

SIME Corporation
A unit of the Stromag Group
Safety in motion

25 August 2009

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

Dear Sir:

The SIME Corporation is pleased to submit this Letter of Intent to submit a proposal in response to the Ohio Third Frontier Advanced Energy Program Fiscal Year 2010 Request for Proposals.

Lead Applicant: SIME Corporation
4623 Gateway Circle, Dayton, Ohio 45440

Administrative Contact: John Glebas, Managing Director
(937) 344-8799 jglebas@simeusa.com

Technical Contact: Daniel P. Kramer, Ph.D., University of Dayton

Project Title: Commercializing Advanced Wind Turbine Braking Systems for Burgeoning United States Wind Power Markets

Estimated Grant Funds to be Requested: \$650,000

Collaborators: University of Dayton Research Institute, 300 College Park, Dayton, Ohio
Stromag Inc., 85 Westpark Rd, Dayton, Ohio
Stromag France, Ave de l'Europe, La Guerche, France

Description: SIME-Stromag is a world leader in the industrial disc brake market, and for the last 25 years SIME-Stromag has designed braking solutions to keep pace with the evolution of wind turbines. SIME brakes equip more than 10,000 wind turbines worldwide, with rotor and yaw disc brake systems for corporate scale wind turbines with power levels up to 5MW. With wind power becoming one of the nation's fastest growing industries, one of the burgeoning markets in the United States is the industrial scale wind turbine market. There are no commercially available brakes that meet the performance requirements of this size wind turbine. The University of Dayton is collaborating with SIME-Stromag to commercialize existing braking systems for the industrial scale wind turbine designs.

The U.S. leads the world in the production of small wind turbines, which are defined as having rated capacities of 100 kilowatts and less, and the market is expected to continue strong growth through the next decade. Reference www.AWEA.org/smallwind

The SIME Corporation looks forward to participating in this program to promote technology-based economic development within Ohio.

Sincerely,
John Glebas, Managing Director
SIME Corporation

4623 Gateway Circle, Dayton, OH 45440

PH: 937 434 7463 FX: 937 434 7464

www.simeUSA.com

AEP 301

Letter of Intent
OTFAEG

August 25, 2009
BioTech Renewable Energy
Todd J. Appelbaum (Lead Applicant)
190 Stanbery Road
Bexley, Ohio 43209-1464
todd@brebio.com
614- 679-8931
Biomass Waste to Energy Project
Requested Funds: \$1,000,000

Known Collaborators:

John Glessner
President
Ohio Fresh Eggs
12923 Hardin Marion Rd
la Rue, OH 43332
(740) 499-2352
jwglessner@aol.com

Lori Pingle
Owner
Pingle Design Group
426 E. Whittier St.
Columbus, Ohio 43206
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614-795-1295

Tim Keller
Owner
Keller Farms
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Fort Recovery, Ohio 45846
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5200 Blazer Parkway
Dublin, Ohio 43017
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Bob Bailey
PHD
Bailey Engineering
791 Atcheson St
Columbus, Ohio 43203
614-736-6095

Brian E. Henslee
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Jiten V. Rupareal
PHD
Dept. Of Business and Economics –
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AEP 302

One Page Summary

The technology of biodigesters has been in existence for a long time. Up until now the majority of biodigesters were used only to produce electricity, which in Ohio make the building and operation of biodigesters not overly cost effective. What is needed is a project that utilizes existing technology and improves upon it by more efficient usage and an established distribution network for the energy produced once the operation is fully operational. This is where the proposed BioTech operation begins.

BioTech's operation creates green manufacturing products and a process which is more efficient, productive, and produces higher output allowing for more renewable energy to be introduced in Ohio, thus reducing our dependence upon non-renewable energy and foreign oil. Products from BioTech's process consist of a fully integrated biogas production system, which will produce natural gas, Compressed Natural Gas, Liquid Natural Gas, and its related produces at a drastically lowered cost.

This process will also create green manufacturing jobs and jobs for services technicians.

The following manufacturing processes and technology will reduce the cost of production of biogas. It does this by three major disciplines.

1. Reduction of capitalization cost:
This is achieved by reducing the component cost and the overall assembly costs.
2. Reductions of operational cost:
This is achieved by command controls software and integrated systems.
3. Increased efficiency:
The increase in Biogas efficiency will reduce cost per cubic foot.

The results of the above implementation will produce the following:

- Increased employment in green manufacturing and services jobs.
- All components will be manufactured in the state of Ohio increasing the manufacturing base of the state.
- Increasing Ohio's green exports worldwide.
- Reduction of capital cost will create wider biogas products user base.
- Reduction of imported energy.
- Lowered biogas operation cost, will enhance the viability of the renewable energy industry in Ohio.
- Increased efficiency will reduce cost per cubic foot of gas.
- The combined effect will bring notoriety to the State of Ohio as a great place to green manufacture.

Therefore, we are requesting funds in the amount of \$1,000,000 to create, refine, and implement a waste to energy facility, which combines numerous sources of biomass feedstock in a centralized location to create electricity, compressed natural gas, liquid natural gas, carbon credits, carbon dioxide, sterilized animal bedding, fertilizer, and other such by-products. These products will be available to both the public through a streamlined distribution center, as well as the private sector as agreements are secured. Our goal with these funds is to work with identified end users such as chicken farms, dairy farms, food processing centers, commercial fishing operations, and yard waste collection centers and utilize their waste to produce the above listed types of energy.

AEP 302

Stock, Pete A.

From: Jim Dawson [jim.dawson@adrctech.com]
Sent: Tuesday, August 25, 2009 7:09 PM
To: OTFAEP2010
Subject: 2010 OTFAEP LOI

Hi Pete,

Project Title: Wind Turbine blade pitch control using advanced wind detection sensors, active disturbance rejection, and system health monitoring. I added it to the LOI below.

I was out out the office today and if it's too late, I understand.

Thanks ... Jim

From: OTFAEP2010@development.ohio.gov
To: jim.dawson@adrctech.com
Date: Tue, 25 Aug 2009 11:47:55 -0400
Subject: RE: 2010 OTFAEP LOI

Received. Please see section 1.3.3. of the RFP. Please resubmit the LOI with a Project Title.

Pete Stock
Program Administrator
Technology and Innovation Division
614.728.8993
Pete.Stock@development.ohio.gov

Email to and from the Ohio Department of Development is open to public inspection under Ohio's public record law. Unless a legal exemption applies, this message and any response to it will be released if requested.

The State of Ohio is an Equal Opportunity Employer and Provider of ADA Services.

From: Jim Dawson [mailto:jim.dawson@adrctech.com]
Sent: Monday, August 24, 2009 5:14 PM
To: OTFAEP2010
Cc: Dave Neundorfer; Zhiqiang Gao
Subject: 2010 OTFAEP LOI

AEP 303

Dear Sirs:

ADRC Technologies Inc submits this Letter of Intent to apply for the Ohio Third Frontier Advanced Energy RFP.

Jim Dawson, President of ADRC Technologies, located at 6508 Blackfriars Lane, Hudson Ohio 44236, (330) 474-0522 Email: Jim.Dawson@adrctech.com, is the Lead applicant for this proposed project. The project name us "Wind Turbine blade pitch control using advanced wind detection sensors, active disturbance rejection, and system health monitoring" and the estimated amount ADRC is requesting is \$1 million for it's wind turbine project

ADRC collaborators are Cleveland State University with Dr. Zhiqung Gao as the Chief Technical officer, graduate students will be using the Parker ADRC Lab to conduct the vital adjustments to the ADRC control to adapt it to advanced energy technology.

8/26/2009

Program Summary:

ADRC Technologies Inc. requests OHIO THIRD FRONTIER FUNDING FOR for research and development in applying the novel Active Disturbance Rejection Control (ADRC) concept and techniques to address the pressing issues in turbine speed control and predictive fault indication. This is an initial request for this innovative control technology that could change the way wind farm operators can optimize electrical generation based on available wind combined with "health Signature" that provide real time indication of the rotating equipment condition for predictive purposes. The commercial applications for this innovative control for wind farm systems are better control, better energy generation, and predictive maintenance is staggering as it can avoid downtime caused by run to fail where a wind turbine may be off line for a month or more.

Most large-scale engineered dynamic systems, such as wind turbines exhibit attributes as unmodeled dynamics, large-grained uncertainty, and incomplete knowledge of key parameter values. Conventional systems and control methodologies are usually inadequate to successfully address difficult and ill-defined situations, take wind turbulence for one example. Most approaches used today rely on intuition and use Artificial intelligence techniques, additional sensor data, fuzzy logic inference, and the like that lack the mathematical rigor required to apply and validate such techniques to complex engineered systems. ADRC capitalizes on identifying and rejecting disturbances in real time with a mathematically rigorous approach that can be shown to perform according to accepted performance standards.

Wind is unpredictable in predictable ways, but the chaotic behavior of wind makes monitoring and analyzing modern wind turbines a challenge. Our proposed research, if successful will be a large step forward in developing reliable wind power; not only for the owner operators, but also for the original equipment manufacturers as well. The variability of data from wind turbines makes monitoring for abnormal behavior difficult for technicians and engineers. ADRC's predictive-analytic technology for monitoring and analyzing the performance and mechanical condition of wind generation systems can detect degradation well in advance of the OEM monitoring systems and help mitigate potential failures. ADRC not only helps the controls work better, it's new predictive-analytic systems in real time can focus attention on abnormal equipment conditions, resulting in improved system performance, reliability and availability.

Our research and prototype development will focus on pitch control to compensate for wind turbulence to limit forces through the gearbox and control the shaft speed and using ADRC's disturbance rejection capabilities to monitor the health of the mechanical systems in the wind turbine. ADRC health monitoring technology provides alerts by exception, as opposed to manual review of all the OEM component sensor data trends, to highlight abnormal conditions. ADRC's exception-based alerting will allow the modern wind farm operators to reduce review time by focusing only on deviations from normal system operations.

The research and prototype development will be conducted by ADRC Technology and will focus on applied research in the above areas critical to wind turbine operation and create a prototype. We will have a letter of intent from a wind farm operator and equipment manufacturer to purchase the unit after field trials.

The wind generation industry is rapidly expanding into remote and diverse areas: oceans, deserts, mountains and plains. We believe there is a global need for this technology and the commercial opportunity exists to retrofit the current installed units with the prototype units and license of the technology to current OEM's making wind turbines.

We look forward to participating in the OTF award process for this exciting technology and making Ohio the leader in advanced controls for wind turbine power generation and reliability.

