Ohio Third Frontier Advanced Energy Program
Letter of Intent for Proposal 2010 TFAEP

Prospective Applicant's Name:	Juice Technologies LLC, dba, Plug Smart
Applicant's Address:	930 Kinnear Road Columbus, OH 43212
Contact Person:	Kathy Ellington
Phone Number:	614-247-1610
Email Address:	kathy_ellington@plugsmart.net
Expected Collaborators:	The Ohio State University Center for Automotive Research
Proposal Type:	Advanced Energy Program
Proposed Project Title:	**Ubiquitous Smart PEV Charging & Distributed Energy Storage**
Estimate Dollars Requested:	$1,000,000

Juice Technologies, LLC is a spin out of Bottomline Resources Technologies, LLC, a company founded by Rich Housh, Tom Hurkmans, and Skip Hauser in late 2007. As a result of market intelligence gained through high level consulting activities, combined with research through the Carnegie Mellon Electricity Institute and The Center for Automotive Research at The Ohio State University, it became obvious that there are significant market opportunities for advanced "intelligent" electric vehicle charging devices in the utility/transportation space. Consequently, Juice Technologies was formed in Q1of 2008 to focus on the invention, design, development, and commercialization of a series of innovative products and services for intelligent electric vehicle charging, targeted to mass market deployment in mid to late 2010 through 2011.

A key partner in this effort is the Ohio State University Center for Automotive Research (CAR) where research and testing activities will be performed. CAR has been involved in electric and hybrid vehicle research and technology development since the early 1990s. CAR has operated an automotive industrial consortium with membership from major automotive sector companies, including GM, Ford, Chrysler, Honda, Dana, Eaton and many others since 1999. In 2008 CAR created a new consortium, SMART@CAR, with a focus on issues related to plug-in hybrid vehicle (PHEV) connectivity to the electric power grid. This consortium sees the participation of AEP, Duke Energy, Dayton Power and Light, PJM, PlugSmart, Vanner. These consortia have created a unique hub of activity around CAR that lends itself to a number of commercialization opportunities. In FY2009 CAR Center of Excellence for Electric and Plug-In Vehicle Technology was awarded $3 million dollars under the Third Frontier Wright Project Program. This grant will fund a new testing facility inside CAR, with the goal of speeding up the conversion from gas to electric vehicles. The facility will be equipped with a heavy-duty chassis dynamometer to simulate real-world operating conditions including load and wind resistance, a large battery cycler system, an environmental chamber, and high-voltage power measurement technology.

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Ubiquitous Smart PEV Charging & Distributed Energy Storage

Electrification of the transportation industry has been under way since the introduction of the first hybrid electric vehicles in the late 90's. Thanks the significant progress made in battery development in the last decade, penetration of hybrid and electric vehicles in both the passenger and commercial vehicle markets is increasing and is quickly emerging as a national priority for energy security, manufacturing competitiveness and end-use energy efficiency.

As a result, a market space is rapidly being created for products that can enable and accelerate the introduction of electric and plug-in hybrid electric vehicles, as well as a host of inter-related technologies dealing with the home/business infrastructure to deploy charging ports, grid interface hardware, smart metering, etc. This market space also interrelates strongly with the early development and penetration of distributed renewable energy technologies deployment for the residential markets, including solar power. It is clear that this fundamental change in how we approach transportation, and related energy streams in local markets, will necessitate the creation and development of new products leading to the potential for significant job creation.

Among the more promising niche markets are charging stations for plug-in electric vehicles, including after-market plug-in conversions of hybrid-electric vehicles that are already in commercial production. This proposal is focused on the commercialization of the Plug Smart™ intelligent charging technology and the opportunity for distributed energy storage. The technology will be demonstrated in multiple applications such as public charging stations, mobile charging devices, and smart receptacles. This product offers a cost effective, easy to use solution for customers desiring to provide electric vehicle charging with the option to utilize PEV batteries as localized energy storage.

The charging devices will incorporate the patent pending Plug Smart™ Engine technology that can communicate directly with the utility company to authenticate the vehicle and owner, as well as send the usage cost data to the customer's home utility bill. If the charging stations are independently owned, authentication and billing can be achieved using a credit card, allowing any driver to access them. Several utilities have already expressed interest in this product, proving an existing opportunity for penetration in a growing market.

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NexTech Materials, Ltd
404 Enterprise Drive
Lewis Center, OH 43035

+1-614-842-6606
FAX +1-614-842-6607
www.nextechmaterials.com
www.fuelcellmaterials.com

August 25, 2009

Ohio Department of Development, Technology Division
77 S. High St., 25th Floor
Columbus, OH 43216-1001

Subject: Letter of Intent for Third Frontier Advanced Energy Program

To Whom It May Concern:

This letter provides notice of intent for NexTech Materials, Ltd. to submit a proposal to the Ohio Third Frontier Advanced Energy Program RFP, which was released on July 31, 2009.

Applicant: NexTech Materials, Ltd.

Address: 404 Enterprise Drive
Lewis Center, OH 43035

Phone: (614) 842-6606

Contact Person: Scott L. Swartz, Ph.D.
Chief Technology Officer
s.swartz@nextechmaterials.com

Project Title: *Catalysts for Biomass Gasification Processes.*

Estimated Dollars: This project is estimated to be a $600,000 effort, with $300,000 of Third Frontier Research and Development funds and $300,000 of cost share funds.

Summary: This project will involve development of catalyst technology for biomass gasification systems for fuels and chemicals production. The project will focus on development and demonstration of two types of catalysts. The first catalyst type is a bi-functional methane reforming and tar removal catalyst for sulfur containing biomass gasifier streams. The second catalyst type is a sulfur-tolerant, high-temperature water gas shift catalyst.

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August 24, 2009

ERSHIGS
A Denali company

The Leader in FRP Systems

Ohio Department of Development, Technology Division
77 South High Street, 25th Floor
Columbus, Ohio 43215

Attention: John Griffin
Director

Subject: 2010 TFAEP LOI

Dear Mr. Griffin:

Please accept this Letter of Intent from Ershigs, Inc. for our Third Frontier Advanced Energy Program (TFAEP) proposal. The relevant information about our proposal is as follows:

Lead Applicant: Ershigs, Inc.
Address: 742 Marine Drive, Bellingham, WA 98225
Telephone: (360) 733-2620
Contact Person: Steve Hettick, Vice President, Manufacturing
Contact Email: shettick@ershigs.com
Project Title: Development and Commercialization of Composite Towers for Wind Turbines
Estimated Grant Amount Requested: $1 million
Known Collaborators: GE Energy, WebCore, Owens Corning, Ashland Performance Materials, University of Dayton, EMTEC, Polymer Ohio, WIRE-Net

Summary of the Proposed Project

In today's growing global wind energy market, wind turbines continue to get larger to capture more wind and consequently reduce the cost of wind energy generation. As the wind turbines get bigger, the towers become larger and taller. Manufacturing and transportation of these towers, some exceeding 100 meters, are becoming increasingly difficult and expensive.

Ershigs and its collaborators are proposing to develop an innovative design and a novel method to manufacture large and tall composite towers on-site near the wind farms where the turbines will be installed. If this effort is successful, this would lead to commercialization of this innovative design. The innovative design and the novel on-site manufacturing process eliminates the complexity and cost associated with the transportation of large tower sections over long distance and can offer a cost-

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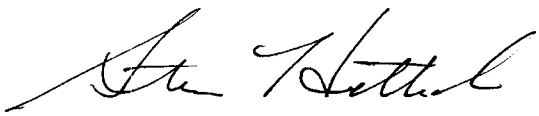
competitive, viable solution to steel towers while maintaining the required levels of performance, quality and reliability.

The Ohio Third Frontier Program has the opportunity to further reinforce and strengthen the State's position as a leader in the wind power supply chain. The proposed team will leverage and build on past and current state investments to benefit Ohio through increased investment, sales, and quality green-collar jobs created. Building upon years of applied research and development, the team will address various technical challenges through further design, testing and manufacturing process development of composite towers to meet the performance and quality standards in large volume production scale at a competitive price that the turbine manufacturers demand.

Ershigs and project collaborators are proposing to leverage the composite tower technology's value proposition to create value for turbine OEMs and tower manufacturers and demonstrate the design and manufacturing process capability of the team. The Third Frontier Advanced Energy grant and matching fund is sufficient to fund demonstrating activities and to move the composite tower technology into market entry. Once market entry is realized, it is anticipated the project will result in the creation of significant technology based economic benefits for the State of Ohio.

Sincerely,

ERSHIGS, INC.



Steve Hettick
Vice President, Manufacturing

Office: (360) 527-3447
Mobile: (360) 201-5824
email: shettick@ershigs.com
web: www.ershigs.com

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www.hpmamerica.com
820 WEST MARION ROAD, MOUNT GILEAD, OHIO 43338 > 419.946.0222 T > 419.946.2473 F

HPM AMERICA, LLC.

August 25, 2009

Ohio Third Frontier Advanced Energy Program

Re: 2010 OTFAEP Letter of Intent (LOI)

HPM America is requesting approval to be considered for the Grant provided by the Ohio Third Frontier Advanced Energy Program. Information needed is as follows:

Lead Applicant:	HPM America, LLC 820 West Marion Road Mount Gilead, Ohio 43338
Contact:	Christopher A. Filos Managing Member / CEO (419) 949-2262 cfilos@hpmamerica.com
Project Title:	Community Wind Blade Development
Estimated Grant Funds Requested:	$1,000,000.00
Known Collaborators:	Edison Materials Technology Center (EMTEC) Fibre Core Technologies

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www.hpmamerica.com
820 WEST MARION ROAD, MOUNT GILEAD, OHIO 43338 > 419.946.0222 T > 419.946.2473 F

HPM AMERICA, LLC.

Project Summary:

Windmills have been used for at least 3000 years as a source of power for pumping water and grinding grain. Until the 20th century though, there had been little interest in using wind turbines for generating electricity. However, the dramatic rise in price of oil in the '70s inspired a lot of countries to explore this valuable source of energy as a viable option. Changing oil prices have alternately spurred and dampened the development of this relatively new technology. In recent years, there has been a renewed interest in exploring Wind Turbine technology due not only to the increase in oil prices, but also the positive impact that generating such clean energy will have on climate change.

Most of the development of wind turbine technology has been done in the large turbine sector, i.e 1MW to 5MW. We believe that there is room for development of small to mid range wind turbines (1kW to 1MW range) which will give the general populace greater access to this technology.

The heart of any Wind Turbine is the blade which captures the kinetic energy of the wind and converts it to mechanical energy which is used to rotate the turbine. We plan to work closely with Edison Materials Technology Center (EMTEC), and Fibre Core Technologies to develop a series of blades for our family of machines. In the first phase, we plan to investigate the use of a three tiered blade design incorporating NREL airfoils to maximize the efficiency of these blades. In this phase, we plan to design, build and test these blades exhaustively (both aerodynamically and mechanically). Depending on the availability of resources, these tests may be carried out in the field or at government test facilities.

Depending on the results obtained from Phase 1, we may choose to either develop our own airfoils using the Eppler code (or similar algorithms/software) or incorporate a different set of airfoils into the existing blades. It is our goal to create a blade design to maximize the energy output from our turbines so as to provide a cost effective alternative to fossil fuels.

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tfcenergy.com™
twenty first century energy, LLC

August 25, 2009

Ohio Third Frontier Commission (OTFC)
Ohio Department of Development
Technology and Innovation Division
Atten: OTFAEP
77 S. High Street, 25th Floor
Columbus, Ohio 43215

RE: 2010 OTFAEP LOI

To Whom It May Concern:

Please accept this letter of Twenty First Century Energy's (TFC Energy) LLC intent to submit a proposal as the lead applicant in response to the Ohio Third Frontier Advanced Energy request for proposals.

