Odyne Systems, LLC
W237 N2878 Woodgate Road
Suite 2
Pewaukee, WI 53072
U.S. 262-544-8405
www.odyne.com

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Clerk of the Board
Air Resources Board
1001 I Street, Sacramento,
California 95814

Attn.: Joe Calivita

RE: PROPOSED REGULATION TO PROVIDE CERTIFICATION FLEXIBILITY FOR INNOVATIVE HEAVY-DUTY ENGINES AND CALIFORNIA CERTIFICATION AND INSTALLATION PROCEDURES FOR MEDIUM AND HEAVY-DUTY VEHICLE HYBRID CONVERSION SYSTEMS

Comments submitted by: Bill Mammen- Director of Engineering

Introduction:

Odyne Systems, LLC develops and manufactures hybrid drive systems for medium and heavy-duty vehicles. Odyne's advanced plug-in hybrid technology enables trucks over 14,000 pounds to have substantially lower emissions, improved performance, quieter job site operation, lower fuel consumption, and reduced operating and maintenance costs.

Odyne would like to thank you for the opportunity to comment on these proposed regulations. Odyne is generally in favor of the proposal and supports the ruling. We also appreciate the amount of stakeholder involvement/collaboration that was used during the development of these documents. We have a few comments, questions and concerns, as detailed below.

Comments on General Policy and Incentive:

One of the issues brought up recently involves the timing of an EO / ITR certification compared to the timing of incentive funds. Vehicles have typically needed an EO (or other CARB legal approval) to be in place before HVIP or other state funding would be available. If the EO or ITR certification is not completed until Q3 or Q4 of each year and delivery takes 3 to 6 months, then it is possible that the vehicle may never be eligible for HVIP funding because of the lack of overlap in the delivery of compliant vehicles and the HVIP eligibility timing. Does CARB have any plans on how to synchronize incentives with the EO / ITR certification process so that vehicles can consistently access incentives?

We understand the desire to achieve All Electric Range capabilities since they provide zero emissions benefits. We do not understand why that is being considered as the only option long term. It is an easier thing to accomplish with light duty vehicles than heavy duty vehicles. With HD vehicles it requires a lot more power and energy due to the wide variety of applications and use cases (duty cycles). The cost of power electronic and batteries are coming down but that may never reach a point to justify the cost for full electric operation. So if the cost doesn't match the customers ROI expectations than demand will go down and have a negative impact on the development of this technology. The EPA Phase II GHG regulations did not focus on AER, they simple focused on the path to reduce fuel consumption which also reduces emissions. Then the right technology in the right application will be able to succeed, so it's a win-win for the Regulators and the Converters.

The main thing to focus on is the overall work day and how they are operated. The work day is some percentage of driving and stationary, that percentage / ratio is different across the various applications. For example our customers spend most of their time stationary and idling to operate equipment at the jobsite. The amount of fuel consumed and emission produced is significantly more while idling than driving. So we have optimized our system to provide some benefit while driving but focus on the stationary benefits.

So the AER is not as important and would impact the remaining energy to operate at the jobsite. Also, having an AER requirement is basically defining the type of technology and how it is applied instead of being technology agnostic and focusing on the result/benefit. Odyne does not have any full electric range capability and do not feel it is appropriate in our application. Our system is always blended with the engine while driving and will offset it during specific conditions when it is typically less efficient. Then we also have the ability to eliminate the idle while stationary/idling. Also, other technologies like hydraulic hybrids will not have any full electric range. We have used the term Equivalent All Electric Range to serve this purpose and relate it to the amount of fuel that was saved. Maybe that could be considered as a replacement measure for AER.

Comments on Appendix E:

General Comments:

In Section 7(c)(1), with regard to PEMS testing, it is stated that for the A to B testing a manufacturer may be allowed to use the same vehicle with the hybrid system disabled for the conventional emissions test (A) and then again with the hybrid system enabled for the hybrid emissions test (B)? Please verify if this is allowed for chassis-dyno emissions testing as well.

Specific Comments:

4.(3)(b) – Tier 1 Certification Requirements time frame (pg.E-10)

"(1) A manufacturer is ineligible to submit an application for Tier 1 certification of a hybrid conversion system that does not achieve at least 35 miles AER as of January 1, 2022.

(2) Tier 1 Executive Orders for hybrid conversion systems that do not achieve at least 35 miles AER expire as of January 1, 2027, and additional units of a hybrid conversion system covered by such an Executive Order may not be installed or sold after January 1, 2027."

There is also similar language used for Tier 2 Certification Requirements. This seems to indicate that a hybrid system must have AER capabilities or it will have to achieve Tier 3 status by January 1, 2022 in order to continue sales. Odyne does not plan to have full electric drive capabilities so will definitely not be eligible for Tier 1 or Tier 2 status after that date. We understand having some sort of a time frame (sunset) for each tier but feel it should not be related to AER. This will create a major barrier to market for Odyne and others. Another thing to consider is to use the wording "after January 1, 2022" instead of "as of January 1, 2022", for clarity.