Sincerely,
Jim Dawson
ADRC Technologies
330.474.0522

AEP 303

Arlington Energy, LLC - 2010 Third Frontier Letter of Intent

Lead Applicant: Arlington Energy, LLC
1237 W. 4th Street
Mansfield, Ohio 43220
(419) 529-9061

Contact: Jeff Schulthies - jeff@arlingtonenergy.net

Proposed Project Title: Mansfield Biodiesel Expansion

Estimated Grant Funds to be requested: \$800,000

Known Collaborators: Arisdyne Systems, LLC

AEP 304

Biodiesel Production and Distribution Expansion Project

Arlington Energy has a biodiesel plant Mansfield (Richland County) Ohio. The Company has begun purchasing new equipment from another Ohio company, Arisdyn Systems, to upgrade to second-generation transesterification process. Arlington uses waste oils and animal fats (Fatty Acids) as feedstock to produce biodiesel.

Feedstock, Fatty Acids, and Biodiesel Yield

Fatty Acid feedstocks contain triglycerides, which are converted to fatty acid methyl esters (FAME), which is a form of biodiesel. The feedstocks also contain varying levels of "free fatty acids" (FFA's). When high-FFA feedstock is used in transesterification, the FFA's bind with glycerin to produce soaps, and reduce the yield of biofuel.

High FFA feedstock can be pre-treated through the process of esterification, which breaks the FFA's into methyl esters. After pre-treatment, the treated feedstock contains a small percentage of finished product instead of FFA's, and after the transesterification process, the result is a high-yield production.

Pre-Treatment Economics

Because high-FFA feedstocks reduce the yield of biodiesel using transesterification, producers prefer low-FFA feedstocks. The result is that high-FFA feedstocks are cheaper. With a sufficiently efficient pre-treatment process, there is an economic advantage to buying the cheaper high-FFA feedstock. Arlington intends to purchase Arisdyn Systems, new, cavitation-based pretreatment technology to process high-FFA feedstock.

Sales of biodiesel via retail pumps

Retail pumps at Arlington's 4th street in Mansfield will provide North Central Ohioans with the first Mansfield biodiesel outlet. The station will be added to the Clean Fuels Ohio list of available biodiesel sites, so that motorists seeking biodiesel will be aware of the new location, which is near State Route 30.

The Ohio Department of Development awarded Arlington \$40,000 for biodiesel pumps. Our Third Frontier project will include installation of biodiesel and other alternative fuels. The Company is evaluating compressed natural gas (CNG) and ethanol (E85), in addition to biodiesel blends.

Project Costs and Grant Request

AEP 304

We estimate the costs of the expansion project to be about \$1.8 million, and we are requesting a Third Frontier grant for 50% of the project, or \$900,000. We expect to begin generating revenues from our 2009 upgrade project by November of 2009. We expect to fund our matching portion of the project from a combination of private investment and revenues from the (wholesale) sale of biodiesel.

GPE Solar
Gary Gerden, CEO
6299 S. Section line Rd.
Delaware, OH 43015
614-940-2162
garygerden11@hotmail.com

August 25, 2009

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

Ohio Third Frontier Advanced Energy Program FY 2010

Letter of Intent

Dear Sir/Madam,

Please accept this letter of intent to apply for the Advanced Energy Program. The lead applicant's information is:

GPE Solar
Gary Gerden, CEO
6299 S. Section line Rd.
Delaware, OH 43015
614-940-2162
garygerden11@hotmail.com

The collaborator in the project is:

Freeman Schwabe
4064 Clough Woods Drive
Cincinnati, Ohio 45103 USA
(513) 947-2888
<http://www.freemanschwabe.com>.

The title of the proposed project is Photovoltaic Panel Assembly Process Improvement. The estimated grant funds to be requested are \$1,000,000.

GPE Solar will assemble silicon solar panels more efficiently utilizing a new automated assembly and sorting system. The focus is on the portion of the supply chain assembling solar cells into panels. The new automated manufacturing process will solve problems with uneven individual (PV-photovoltaic) solar cell production by testing each solar cell and automatically, grouping cells to produce a more cost efficient configuration. Breakage of panels while moving through the assembly line will be eliminated by utilizing robotic arms and rollers. Problems with heating the panels at exact temperatures and times will be automated and controlled eliminating breakage and component adhesion issues. Panels are tested in a UV light chamber and guaranteed to comply with technical specifications. All of the assembly workers are low skilled laborers due to the automation, reducing labor costs. The assembly system can incorporate new silicon wafer technology into the line by inserting new technologically advanced wafers into the assembly line. The new assembly system will be located in Ohio, complying with government purchasing restrictions on products produced domestically. One assembly line costing \$1.3 million can produce \$60 million in solar panels.

Thank you for your consideration.

AEP 305

Letter of Intent Ohio Third Frontier 2010 Advanced Energy RFP



Granata Ecological Engineering LLC

Engineering Solutions for a Sustainable World

August 18, 2009

Lead Applicant: Granata Ecological
Engineering LLC
Address: 226 E. Dunedin Rd., Columbus, OH 43214
Contact: Dr. Timothy C. Granata, Ph.D., P.E., Sr. Ecol.
TEL: 614-263-9775; Cell: 614-804-1399
Email: GranataEcoE@Columbus.rr.com
Collaborators: Biotechnology Consultant, Dr. A.
Sanadi, Upper Arlington, OH
Maulbecker Consulting LLC Upper Arlington, OH
Title: **Ohio farm generated biofuel using a novel, algal bioreactor**
Amount Requested: \$457,868.

Granata Ecological Engineering, in collaboration with a biotechnologist and a business consultant, is proposing to commercialize a process to optimize biofuel yields from a unique microalgae using a novel bioreactor as a stand-alone system on farms in Ohio. Our approach in year 1 (2010) is to determine optimum parameters for oil production and growth of a micron sized algal species (one that has been shown to synthesize excess amounts of oil in nature) then program these parameters into a control unit of a novel bioreactor capable of producing large amounts of biofuel. Maximum growth and oil yields will be achieved at high light levels but low mixing rates and nutrient regimes in the lab. In year 2, the bioreactor will be assembled, calibrated, and tested in Columbus, Ohio. A 50 gallon vessel will be retrofitted with LEDs, tubing, and a computer controller and the bioreactor system calibrated for optimum performance. To demonstrate the commercial feasibility of producing algal biofuel on Ohio farms, the system will be relocated to a farm in northern Ohio where it will be operated under optimum growth conditions from May to October 2011, producing biofuel for use in farm equipment. During these 6 months, the bioreactor should produce up to 600 gallons of biofuel at a cost of less than \$3/gallon, while consuming 0.2 metric tons of CO₂.

Relative to other algal-biofuel systems, such as tubular reactors and ponds, our bioreactor has a small spatial footprint and provides for the most efficient control of algal growth and biofuel production. The entire process is truly sustainable using a combination of solar energy and artificial light to provide the energy source for oil synthesis and produces little waste with low water use. The bioreactor will

AEP 306

Letter of Intent Ohio Third Frontier 2010 Advanced Energy RFP

be a closed loop system of highly concentrated, fast growing cells rich in neutral lipids and manipulated to sequester large amount of CO₂. Because the process has a negative carbon footprint, carbon credits could be traded to offset other CO₂ production in the State.

Besides biofuel, bi-products such as cell protein and exoskeletal material could be marketed as commercial products. When distributed on farms across the state, the system could help to sequester atmospheric CO₂ while producing biofuel on onsite and eliminating transportation costs. The reactor components will be purchased from companies in the USA, and preferably in Ohio. The results of the bioreactor will be presented to capital investors (e.g. TechAngels) before December 2011 in an effort to secure funds for a series of commercial reactors by 2012. TechColumbus has been contacted to provide wet lab space for the first two years. During years 2 to 5 of the grant, the commercialization strategy, business plan, and IP/patent applications will be carried out by the business consultant.

AEP 306

**Letter of Intent
Request for Proposals
Ohio Third Frontier Advanced Energy Program Fiscal 2010**

Prospective
lead Applicant:

SynTerra Fuels, LLC
387 West Dussel Drive
Maumee, OH 43537
Contact: Robert Schuetzle
Phone (415) 939-9904
Email rschuetzle@prfuels.com

Collaborators:

- (1) Red Lion Bio-Energy
Maumee, OH 43537
Contact: Douglas Struble
Vice President of Operations
(419) 897-6868; (419) 466-6962 (cell)
Email: doug.struble@redlionbio-energy.com

- (2) The University of Toledo,
Toledo, OH 43606
Contact: Sasidhar Varanasi; Professor of Chemical Engineering
Phone: (419) 530-8093
Email: sasidhar.varanasi@utoledo.edu

Proposed Project Title: **Commercialization of a new technology for thermo-chemical conversion of Biomass feed-stocks to liquid transportation fuels**

Funds to be requested: \$1,000,000 from Ohio Third Frontier program + required cost Share by the applicants.

A brief summary of the proposed project is provided on the next page.

AE P 307

Commercialization of a new technology for thermo-chemical conversion of biomass feedstocks to liquid transportation fuels

Thermo-chemical conversion technologies convert lingo-cellulosic biomass and its residues to fuels, chemicals, and power using gasification and pyrolysis technologies. Gasification produces a mixture of carbon monoxide and hydrogen, known as syngas. Pyrolysis—heating biomass in the absence of oxygen—produces liquid pyrolysis oil along with some bio-gas and solid char. Both syn-gas and pyrolysis oil can be used as fuels that are cleaner and more efficient than the solid biomass. Both can also be chemically converted to other valuable fuels.

Our approach is based on patented technologies for generating clean syngas from biomass via pyrolysis followed by steam reformation; the H₂ rich “pure” syngas is, subsequently, converted to diesel using a new family of proprietary catalysts patented by the lead applicant. Unlike conventional gasification schemes, this new technology involves biomass pyrolysis followed by “non-catalytic” steam reforming and produces syn-gas with a higher BTU value (350-500 BTU/SCF). This technology can be manipulated to produce syn-gas with a very high H₂ to CO ratio (up to 80% H₂) compared to conventional methods (~ 30% H₂) and is able to convert most of the carbon in the feed stock to syngas. Moreover, syngas produced by most conventional processes often contains unacceptable levels of tars, particulate and other contaminants which will rapidly degrade the efficiency and selectivity of the Fischer-Tropsch catalysts used for the conversion of syngas to liquid fuels. As the clean, H₂-rich syn-gas resulting from Red-Lion Bio-energy’s technology significantly lowers the risk of catalyst poisoning and loss, production of liquid fuels via this process is economically feasible.

Red Lion Bio-Energy (a Maumee Ohio based company) has constructed a Syngas demonstration facility on The University of Toledo campus utilizing their proprietary gasification technology. The process converts agricultural waste, wood waste, and low value coal into clean syngas in such quantities to fuel The University Energy Center. The facility has successfully performed several demonstration runs (up to 1 week continuous operation) at 10 tons/day feed rate. For commercial acceptance the facility needs to achieve production rates that consume 25 – 50 tons per day.

SynTerra LLC is a new Ohio-based company that will represent the integration of Red Lion gasification and Pacific Renewable Fuels’ (California) “syngas-to-liquids” technologies. Pacific Renewable Fuels developed proprietary catalysts for converting Red-Lion’s syngas to hydrocarbon fuel (Terra™ diesel fuel). It was demonstrated that the Terra™ diesel fuel more closely approximates the carbon distribution of current diesel fuel than the diesel made with traditional Fischer-Tropsch catalysts.

