



CAN SMART METERS MAKE SMARTER CUSTOMERS?

Evaluating the Impact of Smart Meters on
Consumer Energy Efficiency Behaviors

June 13, 2012 IEPEC Rome, Italy



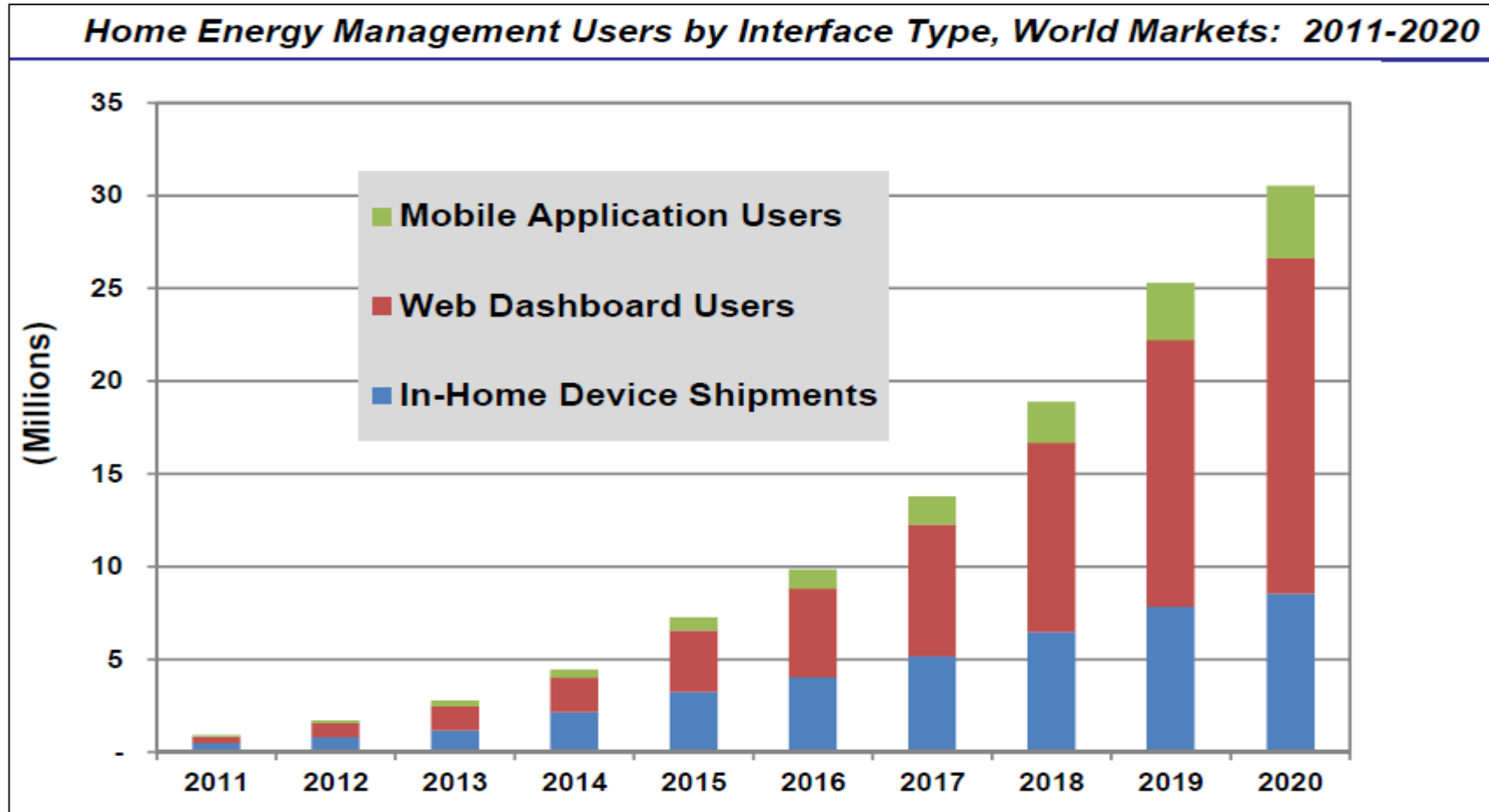
OVERVIEW

- » This presentation will explore customer perceptions and experiences with smart meter feedback technologies.
- » Various examples of how utilities can use the smart grid platform to change the way customers use electricity will be presented.
- » Recent examples of how these programs are being evaluated across North America, including incorporation of newly established experimental design techniques, will also be discussed.

