November 13, 2015

Chairman Mary Nichols
California Air Resources Board
1001 I Street
Sacramento, CA 95814

RE: Second Triennial Cap and Trade Investment Plan (FY 2016-2019)

Dear Chairman Nichols:

The California Energy Storage Alliance respectfully submits the following comments on the draft Second Triennial Cap and Trade (C&T) Investment Plan.

Background

The California Energy Storage Alliance (CESA) is a 501c(6) membership-based advocacy group committed to making energy storage a mainstream resource in helping to advance a more affordable, cleaner, efficient and reliable electric power system in California. CESA accomplishes this objective through policy development, education, outreach, and research.

Our membership includes technology manufacturers, project developers, systems integrators, electrical contractors, software developers, professional services firms and other clean tech industry leaders.

We are technology and business model-neutral, and are supported solely by the contributions and coordinated activities of our 80+ members. A current list of CESA member companies can be found at www.storagealliance.org.

Overall Comments

CESA thanks the California Air Resources Board (ARB) and its staff for its leadership in developing the second triennial C&T investment plan, providing important regulatory leadership and helping California achieve its climate goals and provide benefits to disadvantaged communities. Because energy storage is such a diverse asset class spanning very large scale storage systems to small distributed aggregated energy storage systems and electric vehicles, CESA's comments cover a wide range of topics in the investment plan.

1. *Add Energy Storage as a key Existing Strategy to Meet Green House Gas (GHG) Emissions Reduction Targets*

CESA respectfully suggests that energy storage should be added as a category of GHG reducing solutions in the "energy category" of Figure 5, page 24. AB 2514 (Stats. 2010, ch.469) and the California Public Utilities Commission's (CPUC) resulting D13-10-040 (Decision Adopting Energy Storage Procurement Framework and Design Program) requiring IOUs to procure 1.325 GW of new energy storage capacity by

2020 has successfully added energy storage to the electric power system's toolkit for GHG emissions reductions. Key guiding principles for energy storage procurement policy include:[1]

1. The optimization of the grid, including peak reduction, contribution to reliability needs, or deferment of transmission and distribution upgrade investments;
2. The integration of renewable energy; and
3. The reduction of greenhouse gas emissions to 80 percent below 1990 levels by 2050, per California Goals

All three investor owned (IOUs) and quite a few publicly-owned utilities are now actively procuring energy storage pursuant to this requirement and to meet local capacity and grid reliability needs. Further, SB 861 (2014) authorized an additional 5 years of funding for the California Self Generation Incentive Program (SGIP) which provides commercialization incentives for behind the meter energy storage and distributed generation. Behind the meter energy storage is now being deployed throughout the state to help California ratepayers reduce their use of peak demand energy, which also contributes to GHG emission reduction. Finally, it should be noted that electric vehicles represent a significant new source of energy storage (on wheels) which can be strategically used to help integrate renewable energy and support the grid near term as a load resource.

Small Additions of Energy Storage Capacity Have Significant Impacts

Energy storage can be a significant part of the California tool kit in fighting climate change by contributing to greater overall *system* efficiency of our electric power system. For example, by helping to smooth demand (clip peak demand or reduce minute to minute volatility) or firm up and/or help shift the production of intermittent renewable energy, energy storage has the potential to improve the load factor of our existing transmission, distribution and generation assets. This will of course, help reduce emissions from our existing fossil generation fleet.

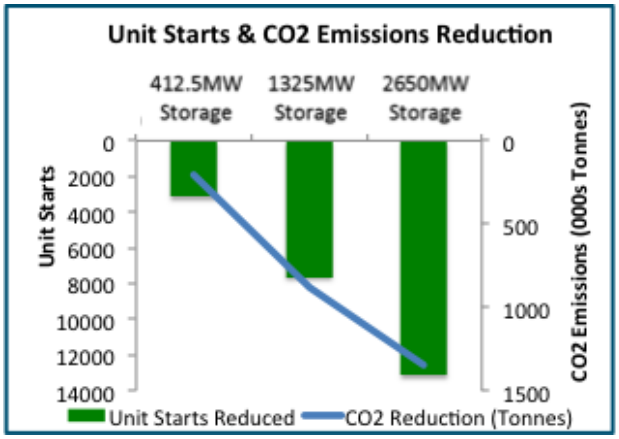
The system impacts and benefits of energy storage are not well understood, as storage has not historically been part of our system planning and modeling efforts. To help quantify the system impacts of energy storage, CESA performed a study earlier this year to assess the impact of higher levels of storage with 40% renewables in the system using the California Independent System Operator's (CAISO) 40% Renewable Portfolio Standard (RPS) long term procurement planning (LTPP) model. To study the impact quantitatively, CESA performed a detailed simulation of the electric grid using the PLEXOS production cost modeling tool. The results show numerous grid benefits. Compared with a no storage case, for model year 2024, the 1.325 GW storage scenario reduced carbon emissions in the Western Electricity Coordinating Council (WECC) region by 750,000 tons, the equivalent of taking roughly 144,000 cars off the road[2]. With 2.65 GW storage added to the system, the emission savings increased to almost 1.5 million ton of carbon reductions as shown in the charts below:

