April 7, 2023

Clerk of the Board

California Air Resources Board (CARB)
1001 I Street
Sacramento, CA 95814

Comments on Proposed Advanced Clean Fleets Regulations

Odyne Systems, LLC (Odyne) appreciates the opportunity to submit these comments in response to the Advanced Clean Fleets (ACF) 15-day proposed regulations issued by CARB on March 23, 2023.

Odyne provides zero-emission solutions for the operation of truck-mounted equipment using electric Power Take-Off (ePTO) units and all-electric export power from battery systems to replace the need for engine-powered generators. Odyne's electrification systems can provide zero emissions power for truck equipment on both ICE vehicles and EVs.

While Odyne will be providing systems to electrically operate truck-mounted equipment and export 120V or 240V AC power for ZEVs, there may still be configurations and applications that receive exemptions permitting the use of ICE vehicles.

Odyne recommends the Board direct the following two changes to the proposed regulations before they are finalized:

1) **Require electric Power Take-Offs (ePTOs) for work trucks receiving exemptions.**

Justification:

Many vehicles on the Configurations List shown in 2015.3(e)(1)(A) that may receive exemptions use Power Take-Offs (PTOs) to operate truck-mounted equipment. PTOs enable the operation of a wide variety of vehicles, including bucket trucks, boom trucks, bridge inspection trucks, cable puller trucks, car carrier trucks, cranes, digger derrick trucks, dump trucks, lube trucks, front-loader refuse compactor trucks, side-loader refuse compactor trucks, rear-loader refuse compactor trucks, refuse roll-off trucks, street sweepers, tank trucks, tow trucks, underdeck PTO drive compressor trucks, and water trucks.

ICE medium and heavy-duty vehicles operating Power Take-Offs (PTOs) produce very high emissions, much higher than during idling. Testing paid for by CARB and performed by the U.S. Department of Energy, NREL, showed NOx levels three times higher than idle emissions, and unlike idle, are unrestricted in duration.

See Appendix A for additional details.

Electric Power Take-Off (ePTO) systems eliminate the high ICE emissions during PTO operation. In addition, ePTOs can quietly power a wide variety of applications without reducing truck equipment operating capacity or speed, maintaining or improving productivity. Electric PTOs can also operate in a fuel and emissions-saving hybrid mode if grid-recharged batteries become depleted, enabling unrestricted mutual assistance or extended operation during declared emergency events. Requiring

ePTOs on exempt vehicles with truck-mounted equipment would also help fleets move closer to full vehicle electrification by requiring that a part of ICE truck operation be electric and grid recharged.

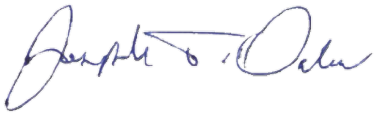
2) **Track Engine Hours for exempt vehicles.**

Justification:

Vehicles may be exempt for specific Configurations (as defined in Section 2015(b)) if listed on the Configurations List (Section 2015.3 High Priority and Federal Fleets Exemptions and Extensions, (e) ZEV Purchase Exemption, (1) ZEV Purchase Exemption List, (A) Configurations List). Of the 20 configurations on the list that are potentially exempt, 17 use a Power Take-Off. PTO operation will not be recorded by miles driven but will increase engine hours. Engine hour tracking will help identify configurations with low miles driven and excessively high engine hours that could likely benefit from electrification when stationary, such as through an ePTO. See Appendix B for detailed suggestions.

Odyne supports the electrification of medium and heavy-duty vehicles and looks forward to supplying solutions that enable trucks to meet diverse and demanding operating requirements.

Sincerely,



Joe Dalum

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Appendix A and B on following pages.

Appendix A: Comments on high emissions during PTO operation and regulations

Electrification of equipment using ePTOs would eliminate unrestricted high emissions.

Electric Power Take-Offs (ePTOs) and zero emissions generator replacements for ICE vehicles save a tremendous amount of NOx and GHG, fuel, engine wear, and noise by keeping engines off when they operate truck-mounted equipment.

Odyne has reviewed emissions regulations, and there appears to be a gap in the regulation of emissions during Power Take-Off (PTO) operation. Odyne welcomes input from CARB to clarify any misinterpretation regarding the apparent lack of emissions stringency during PTO operation.

Engine-driven PTOs can operate for many hours when trucks power equipment, such as cranes, compressors, buckets, digger derricks, pumps, and compactors.

1. The ARB Omnibus Regulation does not appear to regulate emissions during power take-off (PTO) operation, and PTO emissions are much higher than emissions during idle. Heavy-Duty Engine and Vehicle Omnibus Regulation (Omnibus Regulation) will limit idle emissions, but those limitations do not affect PTO operation.

   There is no mention of Power Take-off (PTO) in the regulations. If there are in-use regulations, Odyne would like to understand how often vehicles with a PTO would be tested and required to operate using PTO-powered equipment. Odyne would also like to understand which law or regulation would be violated if emissions from a PTO were high.