Contact Person: Don Knoth – President
Twenty First Century Energy (TFC Energy) LLC
1 Herald Square
Fairborn, Ohio 45324
Office: (937) 343-0165
Cell: (937) 608-0337
Email address: dknoth@tfcenergy.com

Project Title: Ohio Value Chain for Low Speed Wind Energy Systems

Estimated Grant Funds Requested: $750,000

Known Collaborators:

- National Composites Center, Dayton, Ohio
- Wright State University, Dayton, Ohio
- University of Dayton Research Institute, Dayton, Ohio
- Owens Corning, Granville, Ohio
- Staco Energy Products Company, Dayton, Ohio
- Belcan Corporation, Cincinnati, Ohio

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tfcenergy.com™
twenty first century energy, LLC

Summary of Proposed Project.

The proposed project is to complete the development of vertical axis wind turbines (VAWT) for distributed energy applications for small, land based wind energy systems with power generation capabilities from 10kW to 100kW systems in class 2 & 3 wind (wind speeds of 4.4 to 5.6 m/s). This range of power capability is adequate for residential, commercial and municipal buildings, K-12 schools, farms and ranches and military applications where renewable energy is desirable. Wind energy systems with a 100kW capacity can also be employed in small wind farms to power commercial buildings, villages, towns and cities across Ohio and much of the U.S.

Our plan for development and commercialization is supported by more than a dozen Ohio-based small and large companies including established anchor companies, and potential suppliers of composite materials, components and commercially available parts and supplies. Over the planned two year period, our team will complete design optimization, wind tunnel testing of prototype vertical axis rotor systems, the integrated complete turbine system design, material selection, and full scale prototype construction. We will also complete supply chain selection and planning for market entry and be prepared to start production. We will optimize the turbine designs for low speed wind, while determining manufacturing techniques and best practices. The use of composites and other innovative materials and fabrication techniques is considered essential to the success of this project.

This technology will provide customers with an affordable renewable energy system that can be used to reduce reliance on fossil-fuels and reduce energy costs. Since these systems will be optimized for low speed wind they will be directly applicable for use in Ohio, most the U.S., and internationally as well. This technology will address a primary segment of the marketplace and is expected to strengthen Ohio jobs throughout the Ohio supply chain and create 250 high tech jobs within Ohio to support the design, continuing product improvement, manufacture and sustained customer support that will be required by energy customers.

Our proposed effort has been structured to be successful in meeting the stated OTFC goals for job retention, job creation, commercialization of technology, and collaboration between State of Ohio small and large businesses and research and academic institutions. We have embraced the RFP's Technology Commercialization Framework and have set up our proposed program with strong focus on meeting the technology, product development, and funding milestones necessary to commercialize our team's products.

Sincerely

Donald E. Knoth, President

Don Knoth
President – TFC Energy LLC

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1 Herald Square
Fairborn, Ohio 45324
937-343-0165

Phycal

August 25, 2009

The Ohio Department of Development
Technology and Innovation Division
77 South High Street, 25th Floor
Columbus, OH 43215

To Whom It May Concern:

Lead Applicant	Phycal LLC 51 Alpha Park Highland Heights, OH 44143
Contact Person	Jonathan Park, Engineer Jonathan.Park@phycal.com 440-460-0586
Project Title	Development and Demonstration of a Pilot Scale Olexal® Non-destructive Algal Oil Extraction Device
Estimated Funds	$750,000 - $1,000,000
Collaborators	The Ohio State University, SSOE

By this letter, we indicate our intention to submit as Lead Applicant a proposal under the fiscal year 2009 solicitation for the Ohio Third Frontier Advanced Energy Program. The proposal will be entitled Development and Demonstration of a Pilot Scale Olexal® Non-destructive Algal Oil Extraction Device.

Phycal LLC is an Ohio-based company focused on profitably producing algal oil as a feedstock for renewable "green" diesel, renewable jet fuel, and other renewable energy products. Phycal will also sell to other algal oil producers the unit processes necessary to do this once they are proven at commercial scale. One of these unit processes, the Olexal® non-destructive extraction process, is the focus of this proposal.

As much as 40% of the cost of producing oil from algae can come from downstream processing dominated by separating the algae cells from the water and extracting the oil from the algae. Phycal has licensed exclusively from OSU and continued to develop our Olexal non-destructive extraction whereby we "milk" the oil from the algae without dewatering and recycle the living culture back to the growth ponds to produce more oil. By "milking the cow without killing it" we save cost, time, energy, and inputs normally required to grow the algae bodies. Instead, resources are more directed towards the valuable oil. Furthermore, we have shown empirically that the Olexal process reduces or eliminates algal predators and contaminants that often plague open pond growth systems and increases both biomass and oil yield.

Phycal was previously awarded $250k from OTFAEP to build and demonstrate a bench scale prototype Olexal process. Prior to this award, the process had only been demonstrated in the laboratory at OSU on one algae species. Since then Phycal has scaled-up and demonstrated sub-pilot scale Olexal devices as part of our sub-pilot facility in Highland

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Heights. The focus is currently on optimizing and integrating at the sub-pilot scale. We have leveraged this funding and progress into current applications for follow-on federal and private funding for further development.

Project Summary:

The scope of this proposal is to develop and demonstrate a pilot scale Olexal device capable of producing 15,000 L (4,000 gallons) of algal oil per year. This will promote Olexal from *Demonstration* through to the beginning of *Market Entry*. At the end of pilot demonstration, Phycal will be ready to commercialize Olexal devices. Phycal will design and build the devices in Ohio but must demonstrate and validate the devices at scale in our pilot facility in Hawaii. Our Hawaii pilot facility will have a nameplate capacity of 100,000 – 200,000 gallons of algal oil per year. We have chosen Ohio and Hawaii for their relative strengths in commercializing algal biofuels. Ohio affords us tremendous manufacturing expertise and capability while Hawaii has a near perfect climate and a favorably high cost target for algal oil. We believe this to be the fastest path to commercialization of Olexal devices and algal biofuels. Once validated in Hawaii, Phycal can ramp production of Olexal devices for deployment to other algal farms in Ohio and mainland U.S.

Developing a functioning Olexal device requires several skill sets, all of which are represented in this proposal. Phycal, the commercial entity, will build and operate the pilot plants, and integrate the work. Additional research from the professors who have conducted the original research will be performed at OSU. SSOE will perform the architectural and engineering work to analyze the requirements to scale the technology.

Regards,

Jonathan Park
Engineer

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PHYCAL, LLC
51 Alpha Park, Highland Heights, Ohio 44143 office: 440.460.0586 fax: 440.460.2478

Phycal

August 25, 2009

The Ohio Department of Development
Technology and Innovation Division
77 South High Street, 25th Floor
Columbus, OH 43215

To Whom It May Concern:

Lead Applicant	Phycal LLC 51 Alpha Park Highland Heights, OH 44143
Contact Person	Dr. Andrew Swanson, Director of Science & Engineering Andrew.Swanson@phycal.com 440-460-0586
Project Title	Development of Heteroboost™ for Increased Production of Oil from Algae
Estimated Funds	$250,000 - $500,000
Collaborators	The Ohio State University's Bioproducts & Bioenergy Research Laboratory

Please accept this letter as indication of Phycal LLC's intent to apply as lead applicant to the FY2010 OTFAEP with a proposal titled "Development of Heteroboost™ technology for Increased Production of Oil from Algae."

Phycal LLC is an Ohio-based company focused on profitably producing algal oil as a feedstock for renewable "green" diesel, renewable jet fuel, and other renewable energy products. Phycal will also sell to other algal oil producers the unit processes necessary to do this once they are proven at commercial scale. One of these unit processes, the Heteroboost™ process, is the focus of this proposal.

Algae can produce oil by two different mechanisms: (1) phototrophically, whereby the algae are grown in sunlight and convert carbon dioxide into oil, or (2) heterotrophically, whereby the algae are grown in the dark and are fed a fixed-carbon substrate (*e.g.* hemicellulosic sugar, glycerol, and etc.) that is converted to oil. Typically, algae can produce much more oil heterotrophically but this requires a more expensive fixed-carbon substrate source. Phycal's Heteroboost™ process combines these two mechanisms into a "hybrid" system whereby the algae are first grown in the sunlight and fed CO_2 (inexpensive energy and nutrient) to their maximum oil content and then removed from the sunlight, concentrated, placed into a bioreactor and fed a fixed-carbon substrate (more expensive energy and nutrient) to "boost" their oil content to the absolute maximum oil yield prior to oil extraction. Therefore, we can economically optimize the production of algal oil by utilizing the inherent strengths of each oil production mechanism. Furthermore, the fixed-carbon substrates are waste products from other industries. The hemicellulosic sugar is a waste product from cellulosic ethanol production and glycerol is a waste from biodiesel production.

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The Heteroboost™ technology is a patent-pending process licensed from OSU and originally developed by Phycal's Chief Technology Officer, Dr. Richard Sayre, while he was an OSU professor. Since then, Phycal has built up the process to bench scale of a few liters at our subpilot facility in Highland Heights. The focus of this proposal is to transform Heteroboost™ technology from *Incubating* to *Demonstrating* within the technology commercialization framework. The scope is to design, build, optimize, integrate, and automate a next-generation, scaled-up Heteroboost™ unit into Phycal's subpilot facility.

Phycal's related skill set for this proposal is primarily in the algal systems and integration of unit processes. We will therefore enlist the expertise of Dr. Yebo Li's team at OSU's Bioproducts and Bioenergy Research Laboratory in Wooster, OH for assistance on design, development, and optimization of the Heteroboost™ bioreactor and system. Heteroboost™ technology is essentially a mass culture system similar to those used in ethanol production (only aerobic) and Dr. Li's team has expertise in both algae and bioreactor systems.

Regards,

Andrew Swanson, PhD
Director of Science and Engineering

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PHYCAL, LLC
51 Alpha Park, Highland Heights, Ohio 44143 office: 440.460.0586 fax: 440.460.2478

2010 OTFAEP LOI

Lead applicant name	**Energystics Technologies Holdings, LLC**
Address	**3545 Silica Road** **Suite C** **Sylvania, OH 43560**
Phone number	**419.517.4094**
Contact person	**Jeff Culver, CEO**
Contact e-mail address	**jculver@solargystics.com**
Project Title	**Ultra High Capacity Battery with Integral Fault Tolerance**
Estimated grant funding request:	**$600,000**
Known collaborator	**(To be identified at proposal submission.)**

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ENERGYSTICS

Project Summary: Ultra High Capacity Battery with Integral Fault Tolerance

Energystics Technologies Holdings, LLC (ETH) proposes this project to further develop to pilot production its innovative battery technology. ETH intends to request this grant funding to scale its proof-of-concept 1 Amp/hour, 2000 Watt/kg battery to a 500 – 1000 Amp/hour production prototype battery. ETH will originate all battery design and lead all development activity, with a major manufacturer of batteries to be identified at proposal submission, as a collaborator to supply battery components and to pilot produce the prototype.

ETH's innovative battery technology will be developed to achieve up to 95 percent efficiency via active material utilization, three to ten times the energy density of today's average 500 W/kg industrial batteries, self-correcting shorting protection for minimal and contained cell death, and corrosion mitigation on electrodes and collector wire to enable theoretically infinite cell life. The ETH battery is particularly well suited to the industrial battery market for telecommunications infrastructure, where cycle life is paramount, and for solar field and wind farm energy storage, where peak loading capability and storage efficiency are major components of cost economics.

