Moving Towards the Integrated Home
Connected, Interactive, Interoperative, AND Efficient

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Agenda

- Overview of the Shifting Program Landscape
  - Alice Rosenberg, Consortium for Energy Efficiency

- Southern Company – Snapshot and Goals
  - Jim Leverette, Southern Company

- Georgia Power Smart Neighborhood - Altus at the Quarter
  - Tim Carter, Georgia Power

- Alabama Power Smart Neighborhood – Reynolds Landing
  - Shon Richey, Alabama Power

- Q&A and Discussion
The Shifting Voluntary Program Landscape
CEE MISSION

As the Consortium for Energy Efficiency, United States and Canadian efficiency program administrators develop cutting-edge strategies to accelerate commercialization of energy efficient solutions to benefit gas and electric customers, utility systems, and the environment.

- CEE brings together 100 program administrators serving all or part of 45 states and 7 provinces.
- CEE is a member-driven nonprofit, governed by a Board of Directors from member organizations.
- Program administrators formed CEE to reach binational markets and accelerate market uptake of efficient products and services, which achieves lasting public benefit of energy efficiency.

<table>
<thead>
<tr>
<th>Year</th>
<th>ELECTRIC</th>
<th>GAS</th>
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<tbody>
<tr>
<td>2012</td>
<td>$8.0</td>
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<td>2013</td>
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<td>2014</td>
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<td>2015</td>
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<td>2016</td>
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https://www.cee1.org/annual-industry-reports
“In 2016 US electric demand response (DR) expenditures totaled **over $900 million** from ratepayer funded sources only”

Source: CEE 2017 State of the Efficiency Program Industry
the EVOLUTION of ENERGY

NEXT 25 YEARS

First power plants
Nuclear and hydro scale up
Installation of scrubbers on some older units
Increase in renewables (wind and solar)
Increase in natural gas combined-cycle generation

1890 – 1920s
Cities and homes lit by electricity
Electric appliances becoming commonplace
More reliable service

1950s
Rates remain stable, cleaner air

1970s – 1980s
Natural gas shortage contributed to higher energy prices
Greater awareness of energy conservation measures

2000s – present
Environmental stewardship and energy conservation became mainstream
Reduction in air emissions: sulfur dioxide about 90%; nitrogen oxides about 80%

Battery storage
Interoperability
EVs
Power plants
Excess power sales
Plug and play
Digital platform
Fast charging
Energy Ecosystem
Grid balancing
Smart appliances
Fiber networks
Microgrids
Wind
Low-cost batteries
Hourly forecasts
Grid standards
Internet of Things

DUKE ENERGY
Some Dynamics Utilities Face

Declining Electric Load Growth

- Energy efficiency and conservation have become a part of the general culture
- Growth of customer self-generation

Need for Increased Investment

- Customer desire greater reliability/resiliency (post Superstorm Sandy, etc.)
- General aging infrastructure
- Usage control technologies (Smart Grid)
- Cybersecurity

Disruptive Technologies

- Greater Distributed Generation
- Battery storage evolving and being piloted
- Electric vehicle penetration is increasing

Utilities are challenged under the existing regulatory model

Grid Quality Credit Quality

Historical & Forecasted Electricity Growth

Historical & Forecasted Electricity Growth
Utility of the Future: In Concept

Potential Benefits of Connected

- Grid balancing and load management
- Program M&V data
- Enhanced customer engagement
- Ancillary services
- New Integrated DSM program offerings
- Non-energy benefits: remote control, enhanced comfort, health/wellness
- Financial savings from new EE and DR opportunities
- Air quality/carbon
The Integrated Home as a DER

- Energy efficiency
- Load management, demand response
- Energy storage
- Integration of renewables
Defining Characteristics

- Portfolio of residential initiatives that can be bundled together to deliver energy efficiency, load management, and behavioral customer benefits beyond those that can be achieved individually.

- These connected technologies and communicating capabilities have the potential to optimize the performance of the home through individual products and systems and drive improved energy management.
Integrated Home Platform

PRODUCTS
- Central HVAC Appliances
- Water Heating
- Pool Pumps
- Lighting

CAPABILITY
- Compatibility
- Data Exchange
- Consumer Engagement

BENEFITS
- Personalized Information
- Optimized Performance
- Customer Satisfaction

Energy Efficiency
+ Load Management
+ Behavior Change
Potential Program Application

Integrated Home Platform

PRODUCTS

CAPABILITY

BENEFITS

Energy Efficient and Connected Specifications

Demand Response
- Direct Load Control
- Behavioral Price Signals or Messages

Energy Efficiency + Load Management + Behavior Change

Energy Management Dashboards
- Consumer Engagement
Fundamental Components

► Cyber Security and Privacy Concerns
  • Minimum features

► Connectivity and Multiple Pathways
  • Interoperability across products and manufacturers
  • Locational, direct line of site

