

**California Energy Commission  
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Re: Docket No. 08-DR-01  
1516 Ninth Street  
Sacramento, CA 95814-5512**

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<b>08-DR-1</b>	
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**Draft Committee Proposed Load Management Standards**

**Summary of Testimony: Mark M. MacCracken**

CALMAC Mfg. Corp. of Fair Lawn, New Jersey, with over 3,300 Cool Storage installations around the world, is providing comments concerning the Draft Committee Proposed Load Management Standards. this testimony in support of widespread adoption of thermal energy storage (TES) in California by implementation of rate designs and incentives that reflect the benefits of thermal storage to the environment, to the reliability of electrical energy supplies and to the economy of the State of California.

This testimony is also intended to support the findings of the California Energy Commission with regard to the benefits of TES and to highlight Legislative Intent in support of peak load shifting as an important component of California energy policy. We are not providing testimony in support of any specific thermal storage technology or product including our own.

**ISSUE: Draft report states no Standard is needed for Cool Storage**

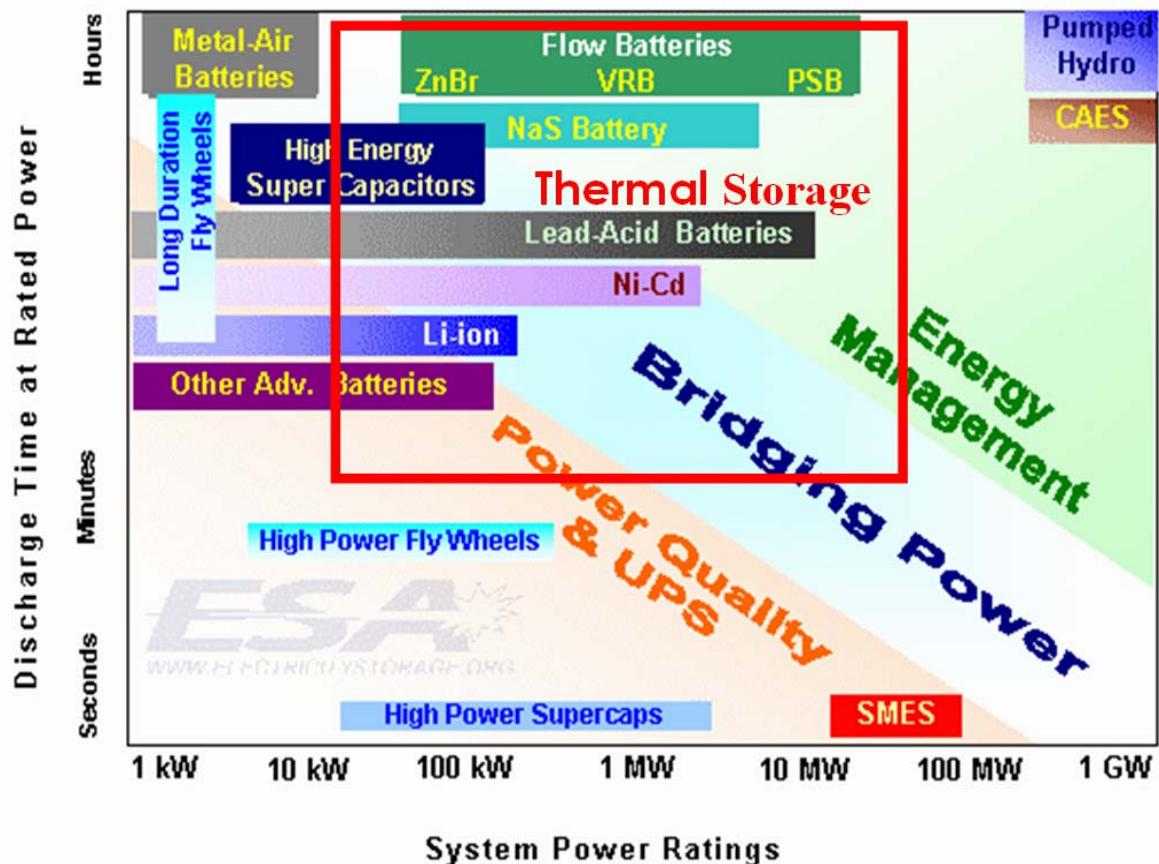
On page 49 of the Draft, it states that no Standard is needed to support thermal storage because of the rate differences between on and off peak power. I believe there are a few flaws to this thinking. First some of the major utilities have been lowering the differentials between day and night power. Secondly, though Cool Storage may very well be able to grow in the new construction marketplace, 90% of the buildings that will be using electricity in the future are already built. Major reductions in peak loads on the grid can be accomplished with this huge stock of existing buildings however the economics need some help. The report states that the technology should justify itself simply on economics from rate differentials however if that is the case then why is there so much support for other technologies like Wind and Solar? Storage is inseparably linked to the successful implementation of Renewable Energy as described below.

