Committee On Electricity
Subcommittee on Nuclear Issues
Moderator: Hon. Greg White, Michigan

Dr. Lara Pierpoint, DOE
Mike Kormos, PJM
Richard Myers, NEI
Dr. Raj Barua, NRRI
Dr. Lara Pierpoint
Senior Advisor, DOE
Nuclear Retirements: Outlook, Carbon Implications and Policy Options

NARUC
July 13, 2015

Lara Pierpoint, Ph.D.
Senior Advisor
U.S. Department of Energy

Energy Policy and Systems Analysis
## Nuclear Plants – Early Retirements

<table>
<thead>
<tr>
<th>Reactor</th>
<th>Operator</th>
<th>Size (MW)</th>
<th>Location</th>
<th>Age at end of license period (years)</th>
<th>Age at retirement (years)</th>
<th>End of Operation (year)</th>
<th>Proximate Reason</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kewaunee (PWR)</td>
<td>Dominion</td>
<td>556</td>
<td>East WI</td>
<td>60</td>
<td>39</td>
<td>2013</td>
<td>Economics</td>
</tr>
<tr>
<td>Crystal River (PWR)</td>
<td>Duke Energy</td>
<td>842</td>
<td>Mid-FL</td>
<td>40</td>
<td>31</td>
<td>2009 (retirement announced 2013)</td>
<td>Damage during steam generator replacement</td>
</tr>
<tr>
<td>San Onofre 2 (PWR)</td>
<td>So Cal Edison</td>
<td>1070</td>
<td>Southern CA</td>
<td>40</td>
<td>29</td>
<td>2012</td>
<td>Faulty steam generators</td>
</tr>
<tr>
<td>San Onofre 3 (PWR)</td>
<td>So Cal Edison</td>
<td>1080</td>
<td>Southern CA</td>
<td>40</td>
<td>28</td>
<td>2012</td>
<td>Faulty steam generators</td>
</tr>
<tr>
<td>Vermont Yankee (BWR)</td>
<td>Entergy</td>
<td>605</td>
<td>Southern VT</td>
<td>60</td>
<td>41</td>
<td>2014</td>
<td>Economics</td>
</tr>
<tr>
<td>Oyster Creek (BWR)</td>
<td>Exelon</td>
<td>637</td>
<td>New Jersey</td>
<td>60</td>
<td>50</td>
<td>2019</td>
<td>Negotiation with the state; otherwise would have required cooling towers</td>
</tr>
</tbody>
</table>
Plants at Risk

• Financial institutions have “watch lists”- with overlaps, indicating which plants are at risk

• Risk factors include:
  – Single-unit, in merchant markets facing lowest wholesale prices
  – PPA expiration
  – Reductions in power prices in areas with high wind production + transmission constraints
  – Local political opposition
Drivers of Nuclear Electricity Cost Increases

- Capital expenditure on upgrades for license extension
- Capital expenditure on uprates
- Capital expenditure on safety-related upgrades (past: vessel-head replacement; future: hardened/filtered vents)
- Security-related upgrades
- Increased uranium prices
Current Risk Environment

Helpful

• EPA Clean Power Plan
• FERC has held 3 workshops on price formation in energy markets
• State legislation
• PPAs

Not as helpful

• Natural gas prices → electricity prices

![Natural gas spot prices (Henry Hub)](image)
Benefits of Retaining Existing Nuclear Plants

- Very low-carbon electricity
- Help mitigate risks associated with high reliance on a single fuel
- Nonproliferation/national security

Arguably, these benefits are undervalued in the market; note these issues play differently depending on the market
Carbon Implications of Retirements

Estimated Annual CO₂ Emissions from Power Sector

- Announced Closures Only
- 5% Fleet Closure
- 30% Fleet Closure

Retired nuclear plants are replaced almost entirely with natural gas-fired generation.
Wholesale Electricity Prices

Day-ahead on-peak power price by market ($/MWh)

Average Daily Power Price in 2005: $74.55

Average Daily Power Price in 2013: $46.84
Price spikes look different by region

Day-ahead on-peak power price by market ($/MWh)
## Policy Options

<table>
<thead>
<tr>
<th>Policy Type</th>
<th>Example</th>
<th>Challenge Addressed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Partner with States/RTOs</td>
<td>Incentivize signing of PPAs</td>
<td>Markets may not fully value the benefits of nuclear power</td>
</tr>
<tr>
<td>Regulatory</td>
<td>Consider cost-of-service contracts for existing low-carbon generation in wholesale markets (likely requires legislative change)</td>
<td>Markets may not fully value the option to maintain low-carbon power</td>
</tr>
<tr>
<td>Subsidies</td>
<td>tax credits or loan guarantees for plant uprates; price floors</td>
<td>Reduce risk/financing costs for uprates, enabling replacement of lost nuclear power elsewhere</td>
</tr>
<tr>
<td>Targeted Tax Support</td>
<td>accelerated depreciation for safety- or environment-related investments at existing plants</td>
<td>High costs of regulatory compliance</td>
</tr>
<tr>
<td>Technology Support</td>
<td>R&amp;D on operations within the LWR sustainability program</td>
<td>Increased O&amp;M costs due to aging</td>
</tr>
</tbody>
</table>
DOE Programs

• Office of Nuclear Energy
  – LWR sustainability program
  – SMR licensing support program
  – Advanced reactor and fuel cycle R&D

• Energy Policy and Systems Analysis
  – Continued tracking of nuclear retirement risks
  – Implementation of QER recommendation on valuation to “work with stakeholders to develop a framework(s) for identifying attributes of services provided to the grid by electricity system components, as well as approaches to incorporate the valuation of grid service attributes in different regulatory contexts...”

• Loan guarantees
Backup
Light Water Reactor Sustainability (LWRS) Program

Develop fundamental scientific basis to enable continued long-term safe operation of existing LWRs (beyond 60 years):

- Improve reliability
- Preserve carbon-free generation
- Support long-term economic viability
- Sustain Safety

Focus areas:

- Materials Aging and Degradation
- Advanced Instrumentation and Controls
- Risk-Informed Safety Margin Characterization
- Systems Analysis and Emerging Issues (includes research to support post-Fukushima lessons learned)

Accomplishments

- Completed the development of a detailed database on irradiated concrete degradation. This database, together with mechanistic modeling, will support the development of a predictive model for concrete degradation.

- Released the first Beta version of the new RELAP-7 code. RELAP-7 is a modern, updated thermal-hydraulics reactor plant simulation code.

- The Arizona Public Service Company received a Nuclear Energy Institute Top Industry Practice (TIP) award for an advanced outage control center automation pilot plant project implemented in conjunction with the Light Water Reactor Sustainability program.
In 2012, DOE initiated a 6-year/$452M program to provide financial assistance for design engineering, testing, certification and licensing of promising SMR technologies with high likelihood of being deployed at domestic sites in the mid-2020’s.

