Comments of the Natural Resources Defense Council (NRDC) on the
2011 Integrated Energy Policy Report (IEPR)
Transportation Energy Forecasts

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2011 IEPR – Transportation Energy Forecasts
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I. Introduction and Summary

The Natural Resources Defense Council ("NRDC") appreciates the opportunity to offer these comments on the issues discussed at the California Energy Commission's ("CEC" or "Energy Commission") *2011 Integrated Energy Policy Report* ("IEPR") committee workshop on Transportation Energy Demand and Fuel Infrastructure Requirements held on September 9, 2011 and on the draft staff report "*Transportation Energy Forecasts and Analyses for the 2011 Integrated Energy Policy Report*," ("Draft Staff Report"). NRDC is a nonprofit membership organization with a long-standing interest in minimizing the societal costs of the reliable energy services that Californians demand. We represent our nearly 100,000 California members' interests in receiving affordable energy services and reducing the environmental impact of California's energy consumption.

NRDC greatly appreciates the staff's hard work to develop the Draft Staff Report, but requests that a number of key points be reexamined to ensure the Transportation Energy Forecasts section ("Transportation Section") presents a more thorough analysis. Specifically, NRDC recommends that the Transportation Section provide a more balanced viewpoint on the high-carbon intensity crude oil provision, reflect a broader range of assumptions and scenarios that can result in compliance with the LCFS, and include additional stakeholder perspectives. In addition to our comments on the workshop and Draft Staff Report included below, we also include for your reference as Attachment A our comments to the California Air Resources Board ("ARB") regarding the proposed regulatory amendments to the LCFS as presented at ARB's July 22, 2011

workshop ("ARB Comments"), which highlights electric vehicles' efficiency advantage for the purpose of projecting future prices. Our comments are summarized as follows:

1. NRDC urges the CEC to include additional stakeholder views on the Low Carbon Fuel Standard's High Carbon Intensity Crude Oil provision in the final staff report.
2. NRDC recommends significantly revising the characterization of California's impact on the global fuels market to reflect the decades of leadership and impact the State has had on fuel standards, both nationally and internationally.
3. NRDC requests the CEC present mid and high case scenarios, at a minimum including ARB's regulatory compliance scenarios, in addition to the overly conservative scenario included in the Draft Staff Report.
4. NRDC urges the final report to include an additional set of assumptions for LCFS compliance scenarios that account for a wider-range of liquid and non-liquid low-carbon fuel market potentials presented by stakeholders.
5. NRDC suggests that staff revaluate its projections that almost no Californians will buy full electric vehicles over the next twenty years and requests that the assumptions behind such forecasts be made transparent.
6. NRDC strongly recommends that the demand for electricity as a transportation fuel in the Draft Staff Report be revised to reflect the consensus of experts that demand will grow, not shrink, in the future.
7. NRDC provides suggested modifications to the figures and tables that display the price of electricity as a transportation fuel to reflect the fact that electricity is three to four times cheaper than gasoline.
8. NRDC recommends that the CEC include tables and figures that display the forecasted price of electricity in cents per kilowatt-hour, in addition to gasoline gallon equivalent.
9. NRDC recommends that forecasts be adjusted to reflect the fact that mandated and anticipated changes in utility electric vehicle rates in 2012 will likely lower the price of electricity as a transportation fuel.
10. NRDC suggests that staff base assumptions on electric vehicle customer preferences for rate choices on actual utility data.
11. NRDC requests that the price assumptions for all five utility service territories examined in the CEC's analysis be included in the final report.
12. NRDC strongly recommends that any assumptions included in a CEC report should be made fully transparent.

II. Discussion

NRDC appreciates the effort of the Energy Commission staff to conduct this transportation energy policy analysis and infrastructure needs assessment, and for soliciting input from stakeholders. In order to create forecasting models, it is

understandable and necessary for the CEC staff to make assumptions about demand, pricing, fuel availability, and variety of other factors. However, these assumptions must be clearly stated in order to provide a transparent analysis to stakeholders and to eliminate confusion about the CEC's conclusions. Furthermore, when descriptions of assumptions are provided in the Transportation Section, they often diverge from widely-held reasonable assumptions without explanation. We offer the following recommendations to ensure that the conclusions and recommendations posed in the final report are derived from an analysis that accounts for the wide range of stakeholder viewpoints and integrates all available data relevant to this assessment. NRDC welcomes the opportunity to work with the CEC staff to further develop and implement suggested revisions.

1. **NRDC urges the CEC to include additional stakeholder views on the Low Carbon Fuel Standard's High Carbon Intensity Crude Oil provision in the final staff report.**

NRDC is concerned that the sections addressing ARB's High Carbon Intensity Crude Oil ("HCICO") provision in the Draft Staff Report are not accurately representing the broad stakeholder viewpoints of the provision. In addition, the analysis presented in the Draft Staff Report only considers *one of the five* proposals currently being discussed by ARB and stakeholders, without sufficient explanation.

NRDC also strongly suggests that the full context of the HCICO provision be included at the first mention of HCICO on page six to ensure that the context is clear to the readers before delving into the detailed policy discussion. We highlight the following specific concerns in the HCICO section of the Draft Staff Report and offer recommendations for improvements.

Lack of representative stakeholder viewpoints

The arguments raised in the Draft Staff Report largely reflect those of one stakeholder group – the regulated oil companies. To provide an accurate account of the issues from the diverse group of stakeholders involved in these efforts, the CEC should also include those perspectives from the alternative fuels industry, the environmental community, health-based organizations, and ARB itself. Being a member of the technical

working group and Advisory Panel, the CEC staff is no doubt well aware of these various stakeholder views and could modify language from testimony in these forums for easy insertion into the Transportation Section.

Omission of alternative ARB proposals

The current Draft Staff Report includes a review of *only one of the five* ARB proposals that are currently under consideration. Since ARB expanded the potential ways to deal with HCICOs in response to the concerns raised by oil companies and the CEC, at minimum the CEC should provide a more balanced and complete analysis of these proposals.

Lack of complete examination of LCFS credit generation prospects

The Draft Staff Report neglects key opportunities to generate LCFS credits for compliance purposes, both from the low energy refinery provisions and the HCICO provisions currently under consideration at ARB. There are many potential "low-hanging" opportunities, not specific to HCICO use, for upstream producers to reduce CO_2 emissions that will become cost effective once the right regulatory incentives are in place. These should be included in the Draft Staff Report's compliance forecasts.

2. NRDC recommends significantly revising the characterization of California's impact on the global fuels market to reflect the decades of leadership and impact the State has had on fuel standards, both nationally and internationally.

