State of California

AIR RESOURCES BOARD

Innovative Clean Air Technologies Resolutions

Research Division

October 25, 2001

INTRODUCTION

Contained herein for Board review are eight resolutions and accompanying summaries from the Innovative Clean Air Technologies Program (ICAT).

Item 1 is an ICAT proposal from AC Propulsion entitled, "Development and Evaluation of a Tri-Fuel, Plug-in HEV with Vehicle-to-Grid Power Flow". The principal investigator will be Thomas B. Gage. Resolution No. 01-39.

Item 2 is an ICAT proposal from Conserval Systems, Inc., entitled, "Solar Crop Drying Demonstrations". The principal investigator will be John Hollick. Resolution No. 01-40.

Item 3 is an ICAT proposal from Gas Technology Institute entitled, "The GTI High-Performance Radiant Tube System". The principal investigator will be Harry Kurek. Resolution No. 01-41.

Item 4 is an ICAT proposal from Gregg Industries, Inc., entitled, "An Innovative Integrated Approach to Non-Incineration Destruction of Benzene, VOCs and Odors from Metal Casting Operations". The principal investigator will be David L. Marshall. Resolution No. 01-42.

Item 5 is an ICAT proposal from IonEdge Corporation entitled "Elimination of Airborne Emissions from Electrolytic and Electroless Plating Operations". The principal investigator will be Mandar Sunthankar. Resolution No. 01-43.

Item 6 is an ICAT proposal from Rypos, Inc. entitled "A Plan to Retrofit Three Diesel Generators with the Rypos/Bekaert System". The principal investigator will be Frank DePetrillo. Resolution No. 01-44.

Item 7 is an ICAT proposal from the Sacramento Municipal Utility District entitled "Demonstration of Electric School Bus with Zebra Battery and Integrated Fast Charge". The principal investigator will be Ruth MacDougall. Resolution No. 01-45.

Item 8 is an ICAT proposal from the University of California, Davis, Institute for Transportation Studies entitled "Hydrogen Bus Technology Validation Program". The principal investigator will be Dr. Marshall Miller. Resolution No. 01-46.

PROPOSED

State of California
AIR RESOURCES BOARD

Resolution 01-39

October 25, 2001

Agenda Item No.: 01-8-2

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, number 01-74, entitled "Development and Evaluation of a Tri-Fuel, Plug-in HEV with Vehicle-to-Grid Power Flow", has been submitted by AC Propulsion, Inc., in response to the 2001 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 Number 01-74, entitled "Development and Evaluation of a Tri-Fuel, Plug-in HEV with Vehicle-to-Grid Power Flow", submitted by AC Propulsion, Inc., for a total amount not to exceed $230,071.

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 Number 01-74, entitled "Development and Evaluation of a Tri-Fuel, Plug-in HEV with Vehicle-to-Grid Power Flow", submitted by AC Propulsion, Inc., for a total amount not to exceed $230,071.

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 $230,071.

ATTACHMENT A

Innovative Clean Air Technologies (ICAT) Grant Proposal:

"Development and Evaluation of a Tri-Fuel, Plug-in HEV with Vehicle-to-Grid Power Flow"

Background

The true cost of hybrid electric vehicles (HEVs) is currently greater than that of comparable conventional vehicles. But if the electrical generation capabilities of HEVs are harnessed and provided to the electric power grid, benefits would accrue to the electric power grid operators, vehicle owners, and system aggregators/service providers. The economic value thus created could help offset HEV ownership costs, thus maximizing their use. This project will address the technical aspects of this subject.

Objective

The primary project objective is to add value to the ownership of HEVs by using them to provide power to the electrical grid. This would ease an objection to their use and thus help reduce automotive air pollution. Intermediate goals include integration of all of the essential elements needed to demonstrate the operation of HEVs for providing net electric power to the electrical grid while parked and under the control of the grid operator. The vehicle's engine would operate on gasoline when in use on the road and on low-pressure natural gas when parked and generating electricity for the grid.

Methods

The appropriate drive train equipment will be installed into an existing vehicle, which will be tested in actual use for its performance both as a vehicle and as an electrical power supplier while parked. Data will be collected regarding reliability, command response, and efficiency. The vehicle's emissions will also be measured during the course of the project using a basic three-gas emission analyzer, with comprehensive dynamometer/constant volume sampling tests to be conducted at a later time.

Expected Results

It is anticipated that this project will demonstrate the technology, hardware and software for using HEVs for providing power to the electric grid and will evaluate the commercial feasibility of this approach.