Commercial SMR development is being accelerated through public/private arrangements with 50% cost share provided by U.S. industry partners.

Site permitting and licensing activities being planned:
- U.S. Government Interagency Agreement for the Tennessee Valley Authority’s Clinch River Site -- Developing Early Site Permit (ESP), expected mid-2019; Cost-shared 50/50
- Second NuScale Cooperative Agreement -- NuScale to partner with a utility to explore siting SMR on or near Idaho National Laboratory; Site-related activities needed to develop license application; Cost-shared 50/50
B&W mPower America
- Cooperative Agreement established with team consisting of B&W, Bechtel, and TVA in April 2013
- Initial DOE commitment of $101 M through March 2014
- B&W announced a reduction in funding in the February 2014 timeframe (to approx. $15 M/year)
- B&W and DOE in process of establishing a path forward to meeting goals of the program

NuScale Power
- Selection of NuScale announced on December 12, 2013
- Cooperative agreement signed on May 27, 2014
- DOE plans to provide $217 M through 2017
- Design Certification application submittal to NRC expected in December 2016
- Focus is on a 2023 deployment
Mike Kormos
PJM
Nuclear Energy 2015: Focus on Value

Richard Myers
Vice President, Policy Development
Nuclear Energy Institute

NARUC Summer Meeting
July 13, 2015
Nuclear Energy: A Solid Value Proposition
Safe, Reliable Electricity 24-by-7-by-365 Plus …

- Supports Grid Stability
- Provides Price Stability
- Runs When Needed (Fuel on Site)
- Provides Clean Air Compliance Value
- Contributes to Fuel and Technology Diversity (Portfolio Value)
- Avoids Carbon Emissions
- Anchors the Local Community: Jobs, Tax Base
The Value of Nuclear Energy

- Adds $60 billion to the country's GDP
- Supports 475,000 jobs
- Saves consumers an average of 6 percent on electricity bills
- Contributes $10 billion in federal and $2.2 billion in state taxes each year
- Avoids over 1/2 billion tons of carbon emissions each year
- Prevents 650,000 tons of NOx and 1 million tons of SO2 emissions
- Valued at a social cost of $33.4 billion annually

Spotlight on Nuclear Energy’s Value

- Polar Vortex demonstrated value of baseload capacity with firm fuel supply
- EPA Clean Power Plan proposal to reduce CO₂ emissions by 30% by 2030 cannot be achieved and sustained without preserving existing nuclear generating capacity and building new nuclear capacity

“NARUC urges the EPA ... to adopt final GHG rules and regulations that ... will encourage States to preserve, life-extend, and expand existing nuclear generation....”

— NARUC Resolution, November 2014
## Cost of Generating Capacity

### 2013 $/MWh

<table>
<thead>
<tr>
<th>Technology</th>
<th>Capacity Factor (%)</th>
<th>Range of Levelized Costs</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Minimum</td>
</tr>
<tr>
<td><strong>Dispatchable</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gas Combined Cycle</td>
<td>87</td>
<td>68.6</td>
</tr>
<tr>
<td>New Nuclear</td>
<td>90</td>
<td>91.8</td>
</tr>
<tr>
<td>Advanced Coal (IGCC with CCS)</td>
<td>85</td>
<td>132.9</td>
</tr>
<tr>
<td><strong>Intermittent</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Onshore Wind</td>
<td>35</td>
<td>65.6</td>
</tr>
<tr>
<td>Utility-Scale Solar PV</td>
<td>25</td>
<td>97.8</td>
</tr>
</tbody>
</table>

Sources: New generating capacity costs from Energy Information Administration, *Annual Energy Outlook 2015*; existing nuclear costs are 2013 total generation costs (fuel, O&M, capital) from Electric Utility Cost Group.
NARUC
Summer Committee Meetings

Committee On Electricity
Modern Utility / Modern Regulation
Moderator: Hon. Susan Ackerman, Oregon

Hon. Lorraine Akiba, Hawaii
Hon. Carla Peterman, California
Hon. Audrey Zibelman, New York
Hon. Lorraine Akiba, Hawaii
NARUC 2015
SUMMER COMMITTEE MEETINGS - Modern Utility / Modern Regulation

Lorraine H. Akiba, Commissioner
Hawaii Public Utilities Commission
July 12-15, 2015
Policy and Regulatory Reforms to Achieve Hawaii’s Clean Energy Future

- Recent directives and orders to Hawaii’s utilities to implement new business models to become a world leading operator of a high renewable energy resource grid
- Regulatory policies and pricing also need to reflect these new business models with new incentives to achieve Hawaii’s clean energy future
- Review and revision of pricing of energy services to reflect new business and technical demands
Recent Major Decisions and Orders to Implement the Integrated Grid

  - White Paper entitled: “Commission’s Inclinations on the Future of Hawaii’s Utilities” which outlines the vision, strategies and regulatory policy changes required to align new utility business models with customer’s changing expectations and state energy policy
  - Provided specific guidance for future energy planning and review, including strategic direction for capital investments in the integrated grid of the future
Reliability Standards Working Group Docket No. 2011-0206 Order No. 32053

- Adopted recommendations from the RSWG working group final work product for integrating utility scale and renewable energy resources in a reliable and economic manner.

- Specific directives for actions to lower energy costs, improve system reliability and addressing emerging challenges to integrate additional intermittent renewable energy.

- Directed the utilities to prepare energy storage utilization plans for all island grids to be included in Power Supply Improvement Plans requirements.
Policy Statement and Order Regarding Demand Response Programs Docket No. 2007-0341 Order No. 32054

- Specific guidance concerning the objectives and goals for demand response programs as distributed energy resources to be used by the utilities as generation resources
- Requires integrated demand response portfolio that will enhance system operations and reduce electricity costs to customers
- Required utilities to address using distributed energy storage and customer sided storage including electric vehicles for demand response
CUSTOMER CHOICE AND EMPOWERMENT

- Key policy directive to involve the most important stakeholder - the customer
- Customers are active partners in the transformation of the utilities of the future
- Customer side and customer sited technologies including distributed generation, distributed energy storage systems and EVs support the grid of the future
- “Integrated energy districts” or microgrids directly assist in integration of more cost effective renewable energy onto the grid with DER while providing resiliency and reliability benefits
Envision the Integrated Grid of the Future

