New Jersey 2019 Energy Master Plan (EMP)

Executive Order 28

Open Energy Efficiency Comments in response to the Reducing Energy Consumption Stakeholder Meeting and the corresponding Discussion Points.

RESPONSE ON BEHALF OF OPEN ENERGY EFFICIENCY, INC.

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Introduction

OpenEE is pleased to submit comments on New Jersey Executive Order 28, and commends the State of New Jersey for its commitment to clean energy resources for the future.

We believe that by supporting policies that provide near real-time feedback on changes in energy consumption, New Jersey can help optimize business strategies and program designs that respond to grid- and carbon-based price signals to both meet the energy needs of the future and achieve the state's commitment to the climate.

Open Energy Efficiency (OpenEE) is an industry leader in meter-based demand-side energy management. We provide an advanced M&V platform, based on the open source OpenEEmeter, to track and normalize metered consumption data from individual buildings so that portfolios of assets can be aggregated to provide a flexible, demand-side load balancing system.

Historically there has been no consistent, accurate and transparent way to track results at the meter level while a program was underway and thus no capacity to provide rapid feedback to improve cost-effectiveness, reward actual success in saving energy, or prioritize and incentivize interventions that provide the savings most needed by the grid. The OpenEE platform enables near real-time performance analytics and supports both traditional regulated programs as well as performance-based initiatives to meet these goals. The platform is designed to make performance data accessible to all parties to overcome key barriers in deploying energy efficiency programs.

Modern grid planning also requires accurate tracking of both the time and locational impacts of energy efficiency and electrification efforts. This tracking is critical not just for load balancing and the deployment of non-wires alternatives, but also for carbon accounting to ensure that greenhouse gas reduction goals are actually being met. In addition to more timely and accurate monthly billing analysis to facilitate market approaches to efficiency, the OpenEE Platform also leverages AMI data and the hourly methods developed and tested through the CalTRACK Methods process to quantify impacts on demand on an 8760 basis to ensure that efficiency and demand flexibility efforts serve larger grid and carbon goals.

OpenEE has experience supporting utilities, administrators, and regulators across the country as they tackle distributed energy resource management. We have operationalized meter-based consumption policies, are supporting pay-for-performance program designs, and are facilitating competitive procurements and tracking for local capacity needs.

Demand Flexibility and the Role of Energy Efficiency

As New Jersey sets forth a strategic vision for the production, distribution, consumption, and conservation of energy, it has a unique opportunity to create sustainable market structures to ensure the continued growth of the clean energy economy. Rather than dusting off a playbook from past energy efficiency and demand side management strategies, New Jersey has the opportunity to re-invent the future of distributed energy resources to meet energy needs.

Three foundational components can ground this strategy, and meet the many objectives that may be envisioned for the Energy Master Plan:

- **Meter-based quantification** of distributed energy resources to enable consistent transparent valuation of grid and customer benefits;
- **Performance-based** deployments of programs and interventions to drive accountability;
- **Procurement-based financing** to secure long term stable investments in distributed energy resources.

In this supplementary material, OpenEE shares our vision for distributed energy resources wherein demand flexibility, energy efficiency and beneficial electrification can play a central role in driving toward fundamental market transformation.

We are finding that meter-based performance programs are attracting a range of market actors delivering a wide range of services to meet a common goal of reductions in energy consumption at the times it is most needed. This same approach can truly invigorate local market actors that make up the economic fabric of New Jersey. With consistent measurement and performance acountatiliby, procurement-level financing can unleash the scale of investment in energy efficiency and distributed resources needed for New Jersey to meet its goals. Ultimately, a market-oriented execution of a clean, lean energy master plan will support policy goals of equitability, drive workforce development, create new jobs and support new industry in the state for the long term.

Meter-based Quantification

Energy efficiency programs across the country typically focus on measure-based interventions and the associated incremental savings. These “deemed” estimates facilitate transactions but, as static estimates, can become outdated quickly and cannot capture true grid impacts. Alternatively, meter-based assessments of changes in energy consumption can be deployed alongside traditional programs to offer a near real-time view of progress and performance. Consistent, repeatable, standard methods create a transparent foundation of measurement and verification for all actors in the system and provide actionable intelligence for continuous improvement.

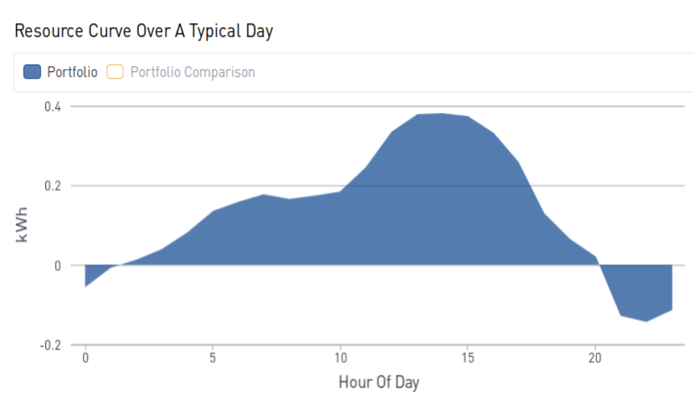
Likewise, the effect of energy efficiency and electrification on carbon emissions has been calculated based on monthly average impact multiplied by average grid carbon intensity. However, this is not a very accurate measure of impacts or the value of the intervention. It matters when and where one uses or saves energy, especially as the grid adds more renewable generation. Changes in consumption from such interventions can and should be better aligned with the value being delivered.

To address these challenges, CalTRACK specifies a set of methods to standardize the way changes in energy consumption are measured and reported. CalTRACK was developed with the participation of over 50 stakeholders from utilities, regulators, valuations, and market participations, through an open process with all methods publicly available.

When CalTRACK is implemented through open source software such as the OpenEEmeter, these methods can be used to support procurement of energy efficiency, electrification, and other distributed energy resources by calculating changes in consumption at the hourly, daily or monthly (billing period) levels. Others can use CalTRACK as a best-practices guide to calculating meter-based changes in energy consumption creating a common pool of understanding of performance.

As we move to increasing levels of clean, but often intermittent, energy resources, the value of time and locational demand flexibility is critical to balance loads and ensure that carbon reduction goals are being met. Therefore, the most recent update to the CalTRACK methods was designed to capture the hourly impacts of energy efficiency interventions. Executed through the OpenEE Platform, these methods can provide accurate accounting for both the load balancing and true marginal carbon reduction value of interventions by accounting for the time and locational impacts of both energy efficiency and electrification efforts.

The OpenEE platform delivers resource curves that measure the time-based impact of behind-the-meter distributed energy resources to the demand of a portfolio of buildings.



Using the methods established by CalTRACK 2.0, time-based changes to demand for individual buildings are rolled into portfolios to create stable counterfactuals of predicted usage that consider the effects of both weather and occupancy. These counterfactuals can measure both energy efficiency and electrification, as well as any other behind-the-meter distributed energy resource.

Interventions impact the grid differently at different times of the day from one neighborhood to the next. A truly flexible demand-side market must be able to send price signals based on grid needs for demand changes that are tied to particular time and locational impacts. By geofencing portfolios and using metered consumption data to measure the actual impact of purported curtailments, portfolio resource curves can be measured and verified with similar precision as hardware such as batteries and solar panels. Hourly resource curves can also be calculated in near real-time and as frequently as consumption data is made available.

New Jersey can start by setting the expectation that meter-based results will be foundational to the state's deployment of efficiency. While advanced metering infrastructure may not yet have traction, adding the monthly meter-based dimension to energy efficiency is a no-regrets strategy. Using consistent methods to quantify impacts at the meter means that New Jersey can support efficient deployment of programs and track progress for the Energy Master Plan. As opportunities to use hourly methods emerge, New Jersey can continue to adapt to create incentive structures that align with more granular grid value. Consistent, transparent measurement and verification makes this incremental approach possible, because the common understanding of the units delivered (decrease or increase in energy consumption) doesn't change.