Significance to the Board

The Air Resources Board's zero emission vehicle program contains incentives for the development and sale of HEVs. The results of the proposed project will allow an HEV

to create value while the vehicle is stationary and plugged into the power grid. This added value will encourage and advance the purchase and use of HEVs, thus furthering the air quality improvement goals of the Board.

Applicant: AC Propulsion, Inc.

Project Period: 10 months

Principal Investigator: Thomas B. Gage

ICAT Funding: $230,071

Cofunding: $524,919

AC Propulsion:	$ 79,895
SCAQMD:	$180,026
Volkswagen:	$225,000
NREL:	$ 39,998

Past Experience with This Principal Investigator: This principal investigator conducted a 1996 South Coast Air Quality Management District project, to which ARB provided emission testing support. His interaction with ARB staff was satisfactory.

Prior ICAT Funding to AC Propulsion, Inc.:

Year	2000	1999	1998
Funding	$ 0	$ 0	$ 0

Note: The Board approved research funding of $164,676 in September 2001 for a separate contract with AC Propulsion, Inc., to develop a vehicle-to-grid technology for battery-electric vehicles.

BUDGET SUMMARY

AC Propulsion, Inc.

Development and Evaluation of a Tri-Fuel, Plug-in HEV with Vehicle-to-Grid Power Flow

Direct Costs and Benefits	**ICAT**	**Total**
1. Labor	$ 85,050	$196,938
2. Employee Fringe Benefits	$ 22,146	$ 51,282
3. Subcontractors	$ 7,306	$ 16,550
4. Equipment	$ 26,227	$283,035
5. Travel and Subsistence	$ 393	$ 755
6. Materials and Supplies	$ 3,049	$ 6,817
7. Other Direct Costs	$ 0	$ 705
Total	$144,171	$556,082
Indirect Costs		
1. Overhead	$ 85,900	$ 198,908
2. Other Indirect Costs	$ 0	$ 0
Total	$ 85,900	$ 198,908
Total Project Costs	**$ 230,071**	**$ 754,990**

PROPOSED

State of California
AIR RESOURCES BOARD

Resolution 01-40

October 25, 2001

Agenda Item No.: 01-8-2

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, number 01-21, entitled "Solar Crop Drying Demonstrations", has been submitted by Conserval Systems, Inc., in response to the 2001 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 Number 01-21, entitled "Solar Crop Drying Demonstrations", submitted by Conserval Systems, Inc., for a total amount not to exceed $150,000.

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 Number 01-21, entitled "Solar Crop Drying Demonstrations", submitted by Conserval Systems, Inc., for a total amount not to exceed $150,000.

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 $150,000.

ATTACHMENT A

Innovative Clean Air Technologies (ICAT) Grant Proposal:

"Solar Crop Drying Demonstrations"

Background

Conserval has developed a solar collector to heat air for a variety of applications. Their solar collector is simple and inexpensive, requires minimal maintenance, and has a very high solar efficiency. The solar collector is a perforated galvanized steel panel with a black sun-absorbing finish and a two-dimensional profile to give it structural rigidity and longitudinal strength. When the sun shines on the black steel panels, it heats the air on the outside of the collector panel. This air is slowly pulled by a small fan through the perforations in the panel and sent to a distribution system.

Objective

The objective of this project is to install several crop-drying systems at drying sheds that currently burn fossil fuel to dry various agricultural products that are commonly grown in California.

Methods

The solar collector technology will be retrofitted into existing drying structures. Conserval will design the most cost-effective solar air heating system for each application. After host site approval, Conserval will fabricate the components, ship them to the site, and oversee installation, start-up, and operation. Instruments will measure parameters such as temperature and flow rates.

Expected Results

This project should prove the technical viability of solar crop drying for a variety of crops produced in California. This is necessary to convince a significant part of California's agricultural businesses of the applicability of this technology, thereby facilitating widespread commercialization.

Significance to the Board

California has hundreds of firms that dry crops (such as nuts and fruit) by burning fossil fuels that pollute the air. Solar energy is abundant in the agricultural areas of the State, where most crop drying occurs. By using free solar energy to reduce their processing costs, California farms can save money and expand their markets. Widespread use of the technology could eliminate 250 tons per year of NO_x emissions. Installing the technology would cut fossil fuel use, which is consistent with State policy.

Applicant: Conserval Systems, Inc.

Project Period: 18 months

Principal Investigator: John Hollick

ICAT Funding: $150,000

Cofunding: $213,244

Conserval Systems	$93,965
Sunsweet Drier	$16,389
Carriere & Sons	$24,090
Gilroy Foods	$54,800
Zoria Farms	$24,000

Past Experience with This Principal Investigator: None.