University of Toledo is working closely with Red-Lion Bio energy and SynTerra LLC on all aspects of the above-described thermo-chemical technology for converting biomass to liquid hydrocarbon fuels (pyrolysis, steam reformation, and catalytic conversion of syngas to liquid fuels). While Red-Lion Bioenergy and SynTerra LLC are focusing on scaling-up their proprietary technologies for commercial implementation, UT researchers are concentrating on optimization of different unit processes through work done on laboratory-scale pyrolysis, steam-reformation and catalytic conversion reactors.

The goal of the proposal is to demonstrate at a pilot-scale an optimized, economically viable thermo-chemical process for producing liquid transportation fuels from biomass feeds-stocks relevant to Ohio’s economy. The collaborators (SynTerra LLC, Red Lion Bioenergy and The University of Toledo), through synergistic integration of their individual capabilities, will resolve all the bottle-necks associated with various process steps to achieve this goal.

AEP 307

MegaJoule Storage, LLC

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 MegaJoule Storage 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: MegaJoule Storage LLC
Contact: Herb Crowther, VP Commercialization
Address: 1112 Kenilworth Avenue, Cleveland, OH 44113
Telephone: 216-496-8302
Fax: 216-751-9537
E-mail: hcrowther@capling.com
Proposed project title: MegaJoule Storage LLC Advanced Battery Project
Estimated grant funds to be requested: \$1 million
Target collaborators: JME, Inc., Panel Master Incorporated, Eaton Corporation, Crown Battery, Great Lakes Institute for Energy Innovation: Case Western Reserve University

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

Sincerely,



Herb Crowther
VP Commercialization

Attachment: Project Summary

AEP 308

**MegaJoule Storage LLC Advanced Battery Project
2010 Ohio Third Frontier Advanced Energy Program Project Summary**

Business Overview: MegaJoule Storage LLC (MegaJoule) intends to be the premier provider of electrical energy storage products and services for bulk, distributed and transportable energy storage applications. MegaJoule's SmartCaps for SmartGrids™ product line, based on exclusive proprietary technology controlled by the company, is poised to be the economic and performance choice for the global energy industry. MegaJoule will manufacture advanced batteries that will be sold to electric utility, renewable energy, industrial and commercial companies. MegaJoule envisions domestic manufacturing capable of supplying gigawatt hour quantities of energy storage capacity to US and global markets.

Project Description: MegaJoule will establish headquarters operations in Cuyahoga County for its executive, administration, marketing, sales and product development staff. MegaJoule is finalizing strategic sourcing relationships with Crown Battery in Fremont, Ohio, Eaton Corporation and Case Western Reserve University to provide MegaJoule with the power electronics and control systems necessary to integrate the energy storage devices with the power grid. Panel Master, which has an ownership interest in MegaJoule, will use Panel Master, Crown battery, Eaton and other Ohio manufacturing facilities, equipment and expertise to manufacture products for MegaJoule.

MegaJoule will produce 50 kWh systems that will be acceptance tested with two electric utility companies, a distributed renewable generation company, and a federal government agency. MegaJoule has a first-to-market opportunity with its SmartCaps for SmartGrids™ product line that will feature transportable, turn-key, bulk energy storage systems ranging from 50 kilowatt hours (kWh) to megawatt hour (MWh) scale capacity. OTFAEP funds will accelerate the growth of MegaJoule by providing capital that will allow them to enter the marketplace faster, accelerate reductions in product cost and further develop their products.

The market opportunity for MegaJoule's advanced battery is compelling. Energy storage is a large and rapidly growing global market. Lux Research (Lux) predicts a \$64 billion market by 2012, driven largely by 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. Extrapolating AEP's vision across the US electric utility industry would translate into 15,000 MW of new domestic energy storage capacity. Currently, MegaJoule has verbal agreements with investor-owned utilities with headquarters in Ohio, a global renewable energy project developer, and a government agency.

TFAEP funds will help to ensure the success of MegaJoule's project in Ohio by accelerating our research, development, engineering, and training. MegaJoule will invest heavily in the project and expects to exceed the targeted 1:1 cost share ratio. The success of the project will be measured by sales of the systems as well as job creation and capital investment by MegaJoule in the Northeast Ohio region. The success of the project, combined with other recent successes in advanced battery technology in Ohio, will help to anchor leadership in the rapidly growing energy storage industry in the State of Ohio

AEP 308



Inorganic Specialists, INC.

Ohio Dept of Development

Letter of Intent for Ohio TFAEP 2010

Aug 25, 2009

Lead Applicant

Inorganic Specialists
965 Capstone Dr.
Miamisburg, Ohio 45343

(937) 865-4491

Estimated Grant funds requested \$1,000,000.

Contact person: Dr. David W. Firsich, dwfirsich@inorganicspecialists.com

Known collaborators: Southeast Nonwovens, Ultramet, EaglePicher

Silicon Coated Nanofiber Paper as a Lithium Ion Anode

I.

ABSTRACT

AEP 309

Silicon coated carbon nanofiber paper is a transformative advance for battery technology. This unique anode material shows stable cycling, low irreversible capacity, and energy storage >1000 mAh/g (based on its full weight). Its *effective* energy storage can be far higher via dual use as an active material and a current collector (saving weight/cost/volume). This material is made using bulk-available nanofibers combined with an advanced inexpensive Si deposition method that keeps the materials cost under \$185/lb, clearly practical.

It is made in two steps. 1) A porous, flexible, conductive pure carbon nanofiber paper is first prepared. A sophisticated nonwoven papermaking process has already been developed to make the uncoated paper, and professional pilot-scale equipment to produce it on a continuous basis has been built. 2) Then the paper is coated throughout with silicon, covering the individual nanofibers within the paper with a smooth, adherent, nanoscale amorphous Si layer. At this time, the coating step is being carried out on small stationary sheets of nanofiber paper.

The first R&D Objective is a proof-of-principle demo that the Si-coating can be done in a continuous fashion onto a moving substrate of nanofiber paper; small-scale moving-belt coating equipment will be built/demonstrated. The second Objective is to construct/test cells and create additional performance proof for this technology. The third Objective is to develop battery-compatible metallic joining technology for the coated paper, so that it may ultimately be used as both active material/current collector and achieve its full promise. The fourth Objective is

expanded development of the existing pilot-scale papermaking equipment as a bridge to a future commercial system. The sum of these Objectives is the project goal, which is to demonstrate cost/manufacturing/performance features that will define this as a commercially compelling next-generation technology, attracting investment/support for its next stage of development.

This material is unique in that it *simultaneously* meets the real-world criteria of breakthrough energy storage, low irreversible capacity, low cost and viable manufacturability. It is transformational because of its impact on carbon dioxide generation, energy storage technology, American industry, and petroleum use. This is an enabling technology for wind/solar generators, a key to making electric vehicles viable, a huge green industrial opportunity and a job creation engine. It positively impacts every item in the Administration's ARPA agenda.

The underlying carbon nanofiber paper itself is a platform technology. Different varieties have applications in batteries, electrochemical capacitors, composites, high-frequency EMI shielding, and heat conduction. Still, the Silicon-coated version for Li-ion batteries is the so-called 'killer application'. This anode quadruples the energy storage of current anode materials, and it can more than double the energy storage of the overall battery. The battery improvement it provides will be further amplified with time, as cathodes improve in energy storage and higher concentration electrolytes emerge. This anode's successful commercialization will assert American science leadership, create a significant reduction in greenhouse gases, and create a 'Tipping Point' for Green Energy in America.

David Firsich

AEP 309

MicroPower
366 Circle Freeway Drive,
Cincinnati, OH 45246
Phone (513) 382-0100

LOI - Ohio Third Frontier Advanced Energy Program Transition of European Turbine to Ohio

Lead Applicant
MicroPower LLC
366 Circle Freeway Dr.
Cincinnati, OH 45246
Contact: Bob Pabodie
Director Engineering
Bpabodie@usturbine.net
513-910-8330

Est Funds \$500K

Collaborators:
Wikov Wind
Triumph Engineering Corp
US Turbine
BHE Environmental

Project Synopsis

MicroPower LLC is working with Wikov Wind to plan the transition of the product from the Czech republic to Ohio.

Tasks include:

Engineering effort to convert to 60HZ

Engineering to meet code/certification

Supply Chain logistics to place as much work as possible in Ohio

Project Management – potential project logistics, site layouts, interconnects, environmental etc.

The Turbine is operational in Europe, and was designed by Wintec. It is 2MW output and has 3 blade configurations, and is very competitive against the major OEMs. The discriminating feature is the gearbox design, which has unique features to extend life, durability etc.

AEP 310

Stock, Pete A.

From: Global Research & Engineering [global@globalrellc.com]
Sent: Tuesday, August 25, 2009 1:50 PM
To: OTFAEP2010
Subject: 2010 OTFAEP LOI
Attachments: Ohio Coal to Fuel LOI.pdf

Please see attached letter of intent.

Applicant:
Global Research & Engineering, LLC
27439 Holiday Lane, Suite C
Perrysburg, Ohio 43551
(419) 874-4422
email address:
global@globalrellc.com
Contact Person:
Daniel Molnar, President

Collaborators:
MR&E, Ltd.
222 West Third Street
Perrysburg, Ohio 43551
(419) 872-8180
Contact Person:
Dennis Coolidge, Vice President

AEP 311

FY2010 Ohio Third Frontier Advanced Energy Program RFP – Ohio Coal to Fuel

Executive Summary

MR&E, Ltd and Global Research and Engineering are both privately held companies located in Perrysburg, Ohio. These companies are proposing a \$665,000, one year program to convert Ohio coal to two fuel sources. The first source would be a cleaner burning solids fuel to compete with high cost low sulfur bituminous coal. The second fuel would be a coal liquid to be used directly as a crude oil replacement for refineries.

The program would employ an average of thirteen persons of the life of the project and the work will be performed in Perrysburg Ohio. Seventy-two percent of the budget will go towards labor and overhead and the remaining twenty-eight percent will go towards equipment to perform the work listed in the proposal.

The successful completion of this work can be the basis for building coal refineries to produce fuel products from Ohio coal.

Overview

The proposed effort "Ohio Coal to Fuel" is fundamentally based on established principles of low temperature (LT) carbonization and subsequent tar processing. In its earliest commercial form, LT coal carbonization was designed to provide so-called "town gas" for residential and street lighting and, concurrently, to manufacture a substantially devolatilized smokeless solid fuel with sufficient volatile remaining to enable simple open combustion. Economic importance was attached also to by-product tars, which were the essential feed stocks for the chemical industry and could be refined to manufacture synthetic fuels. The preferred coals were as a rule, lignites or sub bituminous non-coking coals. More mature coking coals, unless pretreated to destroy their coking propensities, were less suitable because they formed residues that tended to stick to the walls of the carbonization chamber so as to impede the free flow and discharge of the clean coal char products.