The Draft Staff Report suggests that California's environmental policies have little or no or little impact on the fuels market:

> Achieving these emissions reductions will be a challenge for two reasons: oil producers outside of California have alternative markets to sell their crude oil; and the California crude oil market is too small (between 1.2 and 2.1 percent of world market) to justify an investment to reduce the carbon intensity of crude oil production operations.[1]

[1] Transportation Energy Forecasts and Analyses for the 2011 Integrated Energy Policy Report, Draft Staff Report. Pub # CEC-600-2011-007-SD. August 26, 2011, Page 6.

This statement implies that California's environmental regulations will not prompt any investments in cost-effective upstream emission reduction opportunities. However, as discussed above, part of the goal of the LCFS is to provide the proper incentive for regulated entities to pick this low-hanging fruit. In fact, California's efforts are already having a tangible impact abroad. The Canadian government often points to international efforts to price carbon, including those in California, as a key motivation for their investments in simple emissions reducing improvements and more advanced carbon capture and storage technologies. These actions are directly related to the type of increased scrutiny and emissions accounting required by California's LCFS.

The CEC need look no further than at its own 33-year history of refrigerator standards to counter the argument that California's regulations have little or no effect beyond our borders. California also represents a very small percentage of the global refrigerator market, but this did not deter the CEC from promulgating standards that have had a sustained global impact. Language that implies California has no ability to shape markets should be struck as it undermines CEC and ARB efforts to do precisely that. NRDC therefore recommends that the passage in the Draft Staff Report be removed, or at a minimum, modified as follows (modifications presented in underline):

> <u>If California – together with other regions – develops a strong regulatory signal and incentive structure for oil companies to engage in upstream reduction practices, greater investment and innovation will be spurred both within and outside of California. However, absent modifications to the current structure</u> achieving these emissions reductions will be a challenge for two reasons: oil producers outside of California have alternative markets to sell their crude oil and the California crude oil market is too small (between 1.2 and 2.1 percent of world market) to justify an investment to reduce the carbon intensity of crude oil production operations.[2]

3. NRDC requests the CEC present mid and high case scenarios, at a minimum including ARB's regulatory compliance scenarios, in addition to the overly conservative scenario included in the Draft Staff Report.

Before choosing a particular LCFS compliance scenario upon which to make conclusions and recommendations, NRDC strongly urges that the final Staff Report

[2] Transportation Energy Forecasts and Analyses for the 2011 Integrated Energy Policy Report, Draft Staff Report. Pub # CEC-600-2011-007-SD. August 26, 2011, Page 6.

include a discussion of additional scenarios as presented to the LCFS Advisory Panel over the past year, as well as consider the Advanced Biofuels Market Report written by Environmental Entrepreneurs (E2).[3] This discussion should specifically include scenarios presented by ARB in their regulatory impact analysis for the LCFS as well as proposals by Biodiesel Industries Inc.[4]

Furthermore, the current scenario analysis provides an assessment of 2011 market status and implies that this current status would remain the same for 2020. A similar graph assuming status quo for the next nine years was also shown by the Western States Petroleum Association (WSPA) at an Advisory Panel meeting. At that time, NRDC and a number of other stakeholders raised strong concerns that this scenario did not account for any improvements over time. Furthermore, we highlighted that a scenario analysis relying only on the status quo is not a reasonable assessment of what is likely to occur in the market. The assumptions provided by the WSPA graph also excluded drop-in renewable fuels, natural gas, electricity, and hydrogen from the compliance scenarios.[5] As noted above, there are additional credit generation opportunities via low energy use refining and reduction in upstream activities that may also contribute to compliance and would undoubtedly modify the scenario analysis provided in the Draft Staff Report.

For example, the CEC graph included below implies that only E10 and E85 will be used as compliance scenarios when in fact, electricity, natural gas, and hydrogen are assumed by the Air Resources Board and many other stakeholders to play a significant role in achieving compliance. In addition, the graph fails to acknowledge the role of drop-in fuels such as renewable diesel and gasoline, which has been shown by the latest E2 report to potentially provide the majority of advanced biofuel volumes going forward.

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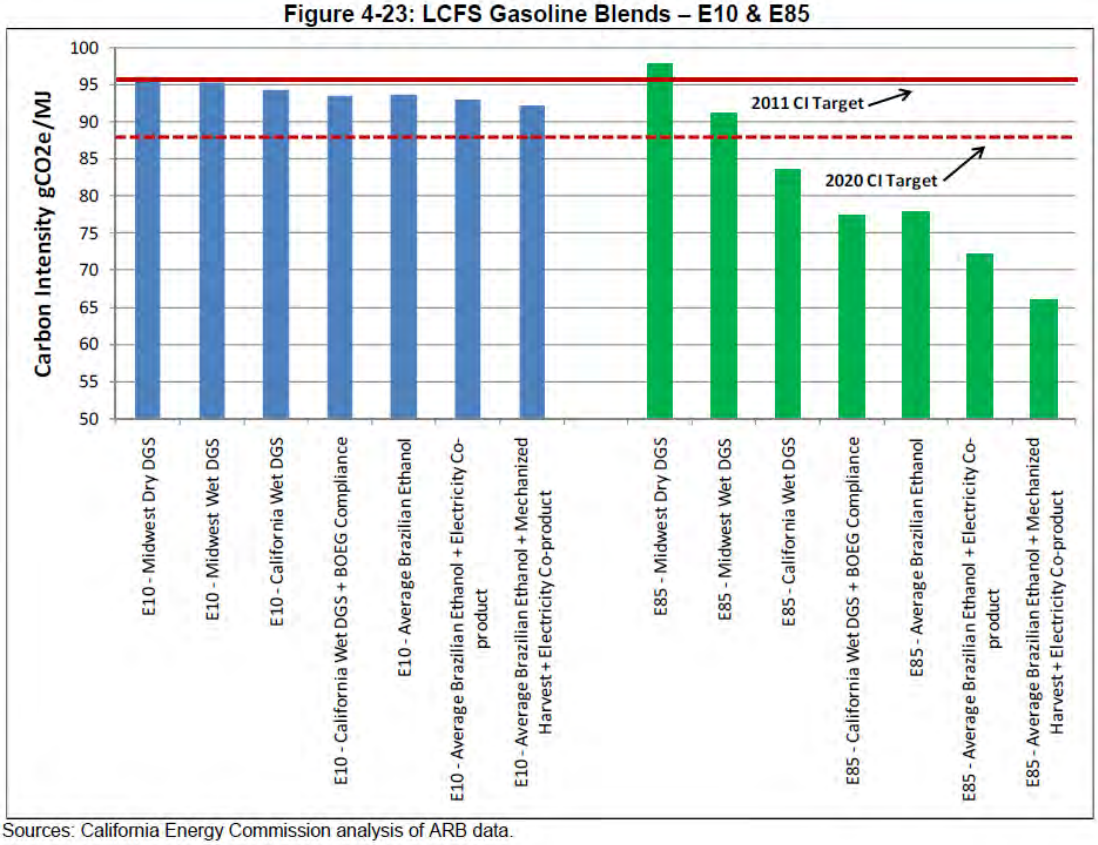
[3] Mary Solecki, David Richey, and Bob Epstein, Advanced Biofuel Market Report 2011, August 22, 2011.
[4] Russell Teall, LCFS Diesel Compliance Options in Millions of Gallon Equivalents, August 25, 2011.
[5] Western States Petroleum Association, LFCS Compliance Challenge, July 18, 2011.