Although staff does not have any prior experience with the PI, the extent of review of ICAT proposals provides a sufficient level of confidence for staff to recommend the proposal for an ICAT award. The ICAT evaluation process includes reviews by five external technical and four external business advisors, as well as internal reviewers from Mobile Source Control and Operations Divisions, Stationary Source Division, Research Division, and the Executive Office.

Prior ICAT Funding to Conserval Systems, Inc.

Year	2000	1999	1998
Funding	$ 0	$ 0	$ 0

BUDGET SUMMARY

Conserval Systems, Inc.

Solar Crop Drying Demonstrations

Direct Costs and Benefits	**ICAT**	**Total**
1. Labor	$ 25,843	$ 43,072
2. Employee Fringe Benefits	$ 5,168	$ 8,614
3. Subcontractors	$ 81,300	$135,500
4. Equipment	$ 0	$100,000
5. Travel and Subsistence	$ 13,260	$ 22,100
6. Materials and Supplies	$ 0	$ 7,500
7. Other Direct Costs	$ 7,200	$ 12,000
Total	$132,771	$328,786
Indirect Costs		
1. Overhead	$ 17,229	$ 34,458
2. Other Indirect Costs	$ 0	$ 0
Total	$ 17,229	$ 34,458
Total Project Costs	**$150,000**	**$363,244**

PROPOSED

State of California
AIR RESOURCES BOARD

Resolution 01-41

October 25, 2001

Agenda Item No.: 01-8-2

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, number 01-47, entitled "The GTI High-Performance Radiant Tube System", has been submitted by Gas Technology Institute in response to the 2001 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 Number 01-47, entitled "The GTI High-Performance Radiant Tube System", submitted by Gas Technology Institute, for a total amount not to exceed $152,773.

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 Number 01-47, entitled "The GTI High-Performance Radiant Tube System", submitted by Gas Technology Institute, for a total amount not to exceed $152,773.

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 $152,773.

ATTACHMENT A

Innovative Clean Air Technologies (ICAT) Grant Proposal:

"The GTI High-Performance Radiant Tube System"

Background

In some industrial furnaces, the combustion gases are contained within tubes that radiate heat into the furnace, rather than allowing direct contact of the gases and the furnaces' contents. Radiant-tube heating is used where the chemical properties of the combustion gases would damage the product and where a uniform temperature is needed within the furnace. Radiant tube furnaces in use today in the metals industry emit high concentrations of NO_x, typically 200 to 250 ppm, because of the high temperatures caused by burning the fuel in a small volume. The geometric restrictions prevent the economical use of standard combustion modifications for NO_x control. There are an estimated 43 furnaces using radiant-tube burners in California.

Objective

The project would demonstrate 60 percent reduction of NO_X emissions from a continuous-strip steel-annealing furnace at California Steel Industries in Fontana. Also, CO and CO_2 emissions each would be reduced by three percent via improved fuel economy. The reductions would result from the transfer of a proven technique, internal gas recirculation, to the new application of radiant-tube burners in metal furnaces.

Methods

GTI will retrofit the forced internal recirculation (FIR) burners on 20 radiant tubes on a continuous steel strip-annealing furnace at California Steel in Fontana. NO_x and CO emissions and fuel use will be measured in the furnace exhaust before and after the retrofit. The performance of the furnace will be tested. The FIR burners must be manufactured for the specific application.

Expected Results

A low-NO_X, energy-saving retrofit technology would be commercially demonstrated.

Significance to the Board

Widespread adoption of the technology by operators of radiant-tube furnaces would reduce NO_x emissions in California by about 0.5 tons per day, CO emissions by about 30 tons per day, and CO_2 emissions by about 12 tons per day.

Applicant: Gas Technology Institute

Project Period: 18 months

Principal Investigator: Harry Kurek

ICAT Funding: $152,773

Cofunding: $488,000

GTI	$100,000
SoCal Gas	$100,000
California Steel	$269,000
Eclipse combustion	$ 19,000

Past Experience with This Principal Investigator:
ICAT grant 99-1, performed satisfactorily. The project demonstrated oscillating combustion (pulsed fuel flow for NO_X control) at a forging furnace.

