BEFORE THE PUBLIC UTILITIES COMMISSION
OF THE STATE OF CALIFORNIA

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In the Matter of the Application of San Diego Gas & Electric (U 902 E) for Approval of its Electric Vehicle-Grid Integration Pilot Program	Application 14-04-014 (Filed April 11, 2014)

RESPONSE OF THE NATURAL RESOURCES DEFENSE COUNCIL TO THE ELECTRIC VEHICLE GRID INTEGRATION APPLICATION OF SAN DIEGO GAS & ELECTRIC

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I. INTRODUCTION

Pursuant to Rule 2.6 of the Rules of Practice and Procedure of the California Public Utilities Commission (Commission) the Natural Resources Defense Council responds to the Vehicle Grid Integration Application of San Diego Gas & Electric (SDG&E).

NRDC is a non-profit membership organization with around 80,000 California members and a long-standing interest in minimizing the societal costs of the reliable energy services that a healthy California economy requires. We have participated in numerous Commission proceedings over the last 30 years with a particular focus on representing our California members' interest in the utility industry's delivery of cost effective energy efficiency programs, renewable energy resources, and other sustainable energy alternatives.

II. THE NEED FOR WIDESPREAD TRANSPORTATION ELECTRIFICATION

A. Meeting Federally Required Clean Air Standards in Non-Attainment Areas Requires a Comprehensive Transition to Zero and Near-Zero Emission Cars, Trucks, and Buses

Nearly twice as many Californians die from dirty air due to traffic pollution as from motor vehicle accidents.[1] To comply with the Clean Air Act, the state's transportation sector needs to be largely converted to zero and near-zero emission vehicles.[2] Specifically, to attain ozone standards, NOx emissions in the South Coast Air Basin and San Joaquin Valley Air Pollution Control District will require virtually all light, medium, and heavy-duty vehicles be zero or near-zero emission.

Accelerating this transition will yield tremendous public health benefits. According to estimates by the American Lung Association, a 100 percent electric fleet in California running on electricity that is one-third renewable would avoid: $13 billion in health, climate, and other societal damages annually, 10,000 asthma attacks every year and 275 tons of criteria pollutants every day.[3]

B. Meeting Long-Term Greenhouse Gas Targets Requires a Near Complete Transition to Zero and Near-Zero Emission Vehicles

Numerous independent studies conducted by government laboratories, agencies,

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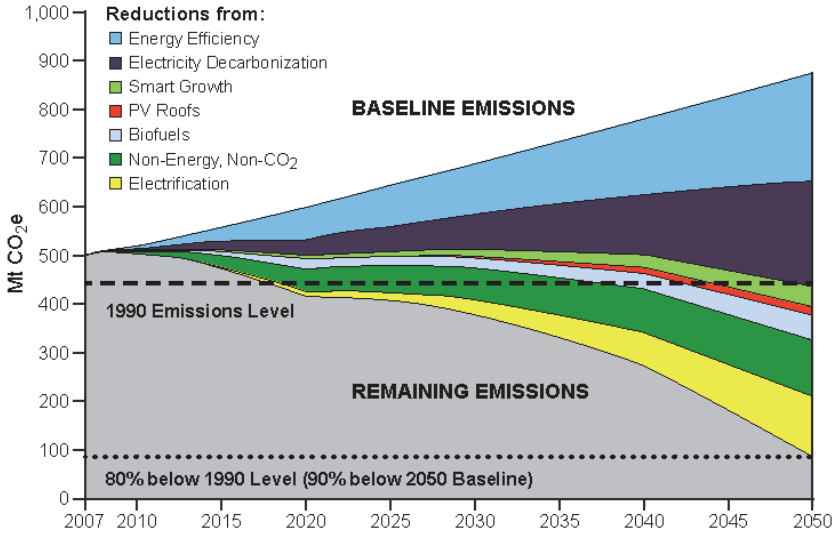
[1] 5,726 annual premature deaths in California due to PM 2.5 and 209 from ozone (Fabio Caiazzo et al., *Air pollution and early deaths in the United States*, Atmospheric Environment, 2013) compared to 3,081 traffic fatalities (*Selected Detail Within Leading Causes Of Death By Sex And Race/Ethnic*, California Department of Public Health.)

