California Electric Transportation Coalition

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May 1, 2008

Christina Zhang-Tillman
Air Resources Board
1001 I Street
Sacramento, CA 95812

RE: CalETC Feedback on the Proposed Concept Outline for the California Low Carbon Fuel Standard Regulation

Dear Ms. Zhang-Tillman,

The California Electric Transportation Coalition (CalETC) is pleased to present the following comments on the Air Resources Board (ARB) Proposed Concept Outline for the California Low Carbon Fuel Standard (LCFS) Regulation, which have also been submitted online per ARB's request. Comments have also been made to identify key policy positions not necessarily addressed in the Proposed Concept Outline. We support many of the fundamentals of the proposed regulation, but differ from ARB's current position on several critical points and have made clarifications to the proposed language as necessary.

We would like to emphasize the following points as policy issues that are particularly critical to fuel electricity's impact within the Low Carbon Fuel Standard:

A. It is critical that GHG emissions from electricity used for transportation purposes not be counted towards any AB32 cap on the electricity sector, as this will discourage electric utilities and other Load Serving Entities from encouraging fuel electricity consumption. We believe electricity used for transportation purposes should be accounted for in the Transportation Sector. (see Issue #15 in the attached comments)

B. In the case where transportation is excluded from a cap and trade program, we support the initial ARB staff recommendation that one-way trading of GHG credits from electric transportation be allowed from the LCFS trading market to other AB32 trading markets, as this will encourage further investment in fuel electricity delivery. Opportunities for expanded trading should be explored as part of overall design of integrated AB 32 trading markets. (see Issue #11 in the attached comments)

C. Due to its extremely low carbon content and the possibility of high administrative costs, fuel electricity producers should be subject to the LCFS only on a voluntary opt-in basis for the purpose of generating and trading credits. (see Issue #2 in the attached comments)

D. The ‘fuel provider’ in the case of fuel electricity deliveries should be the Load Serving Entity (LSE) on behalf of its customers overall, as this category of retail electricity providers has the most influence over the availability, cost, convenience and public knowledge of fuel electricity (see Issue #6 in the attached comments)

E. The LCFS should permit credit generation for surplus greenhouse gas emission reductions achieved from electric Alternative Marine Power projects (also known as cold ironing or port electrification). (see Issues #3, 12, and 14 in the attached comments)

Please let us know if you would like to schedule a meeting to discuss these comments further.

Sincerely,

David Modisette
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Section 1: Applicability of the LCFS

1. The delineation between conventional fuels and alternative fuels needs to be clarified, as well as the compliance requirements for each. (Section 1.a)

The current wording of this section does not clearly differentiate alternative fuels from conventional fuels. We request that the second sentence be changed to:

"These include 'conventional fuels' such as RFG ('gasoline') and ULSD ('diesel'), *as well as 'alternative fuels' such as* compressed or liquefied natural gas ('natural gas'), liquefied propane gas ('propane'),…"

We also recommend that a separate section be drafted to discuss the requirements that will be placed on low carbon fuel providers whose fuel is below the LCFS target AFCI values in 2020. The primary interest of these fuel providers in the LCFS is credit generation and trading rather than compliance. We acknowledge that there may be some overlap, such as if liquefied natural gas eventually has an AFCI value above the annual diesel target. However, it is currently unclear which sections, such as reporting requirements, will apply to all fuel providers in California and which will only apply to conventional fuel providers.

2. Due to its extremely low carbon content and the possibility of high administrative costs, fuel electricity providers should be subject to the LCFS only on a voluntary opt-in basis for the purpose of generating and trading credits. (Section 1.a)

As discussed in our letter to ARB Staff submitted on February 29, 2008, fuel electricity providers should not be inherently regulated by the LCFS for several reasons. According to the UC Technical Report, California average fuel electricity will have an AFCI value of only 27 gCO2e/MJ, and "marginal," or what we refer to as "long term average additional" sources of electricity (which we and most analysts believe is the correct metric for electric transportation) have an AFCI value of only 21 gCO2e/MJ[1]. This figure is drastically lower than the proposed AFCI targets for both gasoline and diesel in 2020 presented in Tables 2.1 (83 gCO2e/MJ) and 2.2 (64 gCO2e/MJ). Thus, including fuel electricity in the LCFS will not necessitate any reduction in the AFCI value of fuel electricity, and we therefore do not understand the benefit of including fuel electricity providers in this regulation on a mandatory basis.

Please consider that if all fuel electricity were regulated by the LCFS, load serving entities (LSE) would be mandated to measure deliveries to all transportation sectors, including non-road equipment such as forklifts as well as electrified truck stops. This will likely not be cost effective for the LSE (especially smaller LSEs) or the customer, considering the uncertainty of LCFS credit value.

As we have discussed with ARB Staff, LSEs will likely choose to generate and sell LCFS credits. However, due the small size of some LSEs in California as well as the possibility of other carbon reduction markets, LSEs should not be forced into the LCFS if it is not in their best interest. In

[1] Farrell, A., and Sperling, D. A Low-Carbon Fuel Standard for California, Part 1: Technical Analysis. UC Berkeley and UC Davis. August 1, 2007. Table 2-3.

addition to the possibility of other carbon trading markets, fuel electricity providers may be wary of the possible time lag between the start of the LCFS in 2010 and the point when obligated parties will need to purchase credits. For fuel electricity specifically, we acknowledge that should providers choose not to opt-in to the Low Carbon Fuel Standard, they will have to be regulated under other regulations of AB32.

In all, we see five options available to sellers of fuel electricity:
1. Follow LCFS protocols to generate LCFS credits, and then sell into the LCFS market.
2. Follow LCFS protocols to generate LCFS credits, and then either trade in AB32 market or use for own AB32 compliance responsibilities.
3. Follow AB32 protocols to generate AB32 credits.
4. Follow the protocols of, and sell into, a carbon trading market unrelated to AB32.
5. Avoid costs of protocols, and do not generate credits in any market.

If ARB Staff is unwavering in its current stance for the regulation of fuel electricity, we request that low-volume producers of electricity be exempt from the LCFS entirely, even if aggregate fuel electricity sales in California exceed the threshold established by the Applicability Exemption of Section 1.d. We will work with ARB to determine what the threshold for a 'Low-Volume Fuel Electricity Provider' should be. LSEs that meet this definition will not be subject to the measurement, tracking and reporting protocols of the LCFS unless they choose to generate LCFS credits, at which point all aspects of the LCFS will apply.

This issue has been previously raised in a February 29, 2008 letter to ARB, which is attached an Appendix C.

3. GHG reductions from electric Alternative Marine Power (also known as port electrification or cold-ironing), which are surplus to state and local requirements, should be eligible to generate LCFS credits. (Section 1.c)

Due to the significant opportunity of low carbon fuel switching and surplus GHG reduction resulting from Alternative Marine Power, we believe that this application should be eligible for LCFS credit generation. Please see Comments 12 and 14 for further discussion on this topic.

<u>Section 2: Fuel Standards</u>

4. The unavailability of low carbon fuels in the 2010-2015 timeframe should not be used as justification for a lax compliance schedule in these years for gasoline or diesel. (Sections 2.1.b and 2.2.b)

ARB Staff should be aware that the infrastructure to deliver fuel electricity to customers is already in place, that significant non-road electric transportation in use today, and that additional on-road electric drive vehicles will be available in the 2010-2015 timeframe. We are not advocating for any specific target schedule for gasoline or diesel between 2010 and 2015, but relatively weak targets should not be justified by a concern for the unavailability of low carbon fuels. In the case of fuel electricity, the generation, transmission and distribution infrastructure is already in place and is scaled to meet peak demand. Since electricity for vehicles will primarily be consumed at night, there will be ample capacity to serve around 5 million electric vehicles without the need for additional infrastructure.[2] According to data from Southern California Edison, the overall demand (load factor) on electric infrastructure is actually declining as peak demand increases.[3] The only necessary infrastructure installations will be those that connect existing distribution infrastructure to the vehicle. In some cases, such as plug-in hybrids, this infrastructure will be in the form of a standard 110V electrical outlet. In more power intensive applications, such as a fully electric vehicle, the installation of a vehicle charger may be required. However, this is done in a short amount of time on an as-requested basis.

The existence of all necessary fuel electricity delivery infrastructure is only part of the story, as vehicles capable of employing fuel electricity are necessary as well. In the case of on-road vehicles, GM has said it will be offering two plug-in hybrids by the 2010 model year[4,5], and Toyota is conducting tests on a plug-in hybrid version of their Prius[6]. Some automakers, such as Nissan[7] and Mitsubishi[8], have even discussed fully electric vehicles for possible release in the United States. On-road vehicles are only part of the story, as electrified truck stop equipment[9], electric lift trucks[10,11], electric scooters[12] and electric golf carts are already available to California consumers. Additionally, alternative marine power is regarded as a proven technology[13], and regulations are developing to make it mandatory in certain cases[14].