Performance Drives Accountability

Millions of grid-balancing assets are waiting to be deployed in the smart grid of the future. These assets include smart thermostats, high-tech water heaters and heat pumps, electric vehicle chargers, demand response, battery storage, and many other new technologies and business models that are waiting for a market. Deploying such assets creates load increases or decreases at different times and locations on the the grid that can be quantified as resource curves.

To date, most efficiency or electrification programs have utilized a centralized infrastructure to send signals to smart devices during periods of high demand or through measure-based efficiency programs based on average or modeled savings. However, as the number of devices and programs multiply and consumer fatigue sets in, other more decentralized forms of grid balancing must be considered to achieve scale in both demand and capital. If we are to leverage the vast potential of demand-side resources, we must look beyond the current centralized framework and leverage the infrastructure, innovation, and capital of third parties, each with their own unique approaches to engaging, financing, and managing the demand patterns of their customers.

Pacific Gas & Electric
Residential Pay for Performance

In 2016 PG&E launched its first Residential Pay for Performance Program with a budget of $5M. The essence of the program design is simple: PG&E negotiated a price per kWh, kW and therm in from prospective bidders offering a wide range of services.

Bidders were free to propose any type of intervention that they believed could deliver savings at the meter and quantified using the standardized methods (CalTRACK). Monthly payments are made to the aggregators based on the meter-based savings. The program administrator, aggregators and their contractors in the field have access to performance information for each project as well as for the portfolio to track progress and make continuous improvements.

The program has since been expanded to $20M and the pool of aggregators is growing. With the evolution of hourly methods, PG&E has included an extra element: a 3X price bonus for aggregators that can deliver savings coincident with afternoon ramping.

A decentralized model based on performance and delivered by third parties offers several advantages:

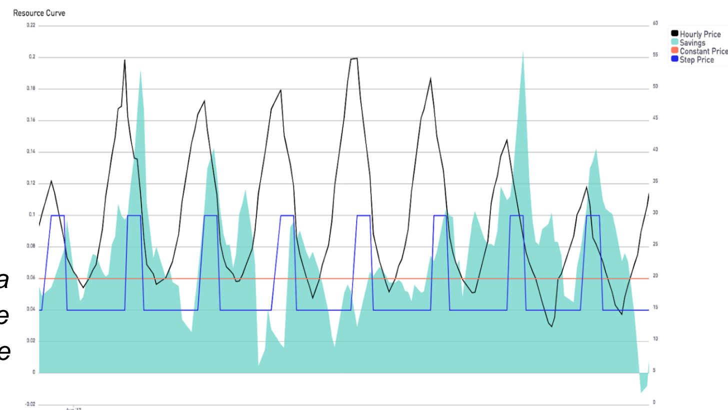
- One size does not fit all when it comes to demand-side management. Instead, an approach that encourages innovation will allow more effective and less expensive demand-side technologies and business models to emerge.
- The use of meter-based resource curves, as opposed to modeled or deemed values, ensures that the impact of third party actions on the grid are accurately and quickly captured, and creates the confidence necessary to treat flexible demand as a procurable resource.
- Driving innovation through markets that pay third parties for results encourages competition that in turn drives consumer demand through innovative technologies and better options.
- Designing market models that align incentives rather than regulating the specifics of each business model and technology greatly reduces administrative costs.
- Utilities and ratepayers pay only for the delivery of real of value to the grid while aligning risk within the market. This allows private capital to be deployed to scale demand-side energy management solutions.

When performance is tracked with consistent methods, the market can leverage price signals based on both time and locational value. Third parties can deliver services that align with this value and any others that are established by New Jersey and that align with the needs of your residents and businesses.

Sending a Price Signal

Rather than deploy programs that try to predict the most promising technology, load serving entities or program administrators in New Jersey can instead send a price signal that will engage the market and deliver more reliable, flexible demand impacts at a lower cost and risk than traditional efficiency or electrification programs. Similar to many demand response programs, third party aggregators will deliver portfolios of buildings with savings concentrated in the most valuable hours.

As an example, PG&E's Residential Pay-for-Performance program sets its valuation to reward savings that happen during the late afternoon ramping period at 3x the value of baseload savings.



Resource Curve: Green area
Locational Marginal Cost: Black line
Tiered Valuation Model: Blue line

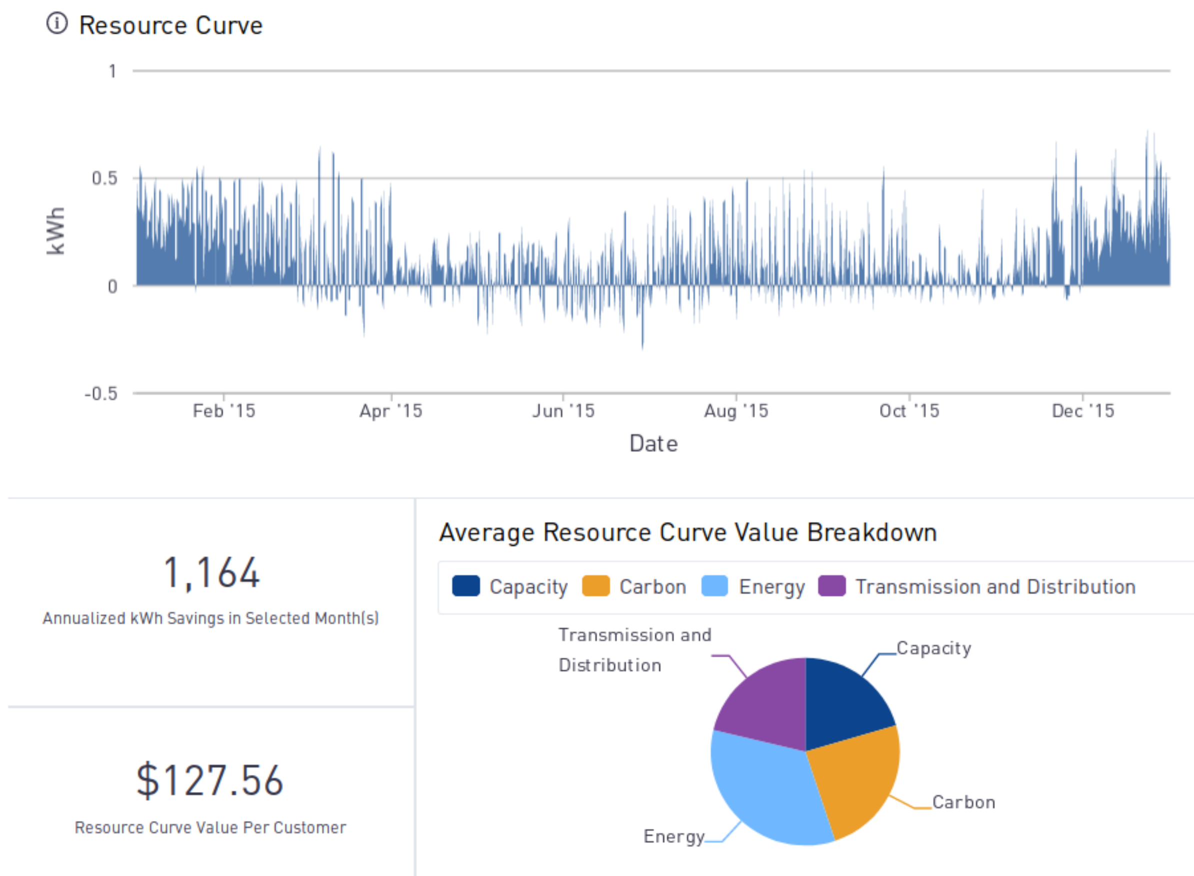
Engaging The Market

Once this structure evolves, New Jersey will be able to procure demand flexibility from third parties through pricing and a specification for other valuable criteria (e.g., particular measures or hard to reach sectors). Third parties will be able to respond with an appropriate price that balances their risk with procurement cost-effectiveness.

