

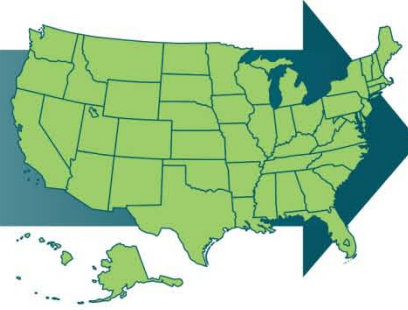


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STATE ENERGY EFFICIENCY ACTION NETWORK

# Customer Information and Behavior (CIB) Working Group Blueprint

May 5, 2011



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The Customer Information and Behavior Working Group of the State Energy Efficiency Action Network is committed to taking action to increase investment in cost-effective energy efficiency. This Blueprint was developed under the guidance of and with input from the Working Group. The document does not necessarily represent an endorsement by the individuals or organizations of Customer Information and Behavior Working Group members.

The Customer Information and Behavior Working Group Blueprint is a product of the State Energy Efficiency Action Network and does not reflect the views, policies, or otherwise of the federal government.

If this document is referenced, it should be cited as: State Energy Efficiency Action Network (2011). Customer Information and Behavior Working Group Blueprint. [www.seeaction.energy.gov](http://www.seeaction.energy.gov)

# Outline

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- SEE Action Introduction
- Overview
- Goals and Priority Actions
- Work Plan
- Current Status of Research, Industry & Policy



# SEE ACTION INTRODUCTION



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# Today's Challenges

- **Challenges**
  - Energy: Rising price of electricity, dependence on imported oil, cost of compliance with environmental regulations
  - Environmental: Need to reduce emissions, protect sensitive water bodies
  - Economic: Need to create jobs, need to reduce price of energy
- **Energy Efficiency is critical piece of solution**
  - Energy: Diversifies energy mix, lowest-cost resource reduces demand
  - Environmental: Zero emissions
  - Economic: Creates jobs (implement efficiency programs)



# Where We Are Today

- Increasing levels of investment in energy efficiency , but not sufficient to achieve all cost-effective efficiency
- Wide range of state policies
- Now is the time to capitalize on the investments in energy efficiency from ARRA and ensure the benefits from these efforts are sustained
- Many well-documented barriers preventing the capture of efficiency benefits – policy, regulatory, customer, market, program



# State Energy Efficiency Action Network

- State Energy Efficiency Action Network (SEE Action) is a federal-state-local effort to assist state & local governments in:
  - Advancing efficiency policies and programs
  - Removing barriers and disincentives to realizing energy savings through efficiency
  - Growing state-level investments in cost-effective efficiency
- Goal: To help the nation achieve all cost-effective energy efficiency by 2020 through assisting state and local governments in their implementation of energy efficiency policies and programs
- Executive Group
  - Provides visionary leadership, strategic direction , and prioritization
  - Approx. 30 members, representing diverse stakeholders, including state policy makers, business leaders, utilities, NGOs, associations
  - Facilitated & co-chaired by DOE and EPA



# Working Groups

- Eight issue-oriented Working Groups to drive investment in efficiency
- Represent all areas of the economy and infrastructure that can increase energy efficiency
- Chaired by state and local leaders
- Advance consistent approaches, best practices and considerations / recommendations
- Develop Blueprints to chart the course for achieving near- and long-term aggressive goals
- Use Blueprints to guide implementation efforts so stakeholders can work together, given their roles & responsibilities





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# CUSTOMER INFORMATION & BEHAVIOR WORKING GROUP OVERVIEW



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# Working Group Members

- Two co-chairs
- 14 Members
  - State and local government
  - Academia/researchers
  - Non-government organization
  - Coordinating organizations