MAKING INFORMED DECISIONS

It's 2012. How are customers getting their energy use information?

Pike Research Study 2011



IN-HOME DEVICES

- » In Home Devices (IHD's) – or home monitors – provide consumers with prompt, convenient feedback on their energy use.
- » These mechanisms can also display costs of energy used and indicate the appliances that are the biggest energy users.

IN-HOME DEVICES

Making consumers smarter.



WEB PORTALS

- » Energy Web Portals bring together energy information from diverse sources in a unified way.
- » Southern California Edison offers customers energy usage data through the SmartConnect web portal. Customers log into their site and obtain detailed energy usage information obtained through their smart meters.

WEB PORTALS

Making consumers smarter.



SMART PHONES

- » Smart phone applications give consumers remote access, and in many cases, control over their home energy networks.
- » For a person who travels or works outside the home the smart phone application can change the way they live.

SMART PHONES

Making consumers smarter.



COMPETITIONS

- » Last June, Itron announced their role as a founding partner in the Biggest Energy Saver Campaign, an initiative created by Texas-based utilities Oncor and CenterPoint Energy.
- » Goal: Jumpstart the market for smart meter applications and empower customers to benefit from smart meter technologies.

COMPETITIONS

Making consumers smarter.



ARE SMARTER CONSUMERS SAVING ENERGY?

