



March 13<sup>th</sup>, 2023

Dr. Cheryl Laskowski  
Chief, Low Carbon Fuel Standard  
California Air Resources Board  
1001 I Street, Sacramento, CA 95814  
Submitted electronically via [helpline@arb.ca.gov](mailto:helpline@arb.ca.gov)

**RE: Comments regarding the February 22, 2023 Public Workshop and the Preliminary Draft of Potential Regulatory Amendments and Amendment Concepts**

Dear Dr. Laskowski,

Smart Charging Technologies (SCT) is a high-tech firm focused on developing innovative IoT energy management and monitoring products and services for the motive industry. As one of the largest aggregators of energy credits for industrial transportation equipment, SCT offers energy credit management services, including managing the LCFS program administered by the California Air Resources Board (CARB) and the CFP program administered by the Oregon Department of Environmental Quality (ODEQ). In addition, the SCT team and its partners have extensive experience in battery charging and monitoring products and solutions for electric forklift trucks having developed and deployed more than 60,000 smart and IoT battery chargers and monitors throughout the US and Canada.

SCT, and on behalf of its client companies, respectfully submits the following comments to California Air Resources Board (CARB) Staff with the hope of advancing the LCFS program in a way that makes it easy and practical for concerned stakeholders to participate.

Our comments are related to the proposed changes to section (4) of the proposed amendments pertaining to Electric Forklifts, namely

**(4)(A)** Designating “the owner of the equipment capable of metering electricity to electric forklifts is the fuel reporting entity and the credit generator”

**Table 5.**

- Reducing the EER value for EER Values for Forklifts with lift capacity <12,000 lbs from 3.8 to 1.9
- Defining a new EER value for EER Values for Forklifts with lift capacity >12,000 lbs of 3.8

While we do support the changes proposed in (4)(A) in terms of requiring metering of the electricity used to power electric forklifts and eliminating the calculation methodology, we strongly oppose the proposed change of EER ratio for electric forklifts < 12,000 lbs to 1.9.

## SUPPORT FOR CHANGES TO (4)(A) REQUIRING ELECTRICITY METERING FOR ELECTRIC FORKLIFTS

CARB initially proposed metering to electric forklifts back in 2020 and SCT submitted a letter supporting such requirement. We continue to support the requirement to meter the electricity dispensed to electric forklifts as that will result in:

- More accurate crediting and aligns electric forklift reporting requirements with all other reported fuel applications
- Removes the need to register and track and report forklift fleet operation and movements
- Eliminates the need to estimate forklift truck usage

Yet, SCT pointed out in its comments on 11/4/2020 that there are challenges to metering of forklift trucks, namely:

- Most of the industrial battery chargers do not have any built-in metering. In addition, forklift charging stations are placed at different locations throughout warehouses and manufacturing facilities. As such, there is no single point to place a meter to aggregate energy measurements.

As such, the metering requirement will entail significant added costs to owners and/or operators of electric forklift truck fleets as they need to either upgrade their industrial chargers to add metering capabilities, or install several electricity meters throughout their facilities to meters the electricity dispensed to forklift truck chargers.

## SCT's DATA OF MEASURED VS. CALCULATED KWHR USAGE FOR ELECTRIC FORKLIFT

SCT has also developed the **IoTah** product platform<sup>1</sup>, an innovative cloud-based forklift truck monitoring and data logging device. The **IoTah** device automatically tracks and logs actual Amp-Hour and kWhr usage of electric forklift trucks thus providing an audit trail of actual forklift truck usage at client facilities.

Over the past year, SCT has deployed 90 **IoTah** units at different facilities in CA to monitor & log actual forklift truck usage (Ahrs and kWhrs). Data analysis shows significant differences between measured and calculated data, namely:

- On average, **calculations overestimate actual truck usage**
- While some sites / some trucks may be heavily used, on average, most are not

Table 1 below shows the sample data of eight forklift trucks over the course of one full quarter highlighting the difference between calculated vs. measured kWhrs. As shown in Table 1, the actual measured kWhrs is much lower than the CARB calculated kWhrs resulting in an overestimate of the credit that will be generated (almost **6X** the calculated kWhrs). As such, the resulting number of

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<sup>1</sup> <https://smartchargetech.com/service/iotah-forklift-truck-monitor-new/>

credits will be greatly reduced with metering, almost ~17% of the calculated value (assuming an EER of 3.8 and all new forklifts).