<b>Co-Chairs</b>	
Vaughn Clark	Office of Community Development, Oklahoma Department of Commerce
Phyllis Reha	Minnesota Public Utilities Commission
<b>State &amp; Local Government</b>	
John Cole	Hawaii Public Utilities Commission
Patrick Hays	Mayor; North Little Rock, Arkansas
Janine Midgen Ostrander	Ohio Consumers' Counsel
<b>Industry</b>	
Cameron Brooks	Tendril Networks
Mat McCaffree	OPOWER
<b>Academia/Researchers</b>	
Linda Schuck	University of California, California Institute for Energy and Environment
<b>Non-Government Organizations</b>	
Skip Laitner	ACEEE
Dylan Sullivan	Natural Resources Defense Council
Elizabeth Titus	NEEP
Ed Wisniewski	CEE
<b>Coordinating Organizations</b>	
Miles Keogh	NARUC
Mary Ann Ralls	National Rural Electric Cooperative Association
Devashree Saha	National Governors Association
Lisa Wood	IEE



# The Premise

The right information, presented in the right way, will lead people to choose behaviors that will reduce their energy consumption.



# Large Potential for Savings

Feedback programs could provide the equivalent of 100 billion kWh of residential electricity savings annually by 2030.

(ACEEE study by *Laitner and Ehrhardt-Martinez, 2009*)

- Equivalent to 6% of total residential consumption by 2030.
- This is in addition to the estimate in the McKinsey study, which estimates residential electricity savings from capital investments of 26% by 2020.

Initial studies show that In-Home Displays providing direct feedback led to an average of 7 percent energy savings.\*

(The Impact of Informational Feedback on Energy Consumption - A Survey of the Experimental Evidence, *Ahmad Faruqui, Sanem Sergici and Ahmed Sharif, 2009*)

\*Further research is needed to validate the magnitude and the persistence of the findings in these initial studies.



# Working Group Purpose and Scope

Assist state and local governments in advancing the use of energy information and feedback to change residential energy consumption behavior and achieve deeper energy and emissions savings.

## Focus:

- Residential energy efficiency programs that target behavior changes, and data needs and privacy rules to support the programs.
- Incorporating behavioral science research into energy efficiency program design.

## Future issues:

- Commercial and industrial sectors, non-electric sectors.
- Energy efficiency opportunities enabled by dynamic pricing and Smart Grid.

## Related Issues:

- Cyber-security
- Customer Data Standards and Interoperability
  - Though the CIB will not develop standards in these areas, they are integral to the long-term goal of creating an environment of innovation in energy information feedback.



# Key Terms and Definitions

## Information and Behavior-Based Energy Efficiency Strategies

**Education and Outreach** provides consumers with energy efficiency information independent of their own energy use.

**Feedback** provides consumers with specific and personalized information about their energy use.

**Indirect Feedback** provides energy use information after some time interval has passed.

**Direct Feedback** provides energy use information in real-time.

## Behavior-based Approaches & Energy Feedback

**Community focus** engages with customers through their community affiliation, often by creating a sense of team effort toward a common goal


**Peer/comparative focus** compares household energy use information against “peers” or other households with similar characteristics.

**Household focus** provides information about a specific home’s energy use, often with custom efficiency advice & disaggregated data



# Types of Behavior Changes

	<b>Investment</b> One-time changes, purchase-oriented, or non- repetitive actions	<b>Habitual</b> Recurring, repetitive, or frequent actions
<b>Low/No-cost</b>	<ul style="list-style-type: none"> <li>- Lighting</li> <li>- Weather stripping</li> <li>- Caulking</li> </ul>	<ul style="list-style-type: none"> <li>- Turn off lights and equipment when not in use</li> <li>- Cold water clothes wash</li> </ul>
<b>Higher-cost</b>	<ul style="list-style-type: none"> <li>- Efficient HVAC and appliances</li> <li>- Whole-house retrofit</li> </ul>	<ul style="list-style-type: none"> <li>- Sensors</li> <li>- Home automation</li> </ul>

 Designates behavior focus areas of the CIB Working Group





# Better Information and Feedback Helps Remove Barriers to Efficiency Investments

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- By helping customers take the first steps to motivate/encourage future actions.
- By increasing certainty of savings from efficiency investments or conservation practices.
- By providing details on energy consumption patterns and the best options to achieve savings.
- By supporting changes in energy use habits.
- By increasing knowledge of specific energy savings opportunities.



