

Mainstream Utility Solar Strategies:

- Large Scale Solar PV in IRPs
- Exploring Community Solar
- Redesigning Rate Structures
- Investing in Grid Edge Visibility
Thinking Beyond the Meter

Responses to the new solar DER Paradigm:

- Integrating Customer Insight
- Enhanced Distribution System Analysis & Planning,
- Rewiring the Utility Standard Operating Practices

“All I’m saying is it’s one thing to be smart, and another to be wise.”
Fundamental Challenges

Grid Perspective:
System = Value
DGPV = Cost
Measured Expectation of Change

Consumer Perspective:
System = Cost
DGPV = Value
Rapid Expectation for Change

- Obligations under the regulatory compact
- Dynamic societal expectations
- Requirements to add generation
- Flat demand
- Pace of regulatory processes
- Concerns about portfolio diversity & stranded assets

- Trade between equity and efficiency
- Uncertainties on definitions of fairness
- Inadequate valuation tools (incl markets)
- Rapid technological advances
- Limited consensus about the nature and role of the regulated monopoly
- Lack of clarity on conflicting expectations
Starting with a Blank Slate for the Future

CHOOSING THE DESTINATION
Phase I
Hypothetical electricity marketplace

THE DESIGNING THE ROADMAPS
Phase II
Journey from current state to future state

STARTING THE JOURNEY
Phase III
Creation of customized roadmaps & implementation of “no-regrets moves”

Crowdsourced visions for the future, starting from a blank slate
Crowdsourced roadmaps that articulate how we get from “here” to “there”
Stakeholder-guided development of bespoke plans for electric power sector transformation
# 51st State Phase II: Developing a Roadmap

<table>
<thead>
<tr>
<th>Retail Market Design</th>
<th>Describe how customers participate (opt-in versus opt-out) of the future state technology enablement provisions, what assets are at their disposal, and how those assets interact with the grid</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wholesale Market Design</td>
<td>Describe impacts and modifications, if any, to wholesale markets, central station generation, transmission assets and services, etc.</td>
</tr>
<tr>
<td>Utility Business Model</td>
<td>Describe how the utility industry needs to evolve from current to future state in order to support the new market while maintaining safe, reliable, and cost-effective service</td>
</tr>
<tr>
<td>Asset Deployment</td>
<td>Address any required technologies (e.g., AMI, smart inverters, load tap changers, etc.) that utilities will need to deploy to support the future state, the timing/triggers for those deployments, and how costs would be recovered</td>
</tr>
<tr>
<td>IT</td>
<td>Describe the software and communications platforms needed for all parties to enable the grid of the future, including those needed for the utility, the firmware required for devices, etc.</td>
</tr>
<tr>
<td>Rates &amp; Regulation</td>
<td>Discuss how regulatory bodies, rules, and regulations must adapt from current to future state, and how retail rates must transform over time to allow for the continued economic health of the system and its participants</td>
</tr>
</tbody>
</table>
### Finding the Potential “No Regrets” Moves

#### Distribution System Investments
- Advanced metering and communications functionality
- System analysis tools (ex: hosting capacity)
- Interconnection protocols (both information & energy)

#### Customer Insight & Engagement
- Improving education and communications interfaces
- Advanced load profile segmentation
- Increasing availability of customer options

#### Evolving Rates & Regulation
- Exploration of time varying rate designs
- Evaluating opportunities to cross-leverage DER incentive programs
- Implementing decoupling and performance trackers
Back Up / Additional Reference Slides

- Utility DER Strategies
- 51st State Additional Details
Utility Approaches to Combined DER Customer Offerings

Customers Crave More Options…

Which new and emerging revenue streams is your regulated utility pursuing? Choose all that apply.

- 66% Offering energy management and efficiency services to customers
- 56% Offering community solar to customers
- 52% Deploying electric vehicle charging infrastructure
- 47% Offering green pricing programs to key accounts
- 40% Deploying distributed energy storage

…And Utilities Want to Provide Them.

Source: Accenture, Utility Dive
Utility Approaches to Combined DER Customer Offerings

What’s the Value of a Tesla Powerwall? $50 per Month, Bets Green Mountain Power

National Grid demand response pilot nets participants 20% energy savings

Minnesota co-op bundles community solar, demand response programs
Thinking Beyond the Meter

Responses to the new solar DER Paradigm:

• Integrating Customer Insight on Load Profiles, Propensity to Adopt, and Messages that Resonate

• Enhanced Distribution System Analysis, Planning, and Operations, with DER as “Non-Wires” Assets

• Rewiring the Utility Standard Operating Practices

“All I’m saying is it’s one thing to be smart, and another to be wise.”
Moving Beyond Combined Programs into a Truly Holistic DER Strategy

**Integrator**
Primary utility investment is technical; i.e. planning and operations
But...is this sufficient for grid effective operations?