Evaluation of demand changes can be conducted using the CalTRACK hourly methods, which are expressed in the open-source OpenEEmeter code. Evaluation is typically calculated simultaneously by both the procurer (most often the utility) and the aggregators. Open methods and source code enable both parties to track savings in real time as well as to forecast yields and target high value customers by analyzing the performance of their existing assets.

Paying-for-Performance

Once a performance period has commenced, daily, weekly, or monthly payments can be issued to aggregators for their performance. The program administrator (utility) simply applies the energy valuation pricing curve to the resource performance curve to calculate payments. The figure below shows how historical resource curves may be calculated for different types of assets to inform forecasting and financial projections. The actual 8760 resource curve and its associated value can be calculated using a number of valuation/pricing approaches, and it can be broken down into different categories (e.g. T&D, carbon etc.), as shown in the bottom figure. This conveys the value of the resource curve to specific components of the grid.



New Jersey can start creating a foundation of performance and accountability now. As programs and strategies are developed for the Energy Master Plan, the delivery of distributed energy resources, including efficiency, should be held to a standard of visibility to assess progress and to make changes as needed. Incorporating this principle now will minimize the heavy overhead and burden of centralized measure-specific guidelines, and create accountability for success that extends beyond formal authorities.

Performance that is tied to meter-based outcomes can drive value to where it is needed. It also keeps all options for capturing that value on the table, allowing for innovative products and customer engagement strategies to emerge in the market. Most importantly though, it allows investments in efficiency and demand flexibility to grow based on their value to the grid (as part of procurement decisions) and to customers, rather than be constrained by traditional program budgets.

Procurement Investments Enable Scaled Solutions

By some estimates, reaching the true potential of efficiency in the United States will require an investment of $1 trillion or more over the next few years.[1] Current program spending, however, hovers between $7 and $8 billion per year.[2] Part of the reason it has been difficult to draw adequate investment into energy efficiency has been the uncertainty created by a lack of transparent tools for calculating energy reduction savings. Without private investment, the risk for delivery of savings for energy efficiency projects is borne by utilities, ratepayers and individual building owners.

Meter-based pay-for-performance is a first step in transforming the way we have traditionally paid for energy efficiency, setting the stage for much greater private investment in the market.

Today, energy efficiency investments are first financed by consumers (either out of pocket or based on their credit or the value of their asset) and then partially reimbursed through a rebate. Performance risk is borne by these same consumers and the ratepayers who fund subsidies; it is not uncommon to see realized savings rates that are 30 percent or more below upfront estimates.

In essence, pay-for-performance programs mirror a Savings Purchase Agreement (SPA), the equivalent of a Power Purchase Agreement in reverse. Paying directly for the change in normalized metered energy consumption creates a cash flow that can be financed through private capital sources like infrastructure investments. This new form of finance differs from most current energy efficiency finance products, which are based on customers' credit or asset value, and is called "project finance", as it is underwritten based upon projected cash flows rather than the balance sheet of the building owner. This form of project finance, akin to the financing of supply side resources, is how one finances the building of grid infrastructure or power plants and can now be applied for the first time to energy efficiency. While there is a high degree of variance of energy efficiency results with individual customers, energy efficiency as a portfolio (when projects are similar and in sufficient supply) is a very consistent asset.[3]

New Jersey has an opportunity to grow toward this vision as it scopes out the Energy Master Plan. The incremental steps of meter-based quantification, coupled with pay for performance,

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[1] Tai, David Frankel and Humayun. "Giving US Energy Efficiency a Jolt." McKinsey & Company, Oct. 2013, www.mckinsey.com/industries/electric-power-and-natural-gas/our-insights/giving-us-energy-efficiency-a-jolt.

[2] Cooper, Adam, and TD Smith. Electric Utility Customer-Funded Energy Efficiency Savings, Expenditures, and Budgets (2014). The Edison Foundation, Institute for Electric Innovation, 2015 http://www.edisonfoundation.net/iei/publications/Documents/IEI_2015USEnergyEfficiency_2014Exp_FINAL.pdf

[3] Natural Resources Defense Council, *Putting Your Money Where Your Meter Is* (January 2017), Page 25. https://www.nrdc.org/sites/default/files/pay-for-performance-efficiency-report.pdf

can help establish the necessary structures to enable a fundamental change in how demand flexibility is funded. By opening procurement models to energy efficiency alongside other distributed energy resources, New Jersey will have the opportunity to scale these resources to support the green economy and address global climate health.

Opportunities and Next Steps

The opportunity to re-invent energy efficiency in New Jersey is coinciding with a broader opportunity to ensure energy efficiency can be part of real grid solutions. Market-based solutions are the key, and there are many benefits to be had on the road to full procurement markets.

The Energy Master Plan can start to lay out strategies for consistent quantification, create clear lines of market accountability through performance, and create a glide path to scale through procurement level investments in demand flexibility as market actors build competence within the system.

There are both short term and long term benefits to a market based solution for demand flexibility and energy efficiency. In the short term, current program strategies can be improved by embedding automated feedback on performance into program deployment. Meter-based rapid evaluation and measurement is a no-regrets next step. Information gathered with this approach can be made available and actionable to all players in the system and can be used to support adjustments to track progress and maximize the cost effectiveness of savings.

In the long term, the greater public benefit comes by, shifting the energy efficiency performance risk currently borne by utilities and ratepayers to the competitive marketplace and attracting the financing needed to attain our climate and efficiency goals. New Jersey can lay out a path to this future as it designs the Energy Master Plan and the funding structure to support the plan's success.

OpenEE recommends that New Jersey consider three core elements to enabling a robust clean energy future as they develop the 2019 Energy Master Plan.

- **Adopt open source and transparent universal tracking of meter-based quantification** of changes in energy consumption to support cost effective deployment of programs and monitor progress in near real time. Use meter-based methods to define the time value of energy efficiency as AMI becomes available.

- **Leverage meter-based performance** as a means to align incentives with value and support the long term sustainable growth of aggregators, contractors and other vendors in New Jersey.

- **Procure distributed energy resources via infrastructure investments** akin to procurement of supply side resources. Competitive procurement via RFPs or service agreements that are open to DERs will enable in the future project finance at the scale of supply side resources and portfolio performance risk insurance.

Responses to Specific Discussion Points

Each response from OpenEE is targeted toward achieving the 2050 goal of total conversion of the State's energy production profile to 100% clean energy sources. They can be implemented over the next ten years to achieve this goal.

General

1. What energy efficiency, peak demand reduction, and demand response programs and systems will assist in helping keep energy affordable for all customer classes, especially as technology advances in areas such as electric vehicles or heating and cooling, which will potentially increase electric energy usage?

Most energy efficiency programs are currently planned and implemented around the measures or technologies that deliver incremental efficiency over the existing product installed. This has been a successful model to overcome the discrete market barrier of first-cost-of-installation of the more efficient technologies, and to offset use of fossil fuels. However, paying for savings in advance, based on deemed savings estimates, presents problems with verifying the actual impacts to the grid. This reduces innovation in capturing savings, and is ultimately less effective at delivering outcomes.

The U.S. currently spends over $150 million every year to evaluate, measure and verify gas and electricity savings, resulting in complex and often subjective reports that often retroactively reduce savings and create substantial uncertainty[4]. In one example, NRDC estimated that an evaluation incorrectly and retroactively lowered the value of PG&E's upstream lighting incentives by $1 billion. In describing the fundamental challenge of the current system of evaluation, measurement and verification, the DOE State Energy Efficiency Action Network put it succinctly: "EM&V is sometimes seen as expensive, not credible, not timely, not transparent, and as a burden, not a benefit."[5]

Today, as the grid becomes greener, the value of being lean needs to be aligned with when and where consumption is happening. Today's grid requires timely, dynamic information about the changes in consumption driven through energy efficiency investments, not averaged summaries

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[4] *2016 State of the Efficiency Program Industry CEE Annual Industry Report - Budgets, Expenditures, and Impacts*. Consortium for Energy EFficiency, 2017. Page 46 www.library.cee1.org/system/files/library/13159/2016_CEE_Annual_Industry_Report.pdf

[5] Lacey, Stephen. "Lies, Damned Lies and Modeling: Energy Efficiency's Problem With Tracking Savings." Gtm, Greentech Media, 3 June 2015, www.greentechmedia.com/articles/read/overcoming-energy-efficiencys-problem-with-tracking-savings

either agreed upon in advance (deemed) or revealed years after implementation (evaluated results).

