

BEFORE THE CALIFORNIA ENERGY COMMISSION

Draft Second Electric Program
Investment Charge (EPIC)
Investment Plan (2015-2017)

Docket Number 12-EPIC-01

COMMENTS OF BIDGELY, INC

Bigdely, Inc., a Sunnyvale, California, emerging growth startup committed to helping customers save energy and money by developing new energy efficiency technologies that leverage California's investments in its Advanced Metering Infrastructure ("AMI"), appreciates the opportunity to submit these comments regarding the California Energy Commission's draft *2015-2017 Electric Program Investment Charge (EPIC) Program-Second Triennial Investment Plan* ("Draft Plan").

In general, Bigdely is pleased that the Draft Plan recognizes and supports the need to demonstrate new technologies with the capacity to benefit a broader cross section of residential consumers and to enable broader residential demand response. Both of these policy challenges have proven to be tough nuts to crack. Bigdely is California's leader in a technology -- energy disaggregation -- with the potential to help the State of California provide cost-effective energy efficiency and demand response services that leverage the state's AMI investment to reach more residential consumers and provide them greater value. The Commission's programs have the potential to accelerate demonstration and deployment of this technology, helping more Californians realize tangible energy savings earlier.

1. **OVERVIEW: ENERGY DISAGGREGATION TECHNOLOGY CAN BE A POWERFUL TOOL TO HELP CONSUMERS REALIZE SIGNIFICANT ENERGY SAVINGS.**

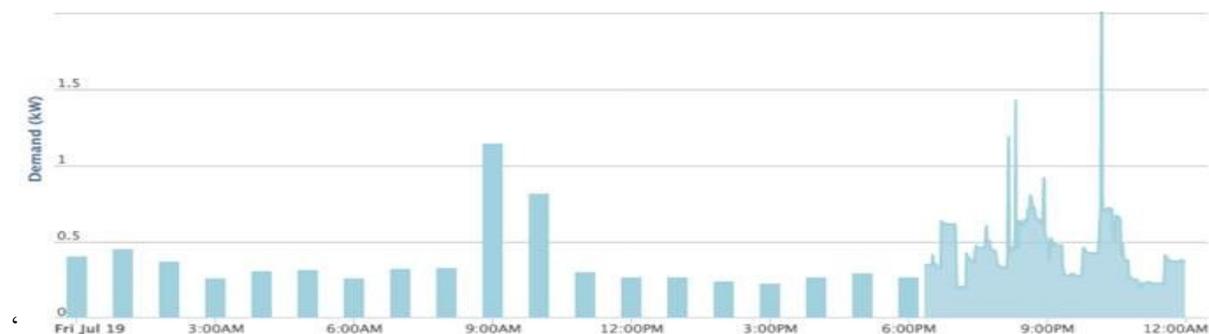
California has spent billions of dollars on its AMI deployment. According to the American Council on Energy Efficiency, harnessing the value of smart meters with new home energy management technologies can enable individual household energy savings of 12% or more.¹ Buildings consume 40% of our energy and a significant component of the total value of smart meters is that they can help consumers save energy and money. To realize the benefit of the smart meter, consumers must have

¹ Karen Ehrhardt-Martinez, Kat Donnelly, et.al. *Advanced Metering Initiatives and Residential Feedback Programs: A Meta-Review for Household Electricity-Saving Opportunities*, American Council for an Energy Efficient Economy (aceee.org), Report Number E105, June 2010, p. iii. Savings across large numbers of residences would be about half of this amount.

access to their energy usage information provided by the meter and technologies that can translate that information into simple, easy-to-use services to save energy.

Over the past two years, the California Public Utilities Commission has issued two orders to make available this information to consumers through two interfaces;

1. **The Home Area Network.** This method – which provides the real-time energy usage information most useful for saving energy -- involves allowing customers to access their energy consumption data from the smart meter through a gateway device placed in the home. Such device is “paired” with the customer’s meter (not unlike pairing your Bluetooth to your phone), allowing customers to receive energy management services of their own choosing. This data is provided in real time and at very short intervals – typically six seconds.
2. **The utility website.** This method involves the utility making available to the customer his or her energy usage information that has been supplied back to the utility from the smart meter and presented through the website (so-called “backhauled data”). This data is provided on a 24-hour lagged basis in 15- or 60-minute increments. It enables you to compare your usage to that used by an “average” household.



