

August 9, 2013

Department for Manufacturing, Innovation, Trade, Resources and Energy  
Energy Markets and Programs Division  
GPO Box 1264, Adelaide SA 5001

RE: Opower's Response to the Review of the South Australian Residential Energy Efficiency Scheme (REES) - Directions Paper July 2013

Dear Sir or Madam:

Opower appreciates the opportunity to submit comments on the "Review of the South Australian Residential Energy Efficiency Scheme (REES): Directions Paper 2013." This consultation seeks to assist the Department for Manufacturing, Innovation, Trade, Resources and Energy (DMITRE) as it considers opportunities to continue and expand the REES. Opower writes to encourage DMITRE to amend the REES Protocol to explicitly include "innovative behaviour change strategies"<sup>1</sup> that have earned broad regulatory approval in other jurisdictions by delivering measurable energy savings at scale. Information-enabled behavioural efficiency programs are uniquely suited to help meet REES goals by driving bill cost savings equitably across all residential energy customers – without the need for costly in-home displays.

Opower is the global leader in behavioural energy efficiency and smart grid customer engagement. We work with over 85 utilities across 7 countries to provide energy insights to more than 16 million households. In South Australia, Opower works in partnership with EnergyAustralia to help residential customers save energy and money. Opower's platform provides a multi-channel approach for giving consumers contextualized energy information and personalized tips, including a web portal available to all customers, and paper and email reports for some customers.

### **Summary of Comments**

DMITRE's proposed major directions for the REES post 2014, if pursued effectively, have the potential to multiply the impact of the scheme while reducing consumers' energy bills. By excluding activities that rely on efficient human behaviour, the current REES Protocol prevents South Australian households from capturing more than AUD12 million each year in potential cost-effective energy savings. Moreover, increasing approved activities to explicitly include cost-effective behavioural efficiency programmes will give retailers important new options for delivering energy savings to low-income customers the REES scheme is designed to assist.

In accord with DMITRE's proposed directions, Opower offers the following recommendations and accompanying rationale:

**I. Pursue proposed direction 3.8.1, by amending the REES protocol to clarify eligibility of behaviour change activities that deliver reliable, measurable energy savings.**

Behavioural efficiency programmes are proven effective. For example, Opower Home Energy Reports reliably drive energy and bill savings of 1.4-3.3% for residential customers across all demographics, including low-income households. Behavioural programmes also drive significantly increased uptake of home energy audits and other common efficiency programmes.

**II. Pursue proposed directions 3.8.2 and 3.6.2, by requiring ESCOSA to consider behaviour change activities approved by comparable energy efficiency schemes and by convening discussions with other Australian jurisdictions to promote harmonization of eligibility criteria.**

Behavioural efficiency programmes are broadly accepted. Regulatory Commissions in twenty-eight US states have approved them as an energy efficiency resource. The U.K. Cabinet Office referenced Opower’s program in its report, “Behaviour Change and Energy Use.” And policymakers in New South Wales are currently considering approval of behavioural energy efficiency under their energy efficiency scheme.

**III. Pursue proposed direction 3.4.2 by amending the obligation threshold from 5,000 residential customers to a minimum level of energy sales and by requiring randomised-controlled trials to verify behavioural savings ex-post.**

Behavioral programmes regularly achieve 85% participation, and experimental programme design enables rigorous measurement of behavioural energy savings across the entire population of participating households. Randomised-controlled trials are both the gold standard for impact evaluation and an affordable means to independently verify performance.

<p><u>Recommendation I:</u> Pursue proposed direction 3.8.1, by amending the REES protocol to include eligibility of behaviour change activities that deliver reliable, measurable energy savings.</p>
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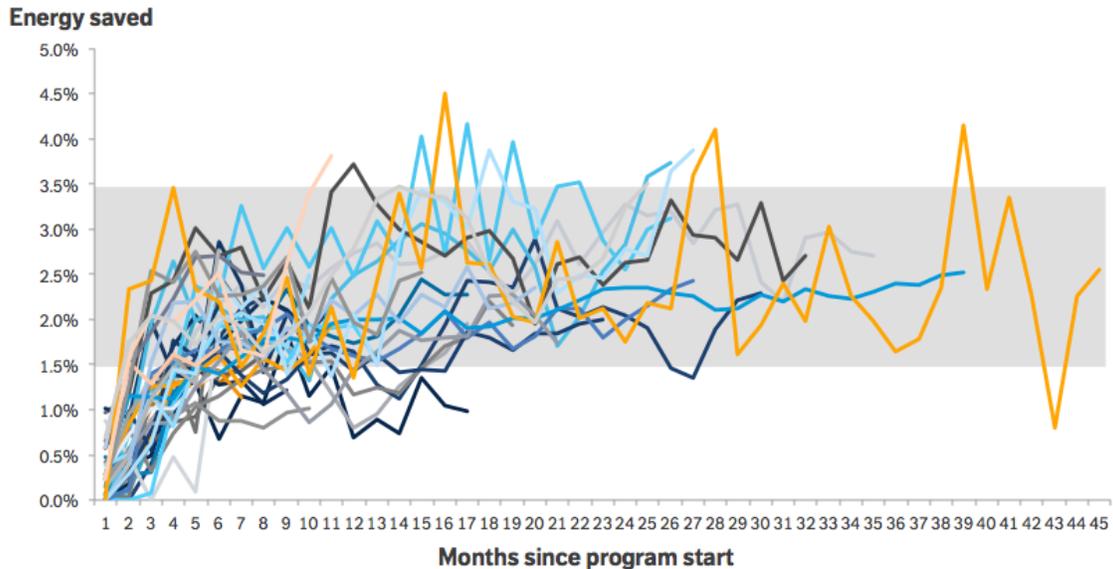
**Behavioural energy efficiency programmes are proven effective**