As it develops the 2019 Energy Master Plan, New Jersey has the opportunity to avoid these pitfalls and costly systems and establish more efficient and effective pathways for delivering efficiency and electrification while keeping rates low and services accessible across rate classes.

Creating markets to scale the development of energy efficiency, peak demand reductions and demand response will enable the delivery of more affordable electricity to everyone. Deployment of distributed energy resources can play a core role in decision making for grid infrastructure as long as they are evaluated consistently based on cost of delivery, the value they provide to the grid, and how well they meet policy objectives. When fully considered in rate making and procurement decisions, these resources can be factored into the resiliency, stability, and value that may come with increased electrification for all customer classes.

Meter-based performance should be central to the deployment of all distributed energy resources including energy efficiency and demand response. This approach also allows for performance based payments which can include adders for capturing the value of targeted interventions for specific rate classes, neighborhoods, or grid-constrained areas to meet broader policy objectives. Competition on price for the value of grid resources can help keep everyone's rates low and performance based programs can efficiently drive investments to areas that need it most. Leveraging procurement structures to finance energy efficiency will enable it to be done at scale to drive maximum benefit to the economy.

2. With the coming requirement that all commercial buildings over 25,000 sq. ft. be benchmarked through EPA's Portfolio Manager, what programs should be created to help with benchmarking and reduction strategies?

Benchmarking requirements should be followed by performance based programs or procurements. This can create a sustainable structure for driving investments into buildings with the greatest opportunity to improve their score, or to improve their grid integration as a dynamic, flexible resource, which may mean increasing usage at times to meet grid needs and improve resiliency.

3. What are the key non-energy benefits associated with energy efficiency? How can their value best be considered in cost-benefit analyses?

There are multiple benefits from energy efficiency to multiple parties. One way to frame the issue is that each party should pay for the value they wish to capture.

For example, customers save on their bill and get other non-energy benefits including comfort, improved performance, a new technology etc. Grid and rate payers get cost-effective and clean grid resources, capacity, resource acquisition and/or non-wires solutions. Policy benefits may include helping low and medium income groups, market evolution and development. It is possible to separate the public value of procuring a cost-effective resource and the other desired policy outcomes.

We can pay for the resource based on meter-based outcomes, and can pay for additional policy outcomes through rate-payer surcharges. The policy outcomes should be tied to the intended outputs, such as reaching low income communities, rather than to an all in cost benefit analysis that finances the social benefits with the energy benefits.

4. What should the role of ratepayer funded programs, whether state or utility run, be in achieving reduction strategies?

The role of rate payer surcharge funds should be targeted toward achieving policy goals and non-resource interventions. These may include codes and standards adoption, education, statewide marketing, and training of skilled labor to deliver and sell energy services. These market-supporting roles will help accelerate the deployment of distributed energy resources like energy efficiency. However, procurement resources should be leveraged to provide solutions for the least marginal cost to the grid. If energy efficiency and other distributed energy resources present lower cost alternatives, then they are a good deal for ratepayers.

States and utilities can play a pivotal role in creating sustainable market structures and procurement strategies to leverage external capital and make distributed energy resources a scalable resource that is part of the grid mix. They also are essential in maintaining accountability and competition via contract guidelines, consistent and open measurement and verification, and supporting growth of the industry.

Until now, most efficiency programs have worked by offering up-front incentives to customers to upgrade the technology in their homes and buildings in order to save energy. Savings are quantified through engineering calculations; however it is challenging to recreate the conditions and test the assumptions of these calculations to verify performance post-installation. As a result, the efficiency marketplace has been riddled with uncertainty, making it difficult to attract private investment at the scale needed to support a competitive marketplace.

By contrast, pay-for-performance markets reward providers of efficiency based on actual, metered results. We recommend that the New Jersey adopt pay-for-performance programs and competitive procurement as a first priority where feasible and appropriate, which will deliver more cost effective reliable savings. The cost savings achieved through the automation of the measurement and verification is realized by ratepayers both directly (through ease of program participation and added value of seeing progress) as well as through the ability of the energy efficiency portfolio to operate more efficiently to deliver savings to the grid.

Pay-for-performance is a key stepping stone to unlocking scale by monetizing savings as they are delivered, aligning incentives to enable innovation and competition in the market. Pay-for-performance markets are structured with incentives that are primarily paid out after savings are realized instead of through upfront rebate payments. The responsibility for achieving energy savings moves from utility programs to market based aggregators. Instead of designing programs, utilities (and ratepayers) pay for outcomes and allow the market to develop strategies to drive demand while optimizing for the most valuable grid impacts. This supports the local economy and creates a level playing field for distributed energy resources (including energy efficiency) and a structure that can animate markets and allow for marketplace innovation and investment in the long term.

5. What type of educational outreach is needed to advance energy efficiency throughout New Jersey?

Educational outreach may be helpful to create an environment of interest and awareness of opportunities and general benefits of energy efficiency to consumers.

However, with performance-based procurement models for distributed energy resources like energy efficiency, the education could also be handled by the market as aggregators seek out opportunities to connect with customers, leveraging any number of strategies to make the case and meet customers “where they are at” instead of trying to craft a universal message from a central location. The innovations necessary to educate and engage consumers will be developed through competitive markets, leading to business model and technology innovation.

Otherwise, education of utilities and regulators on the value of markets and comparability of energy efficiency in the distributed energy resource and grid value context is very important. In addition, energy efficiency providers transitioning to meter-based performance may require additional support in developing business models and taking advantage of tools or services (such as insurance) for managing risk.

Technology

6. What advances in technology should be considered as part of a strategy to reduce energy consumption? What technologies could complement and advance existing energy efficiency efforts?

One key advance in technology that should be considered as a part of a strategy to reduce energy is advanced metering infrastructure or AMI. As AMI is considered in New Jersey, guidelines around access to data to enable markets and target interventions will be critical to the ability to enable effective energy consumption interventions. In particular, locational targeting of decreases (or increases) in energy consumption driven by grid dynamics is a critical use case for the potentially significant investment in AMI.

The value stream for increasing or reducing electric consumption at any given time can now be a meaningful part of grid planning and management. For example, the CalTRACK methods provide a standardized approach to quantify the load shape changes derived from an energy efficiency intervention, in close to real time. When deployed as part of an open source code package (such as the OpenEEmeter) this information can be part of the market transaction and accessible to all players up and down the chain of delivery.

Operationalizing consistent measurement and verification through open source code enables the deployment of any number of known and currently unknown interventions or combinations of interventions that may drive consumer and grid value in New Jersey. Access to data and democratization of the information across market actors would enhance existing programs by making their grid value traceable, and target more investment in the activities that are delivering value to the grid.

OpenEE is enabling utilities and aggregators to treat energy efficiency as a resource through enhanced visibility. If you measure it you can manage it. Once the resource of energy efficiency can be seen as a tangible product, then it becomes a viable tool for targeting energy efficiency interventions to where and when, i.e., timing and location, and it delivers greatest value. It also provides the data necessary for the market to react to price signals in order to optimize how services are delivered and operated.