Engineers at both MR&E and Global have been active, participating over the last 25 years in the development and demonstration of the low temperature carbonization of lignites and sub bituminous coals to produce clean coal char and coal derived liquids. A direct convective heating carbonization technique was successfully demonstrated at the ENCOAL facility located in Gillette, Wyoming. This facility demonstrated LT carbonization using relatively low cost atmospheric pressure retorting circa 1990. Later the same engineers working with Convert Coal Inc., found ways to improve the carbonization procedure using commercially available atmospheric pressure indirectly fired carbonization apparatus. Going forward, the plan involves pretreatment of Ohio coal to adapt the improved carbonization approach to make clean coal char and coal derived liquids suitable for hydrogenation to make a useful synthetic crude oil product.

Our background includes a working knowledge of the FMC Corporation work with the COED process in Princeton, New Jersey circa 1975. Our Mr. Franklin Rinker had a close technical/exchange relationship with a Mr. Len Seglin, the then former Chief Engineer for FMC and responsible charge of the COED development/demonstration program. COED, like our ENCOAL program, was a direct gas to solids LT carbonization program. Our new and improved carbonization procedures and low pressure indirect heating program presents several advantages for both thermal efficiency and enhanced oil recovery. COED does in fact present a critical component as they were able to successfully pretreat several eastern bituminous coals. COED was also successful using hydrogenation to manufacture useful liquid fuels.

Until as recent as November of year 2008, engineers and technicians employed by MR&E/Global were performing continuous piloting work to make clean coal char for use in the steel industry as a form of metallurgical coal referred to as "M-coal" However, due to recent economic business conditions, continuation funding for the work was cut off. Most of the experienced engineers and technicians are currently unemployed. This proposed work, when funded, will result in the employment of seven persons with valuable experience suitable for rapid mobilization leading to pilot testing as proposed herein.

The proposed program will begin with the hiring and training of personnel. Equipment modifications will follow within a few days, leading to bench scale testing in the third month and continuous pilot plant testing by the middle of the fourth month. Assuming that the work can begin by early April, a final report with recommendations for proceeding with a future expanded mine-mouth demonstration can be achieved by early November of year 2009.



**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: Belkin
Proposal Type: Advanced Energy Program
Proposed Project Title: **Intelligent Home Energy Management**
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" energy management devices in the utility/transportation space. Consequently, Juice Technologies was formed in Q1 of 2008 to focus on the invention, design, development, and commercialization of a series of innovative products and services for intelligent electric vehicle charging & home energy management, targeted to mass market deployment in mid to late 2010 through 2011.

Belkin International, Inc. offers an extensive range of innovations designed to give computer and consumer electronics users seamless integration in their homes, cars, and on the go. Belkin, a privately held company founded in California in 1983, is the recognized global leader in connectivity solutions. Since their inception in 1983, Belkin has experienced an amazing 25 consecutive years of dramatic growth.

AEP 312



Intelligent Home Energy Management

In today's environment the need to reduce our reliance on foreign oil and the desire to save the planet for future generations has led to an on slot of initiatives to generate energy through clean, green, renewable sources. These energy sources, all though better for the environment, are currently capital intensive and a premium per kilowatt hour of brown power. This coupled with the upcoming legislation on cap and trade will drive the cost of electricity to hits higher point in history. The upcoming deployment of smart meters will enable a multitude of technologies that enable better understanding and tracking of energy usage and allow consumers to better manage their own utility bills.

Given this scenario, Plug Smart in conjunction with Belkin would like to give consumers a way to control their own destiny in terms of energy usage and cost. The Plug Smart/Belkin home energy management system is being developed to take pricing signals from an AMI smart meter and control Home Area Network device loads based on those price signals. The consumer will have access via multiple media applications such as the internet, cell phone, TV, etc to monitor and edit energy profiles and usage. They can also sign up for utility rate programs to allow them to take advantage of reduced off-peak pricing. Simultaneously, the utility will be able to view a "utility portal" for individual customers or in aggregate to understand use patterns, peak shaving and demand response success rates and future demand forecasting.

The Plug Smart/Belkin product will be focused on delivering high functionality, low cost devices through multiple channels such as wholesale, retail and the utilities to consumers. The supply chain focus will be on companies located in the State of Ohio.

AEP 312

Stock, Pete A.

From: Krouse, Stephanie A. [skrouse@glasstech.com]
Sent: Tuesday, August 25, 2009 1:40 PM
To: OTFAEP2010
Cc: Wetmore, Kenneth H.; Krouse, Stephanie A.
Subject: 2010 OTFAEP LOI
Attachments: Letter of Intent for Third Frontier Stir Melter.docx
SENT ON BEHALF OF KENNETH WETMORE (This LOI is also attached).
Please send confirmation that this email has been received.

Dear Ohio Department of Development;

This is the Letter of Intent (LOI) of Stir-Melter, Inc. to submit a proposal for 2010 Ohio Third Frontier Advanced Energy Program.

The required information of the LOI follows:

Lead Applicant's

- Name: Stir-Melter, Inc
- Address: 995 Fourth Street, Perrysburg Ohio 43551
- Phone Number: 419-661-9500
- Contact Person: Kenneth H. Wetmore
- Contact e-mail: kwetmore@glasstech.com
- Proposed Project Title: Commercialization of a Vitrification Process for recycling or safe storage of waste materials including hazardous materials such as Nuclear waste
- Grant Funds Requested: \$750,000 to \$1,000,000
- Collaborators: Stir-Melter, Inc., Glasstech, Inc. and Ohio suppliers

Stir-Melter Inc. has developed technology which is capable of vitrifying waste streams from various sources. Depending on the waste stream, the resultant glass can be recycled or safely stored in an approved repository. If the vitrified waste stream glass is to be stored, it has the advantage that the waste material is incorporated within the glass and thus leach resistant.

Stir-Melter has developed a small scale, proof of concept, glass melter which has shown the capability of melting various waste streams including fiber glass, asbestos, and simulated nuclear waste into a glass. Fiber glass material can be recycled rather than being placed in a landfill. Hazardous material can be vitrified for safe long term storage to avoid environmental damage.

The grant funds requested would allow Stir-Melter to commercialize these technologies by having a properly sized system in Perrysburg, Ohio that would be used as a demonstration melter for potential customers. Stir-Melter believes the grant program would be carried out over a two year period. By demonstrating the system to potential Stir-Melter customers, Stir-Melter can generate sales of the system in the U.S. and worldwide.

The United States Government has decided not to use the Yucca Mountain Nuclear Waste repository and is currently requiring each Nuclear Reactor to store the spent nuclear fuels on their premises. A Stir-Melter glass melter could be located at each nuclear electrical generator facility to vitrify the stored nuclear materials for the safe long term storage of such hazardous material.

Stir-Melter is a wholly owned subsidiary of Glasstech Inc., and has an extensive supply base within Ohio. Moving forward with this demonstration system will create and retain jobs in Ohio and each sale of a system will also create and retain jobs in Ohio.

AEP 313

8/26/2009

Dear Ohio Department of Development;

This is the Letter of Intent (LOI) of Stir-Melter, Inc. to submit a proposal for 2010 Ohio Third Frontier Advanced Energy Program.

The required information of the LOI follows:

Lead Applicant's

- Name: Stir-Melter, Inc
- Address: 995 Fourth Street, Perrysburg Ohio 43551
- Phone Number: 419-661-9500
- Contact Person: Kenneth H. Wetmore
- Contact e-mail: kwetmore@glasstech.com
- Proposed Project Title: Commercialization of a Vitrification Process for recycling or safe storage of waste materials including hazardous materials such as Nuclear waste
- Grant Funds Requested: \$750,000 to \$1,000,000
- Collaborators: Stir-Melter, Inc., Glasstech, Inc. and Ohio suppliers

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AEP 313

Letter of Intent:

To: Ohio Third Frontier Grant Programs

Project Title: Trapped Vortex Combustor Commercialization

Lead Applicant: Triumph Engineering Corp.
100 Tri-County Parkway
Cincinnati, Ohio 45246

Contact Person: Harry Westerkamp
(513)300-3567 hwesterkamp@triumph-eng.com

Grant Funds to be requested: \$250000

Project Description

This project is a combustor technology development and commercialization project, which will utilize a technology that has achieved a number of significant and disruptive technological break-throughs in combustion technology.

The objective of this project is commercialization of a developed advanced combustor technology, which for most installed gas turbines, can achieve NOx emissions less than 2 ppm and CO emissions less than 5 ppm, with zero particulates, from 50% to 100% load and less than 1 ppm Nox and between 7.5 ppm and 12 ppm CO from 10 to 50% load with zero particulates. These ultra low emission levels were achieved with both natural gas and liquid fuel. The main characteristic of the trapped vortex combustor is its breakthrough in combustion stability which permits the burning of ultra lean fuel mixtures. This combustor can operate at equivalence ratios as low as .3 compared to .5 with DLN. A second important characteristic is that the combustor has lower combustor pressure losses, compared to DLN technology, which improves overall turbine efficiency and reduces fuel consumption by a minimum of 2%.

Commercialization of this technology will reduce emissions on current gas turbines as an interim control measure until alternative energy projects are developed. Reducing emissions of current systems operating should be a goal for all energy producing plants.

AEP 314



366 Circle freeway Drive,
Cincinnati, OH 45246
(513) 382-0100 Phone

LOI - Ohio Third Frontier Advanced Energy Program Commercialization of 2 blade downwind turbine

Lead Applicant
USTurbine LLC
366 Circle Freeway Dr.
Cincinnati, OH 45246
Contact: Steve Taylor
VP Engineering
staylor@usturbine.net
513-382-0100

Est Funds \$1M

Collaborators:
WindTurbine Company
Triumph Engineering Corp
Duke Energy
Cincinnati State College

Project Synopsis

USTurbine is working with The Windturbine Company to develop the 2 blade downwind hardware for commercial use. The unit is a novel design which has fewer parts, reduced loads and a lower cost versus the traditional 3 blade upwind designs. The design has been reviewed by Duke energy, and they see potential for this product.

Previously NREL funded a development program where 2 prototypes were built and tested at NREL. These units were 500KW each, and pure prototype, proof of concept activity. One of the units had an instability in the software for blade pitch control, which caused a failure, but the resolution of this issue is known.

The proposed effort using TF funds will be to review the previous hardware, design applicable hardware and develop a supply chain for Ohio produced components. We would assemble the unit in our facility and install at a site in Ohio. We are talking to several beta sites for the first unit, and would build a first commercial unit to be installed. The size of the unit will be in the 500KW to 1MW. Estimated TF funds are \$1M.

Collaborators: Note the Wind Turbine Company are currently located in Washington State, but will relocate to initiate this activity. Triumph Engineering Corp. is an Ohio based engineering consultancy focusing on high technology projects. Duke Energy will support with installation and site logistics.