# GOALS AND PRIORITY ACTIONS



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# 2020 Goal

- By 2020, reduce residential electricity consumption by 4% by increasing customer awareness of energy use.
- This would save approximately 5 billion kWh of electricity in 2020.
- This goal is roughly equivalent to:
  - 75% of all U.S. households receive comparative home energy reports (resulting in 2% household-level savings); and
  - 30% of all U.S. households have cost-effective direct feedback on energy consumption, including the use of in-home displays, web portals, smart phone applications, etc.



# CIB Working Group Goals

## Year One

**Build expertise on the potential energy savings available from programs that target residential consumer behavior changes by:**

- Providing tools and resources for regulators and policymakers about data issues associated with energy efficiency.
- Supporting the development of uniform methods to measure energy savings from energy efficiency programs targeting behavior changes.

## Medium-Term (2-3 years)

- 20 million U.S. residential households participate in an on-going energy use information feedback program (roughly 2-4 million today).



# Key Goals Identified in 3 Areas

## 1. Data Access

- Utilities/program administrators/third parties share energy information as appropriate to maximize energy efficient behaviors by customers, while maintaining data security and privacy.
- Recognize the role that data has in stimulating innovation and facilitating research while balancing customer privacy and other concerns.

## 2. Program Design

- Consumers reduce energy consumption and pollution by having access to timely, useful, and actionable information.
- EE program administrators and policymakers use energy efficiency programs targeted at behavior changes to supplement traditional energy efficiency programs.

## 3. Evaluation, Measurement & Verification (EM&V)

- Policy makers have access to fact-based, policy neutral information on best practices and policy options for evaluating energy feedback programs.
- Energy feedback savings are evaluated, measured and verified in an accurate, timely, comparable/consistent and affordable way.



# Priority Solutions and Actions to Achieve the Goal

By 2020, reduce residential electricity consumption by 4% by increasing customer awareness of energy use.

## Three Major Work Areas

### Data Access

1. Assistance for Regulators and Policymakers
2. Appropriate Access to Utility Data
3. Data Security and Communications Standards
4. Access to Federal Energy Data

### Program Design

#### Priority Solution Areas

1. Scale-Up Pilots
2. Outreach to Improve the Understanding of Programs Targeting Behavior Changes
3. Provide Information to Decision-makers
4. Highlight Model Programs
5. Support Additional Research

### Measuring Savings

1. Smart Grid Consumer Behavior Studies
2. Cost-Effectiveness of Behavior Programs
3. Methods for Measuring Savings
4. Validate Experimental Design and Other Existing Methods
5. Examine Persistence of Savings