The proposed innovative battery technology replaces the prevailing battery grid design paradigm. Planar flat, rolled, and bipolar grid designs all sacrifice specific energy to achieve greater power and reliability. Greater power necessitates higher plate count and electrode material, contributing to higher weight and lower energy density. Greater reliability necessitates higher plate thickness, also contributing to higher weight and lower energy density, and also to lower power output. Conventional cell design vulnerabilities include shorting, where a single short destroys the entire battery cell, corrosion on grid elements due to casting defects and the inherently higher current on grid edges, and compromised edge collector tab positioning which results in non-uniform current distribution.

ETH has developed a miniature wire design battery technology that overcomes the vulnerabilities and limitations of grid design batteries. The ETH battery structure will be compatible with any electromechanical material couple, including the three most popular: lead acid, nickel metal hydride, and various lithium-based. The battery and its components can be manufactured with a blend of existing battery fabrication techniques and modified industrial wire manufacturing equipment for the composite wiring material. ETH will employ its patent-pending FASER (Frequency Amplitude by Stimulated Emission Radiation) technology for coating the wiring with materials to endow conductivity and anti-corrosive properties.

The ETH battery employs small wire-like electrodes. Lead wire and composite wire will be coated to create fiber-fused electrodes, with conductivity and anti-corrosive properties. ETH's FASER technology has demonstrated capability for making the fiber-fused electrodes, coating the fiber wire in a glassy Pb oxide thin-film. The fiber-fused electrodes are attached to a thin end plate, with a resultant structure that resembles a brush. Each fiber is attached to the end plate with a unique tie design, where the electrode tie itself acts like a fuse if that particular electrode should short. This design innovation contains cell death to that single fiber electrode of many, preventing total cell death. Each end plate-electrodes array structure is inter-digitated, meaning that each Positive structure has a mirrored image Negative structure as its mate: each structure's fiber wire electrodes fit inside the spaces between the electrodes of the other structure but with separator interleaved. These mating electrode array structures can be positioned in any symmetrical configuration within the cell, while a non-corrodible centered current collector wire of each is coated in active material having anti-corrosive and conductive properties. In the case of lead acid batteries, the only known ultimate cell failure mechanism is grid wire corrosion, theoretically giving the ETH battery an infinite cycle life. ETH's combination of the inter-digitated design and the centered collector wire will yield exacting uniform current distribution.

ETH has chosen lead acid as its first electrochemical battery material. Lead acid is particularly attractive for innovation because it has an established and ubiquitous recycling infrastructure, utilizes abundant materials with stable domestic supplies and prices, has the lowest cost of known viable electrochemical materials for batteries, is capable of achieving a superior efficiency by high utilization of active material.

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ENERGYSTICS

GRAFTech
GrafTech International Ltd.

GrafTech International Holdings Inc.
12900 Snow Road • Parma, Ohio 44130

To: Ohio Department of Development Technology Division
From: Lionel Batty
Subject: Intent to Submit a Proposal for a FY 2010 Third Frontier Advanced Energy Program Grant

Dear Sir or Madam,

It my pleasure to present to you this *letter of intent* to submit a proposal in response to the Ohio Department of Development's Third Frontier Advanced Energy Program FY 2010 RFP. The proposed project, entitled *Development of Thermal Management Solutions for Lithium Ion Batteries* will be led by GrafTech International Holdings Inc. (GrafTech), with a primary place of business located at 12900 Snow Rd. Parma, OH 44130 and a telephone number of 216-676-2000. The primary contact for the proposed project is Julian Norley (julian.norley@graftech.com). GrafTech is working to establish a collaborative team composed of a leading Li-Ion cell manufacturer, a battery pack manufacturer and a battery testing lab (a private company, university or government lab based in Ohio). GrafTech and its collaborators anticipate a request of approximately $1,000,000 in grant funds, which will be matched with a cost share of $1,000,000.

GrafTech is engaged in the development and manufacture of engineered solutions for electronics thermal management. Our eGraf® product line includes heat sinks, heat spreaders, and thermal interface materials that are thin, lightweight and feature exceptionally high thermal conductivity (up to 1500 W/m*K). eGraf materials enable many of the slim, lightweight designs of the high-end flat panel televisions, laptop computers, and cell phones on the market today. We believe that eGraf materials can similarly improve the performance, durability and safety of Li-ion batteries, a technology in which inadequate thermal management can accelerate capacity fading and in extreme cases, lead to catastrophic cell failure. Thermal management becomes increasingly critical as battery packs reach the size required for electric vehicle and commercial energy storage applications. The heat spreading properties of eGraf materials will ensure thermal uniformity between cells and within each individual cell.

Securing external funding is a key component of our strategy to move eGraf materials beyond the *Demonstrating Phase and into the Market Entry Phase*. Demands for lithium ion batteries in personal electronics applications are already driving lithium ion battery demand up the exponential growth curve; upcoming launches of hybrid and fully electric vehicles equipped with lithium ion battery packs are expected to accelerate the growth of this market even further. Securing funding for the development of lithium ion battery thermal management solutions **now** will enable GrafTech and its strong collaborative team to develop innovative products that meet customers' current and future needs. Commercialization of eGraf technology for lithium ion batteries will result in battery packs that exceed performance, durability and safety requirements. GrafTech will utilize its portion of the grant to leverage prior investment in flexible graphite manufacturing and create "green collar" manufacturing jobs by growing its electronics thermal management business. Failure to develop the necessary products and know-how well in advance of high volume commercialization of Li-Ion battery packs for electric vehicles and commercial energy storage will result in missed opportunities to direct cash flow from sales into Ohio.

We are confident that our proposal is consistent with the Third Frontier Program's goals of promoting advanced energy technology commercialization and job creation in the State of Ohio, and we gratefully acknowledge the opportunity to compete for these funds.

Sincerely,

LBatty

Lionel Batty
Director of Research and Development
GrafTech International Holdings Inc.

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® eGraf is a registered trademark of GrafTech International Holdings Inc.

PANEL MASTER LLC
ELECTRIC & PNEUMATIC CONTROL PANELS

August 25, 2009

Ohio Department of Development
Technology Division
77 South High Street, 25th Floor
Columbus, Ohio 43215

Subject: 2010 OTFAEP Letter of Intent
VIA: E-mail to OTFAEP2010@development.ohio.gov

To Whom It May Concern:

Please let this letter serve as Panel Master LLC's notice of intent to apply for the fiscal year 2010 Ohio Third Frontier Advanced Energy Program (OTFAEP). Below is the information requested in Section 1.3.3 of the Request for Proposal for the OTFAEP. The attached project summary provides additional details about our project.

Lead applicant: Panel Master LLC
Contact: Ridley Watts, President
Address: 222 Commerce Drive, LaGrange, OH 44050
Telephone: 440-355-4442
Fax: 440-355-4444
E-mail: Ridley@PanelMaster.Com
Proposed project title: Panel Master LLC Advanced Storage Inverter System
Estimated grant funds to be requested: $500,000
Target collaborators: Eaton Corporation, MegaJoule Storage LLC, Tri-Tech Research Ltd.

Thank you for your assistance. Please feel free to contact me if you need additional information.

Sincerely,

Ridley Watts
President

Attachment: Project Summary

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222 COMMERCE DR. ● LAGRANGE, OH 44050 (440) 355-4442 ● FAX (440) 355-4444
E-MAIL: PANELMASTER@PANELMASTER.COM

Panel Master LLC Advanced Storage Inverter System
2010 Ohio Third Frontier Advanced Energy Program Project Summary

Business Overview: Panel Master LLC is working to become a key supplier of electronic management systems for advanced energy storage systems. It is our intent to use a combination of off-the-shelf components from major regional manufacturers and internally developed proprietary control algorithms to provide both free standing and network management of the energy storage media. Panel Master systems will be focused on peak shaving, load shifting and power reliability applications.

Project Description: Panel Master LLC has an existing manufacturing facility in LaGrange, Ohio. It is currently engaged in the business of manufacturing industrial electrical control, inverter and drive systems for industrial and commercial applications.

Panel Master will develop control and inverter systems ranging from granular community storage systems rated at 30-50kWh to large multi-megawatt systems capable of supporting industrial and commercial facilities. OTFAEP funds will provide capital that will allow us to enter the marketplace faster, accelerate reductions in product cost and further develop innovative products.

Energy storage is a large and rapidly growing global market. It is predicted that energy storage market will exceed $60 billion market by 2012, with the majority of this being bulk energy storage for utility companies. One of the largest US utilities, American Electric Power (AEP), publicly announced a goal of deploying 1,000 megawatts (MW) of advanced storage capacity within the next decade.

OTFAEP funds will help to ensure our success in Ohio by accelerating our research, development, engineering, and training. Panel Master expects to exceed the targeted 1:1 cost share ratio. The success of the product will be measured by sales of the systems as well as job creation.

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Via E-mail: OTFAEP2010@development.ohio.gov

August 21, 2009

OHIO DEPARTMENT OF DEVELOPMENT
Technology and Innovation Division
77 South High Street
Columbus, Ohio 43215

Attn: OTFAEP

Subject: 2010 OTFAEP LOI

To Whom It May Concern:

Lead Applicant:	HORSBURGH AND SCOTT CO. 5114 Hamilton Avenue Cleveland, Ohio 44114
Lead Applicant Contact:	William Andreski wma@horsburgh-scott.com 216-431-3900
Collaborators:	Surface Combustion Inc. 1700 Indianwood Circle Maumee, Ohio 43537
Collaborator Contact:	Ben Bernard bbernard@surfacecombustion.com 419-891-7134
Proposed Project Title:	Energy and Process Control Upgrade of an Advanced Wind Energy Gearbox Processing Facility
Requested Funding:	$700,000

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PROJECT SUMMARY

Horsburgh and Scott Company working in conjunction with Surface Combustion, propose an upgrade of an existing heat treatment system used in the manufacture of wind energy gearing and bearing components. With the upgrade of the system, Horsburgh will position themselves as one of the leading world wide producers of large gear / bearing components utilized in the developing wind energy field.

The system upgrade will consist of the following components:

- Energy Efficiency Upgrade
- Advanced Control, Atmosphere, 3-D Quench and Material Modeling
- Enhanced process predictive maintenance system

With the addition of a thermal energy recovery system, component processing costs will be reduced making the system competitive with other best available heating technologies employed world wide. Additionally, improved energy efficiency will lead to a reduction in green house gas production and other harmful pollutants. Energy recovery systems of this type have a large market of application in the heat treat industry.

An advanced control system is proposed that will allow state of the art controls to be integrated with mathematical modeling software to provide predictive control of the carburizing process. Modeling will provide insight into material chemistry, geometry and part quality as it relates to processing conditions. Advances in modeling capability will allow an improvement in part quality not currently seen with existing control technology. Additionally, Computational Fluid Dynamic (CFD) analysis will be applied to the quenching system to better understand the interaction of the quench system to material properties and component distortion. The ability to predict / control product distortion will position Horsburgh as a leader in this field. Distortion control during process heating and quenching are pinnacle concerns to address in the heat treat industry.

With the high cost of components processed in a facility of this type any in process problems can lead to scrapped or damaged materials causing significant losses to operating revenue. Additional energy would also be consumed due to re-work of scrapped loads. With the addition of an enhanced process troubleshooting system working in conjunction with predictive modeling, material scrap and re-work requirements can be eliminated. The elimination of these process problems will allow Horsburgh novel processing insight not currently commercialized in the industry. These implementations will allow Horsburgh to advance processing technology past current industry limitations and establish a strong base for heat treating in an Ohio wind energy supply chain.

