

achatesPOWER

Achates Power, Inc.
4060 Sorrento Valley Boulevard
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California Air Resources Board
1001 I Street
Sacramento, CA 95814

Submitted electronically via rulemaking docket

RE: Comments on Proposed Heavy Duty Engine and Vehicle Omnibus Regulation

Dear Members of the Board:

Achates Power is a technology development company in San Diego, focused on developing and demonstrating intellectual property for opposed-piston (“OP”) engines. We work with commercial engine companies and OEMs around the globe, offering engineering services and technology licenses to put opposed piston engines into production.

Over the last several years, we have received significant agency and industry support for several different engine projects, including:

- A large project with the U.S. Department of Defense to develop a new Advanced Combat Engine, with targeted production in 2024
- Projects with the U.S. Department of Energy for cleaner, more efficient engines for full size pickup trucks and mid-range commercial vehicles
- Most notably is a project with the California Air Resources Board to demonstrate a heavy duty diesel opposed piston engine. We have prototype engines operating at different facilities around the U.S., including our facility in San Diego. The engine will be demonstrated on-road in service next year. We can report the following results based on testing to date:
 1. Based on engine and aftertreatment testing, we are highly confident the engine design can be certified, with adequate engineering margin, to the proposed CARB ultralow NO_x standard of 0.02 g / bhp-hr on the Federal Test Procedure (FTP) cycle.
 2. The engine will also emit less CO₂ than the EPA requires. Testing to date shows the engine already emits less CO₂ than today’s engine regulation, even while emitting 90% less NO_x. With ongoing development, we expect to demonstrate around the end of 2020

that we emit less CO₂ than the 2027 EPA requirement, the terminal requirement for the GHG II standard, again even while emitting 90% less NO_x.

3. Earlier this year we commissioned FEV, an expert in this field, to prepare an independent cost analysis of a commercial vehicle OP engine vs. a conventional engine of the same power & torque. FEV's conclusion is that with everything else being equal – except the OP engine has 90% less NO_x and lower CO₂ – the OP engine, including aftertreatment, will cost between 6 to 14% less than the comparable conventional engine.

While the OPE engine is not yet in volume production, we are confident that if an OEMs starts now to commercially develop an OPE engine, it could be in mass production by 2027, providing lower fuel consumption, more durable emission control and a lower cost.

The industry has done a remarkable job over that last 5 decades in wringing extraordinary improvements in performance, efficiency, and emissions from conventional engines, but has reached a point of diminishing return on all fronts. Each new gain comes at a higher price, in both cost and complexity. The OP engine represents a chance to break this trend towards higher cost and complexity, all while offering more headroom for future efficiency and emissions improvement.

Putting a new engine architecture into production requires a big investment. But modifying conventional engines to achieve the next step in efficiency and cleanliness also requires a big investment but with the added risk that it might not be sufficient to meet the new standards. If, as many believe, we will continue to use a substantial number of diesel engines for a long time in a certain market segments (including, but not limited to Heavy Duty truck), then the more strategic investment is a new OP engine platform that offers low cost and more improvement headroom so that we can reap its benefits soon, and then forever.

Sincerely



Laurence Fromm
EVP, Business Development