BEFORE THE PUBLIC UTILITIES COMMISSION OF THE STATE CALIFORNIA

Order Instituting Rulemaking Concerning Energy Efficiency Rolling Portfolios, Policies, Programs, Evaluation, and Related Issues	Rulemaking 13-11-005 (Filed November 14, 2013)

INFORMAL COMMENTS OF ENERGYSAVVY IN RESPONSE TO QUESTIONS OF ENERGY DIVISION FROM WORKSHOPS ON AB802

February 10, 2016

EnergySavvy
Jake Oster
Senior Director, Regulatory Affairs
159 South Jackson Street
Suite 420
Seattle, WA 98102
Phone: 802-598-1175
Email: jake@energysavvy.com

BEFORE THE PUBLIC UTILITIES COMMISSION OF THE STATE CALIFORNIA

Order Instituting Rulemaking Concerning Energy Efficiency Rolling Portfolios, Policies, Programs, Evaluation, and Related Issues	Rulemaking 13-11-005 (Filed November 14, 2013)

INFORMAL COMMENTS OF ENERGYSAVVY IN RESPONSE TO QUESTIONS OF ENERGY DIVISION FROM WORKSHOPS ON AB802

EnergySavvy appreciates the opportunity to offer informal comments to Energy Division on the promulgation of rules for AB802. EnergySavvy's comments are restricted to questions for which EnergySavvy has the experience and expertise to provide constructive responses.

Background:

EnergySavvy is a software-as-a-service company that serves utility and government administered demand-side management energy efficiency programs. EnergySavvy provides software to improve customer engagement, manage program data and quantify savings. EnergySavvy is a provider of Automated M&V (AM&V) software, an innovative approach to enhance the evaluation, measurement and verification (EM&V) of demand side management energy efficiency programs. EnergySavvy's AM&V software combines cloud based software with industry best practices to identify, analyze and measure DSM savings thoroughly and continuously while complementing existing EM&V approaches. By analyzing data from weather stations, DSM data tracking and energy usage (monthly or interval) from meters, AM&V automates a billing analysis to account for normalized metered energy consumption in an ongoing fashion. To date, EnergySavvy has estimated savings from over 105,000 measures, installed in over 40,000 premises, by more than 550 unique contractors. This involved analyzing over 2.8 million premises, with 48 million meter reads, and granular weather data from each project.

Introduction

EnergySavvy appreciates the opportunity to provide answers to questions posed by Energy Division. EnergySavvy's comments make specific points that are echoed throughout the responses to questions:

1. Different program types require different M&V approaches. A one size fits all approach for M&V has never been employed for EE programs. AM&V and the use of normalized metered energy consumption (NMEC) does not change this fact. EnergySavvy recommends that Energy Division think about M&V differently for each sector – residential, small-medium business/small commercial, large commercial and industrial. EnergySavvy appreciates the differentiating factors included in Attachment A HOPPs White Paper, however, we recommend that Energy Division sketch out different guidance documents for each sector to ensure that clear rules exist for each sector.

2. NMEC is enhanced with the addition of automation (i.e. AM&V). AM&V reduces costs, provides for simplicity, allows for measurement of all projects in a program, can process large amounts of data quickly, supports pay for performance approaches through customized dashboards that display data to various stakeholders, and speeds up M&V by leveraging data science to estimate results from programs and projects. While NMEC can be quantified with spreadsheets or other traditional methods, leveraging automation is an important benefit for the use of NMEC as a measurement approach.

3. Energy Division should use AB802 to help increase trust in the results from AM&V tools. Up to this point, the industry has deployed AM&V tools in partnership with innovative PA's and used case studies to demonstrate results. This approach is slow and limits the ability of the industry to scale up AM&V quickly. Energy Division can assist the industry in moving AM&V tools into place quickly by using this proceeding, and the processes that will follow, to foster standards, trust, and acceptance of AM&V tools.

4. While EM&V and M&V are different activities, both activities are inextricably linked. Energy Division should strive to provide M&V rules for quantifying NMEC that closely adhere to the EM&V practices that Energy Division will use to evaluate programs. While having "two sets of books" may be a necessity, efforts should be made to keep those two sets of books as closely aligned as possible.

Responses to questions:

What would be the implications and consequences of using existing conditions baseline without exception?

EnergySavvy supports the approach taken in Attachment A of the HOPPs White Paper. The conditions included closely follow IPMVP Option C and do not hinder automating M&V. However, it remains important that Energy Division make clear which of these factors apply to residential, small-medium business, commercial and industrial premises.