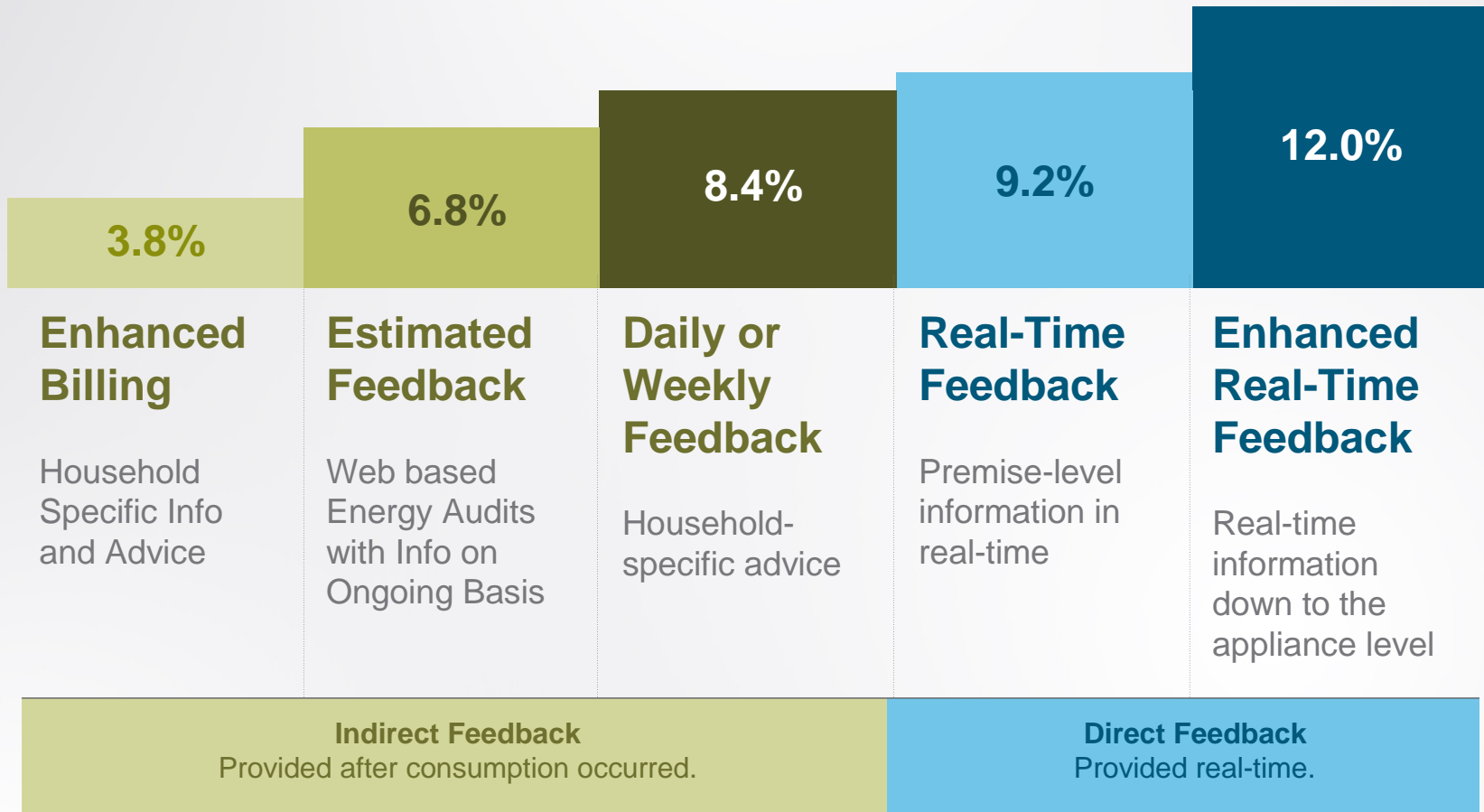
- » ACEEE's 2010 report of a review of 57 different residential sector feedback programs conducted between 1974 – 2010 showed electricity consumption reductions between 4 and 12%.
- » A new ACEEE report released in February 2012 found average savings of 3.8% from feedback initiatives.

ARE SMARTER CONSUMERS SAVING ENERGY?

- » ACEEE study reports that since 1995, feedback induced savings levels have been higher in Europe than in the United States.
- » Reasons for these higher savings may be due to cultural and policy differences between the two countries.

THE POWER OF DATA

Average household electricity savings by feedback type.



Source: *Advanced Metering Initiatives and Residential Feedback Programs*, June 2010

Authors: Karen Ehrhardt-Martinez, Kat A. Donnelly, John A. "Skip" Laitner:

EVALUATION ACTIVITIES TIED TO SMART GRID CAPABILITIES

- » Increasingly, utilities are being asked to quantify the energy savings associated with their behavioral efforts.
- » Smart grid networks enable new technologies and communication pathways that will require new types of research and evaluation.
- » Feedback initiatives will require distinct research methods to parse out the savings associated with customer energy behavior changes.

EVALUATION ACTIVITIES: THE GOOD NEWS? WE HAVE LOTS OF DATA!

- » Smart meters provide evaluators the data to understand how energy use requirements change over time.
- » New efforts focused on developing protocols and new analysis techniques to take advantage of this new wealth of data and to estimate first year savings and their persistence over time.

EVALUATION ACTIVITIES: THE GOOD NEWS? WE HAVE LOTS OF DATA!

- » Granular energy usage data is now easily accessed and linked to customer accounts and enables enhanced evaluations and the formation of control groups.
- » Smart grid databases allow researchers to use cluster analysis to group buildings with different energy signatures.
- » This allows evaluators to determine if differences in usage patterns can be parsed out into estimates of savings for different geographic areas and different time intervals.

EVALUATION ACTIVITIES: EXPERIMENTAL DESIGN

- » Experimental design extremely important when potential changes in usage are likely to be small initially and gradually build over time.
- » Randomizing selection of participants and non-participants allows for the estimation of changes in usage across households.
- » This allows for the control for other factors that make traditional measurement of program impacts very difficult - such as self selection bias.