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OHIO
UNIVERSITY

August 25, 2009

Ohio Third Frontier Advanced Energy Program
Research and Development Fund 2010
Ohio Department of Development

Re: 2010 Ohio Third Frontier Advanced Energy Program/Research and Development Fund RFP LOI

Ohio University partnering with Electrochemical Energy and Environmental Technologies LLC (E3Tech) intents to submit a proposal in response to the Ohio Third Frontier Advanced Energy Program/Research and Development Fund fiscal year 2010 Request for Proposals (RFP) as follows:

Lead Applicant:	Ohio University
Address:	165 Stocker Center Athens, OH 45701
Contact Name:	Gerardine (Gerri) G. Botte, PhD
Telephone Number:	740-593-9670
Email:	botte@ohio.edu
Project Title:	**"Ammonia Fuel Conditioning Units for Heating Appliances"**
Project Areas:	Energy Storage, Biomass
Estimated Grant Funds:	$1,000,000
Collaborators:	Electrochemical Energy and Environmental Technologies LLC (E3Tech) Ohio University-Innovation Center 340 W. State St., Unit 134B Athens, Ohio 45701 Office: 740-541-5611

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Project Summary: The United States consumes over 29,000 TW-h of energy per year, from which 21% are used in the residential sector. The majority of the energy consumed in the residential sector is for space heating (32%) and water heating (13%), that is, heating appliances (water heaters, boilers, and furnaces) consume 3,959 TW-h per year in the residential market, which represents over 13% of the total annual energy consumption in the United States. Heating appliances traditionally operate with gas, oil, and electricity causing the customer high-energy bills during the winter season, and producing significant carbon dioxide emissions. Ohio University has a patented technology, "Ammonia Electrolyzer" or "Ammonia Fuel Conditioning Unit" that provides an economical, efficient, green, and safe solution to supply home heating and/or water heating. In addition to providing fuel at a very competitive price, the technology couples with existing infrastructure already in place in residential houses and commercial buildings as well as fuel distribution systems, which further eases it's adoption into the market.

Ohio University and its commercial partner E3Tech, seeks funds from the Ohio Third Frontier Advanced Energy Program/Research and Development Fund to develop prototypes with technical specifications under a commercial context and validate market acceptance. That is funds will be used to transition from the Demonstrating Phase into the Market Entry Phase.

Thank you,

Gerardine G. Botte, PhD
Ohio University

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Cell Core LLC

P. O. Box 1 • Prospect, OH 43342
www.cell-core.com
740.528.6020

August 25, 2009

OTFAEP2010@development.ohio.gov

The Ohio Department of Development
Technology and Innovation Division
77 South High Street, 25th Floor
Columbus, OH 43215

Re: "2010 OTFAEPLOI"

Dear Administration,

This letter signifies the intent of Cell Core, LLC to submit a proposal for the above referenced RFP.

The lead applicant will be:

Cell Core, LLC
Tom Lambers, Chief Executive Officer
P.O. Box 1
Prospect, OH 43342
Office Tel: 740-528-6020
Mobile Tel: 740-972-4876
Email: tlambers@cell-core.com

Project Title: "Improved Thermoset Prepreg for Composite Structures Generating Wind Energy"

Estimated Grant Funds: $500,000

Known Collaborators: StrateNexus Technologies, LLC

Project summary: Cell Core, LLC has developed technology which economically creates the ease of manufacturing wind energy components. The successful funding of this project would result in Cell Core supplying prepregs and cores from Ohio to Ohio manufactures of wind energy components in Ohio or to other manufacturers out of the State of Ohio. Current prepreg technology requires making prepregs in plants close to manufacturing sites not located in the State of Ohio.

Sincerely,

Tom Lambers, CEO
Cell Core, LLC

AEP 347

Stock, Pete A.

From: Ed Zdankiewicz [ezdankiewicz@rexorce.com]
Sent: Tuesday, August 25, 2009 10:55 AM
To: OTFPVP2010
Cc: ezdankiewicz; mgurin; mark terzola; Philip brennan; theld
Subject: 2010 OTFPVP LOI

Lead Applicant

rexorce Thermionics Inc.
405 S. High St.
Akron, OH 44311
Phone: (234) 542-4379

Contact person: Mark Terzola, VP Corporate Affairs
Contact person email: mterzola@rexorce.com
Contact person mobile phone: (330) 807-0142

Project Title

High Efficiency Supercritical CO2 engine for distributed energy and automotive applications

Estimated grant funds requested

State funds: $1,000,000
Cost match: $1,000,000

Proposed Program Summary

rexorce proposes to develop a hybrid Brayton cycle engine using supercritical CO2 as the working fluid that has application from low (400F) to high temperature (1,500F) applications. The novelty in the approach is to use a piston-based positive displacement device to cost effectively produce power for mobile and distributed energy applications (from 15 kWe to 1.5 MWe outputs). The use of this device has inherent advantages in the production of variable conditioned power generation for mobile and stationary applications. Early modeling has shown the theoretical ability to produce power at up to 60% thermal to electric conversion efficiencies. The proposed patent-pending technology will produce a greater amount of electrical generation from the same physical footprint and smaller system size to open up the distributed energy market.

The outcome from the proposed collaboration is the practical demonstration of the system's multiple advantages:

1) Superior thermodynamic performance at the cycle level
2) Energy density advantages
3) Variable load and conditioned power without the use of power electronics and variable frequency drives
4) Path to demonstrate an installed cost per kW on "small" output systems of $2,400 per kW, which is over 30% lower cost than the current best available technology.

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Proposed Collaborator Team

Global automotive company (OH) --- a market share leader and manufacturer of vehicles for

the consumer automotive market.

Artemis Intelligent Power Ltd. (Edinburgh, Scotland) --- international research, development and technology licensing company globally recognized for their Digital Displacement® hydraulic power technology, and other innovations in the control and transmission of fluid power.

University of Akron (Akron, OH) --- northeast Ohio based university with staff and facilities for testing, characterization and development of advanced bearings, seals and rotating equipment for power transmission and power generation applications.

ThermoAnalytics Inc. (Calumet, MI) --- engineering service provider for advanced CFD modeling and analysis of stead-state and transient fluid, thernal, and multi-mode heat transfer problems for demanding industrial and environmental applications.

Truly yours,

Edward M. Zdankiewicz, PE
Proposal Leader
rexorce Thermionics Inc.

email: ezdankiewicz@rexorce.com
cell: 216-374-3377

reXorce intends that this message be used exclusively for the personal and confidential use of the recipient's named above. This message may contain information that is confidential and exempt from disclosure under applicable law. Unauthorized disclosure or use of this information is strictly prohibited. If you have received this communication in error, please notify us immediately at info@rexorce.com , and delete the original message.

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DJW TECHNOLOGY, LLC

August 21, 2009

Third Frontier Fuel Cell Program
The Ohio Department of Development
Technology Division
77 South High Street 25th Floor
Columbus, OH 43215

Dear Sir/Madam:

SUBJECT: 2010 OHIO THIRD FRONTIER FUEL CELL PROGRAM LETTER OF INTENT

This is the letter of intent (LOI) that we plan to submit a full proposal for the 2010 Ohio Third Frontier Advanced Energy Program by 2:00 PM September 18, 2009. The requested information is as follows:

The prospective Lead Applicant's name with the address and phone number is:
DJW TECHNOLOGY, LLC
5018 Ballybridge Drive
Dublin, OH 43017-8201
Phone: 614-761-9287

The contact person with his E-mail address is:
Douglas Wheeler
E-mail: douglas.wheeler@djwtechnology.com

The proposed Project title is:
Development of Manufacturing Processes for the Commercialization of a Novel Hydrogen Purifier System

The estimated Grant funds to be requested are:
$1,000,000

The known Collaborators are:
The applicant's team consists of DJW TECHNOLOGY, LLC and Oho State University Research Foundation (OSURF).

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5018 BALLYBRIDGE DRIVE, DUBLIN, OH 43017
PHONE: 614-761-9287 FAX: 860-838-9012
MOBILE: 860-614-2286
EMAIL: douglas.wheeler@djwtechnology.com

The on page summary of the proposed Project is:

Hydrogen is the primary fuel for fuel cells and the production of hydrogen from carbonaceous fuels requires enrichment and purification of the hydrogen to remove catalyst poisons such as hydrogen sulfide. Fuel cells powering forklift trucks and used as backup power sources for telecommunication applications are proving their commercial reliability. Fuel cell military applications continue to develop with fuel cell powered unmanned vehicle systems, remote power sources, and portable power sources in demonstration stage. All of the above fuel cell applications require high purity hydrogen. The proposed project is to demonstrate and establish the manufacturing process for a novel hydrogen purifier that will produce high-purity with less than 10 ppm (parts per million) carbon monoxide and less than 10 ppb (parts per billion) hydrogen sulfide for fuel cells.

DJW TECHNOLOGY is the recipient of an STTR funding through the Office of Naval Research (Contract N00014-09-M-0297) "Advanced Hydrogen Reformate Stream Purifier for Fuel Cell Applications" and DJW TECHNOLOGY will identify the feasibility of conditioning the reformate stream from reformed jet fuel using a spiral-wound membrane module for hydrogen purification. DJW TECHNOLOGY has subcontracted a major portion of the STTR funding to Ohio State University for the feasibility study of large scale production of membrane based on the continuous membrane fabrication machine with a width ranging from 14 inches to about 21 inches and continuous membrane lengths to 800 feet or longer being set up at OSU.

The hydrogen purification module is based on research work at Ohio State University supported by the Ohio Department of Development's Third Frontier Wright fuel cell capital funds (Grant 342-0561; OSU Research Foundation Project No. 747312 and 747450), NSF's grant (Grant: CTS-06-25758; OSURF Project No. 60008308), DOE's grant (Grant/Contract Number: DE-FC36-03AL68510), and DJW TECHNOLOGY (Agreement No. DJWTLLC-OSURF-0001). These programs have synthesized and demonstrated in the laboratory novel membranes selective to carbon dioxide and hydrogen sulfide preferentially versus hydrogen or carbon monoxide. This type of membranes has the potential for hydrogen purification in a membrane reactor configuration that can also enhance water gas shift reaction.

For the proposed two-year project, we plan to develop the manufacturing processes to fabricate hydrogen purification systems based on the membrane developed at Ohio Sate University. Membrane manufacturing will be demonstrated on the continuous membrane manufacturing machine at Ohio State University. The continuously fabricated membrane will be incorporated in a compact, spiral wound module with a high surface area per unit volume. The manufacturing assembly process will integrate the thermal management, sweep flow gas management, and control systems with the spiral wound membrane module to produce the hydrogen purification system. The manufacturing process developed in this effort will enable commercialization of the novel membrane for purification of hydrogen.

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Letter of Intent for The Ohio Third Frontier Advanced Energy Program

Lead Applicant: StrateNexus Technologies LLC

Lead Applicant Contact: Alex W. Kawczak, President, StrateNexus Technologies LLC, P.O. Box 3395, Dublin, Ohio 43016, 614-940-7737, akawczak@stratenexus.com

Collaborators: The Ohio State University, Nanotech West Laboratories, and industrial collaborators from the energy storage, automotive and chemical industries

Grant Funds Requested: $750,000

Project Title: High Power and High Energy Density Electrochemical Devices

During the past two decades, requirements for energy storage for both portable and static applications have increased tremendously. As storage and power demands have increased, predominately in the form of batteries, these systems are evolving; however, reduction in cost and improvement in performance is still greatly needed to address requirements of the energy storage requirement. These limitations can be overcome by major advances in new nano-materials design and development.