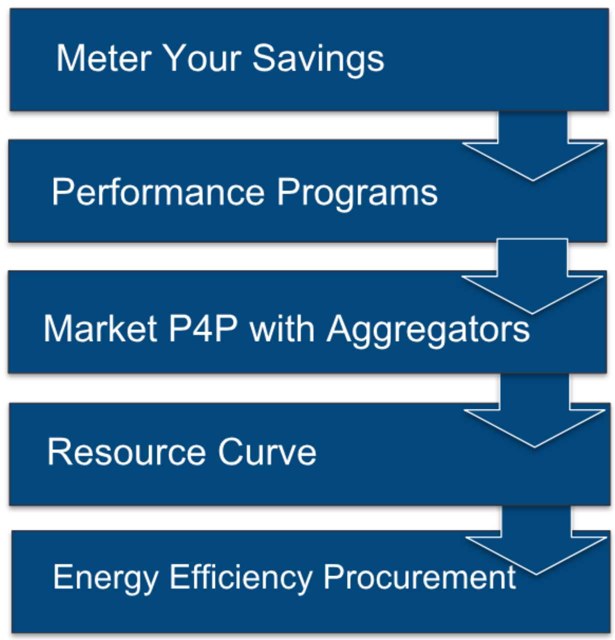
Market-based structures for delivering distributed energy resources can focus on the quantifiable value that a resource like energy efficiency can offer to the grid, in the same way that other grid resources are valued and procured. Contracts and payments will be based on the actual measured performance of that energy efficiency intervention, in addition to the customer's bill reductions and the lasting value it provides for grid management. Meter-based energy efficiency through market structures also achieves additional policy objectives of maximizing the value of investments in AMI that may be made in the future, and helping keep New Jersey rates low.

7. What are the intermediate timeframes and pathways to these new or enhanced technologies and energy efficiency and demand response systems?

The tools to enable markets for demand flexibility are available now. OpenEE, for example, offers a suite of tools and services to make the consistent methods of CalTRACK and the open source engine for calculating changes in consumption (the OpenEEmeter) work in transactional platforms. We provide this service now to Pacific Gas and Electric, Energy Trust of Oregon, ConEd and several other organizations in the country.

The strategies and technologies that deliver the desired change in energy consumption also are all available in the market today and will only continue to grow and expand. Smart Thermostats, energy coaching, HVAC retrofits, whole building retrofits, and other technologies and business models are all delivering savings today across the country, including in New Jersey. Vendors are ready to grow and provide valuable services to the people of New Jersey, and their integration into the economy is as straightforward as setting up markets or performance contracts for them to start delivering value to the system now.

The progression from meter-based energy efficiency to procurement starts with understanding the impacts at the meter and continues with engagement of market actors as performance programs are developed to ensure that the targets and metrics are realistic and the expectations are clear.



As hourly meter data is available in the state, resource curves can help define and explain in more detail the value of interventions to the grid and support their inclusion in procurement processes. The scaled financing opportunities emerge as energy efficiency can be valued in the system.

8. How do we best utilize data analytics for energy efficiency?

We can best utilize data analytics for efficiency by ensuring meter-based consumption is the foundation of the energy consumption policy, practice and procurement.

With a consistent, transparent means of quantifying the change in consumption, now available through CalTRACK and the OpenEEmeter, the state, utilities or other load serving entities can align incentives up and down the delivery chain and stay focused on the outputs of changes in energy consumption necessary to meet state or utility goals for decarbonization.

This keeps the specifics of program design and customer engagement in the hands of aggregators and their chain of contractors who are either already working with customers, and/or have experience and will have the liberty to engage and define incentives that align with specific motivators, rather than depending on a one-size-fits-all regulated program design enabling one technology at a time.

Another way to leverage data analytics for energy efficiency is to ensure that it is embedded in the deployment of all programs that are authorized, and avoid being bogged down in protracted evaluation, measurement and verification feedback loops for impacts on an “ex-post” basis.

Since most energy efficiency programs across the country are tracked using pre-approved, fixed savings and avoided emissions estimates for specific technologies, the actual effects of these measures on the grid may only be known if an ex post evaluation is successfully conducted several years after the intervention. The evaluation activities to recreate the situation in which the intervention happened may be expensive and lack the detailed data necessary to fully understand the impacts.

The challenges of potential inaccuracy of the predetermined estimates, and the time delay of the information to true up those estimates, can largely be resolved with consistent streams of data from universal metering and leveraging open methods and code to automate M&V alongside program deployment. Utilities and regulators can then focus scarce resources on research questions that can further enhance the implementation, but not spend time on re-creating savings impact estimates with sketchy data.

The value of evaluation measurement and verification can be improved significantly by embedding basic data collection, leveraging streams of AMI data, and automating M&V in program design and deployment. For example, the 2013-2014 evaluation of the Home Energy Upgrade program in California cost roughly $375,000, $50,000 of which was set aside for planning and the remainder going to data analysis and reporting.[6] The evaluation was a relatively straightforward billing regression analysis with a handful of additional questions probing program influence and performance. The final report,[7] which was available in 2016, recognized that the poor quality and quantity of data available put severe limitations on the accuracy of the evaluation results. The delay and accuracy issues in the evaluation could likely have been avoided if the data collection and analysis had been embedded up-front in the program design.

By contrast, OpenEE has automated similar techniques for the Energy Trust of Oregon but provides the information as the program is being delivered, enabling dynamic, timely, iterative course corrections. Simply eliminating the time-consuming step of cleaning and analyzing data for one-off reports creates considerable efficiencies for existing programs. Standardizing and automating basic quantification also enables evaluators to focus attention on additional research

[6] Home Upgrade Research and Evaluation - DNV-GL for the California Public Utilities Commission, 2015; https://pda.energydataweb.com/api/view/1293/HUP-ImpactPlan-public.docx
[7] Final Report: Focused Impact Evaluation of the 2013-2014 Home Upgrade Program https://pda.energydataweb.com/api/view/1525/CPUC%20HUP%20Focused%20Evaluation-FINAL_05-03-16+atr.pdf

and inquiry to understand program improvements or market drivers. A final report on this work is pending release fall of 2018.

The Home Energy Reports programs provide another good example of streamlined, embedded EM&V. These programs are enabled through the Opower software platform and are being implemented in many states across the country. The program savings claims are dependent on the measurement and verification in the deployment of the program. Reported savings are based on field performance resulting from customers' exposure to the reports. Participation in other rebate programs are extracted from the savings claim, but the effort to validate results is simple, straightforward and relatively cheap on the evaluation end. The confidence in and acceptance of these savings is largely derived from the fact that a measurement and verification method is embedded in the program.

9. What is the role of blockchain, IoT, big data, 5G, and other specific technologies in energy efficiency?

The emergence of big data, IoT, G5, blockchain and other yet-unknown technologies suggests that the future holds endless opportunities to interact with customers and deliver value to the grid. It also means that neither the state nor the utilities can manage or anticipate every opportunity. Market structures that focus on outputs allow for the expansion of and adaptation to the wide range of technologies and possibilities that may come to bear on the market. These structures can be nimble and dynamic to adapt instead of being stuck in a program cycle with predefined technologies and approaches that will quickly be out of date.

Open source software is another important opportunity. Developing and sharing consistent calculation methods on an open source software platform allows for the greatest level of transparency for the participants, from contractors to aggregators, utilities, and regulators. Working from the same base data and assumptions, efficiency programs can adapt to feedback more readily. Since this feedback is automated, the costs of re-creating data sets are removed from the chain and can be re-invested in projects that deliver energy savings. Industry standard methods for calculating meter based savings are built into open source software tools to remove surprises and generate basic results at a low cost. Making the code for the methods open source removes uncertainties inherent in proprietary software products or evaluation "black boxes". Open source engenders trust among the multiple actors, and provides low cost, consistent results. Open source is also good public policy because the parameters for judging performance are clear to all players in the system, consistent, and allow for oversight and audit as needed.

Blockchain's core use cases as (1) a shared immutable record and (2) a transaction protocol also has the potential to accelerate the deployment of energy efficiency. In the Council on

Foreign Relations' (CFR) discussion paper on blockchain for the broader power industry[8], Sustainability Attribution is identified as one of the most impactful applications of the technology. Fundamentally, this refers to the recording of data that is relevant for multiple parties, in a shared immutable ledger that is accessible, on a permissioned basis, by those parties. For energy efficiency, this data can include past project performance, an audit trail for non-routine adjustments, RFPs for dissemination, and others. OpenEE is currently investigating solutions to the key challenges for this use case, such as on-chain vs. off-chain data storage, the interfaces between the real world and the chain (i.e. oracles), and permission structures.

