



CAPSTONE TURBINE CORPORATION

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Commissioner Jim Boyd
Presiding Member, Transportation Committee
California Energy Commission

Commissioner Karen Douglas
Associate Member, Transportation Committee
California Energy Commission

08-ALT-1

DOCKET	
08-OIR-1	
DATE	
RECD.	AUG 25 2008

RE: Capstone Turbine Corp. Comments on 08-ALT-1 and 08-OIR-1 – AB118 Regulations and Investment Plan Proceeding

Dear Commissioners:

Capstone Turbine Corporation applauds the Commission's efforts to promote the development and deployment of advanced vehicle technologies. Our company is dedicated to creating the technologies of tomorrow that will guarantee California's clean energy future and economic vitality.

We were delighted to hear about the funding opportunity offered by the Alternative and Renewable Fuels and Vehicle Technology Program. In learning more about the program, we are optimistic that our InterCooled Recuperated (ICR) engine meets the robust goals of AB 118, "to develop and deploy innovative technologies that transform California's fuel and vehicle types to help attain the state's climate change policies" (Health and Safety Code Section 44272(a)).

The Capstone ICR is a gas turbine that represents a commercially-scalable paradigm shift for the heavy duty vehicle market. Based on Capstone's proven, ultra low-emission microturbine technology and adapted through significant innovation, we expect the ICR to deliver the following energy, economic and environmental benefits to California and beyond:

- **Improved Fuel Efficiency:** In a study for bus applications, the ICR was 20 percent more efficient than existing hybrid buses and 35 percent more than traditional buses. For heavy duty trucks, fuel savings are 12-20 percent. The ICR will be efficient at high power, but even more efficient at low power conditions, which is a critical need given that the majority of vehicles operate in traffic or at steady-state highway speeds where power requirements are low.
- **Lower Greenhouse Gas Emissions:** Not only will the ICR reduce GHGs through higher fuel economy, but as a gas turbine the engine will be capable of running on cleaner fuels, such as natural gas, biofuels, and even hydrogen.
- **Alternative Fuel Usage:** The ICR can burn diesel much more cleanly than traditional truck engines and run on other fuels, making it ideal from an emissions, greenhouse gas, and energy security perspective.



- **Lower Criteria Pollutants:** The ICR can achieve NOx emissions of less than 0.2 g/hp-hr and particulates of less than 0.01 g/hp-h without any active exhaust after treatment.
- **Sustainable Design:** The ICR is much lighter weight than a diesel engine and the absence of a radiator allows the hood to be more aerodynamic. The patented air bearing design of microturbine requires no oils or lubricants.
- **Hybrid Technology:** The ICR will be capable of either a direct mechanical drive output or an electrical output for hybrid vehicle applications.
- **Low Cost:** The ICR turbine utilizes many of the same rotating turbocharger components that are widely available in the marketplace, enabling Capstone to benefit from economies of scale. Capstone has already demonstrated that its microturbines are highly reliable and require little maintenance.
- **California Economic Benefit:** Capstone is a California company with its headquarters, engineering, and manufacturing facilities located in southern California. Investment in the ICR turbine will provide high-paying green collar jobs right in the state.

Capstone is eager to bring the ICR concept forward to full commercial production. We anticipate being able to reach commercial production approximately two years after demonstration. Funding under the AB 118 program is critical to launching the ICR and leveraging private monies to fund commercial production.

However, there are two issues that threaten the ability of the program to promote advanced vehicle technologies to which we would like to bring your attention:

Proposed Draft Regulatory Language on Funding Restrictions Could Prevent Advanced Vehicle Technologies that Lower Emissions from Benefiting Under AB 118.

We are concerned that emissions-reducing technologies will be excluded from program funding simply because a portion of their benefits could coincide with environmental regulations such as EPA/CARB 2010. The ICR engine will exceed EPA/CARB 2010 emissions levels for NOx and particulates. Clearly, the ICR delivers fuel efficiency, emissions, and economic benefits that go beyond the scope of EPA/CARB 2010, but we are concerned that the appearance of overlap between the ICR's performance and regulatory obligations will create complications.

It is critical that the CEC maintain flexibility in its approach to funding restrictions, so that it will be able to separate projects that are designed to comply with regulations from those that simply overlap with regulations. Flexibility will help the CEC to evaluate projects appropriately in cases where an applicant – i.e. Capstone or its heavy duty vehicle OEM partner – could be subject to regulation, but where the project is not mandated or necessary to achieve compliance with any regulation.



The CEC Should Recognize that the Technologies and Applications Contained in the Statute Were Meant to be Illustrative, Not Comprehensive

AB 118 is one pillar upon which the program will be built, along with the Investment Plan and California's climate change policies. We would like to point to the specific language contained in the statute, which states that, "All of the following [project types] shall be available for funding" (44272(c)). In other words, the statute does not attempt to provide a comprehensive list of project types.

In particular, Capstone would like to highlight an example provided by the statute that we think represents an unrealistic goal: "advanced internal combustion engines with a 40 percent or better efficiency level over the current market standard" (44272(c)(6)). As stated earlier, Capstone's ICR engine will provide a significant improvement in fuel economy – likely as high as 20 percent – in addition to providing lower emissions, fuel flexibility, enhanced energy security, low cost, and sustainable design. Furthermore, the ICR is a gas turbine internal combustion engine that can drive a hybrid configuration, so the project crosses many of the technological categories contained in the statute.

Rather than attempt to articulate a comprehensive list of areas of focus for the program, which may quickly become obsolete or needlessly restrict the process, the CEC should ensure that the program and ensuing RFP process is open enough to encourage projects that accomplish as many of the goals of the program, AB 118, and the underlying goals under AB 32 as possible.

In closing, Capstone would like stress the value of promoting multi-fuel transition technologies that can be deployed on a commercial scale. We believe that the ICR project is such a technology. We look forward to continuing to participate in the AB 118 implementation process and supporting the CEC in any way we can.

Sincerely,

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