

State of California
AIR RESOURCES BOARD

Resolution 09-21

February 26, 2009

Agenda Item No.: 09-2-7

WHEREAS, the Air Resources Board has been directed to carry out an effective research program in conjunction with its efforts to combat air pollution, pursuant to Health and Safety Code Sections 39700 through 39705;

WHEREAS, a proposal entitled "Series Hybrid Hydraulic Drivetrain in a Package Delivery Vehicle" has been submitted by Eaton Corporation in response to the 2008 Innovative Clean Air Technologies (ICAT) Program solicitation;

WHEREAS, the proposal has been independently reviewed for technical and business merit by highly qualified individuals; and

WHEREAS, the Research Division staff and the Executive Officer and Deputy Executive Officers have reviewed and recommend for funding:

Proposal entitled "Series Hybrid Hydraulic Drivetrain in a Package Delivery Vehicle", submitted by Eaton Corporation, for a total amount not to exceed \$214,401.

NOW, THEREFORE BE IT RESOLVED that the Air Resources Board, pursuant to the authority granted by Health and Safety Code Section 39703, hereby approves the following:

Proposal entitled "Series Hybrid Hydraulic Drivetrain in a Package Delivery Vehicle", submitted by Eaton Corporation, for a total amount not to exceed \$214,401.

BE IT FURTHER RESOLVED that the Executive Officer is hereby authorized to initiate administrative procedures and execute all necessary documents and agreements for the efforts proposed herein, and as described in Attachment A, in an amount not to exceed \$214,401.

I hereby certify that the above is a true and correct copy of Resolution 09-21, as adopted by the Air Resources Board.



Monica Vejar, Clerk of the Board

ATTACHMENT A

Innovative Clean Air Technologies (ICAT) Grant Proposal: "Series Hybrid Hydraulic Drivetrain in a Package Delivery Vehicle"

Background

Eaton has been working with the U.S. Environmental Protection Agency (U.S. EPA) and other partners to develop a series hybrid hydraulic drivetrain (SHHD) since 2001. In a vehicle equipped with an SHHD, the conventional transmission is removed and energy is transferred from the engine to the drive wheels through fluid power. In addition, the SHHD is hybridized by adding energy storage devices that store energy both from the engine and from the regeneration of braking energy. The SHHD has demonstrated fuel economy improvements of up to 74% in chassis dynamometer testing of a Class 6 vehicle by the US EPA and 50% in real world testing by UPS.

Objective

The purpose of the demonstration is to show the use of a third generation production intent design series hydraulic hybrid system in a package delivery vehicle used in actual revenue-generating operation for an extended period of at least 6 months. Data on the operation of the system will be collected to verify the expected fuel economy improvement and allow final design improvements before making a decision regarding commencement of production.

Methods

The proposed project involves the design, fabrication, test, and real world use of one P100 UPS package delivery vehicle (PDV) equipped with a series hybrid hydraulic drivetrain. Eaton will further support this vehicle in the field and/or at a UPS depot depending on the type of support needed. The SHHD would be a third generation prototype using Eaton's production intent design configuration. The SHHD-equipped PDV would be placed into real world service by UPS at a "to be determined" location in California for a period of about 6 months starting in mid-2010.

Expected Results

It is expected that the objective of the project will be met, and that the predicted fuel economy improvements will be verified under real-world operating conditions. Data will be collected that will allow for final optimization of the system prior to commercialization.

Significance to the Board

The commercialization of the SHHD product will reduce the greenhouse gases generated by commercial vehicles in California. This is entirely consistent with, and indeed is a primary goal, of AB 32, the Global Warming Solutions Act of 2006. Although commercial vehicles represent only a fraction of the total vehicle population in California, they tend to drive a high number of miles per year and generally get poor fuel economy due to the vehicle mass and stop-and-go operating conditions. Focusing on those sources of greenhouse gases that emit large amounts annually is an effective way to maximize the beneficial effects of the technology. Additionally, concurrent reductions in other pollutants such as oxides of nitrogen, hydrocarbons, carbon monoxide and particulate matter are anticipated.

Applicant: Eaton Corporation

Project Period: March, 2009 to December, 2010.

Principal Investigator: Brad Bohlmann

ICAT Funding: \$214,401

Co-funding: \$264,401.

Past Experience with This Principal Investigator: None.

ICAT Funding Prior to 2008

Year	2007	2006	2005
Funding	\$0	\$0	\$0

BUDGET SUMMARY

Eaton Corporation

"Series Hybrid Hydraulic Drivetrain in a Package Delivery Vehicle"**Direct Costs and Benefits**

	<u>ICAT</u>	<u>Total</u>
1. Labor	\$164,924	\$329,848
2. Employee Fringe Benefits	\$ 49,477	\$ 98,954
3. Subcontractors	\$ 0	\$ 0
4. Equipment	\$ 0	\$ 50,000
5. Travel and Subsistence	\$ 0	\$ 0
6. Materials and Supplies	\$ 0	\$ 0
7. Other Direct Costs	\$ 0	\$ 0
Total	\$214,401	\$478,802

Indirect Costs

1. Overhead	\$ 0	\$ 0
2. Other Indirect Costs	\$ 0	\$ 0
Total	\$ 0	\$ 0

Total Project Costs**\$214,401** **\$478,802**

**State of California
Environmental Protection Agency
AIR RESOURCES BOARD**

Notice of Decision and
Response to Significant Environmental Issues

Item: THE ADOPTION OF A PROPOSED REGULATION TO REDUCE
GREENHOUSE GAS EMISSIONS FROM CALIFORNIA
SEMICONDUCTOR OPERATIONS

Approved By: Resolution 09-22

Agenda Item: 09-2-3

Public Hearing Date: February 26, 2009

Issuing Authority: Air Resources Board

Comment: No comments were received identifying any significant
environmental issues pertaining to this item. The Staff
Report identified no adverse environmental effects.

Response: N/A

Certified: *Trini Balcazar*
Trini Balcazar, Regulations Coordinator

Date: August 13, 2009