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**BEFORE THE PUBLIC UTILITIES COMMISSION
OF THE STATE OF CALIFORNIA**

Order Instituting Rulemaking To
Enhance the Role of Demand Response
in Meeting the State's Resource Planning
Needs and Operational Requirements.

Rulemaking ☐3-09-0☐☐
(Filed September ☐9, ☐0☐3)

**PREPARED TESTIMONY OF SETH FRADER-THOMPSON
ON BEHALF OF ALARM.COM AND ENERGYHUB
IN RESPONSE TO THE JOINT RULING AND REVISED
SCOPING MEMO ISSUED ON APRIL ☐, ☐0☐4**

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I. QUALIFICATIONS

My name is Seth Frader-Thompson and I am pleased to offer this direct testimony on behalf of Alarm.com and EnergyHub. This Testimony is offered in accordance with the *Joint Assigned Commissioner and Administrative Law Judge Ruling and Revised Scoping Memo Defining Scope and Schedule for Phase Three, Revising Schedule for Phase Two, and Providing Guidance for Testimony and Hearings (“Joint Scoping Ruling”)* issued on April 9, 2014.

I serve as the President of EnergyHub, a division of Alarm.com. Alarm.com (www.alarm.com) provides a suite of connected home services, including substantial solutions for interactive energy management. In 2013, they completed the acquisition of EnergyHub (www.energyhub.com), a longtime leader in enabling rapid deployment of demand response and energy efficiency programs. Today, these combined companies

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have more than 10 million subscribers nationwide, with a substantial portion that have internet-connected thermostats.

As President of EnergyHub, I oversee the overall direction and operation of the company, including a dedicated focus on creating an exceptional user experience for EnergyHub customers and providing technology solutions for reducing home energy consumption. The tools we've developed empower consumers and utilities to understand and control how energy is being used, and identify opportunities for savings.

Prior to founding EnergyHub, I served in several managerial and technical roles at Honeybee Robotics. During my tenure at Honeybee Robotics, I worked on the Mars Science Laboratory mission, the Lunar Precursor and Robotic Program, and payloads and tools for Explosive Ordnance Disposal (EOD) robots. I was the principal investigator for a DARPA research effort to build a miniature laser vision system for search and rescue robots.

I have an MS in Mechanical Engineering from the University of Colorado, where my research focused on Microelectromechanical Systems (MEMS) for Ultracold Atom Optics.

II. PHASE III ISSUES AND QUESTIONS

As we have noted in previous comments, Alarm.com and EnergyHub are active participants in demand response programs in California. Further, our companies intend to continue to innovate and develop service offerings that will provide demand response products in the future. We have been active in markets around the country as a demand response aggregator, including participation in the ERCOT market in Texas for several years. This year, we will also be participants in the markets of PJM and the

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New York ISO.

In this proceeding, EnergyHub is particularly focused on developing the best strategies for integrating residential and small commercial customers into utility-administered demand response programs and future demand response markets under the “bifurcated” market structure. We believe that consumer technology and home energy management solutions represent a valuable resource and are critical to demand response markets in the state.

The Joint Scoping Ruling provides, in “Attachment A: Guidance for Testimony”, a variety of questions to which all parties are invited to provide testimony. We intend to provide testimony on the select questions presented in the Joint Scoping Ruling that most directly pertain to residential consumers.

a. Goals for Demand Response

QUESTION: Parties should provide what they consider to be past and current goals for demand response so that this proceeding has a complete and accurate history of the goals.

As noted in the *Order Instituting Rulemaking To Enhance The Role Of Demand Response In Meeting The State’s Resource Planning Needs And Operational Requirements* issued on September 15, 2013, “Demand response programs are an increasingly important element of California’s resource strategy.” The “Background” section of this Order states that, “These programs also provide reductions in peak electricity consumption, ratepayer savings through the avoidance of new generation construction, and greenhouse gas emissions reductions.” This Order continues by stating that, “The Commission has undertaken major efforts to make demand response programs more effective in previous Rulemakings (R.) and Applications (A.), specifically R.06-06-00, R.07-06-04, and A.08-06-00.”