The above chart compares one hour interval data – typically made available through a utility website with a 24-hour lag – on the right with the real-time, short-interval data typically made available through the HAN.

It is particularly the HAN data – near real-time data provided in very small increments directly from the customer’s meter to the customer – that promises the most compelling benefits for consumers. Traditionally the home area network has relied on pairing sensors with each major energy-consuming

device within the home to develop an understanding of where and when energy is being consumed so that inefficient devices and practices can be identified. New technology -- known as energy disaggregation (or Non-Intrusive Load Monitoring). -- reads the real-time, very short interval data from the smart meter and uses algorithms to determine what kind of devices are being operated and how efficient they are. Core to technology disaggregation is the fact that every appliance leaves its “fingerprint” on the home’s energy consumption waveform. Disaggregation extracts this fingerprint from the whole home’s energy meter data, without the need for hardware sensors on individual appliances. Data is collected through a utility’s existing smart meter and provided to the consumer through an inexpensive gateway device owned by the consumer that in turn displays energy usage information and recommendations through Bidgely’s service to the consumer’s existing devices, such as a desktop, laptop, tablet and/or smartphone. By disaggregating energy data and providing 24x7 web and mobile access, Bidgely provides groundbreaking insights and easily actionable recommendations to customers including:

- Appliance-level energy usage and cost
- Real-time and historic energy consumption
- Neighborhood comparisons by home and appliance
- Bill dispute avoidance via notifications and alerts, e.g. high-usage
- Highly personalized recommendations with respect to the management of individual devices that typically enables higher reductions in average and peak demand.

Bidgely also provides software-as-a-service (SaaS) utility intelligence tools that enable utilities to segment and target households most appropriate for specific EE and DR programs. By enhancing the customer’s understanding of when and where he or she is using energy in the home, and by alerting consumers to scale back energy use during periods of peak load, Bidgely drives demand side management results more reliably and at lower expense than other available solutions.

Disaggregation is proving to be a very powerful technology for realizing significant energy savings at low cost, **enabling consumers to realize saving two to three times what they are getting from simple house-to-house comparisons.**² Enabled by California’s AMI investment and data access policies, disaggregation has the potential to be a game changer for the residential sector that can finally enable more significant *residential* savings in at least two ways:

² <http://bidgely.com/press>

- Cloud-based algorithms are both scalable and inexpensive, allowing consumers to receive personalized energy analysis, efficiency strategies and device-specific recommendations in a secure, cost-effective manner. In Bidgely’s case, these services are provided free to the customer.
- Traditional demand response programs – that provide consumers lower rates if they agree to curtail energy use on days when energy is in short supply – have traditionally focused only on heating and cooling technologies, and to a lesser extent, pool pumps. Disaggregation allows a wider array of energy-consuming devices to be included and controlled, making demand response a much more valuable resource and enabling consumers to potentially realize more value.

In addition to its metering infrastructure, California has in place robust protections for consumer privacy and security. In short, all of the policy infrastructure is in place. The next step is to take the steps needed to demonstrate and deploy the gateway devices to enable consumers to realize tangible energy savings.

2. **THE DRAFT PLAN’S SUPPORT OF RESEARCH AND DEMONSTRATION FUNDS TO ENSURE COST-EFFECTIVE EFFICIENCY TECHNOLOGIES REACH DIVERSE COMMUNITIES ARE A GOOD STEP BUT SHOULD BE FURTHER STRENGTHENED.**

In the summer of 2014, Bidgely expects to introduce gateway devices for about \$25 each, a price point substantially lower than many other home energy management devices on the market. By combining the very low cost of gateways capable of leveraging consumer smart phones or computers and low-cost cloud-computing algorithms running free energy management services, technologies like disaggregation have the potential to provide discernable efficiency benefits to a wider variety of households than those that have traditionally been able to access more capital-intensive clean energy installations., including multifamily units, low-income households, and rentals.

Bidgely supports the concept in S1.1.5, *Existing Building Energy Efficiency Retrofit Strategies*, of support for projects that “identify and pilot innovative advanced approaches, strategies, and technologies to bring energy efficiency retrofits solutions to the following sectors: low-income, market-rate residential builders/owners, the multifamily market” but proposes that this language be further strengthened. First, Bidgely suggests that the language refer to both retrofits *and* solutions. It should be clear from the context of this section that it encompasses not only what is viewed as a traditional retrofit but new technologies that enable efficiency savings through strategies such as better management, identification of

poorly performing devices or improved usage patterns.