**Table 1. Measured vs Calculated kWhrs for 8 forklifts over one quarter**

Truck Type	Total Used Hours	Total Used AHRs	Calculated kWhrs	Metered kWhrs	Calculated MTs	Metered MTs
Stand Up	159	13,161	3,457	587	3.32	0.56
Stand Up	582	16,362	4,609	761	4.43	0.73
Stand Up	47	4,478	4,609	205	4.43	0.20
Pallet Jack	138	9,834	2,305	313	2.21	0.30
Reach Truck	1400	47,055	7,117	2,192	6.84	2.11
Reach Truck	359	33,693	7,117	1,573	6.84	1.51
Stand Up	21	765	6,227	36	5.98	0.03
Pallet Jack	1272	16,493	3,559	502	3.42	0.48
<b>TOTALS</b>			<b>39,000</b>	<b>6,169</b>	<b>37.5</b>	<b>5.9</b>

We believe that with metering, the number of credits for forklifts will be reduced by more than 50%. For Class II trucks, the number of credits will be even lower as their usage is typically low. If the EER is further ratio by 50%, the number of LCFS credits generated by electric forklifts will be very low thus making the LCFS program unappealing and discourage participation in the LCFS program. As a result, it will be much harder to incentivize further electrification of forklifts.

If the cost of metering is further factored in, opting-into the LCFS program will not even be economical as participants may not be able to even recoup the cost of added monitoring.

Given the above, and while we do support metering, we strongly oppose reducing the EER ratio as metering will automatically adjust for the fair share of forklifts in the LCFS program.

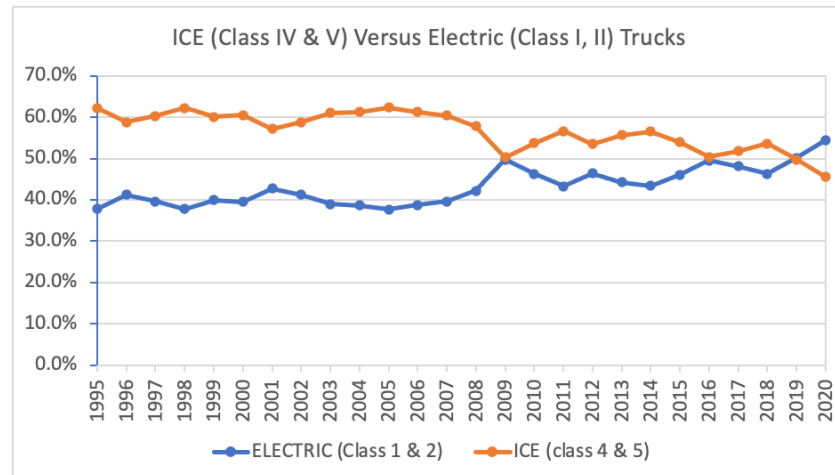
#### **CARB'S JUSTIFICATION FOR REDUCING EER RATIO FOR ELECTRIC FORKLIFTS WITH LIFT CAPACITY <12,000 LBS FROM 3.8 TO 1.9**

During the workshop, CARB indicated that they have included a 50% electrification in the baseline for credit generation for forklifts. In addition, in the question answering session, CARB indicated their desire to eliminate the need to track old versus new forklifts.

With regards to the inclusion of 50% electrification in the baseline for credit generation for forklifts, it's worth noting that while electric forklift trucks make up ~54% of the North American lift truck market<sup>2</sup>, the share of electric forklift trucks has not changed much over the past 15 years. If one compares US shipments of electric class II and class III forklifts versus ICE class IV and class V trucks over the last 15 years, the resulting ratio of electric to non-electric Forklift Trucks has only increased

<sup>2</sup> <https://www.indtrk.org/wp-content/uploads/2019/09/ITA.pdf>

by 4% since 2015<sup>3</sup> (see the Figure 1 below). Since the trend in CA follows the national trend, we believe that since forklift trucks were included in the LCFS program, there has been a small uptick in the percentage of electric truck shipments and hence there is still a long way to go to convert the remaining forklifts to electric.



**Fig. 1. US Electric (Class I & II) vs ICE (Class IV & V) Forklift Truck Shipments (source: ITA)**

According to the ITA, new improvements in electric forklift technology, that allow users to get up to two full shifts of runtime on a single battery charge when employing new Li-Ion battery technology, require significantly higher capital and infrastructure investments. As such, we strongly believe that reducing the EER ratios along with metering will greatly reduce the number of LCFS credits that can be generated for forklifts and will turn the tide on more conversions to electric forklifts and adoption of more efficient forklift and battery technologies.

Another challenge with reducing the EER ratio for forklifts with lift capacities <12,000 lbs while requiring metering of the electricity dispensed by the chargers is the difficulty of separating the metered electricity used to charge forklifts with lift capacities <12,000 lbs versus forklifts with lift capacities >12,000 lbs. As CARB indicated its desire to eliminate the need to track old versus new forklifts, discerning and separating the charging of different types of electric forklifts based on lifting capacity will be quite cumbersome.

As the CARB's desire to eliminate the need to track old versus new forklifts, our experience shows that the majority of trucks reported are new (almost 80%) based on CARB's designation of forklifts newer than 2011. In fact, most forklifts operated by large manufacturing and warehousing facilities are only 5 years old (typically leased over 5 years and/or replaced after 5 years of being in service). This is mainly due to rising costs of maintenance when forklift trucks are operated past their 5 years of operation.

