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## Comments of Opower on Californiaâ€™s Existing Buildings Energy Efficiency Action Plan- DRAFT

*Additional submitted attachment is included below.*

April 21, 2015

California Energy Commission
1516 Ninth Street
Sacramento, CA
95814-5512

Re: California's Existing Buildings Energy Efficiency Action Plan- DRAFT

Comments of Opower on California's Existing Buildings Energy Efficiency Action Plan- DRAFT

## I. Introduction and Background

Opower is a data analytics company that partners with utilities to engage customers and motivate behavioral changes that lead to measurable reductions in energy use and peak demand. Opower was founded in San Francisco in 2007, and our first utility customer was the Sacramento Municipal Utility District (SMUD). Eight years later, Opower is a publicly traded company with nearly 600 employees, operating in 10 different countries and partnering with more than 95 utilities. Through our utility partnerships, Opower's platform engages more than 55 million households around the globe.

We commend the Commission for its thoughtfulness in developing the AB 758 Action Plan ("Plan"), which lays out concrete steps to significantly increase energy efficiency activity in California in support of the state's climate change goals and Governor Brown's challenge to double the efficiency of our existing buildings. While the Plan is both comprehensive and ambitious, containing many important strategies and tactics, we focus our comments on Strategy 2.2: Consumer-Focused Energy Efficiency. Specifically, we offer the following comments and recommendations:

- Behavioral approaches to demand-side management activities are more than stand-alone energy savings programs
- Data-driven, behavioral approaches can achieve measurable, verifiable peak demand reductions as well as energy efficiency savings
- The current description of home energy report programs requires modification for

accuracy

## II. Behavioral Approaches to DSM

Opower appreciates the Commission's inclusion of behavioral programs in the AB 758 Action Plan, as well as the acknowledgement that there are many applications of behavioral methodologies beyond what has become the "traditional" approach (e.g. home energy reports). Behavior change frames the energy efficiency experience for a customer by first informing through data-driven insights and personalized recommendations that motivate both behavioral changes and energy efficient purchases. Once a customer has decided to make an energy efficient purchase or building upgrade, *how* the customer interacts with the appliance or building in question will ultimately determine how much energy is actually saved after the investment has been made. This interaction between the customer and building can be the difference between a 25% reduction in energy use from baseline and a 10% increase after a retrofit or appliance purchase. Therefore, it is critical that the customer is continually engaged with personalized energy information and feedback about his or her energy use in order to maximize the energy savings associated with a given project or purchase.

Among the myriad goals laid out in the Plan, one is to increase participation in energy efficiency programs by 33% by 2020. While current estimates of participation rates vary, it is safe to say that dramatic increases (likely well above 33%) will be necessary in order to meet the state's climate and energy goals. In order to succeed in this regard, it will be imperative that customers are given increased access to resources and tools that utilize their own customer data along with personalized messaging through the right channel and at the right time such that the customer responds and acts.

The Plan notes the many tools that will become available to customers through the Energy Upgrade California website, and we are excited to see those come online. Self-service tools and opt-in customer experiences can provide helpful resources for engaged customers; however, different approaches must be employed in order to reach those who are disengaged and less immediately inclined to engage deeply with the statewide website.

In other words, while, it is important to give engaged customers a way to "opt in" to web portals and various tools that utilize the customer's own data, it is equally important to proactively engage customers through personalized communications on an "opt-out" basis. Opower's experience across 95 utilities has shown that sending customers personalized messaging that speaks to the customer with his or her own data in a fresh and relevant context has proven to engage customers in a meaningful way, and at scale. For example,

based on thousands of customer surveys, Opower has found that home energy reports have a 79% recall rate (e.g. 79% of customers remember receiving them) and 74% of recipients read the reports. 37% of recipients not only read them, but also share them with their family, friends, and neighbors.

Therefore, Opower urges the Commission to recognize that myriad behavioral approaches will be necessary in order to scale California's energy efficiency efforts. Some customers will respond positively to statewide campaigns by engaging with online tools and accessing their Green Button data, while others will be more likely to act when they are auto-enrolled in a home energy report style program. Both must work in concert in order to fulfill the goals of this Plan.