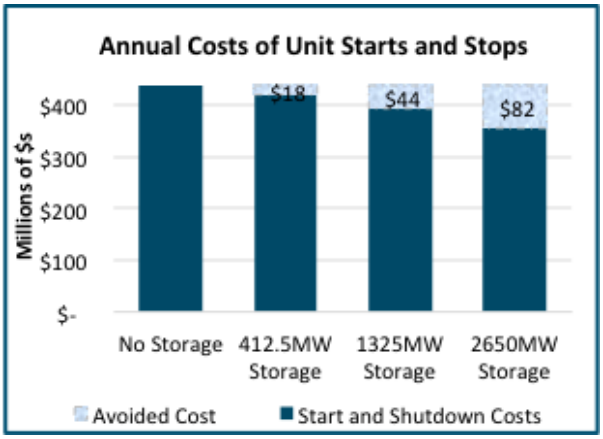
[1] D.13-10-040 section 4.1 Guiding Principles page 9

[2] Assumes EPA average of 9737 lbs. of carbon emissions per car

Storage Scenarios Modeled in the 40% LTPP scenario

	412.5 MW Storage (only 2 hour storage)	1325 MW Storage (2, 4, & 6 hour storage)	2650 MW Storage (2, 4, & 6 hour storage)
% of total CA Generation Capacity	0.5%	1.7%	3.4%
Unit Starts Reduced in CA*	3,149	7616	13,134
Curtailment Reduction in CA	8.1%	23.3%	40.0%





Source: CESA

CESA modeling indicates a 23% reduction in renewable curtailment with 1.3 GW storage; 40% reduction with 2.6 GW storage[3]. " Importantly, in the 1.325 and 2.6 GW storage scenarios of the PLEXOS model runs, 3-4 existing gas fired peakers were removed from dispatch.

2. Add Energy Storage to Summary of Investment Concepts, Figure 10 page 28

In light of the potential benefits described above, CESA respectfully suggests that energy storage be explicitly added as a worthy investment concept for 2016-18 and 2018-19. Because distributed storage is modular and easy to site even in dense urban environments, it is a great candidate for cross cutting approaches to support disadvantaged communities. A simple example includes any disadvantaged community with a pre existing fossil fuel generator located in it – this is a great application for co-locating energy storage at this existing fossil plant to improve its dispatch profile, e.g. to limit emissions-intensive start-up and ramping dispatches. By serving as the load following /flexible resource, energy storage can help such pre existing fossil assets operate optimally, reducing their emissions and improving overall fuel economy for the local community. Energy storage can of course be deployed in lieu of a new gas peaker, or, as described above, remove existing gas peakers from dispatch.

[3] All of the modeling performed by CESA assumes 40% RPS.

3. *Include energy storage as an eligible technology for financing mechanisms envisioned pursuant to GGRF proceeds. (page 29)*

The CA Self Generation Incentive Program (SGIP) has already demonstrated that commercialization incentives for energy storage and other emerging new energy technologies can be highly effective to aid deployment. However, SGIP funds only finance a portion of the capital cost and financing the remainder of the equipment cost can be challenging, especially for smaller less well capitalized businesses. Including energy storage as an eligible technology for any resulting loan funds, loan guarantees or clean energy finance center programs can help overcome this barrier to broader commercialization.

4. *Add use of stationary energy storage and intelligent aggregated EV charging to list of Investment Concepts for Transportation and Sustainable Communities (Figure 12, page 33)*

A key challenge to fast charging an EV is the resulting demand charge that affects electricity costs for the host. Stationary energy storage can be utilized to effectively mitigate the instantaneous demand from a level 2 EV charger by supplying the instantaneous power on demand and then trickle charging from the grid or from an onsite renewable energy source at a slower rate. In other words, stationary energy storage can be used to help vehicle grid integration, and align renewable generation with the growing demand for electric transportation.