The decentralized nature of blockchain ecosystems also makes the technology attractive as a transaction protocol, as highlighted by the CFR and the World Energy Council.[9] Standardization is required for all marketplaces, but blockchain-based marketplaces rely on community consensus, rather than a centralized authority for the determination and revision of standards. This is an attractive forcing function for energy efficiency, where there is a different central authority in each state or county. Successful development of such a marketplace would create an avenue for more projects to seek funding and more capital to enter the space. It would also allow for additional monetization strategies for today's industry participants (including utilities, aggregators, etc.), as it creates new transaction channels. Transactions can happen on the chain directly between ecosystem participants (i.e. without relying on a central clearinghouse), and yet can still be safe, quick, and auditable. There are a plethora of token models to choose from when designing this marketplace, ranging from complex utility token schemes to simple USD-redeemable securities. OpenEE is currently working on tackling issues such as these.

State Policy

10. How can the state play a strong role in reducing its energy consumption?

The strongest role the state can play is in setting up a sustainable market based infrastructure to support long term investments in energy efficiency. Whatever the present positioning of the political pendulum may be, it should not be able to topple a structure with a win-win value proposition of putting clean energy portfolios, including energy consumption reduction, at the table for grid decisions and investments. The state can facilitate data access and infrastructure needed to enable markets. It can adopt standards for how changes in energy consumption will be consistently quantified and considered, and it can encourage performance-based program designs. By setting up the stable opportunities to unleash the market to capture the value of demand flexibility and energy efficiency, New Jersey will be supporting the economy from

[8] Applying Blockchain Technology to Power Systems, July 2018
https://www.cfr.org/report/applying-blockchain-technology-electric-power-systems
[9] World Energy Insights Brief 2018 BLOCKCHAIN: EVOLUTION OR REVOLUTION?, October 2018
https://www.worldenergy.org/wp-content/uploads/2018/10/World-Energy-Insights-Blockchain-Insights-Brief.pdf

installers in the field to utility executives and enabling systems to capture that value irrespective of political winds.

An important role for the state is supporting data infrastructure and access. A report by the California Energy Commission released in 2016,[10] provides a ten year roadmap to activate market forces for demand side management and transform California's existing residential commercial and public building stock into high performing, energy efficient buildings. Chapter 2 - Goal 2 of the report illustrates the value and importance of leveraging existing data streams and monitoring consumption trends to inform policy and track progress. Goal 2 is titled *Data Driven Decision Making* and to achieve this goal the California Energy Commission highlights efforts for monitoring energy consumption baselines to enable top down modeling of energy savings, as well as publish weather normalized distributions of electricity and gas usage by customer segment. In establishing the baselines and publishing the energy consumption data, the CEC hopes to engage more market actors to support improvements in efficiency, and for the state to be able to track progress. The California Energy Commission also intends to develop and manage a centralized "Energy Data Lake" to store, analyze, and visualize building energy and efficiency information for the state.

Ensuring that meter-based analysis is at the core of tracking progress is another important role the state can play. This approach follows a similar vein of leveraging existing consumption data to inform policy and planning decisions. The California Legislature adopted legislation in 2015 requiring investor owned utility programs to re-define energy savings to include "taking into consideration the overall reduction in normalized metered energy consumption."[11] This legislation was a deliberate shift away from the view of savings as a measure of only incremental efficiency toward a definition that is more tightly connected to the changes in consumption that would affect the grid and more closely track with to carbon reductions. It is intended to leverage existing data, enable performance, and expand energy efficiency to meet aggressive climate change goals. This legislative change translated into regulatory guidelines[12] and ultimately approval of nine programs designed around incentivizing performance achieved by reducing normalized metered energy consumption.

Another example of leveraging holistic meter-based analysis to inform policy development can be found with the Energy Trust of Oregon (Energy Trust). OpenEE is currently under contract with Energy Trust to support their automated meter data analytics platform. OpenEE is providing

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[10] California Energy Commission Proceeding CEC-400-2016-023CMF; *Existing Building Energy Efficiency Plan Update, December 2016,* *http://docketpublic.energy.ca.gov/PublicDocuments/16-EBP-01/TN214801_20161214T155117_Existing_Building_Energy_Efficency_Plan_Update_Deceber_2016_Thi.pdf*

[11] Assembly Bill No. 802 Energy Efficiency (2015-2016) Chapter 590; SEC. 6. Section 381.2 (b) https://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=201520160AB802

[12] Assigned Commissioner and Administrative Law Judge's Ruling Regarding High Opportunity Energy Efficiency Programs or Projects, December 30, 2015 as part of CPUC R.13-11-005 http://docs.cpuc.ca.gov/PublishedDocs/Efile/G000/M157/K362/157362236.PDF

real-time measurement and verification of projects and programs, providing managers and third-party evaluators a set of customizable analytical tools that allow them to spend their time answering their most important programmatic questions. This partnership is allowing Energy Trust to improve its performance of existing programs as well as to identify new high-value potential customers and projects. In addition to quality assurance and customer targeting, the program is laying a foundation for future pay-for-performance projects in Oregon.

New York, in its move toward pay for performance, also adopted standard measurement and quantification as prescribed in CalTRACK. In early 2018, the The New York State Energy Research and Development Authority (NYSERDA) and the New York Department of Public Service presented a conceptual framework for pay-for-performance energy efficiency in New York State, and announced its intention to use CalTRACK as the foundation of this $50M project.[13]

States can call for greater accountability through pay for performance programs and data sharing to reach climate goals. Oregon Governor Kate Brown announced on November 6, 2017 that she was ordering the Oregon Public Utility Commission (OR PUC) to work with the Energy Trust to launch P4P programs for energy efficiency beginning in 2019. The governor's directive was part of an executive order designed to help Oregonians use energy efficiency to neutralize their carbon footprints and achieve net zero energy ready buildings as standard practice across the state.[14] The executive order also directs the Oregon Department of Energy and the OR PUC to support broad data sharing to inform energy efficiency policy. As data is the raw ore of innovation in energy efficiency, this is a crucial step toward enabling P4P markets.

11. Which strategies should be state-led, and which ones should be advanced by the private sector? What other players are important leaders in energy efficiency?

State and private interventions should be complementary. The state can play an important role in setting the basic rules of the market. This includes setting up the structure for value (including carbon value), and how energy efficiency and other distributed energy efficiency resources are procured. The state can adopt consistent weights and measures for energy efficiency as well as comparable metrics and valuation for distributed energy resource procurement. By enabling markets, but not micromanaging them, the state can open the opportunity for private sector players to optimize value with in the system.

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[13] NYSERDA and DPS Plans for Pay-for-Performance Efficiency in New York; https://www.openee.io/post/nyserda-and-dps-announce-plans-for-pay-for-performance-efficiency-in-new-york

[14] *Governor Kate Brown Signs Statewide Climate Action Orders Before Traveling to Bonn for UN Climate Conference* http://www.oregon.gov/newsroom/Pages/NewsDetail.aspx?newsid=2402; Executive Order No 17-20. Accelerating Efficiency in Oregon's Built Environment to Reduce Greenhouse Gas Emissions and Address Climate Change; https://drive.google.com/file/d/1UN8oQ6PtM90XaIuWDMPt8s8yPALepA6y/view

The state can also play an valuable role in supporting the market by integrating codes and standards, augmenting training, education and outreach across the state, setting social policy priorities, and enabling secure exchange of data and information. These activities would augment market structures around performance and procurement as a primary pathway for delivering quantifiable changes in energy use as part of grid needs.