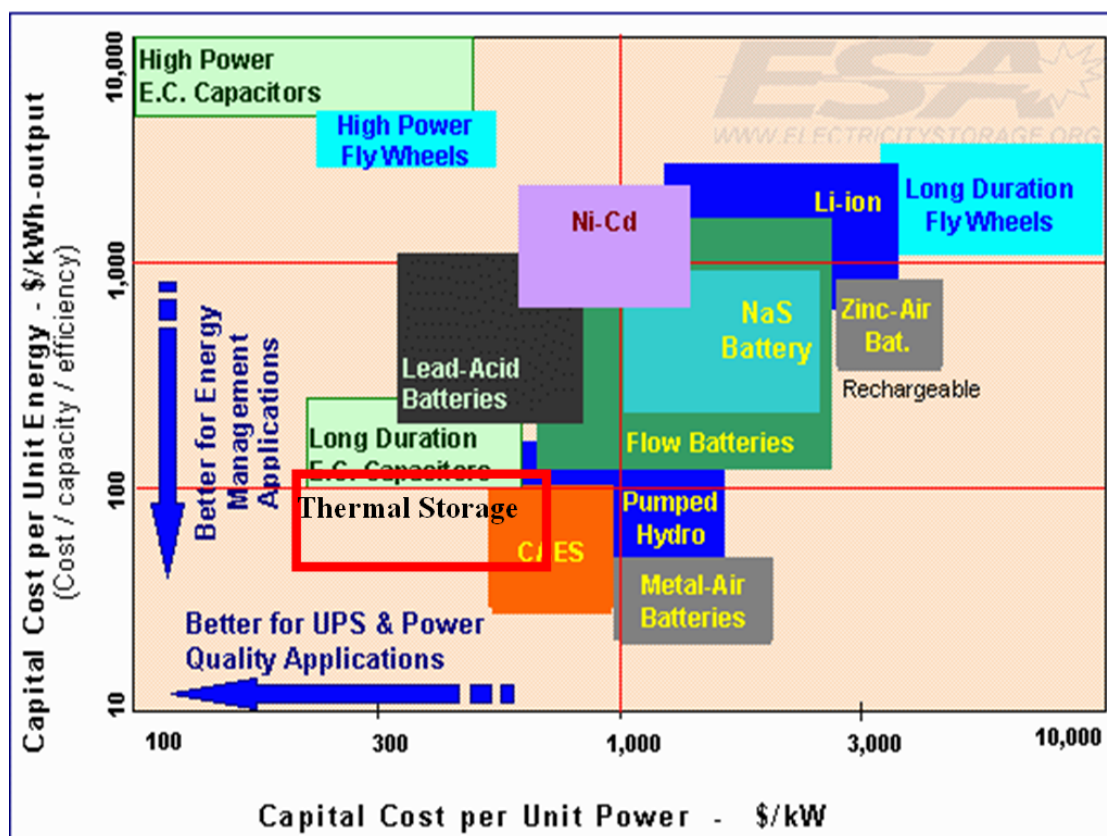
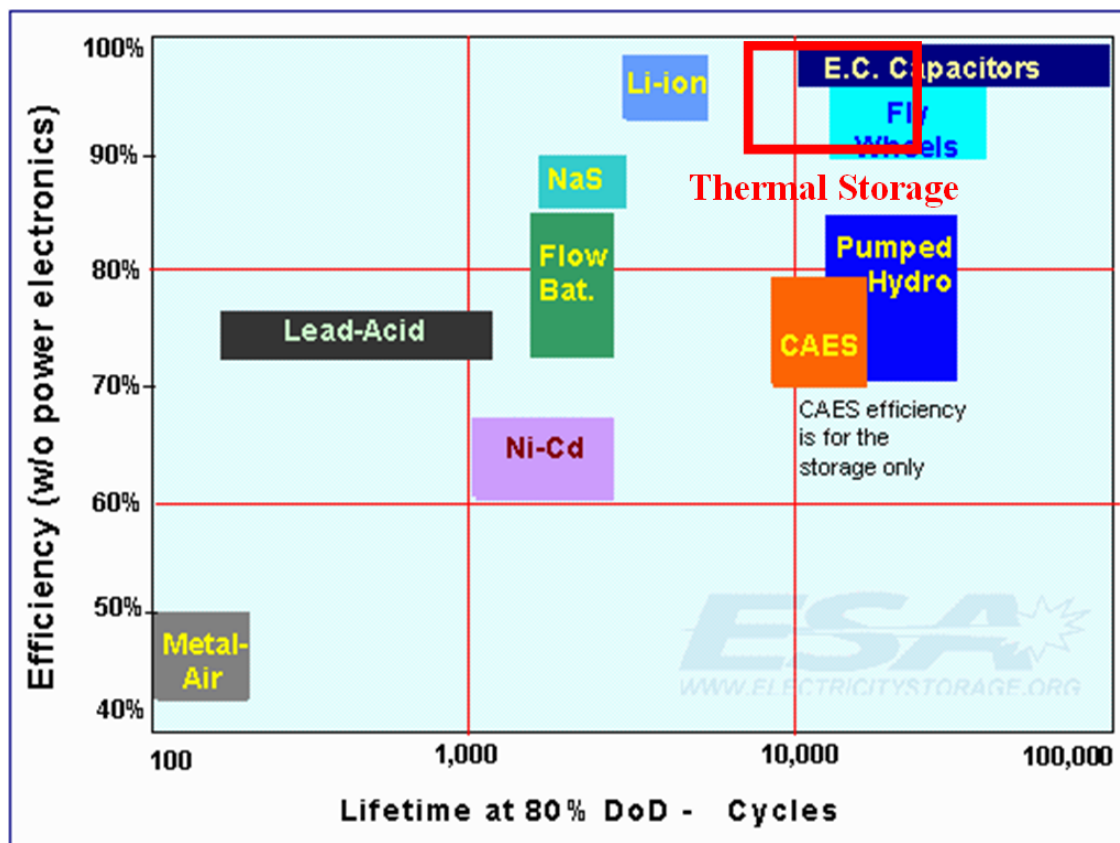
**Energy Storage: A Vital Ingredient of a Renewable Energy Future.**