Figure 4-23: LCFS Gasoline Blends – E10 & E85



Sources: California Energy Commission analysis of ARB data.

In addition, the CEC's graph does not incorporate reasonable assumptions that there would be improvements over time in carbon-intensity scores for fuel pathways. Many of these pathways have shown the potential to improve significantly beyond the default look-up table values developed by ARB. In fact, one of CEC's AB118 projects involves improving in-state corn ethanol facilities while a variety of DOE and CEC grants will help improve the feedstock and plant performance for more advanced biofuels. We are aware of many corn ethanol facilities now submitting data showing an improvement beyond ARB's initial default values.

CEC could improve this graph by showing several scenarios that incorporate the following additions, which would contribute to overall industry compliance:

- Additional contribution from drop-in replacements, natural gas, hydrogen, and electricity alternative fuels
- Potential improvements in carbon intensity over time for each of the fuel pathways

- Opportunities to reduce even further from the efficient energy refinery and high carbon intensity crude oil provisions

NRDC therefore recommends that the CEC run additional scenarios with these assumptions to produce a mid-range and high-range to accompany the current conservative or „low range' assessment included in the Draft Staff report.

4. NRDC urges the final report to include an additional set of assumptions for LCFS compliance scenarios that account for a wider-range of liquid and non-liquid low-carbon fuel market potentials presented by stakeholders.

NRDC urges the CEC to modify assumptions used in the straw-man cases presented on LCFS compliance (pp. 120-123) to more accurately represent current market data. NRDC provides specific recommendations for each Case below:

Case 1 (p.120): In Case 1, the CEC assumes that no cellulosic biorefinery facilities will be built beyond those that "have either [been] completed or have pending registrations." This is analogous to assuming that no additional renewable will be brought on-line to meet the state's Renewable Portfolio Standard. This assumption is not only inaccurate, but also limits the potential for compliance in 2020 to present day conditions. Furthermore, the CEC does not provide any solid analysis or rationale as to why it makes this assumption. Furthermore, this is an unlikely scenario given the current market data presented in the E2 report (as noted above), ongoing efforts by CEC through the AB118 process, and other progress made by companies pursuing cellulosic feedstocks

Case 2 (p. 120): This case assumes that California only gets its fair share of the Renewable Fuel Standard (RFS2) volumes and is similar to the business-as-usual case used for the LCFS regulatory impact analysis. If this case becomes a LCFS "compliance schedule" as opposed to business-as-usual, it would implicitly (and inaccurately) assume that the LCFS program value and credit value is zero (i.e. there would be no additional value from the LCFS). Also, CEC appears to assume artificial limits on renewable diesel production by assuming no imports and only relies on the capacity from existing California facilities, effectively limiting production to at most, the volume from one large-sized commercial plant. NRDC urges the CEC to include a broader assumption of production and include a rationale for providing a scenario case that parallels that of the business as usual impact analysis.

Cases 3 and 4 (p. 121-123): CEC releases its "no cellulosic" fuel constraint and assumes that the LCFS will be met with biofuels of various carbon intensities. It is unclear however whether any other fuels are allowed beyond non-ethanol based fuels or from natural gas, hydrogen, and electricity. In addition, it appears that no improvements from today's carbon intensity are assumed for most of the biofuels included in the scenario.

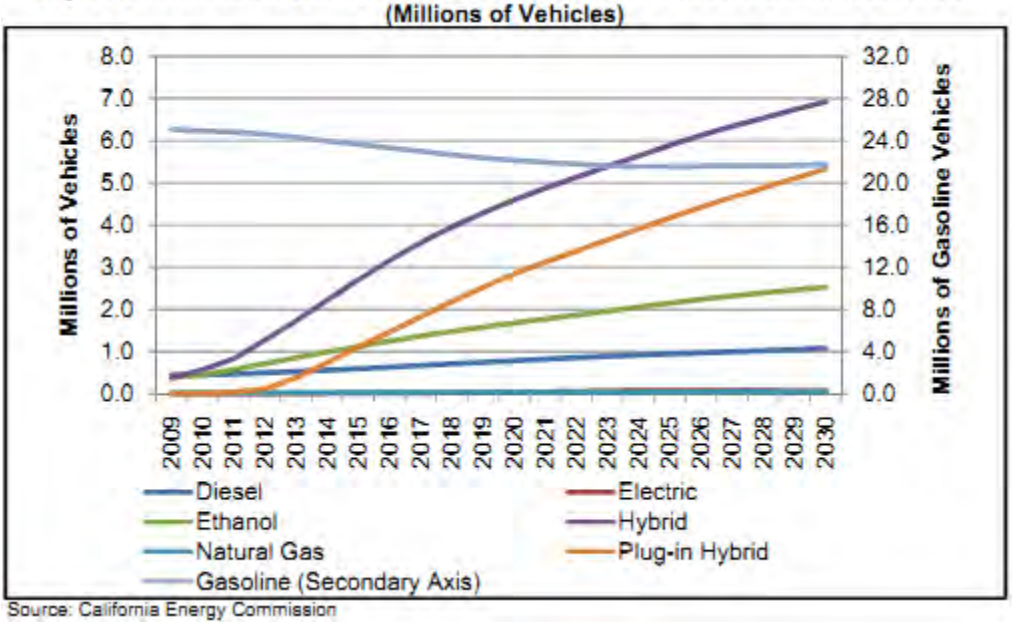
NRDC therefore strongly recommends that the CEC modify its analysis to addresses these concerns to ensure that the final Cases are more in line with current market data and include a range of assumptions for improvements to the carbon intensity of various fuels.

5. NRDC suggests that staff revaluate its projections that almost no Californians will buy full electric vehicles over the next twenty years and requests that the assumptions behind such forecasts be made transparent.

It is not clear what assumptions were used by staff to conclude that "full electric and natural gas vehicles never appreciably gain market share" over the next twenty years.[6] Figure 3-6 and 3-7 below display this prediction out to 2030 under different fuel price scenarios. Even in the high gasoline price and low electricity price scenario displayed in Figure 3-6, the forecast of full electric vehicles never seems to separate from the x-axis, as represented by the barely visible red line.

[6] Transportation Energy Forecasts and Analyses for the 2011 Integrated Energy Policy Report, Draft Staff Report. Pub # CEC-600-2011-007-SD. August 26, 2011, Page72.