Hybrid electric vehicles (HEVs) require energy storage devices that can deliver high power pulses. For HEV applications, the goal is to develop cells that provide peak power of 1000 W/kg or greater, have a cycle life of at least 300,000 shallow cycles, and have a calendar life of 15 years. Plug-in-hybrid electric vehicles (PHEVs) will require devices that both store significant energy and can deliver high power pulses. PHEVs will require batteries that can deliver significant energy (several kWh) for several thousand discharge cycles from an almost full charge to a lower state of charge. These energy storage technologies will rely on developing active electrodes and electrolytes capable of being charged and discharged at high current rates. The development of next generation energy storage devices with high power and high energy density is a key to the success of hybrid and plug-in-hybrid electric vehicles.

Capacitors can deliver high power discharge pulses, accept high power charging pulses from regenerative braking, have very good cycle life, and operate well at low temperatures. The weakness of traditional EDLCs is the limited energy density, an important characteristic for powering hybrid vehicles. One way to improve the energy storage capability of a capacitor is to use asymmetric combinations of different cathodes and anodes, producing a higher working voltage. An example of hybrid system is a capacitor using a combination of EDLC and a battery electrode. Both an increase in the working voltage and high energy density of the battery electrode results in a significant increase of overall energy density of capacitors compared with that of EDLC's.

The proposed program focuses on development and commercialization of high power electrochemical devices based on hybrid designs (battery & electrochemical capacitor). An example of a hybrid system is a capacitor using a combination of EDLC and a battery electrode. Both the increase of the working voltage and high energy density of the battery electrode results in significant increase of overall energy density of the capacitors compared with that of an EDLC.

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THE UNIVERSITY OF TOLEDO

August 25, 2009

Subject: Letter of Intent (LOI) to Submit Proposal for "2010 OTFAEP"

To: The Ohio Department of Development
Ohio Third Frontier Advanced Energy Program

Applicant: The University of Toledo
2801 W Bancroft Street
Toledo, Ohio 43606

Contact: Abdollah A. Afjeh, Ph.D., P.E.
Professor and Chair
MIME Department, The University of Toledo
419.530.8210
aafjeh@utoledo.edu

Project Title: Development of a Cost Optimized, Advanced Concept Offshore Wind Turbine Generator (WTG)

Estimated Funding Request: $1.0M Third Frontier R&D funds; $500K Wright Capital Funds

Known Collaborators: The University of Toledo
Nordic Windpower
Toledo-Lucas County Port Authority
City of Toledo

Please consider this letter as confirmation that The University of Toledo intends to submit a proposal for Funding Opportunity Announcement Number OTFAEP 2010.

Project Summary:
The University of Toledo proposes to conduct a wind energy research, development and commercialization project aimed at producing a more cost-effective offshore wind turbine generator (WTG) design. The project is designed to accelerate offshore wind farm development in the U.S., and promotes offshore WTG manufacturing in Ohio.

The proposed project utilizes a commercially available, 1-Megawatt, two-bladed WTG that was designed for onshore use, and which has unique features conducive to more cost effective offshore installation and maintenance than the current three-bladed designs used in Europe. The project will produce a validated 1-Megawatt offshore WTG design that will be ready for marketing and production by the end of the two-year project period. The project will also build

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on this design to develop a larger scale 2.5 MW unit with even higher cost-saving potential, and which will be ready for prototype testing within the two year project period.

This project directly supports both the alternative energy portfolio standard (AEPS) law for the state of Ohio and the U.S. Department of Energy (DOE) policy of attaining 20% of U.S. electricity production from wind by 2030, with 18% of this total coming from offshore sources. In addition, it builds on Ohio's manufacturing strength to create and maintain jobs and and produce long-term, sustained economic development in Ohio.

Respectfully Submitted,

Abdollah A. Afjeh, Ph.D., P.E.
Professor and Chair

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College of Engineering
Mechanical, Industrial and Manufacturing Engineering • Mail Stop 312 • 2801 W. Bancroft St. • Toledo, Ohio 43606-3390
419.530.8210 Phone • 419.530.8206 Fax • www.mime.eng.utoledo.edu

Swagelok

Swagelok Technology
Services Company
3150 Aurora Road
Solon, Ohio 44139-3492

440.349.5934
440.349.5843 Fax
www.swagelok.com

25 August 2009

Ohio Department of Development
Technology Division
77 South High Street 25th Floor
Columbus, OH 43215

Via e-mail: OTFAEP2010@development.ohio.gov
Subject line: 2010 OTFAEP LOI

Reference: Ohio Third Frontier Advanced Energy Program, Fiscal Year 2010, Request for Proposal: Letter of Intent

To whom it may concern:

Swagelok Technology Services Company, an Ohio-based business with headquarters at 31500 Aurora Road, Solon, OH 44139, (phone 440-649-5614) intends to submit a proposal in response to the above solicitation, in the opportunity area of Advanced Energy. The contact person is John Buda, email john.buda@swagelok.com. We will be collaborating with the Materials Science and Engineering Department of the Case School of Engineering at Case Western Reserve University, Cleveland, OH 44106. Our project title is "Improved Life of Wind Turbine Bearings and Gears through Surface Modification." A one-page summary of the proposed project is attached.

We estimate that the project will begin January 1, 2010 and will be 2 years in duration, with 3 years of follow-up reporting. Total project cost over 2 years is projected to be $2 million. Funds requested will be $1 million over 2 years, with $700,000 to Swagelok for process development, and $300,000 to Case for microstructural evaluation, mechanical testing, and field service trials.

Please feel free to contact me if you need additional information.

Sincerely,

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John Buda
President
Swagelok Technology Services Company

Cc: Mike Butkovic, Vice President, Marketing, Swagelok
Dave Peace, Vice President, Engineering, Swagelok
Sunniva Collins, Sr. Research Fellow, Engineering, Swagelok
Arthur H. Heuer, Professor, Materials Science and Engineering, CWRU

Improved Life of Wind Turbine Bearings and Gears through Surface Modification

Summary of Proposed Project

Performance and reliability of wind turbines depends heavily on the projected life of the gears and bearings. These components are manufactured from a variety of alloys, and experience unusual loading conditions and potential for friction and wear. Component failures due to fatigue and micropitting have negatively impacted the industry's ability to meet design life goals of 20 years.

Swagelok has developed and patented a novel surface carburization treatment, also called low-temperature colossal supersaturation, currently being commercialized as SAT12, for chromium-containing alloys in general, and stainless steels in particular. The process is a gas phase heat treatment performed at temperatures around 450° C. It is a diffusional and conformal process, and can be performed on finished components without distortion or change to dimension. Drastic improvement in wear, erosion and fatigue life has been demonstrated for several alloys. Surface hardness increases by a factor of three to four times the base material, along with improved corrosion, wear and fatigue resistance.

Additional process development and characterization is required in order to develop robust and economical treatment procedures for gear and bearing alloys. Swagelok will undertake process development for treatment of wind turbine bearing and gear alloys, focusing on martensitic chromium containing alloys. The Materials Science and Engineering Department of Case Western Reserve University will perform necessary microstructural characterization and testing (fatigue and wear) to quantify improvements. A field trial of treated gearbox and bearings in an experimental wind turbine at Case will also be sought to evaluate the effect on service life.

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Stock, Pete A.

From: aprakash@wiretough.com
Sent: Tuesday, August 25, 2009 10:18 AM
To: OTFAEP2010
Subject: 2010 OTFAEP LOI; Polywire Tough Composite -2
Attachments: OTFAEP-POLYWIRE-2.pdf

Lead Applicant's Name: Polywire Tough Composites Ltd. (Amit Prakash)
Address : 105 Keswick Dr., Hudson, OH 44236
Phone Number : 330 475 3121
Contact Person: Amit Prakash
e-mail address: aprakash@wiretough.com
Project Title:

A Pneumatic-Gasoline Hybrid Vehicle for 20% better fuel economy

Estimated Grant Fund: $300,000

Collaborators: University of Akron, Akron, OH

Abstract enclosed

Amit Prakash
President

Polywire Tough Composites Ltd. , 105 Keswick Drive, Hudson, Ohio 44236
330-475-3121 aprakash@wiretough.com

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POLYWIRE TOUGH COMPOSITES LTD.
105 Keswick Dr., Hudson, OH 44236; 330-475-3121; aprakash@wiretough.com

Amit Prakash, Ph.D. FASM
President
Adjunct Professor
Department of Mechanical Engineering
University of Akron, Akron, OH

August 24, 2009

Subject : Ohio Third Frontier Advanced Energy Program

A Pneumatic-Gasoline Hybrid Vehicle for 20% better fuel economy at 10% increase in cost

Motivated by electric- gasoline hybrids and a light weight pressure vessel invented by us, we have developed a small 4 seat vehicle using compressed air and conventional motors to manage power. The advantages achieved so far are: 20% better fuel economy, no need of a battery for the start or running of the vehicle and an active inflation system to maintain optimum inflation in tires. Pneumatic components are much cheaper than the electric hybrid components, have longer life and do not use environmentally challenged materials which are used in batteries and electrical components of electric-hybrids. We need to develop a control unit and a fuel injection system to complete the project. Added components / modifications will be within 10% of the cost of a production vehicle. As mentioned earlier, a prototype built in early 2008 has already proved the concept. Development cost of a complete road legal vehicle is expected to be $300,000.

The program will be conducted with the University of Akron, where we have a Super Mileage Vehicle running at 1130 MPG in SAE competitions. MDI Corporation of France has a pure compressed air vehicle claiming very high MPG. MDI has licensed TATA Motors of India to manufacture these air cars. Our technology is a hybrid of air and gasoline similar to current major electric-gasoline hybrids but at a significantly lower cost. Two experimental 3-wheel vehicles were built and tested with 5 passengers achieving up to 90 MPG, a 20 to 50% improvement over standard engines. The vehicle can run with compressed natural gas (CNG) as well. The cost target of the final commercial vehicle is $5000 with minimum 50 MPG, 4 passengers and maximum speed 60 MPH.

Two proto types have been made and successfully tried. In the next development phase, an electronic control unit and a fuel injection system for the current carburetor – gasoline engine will be developed. A suitable chassis system will be designed using steel or aluminum to keep cost within the above limits. Student Team members of University of Akron SAE super mileage program will be part of the development.

The cost to develop a road legal, 4 wheel car is $300,000. The project will jointly run with the Department of Mechanical Engineering of the University of Akron, where the Principal investigator is an Adjunct Professor. The duration is 2 years.

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August 25, 2009

Third Frontier Advanced Energy Program
Ohio Department of Development
Technology Division
77 South High Street, 25th Floor
Columbus, OH 43215
E-mail: OTFAEP2010@development.ohio.gov

LETTER OF INTENT

Eaton Corporation, an $16B company headquartered in Cleveland, OH and with engineering and manufacturing facilities in many states and countries intends to submit a proposal entitled **"Development and Demonstration of a Universal Battery Management System for Vehicular Applications"** in response to the Ohio Third Frontier Advanced Energy Program (OTF-AEP) 2010 RFP.

Per requirements of the OTF-AEP Request for Proposal please note the following:

Applicant's Name:	Eaton Corporation
Address:	13100 E. Michigan Ave, Galesburg, MI 49053
Telephone Number:	(269) 484-7321
Project Title:	Development and Demonstration of a Universal Battery Management System for Vehicular Applications
Expected Grant:	$1,000,000
Contact Name:	Rudy Smaling, PhD
Email:	rudolfmsmaling@eaton.com

In addition to Eaton Corporation, the project team will include Ohio State University Center for Automotive Research and possibly other entities in the process of being identified.

In collaboration with its team members, Eaton Corporation intends to develop and demonstrate a working Battery Management System (BMS) which is suitable for advance Li-ion battery packs in various configurations and using various Li-ion cell chemistries and form factors.