Based on these and other observations, the Order concludes that, “The Commission has collaborated with stakeholders to make demand response programs more effective, yet its work is not complete. As demand response programs have evolved, so have the needs of our electric grid.”

This section includes excerpts from relevant decisions, including from D.04-045, where Commission stated its intent to address competitive procurement of demand response:

The next major policy question we must address is the extent to which we will embrace competitive procurement of [demand response] and the timeline in which this transition will occur. Historically, California has employed a utility-centric model of [demand response] procurement that allows only a limited role for third party aggregators. However, this model is changing. ... We think that third party aggregators can provide additional innovation and services to the market, yielding additional uncaptured potential benefits to [demand response] in California. We intend to take up this question in a new [demand response] policy guidance rulemaking to be opened later this year

We rely on these statements, supported elsewhere in this Order and the record in this proceeding, to reasonably conclude that goals in this proceeding include:

- Improving and enhancing the role of demand response in California’s resource strategy,
- Reducing peak electricity consumption,
- Increasing energy savings,
- Avoiding construction of new generation,
- Reducing greenhouse gas emissions,
- Meeting the demands of an evolving electric grid,
- Expanding the role of non-utility, third-party aggregators, especially for their capacity to provide “innovation” and yield “additional uncaptured benefits”

To the extent that the residential sector includes “uncaptured benefits”, we believe that an implicit goal of this proceeding is to expand the role of demand response within the residential sector.

QUESTION: Parties should provide recommendations for increasing individual demand response program load impacts and overall participation in demand response programs.

As we have noted previously in this proceeding, California has long been a leader in deploying innovative technologies (such as advanced metering infrastructure) and innovative utility programs and associated business models (such as demand response). However, recent years have seen rapid and dramatic changes in consumer technologies, expectations and capabilities. Because of these changes, and to increase the impacts of demand response programs, it is appropriate for the Commission to reconsider some of the opportunities and embedded assumptions regarding consumer behavior that affect the program design, market structure and economic incentives of demand response in California.

For example, adoption of networked thermostats has dramatically increased in the past 3-5 years and the rate of adoption is increasing. It is estimated that 15% of new thermostats sold in 2013 were internet-enabled and that by 2015 over 50% will be internet-connected. It is also important to note that many of these sales are associated with purchases of other, non-energy related services, such as home security. In this sense, this technology base represents a latent capacity for energy services that is distinct from services (such as traditional utility demand response programs) where the primary motivation is related to energy management.

Specifically, in October 2013, EnergyHub President Seth Frader-Thompson offered comments and observations as part of workshops held in San Francisco. Included in his remarks were the following suggested characteristics for a successful Residential Demand Response Program:

- (1) **Direct market access** allowing consumer-owned resources to be aggregated directly into the market, without the requirement to work through a utility,

- (1) **Low-friction end-user enrollment process**, including such seemingly simple tactics as eliminating the need for customers to enter account numbers during the enrollment process, by providing an automated system for looking up account or meter numbers based on the customer’s address (provided the aggregator has obtained the customer’s consent to do so),
- (3) **Access to meter data for M&V** through mechanisms that provide meter data to consumers, their designated agents or designated market agents.
- (4) **Desirable economics for temperature-sensitive loads**, with particular attention to the financial incentives provided to enabling software service providers that enable implementation of demand response events.
- (5) **Predictability** in program design and participation so that businesses can plan accordingly.

In addition to these general observations, we believe the following recommendation will increase the impact of demand response in California:

- *Consumers should be provided with facilitated enrollment processes.*

Based on our experience with other demand response programs nationwide, we believe that one way to dramatically improve the participation of residential customers is to provide facilitated enrollment processes. For example, we have witnessed vastly improved enrollment rates in demand response programs when customers are provided with such seemingly simple information as their account number for enrollment purposes. Therefore, in order to maximize the demand response resource within the residential sector, investor-owned utilities should work collaboratively with non-utility aggregators to provide necessary information to ensure that the consumer

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enrollment and customer support experience benefits from information held by the utilities. One example of such collaboration includes providing a customer account lookup mechanism to support the enrollment process. In our experience, we have witnessed that only 10% of consumers that are required to find and enter their account number will successfully complete this step. This implies that a facilitated process for enrollment could increase participation of residential demand response customers by up to 5 times.