Other players that are important are finance, aggregators, contractors, and customers. Contractors and aggregators can leverage existing relationships with customers to find the right incentives to drive the desired outcomes for reducing consumption. Financiers and utilities can continue to invest in the approaches that are working, funding them through flexible markets that creating cash flow rather than fixed program cycles with limited budgets and detailed rules in ratepayer surcharge programs.

Trade allies are an important part of program implementation. In deemed savings programs, it is not uncommon to see misaligned contractor incentives because they are not tied to performance of the technologies installed. Poor visibility into project performance has hindered efforts to better engage trade ally partners. Embedding meter-based feedback in program design and delivery and including performance accountability helps address this problem and empower trade allies. Contractors doing the work can have visibility to where the highest savings potential lies, and their bids can capture this potential with access to the information. With this visibility, contractors can use the feedback about the performance of the installations to understand if the measures they have installed are generating the intended reduced consumption and bill savings outcomes, and use this information to continuously improve on and deliver high performing projects.

Contractor quality assurance can be managed through aggregators. By breaking down contractor performance and ranking them from high performers to those who consistently fail to deliver promised results, programs can begin to take steps to increase overall program performance. First, contractors who perform better than expected and deliver consistent results can be rewarded with more opportunities than normally awarded. Second, contractors who perform below expectations can have their work analyzed to find where the lapse is in performance. Feedback can range from property or building characteristics targeted to measures installed, and can be used as a tool to help underperforming contractors reach their peers. Both steps, rewarding high performers and working alongside under performers, will lead to programs that perform better overall, making savings more likely and reliable, and each intervention more cost- effective.

At the utility, there is little information about which contractors are generating the most savings, with the exception of self reported counts of measures being installed. Utilities need new tools from which to understand which contractors are doing well in comparison to which ones may be good candidates for targeted support. This is enabled when universal metering and near real time measurement and verification information is available to contractors and utilities alike. Currently, energy efficiency program deployment identifies voluntary customers through a range of strategies and tactics including market sector information for specific technologies, deep relationships through customer accounts, past participation, and perhaps other demographic information depending on the program type.

12. Should the state require energy efficiency in particular projects receiving state incentives?

States leading by example is an important strategy, and it should be part of a broader structure to fund and support an industry grown from investment in the performance of buildings and their capacity as a grid integrated resource. There are multiple options for the state to show leadership in state spending.

For example, in Washington, DC, the city government has led by example by publishing data on energy consumption for all public buildings. This data is used for energy and water performance benchmarking on some of the largest buildings in the District. All data from the benchmark is made publically available and can be seen on the District of Columbia Open Data Portal. Quality of data is immensely important to the future of distributed energy resources, and taking the initiative to prepare and standardize data is a major step that the State of New Jersey can undertake right away.

13. Should the state play a role in encouraging pilots of different "next generation" buildings? How could the state foster the implementation of net zero or passive buildings projects? How could that impact and restructure redevelopment efforts?

The state has a role in advancing new technologies, and strategies. However these investments should not eclipse the bigger "plays" that will fundamentally change the transactions for demand flexibility to have a future and for ZNE or other advances to truly take hold in the market.

14. What Treasury design standards or procurement policies should be updated to reflect and encourage energy efficiency in state building designs or protocols?

OpenEE has no response to this question.

Codes and Standards

15.What portion of the overall energy savings in the transportation, heating, processing, and cooling and electricity markets should be achieved through advanced and enhanced building energy codes and appliance standards systems?

OpenEE has no response to this question.

16.How should each sector — residential, commercial and industrial — be considered in terms of codes and standards updates towards reduced energy consumption? In terms of energy efficiency, are certain sectors more adaptable or important than others?

OpenEE has no response to this question.

17.What type of zoning changes or incentives should be considered related to green infrastructure? How can these be achieved?

OpenEE has no response to this question.

18.What are some examples of existing or potential advanced building energy standards or metrics? (Examples include: net zero energy, Passive House, Living Building Challenge, etc.) How could these be implemented in New Jersey to accelerate greenhouse gas emissions reduction in new and existing residential and commercial buildings?

The Investor Confidence Project is one example of existing and potential advanced building standards and metrics. Currently, our CEO Matt Golden is the Senior Energy Finance Consultant on the Investor Confidence Project, a project of the GBCI, working with a wide array of stakeholder to develop standard methodologies and protocols for energy efficiency project development and documentation, designed to reduce transaction costs associated with energy efficiency investment, and develop actuarial data to unlock capital markets.

Investor Confidence Project: The Investor Confidence Project (ICP) defines a clear road-map from retrofit opportunity to reliable Investor Ready Energy Efficiency. With a suite of Commercial and Multifamily Energy Performance Protocols in place, ICP reduces transaction costs by assembling existing standards and practices into a consistent and transparent process that promotes efficient markets by increasing confidence in energy efficiency as a demand-side resource.

Investor Ready Energy Efficiency refers to and provides information about energy efficiency retrofit projects that conform to the requirements of the ICP Protocols, have been reviewed by ICP Quality Assurance Assessors, and have received Investor Ready Energy Efficiency (IREE) certification.

In order to be IREE certified, project developers must first select the appropriate protocol for their project and then follow all the procedural and documentation requirements associated with each stage of the ICP Protocols (baselining energy usage; savings calculations; design, construction, and verification; operations, monitoring and maintenance; and measurement and verification). Details of all requirements are specified in the ICP Protocols with additional details, instruction, and resources provided in the ICP Project Development Specification.

The core of the ICP methodology are the ICP Protocols that define a standardized road map of best practices for originating energy retrofits. The ICP Protocols leverage existing and commonly accepted standards such as ASTM-BEPA, ASHRAE Guideline 14, and EVO-IPMVP in conjunction with ICP specified elements, procedures, and documentation based on the various stages of a project life-cycle to create standardized projects with reliable returns.

There are six protocols which cover the majority of commercial energy efficiency projects. Protocol selection is based on building type (Commercial and Multifamily) and on project size and complexity including Targeted, Standard, and Large - spanning single measures to whole building deep retrofit.

19. Are there barriers to implementing new energy efficiency codes for building inspectors? How can potential code updates be made less burdensome for inspectors in order to increase compliance and uniformity?

OpenEE has no response to this question.

Security

20. How can energy efficiency and peak demand reduction strategies assist in ensuring enhanced energy security, reliability, and resiliency in the energy markets?

Energy efficiency and peak demand reductions can be a core element in the deployment of a secure, reliable, resilient grid. When it is incorporated into the grid planning system the many benefits in an emergency may include reduced electric demand, buildings that hold temperatures for sheltering in place, and many efficiency interventions can create improved structural integrity across the building stock. Energy security in the broader sense of social and economic benefits and global health are other clear benefits that energy efficiency and peak demand reductions contribute to resilience writ large.[15]

21. Should strategies across the transportation, residential, commercial, industrial, and electricity generation sectors vary based on differing security risks?

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[15] How energy efficiency can boost resilience, ACEEE April 2018; https://aceee.org/blog/2018/04/how-energy-efficiency-can-boost

New Jersey should strive to have comparable metrics for security risks and contributions to prioritize the myriad of strategies that may be available to meet the Energy Master Plan goals.

Economic Growth and Workforce Development

22. What new or expanded manufacturing could be developed related to energy efficiency?

A wide range of possible expansions could occur in manufacturing and other areas of the economy. In addition to the potential improved efficiency of existing businesses allowing them to expand and grow; manufacturing of energy efficient versions of all kinds of products could expand. By leveraging market based strategies for performance and procurement of distributed energy resources, any number of possibilities for local innovation and economic activity could emerge.

E4 the Future estimated that there are about 38,378 energy efficiency jobs in New Jersey.[16] Most of these are in the trades and installation but a few more in engineering research and professional services. This is not inconsistent with the national distribution where the majority of energy efficiency firms install or sell energy efficiency systems and the remainder of business activity found in professional services (11 percent), manufacturing (8 percent), engineering and research (8 percent), and other value chain activities (7 percent). The majority of energy efficiency businesses are small, with 1 to 5 employees. It seems reasonable for New Jersey to expect a similar distribution as the total numbers totals grow with investments in clean energy.