- Hawaii is the living laboratory for the integrated grid of the future
- Implementing real time DER actions and combining the tools of both traditional central plant and decentralized distributed generation models
- Implementing new programs to give all customers access to renewable energy
- On Bill Financing to focus on low income, renters and non profits ability to acquire energy efficiency equipment like solar water heaters and HVAC systems
- Green Infrastructure Financing program to focus on low income and hard to reach customers in underserved markets and provide ability to acquire distributed PV, energy storage systems and energy efficiency equipment with low cost financing through funding from securitized bonds
Hawaii Electric Systems
4 electric utilities; 6 separate grids

Kauai Island Utility Cooperative
27 MW PV (24 MW in development)
System Peak: 78 MW
Customers: 32,700

Maui Electric
Maui: 60MW PV / 72MW Wind
System Peak: Maui 200 MW
Lana’i: 1MW PV
System Peak: Lana’i: 5 MW
Moloka’i: 1.2 MW PV
System Peak: Moloka’i: 5.5 MW
Customers: 68,000

Hawaiian Electric
221 MW PV / 100 MW Wind / 69 MW WTE
System Peak: 1,100 MW
Customers: 300,000

Hawaii Electric Light
39 MW PV / 30 MW Wind /
38 MW Geothermal / 16 MW Hydro
System Peak: 190 MW
Customers: 81,000
Residential (■) and commercial (■) net-metered solar PV capacity in Hawaii; average residential solar PV system size ( ■ )

<table>
<thead>
<tr>
<th>Kauai (KIUC)</th>
<th>Oahu (HECO)</th>
<th>Maui, Molokai, Lanai (MECO)</th>
<th>Hawaii Island (HELCO)</th>
</tr>
</thead>
<tbody>
<tr>
<td>megawatts (MW)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>kilowatts (kW)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: U.S. Energy Information Administration, EIA-861 and EIA-826
Note: Average residential solar photovoltaic (PV) system size calculated by dividing total installed capacity by number of meters. HECO, MECO, and HELCO are subsidiaries of Hawaiian Electric Industries Inc.; KIUC is an independent electric cooperative.
# Hawaii Battery Energy Storage System (BESS) Projects; RFPs

<table>
<thead>
<tr>
<th>Title</th>
<th>MW</th>
<th>MWh</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kauai Island Utility Cooperative Koloa BESS</td>
<td>1.5</td>
<td>1</td>
<td>2011</td>
</tr>
<tr>
<td>Kauai Island Utility Cooperative Port Allen BESS</td>
<td>3</td>
<td>2</td>
<td>2012</td>
</tr>
<tr>
<td>Lanai La Ola Solar ... for 1.2 MW PV (solar) on 5 MW grid</td>
<td>1.125</td>
<td>0.5</td>
<td>2011</td>
</tr>
<tr>
<td>Kaheawa Wind I ... 1st (30 MW) wind on 200 MW grid</td>
<td>1.5</td>
<td>1</td>
<td>2009</td>
</tr>
<tr>
<td>Auwahi Wind ... 2nd (22 MW) wind on 200 MW grid</td>
<td>11</td>
<td>4.4</td>
<td>2012</td>
</tr>
<tr>
<td>Kaheawa Wind II ... 3rd (22 MW) wind on 200 MW grid</td>
<td>10</td>
<td>20</td>
<td>2012</td>
</tr>
<tr>
<td>Maui Electric / USDOE Smart Grid BESS ... Wailea</td>
<td>1</td>
<td>1</td>
<td>2013</td>
</tr>
<tr>
<td>Hawi Substation ... for high wind penetration circuit</td>
<td>1</td>
<td>0.25</td>
<td>2012</td>
</tr>
<tr>
<td>HELCO Battery Energy Storage System ... utility owned</td>
<td>(2)</td>
<td>0.1</td>
<td>(2) 0.25</td>
</tr>
<tr>
<td>Kauai Island Utility Cooperative Anahola BESS 6MW/4 MWh system; targeted for Fall 2015 completion</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HECO Energy Storage RFP ... 60 to 200 MW for Oahu. Finalists selected; targeted for 2017 completion</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
In Maui, large scale renewable energy (72MW of wind and 40+ MW of distributed PV) has been introduced. In addition, EV high penetrations are expected soon.

**Issues**
- Excess Energy
- System Frequency Impact
- Distribution Line Voltage Impact

**Solutions**
- Integrated DMS
- μDMS &Smart PCS
- EV charger control
- Battery system
- Direct Load Control
- ICT Platform

**Basic Policy for Demonstration**

- Maximize Utilization of Renewable Energy (RE)
- Stable Supply of Electric Power
- Solution for Impact of EV & PV High Penetration
Overall View of System Configuration

Smart City Platform (Information Control Hub)

EVECC
DMS
Direct Load Control

M2M Network

AMI

Trans

EVECC: EV Energy Control Center
DMS: Distributed Management System
DLC: Direct Load Control
DR: Demand Response
AMI: Advanced Metering Infrastructure
SVC: Static Var Compensator
DMC: Data Measuring & Communication Device
DP: Distribution Panel
PV: Photovoltaic
PCS: Power Conditioning System
EV: Electric Vehicle

20 Charging Stations

40 Residences

SVC 1 set
Bulk Battery 3 sets
Switch 12 sets
Sub Station

μ-DMS

20 Locations

Data Measuring & Communication Device

μ-DMS

15 Locations

DC Fast Charger
EV level-2 Charger
Home Gateway

Home Battery 10 sets
SmartPCS 10 sets
Water Heater
EV level-2 Charger

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Mahalo!

For any questions, please contact:
Lorraine.H.Akiba@hawaii.gov
(808) 586-2020

Lorraine H. Akiba, Commissioner
Hawaii Public Utilities Commission
Consumer Advocates Respond
Moderator: Hon. Susan Ackerman, Oregon

David Hepinstall, Assoc. for Energy Affordability

Bill Malcolm, AARP

Sonny Popowsky, Former Consumer Advocate of Pennsylvania
Text Questions to 202-596-1708
Committee On Electricity
NARUC
Summer Committee Meetings

Real Data About Customer Wants and Needs
Moderator: Hon. Susan Ackerman, Oregon

Ken Black – ESource
Patty Durand, Smart Grid Consumer Coalition
Elin Katz, Connecticut Consumer Counsel
Denise Senecal, PEPCO Holdings, Inc.
Bradley Berson, American Electric Power
Ken Black
ESource
2015 NARUC Summer Committee Meeting

Patty Durand, Executive Director
Smart Grid Consumer Collaborative
Consumer Pulse and Market Segmentation Study – Wave 5
I have a fairly complete understanding of what it is, how it would work, and how it would affect homes and businesses

7%
7%

I have a basic understanding of what it is and how it would work

18%
16%

I’ve heard the term, but don’t know much about what it means

22%
24%

I have not heard that term

51%
51%

Have heard the term “Smart Meter” and “Smart Grid”