# CIB WORKING GROUP WORK PLAN



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# Sub-Goal: Data Access

## Customer Information and Behavior

Work Plan	Schedule	Lead Stakeholder
<p>Build expertise by developing a regulators guide to address data access issues for energy efficiency. Distribute the guide to regulators and other appropriate stakeholders. Assess revisions and updates to the guide as outreach is completed.</p>	<ul style="list-style-type: none"> <li>• By Sept., publish guide</li> <li>• Conduct outreach for 1 year</li> <li>• Begin assessment of updates 1 year later</li> </ul>	<p>SEE Action members in conjunction with key stakeholders</p>
<p>To improve program design, innovation, and deployment develop guidance on third-party access to utility data.</p> <ul style="list-style-type: none"> <li>• Collect existing information on requirements to make data available to third parties.</li> <li>• Convene inter-agency group to develop a work plan to address requirements to make data available (non-disclosure, certifications etc.) to third parties.</li> <li>• Write a report on options to make data accessible, in consultation with key stakeholders.</li> </ul>	<ul style="list-style-type: none"> <li>• By June, basic research and materials collection will be complete.</li> <li>• By Aug., DOE will convene an inter-agency meeting.</li> <li>• Report to be complete by March, 2012.</li> </ul>	<p>DOE lead collaboration with other Federal agencies and stakeholders</p>
<p>Fully capitalize on the benefits of smart grid and stimulate further innovation by developing standards for uniform and interoperable communications systems and standards for the cyber security of the communications protocols. <i>*National Institute of Standards and Technology (NIST)</i></p>	<ul style="list-style-type: none"> <li>• Ongoing. NIST has recommended standards to FERC for adoption as regulations.</li> </ul>	<p>NIST/ International Electro-technical Commission/ FERC</p>
<p>Spur new research and innovation that can occur through data access:</p> <ul style="list-style-type: none"> <li>• Determine third-party options for access to Federal energy data to enable better program design (e.g. Residential Energy Consumption Survey Data).</li> <li>• Identify all related data that DOE holds.</li> <li>• Identify candidates to be the first to make their data accessible.</li> <li>• Work with researchers and other stakeholders to identify necessary data fields.</li> </ul>	<ul style="list-style-type: none"> <li>• DOE convenes initial meeting by May 1 of all offices that hold data.</li> <li>• By Oct., determine a data set to start with</li> </ul>	<p>DOE</p>



# Sub-Goal: Program Design

## Customer Information and Behavior

Work Plan	Schedule	Lead Stakeholder
Be a catalyst for improved programs and validation of energy savings by initiating scaled-up utility pilots on feedback programs and other information based programs that seek to reduce residential energy consumption.	Reach out to 6 utilities by September. Identify 2-3 potential pilots and evaluate design options by December 2011.	Program administrators, utilities, states
To improve program design, Working Group will conduct webinars and outreach on new information developed by SEE Action and on other study, pilot and program results.	Ongoing. Up to 4 webinars by March 2012.	Working Group
Provide information to key program decision makers by creating a web clearinghouse on customer information and behavior-related studies, papers, and research. Stakeholders access to key information is essential to improve programs.	Identify host stakeholder by September 2011.	Working Group with a key stakeholder
Raise awareness about best practices and programs via outreach efforts to spread awareness of customer information and behavior successes, e.g. through awards programs. Raising the profile of the best programs will draw other programs to adopt best practices.	By June 1, develop a framework and propose to BECC	Working Group with a key stakeholder
Enable better program design by incorporating consumer behavior research into DOE programs – start with identifying potential EERE programs. Work with Program Manager and grant recipients to develop a program design.	By July 15, identify 3 candidate EERE programs to test consumer behavior	DOE-EERE



# Sub-Goal: Measuring Savings

## Customer Information and Behavior

Work Plan	Priority	Stakeholder
<p>Leverage the information and lessons learned from Smart Grid Investment Grant program. Through this program DOE is supporting roughly 10 consumer behavior studies that will look at behavior in conjunction with varying technology and pricing programs.</p>	<p>Results delivered in 2012-2013.</p>	<p>DOE Smart Grid Investment Grant Program</p>
<p>Demonstrate the benefits of feedback programs:</p> <ul style="list-style-type: none"> <li>• Develop a guide on evaluating the cost-effectiveness of feedback/information programs.</li> <li>• Work with NARUC and other stakeholders to develop and disseminate.</li> </ul>	<p>Guide to be completed by March 2012; sequenced with other work products.</p>	<p>Working Group</p>
<p>Support the development of EM&amp;V protocols for behavior-based programs, such as a standardized experimental design, that allow energy savings to be measured and compared across programs.</p> <ul style="list-style-type: none"> <li>• Validate different methods to measure savings from feedback programs, then draft &amp; disseminate a paper to key stakeholders so they have a resource to guide their assessment of these programs.</li> <li>• Commission a report to examine the persistence of savings from feedback programs and behavior changes.</li> </ul>	<ul style="list-style-type: none"> <li>• First documents to be complete by December 2011</li> <li>• Persistence report in March 2012</li> <li>• 6 months of outreach by Working Group</li> </ul>	<p>Working Group with key stakeholders</p>



# CIB Working Group Priority Work

## Data Access

- A regulator's guide on energy efficiency and data access.

