

# DOCKET

10-ALT-01

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California Energy Commission  
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1516 Ninth Street  
Sacramento, CA 95814-5512

## **RE: Docket #10-ALT-1, Advisory Committee Meeting 2011-2012 Investment Plan for the Alternative and Renewable Fuel and Vehicle Technology Program**

Name: Paul Beach

Organization: Quallion LLC, 12744 San Fernando Rd, Sylmar, CA 91342, (818) 833-2013

### **Policy Level Recommendation/Objectives:**

The objective is to demonstrate an Anti-Idling battery (lithium-ion) powered Heating Ventilating Air Conditioning (HVAC) system for use in truck applications to utilize power when stationary. Initial target vehicles will include medium and heavy-duty trucks.

Funding request- \$2.5M of the \$8M for Manufacturing Facilities and Equipment – *Fully fund Quallion's original \$9M+ state proposal for a lithium-ion module manufacturing line. Leverage off Quallion's current \$60M of federal funds from the Title III Defense Production Act.*

Funding request- \$2.5M of the \$7M for Develop and Demonstrate Advanced Technology Medium- and Heavy-Duty Vehicles. *Quallion has partnered with Paccar & Denso to demonstrate an all-electric anti-idling technology.*

### **Market Overview:**

According to the U.S. Environmental Protection Agency, truck idling results in the emission of 11 million tons of CO<sub>2</sub> and the Department of Energy estimates that engine idling consumes 3.2 billion gallons of diesel fuel annually. Thirty seconds of idling can use more fuel than turning off the engine and restarting it, with every gallon of gas used produces about 19 pounds of carbon dioxide.

- Long-haul trucks idling overnight, in addition to short-distance trucks and other heavy-duty vehicles consume 3.2 billion gallons annually<sup>1</sup>
- Industry sources estimate that a long-distance, freight-hauling, heavy-duty truck idles about 6 hours/day (h/d) on the average (TMC 1995). The actual extent of idling varies with the season and with the type of operation. A truck may idle for 10 h/d during winter and less than 5 h/d the rest of the year<sup>2</sup>
- Using an example of 458,000 trucks, with 85 days of heating at 10 h/d and 218 days with average cooling at 4.5 h/d, truck engine idling results in the following emissions<sup>3</sup>:
  - Energy Usage (10<sup>12</sup> Btu) = 107.5 Btu
  - Petroleum (10<sup>3</sup> gal) = 838,140 gallons
  - CO<sub>2</sub> Emissions (10<sup>3</sup> tons) = 9,597 tons
- Using the above baseline information, Auxiliary power units reduce energy and petroleum use and CO<sub>2</sub> emissions by more than 85% for the entire year<sup>3</sup>:
  - Energy Usage (10<sup>12</sup> Btu) = 19.3 Btu
  - Petroleum (10<sup>3</sup> gal) = 150,860 gallons
  - CO<sub>2</sub> Emissions (10<sup>3</sup> tons) = 1,727 tons

1 - *Analysis of Technology Options to Reduce the Fuel Consumption of Idling Trucks*, Center for Transportation Research Argonne National Laboratory, United States Department of Energy; pg 21, paragraph 1

2 - *Analysis of Technology Options to Reduce the Fuel Consumption of Idling Trucks*, Center for Transportation Research Argonne National Laboratory, United States Department of Energy; pg 5, paragraph 3

3 - *Analysis of Technology Options to Reduce the Fuel Consumption of Idling Trucks*, Center for Transportation Research Argonne National Laboratory, United States Department of Energy; pg 22, table 6

### Anti-idling Legislation

- The Environmental Protection Agency is actively supportive of anti-idling technologies to reduce the amount of CO<sub>2</sub> emissions and encourages states to pass anti-idling laws for stationary trucks.
- As of February 2009, 17 anti-idling laws exist in 24 states and the District of Columbia. There are both state and local anti-idling laws that have been signed into effect, meaning that if a driver is traveling through several states he/she needs to be aware of each law.
- Anti-idling laws typically include a 3-5 minute idling restriction with fines as low as \$25, and as high as \$25,000.

### Available Solutions

- Small diesel generators that require frequent maintenance, diesel fuel consumption and still pollute (albeit at lower levels than the main engine). California anti-idling laws will make this system more expensive, as emission controls will be required. This will make an all-electric system more competitive.

### **Technical Overview:**

Funded under a Department of Energy grant, Quallion LLC has designed and developed a battery powered Anti-Idling HVAC solution designed for Class 6-8 Heavy-Duty trucks. The system offers up to 10 hours of uninterrupted battery powered cooling. The DOE and Quallion have developed this new technology to meet OEM specification requirements and have installed the battery in a Class 8 truck for preliminary field testing.

An ultra-efficient HVAC system design makes Quallion's battery solution 25% the weight of equivalent lead acid battery systems that are standard in trucks today. Fuel savings achieved by the system will greatly reduce fleet operating costs and drastically reduce greenhouse gas emissions. Additionally the battery powered HVAC system is significantly quieter than conventional systems, increasing user comfort.

The key to the anti-idling system design is Quallion's patented MATRIX™ battery technology. This technology has been deployed in a number of vehicle, aviation and space applications for back-up power or starter motors. Specific applications include EVs, UUVs and UAVs. The MATRIX™ technology is unique because of its highly reliable ultra-safe performance.

Quallion's Li-ion battery powered high efficiency HVAC system performance features:

- Significant reduction of diesel consumption and CO<sub>2</sub> emissions
- Matrix™ Battery System for safe & highly reliable energy storage
  - 3hr battery charge time
  - 10hr operating period
- Clean, light-weight, quiet, Li-ion powered system
- Custom design/mounting available for different fleets

The HVAC system offers significant advantages compared to conventional diesel APU powered systems including the following:

- A 67% reduction in fuel consumption
- A 67% reduction in CO<sub>2</sub> emissions
- Half the volume
- 41% lower weight