Current Level of Knowledge of…

Smart Grid

Smart Meter

7%
9%

10%

20%

22%

22%

23%

24%

46%

n =

Wave 5 1,004
Wave 1 1,234
Overall Favorability of the terms “Smart Grid” and “Smart Meter”

**Overall Favorability**

<table>
<thead>
<tr>
<th></th>
<th>Smart Grid</th>
<th></th>
<th></th>
<th>Smart Meter</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Total Favorability (%6–10)</strong></td>
<td>49%</td>
<td></td>
<td></td>
<td>50%</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Very Favorable (%9–10)</strong></td>
<td>17%</td>
<td>20%</td>
<td></td>
<td>16%</td>
<td>17%</td>
<td></td>
</tr>
<tr>
<td><strong>Somewhat Favorable (%6–8)</strong></td>
<td>32%</td>
<td></td>
<td>32%</td>
<td>34%</td>
<td></td>
<td>37%</td>
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<tr>
<td><strong>Neutral (%5)</strong></td>
<td>25%</td>
<td></td>
<td>25%</td>
<td>21%</td>
<td></td>
<td>23%</td>
</tr>
<tr>
<td><strong>Unfavorable (%0–4)</strong></td>
<td>18%</td>
<td></td>
<td></td>
<td>24%</td>
<td></td>
<td>15%</td>
</tr>
</tbody>
</table>

*n =*  
*Wave 5* 472, 519  
*Wave 1* 584, 628
The U.S. Population by Segment

- Green Champions: 30%
- Savings Seekers: 20%
- Status Quo: 18%
- Technology Cautious: 17%
- Movers & Shakers: 15%
“Smart energy technologies fit our environmentally aware, high-tech lifestyles.”
“How can smart energy programs help us save money?”
Status Quo

“We’re okay; you can leave us alone.”
Technology Cautious

“We want to use energy wisely, but we don’t see how technologies can help.”
Movers and Shakers

“Impress us with smart energy technology and maybe we will start to like the utility more.”
The U.S. Population by Segment

- Green Champions: 30%
- Savings Seekers: 20%
- Status Quo: 18%
- Technology Cautious: 17%
- Movers & Shakers: 15%
Demand Response Program Interest

- Critical peak rebate
  - Total wouldn't participate: 20%
  - Total might or might not participate: 20%
  - Total would participate: 60%

- Time-of-use pricing
  - Total wouldn't participate: 26%
  - Total might or might not participate: 30%
  - Total would participate: 44%

- Auto demand response
  - Total wouldn't participate: 38%
  - Total might or might not participate: 23%
  - Total would participate: 39%

- Critical peak pricing
  - Total wouldn't participate: 52%
  - Total might or might not participate: 24%
  - Total would participate: 24%
## Critical Peak Rebates

### Likelihood to Participate: Critical Peak Rebates

<table>
<thead>
<tr>
<th></th>
<th>Total</th>
<th>Status Quo (A)</th>
<th>Technology Cautious (B)</th>
<th>Savings Seekers (C)</th>
<th>Movers and Shakers (D)</th>
<th>Green Champions (E)</th>
</tr>
</thead>
<tbody>
<tr>
<td>n=1,004/1,234</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Already Participating</td>
<td>1%</td>
<td>0%</td>
<td>0%</td>
<td>1%</td>
<td>0%</td>
<td>1%</td>
</tr>
<tr>
<td>Total Would Participate</td>
<td>60%</td>
<td>29%</td>
<td>44%</td>
<td>83%</td>
<td>43%</td>
<td>81%</td>
</tr>
<tr>
<td>Definitely Would</td>
<td>24%</td>
<td>9%</td>
<td>14%</td>
<td>32%</td>
<td>17%</td>
<td>36%</td>
</tr>
<tr>
<td>Probably Would</td>
<td>36%</td>
<td>20%</td>
<td>30%</td>
<td>51%</td>
<td>26%</td>
<td>45%</td>
</tr>
<tr>
<td>Might or Might Not</td>
<td>19%</td>
<td>29%</td>
<td>27%</td>
<td>11%</td>
<td>31%</td>
<td>8%</td>
</tr>
<tr>
<td>Would Not</td>
<td>20%</td>
<td>42%</td>
<td>29%</td>
<td>5%</td>
<td>26%</td>
<td>10%</td>
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</tbody>
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n=1,004/1,234

W5/W1

W5/W1
<table>
<thead>
<tr>
<th>Likelihood to Participate: TOU Pricing</th>
<th>Status Quo (A)</th>
<th>Technology Cautious (B)</th>
<th>Savings Seekers (C)</th>
<th>Movers and Shakers (D)</th>
<th>Green Champions (E)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Already Participating</td>
<td>2%</td>
<td>2%</td>
<td>1%</td>
<td>1%</td>
<td>1%</td>
</tr>
<tr>
<td>Total Would Participate</td>
<td>44%</td>
<td>32%</td>
<td>49%</td>
<td>49%</td>
<td>53%</td>
</tr>
<tr>
<td>Definitely Would</td>
<td>15%</td>
<td>7%</td>
<td>10%</td>
<td>19%</td>
<td>15%</td>
</tr>
<tr>
<td>Probably Would</td>
<td>29%</td>
<td>25%</td>
<td>24%</td>
<td>34%</td>
<td>32%</td>
</tr>
<tr>
<td>Might or Might Not</td>
<td>28%</td>
<td>28%</td>
<td>27%</td>
<td>23%</td>
<td>30%</td>
</tr>
<tr>
<td>Would Not</td>
<td>26%</td>
<td>38%</td>
<td>37%</td>
<td>23%</td>
<td>16%</td>
</tr>
<tr>
<td>Total</td>
<td>n=1,004/1,234</td>
<td>220</td>
<td>206</td>
<td>201</td>
<td>168</td>
</tr>
</tbody>
</table>
## Demand Response Pricing

<table>
<thead>
<tr>
<th>Total</th>
<th>Status Quo (A)</th>
<th>Technology Cautious (B)</th>
<th>Savings Seekers (C)</th>
<th>Movers and Shakers (D)</th>
<th>Green Champions (E)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>220</td>
<td>206</td>
<td>201</td>
<td>168</td>
<td>209</td>
</tr>
<tr>
<td>n=1,004</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Likelihood to Participate: Demand Response Pricing

- **Already Participating**
  - Total: 2%
  - Status Quo: 1%
  - Technology Cautious: 1%
  - Savings Seekers: 4%
  - Movers and Shakers: 1%
  - Green Champions: 0%

- **Total Would Participate**
  - Total: 39%
  - Status Quo: 21%
  - Technology Cautious: 26%
  - Savings Seekers: 47%
  - Movers and Shakers: 29%
  - Green Champions: 57%