□ Incorporate platform and software providers within the economic incentives of existing demand response programs.

Currently, economic incentives and rebates for demand response programs in California do not include aggregators and demand response providers. This stands in contrast to other notable demand response programs and market structures in other states, many of which include an ongoing incentive provided to the demand response aggregator and the related entities providing the ongoing platform capabilities upon which each demand response event relies.

Providing the ongoing capability to manage devices, event participation, verification, and settlement is a critical function of any demand response program or market. We believe that demand response programs can be improved with a modest financial incentive. Austin Energy, for example, provides \$15 for customer enrollment and a \$15 per year per customer incentive to the platform provider, which ensures that the demand response resource is available and reliable. It also worth noting that the Texas market demonstrates an elasticity in customer demand, with higher enrollment rates witness in the ERCOT market (versus Austin Energy) with high incentives reaching \$50 per year. California utilities could achieve a similar benefit and improved

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resource through a reallocation of direct customer incentives (primarily one-time

equipment and participation rebates) to incorporate the aggregator.

Under the "bifurcated" market structure established in this proceeding, these

service providers and aggregators will have access to market structures that provide

ongoing payments for available energy values from these demand resources, but

capacity or resource adequacy values may not receive ongoing payment structures. This

structure is inconsistent with the risks and costs the aggregators assume both in terms

of delivery of customer demand and the technical infrastructure required to develop the

demand response resource.

Specifically, we recommend an incentive of \$50/year paid to the software

platform provider for every enrolled customer, for as long as the customer remains in

the program.

3. Participation of residential customers in existing programs can be increased by

expanding "bring-your-own-thermostat" models and incentives that incorporate consumer

technologies within existing demand response programs.

As we have noted earlier in this proceeding, in 2013, Southern California Edison

moved forward with a program that allows consumer-owned thermostats to be

incorporated within the existing air conditioning cycling program that they manage.

We believe this is a powerful model that can be replicated statewide across all the

California utilities. This is commonly referred to as the "Bring Your Own Thermostat"

model.¹

We have proposed that each utility formalize and expand a mechanism by which

¹ For example, "SCE Rolls Out Bring-Your-Own-Thermostat Concept" available at <http://www.greentechmedia.com/articles/read/sce-rolls-out-bring-your-own-thermostat>

customer-owned thermostats and load-control devices can participate in ongoing AC cycling and peak-time rebate programs. Under the newly approved “bifurcated” market structure, including the proposed Demand Response Auction Mechanism, we continue to believe that explicit programs to include these kinds of consumer-owned devices will improve the impact of demand response programs. Further, we believe that economic incentives (such as rebates and other payments) can increase the deployment of these devices and thereby improve the demand response resource available in the residential sector.

4. Default “load modifying” rate structures may pose unique barriers to customer aggregation that should be resolved and mitigated

In order to increase demand response participation, any potential conflicts between load modifying rate structures and the goals of demand response aggregation are well identified and resolved such that demand response aggregators are not disadvantaged by default rate programs. Specifically, we are concerned that customers included by default in rate structures such as peak time rebates or critical peak pricing may also be included the portfolios of the investor-owned utilities for resource adequacy purposes. If that were the case, these customers would need to be dis-enrolled from these rate programs in order to be included in the portfolios of non-utility aggregators. While in theory this may be feasible, in practice we believe that such a customer-by-customer requirement may unduly burden non-utility aggregators and therefore limit the available demand response resource.