In summary, TIAX has estimated the population of electric transportation technologies in California by 2012 could be, if incentivized, as much as[15]:

Electric Truck Refrigeration Units (e-TRU): 21,000
Truck Stop Electrification (TSE): 22,000
Alternative Marine Power (AMP) (calls): 6,000
Electric Forklifts: 77,000
Plug-In Electric Hybrids (PHEV): 292,000

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[2] Sanna, Lucy. Driving the Solution: The Plug-In Hybrid Electric Vehicle. EPRI Journal. Fall 2005. Page 16
[3] Please see Appendix A: SCE Peak Demand & Load Factor Comparison, Presented at EVS-23
[4] "GM's Saturn Vue plug-in could precede Volt." Das, Jui Chakravorty. Reuters. January 15,2008. http://www.reuters.com/article/technologyNews/idUSN1441672720080115
[5] "GM says Volt launch in 2010 a 'stretch.'" Krolicki, Kevin. Reuters. January 8, 2008. http://www.reuters.com/article/CHMMFG/idUSN0853468920080109
[6] "Toyota Will Offer a Plug-In Hybrid by 2010." Maynard, Michelene. The New York Times. January 14, 2008. http://www.nytimes.com/2008/01/14/business/14plug.html?_r=1&n=Top/News/Business/Companies/Toyota%20Motor%20Corporation&oref=slogin
[7] "Nissan Sets 2010 for U.S. Electric Car Launch." Edmunds.com, March 5, 2008. http://blogs.edmunds.com/greencaradvisor/.eea49ea
[8] "Report: Mitsubishi to sell electric car in U.S." CNNMoney.com. October 10, 2006. http://money.cnn.com/2006/10/10/autos/mitsubishi_electric/index.htm?postversion=2006101011
[9] http://www.idleaire.com/cms/About+Us/77.html
[10] http://www.cat-lift.com/electric_counterbalanced.cfm
[11] http://www.crown.com/usa/products/index2.html
[12] http://www.vectrix.com/corporate/US/experience.php
[13] ARB Staff. "Expanded List of Early Action Measures to Reduce Greenhouse Gas Emissions in California Recommended for Board Consideration. October 2007. http://www.arb.ca.gov/cc/ccea/meetings/ea_final_report.pdf
[14] http://www.arb.ca.gov/regact/2007/shorepwr07/shorepwr07.htm
[15] TIAX LLC, Electric Drive Technologies Storyline, http://www.energy.ca.gov/ab1007/documents/2007-05-31_joint_workshop/2007-05-31_ELECTRIC_DRIVE.PDF. May 31, 2007. Table 5-1

5. We support the inclusion of a requirement for obligated parties to supply, or purchase credits for, a certain amount of ultra low carbon fuel, and advocate that fuel electricity be considered an ultra low carbon fuel. (Section 2.9.a)

In order to not only meet a 10% carbon content reduction in California fuels by 2020 but to ensure the technology is available to meet even more aggressive carbon intensity targets beyond 2020, a requirement for ultra low carbon fuel sales in the near term will be of great value. At this point we are not advocating for any specific methodology for the ultra low carbon fuel requirement, nor are we recommending a specific definition for ultra low carbon fuel. However, regardless of how ultra low carbon fuel is defined it should be clear that fuel electricity is an ultra low carbon fuel. Using the data for a natural gas combined cycle combustion turbine combined with a renewable portfolio standard (RPS), which is the "marginal" or more accurately "long term average additional" mix for fuel electricity, the emission factor of fuel electricity is only 21 gCO2e/MJ,[16] close to four times below the 2020 target for gasoline. Additionally, fuel electricity will only get less carbon intensive as old power plants are retired and more efficient plants take their place and as increased renewable sources come online due to stricter Renewable Portfolio Standard (RPS) targets. The LCFS should seek to encourage fuel electricity as much as possible as it currently has minimal carbon emissions and has the potential to be a zero carbon fuel source.

Section 3: Compliance and Enforcement

6. The 'fuel provider' in the case of fuel electricity deliveries should be the Load Serving Entity (LSE) on behalf of its customers overall, as this category of retail electricity providers has the most influence over the availability, cost, convenience and public knowledge of fuel electricity. (Section 3.2.g)

As we have discussed previously with ARB Staff, the electric Load Serving Entities (LSE) are the only logical choice to be the defined 'fuel provider' in the case of fuel electricity. LSEs are the direct counterparts to the entities defined as fuel providers in other fuel markets, and it would be incongruous to define any other entity as the fuel provider in the case of electricity. LSEs have the capacity to influence the fuel electricity market and should therefore be the manager of any generated LCFS credits.

Not only are LSEs low-GHG transportation fuel providers (consistent with the concept of LCFS as a fuels-based standard), but they have the tools and capability to influence the market development and deployment of low-GHG fuels in the transportation sector. LSEs can, and do for some technologies, provide a wide variety of services and inducements for their customers, including: information and educational materials, technical assistance, special time-of-use rates, rate incentives for specific equipment or service features, metering and other infrastructure, and financial incentives. For example, LSEs have been very successful in influencing the market development and deployment of energy efficiency technologies using these tools and techniques.

[16] Farrell, A., and Sperling, D. A Low-Carbon Fuel Standard for California, Part 1: Technical Analysis. UC Berkeley and UC Davis. August 1, 2007. Table 2-3.

The issue of credit generation and ownership in the case of fuel electricity has been previously discussed with ARB Staff in the form of our Guiding Principles document, attached as Appendix B.

7. A Fuel Electricity Measurement Protocol for tracking and recording fuel electricity deliveries in common scenarios. (Section 3.3)

Unlike the case with most liquid fuels, electricity is consumed in sectors that are both regulated and unregulated by the Low Carbon Fuel Standard. As only electricity that is delivered to vehicles should generate LCFS credits, we acknowledge that load serving entities (LSE) are faced with the burden of determining how much electricity flows specifically to transportation on an annual basis. Although direct metering in all cases would be the most accurate method to determine fuel electricity deliveries, due to the uncertainty of LCFS credit value this may not be cost effective for many LSE customers.

Based upon the ARB staff statements that methods less precise than direct metering could be allowable (as long as these other methods had their emissions benefits discounted to reflect the greater uncertainty), we present five options from direct metering to estimation. We propose a higher discount factor as the method becomes less certain. We also recommend that the LSE can choose any one they want to use, recognizing they will have an incentive to choose the (higher) more accurate methods because the discount factor is less.

Please review the five fuel electricity measurement methods below, in order of declining certainty. All methods will be contingent on LSEs acquiring and recording verifiable information regarding the location of new and existing electric transportation equipment used by their customers. In some cases this can be made mandatory, for example when a customer requests an EV time of use (TOU) rate or the installation of a charger, but in other cases LSEs will have to rely on customers voluntarily informing them of their equipment.

Again, we assume LSEs will use the most accurate method possible, depending on the situation, but this should not be a requirement.

1. **Direct Metering:** This will be possible when customers have separate accounts for transportation equipment. On-road electric vehicle owners are currently encouraged to have a separate meter dedicated to their vehicle to take advantage of a TOU rate without subjecting their whole house to that rate. Direct metering can take the form of a separate meter in a garage that is dedicated to a single vehicle, or a meter installed at a public charging station. In the case of the public station, the meter will not be able to delineate the specific vehicles fueled, but it will be known that all fuel delivered at this point was consumed by transportation. Although this will be the optimal method for fuel electricity measurement, it will not be cost effective in many cases, such as for a warehouse that employs several electric forklifts that run throughout the day.

   Example Case: A customer purchases an on-road, light-duty plug-in hybrid electric vehicle and is informed by the car dealership to contact his electric utility to establish service. The customer decides it would be an economical choice to have a dedicated meter installed to take advantage of a time-of-use rate. All kilowatt hours recorded on this meter will count towards LCFS credit generation. It will be at the discretion of the LSE if the kilowatt hours will be reported on a time-of-use basis with time-specific emission factors, or if an averaged emission factor will be assigned to all kilowatt hours delivered. Thus, if in March 2011 the dedicated meter has recorded 200 kWh of consumption, all 200 kWh will count towards LCFS credit generation.

2. **Comparing Consumption Before and After Vehicle or Equipment Purchase:** After a customer informs their LSE about a new electric vehicle, the LSE will compare each month's electrical consumption to the consumption from the same month in the previous year. The difference in total consumption, discounted by 5% for conservativeness, will be considered a proxy for the consumption of the new electric transportation equipment. This method will primarily be used when direct metering is either not cost effective or not feasible. Due to the 5% discount, LSEs will be encouraged to employ as much direct metering as possible.

   Example Case: A customer purchases an on-road, light-duty plug-in hybrid electric vehicle and is informed by the car dealership to contact her electric utility to establish service. The customer decides it would be an economical choice to have her whole home on a time-of-use meter. Each month, this customer's bill will be compared with that month's bill from the previous year, and the difference, discounted by 5%, will be assigned to her vehicle. It will be at the discretion of the LSE if the kilowatt hours will be reported on a time-of-use basis with time-specific emission factors (if the vehicle is connected to a time-of-use meter), or if an averaged emission factor will be assigned to all kilowatt hours delivered. If this customer's March 2010 bill showed consumption of 90 kWh, and her March 2011 bill showed consumption of 290 kWh, then 190 kWh will count towards LCFS credit generation. ((290 kWh – 90 kWh) * 0.95 = 190 kWh)

3. **Estimate Based on Direct Meter Sampling:** In cases where neither direct metering nor consumption comparisons are available, an estimate will be used based on existing direct meter data. For example, there may be a case where someone in a new home has an EV and does not opt for a separate meter. Since a comparison to past consumption will not be possible, LSEs will assume the vehicle uses as much electricity as the average directly-metered vehicle of the same type, discounted by 7.5%. This method also may be used if LSEs have evidence of unreported on-road EVs in their territory, perhaps if vehicle sales data do not match reported ownership data.

   Example Case: A customer purchases an on-road, light-duty plug-in hybrid electric vehicle and is informed by the car dealership to contact her electric utility to establish service. The customer decides it would be an economical choice to have her whole home on a time-of-use meter. This customer has only recently moved into her home, and thus a comparison to the previous year's bill will not be possible. The LSE determines that the average directly-metered plug-in hybrid electric vehicle of the same size and type as this customer's consumes 200 kilowatt hours each month. Thus, for March 2010 the LSE will count 185 kWh (200 kWh * 0.925) towards LCFS credit generation. It will be at the discretion of the LSE if the kilowatt hours will be reported on a time-of-use basis with time-specific emission factors, or if an averaged emission factor will be assigned to all kilowatt hours delivered.

4. **Estimate Based on Consumption Comparison Sampling:** In cases where neither direct metering nor year-to-year consumption comparisons are available, and the sample size of direct metering is too small, an estimate will be used based on existing consumption comparison data. For example, there may be a case where a new warehouse is built that employs electric forklifts, and the owner does not opt for a meter dedicated to the forklifts. Comparison to old consumption is not possible because the warehouse is new, and direct meter data may not be available because separate metering for forklifts will likely be rare. LSEs will assume each piece of equipment uses as much electricity as the average vehicle of the same type, of which the consumption was determined by comparisons to previous years in other warehouses, discounted by 10%. This method also may be used if LSEs have evidence of unreported non-road EVs in their territory, perhaps if equipment sales data do not match reported ownership data.