- **Definitely Would**
  - Total: 10%
  - Status Quo: 4%
  - Technology Cautious: 7%
  - Savings Seekers: 11%
  - Movers and Shakers: 9%
  - Green Champions: 16%

- **Probably Would**
  - Total: 29%
  - Status Quo: 17%
  - Technology Cautious: 19%
  - Savings Seekers: 36%
  - Movers and Shakers: 20%
  - Green Champions: 41%

- **Might or Might Not**
  - Total: 22%
  - Status Quo: 25%
  - Technology Cautious: 28%
  - Savings Seekers: 16%
  - Movers and Shakers: 24%
  - Green Champions: 18%

- **Would Not**
  - Total: 38%
  - Status Quo: 53%
  - Technology Cautious: 44%
  - Savings Seekers: 32%
  - Movers and Shakers: 46%
  - Green Champions: 25%
## Critical Peak Pricing

<table>
<thead>
<tr>
<th>Total</th>
<th>Status Quo (A)</th>
<th>Technology Cautious (B)</th>
<th>Savings Seekers (C)</th>
<th>Movers and Shakers (D)</th>
<th>Green Champions (E)</th>
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</thead>
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<td>220</td>
<td>206</td>
<td>201</td>
<td>168</td>
<td>209</td>
</tr>
</tbody>
</table>

### Likelihood to Participate: Critical Peak Pricing

<table>
<thead>
<tr>
<th>Already Participating</th>
<th>1%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Would Participate</td>
<td>24%</td>
</tr>
<tr>
<td>Definitely Would</td>
<td>6%</td>
</tr>
<tr>
<td>Probably Would</td>
<td>18%</td>
</tr>
<tr>
<td>Might or Might Not</td>
<td>23%</td>
</tr>
<tr>
<td>Would Not</td>
<td>52%</td>
</tr>
</tbody>
</table>

- **Already Participating:** 1%
- **Total Would Participate:** 24%
- **Definitely Would:** 6%
- **Probably Would:** 18%
- **Might or Might Not:** 23%
- **Would Not:** 52%
Technology Adoption and Interest

- Smart Appliances: 57% (W5), 53% (W4)
- Electric or Plug-in Hybrid Vehicle: 39% (W5), 43% (W4)
- Programmable Communicating Thermostat: 51% (W5), 53% (W4)
- Home Energy Management: 55% (W5), 60% (W4)
- Photovoltaic System: 62%

Legend:
- Already have (W5)
- Total interest (W5)
- Already have (W4)
- Total interest (W4)
Top Takeaways

1. Citizens are the priority stakeholder

2. Consumers know very little about the smart grid

3. Consumers tell us they care about energy

4. Consumers tell us they want technology and choice

5. Segmentation helps us understand consumers
Smart Grid Consumer Collaborative

Consumer Engagement for the Smart Grid

PATTY DURAND, Executive Director
Patty.Durand@SmartGridCC.org
@PattyDurandSGCC
678-467-0148
The New Energy Crisis:
The Escalating Cost of Electricity and the Growing Number of Customers Who Can’t Pay Their Bills

Elin Swanson Katz, Consumer Counsel
Connecticut Office of Consumer Counsel

“Real Data About Customer Wants and Needs”
Electricity Committee

NARUC Summer Meeting
July 2015
What’s on customers’ minds?

• The rising cost of electricity
• The increasing share of household budgets taken up by energy bills
• How can they reduce their energy bills/electricity usage
Headlines in New England

NPR: “New England Electricity Prices Spike As Gas Pipelines Lag” - November 05, 2014

“Utilities in New England have announced electricity rates hikes on the order of 30 percent to 50 percent, making prices some of the highest in the history of the continental United States.”
Comparison of all sector electric prices (Winter 2015)

<table>
<thead>
<tr>
<th>Region</th>
<th>Price (cents/kWh)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Connecticut</td>
<td>18.44</td>
</tr>
<tr>
<td>New England</td>
<td>17.34</td>
</tr>
<tr>
<td>Mid-Atlantic (NY, NJ, PA)</td>
<td>12.81</td>
</tr>
</tbody>
</table>

(Source: EIA)
The Connecticut Example

- Two regulated electric utilities
  - **Eversource** (formerly Connecticut Light & Power), with 1.2 million customers
  - **United Illuminating**, with 325,000 customers
## The Human Cost of Unaffordable Energy
### Hardship Customers

<table>
<thead>
<tr>
<th></th>
<th>Number of Hardship Customers (2014)</th>
<th>Hardship Customers with Payment Plans</th>
<th>Hardship Customers without Payment Plans, subject to shut-off</th>
<th>Total Delinquent Balance (Rounded)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eversource</td>
<td>90,000</td>
<td>35,000</td>
<td>55,000</td>
<td>$50 million</td>
</tr>
<tr>
<td>United Illuminating</td>
<td>24,000</td>
<td>200</td>
<td>23,800</td>
<td>$38 million</td>
</tr>
</tbody>
</table>

(Source: Eversource/CL&P and UI Annual 16-262c reports to the CGA)
The Connecticut Story: *Non-hardship Customers*

<table>
<thead>
<tr>
<th>Year</th>
<th>Eversource/CL&amp;P Non-hardship Customers making payment arrangements</th>
<th>Delinquency Total (Rounded)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2012</td>
<td>53,869</td>
<td>$15 million</td>
</tr>
<tr>
<td>2013</td>
<td>98,232</td>
<td>$24 million</td>
</tr>
<tr>
<td>2014</td>
<td>218,850</td>
<td>$50 million</td>
</tr>
</tbody>
</table>

(Source: Eversource/CL&P and UI Annual 16-262c reports to the CGA)
The Connecticut Story: United Illuminating

Non-hardship Customers

<table>
<thead>
<tr>
<th>Year</th>
<th>United Illuminating Non-hardship Customers with outstanding balances that were written off</th>
<th>Deliquency Total (Rounded)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2014</td>
<td>54,266</td>
<td>$5.7 million</td>
</tr>
</tbody>
</table>
What does this mean?

• For Eversource, 218,850 non-hardship customers were on payment plans – over 1/6 of their 1.1 million residential customers.

• United Illuminating wrote off the balance of over 54,000 non-hardship customers – over 1/6 of their 300,000 residential customers.
The New Energy Crisis

• Eversource: Hardship Customers + Non-hardship Customers on payment plans = 310,000 customers had significant difficulty paying their bills in 2014 – *one in four* residential customers.

• UI: Hardship Customers + Non-hardship Customers on payment plans = 78,000 customers with payment difficulty – *one in four* residential customers
Connecticut is not alone.