► Assurance of Desired Amenities
  • Third party certification; laboratory ratings or other

► Data Exchange Capabilities
  • Secure provision of minimal information required

► Enablement of Innovation and Flexibility
  • Cost-effective solutions that meet customer needs
Scope

Services, hardware, or software that serves to optimize overall energy use of a home

Fuel types that delivers these objectives, including:
- Electric
- Natural Gas
- Other

Application levels that can achieve these benefits:
- Product
- System
- Whole House
Consensus Principles of Connected

Contingent upon **individual measures working together** effectively to enable potential benefits

Provides possibilities for **enhanced consumer engagement and EM&V**

Relies on **interoperability and interactive effects** between products and systems
Opportunities for the Consumer

Non-energy impacts and amenities
- Health
- Security
- Comfort
- Entertainment
- Safety
- Environment

Money saving potential

Control of personal products and data

Voice control features and capabilities
Opportunities for Manufacturers

Higher margin for connected products
  • Added value to consumers for connected features
  • Potentially greater volume of sales

Long-term engagement with customers
  • Ability to offer additional services to the customer

Enhanced product design cycles
  • Diagnostics and remote maintenance
  • Informing features for future improvements
Opportunities for Programs

▲ New grid balancing and benefit capabilities
  • Ability to leverage locational and time dependent valuation

▲ Enhancement of evaluation and verification
  • Access to enhanced, real-time energy usage
  • Greater disaggregation of data at interval levels

▲ Incorporation of behavior change and savings
  • Application of, and credit for, behavioral tools and insights that leverage connected capabilities

▲ Customization and targeting capacities
  • Ability to personalize homeowner recommendations
  • Access to diagnostic and maintenance
CEE New Construction Initiative

Specification Components

• Establish performance-based tiers that reference the ANSI/RESNET/ICC 301-2014 Energy Rating Index

• Include minimum quality assurance for all tiers

• Offer optional features and elements that members may adopt where relevant:
  1. Nonenergy Benefits/Building Science
  2. Renewables
  3. Connectivity
  4. Minimum Prescriptive Requirements
3. Connectivity

Members may determine that there is merit to promoting connected requirements for a variety of potential grid, program, and customer benefits. Connected capabilities have the potential to achieve increased efficiency gains, optimize equipment and building performance, add market value to the home, enable greater consumer engagement and amenity, and enable load management opportunities such as demand response, energy storage, and peak load shifting. For programs interested and able to include connected requirements in their offerings, CEE offers the following two strategies for consideration:

- Any products or equipment installed in the house meet the connected requirements outlined in the respective ENERGY STAR or CEE specifications, where available.
- CEE connected criteria advocate for multiple pathways to connect, including a direct, on-premise open standards connection option to ensure consumers realize benefits.
Contact

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Additional Slides
Fundamental Elements
2017 Program Summary Results

Number of CEE Members

CEE New Homes Program Summary
2017 Program Summary Results

Additional Components of Programs

- **Nonenergy Considerations**
- **Multifamily Program**
- **Connectivity**
- **Renewables**
- **Manufactured Homes**
- **Water Efficiency**

Graph showing comparisons between 2016 and 2017 for each component.
Common Themes

- **Rising Codes, Baselines, and Savings Goals**

- **Move Towards Zero Net Energy**
  - Definitions vary, gas vs. electric
  - Efficiency, then renewables

- **Tiered Incentive Structures**
  - Multiple offerings and levels
  - Pathways to Zero Net Energy
  - Performance-based programs

- **Statewide Coordination**
  - Connecticut, Massachusetts, California, New Jersey
  - Gas and electric partnerships
Emerging Trends

Connectivity and Smart
- Smart meters and smart thermostats
- Integrated demand side management

Engagement with Real Estate Industry
- Relations with lenders, mortgagers, realtors, appraisers
- Trainings, education, tradeshows, meetings
- Green Addendum, MLS

Emphasis on Nonenergy Features
- Air quality, health, durability, etc.
- Quantifiable and marketable
A Growing and Evolving Market

Internet of Things Connected Devices Installed Worldwide from 2015 to 2025 (in billions)

Source: Statista, June 2018
Voice Control as a User Interface

Another means through which consumers can interact and engage with their homes

• Projected 1 billion devices in homes by 2021\textsuperscript{1}
• Interface is promising, though still nascent
• Players in the market:
  – Amazon
  – Google
  – Apple
  – Iris
  – Microsoft
  – Athom
  – Intel
  – Insteon
  – Alarm.com
  – Vivint
  – Comcast
  – Device manufacturers

\textsuperscript{1, 2} Parks Associates
Stakeholders in a Complex Space

- Niche players form creative new value propositions
- Diverse offerings across a broad residential suite