Stationary energy storage deployed throughout the state can also provide system efficiency benefits to California's existing fossil fleet. By serving as the flexible, load following asset, energy storage can improve existing fossil assets' operational dispatch and overall heat rate, significantly contributing to reduced GHG emissions. Energy storage, in its ability to be flexibly deployed throughout the electric power system, is also enabling new business models and ways for consumers to activity participate in supporting the grid, improving affordability and reliability; all while reduce GHG emissions. Energy storage is at the nexus many industries directly affecting the electric power system including: generation, transmission, distribution, distributed energy resources, transportation, renewable energy, demand side management solutions, the built environment, emergency backup/resiliency solutions and consumer electronics. As a result, energy storage is a unique asset class that can be leveraged to find synergies and opportunities between and across these industries to benefit ratepayers, disadvantaged communities more specifically and the environment.

Investment is needed to model the impacts and deployment of storage in the most cost effective way going forward for California ratepayers. By more clearly and transparently articulating the climate, energy and cost savings impacts to the system, work funded in this area can help attract a new set of stakeholders from related industries including the information technology and consumer electronics industries to help advance optimization and consumer facing applications necessary in the future. New entrants, innovation and investment should be explicitly encouraged to achieve California's clean energy future. Imagine the possibilities! 100% renewable powered driving, for example.

Sustainable Communities and Transportation Infrastructure should include consideration of energy storage along with public transit, active transportation infrastructure, infill development etc. Such communities can be enhanced with energy storage to facilitate these measures as well as provide

greater resiliency. Longer duration energy storage solutions are now commercially available (from 6 hours to multi day durations), and could potentially replace the need for some backup diesel generators, particularly if that energy storage capacity is dual use (i.e. When the grid is up and running this storage capacity can be used to provide grid services to utilities or to CAISO. When the grid is down, this storage capacity can be paired with renewable energy and provide clean backup power instead of diesel generators.)

5. *CESA applauds the inclusion of energy storage in Figure 14 Draft Investment Concepts for Clean Energy and Energy Efficiency.*

Renewable energy storage is a great application for energy storage. Customer sited renewable energy storage will be a key means of achieving the 50% reduction in energy use in existing buildings as required by SB 350. It is important to note that in addition to home owners, businesses, state agencies and local government (other large loads) recipients may also include EV charging aggregators/developers and third party developers of energy storage systems at utility scale connected either at the distribution system or the transmission system. Renewable peakers, for example, can be developed to directly displace fossil fuel peaker generation in disadvantaged communities.

Further, use of renewable peakers can have the indirect benefit of reducing water use by California's fossil generation fleet.

Conclusions

As described in detail above, energy storage is a valuable resource for reducing GHG emissions and there are several elements of the Cap &Trade (C&T) investment plan where inclusion of energy storage is relevant and necessary. To date, the C&T revenue allocation has not emphasized or provided explicit support for energy storage, a growing and increasingly important resource in California. Therefore, CESA supports the use of Cap and Trade revenue in several ways to help achieve GHG emission reduction:

1. Fund cross-jurisdictional modeling efforts to quantify the GHG emission benefits of utilizing energy storage throughout the electric power system, including co located with fossil generators, customer sited, transmission and distributed sited and the proactive use of electric vehicles as a system resource. This would support the intent of SB 350.
2. Identify and encourage ways energy storage can be implemented in lieu of fossil fuel resources particularly for local capacity in disadvantaged communities.
3. Develop pilots and programs for energy storage to be used in local sustainable communities in lieu of emergency backup diesel generation. For example, long duration storage solutions can be deployed for certain emergency backup applications to displace diesel generators. This storage capacity could also be used to support the grid when not being used for emergency backup.
4. Create specific pilot programs and demonstration project funding to prove the viability of aggregated, behind the meter storage to directly assist with renewable integration and other wholesale market products to the CAISO.

5. Develop incentives for smart vehicle grid integration that meets the needs of California's evolving distribution system and encourages EV adoption.
6. Develop incentives for utilizing storage + customer sited solar to meet SB 350's 50% energy reduction goal for existing building stock.

Respectfully submitted,

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Executive Director

California Energy Storage Alliance