AEP 315

Letter of Intent:

To: Ohio Third Frontier Grant Programs

Project Title: District Heating and Cooling Commercialization

Lead Applicant: Triumph Engineering Corp.
100 Tri-County Parkway
Cincinnati, Ohio 45246

Contact Person: Harry Westerkamp
(513)300-3567 hwesterkamp@triumph-eng.com

Grant Funds to be requested: \$250000

Project Description: **District heating and cooling** is a system for distributing heat generated in a centralized location for residential and commercial heating requirements such as space heating and water heating. District heating plants can provide higher efficiencies and better pollution control than localized boilers. The core element of a district heating system is usually a cogeneration plant (also called combined heat and power, CHP) or a heat-only boiler station. Both have in common that they are typically based on combustion of primary energy carriers. The difference between the two systems is that, in a cogeneration plant, heat and electricity are generated simultaneously, whereas in heat-only boiler stations - as the name suggests - only heat is generated.

The combination of cogeneration and district heating is very energy efficient. A thermal power station which generates only electricity can convert less than approximately 50 % of the fuel input into electricity. The major part of the energy is wasted in form of heat and dissipated to the environment. A cogeneration plant recovers that heat and can reach total energy efficiency beyond 90 %.

School campuses, hospitals, high density areas are great candidates to use district heating. District heating is used extensively in Europe.

This project will identify potential projects to incorporate district heating into a development plan and development the engineering to support the effort. District heating and cooling is best applied to a focused project that the "governing body" has complete control over such as a university, industrial park or hospital. District heating and cooling is less effective in urban areas where individual hookups drive up the cost and lengthen the time to completion of the project.

The project will go out the the communities, determine which development projects are good candidates for district heating and cooling and propose solutions concepts to meet the needs of the project. Triumph Engineering Corp. is uniquely qualified to do this project because of our capability in designing energy systems.

AEP 316

TIMKEN

Where You Turn

Date: August 25, 2009

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

From: The Timken Company
1835 Dueber Avenue S.W.
Canton, OH 44706

Subject: 2010 Third Frontier Advanced Energy Program Letter of Intent

Lead Applicant: The Timken Company

Contact Person: David A. Degrange
(330) 471-6782
dave.degrange@timken.com

Project Title: Wind Energy Component Reliability Testing

Grant Funds to be Requested: \$750,000

Collaborators: Stark State College of Technology
6200 Frank Ave N.W.
North Canton, OH 44720
Contact: Dorey Diab / Caroline Maloney
ddiab@starkstate.edu / cmaloney@starkstate.edu

Project Summary: See attachment

Respectfully Submitted,

David A. Degrange
Manager – Technology Roadmapping and External Funding
Timken

AEP 317

**Wind Energy Component Reliability Testing
Project Summary**

Recent trends show wind turbines growing larger and larger to support the need for more reliable and cost effective energy generation. The drive systems of these larger turbines fail to reliably perform as industry expects, resulting in unacceptably high maintenance and repair costs. The anti-friction bearings used in these applications, which can range from 48 to 126 inches in outside diameter, have been identified as one of the performance-limiting components in the wind turbine's drive system. The development of advanced bearings to improve reliability and reduce wind turbine costs is critical to the commercial viability of meeting the U.S. Wind Energy initiatives.

As the only U.S.-headquartered anti-friction bearing manufacturer capable of producing wind turbine bearings up to the 126 inch diameter size, Timken believes creating component test capability is critical. To do this, Timken will partner with Stark State College of Technology to develop a wind energy component reliability testing facility on the college's campus in North Canton, Ohio. A critical element of this facility will be the development of a unique test rig capable of testing large-diameter components to simulate the load, speed and environmental conditions experienced in the field.

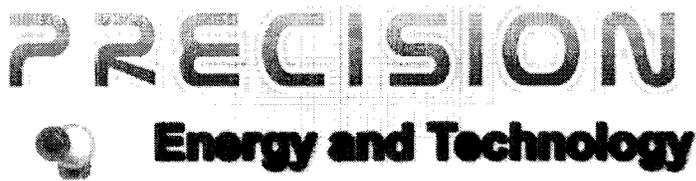
Working in collaboration with Stark State College, Timken proposes the development of a unique large-diameter wind energy component test machine to provide capability missing in the industry. The development and validation of improved bearing design and manufacturing rules is currently limited by the small amount of performance data from the field and the lack of component data generated by driveline system testing. Thus, component-level testing capability is required to cost effectively develop bearing and component designs with improved reliability and reduced system costs. Such capability will allow for the investigation and development of bearing designs in areas such as new design concepts, optimized materials, manufacturing processes, lubrication requirements, sealing and condition monitoring.

The scope of this project will encompass the design, fabrication and commissioning of a component test machine capable of operating bearings and other driveline components under simulated application conditions. The unique size and loading of large bearings will require design and analysis of a new component testing approach. The project team will supervise the construction and run-off of the equipment to ensure adequate test capability is achieved. Conducting initial testing of an ultra-large mainshaft bearing under application conditions to validate the operation, data collection and safety of this new testing capability will be the final phase of the project. This phase will provide the opportunity to develop and train technicians on the proper handling, installation and testing of large bearing components. To advance technician training, Stark State will explore with Timken what academic programs exist or need to be developed to provide technician training for workers in the company's wind business, as well as the potential for internships and externships for students and faculty, respectively.

Timken anticipates the proposed project will require approximately 30 months and \$750,000 in Ohio Third Frontier funding to complete. These estimates are due to anticipated lead times for the unique size and capability of the test machine components. Timken is prepared to provide matching funds and will draw upon Stark State and internal expertise to design and develop effective test capability.

The creation of large-diameter component test capability will enable research and development to support the commercialization of more robust, cost effective bearing designs for wind turbine applications. Improved bearing designs will support the growth of the wind energy industry and enable the trend to larger, more effective turbines by driving down the development costs and speeding up the commercial viability of large components for the wind energy market. In addition, the creation of an Ohio-based testing facility will provide opportunities for technical education in the installation and maintenance of large bearing and turbine components.

AEP 317



Date: August 24, 2009
Subject: Letter of Intent

LOI DATA

LEAD APPLICANT'S NAME: Precision Energy and Technology, LLC (PET)
ADDRESS: 2000 Composite Drive, Kettering, OH 45420
TELEPHONE: 937-558-2708
CONTACT PERSON: Thomas Willis, PE
E-MAIL ADDRESS: twillis@petfc.com

PROPOSED TITLE: Manufacturing a Hydrogen Generator-Storage System for Small Lawn and Recreational Equipment

ESTIMATED GRANT FUNDS: \$1,000,000
KNOWN COLLABORATORS: National Composite Center

Summary of Proposed Project

Precision Energy and Technology (PET) has been working with hydrogen generation over the last 3 years with funding through the Department of Energy and EMTEC's C.O.R.E. program. The results of this development is a hydrogen generating product currently used in the PET Educational Fuel Cell Kit. This technology has been scaled to move from 10 sq. cm to 325 sq. cm active area hydrogen generators powered by the grid and solar panels. In parallel, National Composite Center (NCC) has been developing filament wound pressure vessels based on glass and carbon fiber. In interviewing several potential customers, it has been determined that a hydrogen generator coupled with a storage device based on a filament wound pressure vessel would meet the niche for supplying hydrogen to the small lawn and recreational equipment market.

Therefore, PET and NCC will be joining forces to develop and manufacture a hydrogen generator-storage system for the small lawn and recreational equipment marketplace.

AEP 318



8001 East Pleasant Valley Rd
Independence, OH 44131

August 25, 2009

To: Ohio Department of Development
Email: OTFAEP2010@development.ohio.gov

Subject : 2010 OTFAEP LOI

This letter states our intent to submit a full proposal under the Ohio Third Frontier Advanced Energy Program for Fiscal Year 2010.

Prospective Lead Applicant: Novolyte Technologies, Inc
Prospective Lead Applicant Address: 8001 East Pleasant Valley Rd
Independence, OH 44131
Prospective Lead Applicant Contact: Martin W. Payne, Ph.D.
Contact Telephone Number: 216-867-1040, 440-865-2460
Contact Email Address: paynem@novolyte.com
Proposed Project Title: Development and Commercialization of Advanced Electrolyte Materials for Next Generation Lithium Ion Batteries
Estimated Grant Funds to be Requested: \$1,250,000 Total
\$1,000,000 from Third Frontier R&D Fund
\$ 250,000 from Wright Capital Fund
Known Collaborators: Case Western Reserve University

AEP 319



Martin W. Payne, Ph.D.

August 25, 2009

Date

SUMMARY OF PROPOSED PROJECT

This proposal addresses the need to significantly improve electrolyte materials and additives for lithium ion batteries in order to improve battery performance sufficiently to merit the commercialization of these materials and additives. Since the introduction of lithium ion (Li-ion) batteries by Sony in 1991, the market for Li-ion batteries has grown significantly, with applications ranging from consumer electronics (portable computers, cell phones and camcorders, and, more recently, power tools and digital cameras) to projected vehicular transportation applications (HEV, PHEV, EV, etc) and stationary electrical grid load leveling. However, technological advancements in Li-ion battery design and components (e.g., cathodes, anodes, electrolytes, and separators) are not keeping pace with growth in demand and increased performance requirements. Unfortunately, Li-ion technology today is fraught with many technical challenges that limit near-term adoption, especially in automotive applications. These include thermal runaway problems that could cause dangerous explosions, inadequate temperature performance that limits applicability, and overall thermal management of the battery pack system. Not surprisingly, the US Department of Energy is sponsoring efforts to boost manufacturing capabilities and to gain fundamental knowledge regarding the operation of Li-ion batteries. Novolyte Technologies has received one such grant—to increase electrolyte production capabilities in the US for Li-ion batteries and other electrochemical energy storage devices. Improved understanding of Li-ion batteries and their manufacture is necessary for the US to become a world leader in battery science, technology, and manufacturing, and will contribute to the US achieving global leadership in gradual and eventual replacement of conventional gasoline internal combustion engines by electrically powered vehicles.

The State of Ohio is in a privileged position to accelerate progress in areas critical to further development and optimization of Li-ion batteries and other electrochemical energy storage devices, such as ultracapacitors. Ohio's industrial and academic institutions—such as Novolyte Technologies and Case Western Reserve University—are well positioned to make significant progress, through the Third Frontier Program and other state funding opportunities.

From a technical perspective, the electrolyte may be regarded as the “life blood” of a battery, as it comes in contact with every one of the battery's internal components. As such, the electrolyte critically influences device performance, including (among other factors), power and energy density, temperature range of operation, durability, and safety. Our proposal aims to address several of these factors – safety, reliability, cycle life, and product lifetime – that limit Li-ion adoption, for which technical achievement in these areas will open the door to currently unaddressable markets. Its main objectives can be summarized as follows:

- assessment of novel formulations of electrolytes, incorporating solvents, additives and salts currently produced by Novolyte, employing combinatorial techniques;
- design, synthesis, purification and electrochemical and physical characterization of novel bifunctional electrolytes;
- development of new techniques and methods for the rapid screening of new electrolytes;
- testing and evaluation of the most promising formulations in actual batteries in collaboration with battery manufacturers, followed by large scale production and commercialization.