Energy Cost Impacts on American Families, 2001-2014

Energy Costs as Percentage of Nominal After-Tax Household Income

(Source: AmericasPower.org)
The Home Energy Affordability Gap continues to grow....

- The Affordability Gap is currently $5.7 billion dollars in the United States.
  - Some examples of state Affordability Gaps in 2014:
    - CT: $ 799,127,248
    - FL: $2,317,610,164
    - TX: $3,909,597,949
    - WA: $ 356,558,640
    - CA: $2,955,813,901
    - MT: $ 107,246,351

(Source: HomeEnergyAffordabilityGap.com)
My Conclusions

• Reducing energy costs and electric bills is of central importance to many, many consumers.

• The number of consumers facing life-altering problems paying their energy bills is growing.

• There is not enough dialogue around this issue and the human cost of unaffordable energy.

• Any “re-imagining” of the grid must keep affordability for all as a central focus.
Denise Senecal, Market Research Manager, PEPCo
Meeting Customer Needs

Presented by: Denise Senecal, Market Research Manager
July 2015
Pepco Holdings, Inc. Quick Facts

- Incorporated in 2002
- Service territory: 8,340 square miles
- Customers served
  - Atlantic City Electric:
    - 545,000 – electric
  - Delmarva Power:
    - 503,000 – electric
    - 125,000 – natural gas
  - Pepco:
    - 793,000 – electric
- Total population served: 5.6 million
Customers Want a Variety of Channels for Communications and Transactions

- Issue is choices – customers want to have transactions and information available when they need them.
- Preferences may change based on situation
- Examples:
  - Social media: Customers look for information during storms and major outages but don’t interact much for energy efficiency information
  - Communications: customers are split between email and direct mail/bill inserts, but percentages vary on a regional basis
  - High bill season: both calls to call center and visits to budget billing webpage increased dramatically
Use Of Segmentation to Understand Customer Needs

- Segments developed based on surveys related to energy use, interest in saving energy, attitudes towards saving energy, technology use and interest, and media preferences
- Some segments have a higher concentration of older customers
- Two examples in our service territory:
  - In MD, we have a segment of older customers who are less concerned about the environment and more focused on potential cost savings. They have higher income and currently are not focused on energy efficiency, and need to be convinced they can be both comfortable and save energy.
  - In DC, we have a segment of older customers who are interested in saving energy for cost savings, but want more information on the cost/benefits of different steps they can take.
Washington DC Customer Segments

- Interested Mainstream: 21%
- Young Greens: 26%
- New Techies: 18%
- Energy Indifferent: 15%
- Educate Me: 20%

“I like to be on the leading edge of technologies.”

“Energy efficiency just isn’t that important to us.”

“It sounds like these programs would save us money and help the environment.”

“Saving energy could save me money now and be beneficial to our grandchildren.”

“I’m willing to do whatever I can to help the environment.”
Information Can Provide Customers with Greater Control

Regardless of segment, more information gives consumers a better understanding of their energy usage, but they can decide what to do with it.

- Customers want easy access to information during outages:
  - Can report outage via mobile app, online at website, through IVR or via call center and get updated restoration time when available
  - Information received through any of these channels is consistent

- Customer service:
  - New website with updated information
  - Self-service channels can help improve satisfaction – outages and billing

- Customers want programs to help them save energy:
  - Strong desire for more information but many don’t want to sacrifice comfort
  - Confusion over highest impact changes
Customers are going online for transactions and information, but preferences vary

- While Millennials are more likely to use online access, significant proportions of Gen Y and Baby Boomers are using My Account.
- Devices used may be different.

![Bar chart showing website usage and My Account usage across different age groups: 18 to 34 (84% website usage, 74% My Account usage), 35 to 49 (78% website usage, 57% My Account usage), 50 to 68 (60% website usage, 45% My Account usage), 69+ (25% website usage, 16% My Account usage).]
Customers are interested in viewing their energy use data (from the smart meter) in a wide variety of ways.

Preferences for Obtaining Energy Use Information

- Online, at secure website: 67%
- Monthly mailed report comparing to similar home: 64%
- Monthly paper bill: 64%
- Receiving email messages: 62%
- An in-home display similar to thermostat: 59%
- Using smart phone app: 49%
- Receiving text messages: 33%
- Automated phone call: 29%
New Tools Add Value but Need to Increase Awareness

Customers do not necessarily want to view their energy use frequently, but for it to be available when they need it.

Importance of Tool in My Account Usage

- Ability to compare monthly usage to identify spikes in usage: 79%
- Ability to see hourly and daily usage: 78%
- Ability to set goals for reducing energy use and see tips to help meet goals: 71%
- Interactive tools for understanding cost/benefits of upgrading appliances: 69%

Scale of 0 to 10 where 0 means not at all important and 10 means extremely important.
Energy Information Channels

Energy Information Class in partnership with DC Library

Website

Telephone: CSRs or Energy Advisors can go through daily/hourly usage with customers on the phone

Smartphone App

Paper Reports

Introduction to Energy Management.
The DC Public Library and Pepco are working together this summer to present a new class to help you save money on your energy bill. In this class you’ll:

- Get tips to help you save money and energy
- Design a custom energy management plan for your home
- Learn how to use tools on Pepco’s My Account
- Receive a complimentary reusable gift bag with tools to help you save
Preferred information channels also vary based on customer age and regionally.

- Customers who are 18-54 years of age prefer an email.
- Older customers prefer bill inserts or direct mail.
Uncovering What Customers Really Want

Based on our research:

✓ Both qualitative and quantitative research can be critical to understanding consumer tradeoffs and decision-making
  – Consumers sometimes see the equation as comfort vs. cost
  – Education continues to be important

✓ Customer interests and needs vary regionally
  – Terminology
  – Images
  – Channels

✓ All segments don’t want to interact with you in the same way
  – For certain types of transactions, customers prefer the phone

✓ Expectations are changing, but need to focus on the goal - processes may be behind service expectations
  – Customer expectations for instant service with online applications may not be always be met, unless full process changes
Questions?

Contact information:

Denise Senecal
Pepco Holdings

dhsenecal@pepco.com
NARUC
Summer Committee Meetings

Bradley Berson,
American Electric
Power
Real Data About Customer Wants and Needs

NARUC Summer Committee Meetings
New York City - July 13, 2015

Bradley S. Berson, Principal Analyst
Performance Management & Financial Planning
Customer Services, Marketing and Distribution Services
American Electric Power
What Most Impacts Satisfaction?

Key Drivers of Overall Satisfaction

- Reliability/Restoration/Power Quality.
- Price
- Billing/Payment
- Communications
- Customer Service
- Corporate Identity/Citizenship

Sources: Market Strategies International, 2014 AEP Survey Data
J.D. Power 2015 Electric Utility Residential Customer Satisfaction Study
What is Most Important?