Prior ICAT Funding to Gas Technology Institute (formerly, Institute of Gas Technology)

Year	2000	1999	1998
Funding	$0	$161,803	$ 0

BUDGET SUMMARY

Gas Technology Institute

The GTI High-Performance Radiant Tube System

Direct Costs and Benefits	**ICAT**	**Total**
1. Labor	$ 45,748	$203,272
2. Employee Fringe Benefits	$ (included)	$ (included)
3. Subcontractors	$ 0	$ 0
4. Equipment	$ 0	$ 60,000
5. Travel and Subsistence	$ 20,573	$ 39,586
6. Materials and Supplies	$ 1,000	$160,400
7. Other Direct Costs	$ 0	$ 0
Total	$ 67,321	$463,258
Indirect Costs		
1. Overhead	$ 54,897	$ 92,414
2. Other Indirect Costs	$ 30,555	$ 85,101
Total	$ 85,452	$177,515
Total Project Costs	**$152,773**	**$640,773**

PROPOSED

State of California
AIR RESOURCES BOARD

Resolution 01-42

October 25, 2001

Agenda Item No.: 01-8-2

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, number 01-15, entitled "An Innovative Integrated Approach to Non-Incineration Destruction of Benzene, VOCs and Odors from Metal Casting Operations", has been submitted by Gregg Industries, Inc., in response to the 2001 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 Number 01-15, entitled "An Innovative Integrated Approach to Non-Incineration Destruction of Benzene, VOCs and Odors from Metal Casting Operations", submitted by Gregg Industries, Inc., for a total amount not to exceed $150,000.

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 Number 01-15, entitled "An Innovative Integrated Approach to Non-Incineration Destruction of Benzene, VOCs and Odors from Metal Casting Operations", submitted by Gregg Industries, Inc., for a total amount not to exceed $150,000.

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 $150,000.

ATTACHMENT A

Innovative Clean Air Technologies (ICAT) Grant Proposal:

"An Innovative Integrated Approach to Non-Incineration Destruction of Benzene, VOCs and Odors from Metal Casting Operations"

Background

Metal casting facilities generate Volatile Organic Compounds (VOCs) and particulate matter from sand handling and core making operations. Molds are usually made from sand, which is mixed with coal and organic additives. Benzene, VOCs, and odors are generated from casting and other sand handling operations. Resins used in cores generate odors during curing and casting operations.

Gregg Industries, Inc., a California iron foundry producing iron castings, has developed a process called "Advanced Oxidation" (AO) to reduce the VOC emissions from sand handling operations and abate odors from core rooms. AO uses water containing ozone and hydrogen peroxide to oxidize the VOCs (which include benzene and odor-causing chemicals). The AO method allows an increased reuse of mold materials such as sand, and usually provides better castings and less scrap metal. A modified AO method has been demonstrated to remove odors from core making operations. It incorporates an ultraviolet (UV) oxidation chamber. This project would be the first demonstration of a combined system to control emissions from both sand handling and core making operations.

Objective

The objective of this project is to determine the effectiveness of novel controls to reduce odors and VOCs from emissions generated at a foundry core room and from the foundry's sand handling operations.

Methods

Gregg will install both an advanced oxidation system and an ultraviolet photocatalytic system. Based on testing and analyzing the performance of the combined system, modifications will be made. A final series of performance tests will then be conducted. Emissions testing will be performed both prior to installation and upon project completion.

Expected Results

This project will demonstrate a device to control odors and VOCs from foundries. The project will also establish the overall technical and economic feasibility of the proposed system. The final report will compare the cost of operating the odor and VOC control device with the savings expected to result from the re-use of casting sands that this technology should make possible.

Significance to the Board

Many foundries are located in populated areas, and adjoining communities frequently file nuisance complaints about odors that result from their operations. This project is expected to demonstrate a technology to control odors and VOCs that would also reduce the foundry's operating costs. While the technology would be tested at an iron foundry, the technology could also be applied to metal casting operations in general. Ultimately, this technology has the potential for controlling emissions from other emission categories, such as the printing industry.

Applicant: Gregg Industries, Inc.

Project Period: 18 months

Principal Investigator: David L. Marshall

ICAT Funding: $150,000

Cofunding: $450,000

Gregg Industries	$300,000
SCAQMD	$150,000

Past Experience with This Principal Investigator: None.

Although staff does not have any prior experience with the PI, the extent of review of ICAT proposals provides a sufficient level of confidence for staff to recommend the proposal for an ICAT award. The ICAT evaluation process includes reviews by five external technical and four external business advisors, as well as internal reviewers from Mobile Source Control and Operations Divisions, Stationary Source Division, Research Division, and the Executive Office.

Prior ICAT Funding to Gregg Industries, Inc.

Year	2000	1999	1998
Funding	$ 0	$ 0	$ 0

BUDGET SUMMARY

Gregg Industries, Inc.