Bigdely suggests that research and product demonstration should be conducted on a broader scale than is implied by the term “pilot” so that large numbers of low-income residences have the ability to benefit from a demonstration program. For example, low- or fixed-income households have a variety of older appliances. In multifamily housing units, household living spaces may be beyond the range of the smart meter HAN radio. In rental units, some equipment may be furnished by the landlord so that the usable energy saving options presented to the resident are more limited. In environments where both household and state revenues are constrained, low-cost solutions offer the best option to scale, but it is important to better understand the strategies that will work best across a variety of sectors that have traditionally been viewed as hard to reach. This will require demonstrations that reach wider populations of California’s energy customers than those typically targeted in what we think of as a pilot.

Bigdely also applauds inclusion of language supporting the evaluation and testing of “simple, low cost audit tools or diagnostic approaches that can estimate actual energy use in existing buildings” but believes that the building-level focus in the language is so broad that it may encompass technologies already well established in the market. The newest technologies provide information on the energy use of *individual devices* and specific recommendations about how to realize energy and financial savings with respect to that device. These enable the much more specific, compelling recommendations that in turn appear likely to enable more powerful energy savings. Therefore Bigdely recommends that additional focus be added to the first paragraph on page 15 to the effect that such measures should “*provide information on the use of energy by device (with specific recommendations or options for the consumer to save energy).*” We agree that policy makers can benefit from anonymized energy usage data but would urge that the language include providing information to *consumers* so that they can act upon those recommendations.

Bigdely further suggests that devices acquired be required to be “open” so that residents can have real choice as to energy management services and so that online energy management services have a continuing incentive to innovate and develop more powerful offerings. Further, in demonstrating new technologies that can scale far and wide, the Commission should consider the final price to the consumer that would result through a demonstration rebate program and invite proposals that compete on the basis of price. Some devices on the market retail for hundreds of dollars. Others may retail for a fraction of that. As previously stated, Bigdely’s gateway will retail for about \$25. That, coupled with low- or no-cost energy management solutions such as those provided by Bigdely, offer California the opportunity to

rapidly scale the consumer energy efficiency benefits enabled by smart meters, and in a way that understands and addresses the needs of diverse communities. The amount of funding invested in one home upgrade – \$3,000 as an example – could support the deployment of 120 gateway devices, with free energy management services, at no cost to consumers of modest means, each with the capability of generating significant energy savings on the order of 6-12% or more. Bidgely urges the Commission to consider significant funding for demonstration and deployment for gateways, as the potential gains of even comparatively modest investments in addressing the needs of diverse communities have the potential to deliver significant, cost-effective energy savings.

3. BIDGELY SUPPORTS DEMONSTRATION OF DISAGGREGATION IN DELIVERING MORE COST-EFFECTIVE RESIDENTIAL DEMAND RESPONSE.

Bidgely further applauds the Energy Commission’s objective in S2.1 to enable cost-effective demand response for California consumers, particularly the Draft Plan’s recognition that “large numbers of small loads have the ability to provide a dependable, dispatchable, flexible, fast (in response time) resource for system operators at a very low opportunity cost.” Bidgely suggests that more attention be given to residential demand response as a potential resource and suggests that S2.1 of the Draft Plan encompass support for demonstration and early deployment, as well as applied research and piloting. We suggest that an additional objective be to “*evaluate and demonstrate the extent to which (1) new technologies can enable more devices within residential and/or commercial buildings to participate in DR programs and deliver cost-effective, reliable savings and (2) the extent to which strategies that provide the consumer control (as opposed to direct or remote appliance control) can deliver cost-effective, reliable savings.*”

With respect to the first recommendation, traditional demand response programs focus on heating and cooling technologies. Disaggregation allows a much wider array of energy-consuming devices within the residence to be included, evaluated and controlled, making demand response a much more valuable resource and enabling consumers to realize more value (and to idle devices that do not impact heating or cooling comfort). Thus DR programs can appeal to a wider range of residents, in addition to providing metrics that allow DR resources to be better targeted and evaluated. The second recommendation recognizes that consumers may find it preferable to participate in programs where they maintain control and is focused on validating consumer motivation methods and incentives to reduce energy use on demand response events, including messaging, rebates, charitable contributions, discounts, etc.