“Next, when thinking about the service you receive from AEP, please tell me which one of the following statements is the most important to you as a customer?”

**Residential Customer Survey Data**
- Quickly Restoring Power When Outages Occur: 35.8%
- The Cost of Electricity: 28.4%
- Keeping Power Outages to a Minimum: 23.1%
- Customer Service and Getting Any Questions/Issues Addressed Timely: 7.3%
- Having Options in Paying Your Monthly Bills: 4.1%
- Don’t Know, Refused Answer: 1.3%

**Commercial Customer Survey Data**
- Quickly Restoring Power When Outages Occur: 41.1%
- The Cost of Electricity: 20.6%
- Keeping Power Outages to a Minimum: 26.1%
- Customer Service and Getting Any Questions/Issues Addressed Timely: 10.2%
- Having Options in Paying Your Monthly Bills: 1.2%
- Don’t Know, Refused Answer: 0.8%

*Source: Market Strategies International, 2014 AEP Survey Data*
What Else Do Customers Want?

“What service or services does AEP not currently offer to customers that your (household/business) would like to see them offer in the next five years?” (OPEN ENDED)

### 2014 Residential Customer Survey Data (n=1770)

<table>
<thead>
<tr>
<th>Service/Option</th>
<th>Residential</th>
<th>Commercial</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Don't Know</strong></td>
<td>32.1%</td>
<td>26.0%</td>
</tr>
<tr>
<td><strong>Refused Answer</strong></td>
<td>1.7%</td>
<td>3.5%</td>
</tr>
<tr>
<td><strong>Nothing/None</strong></td>
<td>21.5%</td>
<td>33.7%</td>
</tr>
<tr>
<td><strong>Satisfied As Is</strong></td>
<td>5.6%</td>
<td>5.7%</td>
</tr>
<tr>
<td><strong>Lower Prices/Discounts</strong></td>
<td>12.4%</td>
<td>9.9%</td>
</tr>
<tr>
<td><strong>Improved Reliability/Maintenance</strong></td>
<td>4.9%</td>
<td>3.2%</td>
</tr>
<tr>
<td><strong>Other</strong></td>
<td>3.8%</td>
<td>3.4%</td>
</tr>
<tr>
<td><strong>Renewable/Clean Energy</strong></td>
<td>3.7%</td>
<td>2.6%</td>
</tr>
<tr>
<td><strong>Better Billing/Payment Options</strong></td>
<td>3.1%</td>
<td>2.0%</td>
</tr>
<tr>
<td><strong>Underground Power Lines</strong></td>
<td>2.0%</td>
<td>2.0%</td>
</tr>
<tr>
<td><strong>EE Programs/Usage Info</strong></td>
<td>1.9%</td>
<td>1.5%</td>
</tr>
<tr>
<td><strong>Internet/Cable/Phone</strong></td>
<td>1.7%</td>
<td>0.8%</td>
</tr>
<tr>
<td><strong>Improved Customer Service</strong></td>
<td>1.6%</td>
<td>1.7%</td>
</tr>
<tr>
<td><strong>Better Response Time</strong></td>
<td>1.0%</td>
<td>0.9%</td>
</tr>
<tr>
<td><strong>Offer Natural Gas</strong></td>
<td>1.0%</td>
<td>0.6%</td>
</tr>
<tr>
<td><strong>Smart Meters</strong></td>
<td>0.6%</td>
<td>0.6%</td>
</tr>
<tr>
<td><strong>Better Service</strong></td>
<td>0.5%</td>
<td>0.4%</td>
</tr>
<tr>
<td><strong>Portable Power Generators</strong></td>
<td>0.4%</td>
<td>0.4%</td>
</tr>
<tr>
<td><strong>Local Representatives/Offices</strong></td>
<td>0.4%</td>
<td>0.2%</td>
</tr>
<tr>
<td><strong>More Community Involvement</strong></td>
<td>0.2%</td>
<td>0.0%</td>
</tr>
</tbody>
</table>

### 2014 Commercial Customer Survey Data (n=1038)

<table>
<thead>
<tr>
<th>Service/Option</th>
<th>Residential</th>
<th>Commercial</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Don't Know</strong></td>
<td>32.1%</td>
<td>26.0%</td>
</tr>
<tr>
<td><strong>Refused Answer</strong></td>
<td>1.7%</td>
<td>3.5%</td>
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<tr>
<td><strong>Nothing/None</strong></td>
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<td><strong>Satisfied As Is</strong></td>
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<td><strong>Other</strong></td>
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<td>3.4%</td>
</tr>
<tr>
<td><strong>Renewable/Clean Energy</strong></td>
<td>3.7%</td>
<td>2.6%</td>
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<tr>
<td><strong>Better Billing/Payment Options</strong></td>
<td>3.1%</td>
<td>2.0%</td>
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<tr>
<td><strong>Underground Power Lines</strong></td>
<td>2.0%</td>
<td>2.0%</td>
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<tr>
<td><strong>EE Programs/Usage Info</strong></td>
<td>1.9%</td>
<td>1.5%</td>
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<td>0.8%</td>
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<tr>
<td><strong>Better Response Time</strong></td>
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<td>0.9%</td>
</tr>
<tr>
<td><strong>Offer Natural Gas</strong></td>
<td>1.0%</td>
<td>0.6%</td>
</tr>
<tr>
<td><strong>Smart Meters</strong></td>
<td>0.6%</td>
<td>0.6%</td>
</tr>
<tr>
<td><strong>More Community Involvement</strong></td>
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<td>0.6%</td>
</tr>
<tr>
<td><strong>Better Service</strong></td>
<td>0.4%</td>
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<td>0.2%</td>
<td>0.3%</td>
</tr>
<tr>
<td><strong>Offer Natural Gas</strong></td>
<td>0.0%</td>
<td>0.0%</td>
</tr>
</tbody>
</table>

Preferred Communication Channels

“How would you most prefer that AEP communicate with your (household/business) when you have a question or an issue that needs to be addressed?” (OPEN ENDED)