23. What associated jobs and training will be needed in the new clean energy economy (particularly regarding reducing energy consumption)?

There is a wide range of skilled training that will be needed for energy efficiency contractors, engineering, energy management and even behavioral coaching.

However, within market structures grounded in paying for performance outcomes matter. Trained people, successful outreach strategies, and correct installation becomes critical to business success. This will drive a premium for quality work and workers.

In other words, New Jersey doesn't have to require anyone to use specifically trained people; those on the hook for delivering savings will want to hire the most skilled employees, because good work pays dividends. Business models that are not delivering on promises can be culled through mutual accountability and drive investments that deliver.

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[16] Energy Efficiency Jobs in America, Energy Entrepreneurs and E4 the Future, December 2016
https://e4thefuture.org/wp-content/uploads/2016/12/EnergyEfficiencyJobsInAmerica_FINAL.pdf

24. What type of overall workforce training is needed in the energy efficiency industry, whether for maintaining systems, installation and inspection, or in other areas?

A wide range of workforce training needs may emerge based on the types of programs and strategies that are devised by aggregators. These needs can be driven by the market and supported by the State as they become clear. Early engagement with market actors can help identify the needs they see based on current capacity in the workforce and the type of work that is emerging.

25. What type of educational outreach is needed to advance energy efficiency in the workplace?

OpenEE does not have an answer for this question.

Environmental Justice

26.How can the state be responsive in helping keep clean energy affordable in communities that are disproportionately impacted by the effects of environmental degradation and climate change? How can the state play an active role in improving the condition of older building stock and encouraging energy conservation measures in communities that are disproportionately impacted by the effects of environmental degradation and climate change?

Environmental justice is an important issue for the state to tackle and reflects both historic inequalities and some discrete market failures. However, the flexibility of meter based pay for performance and procurement funding structures enable a clear path to spur engagement and investment in these communities.

The value of the grid resource can and should be valued and paid through utility investments in infrastructure. Funding to support the policy objectives layered on top of those investments can be contributed by the state or other entities that may capture value from investment. This bifurcation of value doesn't mean that the programs themselves must be divvied up. Rather, performance payments can be made to those delivering the energy savings and additional incentives can provided to the same contractors or aggregators for the capturing the other factors as well.

As a very generic example, imagine a program for small and medium businesses in which an aggregator bids into a competitive solicitation for a price per kWh delivered plus a 5 percent bonus for reaching customers in a known geographic region which have been disproportionately impacted by climate change. In this way a price signal can be used to drive investments to these areas or to meet other objectives. In essence, the state can make it profitable to help underserved communities by paying more to deliver services to them while utilities still capture the grid benefits of reducing overall climate impacts as they optimize their portfolio.

27.What efforts are most successful towards making clean energy and energy efficiency measures affordable and accessible to all?

Making clean energy and energy efficiency affordable and accessible should be defined by market drivers. Pay-for-performance program designs can make it profitable to deliver services to all, as well as advance environmental and social justice goals through targeted incentives. Entrepreneurs located in these impacted communities will be key to making energy efficiency and clean energy measures accessible to the homeowners, tenants and businesses in these communities. State support for the financing and development of entrepreneurial ventures in impacted communities may play an important role.

For example, OpenEE is currently in a pre-launch phase of a Low- and Moderate-Income Customers for ConEd's EnergyFit NYC program. This project was created under the principles of New York's Reforming the Energy Vision (REV) initiative. EnergyFit partners with Pratt Center for Community Development and other local community organizations. Customers are then targeted to receive standardized energy efficiency measure packages to achieve proven energy savings, affordability and greatly reduce soft costs associated with traditional home performance programs.

OpenEE was involved to facilitate fast and efficient measurement and evaluation, and consequently, to pave the way to attract additional investment for the next generation home performance business model in New York.

28.How can the state play a role in ensuring that disproportionately impacted communities receive opportunities and benefits connected to the clean energy economy?

The state can play an important role in monitoring the progress of these communities and tracking the investments and impacts achieved. As the information and data emerge, the state can continue to invest in those activities that are delivering value to members of the community and reward those that are bringing about those effects. As such, the state can communicate the value of an equitable clean energy economy through price signals, as well as paying for performance on the criteria aligned with the interests of these communities.

Background

OpenEE was formed in 2015 with a mission of supporting emerging energy efficiency markets. We are the primary developer of the OpenEEmeter, an open source Advanced M&V engine that uses reproducible methods to calculate energy savings. We provide a secure, cloud-hosted enterprise platform implementation of the OpenEEmeter for utilities, program managers, implementers, and third party energy efficiency and electrification aggregators.

Current deployments of the OpenEEmeter utilize methods developed as part of the CalTRACK Methods (www.caltrack.org) process, a transparent and reproducible methodology for calculating normalized metered energy consumption (NMEC).[17] OpenEE led the development of these methods through a process that included over sixty technical stakeholders, as well as the California investor-owned utilities, California Energy Commission (CEC), and California Public Utilities Commission (CPUC).

In addition to providing monthly billing analysis, the OpenEE Platform uses advanced AMI data where available to track time and locational impacts from energy efficiency and electrification efforts on a near real time basis. Accurate accounting of these impacts are critical to the deployment of demand flexibility as a resource that supports load balancing, non-wires alternatives, and accurate carbon accounting.

The OpenEE Platform integrates with a variety of utility and program data platforms and services and offers end-to-end encryption along with advanced analytics that are made available through an Application Programming Interface (API) and through OpenEE's RecurveOS visualization dashboards. Outputs from the platform can be used to automate and support quality assurance, provide measure-level analysis, visualize time and locational savings, present accurate carbon accounting, and support pay-for-performance initiatives.

Much of OpenEE's current work supports the rapid emergence of pay-for-performance approaches to efficiency as an alternative to traditional rebate programs. For PG&E, OpenEE is powering pay-for-performance programs that currently underway, and is the process of implementing a platform to track savings from the PG&E On Bill Financing (OBF) program, which is using the Investor Confidence Project (ICP) as a means to qualify projects. OpenEE tracks the savings from each project, and ties into PG&E's engineering partner to capture project metadata that is generated per ICP Building Button into a single interface for both PG&E and program participants.

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[17] NMEC "normalized metered energy consumption" originated in CA legislation adopted in 2015 (AB802 and SB350). The definition has been further refined through regulations adopted by the California Public Utilities Commission.

Sacramento Municipal Utilities District (SMUD), Marin Clean Energy, Massachusetts Department of Energy Resources (DOER), NYSERDA, ConEd, Energy Trust of Oregon and others are also using the OpenEE Platform to run or develop pay-for-performance programs or, in the case of Marin Clean Energy (MCE), track the savings associated with Property Assessed Clean Energy (PACE) projects in its territory. Each program represents a slightly different market focus, and each will provide insights into how measurement can be successfully incorporated into program design and deliver savings on a performance basis.

OpenEE also offers performance risk insurance for portfolios of energy efficiency and individual projects in partnership with HSB Munich Re.

The OpenEEmeter is 100 percent open-source, licensed under Apache 2.0, which means that all code and documentation is available for everyone to see, make suggestions or submit improvements. This transparency means that in addition to utilities and regulators, a range of businesses--including program implementers, finance and insurance companies such as Hartford Steam Boiler/MunichRE, and technology providers such as OhmConnect and Whisker Labs, and various contractors--can make use of the meter to support their own market offerings.

The OpenEE source code and methods have been built upon industry best practices and have been reviewed and tested by third parties. The California Energy Commission commissioned kW Engineering to review the OpenEEmeter code and test the platform against known models. NYSERDA similarly asked Taitem Engineering to review the OpenEEmeter methods, code, and results. The platform was found to comply with the requirements of the International Performance Measurement and Verification Protocols (IPMVP), and produced results consistent with established M&V engineering practices.