EnergySavvy also agrees with comments made by the Office of the Ratepayer Advocate during the workshops that support the use of comparison groups for mass-market programs. Comparison groups allow AM&V tools to control for the external factors included in IPMVP Option C, without introducing unnecessary complications or creating administrative burdens. Additionally, AM&V, reduces the cost of using comparison groups by automating much of the analysis necessary to control for external factors. ACEEE recently echoed EnergySavvy's perspective on the value of comparison groups and AM&V, "Automated and advanced analysis of comparison groups with program participants improves accuracy and timeliness of energy savings reports, allowing programs to scale more easily and at lower costs."[1]

[1]ACEEE Press Release, December 16, 2015; Independent Reports Reach Same Conclusions on the Future of Energy Efficiency Evaluation, Measurement and Verification. Contact: Patrick Kiker

If exceptions [to measuring with existing conditions baseline] are warranted, how do we define them? For instance, for upstream, midstream, and downstream interventions?

EnergySavvy encourages the Commission to implement AB802 in a way that encourages an increased usage of NMEC for M&V and pushes program design in a direction that allows for more meter-based savings measurement. EnergySavvy also recognizes that exceptions are likely to be necessary. Measuring NMEC requires meter data to be attributable to the installation of a measure. As such, retail downstream programs, where rebates are paid at the point of sale are difficult to tie to a meter. However, some programs in other states have developed downstream program designs that require customers to apply for rebates - thereby allowing the rebate to be linked to an address/meter. To entice customers to follow through with applying for these rebates, the incentives are generous enough to encourage customers to proceed with the extra step of applying for the rebate (instead of point of sale). This allows the utility to confirm the rebate is going to a customer, which is necessary for generous incentive, and link the measure to the meter. This type of program design is probably not practical for lighting, but it can be used for more expensive or complex measures that will benefit from being quantified with NMEC. EnergySavvy provides this example to suggest that exceptions to the use of NMEC will necessary, but should be limited to the greatest extent possible.

What issues need to be addressed with deemed and calculated savings approaches in order to accurately apply existing conditions baseline?

Using NMEC data to update deemed and calculated savings will lower disparities between deemed and NMEC savings estimates. This is important for the purpose of program planning. It will also be critically important for creation of potential studies. If potential studies continue to be based on deemed savings, NMEC data needs to inform the deemed savings so that goals are in line with attainable savings.

Additionally, deemed savings are by definition an average value, where the baseline is assumed to be steady or constant across all installations. This baseline data is typically sourced from saturation surveys, baseline studies, or combinations thereof. When the deemed savings value can assume a code baseline, this at least reduces the uncertainty about what was actually there at any given measure installation. Allowing for existing conditions baseline essentially guarantees that the deemed savings value is incorrect for nearly every installation (this is why evaluation studies often find disparities between billing analysis results and engineering calculation results). Calculated savings values at least require site-specific input on key variables (e.g., existing equipment efficiency, etc.). Risk can be managed by moving away from deemed values, and only permitting calculated approaches or, preferably, meter-based savings results.

How do we determine whether a project is replace on burnout or early retirement*?*

In many cases, data analytics and program tracking data can provide answers to these questions. AM&V tools embedded into programs can analyze load shapes to look for anomalous patterns of usage. As an example, using only monthly meter data, EnergySavvy recently completed a study with a utility that used load shapes to spot existing equipment and the use of such equipment in a home. In this case, one heating measure required the replacement of a functional electric resistance heater (i.e. early replacement). The study revealed that many customers who received this rebate were probably not eligible because they were not using electricity for heating.[2] This study was conducted with monthly meter data. Using AMI data, these types of signals will be more pronounced and easier to identify with AM&V tools.

EnergySavvy recognizes that these approaches are still in their early development and recommends an incremental approach to relying on these data sources to detect ROB vs

[2] ACEEE Intelligent Efficiency Conference; Presentation by Greg Lovett of Ameren of Missouri; Unique Insights from Usage Data: Leveraging Savings Measurement Software; December 7, 2015, Boston MA. http://aceee.org/sites/default/files/pdf/conferences/ie/2015/Session3C-Lovett-IE15-12.7.15.pdf

early retirement installations. However, Energy Division should consider how AM&V, census measurement and continuous monitoring can identify these installations.

Currently, virtually all of portfolio savings are estimated, either through deemed or calculated methods, but both AB 802 and SB 350 focus on meter-based savings. To what extent should the future EE portfolio be metered/ pay for performance versus deemed/calculated savings? In other words, which types of EE activities are best reached through metered approach and which are best reached with deemed or calculated savings approaches?