## III. Data Driven, Behavioral Approaches can Achieve Peak Reduction

The draft AB 758 Plan discusses behavioral approaches to energy efficiency, however, Opower notes that these efforts have also been successful at spurring reductions in peak demand. This demand impact has been isolated in multiple evaluations of the home energy reports program and seeded the development of Opower's behavioral demand response solution.

*Peak Demand Reductions from Home Energy Reports*

Opower's home energy reports program has a long track record of generating energy efficiency savings for utilities throughout the world; however, what has been less talked about is how the HER program impacts peak demand. While most energy efficiency programs help reduce demand to some degree, Opower has found that savings from the HER program actually correlate very closely with peak demand, such that as overall demand increases, so do the savings from the HER program. In other words, customers enrolled in the HER program are actually saving energy disproportionately during times of peak demand.

*Behavioral Demand Response*

Applying lessons learned from 8 years of implementing behavioral energy efficiency programs, Opower has recently begun implementing behavioral demand response programs at a number of utilities in North America to achieve significant reductions in peak demand. In practice, this involves sending customers personalized messaging to alert them the day before a peak event, and giving them customized tips on how to reduce their load during specified hours. During the peak event, customers take myriad actions as makes sense for them (e.g. turning up thermostats, turning off appliances, etc.). Within 24 hours of the peak event, customers receive reports informing them of how much they reduced their demand during the

event, how their performance compared to that of their neighbors in similar dwellings, and how they did compared with the previous peak event or compared to the previous year. Opower first piloted this approach with Baltimore Gas and Electric in the summer of 2013 in order to enhance the utility's peak-time rebate (PTR) program. Customers were paid $1.25/kwh during the peak events, and BGE saw their peak reduced by 5% when events were called using behavioral demand response.

In summer 2014, behavioral demand response was deployed at three utilities across the U.S., including in Southern California, but this time *without* any rebate involved. The average impact of this program was a 3% reduction in demand across all events, and as high as a 5% demand reduction during the hottest hours of the hottest day. The cost per MWh of demand reduction from simply nudging people to reduce their peak consumption is approximately one quarter that of a peaker plant and one third the per-MWh cost of an A/C cycling program. Additionally, energy efficiency savings from customers' actions persisted for approximately one month after the last event.

Behavioral demand response can be deployed quickly and at scale, and can serve as an on-ramp to time-variant rates, which are also contemplated by the Plan. We recommend the Commission include behavioral approaches to demand response in its final revisions.

## IV. Home Energy Reports in the AB 758 Action Plan

We are pleased to see that home energy reports (HERs) were discussed as part of Strategy 2.2. Opower pioneered the home energy reports program in 2007, and since then our programs have saved more than seven terawatt-hours, enough energy to power all the homes in San Diego for one year. We must note, however, that the statements made in the draft Plan about HERs are not entirely accurate, and we request that the Commission revise them before releasing a final Plan.

Page 64 contains a bullet point titled "Home Energy Reports", which reads, "On-bill and/or online summaries of hourly utility energy usage generate approximately 1.5-3 percent savings across all enrolled households." This statement contains a number of inaccuracies that require clarification. Specifically, home energy reports are neither on-bill, nor online, nor do they generally contain hourly utility energy usage data. Opower offers the following comments as clarification.

*Home Energy Reports*
The term, "home energy reports" is generally understood within the energy efficiency

community to refer to personalized comparative home energy usage reports, which are front and back *paper* reports sent *separately from the utility's bill* to customers informing them of how their energy usage compares with that of similar dwellings in their immediate vicinity (e.g. within 0.5-1.5 miles). It is important to note that two critical and related factors in generating measurable energy savings through HER programs are that the customer receives *paper* reports and that they do so on an *opt-out* basis.

*Experimental Design: Randomized Control Trial and Opt-out Implementation*
In order to most accurately measure energy savings from an HER program, Opower implements the programs as a randomized control trial (RCT) from the beginning. One group of customers (treatment group) receives the reports while a similar control group of customers does *not*. By comparing the energy use of the two groups over time, the impact of the HERs can be isolated and quantified. This is the methodology outlined by the Department of Energy's SEE Action (State and Local Energy Efficiency Action) Committee[1] and forms the basis for the reporting requirements contained in SB 488 (2009).