7(c)(4) Data Collection and Quality Control

The list of data to be collected is not supported by most vehicles on J1939. This is a lot of data which is not relevant to emissions performance and will incur substantial additional cost to the manufacturer. Much of it is not supplied by the ECU and will require independent test equipment to collect.

A minimum frequency rate (1 Hz) needs to be called out for position and emissions data collection.

SAE J1526 states that ECU based Fuel Economy calculations are not accurate enough. Are these still considered the "Most Accurate Values"?

5(f)(2)

"…a manufacturer must demonstrate for all heavy-duty engine families that the OBD system can be set to "complete" with no false detections of malfunctions since the fault memory was last cleared for each of the installed monitored components and systems…"

Note: the hybrid system manufacturer should be expected to demonstrate the same OBD system capabilities as the base engine/vehicle is capable of achieving. If the pre-converted vehicle cannot complete all monitors then the converted vehicle should not have to. From previous correspondence, the following paragraph has been suggested by the OBD group and we fell this would adequately address this issue:

If the conversion manufacturer makes a good faith effort to set all readiness monitors but cannot get them all to set because of a flaw with the OEM system, it must at a minimum be capable of setting the readiness on the same monitors as the OEM vehicle.

4(3)(f)(2) Hybrid System Diagnostic Link Connector. (pg. E-11)

"…, the HSDLC must be distinguished from the base engine's or vehicle's OBD system Diagnostic Link Connector (DLC) by locating the HSDLC in the vehicle interior to the right of the centerline of the vehicle."

We agree that it must be a distinguished from the OEM DLC but we do not agree with the location specified. Currently we install our HSDLC near the DLC to make it easier for Service personal to locate. It is a separate and unique connector so it cannot be confused with the OEM DLC. We feel you could remove the last part about the location and leave it up to the converter to specific. We feel the best location is near the DLC since most service personnel are already use to locating in that location.

(3)(A) Duty-Cycle. (pg. E-35)

"A heavy-duty vehicle with ePTO may conduct chassis-dynamometer emission testing pursuant to the hybrid-PTO test procedures defined in 40 Code of Federal Regulations, Part 1037.525, as amended June 17, 2013, which is hereby incorporated by reference herein, in lieu of the Transient Portion of the Heavy Heavy-Duty Truck 5 Mode Cycle."

We feel this should reflect EPA Phase II GHG changes and reference 540 instead of the old 525. This will help identify the stationary / jobsite benefits and tie in with off-cycle credits (idle reduction technology). But we feel this testing should be in lieu of the high speed portion of the testing not the transient. The duty cycle should be designed to account for the typical work day which will be some ratio of driving and stationary. Keep in mind that most vocational vehicles are driven a low speeds over short distances and spend most of their time parked / idling. We also want to mention that is regulation focused on charge sustaining and we feel it should also account for charge depleting.

(3)(B) Charge-Depleting Hybrid-Electric Vehicle.

"A charge-depleting hybrid electric vehicle is to be emission tested in charge-sustaining mode, from the point at which the engine first turns on at the end of the vehicle's AER. A charge-depleting hybrid-electric vehicle for which the ratio of the miles driven in charge-sustaining mode relative to the miles driven in charge-depleting mode is at least 0.98 must meet the emission test requirements of a charge-sustaining hybrid for the purposes of these procedures."

This also relates to the AER expectations. It assumes a vehicle runs full electric to a point and then the engine turns on to provide power to the system. In our case the engine is always running since we do not have any full electric drive capabilities. So our system operates in a charge deplete mode and the amount/rate of discharge depends on the launch to regen ratio. We do not try to actively maintain a state of charge, like what is done in a charge sustain mode. Then if the vehicle is operated long enough and the batteries are fully depleted we just bounce off the bottom depending on the same launch to regen ration. The ratio is not controlled by our system it

is a function of the operator and the driving conditions. It takes a lot more power/energy to launch the vehicle and it can happen over a longer time frame than what we can capture in regen events.

Since the purpose of this procedure it to make sure the engine is operating can you provide some flexibility to account for a blended system instead of just a system that has some full electric range. At least add the option to review this with CARB staff and be able to propose an alternative.

For any clarification or additional information that may be needed please feel free to contact:

Bill Mammen
Director, Systems & Controls
Odyne Systems, LLC
W237N28787 Woodgate Rd
Suite 2
Pewaukee, WI 53072

Main: 262-544-8405
Direct: 262-953-6706
Cell: 262-951-1673
bill.mammen@odyne.com
www.odyne.com