EnergySavvy points to comments above in response to questions about downstream programs. There are limitations to measuring all of the portfolio based on NMEC. However, program design should strive to move as much as possible of the portfolio to a NMEC approach.

The reasons to move towards a NMEC approach also support stated Commission goals. For example, the Rolling Portfolio decision calls for evaluation preparedness to include "internal performance analysis during program deployment."[3] There is also a general sentiment that current evaluation approaches, methods and timelines fail to provide timely feedback to program operations, in order to make needed course corrections and improve cost effectiveness. Measuring NMEC using AM&V software meets the goal of continuous program improvement, as supported by this statement by the Northeast Regional Energy Efficiency Partnerships (NEEP) EM&V Forum in their recent white paper, The Changing EM&V Paradigm: "Estimated savings reductions from automated consumption data analysis can provide rapid feedback to programs whether or not this analysis is used as the final evaluated savings. Such rapid feedback is useful whether it is provided as part of program delivery or as part of evaluation."[4]

---

[3] Rulemaking 13-11-005: Decision Re Energy Efficiency Goals for 2016. p.46

[4] DNV-GL for the Northeast Energy Efficiency Partnership Regional Evaluation Measurement and Verification Forum. 2015. *The Changing EM&V Paradigm: A Review of Key Trends and New Industry Developments, and Their Implications on Current and Future EM&V Practices. http://www.neep.org/sites/default/files/resources/NEEP-DNV%20GL%20EMV%202.0.pdf*

EnergySavvy also notes that this question is inaccurately linking pay for performance programs with meter-based savings. NMEC can be used for programs that are not designed to incentivize performance.

How has the analysis method been used in program development (customer, sector, etc.)? What is new now?

EnergySavvy has partnered with several utilities to deploy AM&V tools to optimize programs in the residential sector. These applications have allowed PA's to measure the performance of individual trade allies/contractors, perform remote QA/QC of projects, and collect data to inform updates to TRMs. Additionally, automated M&V allows for targeted program marketing, testing of new measures with faster feedback on results and for PA's to communicate savings information to program participants.

AM&V also allows energy savings to be valued as a resource. Continuous, automated measurement tracks savings at the meter and can estimate savings at specific times and locations. Due to increased solar penetration, the California IOU's are likely facing a very real situation where avoided costs of energy efficiency are zero or even negative at certain times of the day. For energy efficiency programs and projects to be cost effective, and justifiable from a ratepayer perspective, the time and location of the savings is therefore likely to be essential. This level of savings detail can only be done with automated, continuous measurement of massive volumes of customer interval data. Therefore, taking advantage of AM&V approaches in the early stages of AB802 implementation will ensure that the IOUS and the EE industry in CA are prepared for this eventual outcome.

Are there new opportunities that make this project level approach to M&V scalable for programs (i.e. multiple customers)?

EnergySavvy provides AM&V software for mass-market (residential and small-midsize

business) programs exclusively. AM&V allows for programs based on NMEC to be fully scalable to multiple customers. AM&V tools allow for program designs to be based on NMEC and for the benefits of such program designs to be deployed to all customer classes, not just large commercial buildings. As ACEEE pointed out in a recent paper on technology and EM&V, "The use of ICT [information and communication technology] to track customer energy use can help make residential programs scalable, as the effort and cost involved in expanding a program can be quite small. As more customers are added to the program, the administrative cost per customer goes down, which in turn improves the program's cost effectiveness."[5]

How are time series challenges like how long to measure and the collection of pre and post data handled? How are persistence of the savings identified and accounted for multiyear effects?

AM&V tools ease these challenges by continuously measuring NMEC without additional costs or burdens. Monitoring savings can continue unabated and aided through software without additional costs. AM&V tools provide the unique benefit of consistency with ongoing measurement that can remain "on" for set durations.[6] Additionally, AM&V can provide data to better understand persistence to estimate multiyear effects and feed into planning.

EnergySavvy does seek to note that in mass-market programs, turnover data (the changing of a business at a meter or a homeowner moving) would need to be tracked. AM&V can account for these participants by removing their savings from persistence measurement. To account for "dropping" that premise other program participants would provide savings estimates that can be extrapolated out to account for homes or

---

[5] Rogers, Ethan, et al. 2015. *How Information and Communications Technologies Will Change the Evaluation, Measurement, and Verification of Energy Efficiency Programs*. ACEEE. http://aceee.org/research-report/ie1503; pg 29.
[6] Ibid

businesses with turnover during periods of time where persistence is being measured.