<table>
<thead>
<tr>
<th>2014 Residential Customer Survey Data (n=2231)</th>
<th>2014 Commercial Customer Survey Data (n=1576)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phone Calls (AEP Cust. Service Rep) 66.6%</td>
<td>Phone Calls (AEP Cust. Service Rep) 68.6%</td>
</tr>
<tr>
<td>Email 10.5%</td>
<td>Email 16.4%</td>
</tr>
<tr>
<td>Regular Mail 9.5%</td>
<td>Regular Mail 6.0%</td>
</tr>
<tr>
<td>Phone Calls (Interactive Response) 3.1%</td>
<td>Phone Calls (Interactive Response) 2.2%</td>
</tr>
<tr>
<td>Phone Calls (Recorded Messages) 2.4%</td>
<td>In Person 1.7%</td>
</tr>
<tr>
<td>Bill Inserts 2.2%</td>
<td>Don’t Know, Refused Answer 1.5%</td>
</tr>
<tr>
<td>Don’t Know, Refused Answer 2.2%</td>
<td>Phone Calls (Recorded Messages) 1.3%</td>
</tr>
<tr>
<td>In Person 1.6%</td>
<td>Bill Inserts 0.9%</td>
</tr>
<tr>
<td>Text Message 0.9%</td>
<td>Another Way 0.4%</td>
</tr>
<tr>
<td>AEP’s Website 0.5%</td>
<td>Text Message 0.3%</td>
</tr>
<tr>
<td>Another Way 0.3%</td>
<td>AEP’s Website 0.3%</td>
</tr>
<tr>
<td>Social Media Sites 0.2%</td>
<td>Social Media Sites 0.3%</td>
</tr>
<tr>
<td>Smartphone App 0.1%</td>
<td>Smartphone App 0.1%</td>
</tr>
<tr>
<td>Prefer No Communications At All 0.1%</td>
<td>Prefer No Communications At All 0.1%</td>
</tr>
</tbody>
</table>

Importance of Outage Communications

“How important is it for you to receive information from AEP such as informing you of approaching storms, communicating with you during power outages about the cause and expected length of the outage, and letting you know when power has been restored? Would you say it is…”

![Residential Customer Survey Data](n=1323)

- 3.8% Total Unimportant
- 0.3% Don’t Know, Refused Answer
- 1.8% Very Unimportant
- 2.0% Somewhat Unimportant
- 4.2% Neither Important nor Unimportant
- 19.5% Somewhat Important
- 72.2% Very Important
- 91.7% Total Important

![Commercial Customer Survey Data](n=990)

- 3.3% Total Unimportant
- 0.4% Don’t Know, Refused Answer
- 1.5% Very Unimportant
- 1.8% Somewhat Unimportant
- 2.9% Neither Important nor Unimportant
- 19.1% Somewhat Important
- 74.2% Very Important
- 93.3% Total Important

*Source: Market Strategies International, 2014 AEP Survey Data*
Preferred Outage Communication Channels

“What would be your (household/business)'s preferred method for receiving those types of weather and outage-related communications from AEP?” (OPEN ENDED)

Residential Customer Survey Data

- Live Phone Calls with an AEP Representative: 35.0%
- Radio News: 17.3%
- TV News: 13.5%
- Automated Phone Calls from AEP: 12.9%
- Text Message Alerts from AEP*: 5.4%
- Email from AEP: 4.5%

(n=1323)

*Text Msg Alerts from AEP
Gen X (1965-1980): 26.7%
Gen Y (1981-2000): 30.8%

Commercial Customer Survey Data

- Live Phone Calls with an AEP Representative: 29.0%
- Automated Phone Calls from AEP: 17.8%
- Text Message Alerts from AEP*: 14.1%
- TV News: 4.9%
- Email from AEP: 16.5%
- Radio News: 3.6%

(n=990)

Other Mentions: AEP’s Website (Personal or Tablet Computer), Social Media, Mail, Other, None, Don’t Know

Impact of Outage Communication Channels

“Now we would like you to think specifically about the most recent outage you experienced. Which sources did you rely on to get information about your most recent outage?”

<table>
<thead>
<tr>
<th>Source</th>
<th>Percentage</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Utility emailed</td>
<td>1%</td>
<td>769</td>
</tr>
<tr>
<td>Utility social media site</td>
<td>1%</td>
<td>759</td>
</tr>
<tr>
<td>Utility sent text message</td>
<td>2%</td>
<td>742</td>
</tr>
<tr>
<td>Utility called</td>
<td>4%</td>
<td>737</td>
</tr>
<tr>
<td>Emailed utility</td>
<td>1%</td>
<td>729</td>
</tr>
<tr>
<td>Outage map via utility website</td>
<td>3%</td>
<td>692</td>
</tr>
<tr>
<td>Went to utility website</td>
<td>7%</td>
<td>685</td>
</tr>
<tr>
<td>Utility work crew</td>
<td>3%</td>
<td>682</td>
</tr>
<tr>
<td>Mobile/smartphone application</td>
<td>4%</td>
<td>682</td>
</tr>
<tr>
<td>Radio/TV</td>
<td>5%</td>
<td>689</td>
</tr>
<tr>
<td>Other</td>
<td>3%</td>
<td>666</td>
</tr>
<tr>
<td>None - did not get any outage information</td>
<td>46%</td>
<td>659</td>
</tr>
<tr>
<td>Nearby neighbor</td>
<td>9%</td>
<td>647</td>
</tr>
<tr>
<td>Called utility</td>
<td>34%</td>
<td>647</td>
</tr>
</tbody>
</table>

Source: J.D. Power 2014 Electric Utility Residential Customer Satisfaction Study
Interest in Outage Alerts

“If AEP was to offer customers mobile alerts, how interested would you be to sign up to receive these types of messages? Would you say you would be...?”

Residential Customer Survey Data

Don't Know, Refused Answer: 1.7%
Not At All Interested: 17.6%
Not Very Interested: 8.3%
Neither Interested nor Uninterested: 3.8%
Somewhat Interested: 29.9%
Very Interested: 38.7%
Total Interested*: 68.6%

*Interest in Mobile Alerts
Gen X (1965-1980): 81.7%
Gen Y (1981-2000): 80.2%

Commercial Customer Survey Data

Don't Know, Refused Answer: 0.9%
Not At All Interested: 12.2%
Not Very Interested: 6.3%
Neither Interested nor Uninterested: 3.9%
Somewhat Interested: 34.4%
Very Interested: 42.3%
Total Interested: 76.7%

Future Customer Expectations

Customer Wants:  
• Consistency  
• Convenience  
• Personalization  
• Collaboration  
• Flexibility/Agility

Utility Offerings Should Have:  
• Benefit/Value to the Consumer  
• Customer Control  
• Timely Data Availability  
• Proactive Communications  
• Upping the Value Proposition  
• Benefit/Value to the Utility

Actionable Insights for the New Energy Consumer: Accenture End-Consumer Observatory 2012
“Some people say “Give the customers what they want.” But that’s not my approach. Our job is to figure out what they’re going to want before they do. I think Henry Ford once said “If I’d asked customers what they wanted, they would have said ‘A faster horse!’” People don’t know what they want until you show it to them.”

Steve Jobs, Apple