Figure 3-6: California Vehicle Demand Forecast Low Petroleum Demand Scenario (Millions of Vehicles)



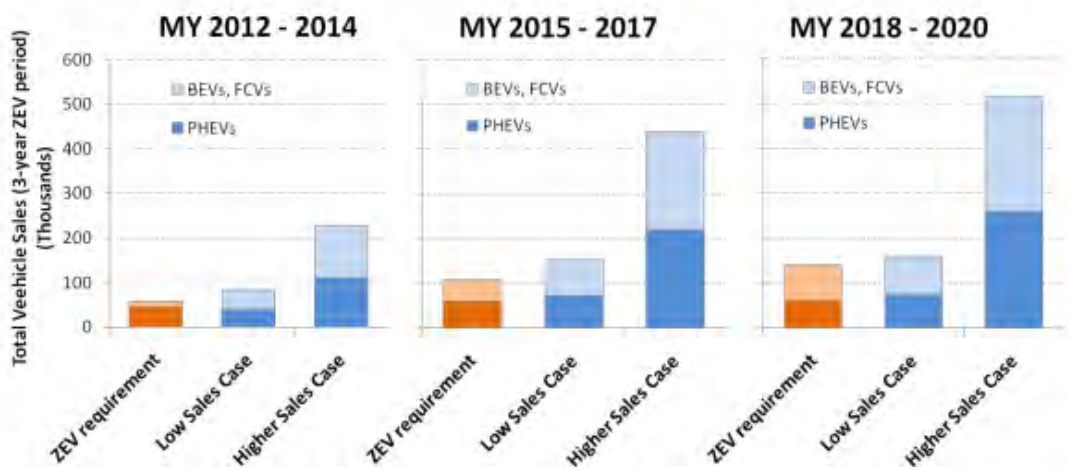
Source: California Energy Commission

Forecasts conducted for NRDC by the Planning Edge and Baum and Associates, which truth tested automaker production claims, estimates that cumulative sales in California of battery electric vehicles between 2010 and 2020 of 225,000 in the low sales case and 770,000 in the high case (essentially the sum of the light blue areas in Figure 9 provided below).[7] We note that Baum and Associate's forecasts provide a bottom-up, model-by-model analysis of the product offerings by automakers and new entrant companies from 2010 to 2015. Automaker production estimates were discounted using a variety of analytic tools and expert judgment. The low and high case projections in Figure 9 correspond to scenarios in which growth either slows or remains steady post-2015, and in which California either purchases at a rate equal to its relative population or at a rate greater than its relative population. It is important to note that roughly half the potential product offerings are full battery-electrics while the other half are plug-in hybrid electric vehicles. In other words, the Baum & Associate forecast stands in marked contrast to that of the Draft Staff Report, which predicts consumers will almost always

[7] Baum & Associates and NRDC, The Zero Emission Vehicle Program: An Analysis of Industry's Ability to Meet the Standards, May, 2010.

opt for plug-in hybrids over full battery electric vehicles.

Figure 9: Comparison of the current ZEV program requirements with the low sales and higher sales case for California.[13] Total cumulative vehicle sales over the three year time periods are shown (e.g. total sales for MY2015 through MY2017).



During the workshop of September 9, 2011, Joshua Cunningham of the California Plug-in Electric Vehicle Collaborative displayed a slide reproduced below that displays various forecasts for plug-in electric vehicle market share in 2020.[8]

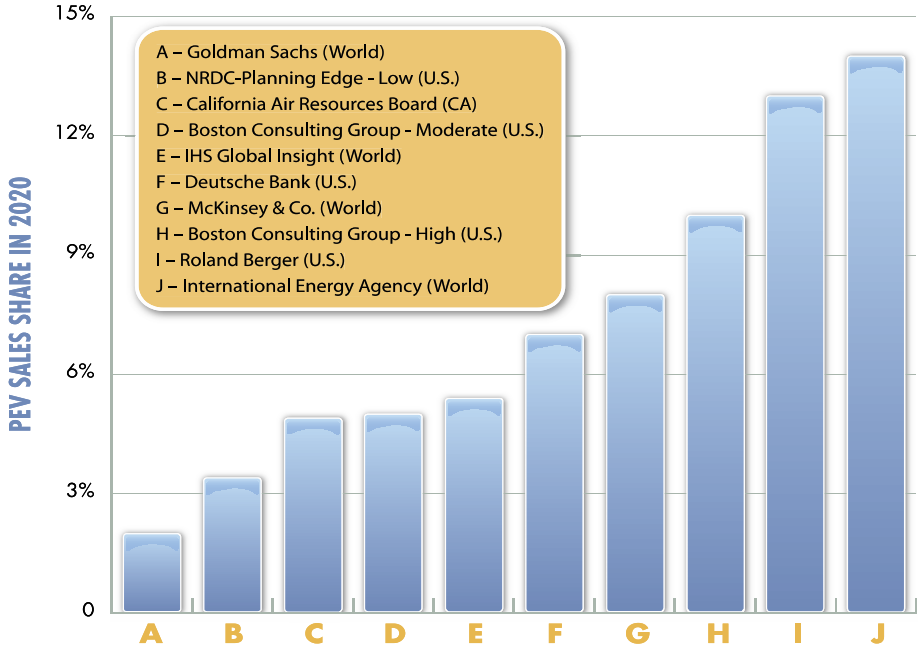


Figure 1. *An example of PEV market projections for 2020*

[8] California Plug-in Electric Vehicle Collaborative, "Taking Charge," 2010, p. 12.

NRDC's forecast, represented by the "B" column, appears relatively low. Two caveats: (1) this chart portrays NRDC's 2015 forecasts, not our 2020 forecasts, as stated in the title. Had our 2020 forecast been included, our column would be firmly in the middle range of this chart, and (2) the forecasts displayed in this chart are not all California-specific, nor do they all differentiate between plug-in hybrid and full electric vehicles. However, the point remains that our forecast of between 220,000 and 770,000 full electric vehicles in California within the next *ten* years reflects a median estimate of market penetration.

In contrast, the Draft Staff Report's forecast that full electric vehicles will fail to gain appreciable market penetration over the next *twenty* years, reflects an anomalous view. NRDC requests that staff revaluate these forecasts and include a detailed explanation of the assumptions used, including those related to vehicle efficiency performance, electric range, consumer preferences, battery costs, vehicle prices, fuel prices, annual miles driven, vehicle incentives, carbon price, and LCFS credit price. In addition, we recommend the forecast used in the Draft Staff Report represent the middle range of forecasts presented in the field, or at the very least provide a range of forecasts including a middle and high case.

6. NRDC strongly recommends that the demand for electricity as a transportation fuel in the Draft Staff Report be revised to reflect the consensus of experts that demand will grow, not shrink, in the future.

As noted in staff's oral remarks during the workshop on September 9, 2011, the fact that Figure 3-15 displays a decline in the demand for electricity as a transportation fuel in 2025 is anomalous and is likely the result of a constraint on staff time, rather than a reflection of actual staff opinion. NRDC supports staff in its stated goal of correcting this anomaly given that state goals and new standards on vehicle tailpipe emissions out to 2025 will undoubtedly affect the demand for electricity as a transportation fuel.