[2] *Vision for Clean Air: A Framework for Air Quality and Climate Planning*, June 27, 2012.

[3] American Lung Association in California, *The Road to Clean Air,* Appendix B.

academic institutes, and non-profits have come to the same conclusion ─ comprehensive policy frameworks to reduce emissions to 80 percent below 1990 levels by 2050 require a dramatic transformation of our vehicle fleet to electric drive technology powered by a de-carbonized electricity grid.[4] The results of one such, long-term "wedge" analysis is included below and semonstrate the critical role "Electrification" shown in yellow.[5]

Figure 1: Emission Reduction Wedges for California in 2050



The transportation sector is the single largest source of greenhouse gas emissions in California. Accelerated technology advancement and fleet turnover is an essential component of a feasible strategy to meet the state's long-term climate goals. Wherever possible, a near-total shift to zero-emission vehicles powered by renewable resources is needed.

III. THE NEED TO DEVELOP MODEL UTILITY ELECTRIC VEHICLE GRID INTEGRATION POLICES AND PROGRAMS

A. The Cost Implications of Transportation Electrification Vary Tremendously

Transportation electrification done at a scale necessary to meet California's air quality and climate goals will have significant implications for the electrical grid. If it is done poorly, the costs will be substantial and could undermine the viability of a strategy that is critical to

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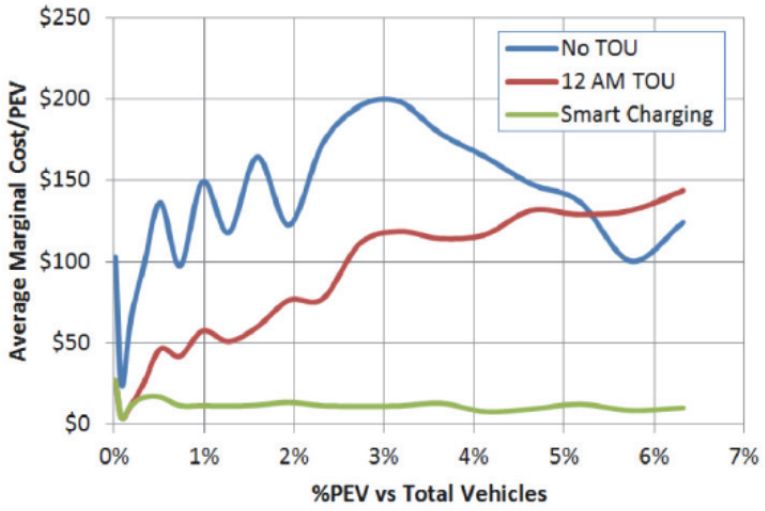
[4] *See* California Council on Science and Technology, *California's Energy Future*, May 2011; Williams et al., *The Technology Path to Deep Greenhouse Gas Emissions Cuts by 2050: The Pivotal Role of Electricity*, Science, January, 2012; internal NRDC analysis; Joshua Cunningham (Air Resources Board), *Achieving an 80% GHG Reduction by 2050 in California's Passenger Vehicle Fleet*, SAE International Journal of Passenger Cars, December, 2010.

[5] *See* California Council on Science and Technology, *California's Energy Future*, May 2011; Williams et al., *The Technology Path to Deep Greenhouse Gas Emissions Cuts by 2050: The Pivotal Role of Electricity*, Science, January, 2012.

meeting California's long-term goals. However, with the right policies and programs in place, the electrification of the transportation sector could be cost-effective, facilitate progress towards the state's renewable energy and energy efficiency goals, and maximize benefits for all utility customers.