An Innovative Integrated Approach to Non-Incineration Destruction of Benzene, VOCs and Odors from Metal Casting Operations

Direct Costs and Benefits	ICAT	Total
1. Labor	$ 75,375	$165,750
2. Employee Fringe Benefits	$ 26,382	$ 58,014
3. Subcontractors	$ 5,000	$ 37,000
4. Equipment	$ 0	$250,000
5. Travel and Subsistence	$ 23,016	$ 48,783
6. Materials and Supplies	$ 4,038	$ 8,075
7. Other Direct Costs	$ 6,033	$ 12,066
Total	$139,844	$579,688
Indirect Costs		
1. Overhead	$ 9,042	$ 18,084
2. Other Indirect Costs	$ 1,114	$ 2,228
Total	$ 10,156	$ 20,312
Total Project Costs	**$150,000**	**$600,000**

PROPOSED

State of California
AIR RESOURCES BOARD

Resolution 01-43

October 25, 2001

Agenda Item No.: 01-8-2

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, number 01-07, entitled "Elimination of Airborne Emissions from Electrolytic and Electroless Plating Operations", has been submitted by IonEdge Corporation in response to the 2001 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 Number 01-07, entitled "Elimination of Airborne Emissions from Electrolytic and Electroless Plating Operations", submitted by IonEdge Corporation, for a total amount not to exceed $250,000.

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 Number 01-07, entitled "Elimination of Airborne Emissions from Electrolytic and Electroless Plating Operations", submitted by IonEdge Corporation, for a total amount not to exceed $250,000.

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 $250,000.

ATTACHMENT A

Innovative Clean Air Technologies (ICAT) Grant Proposal:

"Elimination of Airborne Emissions from Electrolytic and Electroless Plating Operations"

Background

Chromium, nickel, and other metals are electro-deposited on industrial and consumer parts in aqueous processes that emit the metals to the air, leading to public exposure to these toxic pollutants. IonEdge has developed a "Dry Plating" system to replace these aqueous processes with a vacuum coating method. Their system would eliminate airborne emissions of hexavalent chromium and other toxic substances from plating. Furthermore, the technology minimizes hazardous effluent discharge and toxic waste disposal from the plating operations.

Dry Plating will eliminate toxic fumes and other hazardous emissions. There are at least 190 active commercial plating establishments in California. Although the Air Resources Board adopted an airborne toxic control measure in 1988 to control emissions of hexavalent chromium from chrome plating, a significant public health risk remains from these emissions.

Objective

The objective of this project is to demonstrate the "Dry Plating" process on a pilot-production line in a facility in California by depositing metals onto large quantities of commercial microelectronic parts.

Methods

The "Dry Plating" technology will be installed at an industrial facility in Anaheim and operated for several months. Metals will be vaporized in vacuum using heat and plasma energy. The resulting high-energy vapor-stream will be directed to the substrate to be plated. Emission monitoring will be conducted prior to installation and at various times during system operation.

Expected Results

If successful, this project would demonstrate that IonEdge's vacuum coating method has a sufficiently high rate of deposition to be competitive with standard electroplating methods. Costs would be compared to show that the new technology is more cost-effective from a systems-wide perspective than electroplating.

Significance to the Board

If this method replaces electroplating--particularly, chrome plating--emissions of toxic air contaminants would be reduced significantly. In addition, much less water would be used, and the potential for toxic effluents to water and land would be reduced. The

following industries use electroplating, and are expected to be interested in the vacuum coating method once it is successfully demonstrated: defense/aerospace, electronics, automotive parts, and semi-conductor manufacturing.

Applicant: IonEdge Corporation **Project Period:** 24 months

Principal Investigator: Mandar Sunthankar **ICAT Funding:** $250,000

Cofunding: IonEdge Corporation $250,000

Past Experience with This Principal Investigator: None.

Although staff does not have any prior experience with the PI, the extent of review of ICAT proposals provides a sufficient level of confidence for staff to recommend the proposal for an ICAT award. The ICAT evaluation process includes reviews by five external technical and four external business advisors, as well as internal reviewers from Mobile Source Control and Operations Divisions, Stationary Source Division, Research Division, and the Executive Office.