   Example Case: A customer purchases 10 new Class 3 electric forklifts for his new warehouse and is informed by the forklift dealer to contact his electric utility to establish service. The customer decides that a meter dedicated to the forklifts is not an economical choice. Since the warehouse is new, there is no billing data from the previous year for a comparison. Having compared the bills from similar warehouses before and after the addition of Class 3 electric forklifts, the LSE has determined that each uses an average of 500 kWh per month. Thus, in this case the LSE will count 4500 kWh (500 kWh * 10 forklifts * 0.90) towards LCFS credit generation. Whether or not the LSE can use time-specific emission factors will be dependent on whether the average forklift consumption data is averaged over time or time-specific through the use of time-of-use metering.

5. **Estimate Based on Engineering Estimates:** Even when employing direct metering and consumption comparison where cost-effective, there may be vehicle and equipment types on which LSEs do not have empirical consumption data. In these cases, engineering estimates will be necessary, and will employ the AB1007 Full Fuel Cycle Analysis Report and other data from the California Energy Commission. This method will be used as a last resort, and due to the relatively low accuracy, measurements made with this method will have to be discounted by perhaps 12.5%, we want to ensure that LCFS credits can be generated by as many types of electric transportation equipment as possible to encourage as much penetration as possible.

   Example Case: An airport purchases 10 pieces of a new kind of electric ground support equipment. The airport does not directly meter the electric consumption of this equipment, and similar equipment is not yet widely used in other California airports. TIAX estimates show that similar types of equipment consume, on average, 500 kWh per month. Thus, the LSE will count 4375 kWh (500 kWh * 10 pieces * 0.875) towards LCFS credit generation. Time-specific emission factors will not be usable in this example because necessary time-of-use data do not yet exist.

For a discussion on the impact of Advanced Metering on fuel electricity's participation in the Low Carbon Fuel Standard, please see Comment 2 of our February 29, 2008 letter submitted to ARB, attached as Appendix C.

Section 4: LCFS Credits

8. The LCFS credit generation calculation used when fuel electricity is used in the heavy duty market inappropriately accounts for the high efficiency of diesel engines compared to gasoline engines twice. Since the diesel compliance targets already employ the K value for diesel engines, there should be a single K value for each alternative fuel regardless of which fuel it displaces. (Sections 4.1, 5.2.d and Appendix A)

As we have discussed with ARB Staff via email and conference call, CalETC believes that Table 5.2.2 erroneously lists a separate K value for each fuel depending on whether it is displacing gasoline or diesel. We assume the reasoning for this is the fact that a given amount of electricity, for example, will displace less diesel energy than gasoline energy. Thus in Table 5.2.2, the K value for diesel (0.78) is used to discount the K value for fuels that are displacing diesel instead of gasoline. According to this scheme, the volume of fuel electricity calculated will be reduced if it is displacing diesel rather than gasoline.

However, the high efficiency of diesel engines compared to gasoline engines is already taken into account when the AFCI reference value is determined. We understand that the true AFCI value for diesel is around 91 gCO2e/MJ. Since diesel engines are more efficient than gasoline engines, this figure must be multiplied by 0.78 to come up with 71 gCO2e/MJ, as shown in Table 2.2. It is important to note that the use of the adjustment factor when calculating the 2010 baseline emissions and subsequent target AFCI values means that the figures no longer represent grams of carbon dioxide equivalent emissions per megajoule of diesel, but rather they represent grams of carbon dioxide equivalent emissions per megajoule of gasoline displaced. For example, using the 2010 figures, if one consumes 1 MJ of diesel, 91 gCO2e will be emitted. If one consumes enough diesel to displace 1 MJ of gasoline, only 71 gCO2e will be emitted. We believe it is appropriate to calculate the diesel baseline and targets in this manner because it puts gasoline and diesel on an even playing field, focusing on energy at the wheels rather than energy in the fuel tank.

According to the paragraph above, using the diesel K value when calculating the AFCI reference value for diesel puts the reference value on a basis of emissions per unit of gasoline energy displaced. Thus, it is unnecessary and inappropriate to list a K value for fuel electricity that puts it on a basis of emissions per unit of diesel energy displaced, because the target is on a basis of emissions per unit of gasoline energy displaced.

We therefore recommend that a single K value be used for each alternative fuel, and that this K value compare the efficiency of the alternative fuel power train technology to a gasoline power train. Comment 13 below discusses what the K value should be in the case of fuel electricity.

Note that even though there should be a single K value for each alternative fuel regardless of application, we understand that ARB will still need to determine if an alternative fuel displaces gasoline or diesel because it will need to know which AFCI reference values should apply.

9. The expiration of LCFS credits should be clarified. (Section 4.2.b)

As written, Section 4.2.b is currently difficult to interpret. It should be clarified that if an LCFS credit is to be traded within the LCFS market, it will not expire until the regulation ceases to exist in any form. If an LCFS credit is to be used in a separate AB32 trading market, the credit will be subject to the expiration (and all other) requirements of that specific market.

10. External 3rd party entities should be able to *purchase and retire* LCFS credits from the outset of the regulation, and the ability for external 3rd party entities to *purchase and <u>resell</u>* LCFS credits into the market should be reevaluated after the trading market is mature. (Section 4.3.a)

We recommend different positions for "purchase and resell" versus "purchase and retire" as these situations are different.

We understand the concern of some stakeholders that the ability for external 3rd parties to purchase and resell LCFS credits may be a destabilizing force on the expected functioning of the market. Due to the price uncertainty and relatively low credit volume inherent in the future LCFS credit market, speculators may seek to purchase a large amount of credits, thereby artificially inflating the credit price and allowing for the speculators to profit. Although this scenario would be allowed in a free market, speculators acting to inflate the price of credits would have no benefit to the carbon intensity of California fuels, and would only serve to increase the cost burden on obligated parties. Although the purchase and resale of credits should be prohibited at the outset of the LCFS market, it may be worth revisiting after a few years of market function to determine if this would have a positive effect on the market. For this to occur it should first be determined that adequate credits are available to obligated parties at a reasonable price.

Although we are opposed to the purchase and resale of credits at the outset of the LCFS market, we believe there would be benefit to allowing 3rd parties to purchase and retire credits as soon as they wish. This would broaden public understanding of the Low Carbon Fuel Standard, and would allow environmental groups, environmentally conscious businesses, and concerned citizens to claim ownership of emission reductions in the transportation fuel market. Although both this scenario and the speculator scenario above would likely serve to increase the price of credits, they are distinct because the retirement of credits will have a positive effect on California's greenhouse gas emissions inventory, while speculators bring no such effect.

11. We support the initial ARB staff recommendation that one-way trading of GHG credits from electric transportation be allowed from the LCFS trading market to other AB32 trading markets, as this will encourage further investment in fuel electricity delivery. We also recommend that LCFS credits from electric transportation be tradable into any market in which they qualify. Expanded trading opportunities can be considered as part of the overall design of integrated AB 32 trading markets. (Section 4.3.b)

Allowing emission reduction credits generated through the LCFS to be used in complying with AB32 cap requirements, or sold into any carbon trading in which they qualify, would advance the stated public policy objectives of the LCFS. See our Comment #2 for a complete list of options for using the net transportation emission reductions. Allowing load serving entities (LSE) to transfer their LCFS credits to AB32 would enhance the shortage value of LCFS credits in the LCFS market, and provide an added impetus for technology development and investment in low-GHG fuels. Without broader fungibility with the AB32 program, LSEs and other LCFS credit holders will be forced to sell all of their transportation emission reduction credits into the LCFS market. This would result in an increased supply of transportation emission reduction credits in the LCFS market and lower LCFS credit prices. This effectively reduces the value of innovation.

A policy allowing access to a broader trading market would also provide an incentive for AB32-regulated firms to generate more transportation emission reduction credits than they otherwise might, knowing they would be tradable into other carbon markets.

Additionally, and of critical importance, a one-way trade of LCFS credits into the broader AB32 market would alleviate some of the uncertainty associated with credit value in the LCFS market. Although there will be uncertainty about AB32 and other trading markets as well, firms will likely be more willing to invest in low-carbon fuels if there is greater assurance that the generated credits will have value.

Some organizations have expressed concern about allowing one-way trading of intensity-based LCFS credits into AB32 markets that are capped, thinking that large volumes of intensity-based credits would effectively erode the cap. We do not believe that this will occur, and we believe the positive aspects of one-way trading (to encourage greater GHG reductions in the difficult transportation sector) outweigh the possibility of negative consequences. However, there are safeguards that could be put in place to address the concerns. For example, in the initial years, one-way trading might be limited to “ultra-low carbon fuels”. Alternatively, one-way trading transactions could be reported and closely monitored by the ARB and others.

12. The LCFS should permit credit generation for surplus greenhouse gas emission reductions achieved from electric Alternative Marine Power projects (also known as cold ironing or port electrification). (Section 4.5.a)

Electric Alternative Marine Power (also known as cold ironing or port electrification) which replaces the use of petroleum fuels when a ship is at a dock and loading or unloading cargo or passengers, provides an opportunity for a significant amount of greenhouse gas emission (not to mention criteria pollutants and air toxics) reductions in California. We believe this technology is deserving of LCFS credits because it represents low-carbon fuel switching in the transportation sector, exactly what the LCFS has set out to promote. We appreciate that the LCFS will regulate both people and goods movement, and the inclusion of Alternative Marine Power is a logical extension of this.

ARB clearly has authority over this sector, as Alternative Marine Power requirements are well into development.[17] We recognize that when it is mandated, the carbon emission reductions achieved through port electrification should not generate LCFS credits. However, we anticipate many opportunities for surplus carbon emissions where port electrification is not specifically required, when it is employed in advance of requirements, or when a port is able to exceed requirements.