## Program Design

- Identify opportunities to incorporate behavior research into DOE programs/research.

## Evaluation, Measurement & Verification

- A guide on methods to measure savings from energy efficiency programs targeted at behavior changes.
- Validate the use of experimental design to measure savings.
- Analysis of the persistence of savings from feedback programs.



# CIB Working Group Next Steps

- Select contractor/consultant to produce the first deliverable: A regulator's guide on energy efficiency and data access.
- To work on Federal data access and incorporating behavioral research into DOE programs, DOE will form internal teams and report back to Working Group on progress.
- Develop scopes of work for reports on:
  - The persistence of savings
  - Methods to measure savings
  - Validity of experimental design to measure savings
- To work on requirements for third-party access to utility data, DOE will form an inter-agency team and report back to Working Group on progress.



# APPENDIX: CURRENT STATUS OF RESEARCH, INDUSTRY & POLICY



# Key Research on Energy Feedback

- ACEEE study on AMI Laitner and Ehrdardt-Martinez (2009):
  - Feedback programs could provide the equivalent of 100 billion kWh of residential electricity savings annually by 2030.
    - Equivalent to 6% of total residential consumption by 2030.
    - This is in addition to the estimate in the McKinsey study, which estimates residential electricity savings from capital investments of 26% by 2020.
- Carroll, E. et al (2009). “Residential Energy Use Behavioral Change Pilot,” prepared by Franklin Energy for the Minnesota Department of Commerce, Office of Energy Security.
- ACEEE Summer Study 2010 Conference Proceedings
- Behavior, Energy and Climate Change Conference Proceedings

## EM&V

- EPRI Report No. 1020855, Neenan and Robinson (2010): Guidelines for Designing Effective Energy Information Feedback Pilots: Research Protocols”



# Current Status of the Customer Information and Behavior Industry

- More than 16 companies currently exist to offer feedback tools to customers, several at start-up phase.
- Utility administered programs:
  - Utility-based pilot programs (OPOWER) show savings ~2-4% for all customers
  - Some utilities plan to use smart meters to enhance comparative feedback information (e.g., AEP Ohio).

Last 3 Months Neighbor Comparison | You used **32% MORE** than your efficient neighbors.



\* kWh: A 100-Watt bulb burning for 10 hours uses 1 kilowatt-hour.

HOW YOU'RE DOING:

GREAT 😊 😊  
 GOOD 😊  
 MORE THAN AVERAGE

**Track energy over time**  
See how much energy you have used by the day, week or month.

**Always on power**  
The darker shaded portion of the graph shows power that is always on, such as any appliance that goes on standby mode. Many appliances are always on; you just don't know it. Discovering these is one of the easiest and fastest ways to reduce energy use and save money.

**Predict your costs**  
Google PowerMeter helps you to predict your annual energy bill so that you can start making changes and saving early.

