AZ Energy Transformation: Opportunities for Distributed Energy Resources Technology Track

DERA and ASU, April 13, 2018
Joseph Cunningham, DERA President
Director of Operations, Sunny Energy
Distributed Energy Resource Alliance (DERA)

• A 501-(c)-(6) non-profit trade organization
• Distributed energy resources, including:
  • Distributed generation PV
  • Active demand management
  • Distributed grid services and smart grid solutions
• Constructive and proactive clean energy development that benefit energy consumers, electric utilities, and providers
• Collaborative engagement in state-level legislative and regulatory issues and forums
Conference Goals

• Learning experience for everyone
• Understand how PV affects the grid, in Arizona
• Understand current technology limitations
• Understand consumer response to rates and technology
• Understand the role policy plays in Arizona

• Ultimately, unhampered growth of distributed generation PV
Policy, Utility, Consumer & Technology

What if we all worked towards a common goal?
Agenda

- Integrated DER Model
- Technology – What’s Missing?
- The Problem – Utility
- The Problem – Solar Limitations
- Sample chart
- Lack of Integration
- Integrated Technology Solutions
Integrated DER Model

- PV
- Storage
- Distributed Energy Resources
- EV Charging
- Energy Efficiency & Management

DERA Energy Tech for AZ
SUNNY ENERGY
Technology – What’s Missing?

• Consumers want choices, independence, service, savings
• Consumers want comfort, convenience, ease-of-use
• Technology designed for very specific functions
  • PV
  • Storage and backup
  • TOU load shifting
  • Demand management
• But, the pieces are not integrated
• Rate plans send the right signals to modify behavior
• But it’s so complicated consumers are frustrated
Is Arizona Special?

- Very high summer temperatures ~ 6 months each year
- Expensive “Peak” demand rates can help change behavior
- But residential energy use is erratic, unpredictable
- Result - Consumer frustration, not behavior modification
- Technology designed for large markets - CA, MA, NY, etc.
- What works in CA does not necessarily work in AZ
The Problem
Peak Usage Example

- Consumer usage is erratic and peaks in PM
- Consumers want choices and savings

How do we get from here to a flat curve?
The Problem
Peak Usage Example

- Consumer usage is erratic and peaks in PM
- Consumers want choices and savings
- PV temporal value is limited - Solar “9 to 5”
- Excess generation mid-day
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Net Energy with PV & Load Management

$130 saved
The Problem
Peak Usage
Example

• Consumer usage is erratic and peaks in PM
• Consumers want choices and savings
• PV temporal value is limited - solar “9 to 5”
• Excess generation mid-day
• Load manager can reduce and shift load
• Battery storage may reduce peak load and use mid-day excess PV
The Problem
Peak Usage Example

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- Consumers want choices and savings
- PV temporal value is limited - solar “9 to 5”
- Excess generation mid-day
- Load manager can reduce and shift load
- Battery storage may reduce peak load and use mid-day excess PV

Net Energy with PV, Load Management & Storage

$200 saved
Lack of Integrated Technology

- PV, load management, battery storage - readily available
- Separate Devices – Separate User Interfaces
Lack of Integrated Technology

• It’s a complicated problem for utilities
• More complicated for consumers
• Separate technologies often conflict with each other
• Separate technologies difficult to manage
• Without integration, benefits and savings are marginal
Integrated Technology Solution

- Efficiencies > sum of the parts
- Maximize consumer savings
- Maximize grid benefits
- One UI for consumers helps acceptance
- Software to manage integration is key
# DER Technology

<table>
<thead>
<tr>
<th>Problem Statement</th>
<th>Desired Condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Missing technology to manage super off-peak rates.</td>
<td>Automate consumer use of super low rates, often when they are not home, or it’s too difficult to manage.</td>
</tr>
<tr>
<td>Consumers need education to be convinced to adopt rate plans and associated technology.</td>
<td>Interactive technology can serve to educate as well as automate.</td>
</tr>
<tr>
<td>If real-time pricing became a reality, how would consumers manage it?</td>
<td>Easy to use consumer interface to manage and take advantage of real time rate changes, matched with energy management of the home.</td>
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<td>Market differences force technology companies to focus on the largest market opportunities.</td>
<td>Technology companies should focus on market specific technology, not just one size fits all.</td>
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<tr>
<td>Lack of common communication platform.</td>
<td>Common communication platform allows easy integration.</td>
</tr>
<tr>
<td>Lack of a driving market force – savings are not enough.</td>
<td>A killer app to drive consumer adoption.</td>
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## DER Technology

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<td>Manufacturers want to “own” their customers. They build closed platforms.</td>
<td>An open platform would be helpful in creating interoperability opportunities.</td>
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## DER Technology

### Solution Statement

| Common Communication Platform  | Educational User Interface |

### Desired Function

<table>
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<tr>
<th>One platform and UI for all devices</th>
<th>Aggregate data for all devices into one platform</th>
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<tbody>
<tr>
<td>Instant Feedback to consumers for smart decisions</td>
<td>Instant access to utility usage data</td>
</tr>
<tr>
<td>Disaggregated data is most useful to consumers</td>
<td>Monetize feedback to consumers – not kWh or kW</td>
</tr>
<tr>
<td>Low cost</td>
<td>Intuitive UI</td>
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### Communication Standards

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<th>Reliable and secure communication</th>
<th>Instant user experience</th>
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<tbody>
<tr>
<td>Instant user experience</td>
<td>There are policy considerations</td>
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</table>

### General Feedback

<table>
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<tr>
<th>Separate load data</th>
<th>Change usage into $’s</th>
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<tr>
<td>User experience – instantaneous feedback</td>
<td></td>
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Solar Installation
Batteries & Storage
Repairs & Services

www.sunnyenergy.solar