[17] http://www.arb.ca.gov/regact/2007/shorepwr07/shorepwr07.htm

Section 5: Determination of Carbon Intensity Value

13. The Vehicle Efficiency Adjustment Factor (K) proposed for fuel electricity should be adjusted downward to 0.20 to accurately reflect the carbon intensity of this fuel. (Section 5.2.d)

We understand that the K value chosen for fuel electricity by ARB Staff is based on the value from the AB1007 Full Fuel Cycle Analysis. As we discussed in our comments to the California Energy Commission and their contractor (TIAX) during the preparation of the AB1007 Full Fuel Cycle Analysis, many of the electric vehicles evaluated employ outdated nickel metal hydride (NiMH) and lead acid (PbA) battery technology and do not represent the high-efficiency vehicles we will soon see on the market with lithium ion (LiOn) batteries. Therefore we believe that the Energy Economy Ratio (EER) determined for fuel electricity by TIAX is an underestimate. Of the newer technology listed in Table 3-9[18] of their Tank to Wheels Report, the EVs with LiOn batteries have EERs from 4 to 6.5. There is one vehicle currently being produced by AC Propulsion called the eBox which compares directly to a Scion xB. In conversations with Tom Gage of AC Propulsion[19], he indicated that the DC fuel economy for the eBox is 0.19 kWh/mi for city and 0.22 kWh/mi for highway. Applying an 85% efficiency to obtain AC fuel consumption and applying the federal test procedure weighting to obtain composite fuel economy, the eBox has a gasoline equivalent fuel economy of 139.3 mpgge. Comparing that to the 2006 Scion xB with a fuel economy of 31 mpg gives an EER of 4.5. Since this is not a particularly aerodynamic vehicle, further improvements can be seen in other newer electric vehicles compared in Table 3-9[20], Tank-to-Wheels, of the TIAX report. These include the 2006 Tesla Roadster with an EER of 6.5 and a 2004 GM EV-1 with a LiOn battery with an EER of 5.12. We therefore recommend a K value of 0.20, which equates to an EER of 5.0 in the TIAX Reports, for fuel electricity used in on-road vehicles.

Additionally, according to the Electric Drive Technologies Storyline from the AB1007 proceedings, electric forklifts are around 5 times as energy efficient as their gasoline counterparts[21]. A Class 4/5 – Class 1 forklift consumes around 1.6 (range of 1.3 – 1.88) gallons of gasoline per hour, or around 11 kWh in an hour. Using conversion factors of 118 MJ / gasoline gallon equivalent and 3.6 MJ / kWh, this works out to 189 MJ of gasoline or 40 MJ of electricity per hour, indicating a K value of 0.21 (40 MJ / 189 MJ). A Class 4/5 – Class 2 forklift consumes around 0.9 (range of 0.76 – 1.1) gallons of gasoline, or around 5 kWh in an hour. This is equivalent to 106 MJ of gasoline or 18 MJ of electricity per hour, indicating a K value of 0.17 (18 MJ / 106 MJ).

Also included in the Electric Drive Technologies Storyline from the AB1007 proceedings are data indicating that Truck Stop Electrification is about 5 times as efficient as the diesel engine it displaces[22]. A plug-in auxiliary power unit (APU) consumes around 1.4 kWh in an hour, or 0.21

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[18] TIAX LLC, Full Fuel Cycle Assessment: Tank to Wheels Emissions and Energy Consumption. June 2007. CEC-600-2007-003

[19] Personal communication with Tom Gage of AC Propulsion, March 16, 2007.

[20] TIAX LLC, Full Fuel Cycle Assessment: Tank to Wheels Emissions and Energy Consumption. June 2007. CEC-600-2007-003

[21] TIAX LLC, Electric Drive Technologies Storyline, http://www.energy.ca.gov/ab1007/documents/2007-05-31_joint_workshop/2007-05-31_ELECTRIC_DRIVE.PDF. May 31, 2007. Table 5-7

[22] Ibid.

gallons of diesel. Using an adjustment factor of 136 MJ / gallon diesel (118 MJ / GGE * 1.15 (conversion factor from Concept Outline Table 5.2.1)) and 3.6 MJ / kWh, an idling truck consumes either 29 MJ of diesel or 5 MJ of electricity, pointing to a K value of around 0.17 (5 MJ / 29 MJ).

Combining the above data for both on-road and non-road transportation equipment, we recommend that the LCFS employ a K value of 0.20 for all fuel electricity, as this will be simpler than determining and using separate K values that are dependent on the technology type.

At a maximum, the K value for fuel electricity should be changed to 0.24, which reflects the latest (August 2007) figure used in the CEC's AB1007 report. The baseline efficiency for an electric drive vehicle was adjusted between the June 2007 (CEC-600-2007-003) and August 2007 (CEC-600-2007-004-REV) versions of this report, and we believe this change may have been overlooked when this Concept Outline was drafted. The June 2007 version of the report lists a gasoline ICE TTW efficiency of 4.59 MJ/mi,[23] and an EV TTW efficiency of 1.28 MJ/mi.[24] Using these values, one can calculate the K value found in the Proposed Concept Outline Table 5.2.2: 1.28/4.59 = 0.28.

However, the August 2007 version of the report lists a gasoline ICE TTW efficiency of 4.59 MJ/mi[25], and an EV TTW efficiency of 1.12 MJ/mi[26]. Using these values, a different K value is calculated: 1.12/4.59 = 0.24. To reflect the most recent version of the AB1007 report, the K value for electricity presented in Table 5.2.2 should therefore be, at maximum, 0.24.

Regardless of which K value is chosen initially for fuel electricity, it should be reevaluated on a regular basis to account for the possibility of increased efficiency in conventional gasoline vehicles, as well as for real-world data from electric drive vehicles.

As discussed in Comment 8, there should be a single K value for electricity regardless of the displaced fuel.

[23] TIAX LLC for the California Energy Commission. Full Fuel Cycle Assessment: Well-to-Wheels Energy Inputs, Emissions, and Water Impacts. June, 2007. CEC-600-2007-003. Figure A-2. LDA Vehicle Class: Model Years Start 2010 (new), Scenario year 2012, Column G1, ICEV

[24] Ibid. Figure A-3. LDA Vehicle Class: Model Years Start 2010 (new), Scenario year 2012, Column e1, EV

[25] TIAX LLC for the California Energy Commission. Full Fuel Cycle Assessment: Well-to-Wheels Energy Inputs, Emissions, and Water Impacts. August 1, 2007. CEC-600-2007-004-REV. Figure A-2. LDA Vehicle Class: Model Years Start 2010 (new), Scenario year 2012, Column G1, ICEV

[26] Ibid. Figure A-3. LDA Vehicle Class: Model Years Start 2010 (new), Scenario year 2012, Column e1, EV

Section 7: Definitions

14. Definitions should be added for 'alternative fuel,' 'unregulated fuel,' and 'ineligible fuel'. (Section 7)

We acknowledge that the Definitions section as presented is for illustrative purposes only, but would like to encourage ARB Staff to include the following definitions as they would help to explain and clarify the concepts:

Alternative Fuel (Possibly 'Low Carbon Fuel'): Any transportation fuel other than gasoline or diesel that is not an 'ineligible fuel' or an 'unregulated fuel.' This includes hydrogen, natural gas, electricity and biofuels. These fuels are not regulated by the Low Carbon Fuel Standard unless one of the following two criteria is met:

> A. ARB Staff finds the Average Fuel Carbon Intensity (AFCI) of a certain alternative fuel to be higher than the gasoline (if the alternative fuel is used in the light- or medium-duty on-road market) or diesel (if the alternative fuel is used in the heavy-duty on-road or non-road market) reference AFCI value in the current year. If this criterion is met, all providers of the specific alternative fuel will become regulated by the Low Carbon Fuel Standard.
>
> B. An alternative fuel provider that does not also supply gasoline or diesel chooses to generate credits in the Low Carbon Fuel Standard. If this criterion is met, the specific provider will become subject to the tracking and reporting requirements of the Low Carbon Fuel Standard, and is eligible to generate LCFS credits. The choice of an alternative fuel provider to participate in the LCFS does not mean all providers of that alternative fuel will be regulated.

Ineligible Fuel: Transportation fuels that are not regulated or a part of the Low Carbon Fuel Standard in any way. The displacement of ineligible fuels by a lower carbon fuel will not generate LCFS credits. These fuels include jet fuel used for aviation.

Unregulated Fuel: Transportation fuels that are not regulated by the Low Carbon Fuel Standard, but the displacement of which is eligible for LCFS credit generation. These fuels include marine fuel (both bunker oil and distillate fuel) and diesel fuel used in rail applications. These fuels are not required by the LCFS to reduce their AFCI values. If it can be proven that these fuels are displaced by a lower carbon fuel, the provider of that lower carbon fuel my generate LCFS credits from this action.

Issues Not Addressed in Proposed Concept Outline

15. It is critical that GHG emissions from electricity used for transportation purposes not be counted towards any AB32 cap on the electricity sector, as this will discourage electric utilities and other electricity producers from encouraging fuel electricity consumption. We believe electricity used for transportation purposes should be accounted for in the Transportation Sector.