AEP 319



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: Lora B. Thrun, Ph.D.
Director of Commercialization
l.thrun@nextechmaterials.com

Project Title: *Developing Safety Systems for Distributed Energy Storage Facilities*

Known Collaborators:

Estimated Dollars: This project is estimated to be a \$2 million effort, with \$1,000,000 of Third Frontier Research and Development funds, and \$1,000,000 of cost share funds.

Summary: This project will involve development of hydrogen concentration monitoring systems in energy storage systems which generate or store hydrogen. This would include both electrolyzer systems designed to store hydrogen and oxygen from excess electricity generated, as well as traditional lead-acid battery systems, which generate excess hydrogen if they experience overcharge situation. The primary focus of the effort will be placed on manufacturing component technology within the state of Ohio for these monitoring systems.

AEP 320



Applied Sciences, Inc.
PO Box 579 • 141 W. Xenia Ave. • Cedarville, OH 45314-0579
Phone: 937-766-2020 • Fax: 937-766-5886

August 25, 2009

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

Subject: 2010 OTFAEP LOI

Attention: OTFAEP2010@development.ohio.gov

This Letter of Intent serves to communicate Applied Sciences, Inc.'s intention to submit a proposal in response to the FY 2010 Third Frontier Advanced Energy Program for the following project:

Lead Applicant:	Applied Sciences, Inc. (Ohio for-profit company)
Address:	141 W. Xenia Ave., Cedarville, OH 45314
Phone:	937-766-2020 x100
Contact person:	Max L. Lake, President / CEO
Email:	mllake@apsci.com
Proposed Project Title:	Development of High-Performance Batteries
Estimated Request	\$1 million
Known Collaborators	Pyrograf Products, Inc. (Ohio for-profit company)

Sincerely,

Max L. Lake
President

AEP 321



Applied Sciences, Inc.
PO Box 579 • 141 W. Xenia Ave. • Cedarville, OH 45314-0579
Phone: 937-766-2020 • Fax: 937-766-5886

Applied Sciences, Inc.'s proposed project for the FY 2010 Third Frontier Advanced Energy Program

Project Title: Development of High-Performance Batteries

Project Description:

Proliferation of wireless consumer electronics and the emergence of hybrid electric and all electric vehicles has fueled projections of a doubling of the market for primary and secondary batteries by 2015.

Applied Sciences, Inc. (ASI) has a strong track record of developing and commercializing innovative carbon materials. ASI-development of carbon nanofibers has led to the success of the world's third largest carbon nanofiber producer – Pyrograf Products, Inc. (PPI). Because of PPI, Ohio is home to 25% of the world's manufacturing capacity for carbon nanofibers. Carbon nanofibers, and their more expensive variant, carbon nanotubes, are key components of the nanomaterials industry.

In this Third Frontier-funded project, Applied Sciences, Inc. will work with its collaborators to develop high-performance batteries and battery-components.

AEP 321



William G Lowrie Chemical and Biomolecular Engineering
140 W. 19th Ave.
Columbus, OH 43210
614-688-3269

Subject: Letter of Intent (LOI)

Required Details

Lead Applicant's Name : The Ohio State University Research Foundation
Lead Applicant's Address : Research Foundation
1960 Kenny Road
Columbus, OH. 43210

Contact Person : Professor Liang-Shih Fan
Contact E-mail : fan.l@osu.edu
Contact Phone # : 614-688-3262
Project Title : "Advanced Biomass Chemical Looping for Hydrogen Generation"
Grant Requested : \$1,500,000
Collaborators : U.S. Department of Energy

Dear whom it may concerns,

This Letter of Intent is in response to the Ohio Department of Development's Request for Proposals (RFP) for the Ohio Third Frontier Advanced Energy Program. Professor Liang-Shih Fan's research group at The Ohio State University (OSU), the lead applicant for this project, plans to submit a proposal for this RFP. The title of proposed project is "**Advanced Biomass Direct Chemical Looping for Hydrogen Generation.**" In this project, OSU proposes to construct a prototype chemical looping system utilizing a biomass feedstock for cost-effective hydrogen generation. The work in this project will focus on the handling of the biomass-based solid fuels for their application in the fuel cell.

For this project, the U.S. Department of Energy will provide the cost-share through the current chemical looping project for the retrofit to the pulverized coal power plant (DE-NT0005289). The industrial partners in this project include Ohio Coal Development Office, Air Products, CONSOL Energy, Shell, Babcock and Wilcox.

Yours Sincerely,

Liang-Shih Fan, Ph.D
Distinguished University Professor,
C. John Easton Professor in Engineering, and
Professor of Chemical and Biomolecular Engineering
The Ohio State University
140 W.19th Avenue,
Columbus, OH 43210
Email: fan.l@osu.edu

AEP 322



Ohio Third Frontier RCP Program

August 25, 2009

Research Commercialization Program
Fiscal Year 2010
The Ohio Department of Development/Technology Division
77 South High Street, 25th Floor
Columbus, Ohio 43125-6130

Subject: Letter of Intent for the Proposal

**Syracuse Green Energy Initiative:
“Sustainable Green Energy Using Hybrid Solar-Wind Technology”**

Dear Sir/Madam:

Schuyler Murdock, CEO of CM-GC, LLC is submitting a proposal on behalf of our firm, CM-GC, LLC of Cincinnati, Ohio for consideration by the Ohio Third Frontier Research and Commercialization Program for the fiscal year 2010.

Prospective Lead Applicant’s Information:

CM-GC, LLC
1810 Section Road
Cincinnati, OH 45237
513-527-4141
Schuyler Murdock
Email: smurdock@cm-gc.com

Proposed Project Title:

Syracuse Green Energy Initiative

Estimated Grant Fund Requested:

Three Million Dollars (\$3,000,000.00)

Known Collaborators:

Schuyler Murdock, CEO CM-GC, LLC 1810 Section Road Cincinnati, Ohio 45237 513-527-4141 Email: smurdock@cm-gc.com	Howard C. Jackson, Vice President SMC Global, LLC 7811 Laurel Avenue, Suite A Cincinnati, Ohio 45243 513-582-7602 Email: howard@smcglobalc.com	Charles Oyenuga, CEO Technocraft, LLC 7811 Laurel Avenue, Suite B Cincinnati, Ohio 45243 513-205-0106 Email: oyenuga.co@technocraftllc.com
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Please do not hesitate to contact me should you need additional information.

Sincerely,

Schuyler Murdock
President/CEO

CM-GC ■ 1810 Section Rd ■ Cincinnati, OH 45237 ■ Phone: 513.527.4141 ■ Fax: 1.866.364.5106 ■ E-mail: info@cm-gc.com

www.cm-gc.com



Summary of Proposed Project

Syracuse Green Energy Initiative “Sustainable Green Energy Using Hybrid Solar-Wind Technology”

Alternative energy is the call of our nation today. With high costs to produce energy and consumption increasing daily, it is vitally important that sustainable alternative energy systems are created and placed in service to reduce the carbon footprint, yet provide the required energy source to operate utilities in both the public and private sectors as well as for residential consumers. The sustainable green hybrid solar-wind system is one of the catalysts to a new energy source for our region and beyond.

The goal of the hybrid solar-wind energy system is to supplement or replace the use of commonly-used energy systems in light industrial/commercial and residential applications. The hybrid solar-wind energy system is designed to significantly reduce energy consumption virtually off the “standard” power grid. This will be beneficial financially and ecologically to the energy demands of business and industry, and also residential consumers. In urban area where revitalization efforts are underway throughout the country, the hybrid solar-wind energy system would be an asset to reducing the carbon footprint, while at the same time providing all required energy efficiencies. There are also many applications for use of hybrid solar-wind technology in rural areas which may include operating farm equipment and providing energy for utilities.

The hybrid solar-wind system has the advantages of being flexible in construction and efficient in energy conversion and delivery. The system consists of the following parts:

- Low Friction Wind Generator
- Photovoltaic Solar Panel
- Inverter
- Controller
- Batteries

The hybrid solar-wind energy system will make it possible to reduce the carbon footprint, thereby conserving energy, while at the same time supplying necessary power to operate utilities. This alternative source will make it possible for the end-users to:

- Operate Machinery
- Light common areas (internal and external including stairwells, hallways, parking areas, etc.)
- Operate computers
- Household Appliances

The following approach will be used to establish our goals and objectives:

- Establish a test platform, assembly, distribution, marketing and manufacturing facility within the HUB Zone of Cincinnati, which will result in technical job creation for Ohioans, in addition to being the distribution and showcase center for prospective end-users.
- Establish an assembly and manufacturing facility that will be used to assemble, distribute and install the hybrid solar-wind system.
- The assembly and manufacturing facility will also be used as a job training facility to create immediate jobs ranging from technical to administrative and customer service.
- Refinement of the developed Sustainable Green Energy using Hybrid Solar-Wind Technology will result in the necessary commercialization framework to get the product to market in the Ohio, Kentucky and Indiana Region within 36 months.

Ohio Third Frontier Advanced Energy Program

Fiscal Year 2010

Letter of Intent

Submitted to:

2010 OTFAEP LOI
The Ohio Department of Development
Technology and Innovation Division
77 South High Street, 25th Floor
Columbus, OH 43215
OTFAEP2010@development.ohio.gov

Subject:

Letter of Intent

Lead Applicant:

Cornerstone Research Group, Inc.
2750 Indian Ripple Road
Dayton, Ohio 45440

Phone: 937-320-1877

Contact: Hugo Heyns (heynshe@crgrp.com)

Proposed Project Title: Wind Turbine Blade Manufacturing and Life Cycle Cost Reduction

Anticipated Grant Funds Required: \$5,000,000

Cornerstone Research Group (CRG) accomplishes research and development under contract with commercial and governmental entities. Three technologies that were defined and partially developed under these contracted efforts, when combined and applied to wind turbine blade design and manufacture, will significantly reduce the life cycle costs associated with most configurations of existing turbine blade designs. These technologies are:

- Shape memory polymer-based manufacturing tooling, which will allow fabrication of a single piece, complex curvature wind turbine blade using a reusable, single-piece tool;
- Self-healing composite structure and skin materials which will autonomously recognize impact failures to operating blades, initiate and complete structural repairs to 90% structural integrity, and assure that the repair is complete – all autonomously, without any operator or operating system direction; and
- Inherently adaptable blade airfoils which are designed to autonomously sense damaging wind gusts and modify the blade airfoil to avoid turbine over-speed while continuing operations.