7. NRDC provides suggested modifications to the figures and tables that display the price of electricity as a transportation fuel to reflect the fact that electricity is three to four times cheaper than gasoline.

NRDC supports the staff decision to present the price of electricity as a transportation fuel in "cents per gasoline gallon equivalent" terms in Figure B-7 and

Table B-7 of the Draft Staff Report. However, NRDC requests that the CEC make the assumptions behind this calculation transparent as the tables report that the current cost of electricity as a transportation fuel is *more* than the price of gasoline. By NRDC's calculations, the cost of electricity is approximately *three to four times cheaper* than gasoline on a per mile basis.

Because the vehicle efficiency assumptions used by staff are not included in the Draft Staff Report, NRDC derived its own values (as described below) for calculation purposes. The general range of estimates is that the electric drive-train today is about three to four times more efficient than the gasoline drive-train. In calculating the "gasoline gallon equivalent" ("gge") price for electricity in the final report, NRDC suggests staff use the fleet average on-road vehicle efficiency data published by the EPA for both gasoline, applying this range of efficiency improvement for an electric vehicle, and applying the corresponding gasoline and electricity prices to yield a cent per mile value for operating costs. According to the EPA, both the Nissan Leaf and the Chevrolet Volt use about a third of a kilowatt-hour per mile (on-road).[9] We assume that the Leaf and Volt would replace a vehicle that achieves as shown below, using the average efficiency improvement factor of about three and a half (3.5).

$$\text{Gasoline Vehicle Fuel Economy Displaced} = \left(\frac{\text{mile}}{0.34\ \text{kWh}}\right)\left(\frac{33.4\ \text{kWh}}{\text{gge}}\right)\left(\frac{1\ \text{gge electricity}}{3.5\ \text{gal gasoline}}\right) = 28mpg$$

The Draft Staff Report estimates that the cost of electricity as a transportation fuel in California is currently 12.6 cents per kilowatt hour. On 12.6 cents per kilowatt-hour electricity, both the Leaf and the Volt cost about 4 cents per electric mile. On last week's average California gasoline price of $3.94/gallon gasoline, the average light duty vehicle cost about 14 cents per mile, or slightly over three times what it costs to drive an electric vehicle per mile.[10] In fact, gas would have to be close to a dollar a gallon in order for the fuel cost of driving the average gasoline car to be equivalent to the fuel cost of driving an electric vehicle. Based on our calculation using the assumptions noted above, the "per

[9] US Environmental Protection Agency, 2011-2012 Chevy Volt and 2011 Electric Vehicles. "Light-Duty Automotive Technology, Carbon Dioxide Emissions, and Fuel Economy Trends: 1975 Through 2010," ii.
[10] EIA, Weekly U.S. Retail Gasoline Prices, Regular Grade, September 12, 2011.

gasoline gallon equivalent" price of electricity as a transportation fuel should be close to a dollar, not more than four dollars, as displayed by Figure B-7 and Table B-7.

During the workshop of September 9, 2011, staff stated in oral remarks that costs-per-mile were used for forecasting purposes. NRDC requests that these numbers also be made transparent. Assuming CEC's cost-per-mile estimates are similar to those derived immediately above, it should be clear that the fuel cost per mile of driving on electricity is roughly three times cheaper than the fuel cost of driving on gasoline. Figure B-7 and Table B-7 show no savings relative to gasoline. NRDC requests that the assumptions behind these tables be made transparent and the tables themselves be corrected to reflect the significant fuel savings advantage of driving on electricity today.

As for the future prices projected in Figure B-7 and Table B-7 NRDC recommends that staff assume that electric vehicles will retain today's efficiency advantage. Efficiency improvements are expected to occur for both gasoline and electric drive, so it is reasonable to assume that the ratio between the two will remain similar until further data is available. In future IEPR reports, this ratio should be updated to reflect the latest information. A similar "Energy Economy Ratio" ("EER") calculation must be carried out by Air Resources Board for the purposes of the Low Carbon Fuel Standard. As stated in our comments to the Air Resources Board (Attachment A), NRDC does not recommend comparing new model year efficiency performance, but rather should use the fleet average on-road efficiency performance:

> *Currently, EER updates proposed by the Air Resources Board are based on a comparison of new model year efficiency performance. However, this approach may inadequately describe the EER performance of the current on-road vehicle stock that will use the majority of the low- carbon fuel as well as the petroleum-based fuels. Technically, an EER that is population weighted to reflect the on-road fleet would capture both the lifecycle GHG emission benefits of current and existing vehicles already on the road. In addition to improving the overall accuracy, focusing on the on-road fleet would likely result in a milder change in the EER over time. Recent announcements to reduce emissions of new cars and trucks sold by MY2016 to 250 grams CO2e/mile and MY2025 to 163 grams CO2e/mile could lead to potentially large EER shifts over time if the focus is on the new vehicle fleet alone. ARB's ZEV program as well as the California Energy Commission collects historic and current California sales of alternative vehicle by model year and type, allowing an EER of the on-road fleet to be*

established. A simple spreadsheet model would allow this to be VMT weighted as well.[11]

8. NRDC recommends that the CEC include tables and figures that display the forecasted price of electricity in cents per kilowatt-hour, in addition to gasoline gallon equivalent.

In addition to Figure B-7 and Table B-7, which display the forecasted "gasoline gallon equivalent" price of electricity, NRDC requests that a figure and a table that display the forecasted price of electricity as a transportation fuel in cents per kilowatt-hour also be included. While presenting the price of electricity in "gasoline gallon equivalent" terms is extremely useful as explained above, the forecasts for the price of electricity in kilowatt-hours are needed for other purposes, such as comparing the price of electricity for transportation fuel to the price of electricity for other end-uses.

9. NRDC recommends that forecasts be adjusted to reflect the fact that mandated and anticipated changes in utility electric vehicle rates in 2012 will likely lower the price of electricity as a transportation fuel.

California Public Utilities Commission Decision 11-07-029 ordered PG&E to replace E9-B with a non-tiered, but time-variant rate.[12] It is NRDC's understanding that by early 2012, both PG&E and SCE will have implemented non-tiered, but time-variant separate and single metered electric vehicle rates. This should reduce the price of transportation electricity in California. The forecasts included in Figure and Table B-7, and in the additional figure a table NRDC requests immediately above, should reflect this fact.

10. NRDC suggests that staff base assumptions on electric vehicle customer preferences for rate choices on actual utility data.