One must only consider the following simple fact: Solar and Wind are forms of prime energy. You might say coal, oil and natural gas are also prime energy but you would be only partially correct. If you touch coal it is not hot, and oil in the barrel is not moving. Fossils fuels are actually forms of STORED Energy. If our society is going to successfully reduce our dependence on fossil fuels, we cannot ignore the "STORAGE" aspect of what we are replacing.

Because fossil fuels are stored energy, they can be dispatched when needed. Renewable energy lacks this ability and therefore its value to the Grid is lessened, or conversely, the cost to Customers will be much higher. The installed cost of Wind is running about \$1.80 to \$2.40/ Watt however in California only approximately 20% of that peak capacity is available during Grid Peak, so the cost is actually about \$12 per Watt of Grid Peak (\$12,000/kW). These costs are dramatically higher than any other form of generation. However if Storage is added, to make Renewable Resources dispatchable at peak, the installed value becomes competitive with fossil fuels plants, which is explained later in this testimony.

There are many ways to store energy: pumped hydro, compressed air, chemical batteries, inertia wheels, etc, however for large scale Energy Storage, by far the lowest cost, most energy efficient and proven is Thermal Energy Storage. The charts below (numbers are in 2002 dollars) show the comparisons of the different Energy Storage technologies in terms of Size, Cost and Cycle Efficiencies. These charts may seem unfair since many of these other types of storage can be supplied as electrons and Thermal Storage can not. However, because, as with most of the country, the California Grid Peak is based on the requirements for cooling, this re-conversion is not necessary. To summarize, it is extremely expensive to store “electrons” however it is not expensive to store what most of the electrons are needed for, namely cooling. Cool Storage is the simple and proven solution to Renewable Energy integration.