5. Flexibility should be provided for telemetry systems and information

We are concerned that depending on existing advanced meter infrastructure

(AMI) platforms will be insufficient to satisfy telemetry requirements to maximize demand response resources in the residential sector. For example, EnergyHub aggregates primarily residential load for demand response in multiple markets. For heating and air conditioning (HVAC), the primary source of residential telemetry is HVAC runtime information provided by the thermostat. We download this information from each individual home every 5-15 minutes, depending on the equipment installed in the customer's home. We then input each home's current and historical runtime data, along with historical interval meter data, into a load conversion model to provide aggregate load telemetry every few seconds.

EnergyHub's approach—providing a calculated telemetry proxy—is the only cost-effective way to provide high-frequency telemetry from residential load sources that we have found. Existing AMI networks are not designed to obtain real-time telemetry from smart meters, and it is not cost-effective or practical for residential demand response aggregators to install their own dedicated telemetry equipment in each home.

Therefore, to maximize demand response resources in the residential sector, we believe that any telemetry requirements established through this rulemaking should maintain sufficient flexibility to be implemented in a practical manner.

b. CAISO Market Integration Costs

QUESTION: PG&E provided a list of solutions for decreasing CAISO market integration costs in its December 13, 2013 filing at page 13. Provide comments on the list of solutions.

As we have noted, we agree with many elements of the list provided. Specifically, we agree that the stated objectives to “Simplify telemetry requirements”

and “Simplify registration for mass market customers” will increase demand response participation in California.

c. Supply Resources Issues

QUESTION: Are there benefits or drawbacks to holding one auction per year for seasonal products (May-Oct; Nov-Apr)? Describe these benefits and drawbacks. How should seasonal products be defined and structured, so as to maximize the potential of demand response in these seasons? If a different approach is preferable, describe in detail.

Residential customer loads and their potential to provide demand response vary by season and weather. To this extent, these resources can and will vary from season to season and month to month. As a result, we believe that one auction per year may result in less of this resource being captured than its potential.

More specifically, the auction mechanism should accommodate varying levels of load by month. The month-to-month variance in weather results in higher levels of potential curtailment in August, for example, than in May. Therefore, the auction process should provide a structure to bid varying levels of curtailment from the same customer demand response resource.

Further, we have experienced organic subscriber growth during the summer months. The limited number of auction windows will result in more conservative aggregator bids than the demand response resource allows. We believe that a mechanism that allows for additional bids for one month at a time will result in higher levels of demand response resource from the residential sector.

We believe that the existing proposed auction schedule can be improved by including opportunities to supply interim or monthly auctions that complement the

annual auction process.

QUESTION: Is it preferable to have additional minimum eligibility criteria for bids than those listed in this proposal? Please fully describe the recommended criteria and how it should be used to judge bid viability.

As noted earlier, we believe the goals of this proceeding include:

- Improving and enhancing the role of demand response in California's resource strategy,
- Reducing peak electricity consumption,
- Increasing energy savings,
- Avoiding construction of new generation,
- Reducing greenhouse gas emissions,
- Meeting the demands of an evolving electric grid,
- Expanding the role of non-utility, third-party aggregators, especially for their capacity to provide "innovation" and yield "additional uncaptured benefits"

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It is therefore appropriate that the eligibility and acceptance criteria reflect these goals. Specifically, the criteria should reflect a preference for demand response resources that can simultaneously provide additional benefits such as energy efficiency, greenhouse gas reductions and reflect increased activity of non-utility, third-party aggregators. For example, devices such as smart thermostats can be used to provide energy efficiency (through optimization of setback settings) during periods outside of demand response events. Similarly, a “bring-your-own-thermostat” program provides additional benefits related to innovation and expanding the role of non-utility, third-party aggregators that should be reflected in selection criteria.

We recognize that these additional criteria may rightfully be considered additional to the “minimum” eligibility criteria, but we believe the such criteria are consistent with the goals set forth in this proceeding.

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QUESTION: Provide your comments on whether a utility-centric model for supply resource demand response can meet current and future needs. Provide your comments on the ability of third-party providers to provide supply resource demand response to meet current and future needs.