The Draft Staff Report states: "PG&E's E-9 Rate B was used for all households which were not restricted from, or had questionable access to, duel metering." PG&E's online rate calculator contains a disclaimer that the metering, permitting, and installation costs required by the E-9 B rate will likely be between $2,000 and $10,000.[13] Assuming that all customers who have the option to do so will choose this rate is questionable given

[11] Attachment A, "ARB Comments," Natural Resources Defense Council.
[12] California Public Utilities Commission, Decision 11-07-029, p. 84.
[13] Pacific Gas & Electric Company, Plug in Electric Vehicle Calculator, Accessed September 16, 2011.

the associated expenses. It is NRDC's understanding that the vast majority of actual PG&E electric vehicle customers are opting for the single-meter rate to avoid the significant expense associated with the separate meter rate. NRDC recommends that the CEC acquire utility data on customer choice and modify this assumption accordingly. The assumptions as to which rate choice will be made in all utility service territories, not just that of PG&E, should also be included in the Draft Staff Report.

11. NRDC requests that the price assumptions for all five utility service territories examined in the CEC's analysis be included in the final report.

The 12.6 cent per kilowatt-hour estimate included in the Draft Staff Report is useful for statewide trends, but it is not an actual rate offered by any of the five utilities examined. Readers of the Draft Staff Report should also be able to see what prices are expected in various utility service territories. In addition, as currently drafted, it is not clear that the price assumptions reflect the most up-to-date information. For example, the Draft Staff Report states: "For the dual meter rates, electricity consumption is charged separately from household consumption, but uses the same monthly baseline allotment."[14] This statement is in the plural, inferring there are multiple dual meter, tiered electric rates. Of the five utilities examined in the staff analysis (PG&E, SCE, SDG&E, SMUD, and LADWP), only PG&E has a tiered dual meter EV rate. SMUD, SCE and SDG&E's separate meter EV rates have no baseline because they have no tiers. Aside from PG&E, the only separately metered EV rate which could be characterized as tiered is LADWP's, which has a discount that only applies to the first 500 kWh of consumption. However, that discount is an incentive, and does not correspond to the baseline allowance used in LADWP's standard R-1 residential service rate of 350kWh. In short, the assumptions used in the Draft Staff Report, including those used in the utility territory-specific price calculations, should be made transparent.

[14] Transportation Energy Forecasts and Analyses for the 2011 Integrated Energy Policy Report, Draft Staff Report. Pub # CEC-600-2011-007-SD. August 26, 2011, Page B-11.

12. NRDC strongly recommends that any assumptions included in a CEC report should be made fully transparent.

NRDC continually advocates for increased transparency in multiply agency proceedings to ensure that stakeholders can adequately understand and assess the various analyses conducted across the state. To summarize requests made above, NRDC respectfully suggests that the following forecasts and assumptions be included in the final report:

(1) *Electric ranges for both plug-in hybrid and full battery electric vehicles*

(2) *Battery costs*

(3) *Annual miles driven*

(4) *Fuel costs-per-mile for all vehicle types examined*

(5) *Vehicle incentive amounts and presumed expiration dates (both Federal and state)*

(6) *Carbon price under AB 32*

(7) *LCFS credit price*

(8) *On-road fleet average vehicle efficiency performance data for all vehicle types examined*

(9) *Forecasted electricity prices in cents per kilowatt-hour (statewide and by utility service territory)*

(10) *Customer rate choice preferences by service territory*

III. Conclusion

Thank you for the opportunity to comment on the issues relating to the Transportation Energy Forecasts workshop and CEC Draft Staff Report and for considering our recommendations. We look forward to continuing to work with the CEC to ensure the accurate and successful forecast analysis of transportation energy in California.

Sincerely,

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Max Baumhefner
Legal Fellow
Natural Resources Defense Council

Siddhartha Oza
MAP Sustainable Energy Fellow
Natural Resources Defense Council

NATURAL RESOURCES DEFENSE COUNCIL

August 5, 2011

Michelle Buffington
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Re: Comments on the LCFS Workshop on Proposed Amendments (July 22, 2011)

Dear Mrs. Buffington,

The Natural Resources Defense Council (NRDC) is pleased to provide comments to ARB regarding the proposed regulatory amendments to the LCFS as presented at the July 22, 2011 workshop. We thank ARB staff for their tremendous efforts over the past year to ensure the LCFS is implemented in an effective manner.

We provide recommendations on the following areas covered by the presentation: high carbon-intensity crude oils, certification, land use change, energy-efficiency ratio (EER), and electricity.

1. **NRDC continues to strongly support ARB's efforts to ensure that the California gasoline and diesel baseline does not backslide through increased use of high carbon-intensity crude oils.**

We will continue to work with ARB staff and stakeholders to ensure that the LCFS provisions accomplish the following goals:

- Accurately accounts for potential increases in the gasoline and diesel baselines should the crude oil slate become more carbon-intensive over time
- Provides a signal to upstream producers and refineries to invest in innovative reduction activities to reduce emissions from crude oil sources
- Results in upstream emission practices being "day lighted" and reported
- Provides a leadership example to other jurisdictions
- Treats finished and intermediate product imports equally so that both domestic and foreign producers are held to the same standard.

2. **Certification requirements should require invoices of the types of biomass feedstock(s) and amounts used over time, since these factors could significantly affect the carbon-intensity values.**

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It is unclear whether the proposed certification requirements under Method 2B include the amounts, type, and energy content of feedstock(s) used by a facility over time. These factors could significantly influence the carbon-intensity of the resulting fuel product. We recommend the following regulatory modification to more explicitly capture this information:

> *Invoices covering a period of no less than two years for all forms and sources of energy and any feedstock inputs affecting the carbon intensity consumed in the fuel production process. If special circumstances prevent the submission of invoices covering at least two years, the applicant shall work out an alternative period with the appropriate ARB staff.*

This would potentially capture primary sources of energy (such as natural gas, coal, and biomass) that serve as feedstock inputs into a facility. ARB should also ascertain whether invoices or documentation supporting specific GREET parameters should also be collected.

ARB should also consider encouraging and requiring third-party certification systems to help ensure that facility processes have substantially over time. This approach would be analogous to a public accountant assuring the financial statement and records of a company are accurate.

3. We continue to support ARB undertaking careful analysis of the impact of biofuel production on food consumption and making the extent of this phenomenon very clear.

We strongly support ARB eliminating or significantly reducing any land use change credit for reduced food consumption. It is inappropriate to inadvertently provide a carbon-intensity credit for biofuels by allowing regional or global food consumption to be reduced in the modeling. ARB should work to ensure that modeling account for the likely scenario that policymakers will take measures to hold food consumption unchanged from the reference case scenario.

We refer staff to our May 11, 2011 community letter to ARB on this issue.

4. NRDC recommends changes to the energy efficiency ratio (EER) methodology to improve the estimates going forward. We also request ARB better describe the methodology and process to update the EER.