CRG proposes to complete these development efforts; apply the results to turbine blade design; conduct small-scale and full-scale design, structural, reliability, and performance testing; and fabricate design proof articles for testing on an existing wind turbine. Full rate production will then follow an initial rate production proofing.

AEP 324



August 24, 2009

Attn: John Griffin
Director
Ohio Department of Development, Technology Division
77 South High Street, 25th Floor
Columbus, Ohio 43215

Subject: 2010 TFAEP LOI

Dear Mr. Griffin:

Please accept this Letter of Intent from WebCore Technologies, LLC. for our Third Frontier Advanced Energy Program (TFAEP) proposal. The relevant information about our proposal are as follows:

Lead Applicant: WebCore Technologies, Inc.

Address: 8821 Washington Church Road, Miamisburg, Ohio 45342

Telephone: (937) 435-2200

Contact Person: Dr. Rob Banerjee, Vice President of Business Development

Contact Email: rbanerjee@webcoreonline.com

Project Title: Development and Commercialization of Composite Towers for Wind Turbines

Estimated Grant Amount Requested: \$1 million

Known Collaborators: GE Energy, Ershigs, Owens Corning, Ashland Performance Materials, University of Dayton, EMTEC, PolymerOhio, 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.

WebCore 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

AEP 325

WebCore Technologies, LLC

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-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.

WebCore 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,



Rob Banerjee, Ph.D.
Vice President, Business Development
WebCore Technologies, LLC.
8821 Washington Church Road
Miamisburg, Ohio 45342
Office: 937-435-2200 ext 224
Mobile: 937-321-5035
email: rbanerjee@webcoreonline.com
web: www.webcoreonline.com

AEP 325

Stock, Pete A.

From: Dave [dsarafian@stratumenergy.com]
Sent: Tuesday, August 25, 2009 12:34 PM
To: OTFAEP2010
Cc: 'Mark Daroux'
Subject: 2010 OTFAEP LOI -- Stratum Energy - High Power Lithium Batteries
Attachments: OTFAEP2010-Stratum Energy LOI--improved EV efficiency.zip; OTFAEP2010-Stratum Energy LOI--improved EV efficiency.pdf

Please find attached Stratum Energy's Letter Of Intent for the 2010 Advanced Energy Grant program. Our proposal will be titled "High Power and High Energy Lithium-ion Polymer Batteries for Traction Applications".

The LOI is submitted in both PDF and Word (zipped) formats.

If you have any questions, please feel free to contact us.

Sincerely,

David Sarafian

Stratum Energy
Cleveland, Ohio
216-432-9850

10-326

9/1/2009

SUN POWER

1000 Mill Street, Athens, Ohio 45701-1000, USA Phone: 740-594-2221 Fax: 740-593-7531

To Whom It May Concern:

This letter has been prepared by Sunpower Inc. to announce the company's intention to respond to the Ohio Third Frontier Research Commercialization Grant Program's RFP. Below is general company information requested in the RFP.

General Information:

Lead Applicant:

Sunpower Inc.

182 Mill Street

Athens, Ohio 45701

Phone: 740-594-2221

Contact: Courtney Lenart (lenart@sunpower.com) or Josh Collins (collins@sunpower.com)

Project Title: Commercialization of the free-piston Stirling engine

Estimated Grant Funds: \$1,000,000 OTF AEP; up to \$1,000,000 WCF

Known Collaborators: NASA Glenn Research Center, Voinovich School of Leadership and Public Affairs Appalachian Regional Entrepreneurship Group (AREG), Voinovich School of Leadership and Public Affairs Consortium for Energy, Economics and the Environment (CE3).

Attached is a one page summary of the proposed project.

Please feel free to contact me at any time via telephone, 740-594-2221 Extension 506, or via email, lenart@sunpower.com.

With kind regards,



Courtney Lenart

Contracts Administrator and Export Control Officer

Phone: +1-740-594-2221, Ext. 506

Fax: +1-740-593-7531

www.sunpower.com

AEP 327

Proposed Project

Project Summary

Sunpower is requesting funds to take a demonstrated proof of concept through pilot production by fabricating 50 commercial free-piston Stirling engines (FPSE) (10 for prototyping, 20 for life testing and 20 for pilot production), with the ultimate goal of becoming an Ohio-based Original Equipment Manufacturer (OEM). The proposed application of the technology will address remote power generation needs for applications such as communications infrastructure, remote monitoring equipment, and off-grid subsistence. The competitive advantage Sunpower's FPSE to power these applications resides in proven superior efficiency, long operational life, fuel flexibility (including solar, biomass and fossil fuels), minimal maintenance requirements, and compact size. At production quantities, Sunpower's engine is projected to be cost-competitive with the established technologies in the market space. In addition, commercialization efforts will build on Sunpower's ongoing commitment to working with Ohio companies, maximizing the economic footprint of the funds requested.

The Company

Since 1974, Sunpower has been a world leader in free-piston Stirling technology, specializing in engineering Research and Development and cryocooler manufacturing. The company's intellectual capital is protected by 39 U.S. patents and 97 international patents. On a cumulative basis since 1995, Sunpower has received over \$60 million in funded research. In addition, the U.S. government has awarded Sunpower with more than 30 Small Business Innovative Research grants for ground-breaking technological development and commercialization. Located in 23,000ft² of facility space in Athens, Ohio, Sunpower has been a steady employer of high-tech jobs in Appalachia. Currently, there are 63 full time employees.

Project Background

Sunpower intends to commercialize free-piston Stirling engines (FPSE) to be used for remote power generation applications. This project is in line with Third Frontiers' Advanced/Alternative Energy technology focus area. Sunpower FPSEs are in the late demonstration phase of development. Over \$665,000 of Sunpower internal funds have been invested into this project since the 1st quarter of 2008. Third Frontier's additional funding will drive Sunpower's commercialization efforts up the steep ascent out of the "Valley of Death." The proposed project is backed by market surveys, customer input on potential applications, and Sunpower's proven performance in hardware development and delivery. Examples of successful hardware development include the Advanced Stirling Convertor developed through NASA Glenn Research Center funding, Sunpower onsite cryocooler manufacturing, and Micro Combined Heat and Power (Micro-CHP) commercialization efforts by a Sunpower licensee.

Economic Impact

This project will create and retain high-tech/high-paying jobs in a region with traditionally high unemployment and in a Historically Underutilized Business Zone. The majority of Sunpower's workforce is from Appalachian Ohio counties; however, current recruitment has attracted candidates on local, regional, national and global levels. The net effect is successfully reducing the export of Appalachian Ohio's educated workforce and creating new economic building blocks. Commercialization efforts will also trickle down funds to Ohio-based machine shops, technology/process development centers, specialized process providers, production equipment providers, and lab equipment providers. Sunpower relies heavily on Ohio-based service and hardware providers and sourced over \$1.1 million in 2008, roughly 13 percent of the company's 2008 revenue. This type of collaboration is expected to carry over into all commercial endeavors.

Proposed Project

To move to the next phase of commercialization, Sunpower must build pre-production and lifecycle demonstrators as well as dedicated production facilities. The demonstrators will include modifications to reduce costs and improve commercial viability addressing Sunpower's primary barrier to market entry: cost. Sunpower is requesting \$1,000,000 of Ohio Third Frontier Advance Energy funds, and up to \$1,000,000 of Wright Capital Funds to assist with this phase of development. NASA Glenn Research Center has expressed interest in providing support for the proposal and cost sharing as a collaborative partner in this effort. Sunpower is also collaborating with the Voinovich School at Ohio University for market analysis and identifying resources to develop design for manufacturing capabilities in house. The company's long-term goal is to begin manufacturing in Athens, Ohio and to become an OEM of FPSEs. Sunpower has past experience with successfully commercializing its technology, as demonstrated by a self-sustaining cryocooler manufacturing entity within the company.

Sunpower is requesting Third Frontier funds to aggressively pursue the commercialization of its free-piston Stirling engine. The requested funding will directly assist an Appalachian Ohio based high-technology company in commercializing a mature technology that will serve as the base for a range of business opportunities. Ohio's economy will be positively impacted on a regional and state level through the creation of a new industry seeded in Ohio and continued use of Ohio-based companies as primary supply chain partners.

AEP 327

**Letter of Intent
Request for Proposals
Ohio Third Frontier Advanced Energy Program Fiscal 2010**

Prospective
lead Applicant:

SuGanit Systems Inc.,
Suite # 2000E
Research and Technology Complex 1,
2600 Dorr Street,
Toledo, OH 43606

Collaborators:

- (1) The University of Toledo,
Toledo, OH 43606

- (2) GrafTech International Holdings Inc
12900 Snow Road
Parma, OH 44130

Contact person:

Praveen Paripati
President, SuGanit Systems Inc.
Phone: 703-371-6718
praveen@suganit.com

Proposed Project Title: **Carbon Fibers from Biomass for Wind and Solar Energy Applications**

Estimated Grant Funds

To be requested: \$1,000,000 from Ohio Third Frontier program +\$1,000,000 (Cost Share by the applicants)

A brief summary of the proposed project is provided on the next page.

AEP 328

Carbon Fibers From Biomass For Wind And Solar Applications

Lignocellulosic biomass (agricultural and forestry residues, herbaceous and woody crops) is the most abundantly available renewable material on this planet. Use of such renewable resource is a major part of the solution for producing renewable fuels and chemicals and reducing the carbon footprint. SuGanit Systems Inc. in collaboration with The University of Toledo has successfully developed a platform (that is currently being scaled up for pilot scale level operations) to produce sugars and lignin from various types of biomass feedstock. The intent of this proposal is to produce carbon fibers from lignin. One of the collaborators, GrafTech has extensive experience in evaluating the carbon fiber feedstock and in processes in making carbon fibers (GrafTech is the inventor of the high strength high modulus mesophase pitch fiber and rayon fiber), and applying them in various energy related and industrial applications.

Carbon fiber is typically manufactured from petroleum based feedstock. As such, it suffers from the vagaries of high price fluctuations of the crude oil in addition to being imported to a significant extent. The goal of the proposal would be to develop technology for the production of carbon fibers from lignin for use in renewable energy systems manufacturing applications – namely in solar photovoltaic and wind energy manufacturing applications. More specifically, various graphite crucibles and insulating products (made from carbon fibers) are used to produce single crystal silicon for use in solar panel. For wind energy, carbon fiber reinforced plastics are used for the wind turbine blades. Developing a reliable framework for production of carbon fibers from lignin will reduce the need for importing crude oil, increase the use of locally grown biomass and also help reduce the carbon footprint of the carbon fiber manufacture process, and at the same time help stabilize the price of carbon fiber products.

As SuGanit scales up its cellulosic bio-fuels/chemicals process, lignin is produced on a very large scale (a 10 ton/day pilot scale plant could produce 1 to 2 tons of lignin per day, and commercial production is fifty to hundred times larger in scale). Finding proper uses for lignin becomes an important business driver. Similarly, for GrafTech, finding a steady and renewable replacement source for petroleum based feedstock to make carbon/graphite products is a significant goal.