In his article published in the *Journal of Public Economics*, Dr. Hunt Allcott of MIT determined that Opower is one of the most effective energy efficiency measures.<sup>2</sup> After evaluating nearly 22 million utility bills from over 600,000 households across Opower’s 17 longest running deployments, Allcott concluded that Opower’s program generated electricity and gas savings of 1.4 – 3.3% for all targeted households, with an average of 2.0%. These robust program results have been confirmed by empirical evidence from more than seven million households across regulatory jurisdictions, climate zones, and economic environments. Savings from Opower’s HER programmes have been independently verified by twenty-five separate evaluations.<sup>3</sup>

The savings from HER programmes are maintained – and in fact continue to grow – even in the most mature deployments. For reference, consider figure 4 below, which depicts the

growth and durability of energy savings over time for a number of independently verified Opower deployments.

**Figure 1: Energy savings from HERs endure reliably over time**

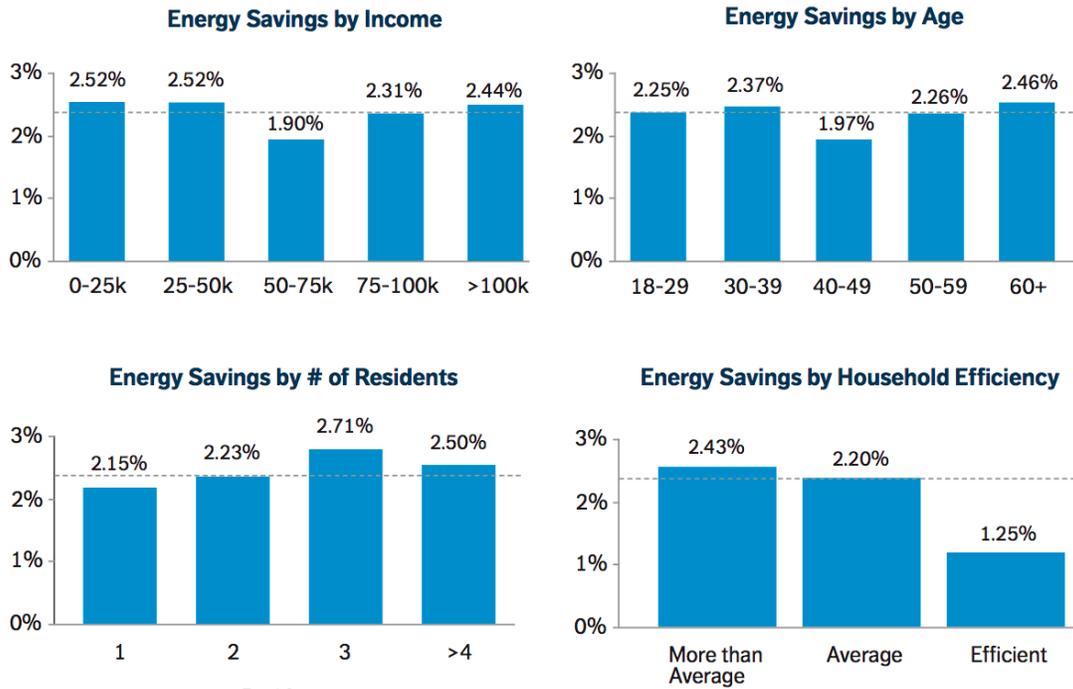


The consistent improvement in behavioural efficiency outcomes driven by Home Energy Reporting programmes helps quantify the market barriers that the REES’s hardware-only approach fails to address. We estimate that each year, South Australia is losing over 12 million AUD in bill savings, 42 gigawatt hours of cost-effective energy savings, and 38 thousand tons of avoided CO2 emissions.<sup>4</sup> In other words, South Australians are paying for power to more than 6,500 homes that could be taken off the grid by a REES that incentivizes the provision of information-enabled behavioural efficiency.