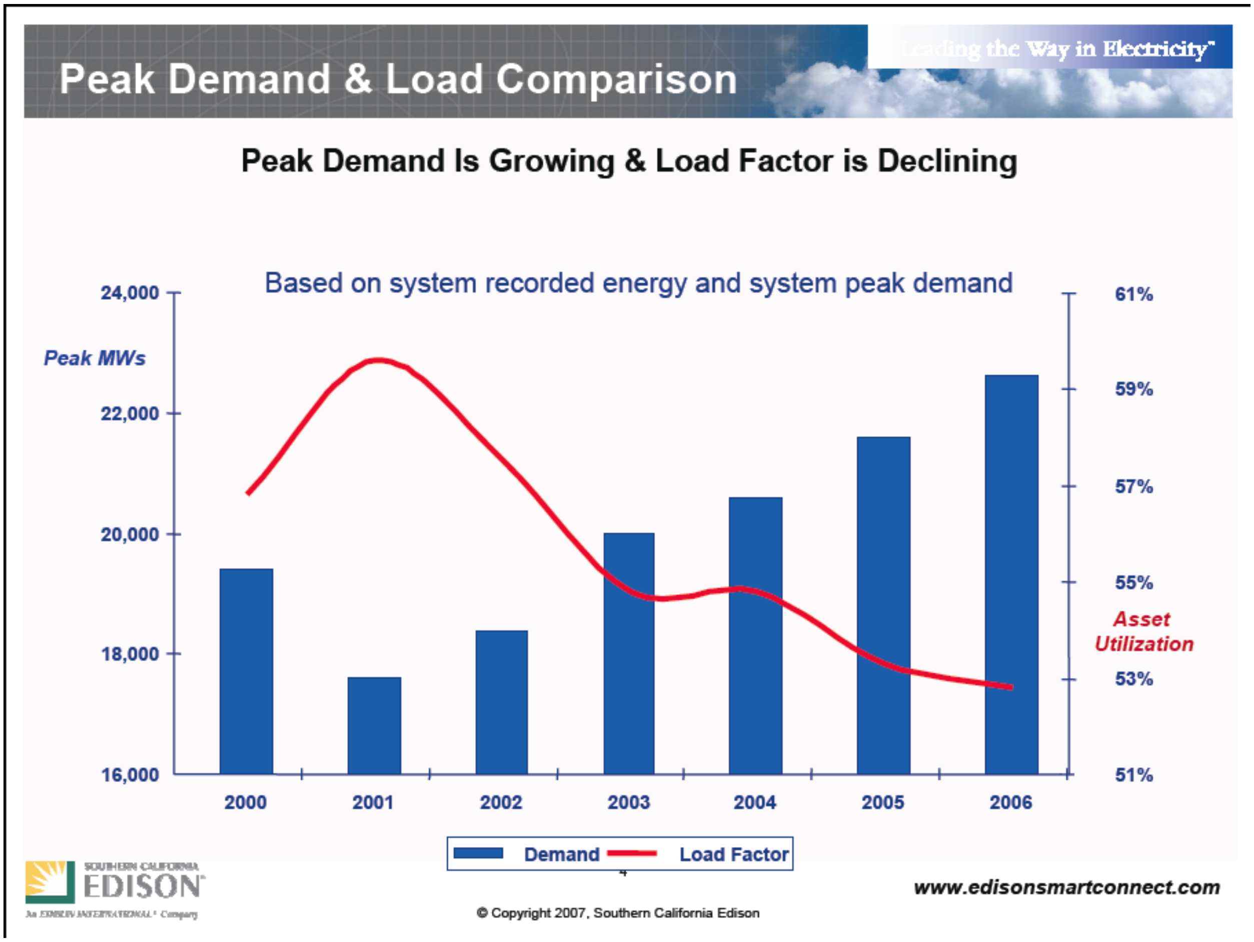
The LCFS is designed to shift transportation fuel usage away from petroleum and increase the use of low-carbon transportation fuels, including electricity. This shift of transportation fuel use to electricity is socially beneficial (because of the very large reduction in greenhouse gas emissions and other benefits that this provides) and should be encouraged. However, this increase in electric load conflicts with proposed caps on utility GHG emissions under AB32.

As we have previously discussed with ARB Staff, it is critical for the participation of electricity in the California transportation market that emissions associated with the production of fuel electricity not be included in the AB32 emissions cap of the load serving entity (LSE). As ARB Staff is aware, the profits of LSEs are decoupled from their deliveries, thus we do not have the same financial incentives as other alternative fuel suppliers to deliver our fuel. Should fuel electricity be included in each LSE AB32 cap, the LSE will have to bear the cost of offsetting these emissions, possibly making the most cost effective option the discouragement of electric transportation. LSEs will continue to have an obligation to serve any load, but we will have no interest in encouraging electric transportation through incentive programs, time-of-use rates, public charging installations, or education.

This point should not be taken to indicate that fuel electricity in California will not continue to be one of the lowest-carbon options available. Electricity in California is already subject to several regulations that tend to reduce greenhouse gas emissions, including renewable portfolio standards (SB1078), energy efficiency targets (AB2021, SB1037), as well as a greenhouse gas performance standard (SB1368). Of course these regulations will continue to apply to all of the deliveries of an LSE, including those that serve transportation.

Please see the first point in our attached Guiding Principles document, attached as Appendix B. This document has been previously shared with ARB Staff.

A P P E N D I X   A


Peak Demand & Load Comparison
Leading the Way in Electricity
Peak Demand Is Growing & Load Factor is Declining
Based on system recorded energy and system peak demand
Peak MWs
24,000
22,000
20,000
18,000
16,000
61%
59%
57%
55%
53%
51%
Asset Utilization
2000
2001
2002
2003
2004
2005
2006
Demand
Load Factor
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APPENDIX B

California Electric Transportation Coalition

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A non-profit association promoting cleaner, healthier air through the development and use of zero-emission electric vehicles, hybrid electric vehicles, electric mass transit buses and rail.

CalETC LCFS Principles May 11, 2007

(Minor Revisions November 13, 2007)

1. "Load serving entities" (i.e., utilities and other retail providers of electricity and natural gas; see Glossary.) should generate and own LCFS credits for the benefit of their customers generally, both because LSEs are low-GHG transportation fuel providers and because they can influence the market development and deployment of low-GHG fuel in the transportation sector.[27]

   LSEs should generate and own LCFS credits when natural gas or electricity is transferred to a vehicle, including to the following transportation platforms: light-, medium- and heavy-duty vehicles, and non-road vehicles.[28]

   Greenhouse gas (GHG) reduction credits under LCFS should appropriately accrue to LSEs for the benefit of their customers generally because they are low-GHG transportation fuel providers (consistent with the concept of LCFS as a fuels-based standard), and because they have the tools and capability to influence the market development and deployment of low-GHG fuels in the transportation sector. LSEs can, and do for some technologies, provide a wide variety of services and inducements for their customers, including: information and educational materials, technical assistance, special time-of-use rates, rate incentives for specific equipment or service features, metering and other infrastructure, and financial incentives. For example, LSEs have been very successful in influencing the market development and deployment of energy efficiency technologies using these tools and techniques.

2. The net benefits of LCFS credits should be used for the benefit of LSE customers as appropriate in accordance with the regulatory authority or local governing body with jurisdiction over the ratemaking for the LSE, such as in the design of time-of-use rates that support LCFS vehicles.

3. Low-GHG fuels should not be subject to 10% carbon intensity reduction.

   Current GHG intensity of reformulated California gasoline should serve as the baseline against which LCFS-regulated entities' fuel delivery mix and all credit generators are measured. The LCFS requirement of a 10% reduction in carbon intensity should only apply to providers of gasoline and not to entities that are strictly low-GHG fuel providers (such as load serving entities), in order to prevent disincenting low-GHG fuel providers from entering the marketplace.

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[27] Although SCE believes the net benefits of credit ownership should belong to either the individual customer or customers in aggregate, they also recognize that such can occur with LSE ownership via the regulatory oversight embodied in Principle #2.

[28] Including, but not limited to: battery-electric cars, plug-in hybrid electric cars, truck stop electrification, truck refrigeration, port electrification, etc.

4. “Fuel electricity” should not be included in any load serving entity (LSE) emissions cap under AB 32.

    In increasing utility service to customers for transportation applications, LSEs’ greenhouse gas and other emissions may increase in conjunction with the associated increase in electricity and natural gas demand. To ensure that utilities are not disincented from serving their customers’ transportation load, electricity and natural gas provided to transportation applications should be quantified as “fuel electricity”[29] and “fuel natural gas.” Emissions associated with these loads should be attributed to the “transportation sector” and not be counted towards any LSE emissions cap, such as AB 32[30]. Alternatively, a similar policy that at a minimum makes utilities neutral with regard to transportation load and emissions cap compliance, such as AB32 compliance, should be implemented[31].

5. Credit generation should be simple to start, then refined as needed.

    Initially, the mechanics of LCFS should be simple and to the extent needed, expanded and refined over time. Initial methods should include:

    a. To determine fuel electricity and credit quantities, the LCFS should initially use the electricity emission factors and the electric vehicle motor efficiency adjustment factors referenced in CalETC comments on the Draft AB1007 Full Fuel Cycle Analysis.

    b. In the early years of LCFS implementation (before a to-be-determined market penetration threshold is met), quantification of fuel electricity will require non-trivial use of estimation, given customer cost considerations as well as the state of advanced metering infrastructure deployment and compatibility with sub-metering technologies. As metering technology progresses, increased use of direct metering of fuel electricity will be evaluated, due to LSEs’ desire to minimize costs and load impacts to generation and distribution facilities as well as to quantify fuel electricity relative to an AB32 cap. LSEs will work with their respective regulatory bodies to develop measurement methods to quantify fuel electricity that maximize customer benefit and minimize impacts to generation and distribution facilities. Note: Metering of all electric vehicle associated energy usage may not be feasible given the voluntary nature of the rate-application process and restrictions on sub-metering by local regulatory jurisdictions.

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[29] As conceptualized by U.C. LCFS researchers.

[30] In addition, PG&E would like to emphasize that emission reductions attributable to actions by LSEs should be credited to those LSEs.

[31] Note that electricity in California is subject to regulations that tend to reduce greenhouse gas emissions, including renewable portfolio standards (SB 1078), energy efficiency targets (AB2021, SB1037), as well as a GHG performance standard (SB1368).