Prior ICAT Funding to IonEdge Corporation:

Year	2000	1999	1998
Funding	$ 0	$ 0	$ 0

BUDGET SUMMARY

IonEdge Corporation

Elimination of Airborne Emissions from Electrolytic and Electroless Plating Operations

Direct Costs and Benefits	ICAT	Total
1. Labor	$ 52,924	$ 68,310
2. Employee Fringe Benefits	$ 17,465	$ 22,542
3. Subcontractors	$ 50,000	$ 50,000
4. Equipment	$ 0	$ 15,000
5. Travel and Subsistence	$ 10,000	$ 15,000
6. Materials and Supplies	$ 28,105	$180,000
7. Other Direct Costs	$ 0	$ 0
Total	$158,494	$350,852
Indirect Costs		
1. Overhead	$ 70,389	$ 79,922
2. Other Indirect Costs	$ 21,117	$ 69,226
Total	$ 91,506	$ 149,148
Total Project Costs	$250,000	$500,000

PROPOSED

State of California
AIR RESOURCES BOARD

Resolution 01-44

October 25, 2001

Agenda Item No.: 01-8-2

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, number 01-11, entitled "A Plan to Retrofit Three Diesel Generators with the Rypos/Bekaert System", has been submitted by Rypos, Inc., in response to the 2001 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 Number 01-11, entitled "A Plan to Retrofit Three Diesel Generators with the Rypos/Bekaert System", submitted by Rypos, Inc., for a total amount not to exceed $100,000.

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 Number 01-11, entitled "A Plan to Retrofit Three Diesel Generators with the Rypos/Bekaert System", submitted by Rypos, Inc., for a total amount not to exceed $100,000.

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 $100,000.

ATTACHMENT A

Innovative Clean Air Technologies (ICAT) Grant Proposal:

"A Plan to Retrofit Three Diesel Generators with the Rypos/Bekaert System"

Background

Retrofit control technologies are needed for particulate matter (PM) emitted from stationary diesel engines. In particular, there is a need for controls that can operate effectively and economically when the engine is working at low loads and the exhaust is not hot enough for passive regeneration of PM traps. Devices that can regenerate (destroy collected soot) when the exhaust is cool have been developed, but they consume considerable fuel in raising the exhaust temperature to a suitable degree.

Objective

Rypos would retrofit its sintered metal, electrically regenerated PM trap system onto three stationary or portable diesel engines in commercial service. The target engine sizes are 100 kw, 200 kw, and 400 kw. Performance of the retrofit systems would be measured versus purposefully varied load and during three months of actual operation. Goals for the project would be at least 75 percent average PM removal, regeneration independent of exhaust temperature, back-pressure less than 40 inches of water, and additional fuel use less than two percent.

Methods

Rypos will retrofit its trap on three in-use stationary engines with outputs of 100 kw, 200 kw, and 400 kw. Rypos will monitor the engine loads, exhaust temperatures, trap back-pressures, CO and NO_x concentrations, exhaust opacities, and PM emission rates for three months. The opacity and PM measurements will be compared to data taken without the trap inline.

Expected Results

A successful project would demonstrate the practical utility of a PM control technology with widespread applicability for stationary engines.

Significance to the Board

The ARB needs to verify performance of control technologies for retrofit on stationary diesel engines. The staff intends to propose "airborne toxic control measures" that will require retrofitting controls that have been verified by ARB.

Applicant: Rypos, Inc.

Project Period: 9 months

Principal Investigator: Frank DePetrillo

ICAT Funding: $100,000

Cofunding: $116,560

Rypos	$40,000
Bekaert Fibre Technologies	$76,560

Past Experience with This Principal Investigator: None.

Although staff does not have any prior experience with the PI, the extent of review of ICAT proposals provides a sufficient level of confidence for staff to recommend the proposal for an ICAT award. The ICAT evaluation process includes reviews by five external technical and four external business advisors, as well as internal reviewers from Mobile Source Control and Operations Divisions, Stationary Source Division, Research Division, and the Executive Office.

Prior ICAT Funding to Rypos, Inc.:

Year	2000	1999	1998
Funding	$ 0	$ 0	$ 0

BUDGET SUMMARY

Rypos, Inc.

A Plan to Retrofit Three Diesel Generators with the Rypos/Bekaert System

Direct Costs and Benefits	ICAT	Total
1. Labor	$ 0	$ 45,690
2. Employee Fringe Benefits	$ 0	$ 5,870
3. Subcontractors	$ 40,000	$ 40,000
4. Equipment	$ 0	$ 40,000
5. Travel and Subsistence	$ 10,000	$ 20,000
6. Materials and Supplies	$ 20,000	$ 35,000
7. Other Direct Costs	$ 0	$ 0
Total	$ 70,000	$186,560
Indirect Costs		
1. Overhead	$ 13,500	$ 13,500
2. Other Indirect Costs	$ 16,500	$ 16,500
Total	$ 30,000	$ 30,000
Total Project Costs	**$100,000**	**$216,560**

PROPOSED

State of California
AIR RESOURCES BOARD

Resolution 01-45

October 25, 2001

Agenda Item No.: 01-8-2

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, number 01-56, entitled "Demonstration of Electric School Bus with Zebra Battery and Integrated Fast Charge", has been submitted by the Sacramento Municipal Utility District in response to the 2001 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 Number 01-56, entitled "Demonstration of Electric School Bus with Zebra Battery and Integrated Fast Charge", submitted by the Sacramento Municipal Utility District, for a total amount not to exceed $140,000.