### **Behavioural programmes drive savings across demographic groups**

Behavioural programs, unlike many efficiency programs, deliver savings consistently and equitably across all customer segments, including low-income households, renters, and the elderly (see Figure 5). This is particularly significant as low-income households have the greatest economic need for efficiency savings, yet are one of the hardest populations to reach.

**Figure 2: Opower HERs drive savings consistently across all demographic groups**

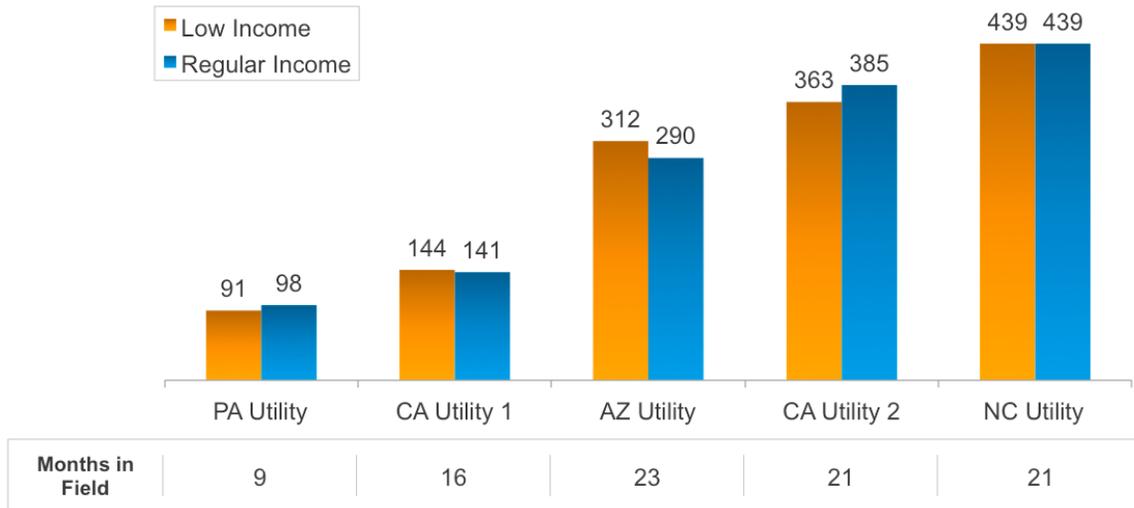


Moreover, Opower’s experience across many jurisdictions is creating a growing body of evidence showing that in many utility service territories low-income households who receive home energy reports save as much in money terms (i.e. not just percentage of usage) as their wealthier neighbors.

**Figure 3: Low-income households save as much as regular-income households**

**Cumulative savings**

*kWh savings per household*



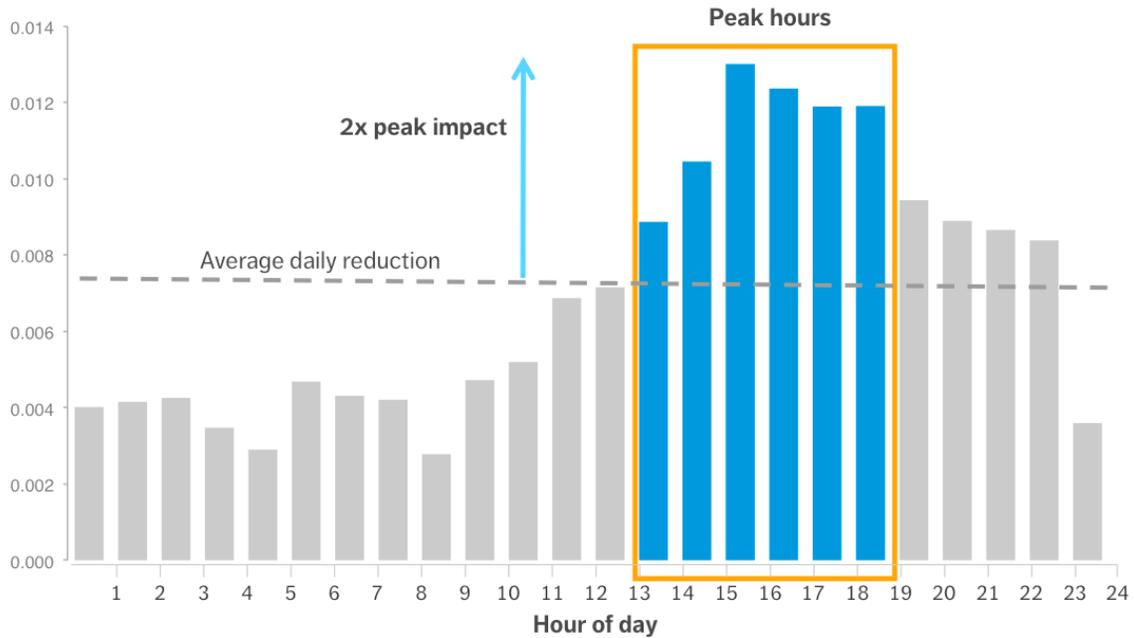
One key driver of savings at scale is the opt-out, installation-free nature of Opower’s behavioural programmes. Customers need not proactively choose to receive reports; rather, energy retailers can enter their customers into the HER programme by default and offer them the choice not to receive reports. While opt-in approaches—typical for installed measures—elicit engagement from less than 5% of customers, Opower’s opt-out approach motivates 85% of recipients to take action.<sup>5</sup> High participation rates mean that small savings on a per household basis will add up to significant savings in the aggregate, delivering real, broad-based benefits to individual customers and to the South Australian community at large.