NRDC recommends that the EER be updated over time to reflect the relative efficiency performance of the **on-road** alternatively fueled fleet relative to the on-road gasoline or diesel fleet being displaced. Currently, the EER updates proposed by ARB are based on a comparison of new model year efficiency performance. However, this approach may inadequately describe the EER performance of the current on-road vehicle stock that will use the majority of the low-carbon fuel as well as the petroleum-based fuels. Technically, an EER that is population weighted to reflect the on-road fleet would capture both the lifecycle GHG emission benefits of current and existing vehicles already on the road.

In addition to improving the overall accuracy, focusing on the **on-road** fleet would likely result in a milder change in the EER over time. Recent announcements to reduce emissions of new cars and trucks sold by MY2016 to 250 grams CO_2e/mile and MY2025 to 163 grams CO_2e/mile could lead to potentially large EER shifts over time if the focus is on the new vehicle fleet alone. ARB's ZEV program as well as the California Energy Commission collects historic and current

California sales of alternative vehicle by model year and type, allowing an EER of the on-road fleet to be established. A simple spreadsheet model would allow this to be VMT weighted as well.

5. If ARB decides to focus on an EER based on new vehicle sales, the model year comparisons should be consistent.

We note that ARB's presentation was suggesting that model year 2011 vehicles would be compared against a model year 2016 vehicle. Instead, we recommend that a model year 2011 Chevy Volt or Nissan LEAF should be compared to the 2011 model year gasoline vehicle as opposed to the MY2016 or MY2020 vehicle standard. A trajectory could be developed instead that would automatically update the values over time. ARB could establish an equation that would update the EER automatically, so that the MY 2016 Volt or LEAF is compared against an equivalent MY2016 gasoline vehicle.

As ARB looks to finalize its regulatory changes, we also recommended that ARB provide a description of the process, frequency, and methodology to update the EER ratios going forward. This will allow for greater certainty in terms of the potential credit value and compliance obligations.

6. NRDC supports ARB's goal of maximizing the number of electricity credits generated and ensuring that credit value leads to increases in the use of low-carbon electricity for the transportation sector. We recommend the following improvements to better reflect those goals.

A. Credit generation should not be limited to "Level II" charging

NRDC supports the staff of goal of maximizing the number of credits generated. Limiting credit generation to a specific level of charging, such as residential "Level II" charging, appears to undercut this goal. We understand that there is some concern among staff that allowing Level I charging to qualify could lead to credit generation from non-EV load. However, that same concern holds true of Level II charging, given that 240V outlets are equally capable of being used for purposes other than EV charging. This concern is properly addressed by CARB's proposed reporting requirements and should not be addressed by CARB's requirements for regulated parties for electricity. Excluding Level I charging fails to address the need to track credits accurately.

Our understanding is that many customers, especially plug-in hybrid electric vehicle drivers, are currently charging on standard "Level I" (110V) outlets, either because it is sufficient for their driving habits or to avoid the cost and inconvenience of installing equipment capable of higher rates of charge. Excluding those kilowatt-hours could drastically reduce the number of credits generated in the electricity sector. Furthermore, it would provide an incentive to charge at levels that increase the possibility of adverse electrical grid impact, particularly if that charging is not

intelligently managed. As noted by the California Public Utilities Commission ("CPUC") staff, utility distribution systems are expected to absorb Level I charging with minimal impacts.[1]

In order to both maximize the number of credits generated and create an incentive to charge at levels that could actually minimize adverse grid impacts, the draft regulations should be altered as follows:
(A) For transportation fuel supplied ~~through Level II electric vehicle (EV) charging equipment~~ to charge plug-in electric vehicles in single and multi-family homes

B. We support CARB staying flexible with respect to initial LCFS metering requirements and recommend staff continue to support efforts to develop lower-cost metering solutions, submetering protocols and standards, and improved measurement over time.

NRDC commends staff for intending to allow for other means of tracking LCFS credit generation before 2015, because many EV customers will not be using separate metering and the costs of separate metering could be greater than the value of LCFS credits associated with such meters. However, the draft regulations stipulate that all electricity credits should be based on "direct metering (also called submetering)" by 2015. This language may cause confusion given the recent CPUC Decision 11-07-029. NRDC recommends the parenthetical reference to "submetering" be removed to resolve CARB's draft regulations with the definitions of metering options included in CPUC Decision 11-07-029. In the terms of that decision, "submetering" is only one form of direct metering and is presently unavailable (at least in terms of a revenue-grade meters as well as utility ownership). We are unclear of CARB's intent here since the only means of metering that could fulfill ARB's "direct metering" requirement by utilities are actually "separate metering," which involves the use of a second utility revenue grade meter in parallel to the primary service meter.

At this early stage of the market, the incremental cost of separate metering cannot be precisely defined. That said, NRDC has good anecdotal information that separate metering results in incremental costs of several hundred, to several thousand dollars, as it requires a second service panel and complicates the installation of charging equipment. As a result, it is quite likely that many electric vehicle drivers will continue to opt for "whole-home" EV rates that do not track EV load separately and would be unable to do so unless they (1) purchase a separate meter or (2) utilize a submeter downstream of the main meter (either separate, in the EV charging unit, or onboard the vehicle itself).

San Diego Gas & Electric ("SDG&E") currently offers a non-tiered time-of-use whole-home EV rate. Southern California Edison ("SCE") and Pacific Gas & Electric ("PG&E") offer tiered time-of-use whole-home rates currently, but anticipate offering non-tiered versions by early 2012. Many customers will likely find these whole-home EV rates to be the most economical option. Before imposing requirements that would disallow credit generation from EV load serviced under such rates, CARB should be satisfied that lower cost direct metering options are widely available. NRDC recommends that CARB staff participate in the sub-metering protocol

[1] Energy Division, *Revenue Allocation and Rate Design*, September 10, 2010, p. 12.

created by CPUC Decision 11-07-029, as it is intended to foster lower cost metering solutions. However, CARB should remain aware that the goal of that protocol, to create "utility revenue-grade" sub-metering, may be more burdensome than what is necessary to track electricity consumption for LCFS purposes.

C. NRDC supports the requirement that utilities offer their customers rates which are appropriate for electric vehicles. However, CARB should define this requirement to include all appropriate rate options

The draft regulations would require utilities to provide customers with "EV time-of-use pricing as a rate option *that includes a discount for off-peak charging.[italics added]"* As a preliminary matter, confusion about the word "discount" should be resolved. "Discount" could mean either a decrease relative to on-peak periods, or imply some type of subsidy relative to non-EV rates. The CPUC has provided no signal that EV rates will be subsidized. EV rates will likely reflect the same cost-of-service rate design principles that apply to other end-uses. Accordingly, off-peak prices under such rates will not return LCFS credit value to those charging electric vehicles. In sub-section (E), NRDC recommends a third requirement meant to ensure this goal of providing a LCFS "discount" is met.

