



July 1<sup>st</sup>, 2009

Mr. Matthew Crosby  
Policy and Planning Division  
California Public Utilities Commission  
505 Van Ness Avenue  
San Francisco, CA 94102

Dear Mr. Crosby,

Thank you for the opportunity to comment on the California Public Utility Commission's (CPUC) Staff White Paper entitled "Light-Duty Vehicle Electrification in California: Potential Barriers and Opportunities." As the CPUC develops its role in facilitating mass electric vehicle (EV) adoption in California, this paper strongly reflects a commitment to thoughtful and judicious objective review of the evolving EV landscape, its players, potential pitfalls, benefits, opportunities and hurdles.

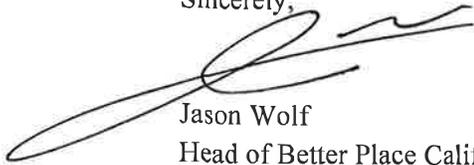
We provide comments on a number of issues, but wish to particularly emphasize the importance of establishing policies that enable the development of viable competitive markets. The Commission is in a key position to clarify any outstanding regulatory ambiguity and help ensure that regulatory policies permit entry and participation in infrastructure markets by unregulated market participants. In turn, entrepreneurship and investment fostered in a competitive market will benefit ratepayers and play a role in overcoming many of the adoption barriers identified in the CPUC White Paper. As the CPUC is aware, Better Place is one among several companies developing forward-thinking business models that will enable a single company to achieve efficiencies by installing and operating EV charging infrastructure (private, public charging and battery switch stations) and providing related products and services. At the early stages of this nascent industry, we encourage the CPUC to provide critical support for this developing market and the associated new business models.

As noted in the White Paper, mass EV adoption can produce tangible benefits for all California residents through increased grid utilization, additional intermittent renewable energy incorporation and the potential for utility Ancillary Services, plus the environmental, economic and geopolitical benefits. Given this, Better Place supports the position that CPUC involvement through creating and implementing policies that actively promote EV adoption would serve the public interest.

In addition to the above comments, we note additional policies meriting consideration, and provide further comments, in Attachment A.

Once again, thank you for the opportunity to comment on your White Paper documenting the current EV landscape and recommend further effort by the CPUC to encourage development of this important industry. We appreciate the effort CPUC is devoting to this crucial topic and look forward to working together to further develop an optimal EV strategy that benefits California residents.

Sincerely,

A handwritten signature in black ink, appearing to read "Jason Wolf", written over a horizontal line.

Jason Wolf  
Head of Better Place California

Attachment

CC:

Molly Tirpak Sterkel, CPUC

Peter Allen, CPUC

Dean Simeroth, California Air Resources Board

Peter Ward, California Energy Commission

## Attachment A:

The CPUC has proposed several policies to remove barriers to EV adoption. Better Place highlights additional policies that also merit consideration:

- **A “Green” EV Tariff:** The concept of a green EV tariff is mentioned in the White Paper. The need for both on-demand load and reliable electrical energy storage is expected to dramatically increase as intermittent renewable energy becomes a greater part of California’s electricity generation mix. Electric vehicles provide a solution to the particular challenge of incorporating wind-generated electricity, which tends to be generated primarily during off-peak hours. As such, the CPUC should consider the value of on-demand load and energy storage when approving tariff designs, and consider providing added incentives for EV customers that use electricity generated renewable energy to power their vehicles.
- **Charging Infrastructure Rebates:** To reduce the initial cost of EV ownership due to the necessity of charging infrastructure (be it at home, work or battery switch stations) the CPUC should investigate the feasibility of a statewide program that provides rebates for charging infrastructure in similar fashion to energy efficient appliances. Rebates are mentioned in the White Paper, and Better Place supports further consideration of this tool for encouraging private investment, especially in the near term. Given the substantial economic, environmental and public health benefits associated with mass EV adoption, such a program would have a wide and targeted impact and produce benefits shared by all citizens.
- **A Statewide EV Infrastructure Approval Process:** To mitigate concerns ranging from standardization, compatibility and charging capability, some municipalities and utilities are requiring EV infrastructure providers to go through a formal approval process before being designated as an official contracting partner. Better Place supports these efforts as they help reduce uncertainty and ensure future interoperability. In addition, the CPUC and/or the California Energy Commission (CEC) can play a valuable role by ensuring these fragmented efforts remain consistent across regions. Better Place suggests the CPUC refer to the City and County of San Francisco’s recent Request for Proposals for EV infrastructure, which identified the critical prerequisites needed from infrastructure and service providers. For example, to ensure that EV charging does not impact peak load, the CPUC could require that infrastructure providers include provisions for demand response, to incorporate intermittent renewable energy, etc.
- **Updated building codes to make new developments EV-ready:** In many existing parking lots, a substantial portion of the costs associated with installing EV infrastructure is related to the backend upgrades required to supply sufficient electrical service. These costs can be significantly reduced by requiring the installation of this equipment and capacity at the time of the parking lot construction or renovation which simultaneously minimizes the long-term financial impact to the developers. The CPUC and potentially in

partnership with the CEC should consider convening a working group to determine a sensible set of reforms and estimate their costs to the relevant parties.