**At peak times, savings double**

Opower delivers energy savings when it matters the most, with savings during peak hours and seasons that are often double those achieved on average. The figure below demonstrates Opower’s average peak reduction across seven deployments, measured precisely with AMI data. These additional savings accrue without added cost to the retailer or inconvenience to the customer.

**Figure 4: Energy saving impact of HERs doubles at peak hours**

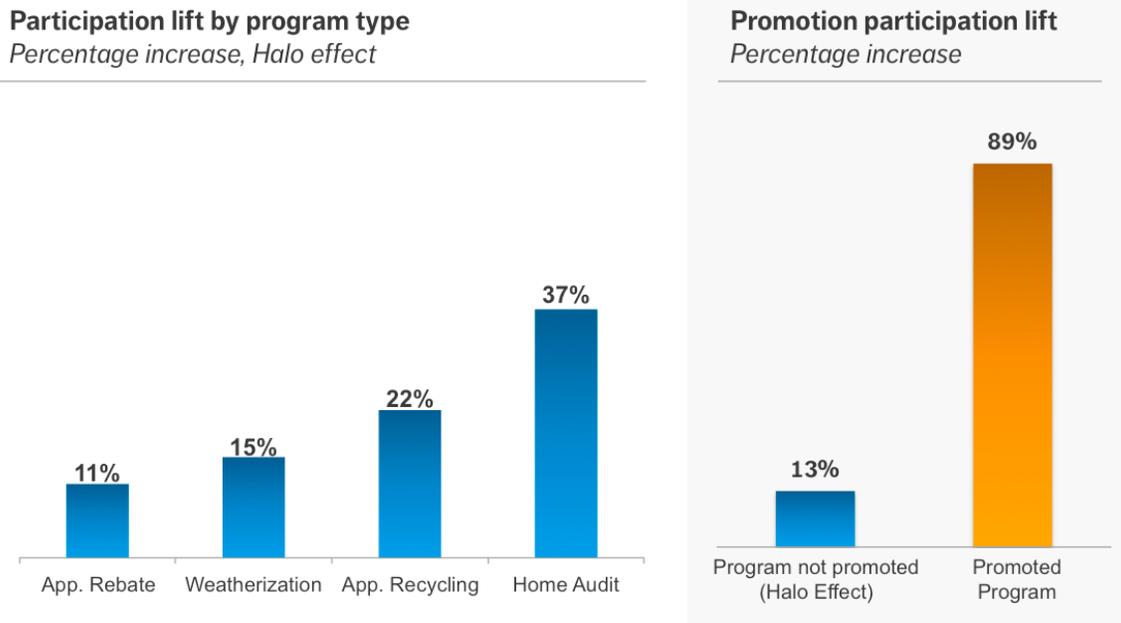
Average hourly kW reduction per home



### **Behavioural programmes drive increased participation in other programs**

The proposed directions in section 3.5 emphasize the importance and effectiveness of the REES residential audit requirement, while noting the “need to avoid excessive costs to obliged retailers in meeting their audit targets.” However, several of the listed suggestions to improve the audit process seem likely to increase programme costs (e.g. “longer consultation after visit” and “multiple visits to enhance behavioural change aspects”) without promising clearly improved outcomes, which would limit the program’s cost-effective reach. Behavioural programmes offer a means to either forgo or mitigate those costs by increasing program participation and reducing associated marketing costs. As the REES Protocol observes, “Other opportunities to improve household energy efficiency are likely to emerge, and this may also make some existing activities more cost effective.”<sup>6</sup>

**Figure 5: Opower’s programme increases participation in other efficiency programmes**



Opower’s behavioural programmes have demonstrated an ability to increase participation in other efficiency programmes.<sup>7</sup> Increased uptake in other energy saving activities can occur by increasing general awareness of energy use – which we call the Halo Effect – or can occur through direct promotion of specified programs. Under the Halo Effect, we see a median lift of about 20%. When behavioural program communications explicitly promote other efficiency programs, participation rates in those other programs can double.<sup>8</sup>

**Recommendation II:** Pursue proposed directions 3.8.2 and 3.6.2, by requiring ESCOSA to consider behaviour change activities approved by comparable energy efficiency schemes and by convening discussions with other Australian jurisdictions to promote harmonization of eligibility criteria.