**Educator**
Utility establishes itself as the trusted energy advisor
But...is there a sustainable revenue model for this role?

**Solution Provider**
Utilities provide sales and/or financing for deployment
But...are utilities equipped to provide this service?

**VPP Owner / Operator**
Utilities reasserts traditional holistic role in provision of electricity
But...are regulators comfortable with this model?
The Rise of Distributed Resource Planning

- Increasing regulator and customer demand for DER choices

- Utility policies and procedures designed to react to out-of-date paradigms

- Improved economics of key technologies:
  - Sensors
  - Data management
  - Software
  - Communications
  - Power electronics

Source: Planning the Distributed Energy Future, SEPA and Black & Veatch
The Rise of Distributed Resource Planning

Perceived Challenges to Integrating High Levels of DER

<table>
<thead>
<tr>
<th>Challenge</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>System stability or protection</td>
<td>49.0%</td>
</tr>
<tr>
<td>Inability to model DER in planning load flows</td>
<td>33.7%</td>
</tr>
<tr>
<td>Lack of control over DER</td>
<td>32.7%</td>
</tr>
<tr>
<td>Lack of visibility (status &amp; forecast)</td>
<td>30.6%</td>
</tr>
<tr>
<td>Other</td>
<td>9.2%</td>
</tr>
<tr>
<td>Don’t see a challenge</td>
<td>7.1%</td>
</tr>
<tr>
<td>Don’t know</td>
<td>17.3%</td>
</tr>
</tbody>
</table>

Source: Black & Veatch
What makes 51st State unique?

1. Phased approach
2. Collaborative process
3. Wide-spread engagement
4. Replicability
Utility of the Future
Sample Paradigms

<table>
<thead>
<tr>
<th>Integrated Energy Services Company</th>
<th>Distributed Resource Enabler</th>
<th>Transactive Distribution Grid</th>
</tr>
</thead>
<tbody>
<tr>
<td>Utility-directed deployment of behind-the-meter resources for system benefit</td>
<td>Leverages existing models to allow for increased access for Distributed Energy Resources</td>
<td>Applies market rules from wholesale restructuring to distribution level</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Utility Revenue Model</th>
<th>Performance-Based Rates</th>
<th>Cost of Service supplemented by Performance Bonuses</th>
<th>Wires: Cost of Service Platform: Taxes or Fees</th>
</tr>
</thead>
</table>

<table>
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<tr>
<th>Pace of Change</th>
<th>TRANSFORMATIONAL</th>
<th>INCREMENTAL</th>
<th>TRANSFORMATIONAL</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>LEVEL OF UTILITY CONTROL</th>
<th>HIGH</th>
<th>LOW</th>
</tr>
</thead>
<tbody>
<tr>
<td>Natural Capitalism</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ma Bell</td>
<td></td>
<td></td>
</tr>
<tr>
<td>NRECA</td>
<td>Regan</td>
<td>Rabago</td>
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Sources: SEPA Analysis, 51st State Concept Papers
Customer Journey Map Example

**Awareness**
Utah is a potential travel destination
- I don't know this existed
- What is the Mighty 5
- Looks amazing
- I need a vacation

**Consideration**
Evaluating Utah vs. other destinations
- Should I go here or there
- Can I afford this
- What will I get out of it
- How will this enhance my life
- What's it like there
- Is this right for us
- Is it popular

**Planning**
Travel, lodging, to-dos and to-don'ts
- Can I afford this
- How will I get there
- What will I do there
- What do people think
- What do I need to bring
- When is the best time

**Experience**
Journey to and park(s) experience
- This is amazing
- Better than I imagined
- What else should I do here
- FOMO
- Changing plans/recalibrating
- What's around here

**Advocacy**
Sharing experiences and feedback
- Amazing experience
- Share advice/help others
- Can't wait to come back
- Longing
- Rate and review
- Internalized narrative

**Thinking**
- Display Ads
- Television
- Search
- Blogs
- Hotels
- # Social

**Doing**
- Influencers
- Word of mouth
- Travel blogs
- Tourism sites
- Booking sites
- Parks
- FourSquare
- Yelp
- Instagram
- Facebook
- Twitter
- Reward sharing
- Aggregate UGC

**Acting**
- Educate
- Create Dialogue
- Resources
- Storytelling
- Social proof
- Resources
- Content
- Reassurance
- Branding
- Sharing
- In-park engagement

**Smart Electric Power Alliance**
Initiative Timeline

Phase I
- Launch: Sept '14
- Concept Papers Released
- Summit: Sept '15
- Education & Outreach

Phase II
- Launch: Sept '15
- Roadmaps Released
- Summit: Fall '16
- Education & Outreach

Phase III
- Capstone Report Released
- Launch: Fall '16