We also submit the following comments in response to specific points in the CPUC White Paper:

*Page 8: The paper states EVs merit CPUC attention in light of “volatile petroleum costs, petroleum security concerns, increasing fuel economy standards, and the overarching California Assembly Bill 32 goal of reducing greenhouse gas (GHG) emissions in all sectors.”*

We encourage the CPUC to also emphasize the benefits of EV adoption on air quality. One recent study estimates that pollution from light and heavy duty gasoline vehicles causes approximately 15,000 premature U.S. deaths per year.<sup>1</sup> Shifting the country’s transportation fuel away from petroleum and toward renewable energy will therefore produce tremendous human health as well as environmental, economic and security benefits. Further, the original basis for the Zero Emission Vehicle regulation (some would argue the birthplace of the modern EV) was to assist in meeting California air quality standards.

*Page 17: The assumed carbon intensity of gasoline is 8.8 kg per gallon*

We recommend the CPUC adopt a full life cycle assessment when measuring the GHG emissions associated with gasoline. The 8.8 kg/gallon assumption does not account for the emissions associated with extracting, refining and transporting petroleum. The California Air Resources Board estimates gasoline has a well-to-wheels carbon intensity of 95.9 g/MJ.<sup>2</sup> This translates to approximately 11.6 kg per gallon of gasoline.

*Page 20: Discussion of infrastructure upgrades required to enable Vehicle-to-Grid (V2G) interactions*

Vehicle-to-Grid (V2G), the ability to move energy from the battery back to the grid/ home/ office, offers enormous potential in enabling critical grid stabilizing services, and Better Place is exploring this opportunity. However, not all grid-stabilizing activities or utility Ancillary Services require V2G. Valuable services such as power regulation and demand response can be performed by simply managing EVs’ rate of charge. As an EV network operator, Better Place is in a unique position to leverage available EV battery capacity through its sophisticated network management software, thereby providing significant environmental and economic benefits compared to an ad hoc or loosely-managed process.

*Page 27: Discussion of economic costs to EV owner*

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<sup>1</sup> Jacobson, Mark. 2009. “Review of Solutions to Global Warming, Air Pollution, and National Security.” Energy and Environmental Science, Vol. 2, 148-173.

<sup>2</sup> California Air Resources Board. 2009. “Proposed Regulation to Implement the Low Carbon Fuel Standard: Volume II, Appendices.”

In addition fuel cost savings, EV ownership also carries lower lifetime maintenance costs in comparison to an internal combustion engine (ICE). The Berkeley Global Venture Lab estimates lifetime maintenance costs to be approximately 75 percent lower for EVs. These savings significantly improve EVs short-term cost-competitiveness compared with conventional vehicles.

*Page 34: The paper estimates that charging three million EVs in an uncontrolled, worst-case scenario would require (depending on the average rate of charge) between 5,400 to 19,800 MW of additional generating capacity.*

Not only does uncontrolled EV charging have the potential to require additional generation capacity, as noted above, but it will also likely place severe stress on electricity grid's transmission and distribution system, requiring proportional upgrades to both. A recent study conducted by the Israel Electric Corporation determined that unmanaged charging of the entire Israeli light duty fleet (two million EVs) would require substantial increases in the country's generation, transmission and distribution capacity. The study found that price incentives shifting EV charging to off-peak hours would reduce the required grid investments, but the EV network operator charging scenario resulted in the least costly outcome, requiring only minor distribution upgrades.

Thus to more accurately estimate EVs' effects on California's electricity grid, we encourage the CPUC to explore the effects on transmission and distribution infrastructure in addition to generation capacity both with and without an EV network operator.

*Page 41: "Quick charging places acute demands on the distribution system"*

Discussions around rapid charging should also consider "fast refueling" or "fast charging," the charging method noted in the CPUC paper (as distinguished from "quick charging.") Within the ZEV regulation, ARB defines fast refueling/charging as the ability to replace 95 percent maximum rated energy capacity in 10 minutes or less.<sup>3</sup> At present, Better Place is only aware of one commercial battery chemistry capable of repeatedly charging in this manner. The CPUC should assess and discuss the potential impacts of this charge method on existing electricity infrastructure.

*Page 41: "There is a battery efficiency loss associated with increased charge rates."*

Increased charge rates also have the potential to increase battery degradation rates. This can dramatically alter the cost-benefit analysis of quick and/ or fast charging EV batteries. The industry is currently working on measuring and quantifying this relationship, and Better Place is following closely. We encourage CPUC to do the same.

*Page 42: "Better Place's business model plans to offer battery swapping, public charging, and residential and commercial charging as part of a subscription service plan."*

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<sup>3</sup> California Air Resources Board. 2006. "Manufacturers' Advisory Correspondence 2006-02."

Better Place's subscription plans also include three key elements accelerating the mass adoption of EVs: First, (and likely the most important to the CPUC) Better Place is the EV network operator, orchestrating when charging occurs, minimizing impacts to the electrical grid, enabling intermittent renewable energy "harvesting" and the potential for electrical grid support through utility Ancillary Services and peak shaving. Second, separation of vehicle and battery ownership, which allows batteries to function as part of the infrastructure and significantly lowering up-front costs and eliminating the risks associated with ownership (battery calendar and cycle life, technology obsolescence, etc). Third, Better Place provides sophisticated on-board software offering charge management, route planning and charge spot/Battery Switch Station navigation etc.

*Page 67: "Public Utilities Code section 218 likely discourages the use of certain business models..."*

To attract investors in EV infrastructure, it is key for the CPUC to confirm that participants in the EV infrastructure market -- from the small "mom and pop" operations to operators who bundle multiple services -- can offer EV recharging facilities without undue regulation and that these facilities can be incorporated into a wide variety of business models. Better Place therefore encourages the CPUC to assist in clarifying the extent to which bundled third party services and competitive options to tariffed utility services are permissible under the existing regulatory structure.