### **Behavioural efficiency is broadly accepted**

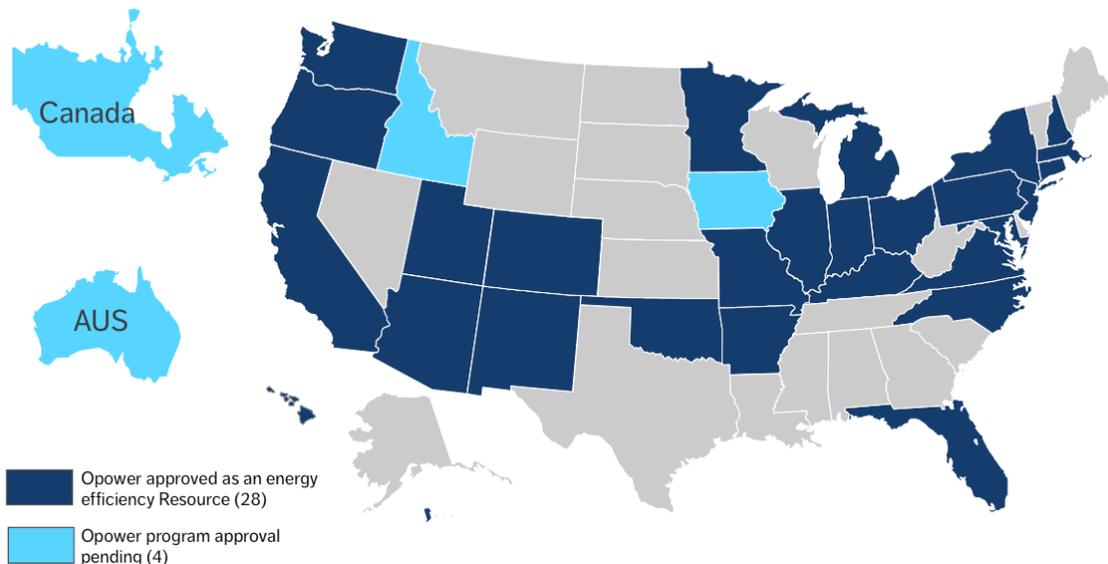
In the U.S., where Opower programmes have been in the field for over five years, regulatory acceptance of behavioural efficiency programs has become the norm.<sup>9</sup> Regulatory Commissions in twenty-eight US states have approved them as energy efficiency resources – as demonstrated in the map below.

Moreover, regulatory commissions in jurisdictions with a tradition of leading on energy efficiency are coming to see behavioural programs as a core element of the portfolios they oversee:

- The Massachusetts Department of Public Utilities recently approved a 3-year, 3.7 TWh statewide efficiency plan that relies on behavioural efficiency programs to drive 24% of electricity savings and 20% of gas savings.<sup>10</sup>
- Within the framework approved by the Rhode Island Public Utility Commission to require investment in all cost-effective energy efficiency, National Grid's behavioural efficiency program will soon reach all of Rhode Island's 425,000 households – the first fully statewide behavioral program in the US.<sup>11</sup>
- The California Public Utility Commission sets a “floor” on utility investment in behavioural energy efficiency, by requiring that no less than 5% of residential households in each investor-owned utility participate in behavioral programs by 2014.<sup>12</sup>

Regulators in each of these states have come to the same conclusion: hardware-based programs and behavioural programs complement one another, and together deliver more cost-effective energy efficiency benefits more equitably than either could alone.

**Figure 6: Broad Regulatory Acceptance for HER Programmes**



Moreover, as the commercial appeal of behavioural efficiency programmes spreads internationally, so too does regulatory approval. Similar acceptance is now under consideration in two leading EU Member States as they prepare for compliance with the 2012 Energy Efficiency Directive. In the United Kingdom, the Cabinet Office referenced Opower's program in its report, "Behaviour Change and Energy Use."<sup>13</sup> At the same time, First Utility, a British supplier, has decided to deploy Opower's program in conjunction with its smart metering rollout. And perhaps most important, consideration of expanded eligibility criteria is now pending in New South Wales.

**Recommendation III:** Pursue proposed direction 3.4.2 by amending the obligation threshold from 5000 residential customers to a minimum level of energy sales and by requiring randomised-controlled trials to verify behavioural savings ex-post.