Routine and non-routine adjustments how are they handled? Do they matter? Why or why not? How is maintenance handled? (routine or non-routine?)

In mass-market programs, routine and non-routine adjustments are less of an influential factor in measurement. Large sets of projects allow automated measurement to segregate outliers from the group for the purposes of measuring savings from a particular program or treatment applied to a group of premises.

An alternative method is to approach programs with a mindset that the "noise" will "wash out" from large sets of projects. In technical terms, error distributions at the individual building level are not normal. However, according to the Central Limit Theorem, a normal distribution of error is achieved by aggregation of savings across large numbers of participants, enabling high certainty in the savings estimates at traditional confidence intervals (e.g., 90%). EnergySavvy has found that aggregated sets of 25 or more projects provide a signal that savings exists. However, without bias correction from the use of robust comparison groups of non-participants it is unclear if that savings is naturally occurring or a result of a program intervention. To arrive at an accurate savings estimate for an aggregated set of premises, it likely requires no less than 150 projects, however the same robust comparison groups are necessary to attribute the saving to program intervention. More complex programs, may require larger sets of projects to arrive at similar results.

EnergySavvy expects that Energy Division will want to see studies on the use of AM&V tools employing the Central Limit Theorem. In the meantime, EnergySavvy recommends that outliers be removed from program results and median results be extrapolated out to assume their place in the savings estimates or that Energy Division take a "no regrets" approach to accepting that outliers will wash out from the overall measurement data.

How does the method deal with detecting small interventions versus big interventions?

AM&V tools for mass-market program are able to detect savings as low as 2-3% for a treatment. EnergySavvy also sees promise that advances in data science, combined with AMI data, will allow AM&V tools to measure savings down to 1%.

Are proprietary models or methods required and how does it relate to the need for transparency to ensure a level playing field for market actors as well as confidence in the results?

Proprietary tools are the best in class AM&V products and are evolving at a rapid pace as private companies invest in research and development to offer modern solutions for EE. Firms, such as EnergySavvy, are constantly working with experienced data scientists to improve methods and refine approaches. It's also important to recognize that proprietary tools may be the only option available for certain program sectors to employ embedded AM&V for continuous program measurement. Furthermore, as the AM&V industry continues to evolve, the market for tools will grow and change. That may result in certain AM&V tools becoming public or provided as a public service by private companies. The Commission should enable the market for tools to grow, serve the PA's and provide best in class solutions for energy efficiency programs to deliver the value for ratepayers.

Proprietary tools can be transparent and validated. EnergySavvy supports transparency so that confidence in results can be assured. For decades, evaluation firms have been open with methods and provided methodologies, calculations, model specifications, inputs and outputs, as part of evaluation. EnergySavvy follows that practice and provides documentation of methodologies to all stakeholders. EnergySavvy supports the approach taken in Attachment A of the HOPPs White Paper, "Models, methods and tools must be transparent, reviewable and replicable by peer reviewers." Including the footnoted use of outside reviewers that will be under non-disclose agreements with the CPUC.

EnergySavvy expects that methodological review will be necessary for all tools – public or proprietary – that are used for AM&V. Using NMEC for quantification will require new methodologies, adapting to large amounts of data and may require new approaches to perform M&V. Regardless of which tools are used for this purpose, Energy Division should carefully scrutinize the validity of M&V approaches and provide guidance on how M&V can be continually improved for the purposes of measuring NMEC.

EnergySavvy expects that Energy Division will play a critical role in validating tools, methodologies and AM&V approaches as evaluations of programs with embedded AM&V become available. As was stated by several stakeholders during the workshops, Energy Division can review approaches and develop trust in automated methodologies. Over time, EnergySavvy expects that trust will foster support for common standards that will benefit the industry and encourage vendors to continue to develop innovative solutions.

Proprietary tools can foster a level playing field. Proprietary AM&V tools can be available to various market actors. Software allows data to be displayed on dashboards for different market actors. These dashboards allow program or project measurement to be viewed by market actors while protecting PA data. This level of sophistication is not complicated for AM&V firms and can provide access to savings information to various stakeholders. Building dashboards, maintaining service and ensuring that market actors are receiving modern tools requires upkeep and attention, firms providing proprietary tools will be incentivized to provide that service. EnergySavvy is actively working to support programs that utilize accessible dashboards for various market actors. EnergySavvy also believes that methodology review should also be allowed by outside market actors (e.g., aggregators, trade allies, financiers, etc.) to ensure confidence in results.

What customers or market segments will most benefit from your programs? (i.e. what does it supplant in the existing portfolio?)