Another point to consider is the fact that while trucks may be old (older than 2011), most chargers in operation are new generation high frequency and high efficiency chargers. In addition, since

<sup>3</sup> <https://www.indtrk.org/wp-content/uploads/2021/03/Factory-Shipments-Table-2021-Directory.pdf>

most industrial batteries have a life span of 5 years, old trucks are mainly fitted with new batteries (including new Li-Ion batteries) and are primarily charged with high efficiency and high frequency industrial chargers. As such, the electricity usage of those trucks is very similar to new trucks.

In summary, we do support CARB's desire to eliminate the need to track old versus vs. new trucks and use the new truck EER and adjustment values for all trucks. Note that both new and old trucks are charged by the same chargers and will be all metered accordingly.

## CHALLENGES WITH FORKLIFT ELECTRICITY METERING

In addition to the above, CARB has not defined the type of metering that will be acceptable to meter electricity to forklifts. To that end, SCT has developed two technologies that will allow electric forklifts to be metered, namely:

1. **CHARGlink**: SCT has developed the **CHARGlink** product platform<sup>4</sup>, an innovative, cloud-based industrial charger monitoring and data logging device. **CHARGlink** automatically tracks and logs actual Amp-Hour and kWhr supplied by industrial chargers to charge electric forklift trucks thus providing an audit trail of actual forklift electricity usage at clients' manufacturing and distribution facilities. The new **CHARGlink** product is intended to support the LCFS program reporting and comply with new proposed CARB amendments. Each **CHARGlink** unit is equipped with wireless communication for remote monitoring and configuration, where data is automatically uploaded to SCT's cloud-based servers. The **CHARGlink** unit can be easily installed at the output terminals of industrial chargers for an easy upgrade to a metered and wireless connected charger.

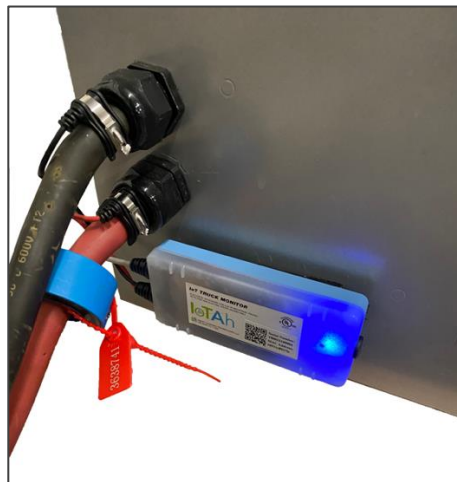


Fig. 1. **CHARGlink** Installed on an industrial charger

2. **IoTEmeter Edge**: SCT has also developed the **IoTEmeter** product platform<sup>5</sup>, an innovative, cloud-based electricity metering and data logging device. *The IoTEmeter product platform*

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<sup>4</sup> <https://smartchargetech.com/service/chargelink/>

<sup>5</sup> <https://www.smartchargetech.com/iotemeter/>



logs and measures the actual amount of electricity (in kWhr) consumed by industrial chargers to charge electric forklift trucks, as well as the time it was consumed, thus providing an audit trail of actual forklift electricity usage at clients' manufacturing and distribution facilities. The new **IoTEmeter** product platform is also intended to support the LCFS program reporting and comply with new proposed CARB amendments. Each **IoTEmeter** unit is equipped with wireless communication for remote monitoring and configuration, where data is automatically uploaded to SCT's cloud-based servers. The **IoTEmeter** units would need to be installed at the AC panels or subpanels feeding industrial chargers or at each charging station, the chargers are distributed throughout the facility.

While the technology exists to meter the electricity dispensed by industrial chargers, there are two main challenges that need to be noted:

- a. **Hardware and installation costs as well as recurring reporting expenses.** There are significant costs associated with deploying the needed hardware as well as installing the monitoring devices to comply with the metering requirements dictated by CARB. In addition, and since the data reporting will be automated through a cloud app (requires one cell service per site), monthly recurring connection costs will be incurred.
- b. **Reduced LCFS credits.** Since LCFS credits will be accurately logged and reported, the number of LCFS credits earned by forklift truck operators will be reduced. This is due to the fact that the present calculation method assumes that forklift trucks are operated consistently based on the audited operation profile. While SCT typically subtracts downtimes associated with breaks throughout a shift, **actual operation logs will lead to significantly lower reported forklift truck usage and thus lower LCFS credits.** This may disincentivize forklift truck operators from installing these devices as it will lead to lower earned LCFS credits.

To conclude, while we do support CARB's proposal to eliminate calculation methodology for forklifts and adopting metering electricity to electric forklifts, we **strongly oppose the proposed reduction in EER ratio for forklifts to 1.9** as that will in effect kill the LCFS program for forklifts since the number of credits generated will be greatly reduced due to metering and the added cost of metering will make the program prohibitive to participate in by almost all existing and potential participants.

Thank you for taking our comments into consideration. We look forward to continued participation and discussion.

Respectfully.

/s/

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CEO

Smart Charging Technologies LLC