## **Cool Storage Comes of Age**

CALMAC Mfg. Corporation's IceBank Cool Storage is used in 35 countries around the world for both New Construction and Retrofit installations. In the past 4 years in New York City, the most densely populated and energy intensive area in the country, Retrofit Cool Storage installations have been completed for Rockefeller Center, Credit Suisse, Morgan Stanley (2), The Durst Organization (the "Greenest" developer), and TIAA Cref (2<sup>nd</sup> largest Property owner in the USA) cooling approximately about 5 million Sqft of offices. Another 4.5 million Sqft of New Construction for The Bank of America Tower at One Bryant Park (2<sup>nd</sup> tallest building in NYC) and Goldman-Sachs HQ in Battery Park City (Green area of NYC) have been installed. The technology is proven, economical and reliable or these major corporations would not risk their buildings on it.

CALMAC Mfg. Corp. has over 3,300 installations including over 100 in California. Most of the California installations were installed in the early to mid 90's and are still in operation today. El Capitan project, Culver Studios, The West Valley Detention Center (Rancho Cucamonga), Tri-City Medical Center (Oceanside) and Gallo Winery (Modesto), Kern High School District (Bakersfield) are but a few of our projects that are approximately 10 to 17 years old. We have about a dozen ASHRAE Award winning projects, many of which can be found on the [www.CALMAC.com](http://www.CALMAC.com) website. These have consistently provided reliable cooling, reduced Peak Demand and lower energy costs to customer while lowering source energy usage for the generator.

## **Successful Cool Storage Program Requires Consistent Long Term Policy**

Florida Power and Light's and now New York's success in addressing peak load has come from consistent programs that clearly recognize the value of Peak Demand as well as Energy Efficiency. FPL started its program back when California's Utilities stated theirs however it was not abandoned in 1996 when "Deregulation" started. With a modest program (\$300 per KW reduced) the program has had consistent modest results of about 60 MW removed from peak. While reducing peak demand, FPL has also dramatically cut source energy use because they are shifting from Single Cycle Combustion Turbines to Combined Cycle plants which are much more efficient (see ASHRAE Winter Meeting Proceeding Jan-2008). So to put Renewable Energy into perspective in past 15 years, FPL has invested \$18 million in storage. If FPL wants those 60 MW to come from Carbon Free Wind Renewable Energy, to essentially meet Peak Demand, they will need to invest only \$144 million more in Wind turbines. California will have to invest \$720 million since they didn't support storage. The cost per kW in FL calculates to \$2,700 per kW of carbon free Peak Energy vs. \$12,000 for CA.

New York has also recognized these realities and in NYC alone, in just 5 years, with NYSEDA's support of \$450/KW, almost 10 MW has been removed from peak by CALMAC's IceBank Storage Systems.

## **Electric Car Energy Storage to help Utilities meet Peak?**

Some in the energy field think that the excess capacity, in the future electric car fleet, will be a source of stored energy to help meet Grid Peak demand. Even with a very smart Grid, we believe this goes against human nature and is unlikely. Grid Peak occurs somewhere between 3 and 6 pm in most places which is exactly when most people are just about to use or are using their commuter cars (good mileage ones). Sacrificing stored energy from your car battery and giving up travel freedom, just before a trip home, or risking going to gasoline (hybrid) for some unexpected miles just isn't realistic. We don't believe the CPUC can count on these resources to be reliably available, and certainly not in the near future.

### **CEC Direction**

The CEC needs to continue to show great leadership in order to prepare CA for clean energy future. TDV is a sign of that leadership. It recognizes the value of energy based on time. The problem is that TDV is only for New Construction and so the driving force to reduce peak demand is greatly diminished in Retrofit applications.

There is no silver bullet technology that will solve all the problems. It takes a broad understanding of all the factors since the problem stretches from generation to consumer and resources to emissions. In a New Jersey Master Energy Plan meeting, following a statement by the CEO of PSEG that the generation Heat Rates for On-Peak electricity is about "15,000 Btus/kWh and the Off-Peak Heat Rate is 10,000 Btus/kWh", I asked then "why doesn't the utility support load shifting programs", and his reply was "we don't get compensated to do that.". If a Standard to encourage Peak Load Reduction through the use of Cool Storage is not encouraged by the CEC, only a very small fraction of its potential peak load reduction will be realized by the State.

So I am speaking to you, the people responsible for much of the potential energy and environmental actions that must be taken, if we are to be able to economically and quickly change the dyer course this country is on. And yes, I say country because California has always been and continues to be the pioneer state in smart Energy

Respectfully Submitted,

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