Modelling conducted by the Sacramento Municipal Utility District (SMUD) demonstrates the significant difference in the cost implications of vehicle electrification done poorly and vehicle electrification done intelligently. The chart below, taken from an article published in *SAE International Journal of Alternative Powertrains* that describes the results of this modelling, shows the value of programs and policies that ensure costs are below the blue "business-as-usual" case.[6]

Figure 2: Comparison of Average Infrastructure Cost per PEV (measured in 2013 dollars)



This analysis is specific to SMUD's generation, transmission, and distribution system; the exact results of such analysis will vary by utility service territory and may not hold in other utility systems. This analysis also does not attempt to account for the financial benefits that could accrue to all utility customers from the intelligent management of PEV load. As the chart shows, both time-of-use (TOU) pricing and smart charging can provide substantial value. In the short term, TOU pricing coupled with strategic customer education and outreach can successfully shift load to off-peak hours and minimizes associated costs. Some customers will likely always prefer to manage their own charging "manually," but in the long-term, the chart

[6] Berkheimer, J., Tang, J., Boyce, B., and Aswani, D., *Electric Grid Integration Costs for Plug-In Electric Vehicles*, SAE Int. J. Alt. Power. 3(1):2014, doi:10.4271/2014-01-0344.

also illustrates that smart-charging will become increasingly important. Currently, plug-in electric vehicles account for approximately 83,000 or 0.36% of California's 23,237,523 registered automobile fleet.[7] Accordingly, there is still some time before PEVs achieve the type of penetration depicted in the chart above. However, the PEV market is expanding rapidly; now is the time to develop policies and programs to ensure the state follows the green line and avoids unnecessary costs.

B. The Vehicle Grid Integration Application of San Diego Gas & Electric Could Test Programs Necessary to Ensure Widespread Transportation Electrification Maximizes Benefits for All Utility Customers and Facilitates Progress towards Renewable Energy and Energy Efficiency Goals

In contrast to some utilities outside of California that could be seen as using PEV deployment as a rationale for engaging in unjustified "load-building" and cross subsidization, SDG&E's application represents a substantial effort to test and demonstrate the utility system benefits associated with transportation electrification done intelligently. It also promises to demonstrate how a significant barrier to PEV adoption for those who reside in multi-unit dwellings could be removed. Likewise, the application aims to test the viability of smart charging as a form of energy storage and a means to integrate increasing levels of variable renewable generation.

In implementing programs proposed in this application, SDG&E should leverage the significant overlap in the customer populations interested in PEVs and energy efficiency to facilitate progress towards the Commission's PEV and energy efficiency goals. Driving a PEV can increase typical household electricity consumption by about one-third, an amount that can generally be completely offset using readily available residential efficiency upgrades, including lighting, heating, cooling, and building envelope improvements.[8]

However, the promise of facilitating progress towards air quality, climate, renewable energy, and energy efficiency goals is not sufficient. The SDG&E application raises many critical questions that the Commission must answer before authorizing proposed expenditures.

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[7] *See* California Plug-in Electric Vehicle Collaborative: http://www.pevcollaborative.org/ and California Department of Motor Vehicles: http://dmv.ca.gov/about/profile/official.pdf

[8] The average U.S. household uses 11,500 kWh per year (Energy Information Agency, Table 5.A: Residential Average Monthly Bill by Census Division, and State 2010). A PEV with an efficiency of 0.33 kWh per mile that is driven 10,000 miles per year would increase the average home consumption by less than one-third, an amount that can be offset using readily available technologies (Rich Brown, Sam Borgeson, Jon Koomey and Peter Biermayer, U.S. Building- Sector Energy Efficiency Potential, Sept. 2008, Table 2).

The specifics of the programs proposed must be examined thoroughly. This is likely best done in evidentiary hearings.

IV. CONCLUSION

NRDC urges the Commission to consider these issues seriously and to develop precedent-setting policies and programs that show the nation the electric industry can play a productive and appropriate role in transforming the transportation sector in a manner that minimizes adverse impacts to the electrical grid and maximizes utility customer benefits.

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Respectfully submitted,

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