EnergySavvy works in the field of mass-market programs. For those programs, NMEC, paired with AM&V can help drive deeper savings, simplify M&V, allow for comprehensive approaches, reduce administrative costs, and provide accurate savings estimates that track persistence over time. Generally, EnergySavvy agrees with the slides shown by David Jump of QuEST during the first day of the workshops.

What cost effectiveness barriers or opportunities come from embedding savings quantification – normalized metered energy consumption – in your service offerings?

EnergySavvy has been working with PA's around the country to embed continuous AM&V tools into mass-market programs. Based on results from work in several jurisdictions, EnergySavvy has discovered several benefits from embedded AM&V.

- Continuous AM&V provides PA's information on leading and lagging indicators of program performance. This allows PA's to make mid-year program changes to improve realization rates. These factors include individual measures, housing stock, contractors, usage patterns and any other factors collected as part of the program.[7] EnergySavvy estimates that these improvements can lead to up to 5% of additional savings.
- Remote QA/QC for every project in a program allows PA's to target QA/QC budgets, uncover hidden QA/QC issues and target QA/QC budgets to specific projects or trends noticed in a set of projects that require further investigation.
- Collecting large quantities of primary source data for TRM (also applies to the

[7] ACEEE Intelligent Efficiency Conference; Presentation by Greg Lovett of Ameren of Missouri; Unique Insights from Usage Data: Leveraging Savings Measurement Software; December 7, 2015, Boston MA. http://aceee.org/sites/default/files/pdf/conferences/ie/2015/Session3C-Lovett-IE15-12.7.15.pdf

DEER or CalTF) updates.[8]

- Data analytics, partnered with automated continuous M&V allows PA to conduct targeted marketing. This can allow programs to yield stronger projects and drive deeper savings from program dollars/identify premises with stranded assets.

It is important to recognize that this list of benefits is likely incomplete and numerous other benefits will emerge as AM&V becomes widely utilized in more programs and more jurisdictions.

What would be the impacts of tying incentive payment to performance? Perceived adverse impacts to participants?

Alongside the discussion of how pay for performance programs are structured, EnergySavvy seeks to point out an additional benefit that should be considered in relation to pay for performance approaches. For too long, mass-market programs have not been designed to inform customers of project level energy savings. This has caused customers to remain disconnected from energy efficiency projects, fostered skepticism about savings being real, and hindered program participation. Using AM&V to measure projects (even if results are aggregated for evaluation or incentive purposes) can allow customers to receive data on their projects. This enables customers to understand the savings, recognize value in their own project, and, ideally, help spread the word about EE programs, thereby increasing customer participation.

How do you deal with proprietary information from vendors? What are appropriate levels of disclosure and to whom for what purpose?

As stated above, EnergySavvy strongly supports transparency for AM&V tools. EnergySavvy supports the approach included in Attachment A of the HOPPs White Paper

[8] ACEEE Intelligent Efficiency Conference; Presentation by Greg Lovett of Ameren of Missouri; Unique Insights from Usage Data: Leveraging Savings Measurement Software; December 7, 2015, Boston MA. http://aceee.org/sites/default/files/pdf/conferences/ie/2015/Session3C-Lovett-IE15-12.7.15.pdf

and recommends Energy Division continue that approach for AB802. As has been done in the past, methodologies and model specifications need to be open. Methodologies also need to be shared with stakeholders and available for review. It is incumbent on vendors to provide methodologies in a format that can be understood and interpreted by various stakeholders.

As familiarity with the use NMEC and embedded M&V progresses, the development of approved methods, which can lead to standards, will help to foster increased acceptance for AM&V solutions. This will allow increased trust and acceptance of the results from these tools to accrue and further the deployment of AM&V tools.

What are the key elements in the review process that may affect scalability? How public does it need to be?

As EnergySavvy stated during the workshop, the review process, aside from focusing on impact evaluation, can serve an important validation purpose for AM&V tools. The review process can also aid in the development of standards for AM&V, standards for different program designs, and foster trust in AM&V tools. EnergySavvy strongly encourages Energy Division to include these goals as part of the review process.

Conclusion:

EnergySavvy appreciates the opportunity to provide informal comments on this important proceeding. The development of rules for the quantification of energy savings based on NMEC is an important development that can usher in greater use of AM&V tools. And the deployment of AM&V tools can support an increased reliance of EE as a true resource. A resource that can be tied to specific times and locations. EnergySavvy looks forward to continuing to work with Energy Division and the Commission on this process.

Respectfully submitted,

Dated: February 10, 2016

Jake Oster
EnergySavvy
Senior Director, Regulatory Affairs