Importantly, customers are enrolled in the reports program on an opt-out basis, as opposed to volunteering for the program. This is a key distinction between an HER program and most other energy efficiency programs, which customers have to choose to participate in. If customers were allowed to opt into the HER program, it would not be possible to isolate the impact of the reports, as these volunteer participants will have already self-identified as engaged customers that are thinking enough about their energy use already to actually sign up for a program. Therefore, it would be more difficult to isolate whether any change in energy usage from these volunteers was attributable to the reports.

Opower recognizes that behavioral approaches to energy efficiency have existed since long before this home energy reports program design, and new ways of engaging customers utilizing learnings from behavioral science are continually being developed. The key differentiation between "behavioral energy efficiency", broadly, and a comparative energy usage disclosure program (e.g., HERs) is the ability to attribute energy efficiency savings to the latter through the opt-out, randomized control trial design. This is not the only way to approach behavioral efficiency but it has been the most widely accepted and the most common path towards generating behavioral energy efficiency that can valued as an energy

[1] State and Local Energy Efficiency Action Network. 2012. *Evaluation, Measurement, and Verification (EM&V) of Residential Behavior-Based Energy Efficiency Programs: Issues and Recommendations*. Prepared by A. Todd, E. Stuart, S. Schiller, and C. Goldman, Lawrence Berkeley National Laboratory. http://behavioranalytics.lbl.gov.

efficiency resource.

*Paper Reports*

Reports are delivered by mail in paper format to recipients, as Opower's experience has shown that customers respond more strongly to physical paper reports than to receiving the same information through digital channels such as e-mail. Paper reports are more visceral to the customer, and are oftentimes shared with family members and neighbors or placed on refrigerators for the whole household to see. Opower works with many utilities to provide much of the information in the HERs available via a web portal that is integrated into a customer's online utility account. This can be done for both customers that receive the physical reports in the mail and those that do not; however, savings from these portals are not measured as part of the HER program. For example, in PG&E territory, approximately 22% of residential customers receive home energy reports, and the energy savings generated by the program are claimed toward PG&E's savings goals; however, all residential customers can log into their accounts and access many of the same personalized energy insights, including their neighbor comparison, by clicking on the "My Usage" tab.

With the exception of a limited number of utilities in the U.S., which have designed their own variations of the neighbor comparison and included it *on* customers' bills, home energy reports are sent separately from the bill. As noted above, HERs are also a paper product, delivered via mail, not "online" as described in the draft Action Plan. Also, HERs do not contain hourly energy usage data, nor is this what drives 1.5-3 percent savings in enrolled households.

Rather, the central component of the reports is the neighbor comparison, which shows a customer how his or her household's energy usage stacks up against that of neighbors in similar dwellings within a close geographic radius (e.g. 0.5-1.5 miles). The purpose of this comparison is to help customers understand their energy use in context, as opposed to just seeing that they used X number of kWh last month, which means little to the average customer. The concept of comparing households to their neighbors in order to drive energy efficiency behaviors is well documented and best demonstrated by the research of Dr. Robert Cialdini and Dr. Wesley Shultz.[2]

The reports also illustrate the neighbor comparison over time by plotting a household's usage against that of its neighbors over the course of a number of months. Importantly, HERs conclude by recommending multiple actions that can be taken to reduce the household's

[2] Cialdini, Robert and Wesley Shultz. *Understanding and Motivating Energy Conservation via Social Norms.* Report prepared for the William and Flora Hewlett Foundation. 2004

energy use, from low-cost/no-cost behavioral actions to deeper investments in energy efficient appliances and retrofits.

As noted earlier, home energy reports are delivered through direct mail, and oftentimes these programs are paired with an online web portal that is integrated with the customer's online utility account, in which they can take a deeper dive into their energy use. Importantly, however, hourly energy use is not typically displayed on the reports, although it is generally available through the online portal down to the 15-minute interval, along with daily and monthly energy use along with the associated charges..