### **Experimental design of large scale behavioural programs enables rigorous M&V**

The REES Protocol now in force effectively excludes behavioural savings from compliance eligibility in the following section:

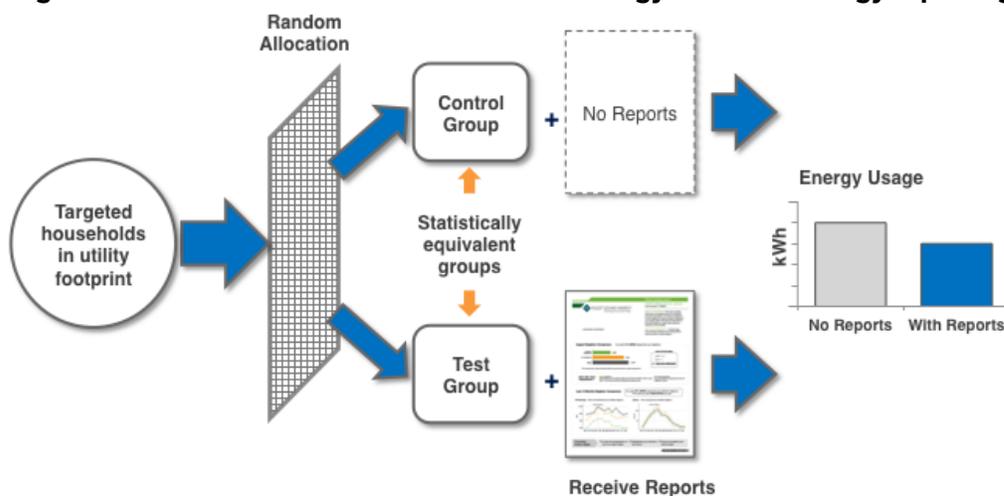
*“Consistency of the saving - there should be a high level of confidence that the estimated savings could be achieved in the majority of circumstances. For example, the activity does not predominantly rely on variable human behaviour or accurate use by the household.”<sup>14</sup>*

Opower’s experience – and subsequent independent verification of our results on more than two dozen occasions – proves out the faulty logic that sets “a high level of confidence” in savings apart from activities that “predominantly rely on ... human behaviour.” Because randomised controlled trials are used to evaluate these large-scale deployments, measurement of savings is precise, without bias, easily verifiable, and statistically significant. Statistical confidence in these savings is greater than 90% in each case, and has exceeded 95% in many occasions.

Randomisation is a particularly methodology for accurately determining impacts and isolating savings from a single efficiency program. To employ this methodology, a programme implementer establishes a target population of households that are eligible for an efficiency program. These households are then randomly assigned to either receive the efficiency measure (“treatment”) or not (“control”). The treatment group receives the measure while the control group does not. The control group is the baseline against which energy savings achieved by the treatment group are measured. Randomisation eliminates bias by controlling for factors that may result in a control group being fundamentally different than a treatment group. When this bias is eliminated, savings can be properly attributed to a given efficiency programme with confidence.

The figure below explains how randomised controlled trials are implemented for home energy reporting programs.

**Figure 7: Randomised controlled trial methodology for home energy reporting programs**



This experimental design approach is proven effective. Each of the twenty independent evaluations of Opower programmes—including one evaluation that covers seventeen separate deployments—have verified the statistical rigor and accuracy of this approach (see section on Support Documentation). It has also been endorsed by the US Department of Energy’s State and Local Energy Efficiency Action Network (“SEE Action”), the US Environmental Protection Agency’s National Action Plan for Energy Efficiency guidelines,<sup>1</sup> and the 2012 EU Energy Efficiency Directive.<sup>2</sup>

Randomised controlled trials are also relatively inexpensive to implement and scale without significant additional cost. In this approach, statistical billing analysis is used to estimate savings, which typically accounts for less than 5% of total programme costs. As programmes grow in size and duration, the additional data improves the accuracy of the analysis while decreasing the per-household cost of monitoring.

### **Randomized controlled trials enable clear evaluation of additionality**

This type of experimental programme design ensures that all savings measured from the treatment group are “additional” to those experienced by the control group. For example, the National Energy Customer Framework includes requirements for benchmarking that may in future be considered in South Australia. In contrast to the baseline on-bill benchmarking, Opower’s home energy reporting platform provides personalized, targeted, highly analytic reports and communications that are grounded in behavioral science. If benchmarking becomes mandatory in South Australia, the new bill features would be required for both the

<sup>1</sup> See SEE Action, 2012, “Evaluation, Measurement, and Verification (EM&V) of Residential Behavior-Based Energy Efficiency Programs: Issues and Recommendations.” SEE Action’s key recommendations include: “For program evaluation design, we recommend use of randomized control trials (RCTs), which will result in robust, unbiased program savings impact estimates”, see also Action Plan for Energy Efficiency. *Model Energy Efficiency Program Impact Evaluation Guide*. November 2007.

<sup>2</sup> Under the “metered savings” method of verification, in which savings are “determined by recording the actual reduction in energy use,” termed “ex post.” See EU 2012 Energy Efficiency Directive, Art 7 (6).