6. Broad markets (LCFS, AB 32, exchanges, etc) for credit generators should be encouraged.

    LCFS credit owners should be able to sell, bank or use emission reduction credits earned from serving transportation load in any greenhouse gas market for which the credits qualify. This should specifically include the AB 32 market provided that an appropriate adjustment factor is applied to ensure the credit is fungible and tradable in such markets. Establishing broad demand for transportation emission reduction credits is likely to increase stability needed to attract investment into low-GHG transportation fuels.

7. Mechanisms to ensure credit generators are fairly compensated should be established.

    Lowest cost credits could remain unpurchased due to competing business interests; therefore LCFS might include the following provisions to ensure LSEs are fairly compensated for credits generated from sales of low-GHG fuels to the transportation sector:

    a. Market design should ensure credits are "generic," that is, fully fungible and tradable among LCFS market participants without any reference to identity or industry of the fuel provider, or the specific fuel used to generate credits.
    b. Compliance "off-ramp" funds should be used to purchase available credits.
    c. Periodic reviews should be conducted to ensure that the credit market is working to meet the Governor's LCFS goals, e.g., that credits are purchased on a least-cost basis.

8. The LCFS structure adopted by California should be able to be replicated at the national level.

9. "Principles" derived from state law or other documents:

    a. LCFS should accurately and consistently treat all fuels on a "well-to-tank" basis (including the carbon content of the fuel), with the LCFS credit calculation including an efficiency adjustment factor for fuel used in dedicated electric, plug in hybrid electric and fuel cell vehicles[32]. Electricity fuel merits such an adjustment because it is consumed approximately 5 times more efficiently than gasoline, and as such can contribute substantial greenhouse gas and petroleum reductions to meet the Governor's LCFS goals. [33]

    b. Fuels should not generate credits under LCFS if their use 'interferes with efforts to achieve and maintain federal and state ambient air quality standards and to

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[32] Crane, David and Brian Prusnek, *The Role of a Low Carbon Fuel Standard in Reducing Greenhouse Gas Emissions and Protecting Our Economy* (white paper), January 2007.
[33] Ibid (footnote 10). Also see CalETC comments to the California Energy Commision on the AB1007 draft Full Fuel Cycle Analysis.

reduce toxic air contaminant emissions'[34] or generates harmful multi-media impacts according to the California Environmental Policy Council[35].

Glossary

A. **Compliance Off-Ramp:** provision that allows regulated entities a compliance option that does not involve credit purchase, which has the benefit of providing assurance that compliance will be possible in the absence of credits. The Off-Ramp would involve regulated entities' paying into a fund as an alternative to credit purchase.

B. **Efficiency adjustment factor:** Also known as 'EER' (energy economy ratio) in the AB1007 draft Full Fuel Cycle Analysis, and 'BTU adjustment factor' in other reports. It means the ratio of the miles per gasoline gallon equivalent of an electric-drive vehicle divided by the miles per gallon of a comparable conventional vehicle. The efficiency adjustment factor allows a fair comparison of electric-drive vehicles (which have inherent efficiency from use of electric motors) to vehicles that use internal combustion engines.

C. **Emission rate:** the mass of CO2-equivalent emissions[36] of a transportation fuel divided by the energy content of the fuel served.

D. **Fuel Electricity**: electricity served to transportation applications including: passenger and other light-duty vehicles, medium- and heavy-duty vehicles, and non-road vehicles.

E. **Fuel Natural Gas:** compressed or liquefied natural gas served to transportation applications including: passenger and other light-duty vehicles, medium- and heavy-duty vehicles, and non-road vehicles.

F. **LCFS Credit**: unit of carbon dioxide equivalent in mass units, generated when the emissions rate of a quantity of fuel sold by a fuel provider is lower than that of the LCFS emission target for a given year. It is derived by calculating the difference in emissions rates between the LCFS emission target and the fuel in question multiplied by the quantity of fuel sold (on an energy equivalent basis to the LCFS emission target.)

G. **LCFS Credit Generator**: a retail provider of a California transportation fuel that has an emissions rate lower than the LCFS emission target for a given year. May or may not be an 'LCFS-regulated entity' directly subject to regulation and consequent compliance and enforcement procedures under LCFS.

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[34] Language is from the text of AB32, as guidance for emission reduction measures implemented on or before January 1, 2011.
[35] California Health and Safety Code Section 43830.8
[36] Measured on a 'well-to-tank' basis, including the carbon content of the fuel, divided by a vehicle efficiency adjustment factor of approximately 5 for battery electric and plug-in hybrid electric vehicles.

H. **LCFS Emission Target:** the emission rate of California reformulated gasoline in a baseline year, reduced on a percentage basis as required by LCFS for a given year.

I. **LCFS-regulated Entity**: a wholesaler, importer, producer or blender of a California petroleum fuel, which is directly subject to regulation under LCFS (i.e. which is required to reduce the GHG-content of provided fuels, and which is subject to compliance and enforcement procedures under LCFS).

J. **Load Serving Entity (LSE):** used in the broadest sense to refer to retailers of electricity or natural gas owned by investors, co-ops, or municipal governments; includes traditional electric utilities, community choice aggregators, energy service providers, as well as natural gas providers.

K. **Low-GHG Fuel:** a transportation fuel whose emission rate is lower than the LCFS emission target for a given year.

L. **Transportation Fuel Provider:** a wholesaler, importer, producer, retail provider, or blender of a transportation fuel provided to Californians.

A P P E N D I X   C

California Electric Transportation Coalition

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Legislative Director

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CalETC@ix.netcom.com

February 29, 2008

Dean Simeroth
Air Resources Board
1001 I Street
Sacramento, CA 95812

RE: Policy Comments for Low Carbon Fuel Standard Development

Dear Mr. Simeroth:

Based on our initial discussions with you and other ARB staff, in addition to information presented at the Policy Working Group meetings, the California Electric Transportation Coalition is pleased to present the following comments. These comments represent issues on which we have enough information currently, but we will likely have several additional comments as the rulemaking process continues. We look forward to discussing these comments with you at our upcoming meeting.

Sincerely,

Dave Modisette

CC:
Renee Littaua
John Courtis
Christina Zhang-Tillman
Jing Yuan
Anil Prabhu

A non-profit association promoting cleaner, healthier air through the development and use of zero-emission electric vehicles, hybrid electric vehicles, electric mass transit buses and rail.

1. Fitting Fuel Electricity into the Modified RIN System

Since all LCFS credits will be in the mass units of tons of CO2eq, it may not be necessary to fit fuel electricity into a RIN system prior to conversion to these mass units. However, according to the recently passed Federal Energy Bill, electricity generated from renewable sources may eventually be eligible to compete in the RFS market. It therefore may be in the electric utilities' interest to develop a method of converting fuel electricity deliveries to RINs. We have developed a proposal to fit fuel electricity into the current RIN structure for ARB consideration. Should ARB decide that not all fuels will have to fit into the RIN system, we would be happy to develop a simplified scheme that converts fuel electricity sales directly to LCFS credits.

It is not currently possible to associate specific feedstocks to specific megawatt-hour deliveries, so RIN use for fuel electricity will have to be much more generalized than it is for liquid fuels. We propose that 'Company ID' and 'Facility ID' be collectively used to indicate all information necessary to determine the emissions associated with fuel electricity deliveries. Electric utilities seeking LCFS credits will have the choice to either use conservative, generalized default values for their emissions, or to prove utility and/or time-specific emission values. Each utility that chooses to use company-specific emission factors will have to prove their long-term average additional emission rate, and will have to do so for each time of day block (should they choose to pursue time-specific rates). For a discussion of a statewide long-term average additional emission rate, please see Appendix A below. Time of day blocks will mirror the blocks present in the utility's time of use rate(s) designated for electric vehicles. There will also need to be a time-neutral emission rate for each utility to use when the time of day delivered is not known. We want to be clear that credit generation needs to be available in both a simplified form for small utilities and/or small loads, as well as a slightly more detailed form that allows for more accurate emissions accounting. We acknowledge that the more simplified of an approach a certain utility takes, the more conservative the emission factors will have to be.

Proposed RIN code, with definitions specific to fuel electricity is below. Please note that the scheme below is intended as a proposed RIN structure for fuel electricity deliveries; we are not advocating specific numeric codes.

KYYYYCCCCFFFFFBBBBBRRDSSSSSSSSEEEEEEEE

K: This will be 1 (assigned) when the fuel is sold, and will change to 2 (unassigned) when the RIN is converted to a number of LCFS credits

YYYY: Year electricity is delivered

CCCC: This will identify the utility that delivered the fuel electricity. Some utilities, such as PG&E and SDG&E, supply more than one low carbon fuel, and this will be designated elsewhere in the RIN:

0000 = (Default) CA Average Value
0001 = PG&E
0002 = SCE
0003 = SDG&E
0004 = SMUD
0005 = LADWP
0006 = etc. other individual utilities

FFFFF: For electricity this would not be used for Facility ID per se, because it will not be feasible to trace specific deliveries back to specific generation facilities. Instead, these five digits will be used to define other aspects of the delivered electricity, which will help determine the associated emissions and credits. For example:

First Digit in the five-digit sequence (i.e. X0000): Fuel Type
Since several utilities provide more than one low carbon fuel, it will be necessary for the RIN code to illustrate fuel type. (Note: Remainder of discussion is based on electricity. The other alternative fuels below will require different RIN schemes.)
1 = Electricity
2 = Compressed Natural Gas
3 = Liquid Natural Gas
4 = Compressed Hydrogen
5 = Liquid Hydrogen

Second Digit in the five-digit sequence (i.e. 0X000): Utility Specific or Default Value
0 = (Default) California Statewide Average Additional Long-Term Generation Emissions Value
1 = Utility-Specific Generation Emissions Value (as approved by ARB)

Third Digit in the five-digit sequence (00X00): Fuel Displaced
In order to calculate emission savings, it will be necessary to know the type of fuel electricity is displacing. For loads metered directly, customers will have to provide vehicle information in order to receive the dedicated meter and/or electric vehicle billing rate. For estimated loads (discussed in Comment 2), we will have to work with ARB to determine a default value for displaced fuel.
0 = Default Value
1 = Electricity Displacing Gasoline
2 = Electricity Displacing Diesel
3 = Electricity Displacing Propane
4 = Electricity Displacing Bunker Oil

Fourth Digit in the five-digit sequence (000X0): Time Period Delivered
Utilities will have the option of delineating fuel electricity sales by time period to further refine emission figures. Please note that not all utilities will have the resources to accomplish this, and that a default value will be required.
0 = (Default) No time differentiation
1 = Off-Peak
2 = Shoulder Peak
3 = On Peak

Fifth Digit in the five-digit sequence (0000X): Unassigned

BBBBB: We have not determined the optimal way to assign the digits in the Batch Number.