The bullet point on page 64 goes on to state, "…in their current format these reports do not offer recommendations based on household-specific, disaggregated smart meter data and often include recommendations that are mismatched with the recipients' household realities." This statement is also not factually accurate, and the basis of these claims is not clear. Opower's home energy reports (which represent the majority of all HERs delivered in California) do in fact provide energy reduction tips and recommendations that are tailored to each individual household. For example, a customer living in a studio apartment in San Francisco does not receive a report with a recommendation that he or she perform a whole-house retrofit. Opower is currently able to perform customer segmentation based on more than 80 different characteristics. For example, Opower can utilize customer-specific information to recommend a furnace replacement program to a customer who is an owner of a single-family house whose heat type is gas and who has not participated in any EE rebate programs previously. Customers who receive the reports are also encouraged to log into their utility account online, where they can not only further explore their energy use, but they can refine the assumptions about their household in order to further increase the specificity of the neighbor comparison and tips.

Additionally, smart meter data is in fact being used increasingly to segment and further customize the communications. For example, through machine learning, Opower has used smart meter data from its deployments to find patterns in usage profiles that has led to the discovery of five "energy personalities" or load profile archetypes that most customers fall into based on when they use energy throughout the day. Different profiles respond in varying ways to behavioral messaging, and communications can now be tailored to each one.

Opower therefore respectfully requests that the Commission revise the "Home Energy Reports" bullet point on page 64 to read as follows:

**Home Energy Reports-** The delivery of personalized insights derived from individual

household usage data combined with other data sources related to housing characteristics, weather patterns and other relevant factors can cause recipients of home energy reports to reduce their energy use through behavioral changes. Mailed separately from the utility bill, home energy reports inform customers about how their household energy use compares with that of similar homes in their vicinity in a given month and contains tailored tips and program promotions to help the recipient reduce his or her household energy consumption. By implementing this program as a randomized control trial (RCT), the impact of these communications have been quantified, and program administrators generally observe savings on the order of 1.5-3% of electricity usage and 0.5-1.5% for natural gas.

The second half of the bullet point on Page 64 goes on to read:

"The Energy Upgrade California website is in the process of being upgraded to enable households and small businesses to sign up for behavior reports based on green button connect data. Consumers will be able to view their usage, create action plans, and identify rates, rebates, appliances, contractors, and financing options that are the best for them. The tool is expected to be available by April 2015."

While it is exciting that Californians will soon have access to such tools through the Energy Upgrade California portal, Opower must note that what is described here is fundamentally different from home energy reports. In order to be able to accurately quantify the impact of the program, home energy reports are sent to a randomized group of utility customers on an "opt-out" basis (e.g. *not* at the customers' request). This is consistent with the guidance regarding evaluation of behavioral energy efficiency programs prescribed by the Department of Energy's SEE Action Network.[3] What is contemplated in the above quotation is an opt-in program, in which a customer must choose to receive "behavior reports based on green button connect data."

Additionally, it is unclear what is meant by "behavior reports" in this context; however, without access to the full database of energy usage data for a given utility's customer base, it will not be possible for customers who enroll in the Energy Upgrade California reports program to see their households' energy usage compared with that of similar households in their vicinity without having access to usage data for thousands of other customers, most of

[3] State and Local Energy Efficiency Action Network. 2012. Evaluation, Measurement, and Verification (EM&V) of Residential Behavior-Based Energy Efficiency Programs: Issues and Recommendations. Prepared by A. Todd, E. Stuart, S. Schiller, and C. Goldman, Lawrence Berkeley National Laboratory. http://behavioranalytics.lbl.gov

whom in all likelihood have not signed up for the program. Without the neighbor comparison, any behavioral messaging will be fundamentally different from what is found on a home energy report. While many interesting insights may be available to customers who engage with this portal, this type of program would be a substantially different experience than that of home energy reports. Therefore, it is not clear why these two programs are both discussed under the heading of "Home Energy Reports" and we recommend the Commission separate them in order to avoid conflating two different types of programs as being the same.

Opower thanks the Commission for its efforts to develop this draft Action Plan, and we look forward to engaging in its refinement and implementation.

Sincerely,

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