   <u>PTO emissions are much higher than idle emissions.</u>
   NOx emissions for work truck PTO operating cycles are approximately 65 g/hr to 73 g/hr; over 3x higher than tested idle emissions, are not subject to idle reduction regulations enabling unrestricted duration, and are 6x higher than Omnibus Idle regulations. National Renewable Energy Laboratory, NREL/TP-5400-5782 https://www.nrel.gov/docs/fy20osti/75782.pdf . Page 54, Fig. 54 (study funded by CARB).

Figure 54. Time-based NO_x emissions for the various operating modes

2. California law permits the engine shutdown system to be overridden during PTO operation. There is no limit to the continuous operation of the engine provided that a PTO switch is "on."

   <u>There are no regulations requiring engines to shut down when a PTO switch is engaged (even if the PTO is not providing power)</u>

   https://www.law.cornell.edu/regulations/california/13-CCR-1956.8
   Cal. Code Regs. Tit. 13, § 1956.8 - Exhaust Emissions Standards and Test Procedures - 1985 and Subsequent Model Heavy-Duty Engines and Vehicles

   (a)(6)(A)2.a.

   2. *Engine Shutdown System Override*: The engine shutdown system may be overridden, to allow the engine to run continuously at idle, only under the following conditions:
   a. *If the engine is operating in power take-off (PTO) mode*.
   The PTO system shall have a switch or a setting that can be switched "on" to override the engine shutdown system and will reset to the "off" position when the vehicle's engine is turned off or when the PTO equipment is turned off. Subject to advance Executive Officer approval, other methods for detecting or activating PTO operation may be allowed;

3. California law permits the heavy-duty on-board diagnostic system to stop diagnosing emissions during PTO operation

   <u>There is no mandated monitoring of emissions during PTO operation</u>

   https://www.law.cornell.edu/regulations/california/13-CCR-1971.1

   (2.3.4)(B) Additionally, the Executive Officer will approve a manufacturer's request in accordance with sections (g)(5.3), (g)(5.4), and (g)(5.6) to disable misfire monitoring when the fuel level is 15 percent or less of the nominal capacity of the fuel tank, when PTO units are active, or while engine coolant temperature is below 20 degrees Fahrenheit (or -6.7 degrees Celsius). The Executive Officer will approve a request to continue disablement on engine starts when engine coolant temperature is below 20 degrees Fahrenheit (or -6.7 degrees Celsius) at engine start until engine coolant temperature exceeds 70 degrees Fahrenheit (or 21.1 degrees Celsius).

   (4.5.2) Within 10 seconds of the start of a PTO (see section (c)) operation that disables a monitor required to meet the monitoring conditions in section (d)(3.2), the OBD system shall disable further incrementing of the corresponding numerator and denominator for each monitor that is disabled. When the PTO operation ends, incrementing of all corresponding numerators and denominators shall resume within 10 seconds.

   (5.6) A manufacturer may request Executive Officer approval to disable monitors that can be affected by PTO activation on engines or vehicles designed to accommodate the installation of PTO units (as defined in section (c)).

4. California law exempts operators from turning engines off when the vehicle is providing a power source for equipment or operations (involves a power take-off)

   Operators don't have to turn off an idling engine if the PTO is on, even if the equipment is not operated

   13 CCR § 2485. Airborne Toxic Control Measure to Limit Diesel-Fueled Commercial Motor Vehicle Idling. (Attached)
   (2) Subsection (c)(1) does not apply for the period or periods during which (Note: (c)(1) = (c) Requirements.(1) Idling Restriction)
   (H) idling when positioning or providing a power source for equipment or operations, other than transporting passengers or propulsion, which involve a power take off or equivalent mechanism and is powered by the primary diesel engine for:
   1. controlling cargo temperature, operating a lift, crane, pump, drill, hoist, mixer (such as a ready mix concrete truck), or other auxiliary equipment;
   2. providing mechanical extension to perform work functions for which the vehicle was designed and where substitute alternate means to idling are not reasonably available; or
   3. collection of solid waste or recyclable material by an entity authorized by contract, license, or permit by a school or local government;

Appendix B:

Suggested Changes:

Section 2015.4 High Priority and Federal Fleets Reporting

(c) Fleet Reporting.

(2) Vehicle Information.

(A) Odometer, or if applicable, hubodometer readings for vehicles as specified in section 2015.4(f);

(B) NEW: Engine Hours

(f) Odometer Reading Reporting.

(1) Odometer Readings. Report annually the odometer reading from January 1 of the current calendar year and the date the reading was recorded from a properly functioning odometer or hubodometer;

(g) NEW: Engine Hour Reading Reporting

(1) Engine Hour Readings. Report annually the Engine Hour reading from January 1 of the current calendar year and the date the reading was recorded from a properly functioning display showing Engine Hours;