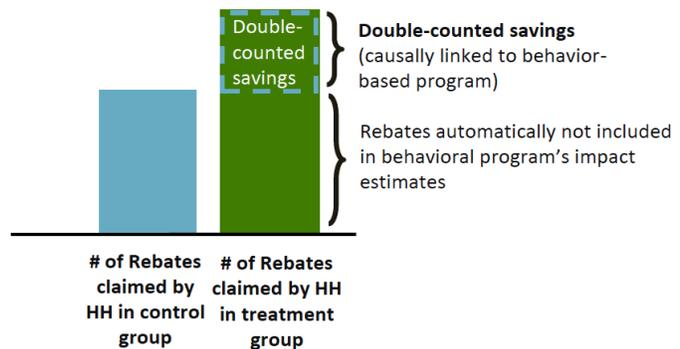
control and treatment groups outlined above. Randomised controlled trials ensure that, because everyone in the test and control receives energy bills with the same format, the savings found will be additional from the Opower programme.

Moreover, experimental design and randomised-controlled trials can also prevent double-counting of savings motivated by more than one programme. As established above, there is evidence that Opower’s programme increases uptake of audit offers and other energy efficiency programmes. This halo effect can lead to more savings at lower cost for households, which creates greater net benefits for households. But it also creates the potential for savings from these programmes to be double counted – by both Opower’s programme and the other utility-run efficiency programme.

Opower follows SEE Action’s recommendations for addressing double counting, as articulated in Figure 5 below.<sup>15</sup>

**Figure 8: Addressing double counting**

1. Calculate the savings that result from participation in a given programme in the control (blue shading) and treatment groups (green shading)
2. Measure the difference between savings in treatment and control groups (“double-counted savings” in chart)
3. Assign double-counted savings and associated programme cost to Opower, the other efficiency programme, or both



For individually tracked utility-run efficiency programmes, Opower can estimate these double-counted savings with statistical precision. From an accounting perspective, these savings can either be subtracted from Opower’s overall savings reported or shared between the Opower programme and the other programmes.

**Conclusion**

Opower appreciates the opportunity to comment on the proposed changes to REES. By excluding activities that rely on behavioural efficiency, the current REES Protocol prevents South Australian households from capturing more than AUD12 million each year in potential cost-effective energy savings.

Opower recommend:

- 1) Pursuing proposed direction 3.8.1, by amending the REES protocol to include eligibility of behaviour change activities that deliver reliable, measurable energy savings.

- 2) Pursuing proposed directions 3.8.2 and 3.6.2, by requiring ESCOSA to consider behaviour change activities approved by comparable energy efficiency schemes and by convening discussions with other Australian jurisdictions to promote harmonization of eligibility criteria.
- 3) Pursuing proposed direction 3.4.2 by amending the obligation threshold from 5,000 residential customers to a minimum level of energy sales and by requiring randomised-controlled trials to verify behavioural savings ex-post.

Opower would be pleased to provide any further information needed for the review.

Sincerely,

Adam Welsh  
 Director of Regulatory Affairs, APAC  
 Opower

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<sup>1</sup> Directions Paper, 3.8 - *Approval of Activities*; p. 26.

<sup>2</sup> Allcott, Hunt, October 2011, "Social Norms and Energy Conservation," *Journal of Public Economics*, available here: <http://web.mit.edu/allcott/www/Allcott%202011%20JPubEc%20-%20Social%20Norms%20and%20Energy%20Conservation.pdf>

<sup>3</sup> See the following: i) Anne Dougherty, July 2012. Massachusetts Three Year Cross-Cutting Behavioural Program Evaluation Integrated Report. *Opinion Dynamics Corporation and Navigant Consulting*; ii) Randy Gunn, May 2012. Evaluation Report: Home Energy Reports, Commonwealth Edison Company. *Navigant Consulting*; iii) Ken Agnew, April 2012. Puget Sound Energy's Home Energy Reports Program: Three year Impact, Behavioural and Process Evaluation. *DNV KEMA Energy & Sustainability*; iv) Anne Dougherty, June 2011. Massachusetts Two Year Cross-Cutting Behavioural Program Evaluation Integrated Report. *Opinion Dynamics Corporation and Navigant Consulting*; (v) Davis, Matt, May 2011. "Behaviour and Energy Savings: Evidence from a Series of Experimental Interventions." *Environmental Defense Fund*; vi) Cooney, Kevin, February 2011. "Evaluation Report: OPOWER SMUD Pilot Year 2." *Navigant Consulting*; vii) Todd, Annika, Steven Schiller, and Charles Goldman, October 2011. "Analysis of PSE's Pilot Energy Conservation Project: "Home Energy Reports." *Lawrence Berkeley National Laboratory*; viii) Ivanov, Chris, July 2010. "Measurement and Verification Report of OPOWER Energy Efficiency Pilot Program." *Power System Engineering*; ix) Macke, Rich, June 2010. "Measurement and Verification Report of Lake Country's OPOWER Energy Efficiency Pilot Program." *Power System Engineering*; x) Allcott, Hunt and Sendhil Mullainathan, March 2010. "Behaviour and Energy Policy." *Science*, Vol. 327; xi) Allcott, Hunt, February 2010. "Social Norms and Energy Conservation." *Working Paper, Massachusetts Institute of Technology's Center for Energy and Environmental Policy Research*; xii) Ayres, Ian, et al., September 2009. "Evidence From Two Large Field Experiments That Peer Comparison Feedback Can Reduce Residential Energy Usage." *NBER Working Paper*; xiii) Klos, Mary, September 2009. "Impact Evaluation of OPOWER SMUD Pilot Study." *Summit Blue Consulting, LLC*; xiv) October 2010. "Puget Sound Energy's Home Energy Reports Program." *KEMA*; xv) Gunn, Randy, May 2012. "Evaluation Report: Home Energy Reports." *Navigant Consulting*; xvi) Dougherty, Anne, July 2012. "Massachusetts Three Year Cross-Cutting Behavioural Program Evaluation Integrated Report." *Opinion Dynamics Corporation with Navigant Consulting*; xvii) Sutter, Mary, October 2012. "Impact and Process Evaluation of 2011 (PY4) Ameren Illinois Company Behavioural Modification Program." *Opinion Dynamics Corporation with The Cadmus Group, Navigant, and Michaels Engineering*; xviii) Wu, May, November 2012. "Impact & Persistence Evaluation Report: Sacramento Municipal Utility District Home Energy Report Program." *Integral Analytics, Inc with BuildingMetrics Incorporated and Sageview*; xix) Gunn, Randy, November 2012. Commonwealth Edison