RR: Equivalence Value will be the assigned efficiency adjustment factor, based on the fuel displaced. For fuel electricity that displaces gasoline for example, this value will be 50 (5.0) according to the University of California recommendation.[37] An average efficiency adjustment factor will have to be developed for other possible displaced fuels (diesel, bunker oil, propane) as well. The high energy efficiency of electric motors relative to internal combustion engines is what makes fuel electricity so attractive as a low carbon fuel. For purposes of LCFS credit calculation, the high efficiency of electric drive vehicles will be taken into account when determining the carbon intensity of the fuel rather than the volume delivered. Thus, the number of RINs (See SSSSSSSS/EEEEEEEE below) alone will be the volume necessary to calculate LCFS credits. However, the Equivalence Value may be necessary to determine the equivalent amount of ethanol for purposes of trading in the Renewable Fuel Standard or another volumetric fuel regulation.

D: Renewable type code will be 1. This may have to be revisited should significant amounts of electricity eventually be generated with cellulosic biomass.

SSSSSSSS / EEEEEEEE: This will relate to the amount of fuel electricity in a given batch, converted to the energy content in a gallon of ethanol. Thus, 1 RIN gallon will be generated for each 22.3 kWh of fuel electricity delivered. (Ethanol has an LHV of 76,000 BTU/gallon, 1 kWh = 3412 BTU) When converting fuel electricity to RIN gallons, it is strictly the energy content within the fuel that is taken into account. When calculating LCFS credits, the high efficiency of electric motors is taken into account when the emission factor for electricity is calculated.

Please see Appendix B for an example of this scheme.

[37] Farrell, Alexander E. and Sperling Daniel. A Low Carbon Fuel Standard For California, Part 1: Technical Analysis. August 1, 2007. UC Berkeley and UC Davis.

2. Advanced Metering and its Impact on the Low Carbon Fuel Standard

As the Advanced Metering Initiatives of several California electric utilities will have a strong interaction with future generations of dedicated electric and plug-in hybrid electric vehicles, a discussion on how advanced meters and vehicles interact is warranted. It should be noted that much of the direct metering of plug-in vehicles discussion is focused on personal vehicles. There is a significant and growing amount of non-road electric transportation in California, such as electric lift trucks and electrified truck stops. Since these vehicles are often inflexible in when they can charge, dedicated meters would rarely be in the owner's best interest. In addition, small electric utilities may wish to participate in the LCFS, but may not be able to install dedicated meters for vehicles in a cost-effective manner. For these reasons, ARB should remain open to the prospect of using estimation rather than metering to determine fuel electricity sales. We acknowledge that these estimates will have to be conservative, but are concerned that too many transportation loads will be ignored if metering is required in all cases. Estimations might be based on equipment sales and provided customer information.

Current Meters

Currently, the five largest electric utilities in California, representing over 90% of residential accounts, have rates designed for separately metered electric vehicles. Separate meter costs vary widely, and it is frequently not in the economic interest of the customer to use a separate meter. In some municipalities, such as San Francisco, separate metering is prohibited. Since plug-in hybrids do not consume as much electricity as fully electric vehicles, we expect a significant number of PHEV owners to eschew a second meter until low cost separate or sub-meters are available.

Current Advanced Meters

While the majority of Californians continue to have analog meters that must be read by meter-readers, advanced meters are currently being rolled out to customers in some areas. These advanced meters enable hourly consumption data and remote reads. These advanced meters are expected to make separate or sub-metering less costly for the customer, perhaps around $100-$300 each, installed. It is possible that these separate or sub-meters will also be prohibited in certain municipalities.

Next Generation Advanced Meters

All major electric utilities in California are currently evaluating technologies for their next generation of advanced meters, and for the majority of customers next generation advanced meters will leapfrog the current advanced meters discussed above. The next generation advanced meters will likely enable customers to easily control the timing of various loads, such as their plug-in vehicle, to take advantage of time of use pricing. This should minimize the infrastructure required to support plug-in vehicles. These meters may also enable small, low cost sub-meters in the $100 range. Rollout of these meters by the major utilities is expected to be complete by around 2013. We are hopeful that these sub-meters will not be subject to the municipal sub-metering restrictions cited above, but legislation may be required to ensure that dedicated meters can be used for all personal plug-in vehicles. These advanced meters will be rolled out to industrial customers as well as residential customers, but we are uncertain if there will be a cost-effective method to separately meter non-road equipment such as lift trucks.

Near Term Solution

For plug-in hybrid owners, with current available metering technology it may be more economical for them to keep their home and vehicle on a single meter. However, by 2013 we anticipate the availability of low cost separate or sub-meters. At this point, it will likely be in the best interest of plug-in vehicle owners to use one of these meters, and it may actually be made mandatory by the utility to ensure the availability of important pricing signals. Should plug-in hybrids or other electric drive vehicles arrive in significant numbers prior to 2013, an estimation method might be jointly developed by ARB and the utilities to account for these fuel electricity sales. An annual estimate of fuel electricity consumption per vehicle could be developed, and vehicle estimates will be tied to sales within each utility service territory. This estimation method should also address non-road transportation equipment, which are unlikely to be separately metered within the LCFS 10 year timeframe.

When low-cost sub-metering, PHEVs and other on-road electric vehicles become widely available, it may make sense for ARB to require separate metering as part of LCFS credit generation for on-road residential vehicles. Since these technologies are not commercially available we recommend that the ARB be careful about imposing additional requirements and costs on consumers as the market for these technologies develops. We strongly advocate for estimation to be allowed for credit generation at least in the early years, or until some threshold level of market penetration is reached. We also advocate that estimation be allowed indefinitely for non-road electric transportation equipment when dedicated metering is impractical or not cost-effective.

3. A 'Bulletin Board' Credit Trading Scheme Managed by a Third Party can Ensure All Credits are Treated Equally while Maintaining Necessary Transparency

Despite the likely availability of LCFS credits for all low carbon fuels in the trading market, we are concerned that the initial trading market for LCFS credits be transparent, liquid and efficient enough to provide immediate benefits, especially during the startup period and prior to formal linkage and integration with other GHG trading markets.

One of the most important attributes of a workable LCFS credit trading market is fungibility of the credits, and a method to ensure fungibility was suggested in our list of principles presented to staff on November 14, 2007, and we believe it could benefit from further explanation:

> "Market design should ensure credits are 'generic,' that is, fully fungible and tradable among LCFS market participants without any reference to identity or industry of the fuel provider, or the specific fuel to generate credits."

Under our revised proposal, in order to ensure immediate fungibility and transparency, entities with LCFS credits for sale would 'post' their availability, quantity, and asking price to an electronic 'Bulletin Board,' perhaps managed by ARB or a contracted third party. Credit sellers would disclose all credit information to the Bulletin Board manager, but credit buyers would only be able to view credit price until purchase. Buyers that wanted to purchase credits would do so through the ARB or the third party. Credit buyers would effectively purchase credits from the ARB or the third party, and the ARB or the third party would use these funds to purchase credits from sellers. This way, low carbon fuel providers can have assurance that their credits will not be avoided for strategic purposes and may be more likely to invest in credit generation. Based on our experience with ZEV credits, regulated entities may be averse to publicly purchasing credits from other regulated entities. To avoid this, public records will note all credit sales directly to ARB (or another third party), and all purchases from ARB. Interested members of the public will be able to ensure that regulated entities are meeting their targets, and that no more credits are being purchased than were produced.

4. Electricity Should Exclusively be Able to Opt-In to the Low Carbon Fuel Standard

During the November 16, 2007 meeting of the Policy and Regulatory Development Working Group, ARB Staff recommended that the LCFS apply to low-carbon fuels such as natural gas and electricity, while hydrogen will be allowed to opt-in. This is in contrast to the recommendation by the UC Team that all low-carbon fuel providers participate in the Low Carbon Fuel Standard on a voluntary basis.

We are uncertain of the benefits of including electricity in the rule on a mandatory basis, and would also appreciate clarification why under this scheme hydrogen producers would be treated separately, and would not be required to participate. Should the LCFS create a market with significant value for carbon reduction credits from “fuel electricity”, as we anticipate, electric utilities will want to participate. However, since more lucrative markets may develop, and since the administrative costs of participation may be excessively high for smaller utilities, we believe that electric utilities should be allowed to participate in the LCFS on an opt-in basis. For fuel electricity specifically, we acknowledge that should providers choose not to opt-in to the Low Carbon Fuel Standard, they will have to be regulated under other regulations of AB32.

In all, we see five options available to sellers of fuel electricity:

1. Follow LCFS protocols to generate LCFS credits, and then sell into the LCFS market
2. Follow LCFS protocols to generate LCFS credits, and then either trade in AB32 market or use for own AB32 compliance responsibilities
3. Follow AB32 protocols to generate AB32 credits
4. Follow the protocols of, and sell into, a carbon trading market unrelated to AB32
5. Avoid costs of protocols, and do not generate credits in any market

5. The Inclusion of Diesel is Critical to the Goals of the Low Carbon Fuel Standard, and We Support the Current Staff Recommendation

In order for the Low Carbon Fuel Standard to meet its potential in terms of carbon intensity reduction, petroleum dependence reduction and transportation sector innovation in the long term, diesel fuel must be included. We are very pleased that the preliminary ARB Staff recommendation includes a separate standard for gasoline and diesel, thereby encouraging innovation and carbon intensity reduction in both fuel markets.