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 Number 01-56, entitled "Demonstration of Electric School Bus with Zebra Battery and Integrated Fast Charge", submitted by the Sacramento Municipal Utility District, for a total amount not to exceed $140,000.

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 $140,000.

ATTACHMENT A

Innovative Clean Air Technologies (ICAT) Grant Proposal:

"Demonstration of Electric School Bus with Zebra Battery and Integrated Fast Charge"

Background

Existing heavy-duty battery-electric-powered vehicles, such as school buses, have issues of low vehicle range, erratic performance and reliability, and increased maintenance burdens when compared with diesel-, CNG-, and hybrid-powered vehicles. Such issues inhibit the widespread deployment of these heavy-duty zero emission vehicles (ZEVs), resulting in greater air pollution due to the use of the internal combustion-powered alternatives. The proposed project will use technology that promises to remedy these deficiencies through the use of the first truly "advanced" battery system suitable for application to medium- and heavy-duty vehicles.

Objective

The overall project objective will be to demonstrate the performance and safety characteristics of this advanced heavy-duty ZEV technology and its utility in reducing emissions from school bus operations. Intermediate objectives include the retrofit of an existing Blue Bird 72-passenger school bus with an advanced electric propulsion system including a sodium-nickel chloride Zebra battery and integrated fast-charge capability. After a period of road testing, the bus will be delivered to Napa Valley Unified School District (NVUSD) for regular service operation and evaluation.

Methods

An existing bus will be equipped with the Zebra battery system and the associated electric drivetrain equipment. The bus will be tested for two months in simulated service to ensure it is operating properly. Then the bus will be delivered to the NVUSD for eight months of field service operation. During all vehicle operation, data will be collected regarding battery efficiency, energy consumption, mileage and maintenance costs. Comparison will also be made with the NVUSD's other electric bus operations and experience, including an upcoming demonstration of a nickel-metal hydride battery-powered bus.

Expected Results

The project is expected to demonstrate that electric vehicle technologies can be successfully applied to the medium- and heavy-duty transportation industries, specifically the school bus industry, when the proper technology is used and systems integration efforts are properly conducted.

Significance to the Board

The efforts of the Board to promote and encourage the use of zero-emission vehicles will be significantly advanced by this project. The proposed technology will remedy the shortcomings of previous medium- and heavy-duty vehicle designs and will accelerate the deployment of such vehicles and the emissions reductions that are unique to the pure-electric platform.

Applicant: Sacramento Municipal Utility District **Project Period:** 13 months

Principal Investigator: Ruth MacDougall **ICAT Funding:** $140,000

Cofunding: $260,713

SMUD:	$ 40,065
MES-DEA:	$ 27,648
Napa Valley Unified School District:	$ 8,000
U.S. Department of Transportation:	$185,000

Past Experience with This Principal Investigator: A separate project currently underway with this PI, managed by MSCD, is proceeding satisfactorily.

Prior ICAT Funding to Sacramento Municipal Utility District:

Year	2000	1999	1998
Funding	$ 0	$ 0	$ 0

BUDGET SUMMARY

Sacramento Municipal Utility District

Demonstration of Electric School Bus with Zebra Battery and Integrated Fast Charge

Direct Costs and Benefits	ICAT	Total
1. Labor	$ 0	$ 13,636
2. Employee Fringe Benefits	$ 0	$ 5,186
3. Subcontractors	$140,000	$370,648
4. Equipment	$ 0	$ 0
5. Travel and Subsistence	$ 0	$ 891
6. Materials and Supplies	$ 0	$ 0
7. Other Direct Costs	$ 0	$ 0
Total	$140,000	$390,361
Indirect Costs		
1. Overhead	$ 0	$ 10,352
2. Other Indirect Costs	$ 0	$ 0
Total	$ 0	$ 10,352
Total Project Costs	**$140,000**	**$ 400,713**

SUBCONTRACTOR BUDGET SUMMARY

Santa Barbara Electric Bus Works

Demonstration of Electric School Bus with Zebra Battery and Integrated Fast Charge