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Company "Energy Efficiency / Demand Response Plan: Plan Year 4 (6/1/2011-5/31/2012), Evaluation Report: Home Energy Reports." *Navigant Consulting*; xx) December 2012. "Verification of Hawaii Energy 2011 Programs." *Evergreen Economics*. (xxi) December 2012. "Program Year 1 (2011-2012) EM&V Report for the Residential Energy Efficiency Benchmarking Program." *Navigant Consulting*. (xxii) March 2013. "Puget Sound Energy's Home Energy Reports: 2012 Impact Evaluation." *KEMA*. (xxiii) April 2013. "Evaluation of Pacific Gas and Electric Company's Home Energy Report Initiative for the 2010-2012 Program." *Freeman, Sullivan & Company*. (xxiv) May 2013. "Home Energy Reports Program: Program Year 2012 Evaluation Report." *Navigant Consulting*. (xxv) June 2013. "Massachusetts Cross-Cutting Behavioural Program Evaluation Integrated Report." *Opinion Dynamics Corporation*.

<sup>4</sup> This estimate assumes behavioural efficiency programs would achieve the lower bound of observed average savings for mature programs: 1.4%. Assumptions for typical household usage (6500 kWh) and retail price per kWh (\$0.29/kWh, the lowest rate AER projects for 2012 among South Australia's retail distributors) drawn from: Australian Energy Regulator. State of the Energy Market 2012. Chapter 5. Assumptions for carbon intensity (0.914 tons/MWh) drawn from [www.carma.org](http://www.carma.org). Assumption for number of households in South Australia (643,886), from Australian Bureau of Statistics, Census of Population and Housing, 2011.

<sup>5</sup> See Navigant Consulting Study, July 2012, "Massachusetts Three Year Cross-Cutting Behavioural Program Evaluation Integrated Report."

<sup>6</sup> Residential Energy Efficiency Scheme (REES) Protocol set by the Minister for Energy, November 2008; p. 2.

<sup>7</sup> Results based on analysis from Opower deployments across 11 US utilities.

<sup>8</sup> See, for example: Baltimore Gas and Electric Company - Q3 2011 EmPOWER Maryland Report. Case No. 9154. October 31, 2011.

<sup>9</sup> Information-based behavioural energy efficiency programs are approved in 28 U.S. states. Approval is pending in Idaho and Iowa. A complete list of relevant Commission orders and docket numbers is available on request.

<sup>10</sup> DPU Order Approving 2013-2015 Three-Year Electric & Gas Energy Efficiency Plans, relating to dockets 12-100 to 12-111.

See: <http://www.ma-eeac.org/DPU%20Proceedings.html>

<sup>11</sup> Rhode Island Public Utilities Commission, Docket 4284. See:

<http://www.ripuc.org/eventsactions/docket/4284page.html>

<sup>12</sup> "Decision Providing Guidance on 2013-2014 Energy Efficiency Portfolios and 2012 Marketing, Education, and Outreach," Public Utilities Commission of the State of California, Decision 12-05-015, May 10, 2012.

<sup>13</sup> "Behaviour Change and Energy Use," 2011, UK Cabinet Office and Department of Energy and Climate Change. See <https://www.gov.uk/government/publications/behaviour-change-and-energy-use-behavioural-insights-team-paper>

<sup>14</sup> Residential Energy Efficiency Scheme (REES) Protocol set by the Minister for Energy, November 2008; p. 3.

<sup>15</sup> U.S. State & Local Energy Efficiency Action Network. "Evaluation, Measurement, and Verification (EM&V) of Residential Behaviour-Based Energy Efficiency Programmes: Issues and Recommendations," May 2012. pp. 31 – 33.