In order to resolve confusion surrounding the word "discount" and not preclude the most efficient rate designs, the draft regulation rate requirement should be revised as follows:

> ~~*Provide EV time-of-use pricing as a rate option that includes a discount for off-peak charging*~~
> *Provide customers with rate options that encourage charging behavior that minimizes economic, social, and environmental costs and maximizes economic, social, and environmental benefits*

Again, NRDC supports the staff goal of requiring utilities to provide rates that are designed with electric vehicles in mind. However, the requirement should not be restricted to those utility rates with the moniker "EV rate," but should include all rates that will minimize the costs and maximize the benefits of electric vehicle charging. As explained above, such rates will not be limited to separately metered EV rates, and will include "whole-home" EV rates as well. Whole-home EV time-of-use rates are likely to be functionally equivalent to general time-of-use rates. In addition, the draft regulations should be revised to reflect the fact that "time-of-use" rates are only one type of time-variant rate which could be used in the EV context. "Time-of-use" is a term of art referring to rates that have pre-determined prices for various periods of the day (e.g. "on-peak," "partial-peak," "off-peak," "super-off-peak"). Other forms of rate design, including dynamic pricing or hourly pricing, could prove more efficient in the EV context. In fact, analysis done by the Electric Power Research Institute and MidAmerican Energy for the Illinois Commerce Commission suggests that time-of-use rates could result in artificial load spikes at the beginning of off-peak periods.[2]

CARB may wish to consult with the CPUC to determine which utility rates meet this requirement.

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[2] MidAmerican Energy, *Initial Assessment of the System Impact of Plug-in Electric* Vehicles, 2010, p.18.

D. To further the goals of the LCFS, credit value should be returned to customers charging plug-in electric vehicles

NRDC supports the key staff goal of returning credit value to those charging plug-in electric vehicles. Without them, no credits would be generated. Returning credit value to those customers not only reflects this fact, but creates additional incentives for Californians to use electricity as a transportation fuel. NRDC supports the intent of the draft regulations to ensure that value is returned to customers by requiring utilities to provide electric vehicle rate options and online tools to help customers choose the best rate option. However, as explained above, these requirements alone will not fulfill the goals of retuning credit value to electric vehicle customers and increasing the use of alternative fuels. A third requirement should be included which more squarely addresses these goals. The draft regulation should be revised accordingly:

In order to receive credit for electricity supplied as a transportation fuel, the Utility Distribution Company must:

1. Return credit value to customers charging plug-in electric vehicles to incentivize the switch from conventional gasoline and diesel to lower carbon intensity electricity;

Such a requirement returns credit value to those, without whom, no credits would exist and furthers the goal of increasing the use of alternative fuels. It should be noted that, given the CPUC's determination that third-party charging service companies will largely be utility customers, they too would benefit from a requirement that utilities return credit value to those customers charging electric vehicles. Other customers such as commercial or workplace customers helping their customers or employees charge their vehicles would also benefit. The above-suggested language is worded to ensure that all customers charging plug-in electric vehicles, including third-party charging service providers, would receive the value derived from the sale of LCFS credits allocated to utilities.

E. NRDC supports the requirement for web-based rate tools, but it should be modified to better reflect the core customer service obligations of utilities

NRDC supports the requirement that utilities provide web-based tools to assist customers in choosing between rate options, but such a requirement does not alone reflect the customer service obligations of a utility, nor does it fulfill the staff goal of returning credit value to electric vehicle customers. All utilities should be prepared to answer the question: "Which rate is best for me?" This is true for all customers, and is not limited to EV drivers.

Answering that question will likely require the use of simple spreadsheet tools, such as the Excel spreadsheet currently available for download on PG&E's website. Making such spreadsheets or other simple tools available online as a precondition for LCFS credit generation is not an unreasonable requirement. Both PG&E and SCE currently provide such services online. As demonstrated by PG&E's spreadsheet, online tools need not be extremely complicated. While

SDG&E does not yet have such an online calculator, their customer service representatives offer customers personalized analysis, as do the representatives of PG&E and SCE.
Providing such personalized analysis is a key element in fulfilling a utility's customer service obligations. The California Public Utilities Commission has made it clear that servicing electric vehicle load and preparing customers for electric vehicles is an essential utility function, stating that:

> *Each utility has an obligation to use funds to provide its customers with information regarding the choices available for metering arrangements, rates, demand response programs, charging equipment, installation, safety, reliability, and off-peak charging.*[3]

Online rate tools, while necessary, are alone insufficient to meet a utility's customer service obligations. Many customers may not be comfortable with such tools and will likely rely on real-time communication with utility customer service representatives to determine which rate suit them best. Customers will expect, and should be able to receive answers that are specific to their situations. Accordingly, the draft regulations should be revised as follows

> ~~*Provide a web-based user-friendly tool that allows EV customers to compare rate structure options and provides examples of one or more typical EV households.*~~
> *Provide customers with resources, including user-friendly web-based tools and personalized analysis that allows customers to compare rate options.*

Such a requirement is reasonable because it simply reflects the core customer service obligations of utilities. It does not, however, return LCFS credit value to customers charging electric vehicles. In other words, it is insufficient to meet a core staff goal for LCFS credits in the electricity sector.

F. NRDC supports CARB's intention to require that certain conditions be met before credits are allocated in the electricity sector

The staff's proposed rate option and online tool requirements and NRDC's additional suggested requirement that credit value be returned to customers are reasonable conditions to impose upon utilities that choose to become regulated parties in order to receive LCFS credits. Electricity providers are exempted from the LCFS. Their decision to become a regulated party is entirely voluntary and is premised upon the desire to secure value for their customers. In exchange, it is reasonable to expect that such providers actually return that value to customers, while offering rates that will maximize benefits and minimize costs, as well as the resources necessary to chose amongst such rate options. These three simple requirements will further California's goals for reducing emissions in the transportation sector, as expressed in the both LCFS and AB 32.

G. Complete Recommended Changes:

(A) For transportation fuel supplied ~~*through Level II electric vehicle (EV) charging equipment*~~ *to charge plug-in electric vehicles in single and multi-family homes, the Utility*

Distribution Company (as defined by the California Public Utilities Commission as an entity that provides regulated services to customers) is the regulated party in their defined utility territory. In order to receive credit for electricity supplied as a transportation fuel, the Utility Distribution Company must:
1. Return credit value to customers charging plug-in electric vehicles to incentivize the switch from conventional gasoline and diesel to lower carbon intensity electricity;

~~*1. Provide EV time-of-use pricing as a rate option that includes a discount for off-peak charging, and*~~

2. Provide customers with rate options that encourage charging behavior that minimizes economic, social, and environmental costs and maximizes economic, social, and environmental benefits

~~*2. Provide a web-based user-friendly tool that allows EV customers to compare rate structure options and provides examples of one or more typical EV households.*~~

3.Provide customers with resources, including user-friendly web-based tools and personalized analysis that allows customers to compare rate options.

We thank ARB staff and management for their time and consideration of these comments.

Sincerely,

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