Direct Costs and Benefits	**ICAT**	**Total**
8. Labor	$ 16,933	$ 23,468
9. Employee Fringe Benefits	$ 5,079	$ 7,040
10. Subcontractors	$ 67,074	$ 89,074
11. Equipment	$ 0	$ 0
12. Travel and Subsistence	$ 10,800	$ 10,800
13. Materials and Supplies	$ 0	$170,087
14. Other Direct Costs	$ 10,000	$ 10,000
Total	$109,886	$310,469
Indirect Costs		
3. Overhead	$ 30,114	$ 60,179
4. Other Indirect Costs	$ 0	$ 0
Total	$ 30,114	$ 60,179
Total Project Costs	**$140,000**	**$370,648**

PROPOSED

State of California
AIR RESOURCES BOARD

Resolution 01-46

October 25, 2001

Agenda Item No.: 01-8-2

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, number 01-52, entitled "Hydrogen Bus Technology Validation Program", has been submitted by the University of California, Davis--Institute for Transportation Studies in response to the 2001 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 Number 01-52, entitled "Hydrogen Bus Technology Validation Program", submitted by the University of California, Davis--Institute for Transportation Studies, for a total amount not to exceed $124,949.

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 Number 01-52, entitled "Hydrogen Bus Technology Validation Program", submitted by the University of California, Davis--Institute for Transportation Studies, for a total amount not to exceed $124,949.

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 $124,949.

ATTACHMENT A

Innovative Clean Air Technologies (ICAT) Grant Proposal:

"Hydrogen Bus Technology Validation Program"

Background

UC Davis-ITS, with assistance from NRG Technologies (holder of patents for the technology of the ICAT proposal) is conducting a validation program for hydrogen-fueled bus technologies. The program is funded in part by the U.S. Department of Transportation. One of the technologies is "HCNG", a 30/70 mixture of hydrogen and natural gas. That mixture allows a suitably modified engine to run at air/fuel mixtures much leaner than what is possible with natural gas. The lean mixture leads to very low NO_X emissions. A prototype HCNG bus is on hand and will be operated in transit service to provide data for designing an advanced prototype whose construction and deployment in transit service would be partially funded by ICAT.

Objective

The objectives are to achieve the 2007 NO_X standard of 0.2 gram/brake hp-hour, (g/hp-hr), to compare operational performance of the HCNG transit buses with the performance of CNG buses, and to predict, via models developed from project's data, HCNG performance in service other than the transit operation of the project.

Methods

UC Davis-ITS will collect emission and performance data from an existing prototype of the HCNG bus to complete the design of components for the second bus whose demonstration will be funded by the ICAT project. The second bus will be placed in transit service in Yolo County in parallel with ordinary CNG buses. Performance and emissions will be monitored. Data from the operations will be input to models to estimate operating costs in comparison to CNG buses in general transit service.

Expected Results

A successful project should give transit operators the information needed to allow them to choose HCNG as the technology for buses ordered for 2007.

Significance to the Board

A successful project would be the first demonstration of the ability to achieve the 0.2 g/hp-hr NO_X standard for 2007. Commercial use of HCNG would encourage the development of a hydrogen fueling "infrastructure".

Applicant: UC Davis, Institute for Transportation Studies **Project Period:** 12 months

Principal Investigator: Dr. Marshall Miller **ICAT Funding:** $124,949

Cofunding: $126,074

UCD-ITS	$100,051
NRG Technologies	$26,023

Past Experience with This Principal Investigator: None.

Although staff does not have any prior experience with the PI, the extent of review of ICAT proposals provides a sufficient level of confidence for staff to recommend the proposal for an ICAT award. The ICAT evaluation process includes reviews by five external technical and four external business advisors, as well as internal reviewers from Mobile Source Control and Operations Divisions, Stationary Source Division, Research Division, and the Executive Office.

Prior ICAT Funding to the University of California, Davis, Institute for Transportation Studies:

Year	2000	1999	1998
Funding	0	0	0

BUDGET SUMMARY

UC Davis, Institute for Transportation Studies

Hydrogen Bus Technology Validation Program

Direct Costs and Benefits	**ICAT**	**Total**
1. Labor	$ 29,149	$ 87,457
2. Employee Fringe Benefits	$ 8,162	$ 24,488
3. Subcontractors	$ 81,666	$121,023
4. Equipment	$ 0	$ 0
5. Travel and Subsistence	$ 410	$ 3,393
6. Materials and Supplies	$ 956	$ 2,869
7. Other Direct Costs	$ 0	$ 0
Total	$120,343	$239,230
Indirect Costs		
1. Overhead	$ 4,606	$ 11,793
2. Other Indirect Costs	$ 0	$ 0
Total	$ 4,606	$ 11,793
Total Project Costs	**$124,949**	**$251,023**