6. The Low Carbon Fuel Standard can Remain Separate from the Emissions Standards of AB1493 in a 'Double Crediting / Single Counting' Structure

The Low Carbon Fuel Standard and AB1493 are both necessary regulations to reduce the global climate change impact of transportation in California. Since these two regulations address distinct aspects of transportation (fuel carbon content and direct vehicle emissions, specifically), they can easily coexist without the need to overlap. Since AB1493 gives credit to automakers for efficiency improvements while the LCFS gives credit to fuel providers for low carbon fuel sales, we do not see inherent double counting concerns. There may be concern over crediting an automaker for producing an electric vehicle and crediting a fuel provider for selling electricity to that vehicle. For the purposes of inventorying, it is critical that the carbon reductions that result from this electric vehicle only be counted once, likely based on fuel sales as this will give a more precise measure of displaced gasoline. However, since it is in society's interest to both promote the production of electric vehicles and the sale of fuel electricity, both parties should be credited through the applicable rules. As long as the AB1493 and LCFS credit trading markets are kept separate, this 'Double Crediting / Single Counting' structure will be in line with the goals of both regulations.

7. Determining if Fuel Electricity Displaces Diesel or Gasoline

In order to properly assess the benefit of displacing a petroleum-based liquid fuel with electricity, we must know if it is displacing gasoline, diesel, or another fuel with a higher carbon intensity than electricity. We propose that the primary method of determining this be required information submittals from customers that request electric transportation rates and/or sub-meters intended for use with electric transportation. Before receiving the rate and/or meter, the customer will have to inform the utility what the rate and/or meter will serve. Displaced fuel can be asked directly for vehicle replacements, and for new vehicles it will be assumed that the following fuels are displaced:

Passenger Car or Light Duty Truck: Gasoline
Heavy Duty Truck: Diesel
Truck Stop Electrification: Diesel
Port Electrification: Bunker Oil
Lift Truck: Diesel or Propane (Depending on class)
Other Non-Road: Diesel

In some cases it may be necessary to assume a default fuel when sufficient information is not necessary. These cases include customers that do not choose to use an electric transportation rate or meter, or customers that fuel multiple types of vehicles from one account.

2. Statewide Marginal Emissions for PHEV and EV Load

CalETC has several comments on the use of the term "marginal emission factors" for PHEV and EV load. First, we believe there is a nomenclature problem. The utility industry uses the term marginal in a near-term context to mean the next unit to be dispatched. The scenarios that TIAX lays out in 2017, 2022 and 2030 are not marginal scenarios, but rather we would call them long-term average additions for the PHEV and EV load that are well understood and can be adequately planned for in the future. Once a new load is understood it can be adequately and correctly planned for in the utility long-term procurement process but prior to understanding the load effects the load is truly "marginal" and would be served by the marginal resource. **CalETC therefore recommends that references to 'marginal' generation be adjusted to 'long-term average additional' generation.**

CalETC recommends that in the near-term (2012), the emission factors for PHEV and EV load should not include any effects of renewables due to the uncertainty of the load forecast, and the emission factor we believe is correct for this incremental load to the system is approximately 937 pounds per MWh (425 g/kWh) for CO2 based on natural gas-fired combined cycle combustion turbines (NG CCCT)[38].

However, as utilities are able to better understand and forecast future EV, PHEV and other alternative fuel production load in the long-term procurement process, renewables will be added due to the state renewable portfolio standards. At this point, emission factors for the average energy used to charge such vehicles will equate to the 750 lbs per MWh (341 g/kWh) figure, which was referenced in Table 3-32, Well-to-Tank. By 2015, we anticipate EV and PHEV market growth becoming predictable enough to allow accurate forecasting of their load. At this point electric utilities will be able to contract a proportionate amount of renewable resources on an annual basis to achieve the 80% NG CCCT, 20% renewables scenario stated throughout the report. **Therefore, we recommend the stated (Table 3-32, Well-to-Tank) figure of 750 lbs per MWh (341 g/kWh) be used for greenhouse gas emissions resulting from EV and PHEV load starting in 2015.** At some future point, perhaps in 2012, this recommendation must be revisited to ensure electric utilities are in fact able to accurately forecast this load. If the very large numbers of PHEVs in the report are obtained in 2020 and 2030 and charge at night, the emission factors might drop further because the configuration of the system will change based on economics and other regulatory requirements. The presence of more off-peak load may facilitate the integration of more night-time wind or other renewable energy, which might otherwise require turning off natural gas generation needed the next day or making other modifications to the system for operational reasons.

CalETC and its member companies are also willing to work with the CEC and other stakeholders more on these very complex questions. As described in the Well-to-Tank report, there are many

[38] TIAX LLC, "Full Fuel Cycle Assessment – Well to Tank Emissions and Energy Consumption," CEC Report CEC-600-2007-003-D, February 2007. Table 3-32, 2012 CO2 emissions from NG CCCT + Combustion RPS divided by 0.8 to remove renewables.

complex factors relating to retirements, new plant construction, integration of renewable resources, regulatory proceedings and other factors that go into such an analysis, all of which can change the incremental or marginal emission factors as well as the future system average emission factors. CalETC and its members need to better understand the electric industry assumptions behind the TIAX report Well-to-Tank report and in the many competing analyses currently underway.

For example, EPRI and NRDC are jointly working on an important Phase 1 report on PHEV emissions that is very sophisticated and will soon go out for stakeholder review. (Contact Mark Duvall at 650-855-2591 for more information.) USDOE's Office of Electricity just released its report on PHEV grid impacts by the Pacific Northwest National Lab.[39] Finally the CEC has been undertaking a large in depth 3 year analysis on the potential effect of alternative fuel pathways in the transportation system into the natural gas and electricity systems, which includes examining PHEV and pure EV emissions as far as 2050[40]. Given all of these reports, CalETC and its members look forward to working with the CEC in the future on the question of PHEV grid impacts, and the societal benefits of PHEVs. The near-term, mid-term, and long-term emission factors associated with forecasting for the expected future PHEV load must be refined in the next few years to accurately assess both the economics of PHEV's and the effects of such implementation on system emissions.

Additionally, the outlook for electrical generation may change due to the proceedings of AB 32. **CalETC respectfully recommends that the assumptions for this report be revisited after AB 32 implementation rules have been established.**

Finally, the draft report mentions electric forklifts and other types of electric transportation (Section 2.3, Tank-to-Wheels). CalETC and its members have much experience with these loads and are willing to work with the CEC to better understand these loads as well, as there are already over 300,000 of these electric forklifts, bag tugs, tow tractors, golf carts and similar non-road electric vehicles in California today. See our comment number 5 below.

Appendix B: Example Credit Generation Scheme for Fuel Electricity Using RIN System

[39] Kintner-Meyer, M; Schneider, K; and Pratt, R. Impact Assessment of Plug-In Hybrid Vehicles on Electric Utilities and Regional U.S. Power Grids Part 1: Technical Analysis. Pacific Northwest National Laboratory, US DOE Contract DE-AC05-76RL01830.

[40] Advanced Energy Pathway's project of the CEC. Contractors include University of California, GETF, Lawrence Livermore National Lab and others.

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Fuel Electricity LCFS Credit Generation Using RIN Scheme

Assume Utility A sells the following amounts of fuel electricity in 2012

Time Period	Displaced Fuel	Electricity Delivered (MWh)	Utility A Emissions Adjusted for Motor Efficiency (g/MJ)	Renewable ID Number	Displaced Fuel Emissions Target (g/MJ)	Emissions Difference (g/MJ)	Credits Generated (Deliveries x Emissions Difference) (tons CO2eq)
Off-peak	Gasoline	65	25	1201200011111xBBBBB5010000000100002914	90	65	13.80
Off-peak	Diesel	20	25	1201200011121xBBBBB5010000291400003809	70	45	2.94
On-peak	Gasoline	1	35	1201200011113xBBBBB5010000381000003854	90	55	0.18
Default	Propane	2	25.5	1201200011130xBBBBB5010000385500003944	77	51.5	0.34
On-peak	Propane	2	35	1201200011133xBBBBB5010000394500004034	77	42	0.27
Shoulder	Gasoline	10	25	1201200011112xBBBBB5010000403500004482	90	65	2.12

('x' above refers to unassigned digits)

Total Credits Generated:	19.65

Conversions	
1102310	grams / ton
76000	BTU / gallon ethanol
3412	BTU / kWh
22.3	kWh / gallon ethanol
3600	MJ / MWh

RIN Code Book (Selected Excerpts)

CCCC	
0001	Utility A (Electric)
0002	Utility B (Electric)

Utility A Average Long-Term Additional Emissions		
Time Period	**Source**	**Adjusted Emission Rate (g/MJ)**
Off-peak	NGCCCT	25
On-peak	NGSCCT	35
Partial peak	NGCCCT	25
Time-Neutral	95% NGCCCT + 5% NGSCCT	25.5

FFFFF	
Xxxxx	**Fuel Type**
1xxxx	Electricity
2xxxx	CNG
3xxxx	LNG
4xxxx	Compressed H2
5xxxx	Liquid H2
xXxxx	**Specificity**
x0xxx	California Default
x1xxx	Utility Specific
xxXxx	**Fuel Displaced**
xx1xx	Gasoline
xx2xx	Diesel
xx3xx	Propane
xx4xx	Bunker Oil
xxxXx	**Time Period**
xxx0x	Default
xxx1x	Off-Peak
xxx2x	Shoulder
xxx3x	On-Peak

Associated Emissions (g/MJ)	
CCCCFFFFF	
00011100x	25.5
00011101x	25
00011102x	25
00011103x	35
00011110x	25.5
00011111x	25
00011112x	25
00011113x	35
00011120x	25.5
00011121x	25
00011122x	25
00011123x	35
00011130x	25.5
00011131x	25
00011132x	25
00011133x	35

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