Battery Management Systems (BMS) are currently typically handled by proprietary products and software developed mostly by battery cell manufacturers, increasing cost and limiting significantly the vehicle development process. The tremendous growth expected in the electrification of the ground transportation ranging over the next decades for vehicles ranging from light duty vehicles to heavy duty and specialty vehicles in many embodiments) creates a very large commercial opportunity for battery pack developers and integrators, vehicle integrators and OEMs to purchase and use a 'commoditized' Battery Management System, i.e., a mass-manufactured, lower cost, near universal hardware device with accompanying software and calibration tools which can be readily deployed in vehicle applications regardless of pack configuration and details of the battery cell chemistry, form factor and characteristics. The

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devices targeted are generically intended to provide State of Charge estimation, State of Health estimation, Cell Balancing functions and safety functions while seamlessly interacting with all the on-board controllers and communication protocols found in vehicles. Furthermore, the development of calibration processes to accompany the device is critical to offer a cost effective, market-ready product that can be commoditized and have a large market penetration.

Eaton Corporation, through its own vehicle product development has a significant internal demand for such products. However, beyond its own internal uses, such products can have a large penetration in smaller companies that have the same demonstrated need but may not have the engineering and manufacturing infrastructure required to develop their own products. On the other hand, Ohio State University Center for Automotive Research has significant expertise with battery testing, aging, management and hybrid vehicle demonstrations and is ideally positioned to lend subject matter technical expertise, trained personnel and testing facilities, as well as access to a vast network of specialists to fill some gaps as they are identified.

Using this funding opportunity to develop part of the flexible Battery Management systems has significant benefit to Ohio in producing viable products suitable for potentially very large market in electrified vehicles. This, in turns, represents a significant opportunity for job creation while being instrumental in moving us toward the ultimate larger goal of vehicle electrification, lessening energy needs for transportation while decreasing the environmental impact of ground transportation.

The team is pleased to submit this letter indicating our intent to submit a full proposal to the TF-AEP 2010 program.

Yours truly,

Rudy Smaling, PhD
Chief Engineer - Hybrid Power Systems
Eaton Corporation
13100 E. Michigan Ave
Galesburg, MI 49053
269 / 484-7321
FAX: 269 / 484-7821
Mobile: (269) 779-5083
rudolfmsmaling@eaton.com

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Ohio Third Frontier Advance Energy Program

Name of Applicant: **Energy Independence of America Corp**

Address: **500 Lehman Avenue, Suite 208**
P.O. Box 126
Bowling Green, OH 43402

Point of Contact: **Albert Calderon**
Phone: **(419) 354-4632**
Fax: **(419) 353-6293**
e-mail: **acalderon@bghost.net**

Title of Project: **Co-Production of Molten Iron from Ore Fines and Coal Together With Converting Flue Gas Containing Nitrogen and CO_2 Into Fertilizer**

Grant Funds Requested: **One (1) Million Dollars**

Known Collaborators: **Morgan Engineering Co., Alliance, Ohio**
Ajax-Tocco, Warren, Ohio
Systems Associates, Bowling Green, Ohio

Letter of Intent Due: **August 25, 2009**

Proposal Due: **September 18, 2009**

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Project Summary

This project relates to "The Innovative Concept for Beneficial CO_2 Use for Industrial Applications." A proposal was submitted to the U.S. Department of Energy (DOE) on August 7, 2009, in response to Solicitation N°. DE-FOA-0000015. The Project will have a total duration of 63 months, with Phase 1 lasting 6 months and Phase 2 lasting 57 months, with a cost-shared funding of 80% by DOE and 20% non-DOE. The activities in Phase 1 cost $10 million and include testing in an existing pilot owned by the Applicant to satisfy U.S. Steel's goals of 80% metallization of the ore, and the preparation of the Front End Engineering Design of a Pioneer Plant to produce 100,000 tons of molten iron/year using one single reactor that is replicable when applied commercially, together with a Definitive Cost Estimate of such Pioneer Plant for which a second proposal (including a cost estimate) will be submitted to DOE to carry out Phase 2. Phase 2 will comprise detailed design, permitting, construction, start-up, and one year of operation.

The Project is directed towards steelmaking's primary end: making molten iron from ore prior to its conversion into steel. This primary end is the most energy intensive and most polluting part of converting iron ore into steel, and consists of four most capital-intensive activities: pelletizing, sintering, cokemaking, and blast furnace operation. These four activities produce some two-thirds of the CO_2 generated in the field of steelmaking, beginning with pelletizing and ending up with rolling.

The technical approach proposed by the Applicant is divided into two parts. Part 1 (patent issued in the U.S. and other countries, including China) replaces the four activities with a comprehensive and proprietary novel process—known as the "Calderon Process"—to result in increasing overall efficiency, reducing CO_2 formation, and lowering capital and operating costs of steelmaking by some 40%. Part 2, which deals with CO_2 emissions from this novel process (U.S. patent application on file) consists of converting flue gas containing carbon dioxide (CO_2) and nitrogen (N_2) without separation and without the use of expensive ammonia, into a low-cost, slow-release fertilizer (oxamide) that can be advantageously used in agriculture and forestation while eliminating the need for capturing CO_2 and sequestering it into a geologic formation.

To demonstrate this advanced Process at a scale that can be replicated in a commercial application, the tasks in Phase 2 will consist of detailed design, construction, start-up, and one year of operation of a Pioneer Plant comprising a molten iron facility, to which a by-product facility is integrated, at a test facility in Alliance, Ohio, owned by the Applicant. This Pioneer plant will contain one full-size, replicable commercial Reducing reactor with a matching melting induction channel furnace, with the Reducing reactor having a built-in feature capable of converting flue gas containing CO_2 into a feedstock for conversion into oxamide, a low-cost substitute for expensive urea by virtue that the raw material used is a waste gas (flue gas). The Pioneer plant will be designed to produce 100,000 tons of molten iron per year from ore fines (or concentrate) and low-cost, non-metallurgical Ohio coal. The size of its Reducing reactor will serve as a standard to be replicated and mass produced in fabricated shops in economically depressed areas of Ohio and shipped to construction sites as large components for ease of assembly in commercial applications, similar to the "Liberty Ships" rapidly constructed during World War II. Such an approach will accelerate the commercial application of this badly needed Process for domestic use as well as worldwide export of specialized heavy equipment that requires special know-how to produce, thus creating tens of thousands of jobs within the United States while addressing the conversion of CO_2 emissions into beneficial CO_2 use.

It is the intention of the Applicant to submit a second proposal to the State of Ohio for financial assistance, consistent with the Phase 2 proposal to DOE requesting our State also participate in assisting in the funding of the Pioneer Plant once Phase 1 has been completed.

AEP 356

Lead Applicant

Joel Bednar
5623 Humelsine Drive
Hudson, OH 44236
216-262-4065
POC: Joel Bednar
joel.bednar@gmail.com
Title: Biodiesel Franchise assessment

Funds: 20,000 - 200,000.00

Collaborators:
Tri-C Green academy

Summary:

This proposal is to investigate the possibility and commercialization timeline of small to mid-scale Biodiesel production facilitates located in strategic areas throughout Ohio. The goal of this proposal is to leverage local feed stocks of both used and virgin oil in the product of Biodiesel to lower transportation cost and employ local labor to produce a local product. In addition economies of scale will be use in the purchase of the other necessary process raw materials and the sale/reuse of the byproducts of each operation. A large part of this process is the formation and implementation of a Biodiesel production, sales, and byproduct market and curriculum at Cuyahoga Community College Green Academy (Tri-C).

The bulk of the funds will be used to set up a small scale production facility at Tri-C to teach the production process from beginning to end for prospective entrapinors that want to start their own facility. Provide guidance on the equipment needed based on output capacity, assistance in sourcing feed stocks, subject matter experts on the acquisition, process, manufacture, distribution, sale, and environmental sound and profitable disposal of byproducts of manufacture.

Basically we want to set up a McDonalds for Biodiesel.

AEP 357

Ohio Third Frontier Advanced Energy Program Letter of Intent

Project Title – "Develop/Commercialize Residential Energy Storage Technology to Store Power Collected From Any Source of Electricity For Use At a Later Time"

Lead Applicant – R. W. Beckett Corp.
38251 Center Ridge Rd.
North Ridgeville, OH 44039
Contact Person: Mr. John Bohan
Phone/Email: 440-353-6228, jbohan@beckettcorp.com

Estimated Grant Funds Requested - $1,000,000.

Known Collaborators - Energy Technologies, Inc. (Mansfield, Ohio)

Project Summary –

The objective is to develop and commercialize a residential energy storage system would allow an electric utility customer the ability to store power from solar, wind and electric utility generated sources thereby reducing demands on our nation's grids during peak usage periods, offsetting the need for peak power generators, optimize the use of renewable generation and reduce green house gas emissions. The project will establish design and system configurations/specifications along with the manufacturing processes of the system components required to demonstrate a commercially viable product. Job creation will involve positions in engineering, manufacturing and system installation.

Electric utilities currently have no efficient way to store energy. Electric utilities must maintain enough production capacity to meet peak demand. Long-life, high-energy density, battery energy storage technology can be used to substantially level the load on the nation's electrical grid. Load leveling reduces the need for additional generation capacity and cuts carbon emissions considerably. Breakthroughs in high-energy density and long lasting lithium ion battery technology make load leveling via batteries possible today. Solar and wind energy also become more attractive with residential batteries because produced energy can be stored on site.

Coupled with "Smart Grid" technology, the utility companies would also have the ability to "purchase" power from the residential systems to augment their peak demand requirements. Wide use of the residential energy storage systems could add 50% generating capacity to the nation's electrical grid by storing energy for times when it's needed most. This would optimize the existing electric utility's assets.

The energy storage system would be packaged as a floor or pad mounted appliance that would house the lithium ion battery modules, battery charger, grid tie inverter (that would convert the direct current from the batteries to alternating current with the proper voltage and frequency to allow it to be in synchronization with the power line) and communication technology that would allow the system to communicate with the "Smart Grid". An additional benefit to the resident would be the fact that in the event of an electrical utility power interruption, the system would provide backup power to the home. The number of lithium ion battery modules would determine the amount of reserve power to the home in the system.

Our collaboration will encompass:

- Battery charging and the grid-tie inverter technology provided by Energy Technologies, Inc. of Mansfield, Ohio
- Product design, program management, market access and field trials provided by R.W. Beckett in addition to contributing application-specific design knowledge and product development expertise.

Kevin Beckett, Pres. CEO R.W. Beckett Corp.

August 24, 2009

AEP 358

BEC OHIO, LLC

Developing alternative energy resources through innovative design, ecological awareness and a sense of global responsibility.

August 25th, 2009

Ohio Third Frontier Advanced Energy Program
The Ohio Department of Development
Technology and Innovation Division
77 South High Street, 25th Floor
Columbus, Ohio 43215

Subject: 2010 OTFAEP LOI

Bio-Energy Conversion Ohio, LLC. intends to submit a proposal in response to the RFP for the Ohio Third Frontier Alternative Energy Program FY 2010. Following is the required information as articulated in the RFP:

Lead Applicant	
Name:	Bio-Energy Conversion Ohio, LLC
Address:	2233 Greenlawn Drive Toledo, Ohio 43614
Phone Number:	(419) 392-4312
Contact Person:	Richard Dunn
Contact email:	Dunn.Rich@campusvillage.com
Project Title:	BEC Ohio – Coal & MSW Gasification
Estimated Grant Funds to be Requested:	$ 740,000
Known: Collaborators:	Bio-Energy Conversion Ohio, LLC. (lead) University of Toledo Owens Illinois
One Page Summary:	See Attached.

We look forward to submitting our detailed proposal.