The collaborators (SuGanit Systems Inc, University of Toledo and GrafTech International) have the expertise and the capability to carry the project all the way from receiving feedstock at a cellulosic ethanol plant, separating and refining lignin and manufacturing carbon fibers from it. By promoting such collaborations, Ohio can lead the way in exploiting the synergies that are available between different types of renewable resource usage technologies.

AEP 328

LETTER OF INTENT – GENERAL INFORMATION
APPLICATION FOR FUNDING FROM
OHIO DEPARTMENT OF DEVELOPMENT
OHIO THIRD FRONTIER ADVANCED ENERGY PROGRAM

1. Proposed Project Title: Wind Diverters for Wind Turbines
2. Lead Applicant's Name: Wind Diverters Limited
3. Lead Applicant Contact Person: Stephen Boyd
4. Lead Applicant Address: 2473 Victoria Parkway
Hudson, OH 44236
5. Lead Applicant Telephone No.: (330) 655-0514
6. Lead Applicant Email Address: sboyd61471@roadrunner.com
7. Collaborators:
- The University of Toledo
College of Engineering
Mechanical, Industrial and Manufacturing
Engineering Department
Toledo, OH
- Contact: Dr. Terry T.M. Ng
- Seaman Corporation
Wooster, OH
- Contact: Kenneth Chaloupek
Vice President of Engineering
& Information Technology
- Semtorq, Inc.
Aurora, OH
- Contact: Joe Seme
President
8. Funding:
- a. Total Project Cost: \$485,000.00
- b. Grant to be Requested: \$242,500.00

AEP 329

LETTER OF INTENT - EXECUTIVE SUMMARY

WIND DIVERTERS FOR WIND TURBINES

In the spring of this year, preliminary research was conducted at the University of Toledo by the Senior Design Class of the Mechanical, Industrial and Manufacturing Engineering Department to investigate the feasibility of diverting the airflow that passes underneath the Rotor of a Wind Turbine up to the Rotor Blades. Several different designs of Wind Diverters were considered. Computational studies were made of the different designs. In addition, models were made of three (3) designs and tested in the Wind Tunnel at UT. Comparisons were then made between the energy output of a model Wind Turbine with and without a Diverter. It was found that the energy output, depending on the design and wind speed, increased in the range of 30% to 50%.

The reasons why we are applying for this grant from the Third Frontier Advance Energy Program are as follows:

1. University of Toledo

The preliminary research that was conducted at the University of Toledo showed that the basic concept was correct, that it is possible to divert the wind from up underneath the Rotor to the Blades themselves. However, the best shape / configuration for the Diverter was not finalized. Additional design / testing is needed to determine the optimal Diverter design.

In addition, we would like to develop a computation model that can be used to predict the increase in energy output for a specific Wind Turbine size, height, location and wind speed or speeds. This computational model will help us to demonstrate to the Owner of a Wind Turbine the economic benefit of installing a Wind Diverter on their existing or new Wind Turbine.

2. Semtorq, Inc.

After completing the theoretical design work at the University of Toledo, we would like to build and field test the best design or designs that are developed by the University. One of the configurations that we plan to test is a pole mounted, solid Diverter. We plan to test both a single and double version. It is thought that it will be possible to actually double the Wind Speed with the double version with the objective of reaching an 8 times increase in the energy output from the Wind Turbine. A comparison of energy output with and without the Diverter will be made.

Semtorq has the capability of fabricating the Diverters needed for the field test. In addition, they have land available around their factory that they will provide for locating the Wind Turbines and personnel available for installation and continuous monitoring of the field test results.

3. Seaman Corporation

As noted above, after completion of the design work at UT, we would like to also build a ground based model of the Diverter for field testing.

Seaman Corporation is a supplier of fabrics for tensioned fabric structures. We plan to build a small fabric version in order to develop the design and techniques required to build a utility scale version of the Diverter. Also, we will install the ground based Diverter around the base of a Wind Turbine to test and compare the increase in energy output with and without the Diverter.

AEP 329

INTEGRATED BIO-REFINERY LABORATORY
Funding Opportunity - Ohio Third Frontier Advanced Energy Program

Proposed Project Title: Integrated bio-refinery laboratory

Lead Applicant Name: M&G Polymers USA, LLC

Lead Applicant Address: P O Box 590
6951 Ridge Road
Sharon Center, OH 44274

Lead Applicant Phone: 330-239-7401 (Office)
330-351-6261 (Cell)

Lead Applicant Contact Person: Delane N. Richardson, Director of Research and Development

Lead Applicant Email Address: Delane. N. Richardson@GruppoMGUS.com

Estimated Grant Funds Requested: \$2,000,000 (\$1,000,000 Capital)

Known Collaborators: M&G Polymers USA, LLC, Sharon Center, OH
Ohio State University, Columbus, OH
Barry Farms, Wadsworth OH
OBIC Industry Alliance members
Polymer Ohio
Chemtex US, Wilmington, NC
C5.6 Technologies, Madison, WI

Project Duration: 5 Years

Summary of the Proposed Project:

The objective of the project is to build, equip and staff a bio-chemical laboratory to facilitate commercialization of second generation bio-refining technology in Ohio.

AEP 330

Lead Applicant:

Douglas Struble
Vice President of Operations
Red Lion Bio-Energy
387 West Dussel Drive
Maumee, OH 43537

(P) 419/897-6868

Douglas Struble
(e) doug.struble@redlionbio-energy.com

Project Title: Non-Combustive Gasification Commercialization

Estimated Grant Funds to be Requested: \$1,000,000.00

Collaborators:

Surface Combustion, Inc.
1700 Indian Wood Circle
Maumee, OH
Key contact: Max Hoetzi

The University of Toledo
2801 West Bancroft
Toledo, OH 43606-3390
Key contact: Dr. Sasidhar Varanasi

Project Summary:

Red Lion Bio-Energy (a Maumee Ohio based company) has constructed an Advanced Energy demonstration facility at The University of Toledo utilizing a proprietary non combustive gasification technology. The process converts agricultural waste, wood waste, and low value coal into clean syngas in such quantities to fuel The University Energy Center. The facility has successfully performed several demonstration runs (up to 1 week continuous operation) at 10 tons/day feed rate. For commercial acceptance the facility needs to achieve production rates that consume 25 – 50 tons per day. The first stage of the process includes a Pyrolysis unit, which has been identified as the bottle-neck to increasing production. An engineered solution has been completed and technology exists to implement a new pyrolysis unit capable of achieving the commercialization goal. The “new pyrolysis unit” is a modification to an existing proven technology. Red Lion Bio-Energy has achieved proof of concept of the technology while Surface Combustion has significant experience with manufacture and supply of pyrolysis units. The University of Toledo has worked with Red Lion Bio-Energy over the past 2 years and has installed laboratory equipment and expertise to further support this project. By collaborating together and with State of Ohio support, a commercial plant will be realized.

AEP 331

The project work will occur at the existing plant in Northwest Ohio, at University of Toledo with all Ohio collaborators. Red Lion Bio-Energy has received funding from the Regional Growth Partnership (Ohio Third Frontier Entrepreneurial Program) and employed Surface Combustion to engineer modifications to their base pyrolysis design to integrate into the Red Lion process. This engineering has successfully been completed.

The goals of this project are: 1) Build and install a new pyrolysis unit, based on completed engineering that will allow facility to operate at 25-50 tons/day. 2) Determine optimal processing parameters. 3) Perform detailed mass and energy balances at 25-50 tons/day production rate over extended runs. 4) Document critical parameters and modify business plan, if needed, to reflect actual cost and performance. 5) Close a deal for a new plant installation.

By leveraging the significant private investment and experience of Red Lion Bio-Energy, past investment by Ohio Third Frontier Entrepreneurial Program, Surface Combustion Pyrolysis experience, the great knowledge at The University of Toledo, and support of this grant the goals will be met.

Sincerely,

Douglas Struble

Douglas Struble
VP Operations
Red Lion Bio-Energy
Maumee, Ohio 43537
(419) 897-6868

AEP 331

24 August, 2009



Ohio Department of Development,
Technology Division,
77 South High St, 25th Floor
Columbus, Ohio 43215
Attn: TFAEP Program

Re: Letter of Intent from Stratum Energy Systems, LLC to submit a Proposal for Ohio Third Frontier Advanced Energy program (Fiscal Year 2010)

Dear Sirs,

Stratum Energy Systems intends to submit a proposal for the above program in response to your RFP released 31 July, 2009.

Lead Applicant: Stratum Energy Systems
Address: 1791 East 40th Street, Cleveland, Ohio 44103
Phone: 216-432-9850
Contact: Mark Daroux
Email: mdaroux@stratumenergy.com, markdaroux@yahoo.com

The title of our proposal will be "Improved Energy Efficiency for Hybrid and Electric Vehicles". We are requesting \$1 million in grant funds under this program to fund development of a product, the establishment of a small test fleet which will prove the system in the field, and finally commercialization. We will collaborate in this work with the Great Lakes Energy Institute at Case Western Reserve University.

Please find a summary of our project attached.

Yours sincerely,
Mark Daroux
President,
Stratum Energy Systems, LLC.

AEP 332



PROJECT SUMMARY

It now appears certain that Electric Hybrid and All-Electric vehicles will play an increasingly important role in transportation worldwide, because of the benefits they bring for energy strategies and emission reductions. The speed with which they find widespread introduction however will be strongly dependent on price, and the cost of the advanced batteries needed is the largest limiting factor. The greatest benefits come when the vehicle is being operated in all-electric mode, but for most cars the need to keep the cost of the battery pack reasonable will limit the range achievable in this mode. Since price will set an upper limit on the size of the battery, there is therefore a strong incentive to make the most efficient use of the energy stored in order to provide consumers a practical range. Weight minimization and aerodynamic design will be important, but recapturing energy during braking is probably the area offering the greatest potential for improved efficiency.

Under this proposal we will increase the amount of energy recovered under regenerative braking, which for most hybrid electric cars currently available is of the order of ten percent or less. Our solution is to develop a braking system that co-ordinates the electric motor/ generator with hydraulic brakes and a lithium-ion battery pack optimized to accept the energy transients generated. Among other requirements, the control system needed must direct the energy flows involved while still giving the driver control and feedback of the brakes, and the battery must be able to accept and store the energy generated over a period of only a few seconds without overheating, and be able to do this many thousands of times without degradation.

Stratum Energy is a developer and manufacturer of large format lithium-ion batteries, and has a manufacturing operation in Cleveland, Ohio. It is developing battery conversion kits for both plug-in hybrid and all-electric vehicles. Stratum will develop and test the battery packs required. The Great Lakes Energy Institute at Case Western Reserve University, in conjunction with the Engineering School, will develop and test the braking control system. The combined system will then be field tested in a small test fleet of up to ten PHEVs and electric cars, before being incorporated into Stratum's commercial kits.

AEP 332