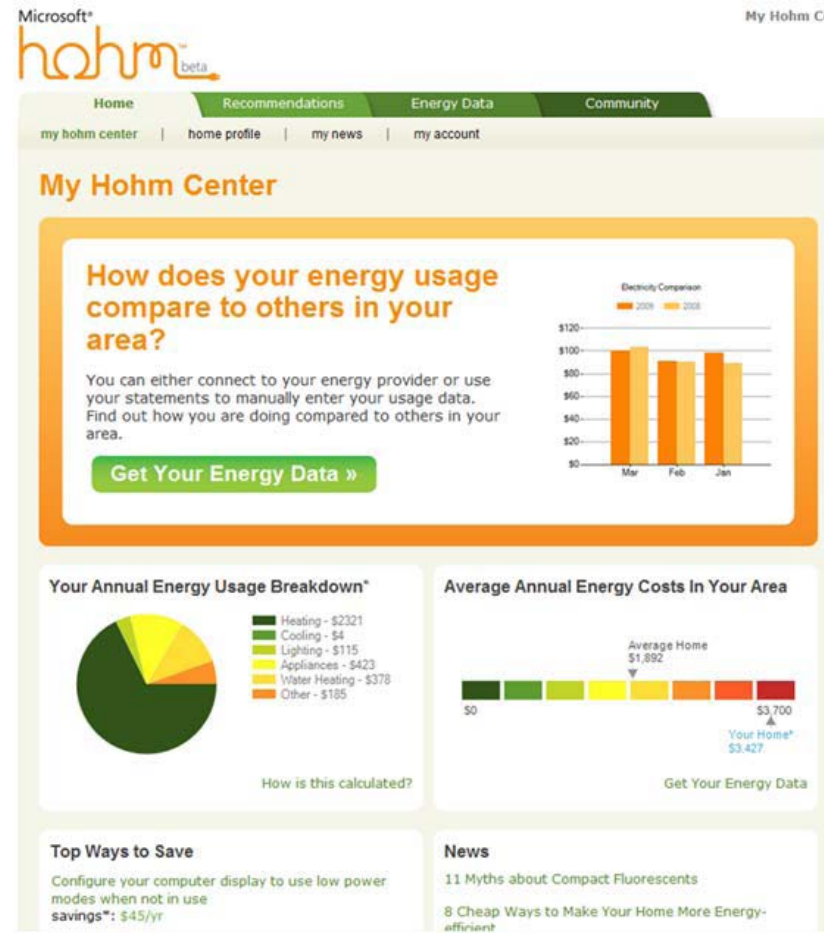
**Budget Tracker**  
Set an energy savings goal for yourself and track your progress.

**Compared to past usage**  
6% under Thursday's energy budget  
 night 7.4 kWh used, morning 3.2 kWh used, afternoon 3.9 kWh used, evening 1.8 kWh used, 8.6 kWh expected



# Current Status of the Customer Information and Behavior Industry

- Social marketing and education
  - Online tools use goal-setting, rewards, community pride/social norms to induce energy savings.
  - Some communities and local governments have set energy savings targets—seek to generate local “buzz” and community pride in energy efficiency.
  - Integrates indirect feedback for better education, outreach, and marketing of energy efficiency opportunities.
  - Less information currently available about impacts/efficacy of these efforts.





# Current Status of Energy Feedback Industry

	Common Feedback Approaches	Type of Feedback and Duration	Companies in the Market
<b>Administered Feedback Programs</b>	Peer/comparative focus and household focus	Indirect Feedback provided on an ongoing basis	OPower, Efficiency2.0
<b>Social Marketing and Education</b>	Community focus, peer/comparative focus, and household focus	Indirect Feedback provided one-time or ongoing basis	EarthAid, Efficiency2.0, Stickk, EnergySavvy, ENERGY STAR tools, Microsoft Hohm
<b>New Consumer Products</b>	Household focus (emerging activity in areas of community and peer/comparative focus)	Direct feedback on an ongoing basis	Tendril (Grounded Power), Control4, iControl, EnergyHub, Google PowerMeter, Cisco, IBM, The Energy Detective

Note: Companies categorizations are approximate; company approaches are constantly evolving and may cover multiply categories. This is not an exhaustive list.



# Government and Regulatory Programs and Actions

## Standards and Protocols

- NIST is currently developing smart meter security and data access standards.
- Three states have protocols to count energy feedback savings as part of utility efficiency programs (CA, MA, MN).

## Utility Programs

- As of January 2011, approximately 1.5% of U.S. households are currently offered utility administered comparative feedback programs; expected to increase to almost 10% by the end of 2011.
- Some states are running pilots, many through smart grid investments, but are not counting savings in administered programs.

## Public Utility Commissions

- At least eight state Commissions have opened proceedings related to smart meter deployment, home energy displays, and use of customer energy data.