EVALUATION ACTIVITIES: EXPERIMENTAL DESIGN

- » Recommended Best Practices from CPUC workshop:
 - Randomized Controlled Experiments (for feedback program where treatment and control groups can be easily separated before the program begins)
 - Quasi-Experimental Designs (for programs where customers must be recruited)

EVALUATION ACTIVITIES: PROTOCOLS BEING CREATED

- » In the U.S, the SEE Action group is in the process of finalizing a national set of Evaluation, Measurement and Verification (EM&V) protocols for Residential Behavior-Based Energy Efficiency programs.
- » These protocols will give local and state policy makers simple evaluation tools to quickly develop sample designs estimate the impact of different forms of feedback and general behavioral programs.

EVALUATION ACTIVITIES: ETHNOGRAPHIC RESEARCH

- » The usefulness of ethnographic research is promoted as highly valuable in the ACEEE 2012 report. Granular data obtained through smart meters can provide a rich foundation for ethnographic research.
- » California Studies (2010) using ethnographic research produced a treasure trove of information showing how customers gather, synthesize and act upon energy usage information and data.

EVALUATION ACTIVITIES: THE ISSUE OF PERSISTENCE

QUESTIONS

- » Are the new IHDs merely a novelty which after a few months are just another appliance that needs dusting each month?
- » Or are IHDs an important tool that are used, at least intermittently, to maintain initial levels of behavioral energy savings?

EVALUATION ACTIVITIES: THE ISSUE OF PERSISTENCE

- » The new functionalities offered by smart grids and the increased availability of energy usage data can be used to tackle the most difficult of evaluation problems, **estimating the persistence or degradation of savings over time.**
- » Documenting the persistence of savings, while not unique to behavioral programs, is an issue which researchers have begun to evaluate using randomized control experimental techniques.

EVALUATION ACTIVITIES: THE ISSUE OF PERSISTENCE

- » Opower has been monitoring the persistence of energy savings from its various behavior programs using monthly billing data for over four years with a number of utility clients.
- » From the inception of its feedback programs, participant treatment and control groups were selected on a random basis.

EVALUATION ACTIVITIES: THE ISSUE OF PERSISTENCE

- » Opower research shows annual savings from the program tend to steadily increase during the year one, and then continue to increase; albeit at a slower rate in the 2nd and 3rd year.
- » The analysis of annual savings has not yet shown signs of degradation, or a loss of savings, even after the third year.

EVALUATION ACTIVITIES TIED TO SMART GRID CAPABILITIES

- » Opower has begun using smart meter granular data in their programs hoping that in the future this will allow for the estimation of incremental impact of different types of dynamic rates on customer adoption of peak savings technologies and/or the better understanding of the effectiveness of the Opower feedback reports.

CONCLUSIONS

- » Early evidence is promising and suggests that consumers are not only accessing their smart meter energy information through a variety of feedback mechanisms, but that the knowledge obtained is leading to **smarter customers and smarter energy decisions!**

CONCLUSIONS

- » However - consumers may be reaching a saturation point in terms of the smart device interactions.
- » Providing devices to meet the needs of a variety of customer segments is key challenge.
- » User segments want various things: usage per hour (UPH) of each device, total energy consumption at a given point, equipment management, and alerts when energy budget exceeded.

CONCLUSIONS

Pitfalls:

- » One area of concern is the quest for the “perfect” feedback device. Consumers should be provided a number of options and allowed to choose the option that works best for them.
- » Need to reassure the small, but vocal minority, that their data information can remain private.

CONCLUSIONS

- » Using smart meter data in our research and evaluations will make savings more transparent and bring increased customer support for these new technologies.
- » Savings protocols for smart grid enabled programs are already starting to spring up. This bodes well for **reliable results** in the future!

THANK YOU



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