In our opinion, the question is less about whether the utility-centric model can meet current and future needs, but rather whether a utility-centric is model will be the most effective method of satisfying those needs. With regard to residential customers and consumer technology, we believe that non-utility, third-party service providers are fully capable of providing demand response resources.

California is not the only state that is considering the most effective way to address the challenge of meeting the demands of an evolving electric grid. We would call attention to a recent proceeding in New York State. In the initiating order for this

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2014 NY Public Service Commission, April 5, 2014. Reforming the Energy Vision. New York Public Service Commission. In Regard to

Accordingly, we would observe that the capacity or resource adequacy value of demand response resources remains obscure to non-utility market participants under the bifurcated market structure. In the context of the question regarding the ability of third-party providers to supply resource demand response to meet current and future needs will depend to what degree these providers have access to clear, transparent and

We encourage the Commission, in this proceeding, to similarly examine the question of what are the best, most effective methods of meeting new demands. As we have stated, within the residential sector, the demand and preference of customers may result in the conclusion that non-utility, third-party service providers will develop this resource more effectively and more reliable achieve one of the key goals in this proceeding.

Among the principles that have governed the operation and regulation of electric systems, two have had a particularly strong impact on the way in which electric systems have been designed and operated. These are the assumptions that demand is inelastic, and that economies of scale make central generating stations the most economic way to meet power needs. For most of the last hundred years, these assumptions were deemed reasonable, and supported a system designed to meet the forecast peak demand plus a substantial reserve margin. Because peak demand only occurs over a few hours per year, much of the system is underutilized most of the time. The inefficiency of this arrangement has been tolerated because it is balanced against the need for reliability--the principle that the ability to meet peak demand is a paramount priority. Reliability remains paramount; in fact it is a higher priority now than ever before. However, the most economic method to achieve reliability has been brought into question due to the convergence of several developments. The demands of the digital economy have increased the real economic costs of outages, and are causing many customers to consider locally generated power as a supplement to grid power. Increasingly severe weather events amplify this tendency, as the frequency of major storms increases and the vulnerabilities of the traditional distribution system are exposed. Weather-driven forecasts of higher peaks will exacerbate the inefficiencies of a system that is planned to meet unmanaged demand levels. At the same time, technological developments have made alternative methods of managing and satisfying demand more feasible. Developments in telecommunications, industrial system controls, building system controls, distributed generation, and energy efficiency, taken together, warrant a reevaluation of the assumptions of demand inelasticity and bulk economies of scale. (Emphasis added)

proceeding, the New York Public Service Commission observes:

direct mechanisms to capture the capacity and resource adequacy value of the demand response resource that they develop and manage.

III. DEMAND RESPONSE AUCTION MECHANISM PROPOSAL

QUESTION: Provide Bidders are prohibited from scheduling actual DRAM deliveries from the same customers as another bidder, or those that are current participants in a utility demand response program. Thus, all capacity bids must be for unique resources that are additional and incremental to existing utility baselines, unless the bidder demonstrates that the customer(s) has(ve) disenrolled from the applicable utility program, or have committed to disenroll by the commencement date of the contract.

In order to most effectively capture the opportunity of demand response in the residential sector, it is critical that aggregators have the ability to offer bids into the auction process without identifying the specific resources or customers prior to the performance period. Sufficient flexibility should be included in auction mechanisms to allow aggregators to provide bids and provide specific customers immediately prior to the performance period. This is true because there will inevitably be changes in what programs customer enroll in and because the pace of technology adoption will mean that the resource base will change on a monthly and quarterly basis as new customers adopt technology and enroll in offered programs or services.

QUESTION: Capacity awards and obligations may not be sold, traded, or otherwise transferred to another non-demand response capacity resource – either conventional or preferred.

We do not understand the rationale that motivates this restriction. A key feature of competitive markets is the ability to assume and transfer risk among market participants. We believe this restriction will unduly limit the ability of market

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participants to adjust obligations and risk exposure. Provided that resources are delivered according to contractual commitments established by the auction process, it should not matter whether obligations are transferred between parties.

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Respectfully Submitted,

/s/ Seth Frader-Thompson

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