Sincerely,

Richard Dunn
Principal

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BEC Ohio, LLC Summary

Bio-Energy Conversion Ohio was formed to explore renewable energy resources and the manufacturing of bio-energy products. BECO joined with Tucker Engineering Associates, Inc. (TEA) located in Locust, North Carolina via Richard Tucker PE, the President & CEO of TEA. Mr. Tucker is the inventor of a proprietary gasification technology that converts organic and synthetic compounds into Carbon and Syngas. The goal of this patented technology is to build sites in Ohio and the United States to gasify coal and/or Municipal Solid Waste (MSW) and sell the products manufactured from the resultant carbon.

BECO is currently managed by three Professionals who make up a seasoned group of executives that represent the fields of engineering, systems and contols, software design, administration, marketing and sales. Richard Tucker, Jerry Tucker and Rich Dunn have a collective 108 years of experience in the manufacturing and engineering industry. The BECO team is united by their sense of global responsibility and desire to establish and refine alternative energy options. Each BECO installation will utilize state-of-the-art technologies to develop totally green processes that will improve the environment while producing clean fuel and useful products with zero emissions. The control/feedback systems have been designed by TEA utilizing the ANSI C12.19 and C12.22 communications protocol Standards which were designed by Richard Tucker for the IEEE.

The future plant layouts will implement three distinct processes:

1. Sorting and separating landfill materials, chipping polyethylene, and making fuel pellets.
2. The gasification of coal and/or the pellets from Municipal Solid Waste which produces methane and carbon, with a portion of the methane being sold to an end user.
3. The manufacturing of carbon products utilizing chipped polyethylene from the landfill operation and carbon from the gasification process.

Each gasifier will be capable of processing a minimum 25 tons of coal and/or 20 tons of MSW per day. The coal syngas, which is rich in methane, can be used to supply the thermal needs of an end user, piped to turbine or reciprocating generators to produce electricity, or other requirements such as fueling CNG (Compressed Natural Gas) vehicles. A small portion (10-15%) of the gas produced is used to supply the energy requirements of the process. With coal as the feedstock the energy derived from one converter can continuously supply electrical energy at approximately 36 Mwhr per day and each gasification unit produces 12-15 tons of Carbon per day. With MSW as the feedstock the output of energy and carbon is reduced due to the lower density and lower energy content of the MSW fuel pellets (RDF).

Carbon has many applications including structural uses, filtration of air, chemicals and water. The management at BECO has identified a long list of products that can be made of carbon. This process also produces a non-whetting carbon that has not been made by anyone until now.

While similar but less efficient technologies have been and are currently being developed by like-minded companies, BECO perceives an opportunity to acquire a significant market share by maintaining high quality, durable converters with a significant number of feedstock options that provide low cost electricity, natural gas, and value-added carbon products. BECO's strategy is built upon sustainable advantages from a superior process, low operational costs, engineering expertise, and monopolization of future products by our Research and Development team.

Michelin Aircraft Tire Company has signed a 10 year contract to purchase methane gas from our process and they want to be the first customer when we expand outside of Ohio. Two converters would be used to gasify coal to provide syngas to fuel their boilers.

The current focus is to attract enough Ohio Third Frontier Alternative Energy funds to help build a third-generation unit which will encompass the refinements that have been gleaned from approximately 320 hours of test runs. It would then be placed at the University of Toledo's Campus of Energy and Innovation for a 30 day continuous run where precise data collection will occur. The next concern will be where to set up a manufacturing plant to build the units.

AEP 359

UniControl Inc.

UniControl Inc.
1111 Brookpark Road
Cleveland, OH 44109

August 24, 2009

The Ohio Department of Development
Technology and Innovation Division
77 South High Street
25th Floor
Columbus, Ohio 43215

Subject::
Ohio Third Frontier
Advanced Energy Program
Request for Proposals; Fiscal Year 2010
Letter of Intent to Apply

Dear Sir or Madam:

Prospective Lead Applicatant:
UniControl Inc.
1111 Brookpark Road
Cleveland, Ohio 44109

(216) 398-4414

Contact person: Steve Craig – President email: scraig@unicontrolinc.com

Proposed Project Title: Biomass Combustion Control System

Estimated grant funds to be requested: $100,000

Known collaborators: Cleveland State University

Regards,

AEP 360

Steve Craig
President
UniControl Inc.

Attached: Summary of Proposed Project

Ohio Third Frontier
Advanced Energy Program
Request for Proposal; Fiscal Year 2010
Letter of Intent from Lead Applicant: UniControl Inc.

Proposed Project Title: Biomass Combustion Control System

Summary of Proposed Project

This project will research and develop for commercialization an advanced biomass-fuel combustion control system for use on commercial and industrial boilers and hot water generators. The control system will have the following features:

- Combustion gas analyzers for monitoring key compounds in the combustion flue gas, including oxygen, nitrogen oxides, carbon oxides, and sulfur oxides
- Various transmitters for monitoring process variables including pressures, temperatures, levels, and flows
- Programmable control system hardware and software including advanced energy control logic
- Operator interface
- Supervisory control and data acquisition interface
- Final process element interface

AEP 360

August 24, 2009

Ohio Department of Development
Technology and Innovation Department
77 South High St., 25th Floor
Columbus, OH 43215
Subject: OTFAEP Letter of Intent

Attn: Ohio Third Frontier Advanced Energy Program Staff:

Please accept this transmission as our Letter of Intent in regard to filing a proposal for the 2010 Ohio Third Frontier Advanced Energy Program. Our company information appears below:

AcuTemp Thermal Systems
2900 Dryden Rd.
Dayton, OH 45439
937-312-0114
Contact:
1) Todd DeVore, Director of Product Development
tdevore@acutemp.com
2) Brian Kohr, President
bkohr@acutemp.com
3) Doug Roberts, Vice President, Business Development- ThermoCor
droberts@acutemp.com

Project: Advanced Automated Manufacturing of High Performance Insulation (Vacuum Insulation Panels) to Improve Energy Efficiency of Energy Star and Similar Refrigeration Appliances
Estimated Grant Funds Requested: AcuTemp will request $1 million ($1,000,000) in grant funds and will provide a matching $1 million in-kind and cash to fund this development of automated manufacturing processes to reduce the cost of AcuTemp's high performance insulation panels. These panels are beginning to be used in an Energy Star refrigerator manufactured by General Electric. The intent of this project is to automate and advance the current process, with the goal of reducing the current sale price of approximately $4.50 per board foot (144 inches squared at one inch thickness) by 20-35%.
Collaboration: AcuTemp intends to include the Advanced Energy Manufacturing Center at the Edison Welding Institute as a collaborator.
Project Description: For many years AcuTemp Thermal Systems has been manufacturing vacuum insulation panels (VIPs) for Norcold in Sidney, Ohio. Norcold has for about 15 years applied VIPs to some of its "top-of-the-line" refrigerators for recreation vehicles. The use of VIPs has allowed Norcold to design refrigerators that have very thin walls, maximizing the amount of internal space they can provide within a standard RV refrigerator footprint. Norcold uses polyurethane foam insulation in their standard refrigerators, which provides R (resistance) values of about R6 to R7 per inch.

AEP 361

With vacuum insulation they can provide R values of R35 to R40 per inch thickness. Thus using VIPs in particular portions of their "high-end" refrigerator walls allows for at least the same, frequently better, performance in walls that are significantly thinner.

Residential and commercial refrigerator manufacturers have been aware of VIP technology for many years, but have resisted including the technology in their refrigerators because of cost. Over the nearly 15 years of Norcold's use of VIPs, AcuTemp has been able to reduce the price from about $8 per board foot to the current approximately $4.50 per board foot. This has been accomplished through material advancements and changes and process improvements.

The current societal and governmental emphasis on energy efficiency has brought commercial and residential refrigeration manufacturers back to look at VIPs. They are looking at them to provide the operating energy reductions they need to meet more stringent market requirements for "Energy Star" refrigerators. As a result, in June of this year (2009) AcuTemp received an order from General Electric for 750,000 VIPs to be used in the Energy Star 17 cubic foot refrigerators GE is manufacturing for use in HUD (Department of Housing and Urban Development) homes. As AcuTemp gears up to respond to this order, they have added approximately $1.5 million of new equipment, and approximately 80 new jobs, ranging from factory workers to engineers and additional management. In addition to AcuTemp's other product lines, their flat panel business has in the recent past required manufacturing approximately 2,500 panels per week. This new order will require approximately 15,000 panels per week.

This order marks the entry of VIPs into high volume refrigerator production. But in order to keep and expand thus foothold, VIP costs must be reduced. AcuTemp believes, based on recent market feedback, that a cost reduction of 20-35% will result in significant use of VIPs in a high percentage of the nearly 10+ million refrigerators built annually in the U.S. Such a cost reduction will also open the commercial refrigeration market to VIPs.

But this cost reduction cannot be achieved through just material improvements. Much of it must come through manufacturing process improvements. Reducing the person hours per panel through automation and other improvements will dramatically expand the market, bringing significant job growth. As a major player in a currently limited industry, this project can give Ohio an opportunity to become a dominant player in this new energy efficiency industry. As society and governments push for better energy performance, a growing new industry is being born. AcuTemp is well positioned, with the appropriate help, to capitalize on this new industry, for the Dayton region, for the State of Ohio, and for the nation. We intend to file a proposal detailing our design for such a project.
Thank you.

AEP 361

Sincerely,
Brian Kohr
President

THIRD MILLENNIUM METALS, LLC

110 E. EMMITT AVENUE, WAVERLY, OHIO 45690

August 27, 2009

OTFAEP2010@development.ohio.gov

The Ohio Department of Development
Technology and Innovation Division
77 South High Street, 25th Floor
Columbus, OH 43215

Re: "2010 OTFAEP LOI"

Dear Administration,

This letter signifies the intent of TMM to submit a proposal for the above referenced RFP.

The lead applicant will be:

Third Millennium Metals, LLC
Jason Shugart, President
110 E. Emmitt Avenue
Waverly, Ohio 45690
Tel: 740-947-7277
Email: jshugart@tmmetals.com

Project Title: "More Conductive Copper for Higher Efficiency Induction Furnaces"

Estimated Grant funds: $1,000,000

Known Collaborators: Ajax Tocco Magnethermic (ATM), Warren, OH

Project summary: Third Millennium Metals, LLC (TMM) has developed a new process to introduce carbon into copper in quantities not previously understood to make a Copper Nanocarbon Metal material. The Cu NCM shows enhanced thermal conductivity properties in large excess over copper used to date by ATM. This material will be produced; evaluated and specific furnace applications tested with collaborator ATM for producing higher efficiency induction furnaces. TMM will grow its Cu NCM business and Ajax will increase its furnace business as a result of the success expected from this funded project.

Best regards,

AEP 362

Louis A Luedtke, CEO
Third Millennium Metals, LLC

To: The Ohio Department of Development
Technology Division
77 South High Street, 25th Floor
Columbus, Ohio 43215
OTFAEP2010@development.ohio.gov

From: Tremont Electric LLC
2379 Professor Street
Cleveland, Ohio 44113
(P) (614) 563-5310
(E) candres@GREENnPOWER.com

To: ODOD

Please find this document as our Letter of Intent (LOI) in response to your Ohio Third Frontier Advanced Energy Program, fiscal year 2010, request for proposals. We intend on supplying you with a proposal prior to the published due date of 2:00 PM September 18, 2009. We appreciate the opportunity to participate in such an exciting program. Thank you for your time and consideration.

Regards,

Corey J. Andres
Vice President of Business Development
Tremont Electric, LLC

Lead Applicant's Name: Tremont Electric, LLC
Lead Applicant's Address: 2379 Professor Street
Cleveland, Ohio 44113
(P) (614) 563-5310
(E) candres@GREENnPOWER.com

Contact: Corey J. Andres

Project Title: *Commercially Viable Wave Energy Converters (WEC) in Lake Erie*

Estimated Grant Funds to be requested: $1,000,000

Collaborators: The Ohio State University
The University of Akron

AEP 363

Tremont Electric, a Cleveland-based company, was founded in May of 2007 to commercialize a technology that efficiently captures kinetic energy. The technology can be applied on a small scale to recharge personal mobile electronic devices and on a large scale to produce commercial level power for the electrical grid.

Tremont Electric, The Ohio State University, and The University of Akron are collaborating to develop a large scale prototype Wave Energy Converter (WEC) for ocean and lake environments. Tremont Electric is using a Point Absorber system to maximize conversion efficiency. Our system has a broad resonance which enhances our wave capture capabilities. The resonant system is a motion concentrating device which will enhance the efficiency of power take off. The third area that differentiates our technology is the ability to harness the low amplitude, high frequency waves of the Great Lakes. Therefore, we are positioned to demonstrate a technology that by design is more effective at capturing wave energy, more efficient in power take-off, and versatile in the potential locations for deployment. The collaboration will develop and demonstrate a pre-commercial 50 kilowatt WEC in Lake Erie. When successful, this technology will position Ohio to be the center of ocean as and Lake Wave Energy harvesting technology.

With a large population and a heavily industrial economy, Ohio is among the top States in total energy consumption. The industrial sector dominates energy consumption, largely due to several energy-intensive industries, including chemicals, glass, metal casting, and steel. Energy consumption in Ohio's industrial sector ranks among the highest in the Nation.[i] Senate Bill 221 mandates that 25% of the electricity sold in 2025 must come from alternative energy sources. As of April 2008 the net electricity generation in Ohio was 11,677,000 MW hrs yet the net generation of electricity from other renewables was 14,000 MW hrs. This means *0.12%* of the electricity being sold in Ohio is currently coming from renewable energy sources. Senate Bill 221 has provided a significant challenge to electrical utility companies in Ohio.

The collaboration between Tremont Electric, The Ohio State University, and The University of Akron will position experts of kinetic energy harvesting, Lake Erie fluid dynamics, and electromagnetism in a strategic partnership to begin to bring renewable wave energy to Ohio utilities. The strategic advantages for our project are the proprietary technology, the ability to harvest low amplitude, high frequency waves of the Great Lakes, and the support of The Ohio State University Finite Element Hydrodynamic Model. Target goals for electricity production are $.05 per kilowatt hour.

AEP 363

AHL-TECH

Clean by Nature
Powerful by Design

ALTERNATIVE HYBRID LOCOMOTIVE TECHNOLOGIES

August 24, 2009

Ohio Department of Development
Ohio Third Frontier Advanced Energy Program – FY 2009 RFP

Re: OTFAEP LETTER OF INTENT

To Whom It May Concern:

This letter serves as AHL-TECH's letter of intent that we will be submitting the following project proposal for the Ohio Third Frontier Advanced Energy Program (OTFAEP):

Lead Applicant:

Alternative Hybrid Locomotive Technologies, Inc. (AHL-TECH)
5303 DuPont Circle
P.O. Box 250
Milford, Ohio 45150-0250
513-575-5626

Contact: Tom Mack
tmack@AHL-TECH.com

Project Title: Prototype Ethanol-Electric Hybrid Locomotive

Estimated Grant Funds Requested: $800,000

Collaborators/Subcontractors:

University of Toledo – Toledo, Ohio
Crown Battery – Fremont, Ohio
Renewable Lubricants – Hartville, Ohio

One Page Summary follows

Signed,

AEP 364

Tom Mack

Tom Mack
President/CEO

One Page Summary – Prototype Ethanol-Electric Hybrid Locomotive:

Alternative Hybrid Locomotive Technologies (AHL-TECH) is developing a new generation of greenhouse gas-reducing and efficient-to-operate biofuel-electric hybrid (internal combustion engine plus battery) railway locomotives. AHL-TECH's use of globally available ethanol allows our engines to meet or exceed the most stringent emissions standards now in place (EPA Tier 2) and will meet upcoming standards as well (EPA Tier 3 and Tier 4). AHL-TECH locomotives are designed for use in railroad yards, industries, branch lines, or main lines where concerns about emissions are highest and a lower horsepower (1,500-3,000hp) locomotive is suitable. AHL-TECH's prototype switcher locomotive is a 4-axle 1,500hp ethanol-electric hybrid targeted at the North American locomotive market. The prototype locomotive actually can produce up to 2,000hp through its 1,500hp triple-generator sets and 500hp via the on-board battery system, but only 1,500hp needs to be continuously applied to the wheels at any given time. Hence this locomotive is referred to as a 1,500hp switcher, although it has the potential to be upgraded to the full 2,000hp through software changes in the future, if a railroad has a duty-cycle venue where the additional horsepower can be utilized. AHL-TECH will use an existing switcher locomotive cab, frame, and trucks (wheel assemblies), with the rest of the components being produced by AHL-TECH and its suppliers. The AHL-TECH locomotive has been in development for almost four years.

AHL-TECH Innovations:

- AHL-TECH is the only company developing a locomotive technology that uses a high percentage of renewable fuel as the primary fuel source. The revolutionary AHL-TECH engine and generator set will use 95-98% ethanol, compared to biodiesel engines that can only use a maximum of 5-20% biodiesel blended with petroleum diesel. AHL-TECH is the first and only company to offer the use of liquid alternative fuels (ethanol, biodiesel, or biobutanol) generator sets (GenSets) to power these locomotives and charge the batteries that are an integral part of this technology. The design of the high horsepower ethanol engine has been completed and parts procured to build and test the first prototype.

- AHL-TECH uses a unique locomotive design that actually permits the interchangeable use of alternative fuels generator sets (GenSets) powered by ethanol and next generation biofuels. Thus, railroads will have the option of choosing a fuel source today (e.g. ethanol), but convert to a different fuel source (e.g. biobutanol) at a later date by simply upgrading or replacing the GenSet.

- The design also incorporates the use of leading edge hybrid technologies such as the EMCap high capacity energy storage system (being developed in conjunction with The University of Toledo) and high-efficiency regenerative braking.

- AHL-TECH is also developing a revolutionary new software technology known as Predictive Power Management Control (PPMC). PPMC is a patent pending software system that stores detailed information regarding the track on which the train is running (grades, curves, speed limits, etc.), This key track information is known as a "track chart." By employing GPS to determine where the train is in relation to the track chart, PPMC can determine how best to control the power needed to move the train along the route with the greatest efficiency and fuel economy. PPMC uses this "power need" knowledge along with advanced algorithms to store or retrieve energy from the most efficient combination of batteries, GenSets, and other power supply/storage devices: Electro-Mechanical Batteries (EMB), Ultracapacitors, Fuel Cells, etc.

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Environmental Benefits

In addition to reducing particulate matter (soot, which contributes to cancer) by over 98%, AHL-TECH engines should reduce nitrogen oxides by over 90% (NOx, which has a correlation with smog, combines with hydrocarbons in the atmosphere to form ozone). Both of these emissions are produced in high quantities by diesel engines. Most importantly, the AHL-TECH ethanol locomotive engine also reduces greenhouse gas (GHG) emissions by almost 50% and holds promise to reduce GHG by up to 90% using cellulosic ethanol as a fuel. GHG emissions have been identified as a major contributor to global warming.

August 24, 2009

The Ohio Department of Development
Technology and Innovation Division
77 South High Street, 25th Floor
Columbus, OH 43215

Submitted via email: OTFAEP2010@development.ohio.gov

RE: Third Frontier Grant Letter of Intent

The attached is our letter of intent for the Ohio Third FronTier Advanced Energy Program. The information provided is in accordance with section 1.3.3 Letter of Intent.

Lead Applicant	Industrial Railway Switching & Services
Lead Applicant Address	2199 E.28th Street stop 669 Lorain, Ohio 44055
Lead Applicant Phone	P. 440-277-5151 F. 440-277-5151
Lead Applicant Contact Person	Lead applicant name: Jack A. Siffert irss@eriecoast.com
Proposed Project Title	Lean and Green 2000
Estimated Grant Funds Requested	$500,000
Known Collaborators	MTU-Detroit Diesel Darrah Electrical Clean Emissions systems G.L.I.D.E. Lorain County Community College T.M.V. traction control systems W.W. Williams
Possible Collaborators	West Virginia University C.A.F.E.E.

AEP 365

In the course of marketing the Lean and Green Locomotive, a new market has emerged. The railroads are in the market for road switchers in the 2,000 B.H.P. range. There are potential sales for at least 1,000 units in this range. The current fleets are used predominantly in non-attainment areas.

Our plan is to implement the Lean and Green Technology in a 2,000 HP platform and offer a Tier 4 locomotive.

A successful locomotive in this market would provide hundreds of good paying jobs and position Ohio at the forefront of locomotive manufacture.

AEP365

August 24, 2009

The Ohio Department of Development
Technology and Innovation Division
77 South High Street, 25th Floor
Columbus, OH 43215

Submitted via email: OTFAEP2010@development.ohio.gov

RE: Third Frontier Grant Letter of Intent

The attached is our letter of intent for the Ohio Third Frontier Advanced Energy Program. The information provided is in accordance with section 1.3.3 Letter of Intent.

Lead Applicant	Industrial Railway Switching & Services
Lead Applicant Address	2199 E.28th Street stop 669 Lorain, Ohio 44055
Lead Applicant Phone	P. 440-277-5151 F. 440-277-5151
Lead Applicant Contact Person	Lead applicant name: Jack A. Siffert irss@eriecoast.com
Proposed Project Title	Lean and Green Upgrade
Estimated Grant Funds Requested	$100,000
Known Collaborators	MTU-Detroit Diesel Darrah Electrical Clean Emissions systems G.L.I.D.E. Lorain County Community College T.M.V. traction control systems W.W. Williams
Possible Collaborators	West Virginia University C.A.F.E.E.

AEP 366

The proposed Lean and Green Upgrade project is the next logical step in the evolution of the Lean and Green project.

Interest from the field has been high for the current Lean and Green project. Several potential customers are in line to test the prototype. The recent economic problems have hindered the demand from the customers who would purchase said locomotives out of their own funds. Once the economy rebounds and industry achieves a "comfort level" with the economy, we fully anticipate that orders will be placed.

Currently, the market is biased toward purchases made with government grants. In the past six months, the Federal government has implemented a program whereby the purchase of only Tier 3 locomotives can be funded. This requirement precedes the enforcement of these specifications by the Environmental Protection Agency.

The proposed Lean and Green locomotive can match the emission reductions of a Tier 3 locomotive by combining anti-idle technology with the Tier 2 engine but it is an uphill battle. Industrial Railway Switching & Services (I.R.S.S.) and our collaborators propose using proprietary processes that should allow us to surpass Tier 3 requirements and go straight to Tier 4. Since Tier 4 requirements are not scheduled to be implemented until 2014, we will be two to four years ahead of Federal requirements. This enables the proposed Lean and Green locomotive to be the ONLY locomotive in the market to meet the Tier 4 requirements. By meeting Tier 4 requirements, a cross over to other applications can be developed. The proposed engine would be the first engine (over 700 B.H.P.) to receive Tier 4 certification in off-road use, this would allow implementation into other fields such as power generation, mine haul trucking and possible marine use.

Not only would the proposed system be the first Tier 4 locomotive, but it also drastically reduces the costs to achieve Tier 4 by at least 70% over anything currently being proposed.

Success of this grant would put Ohio at the forefront of reduction technologies with all of the benefits (jobs) that go hand in hand with this emerging field.

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