WP &C WHITESTONE POWER & COMMUNICATIONS
PHONE: (907) 895-4938 FAX (907) 895-4787 P.O. BOX 1229 DELTA JCT. AK, 99737

Poncelet Kinetics RHK100 Prototype Demonstration Project

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Whitestone Power and Communications
950 Westside Loop
Delta Junction, AK 99737-1630
907-803-5432
Steve Selvaggio, President

Project Partners: Hasz Consulting, LLC; Energetic Drives, LLC; CE2 Engineers, Inc

Total Project Cost: $1,394,177
Total Grant Funds Requested: $1, 394,177
Total Matching Contributions: None

Previous Application Title(s): Whitestone Poncelet RISEC Project (2011)

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PROJECT ABSTRACT

1) Project Summary

a) Project Description: Whitestone Power and Communications (WPC) proposes to deploy and test a hydrokinetic turbine. The proposed test site is at the confluence of the Tanana and Delta rivers near the community of Whitestone. The technology to be tested under this project is the Poncelet Kinetics RHK100 prototype developed by WPC under a project previously funded by the United State Department of Energy (DOE). Specifically, the project will demonstrate new debris management techniques with broad application to many different hydrokinetic technologies, document interaction of aquatic life with this prototype turbine in order to better understand the impacts of hydrokinetic installations, and demonstrate the power generation capabilities of this undershot turbine technology coupled with groundbreaking electronic controls technology.

b) Project Eligibility: In accordance with Section 4.2 of the RFA, this project is eligible for funding under the Emerging Energy Technology Fund (EETF) program. The project will test an emerging energy technology (hydrokinetic power generation), will demonstrate an improved method for controlling renewable technologies of every description and will demonstrate a new technology that has never been deployed in the state before.

c) Project Innovation: At the time of this writing no hydrokinetic technology had been successfully deployed in the state of Alaska. This is largely due to the problems of debris management and potential impacts on aquatic life. The proposed project will demonstrate technologies that are able to survive in the harshest conditions with minimal impacts to aquatic life. As such, the project will not only provide a foundation from which the Poncelet Kinetics technology can be used across the state, but will also provide some much needed information for the hydrokinetic industry in Alaska as a whole. Hydrokinetic technologies have the potential to significantly reduce the cost of energy from rural communities in Alaska; this project is the first step toward that goal.

d) Priority: The proposed project will be completed by an Alaskan organization, is supported by matching funds, and will demonstrate a technology with the potential for wide deployment across the state.

2) Technology Validation and Research Methodology

a) Objectives: The proposed project has three objectives: (1) to demonstrate new debris management methods, (2) to acquire information regarding the interaction between aquatic life and hydrokinetic technologies, and (3) to demonstrate the power production capability of the Poncelet Kinetics technology in the Alaskan environment. These objectives will be achieved by deploying a full-scale prototype of the Poncelet Kinetics RHK100 in the Tanana River and testing, observing, and reporting results over the following two years.

b) Methodology: The proposed project will take place at the confluence of the Tanana and Delta rivers. This is an ideal location for the testing of hydrokinetic technologies. WPC has already received all the necessary permits for the project and is in the final stages of obtaining a Federal Energy Regulatory Commission (FERC) pilot project license. In addition, the Tanana River provides a good representation of many of Alaska's rivers: high debris and silt loads, high concentrations of aquatic life, shallow water, harsh temperatures and winds. The project will be closely monitored to determine its performance on many fronts. Video surveillance will be used to document debris impingements, wildlife interaction and any other visibly observable environmental impacts. The electrical power generation will be monitored remotely and its performance analyzed using the standard electrical power generation parameters including power factor, frequency, power generated as a function of water velocity, and mean-time-between-failures. The project will be tested in three modes: stand-alone on a finite grid, in parallel operation with diesel generators on a finite grid, and on an infinite-grid-tie. This information will be documented and available throughout the duration of the project on WPC's website. The data will be analyzed to determine return-on-investment in order to demonstrate the cost effectiveness of the technology. The video surveillance data will be used to analyze the performance of the technology from the standpoint of debris management as well as to suggest better methods for managing debris. Interaction with aquatic life will be monitored, recorded and analyzed as recommended by the Alaska Department of Fish and Game (ADFG). This data will also be available to the public as it is obtained.

3) Summary of Project Schedule and Summary Project Budget

a) Project Schedule

i) Procurement: October 2012 – March 2013
ii) Construction: April 2013 – May 2013
iii) Deployment and Testing: June 2013 – October 2014
iv) Final Reporting and Analysis: November 2014 – December 2014

b) Project Budget

Category	Cost	Percent of Total
Materials	$1,046,537	75.1%
Labor	$181,250	13.0%
Testing	$100,000	7.2%
Administration	$66,389	4.8%
TOTAL	**$1,394,177**	**100.0%**
Funding Sources		
State Funds	$1,394,177	100.0%

4) Project Team Qualifications:

The Whitestone Poncelet Kinetics team is made up of the following highly qualified personnel. Steve Selvaggio, WCA, President; John R Hasz, Hasz Consulting LLC, Professional Engineer; Steven Selvaggio, Hasz Consulting LLC, EIT; Samuel Woolfolk, Hasz Consulting, LLC, Research Technician; Brian Aklin, CE2 Engineers Inc., President; and Ian Griffiths, Energetic Drives, LLC, Vice President of Sales and Engineering.

Steve M. Selvaggio has served as the President of WCA for the past nine years and has coordinated and served as the project manager and personnel coordinator for various projects including the construction of a bulk fuel facility and the design and installation of a power plant of the community of Whitestone. Mr. Selvaggio holds a journeyman electrician's license and has years of experience in power line distribution, design and installation. He has also served as WCA's liaison with State and Federal agencies, coordinating communications and data with all necessary parties.

John R. Hasz is the President of Hasz Consulting with over forty years of experience as a mechanical engineer. With a strong background as the Director of Researeh and Development for Cincinnati Milacron as well as the Manager of Application and Product Development, Mr. Hasz has overseen the Poncelet Kinetics Team as it has brought this project from theory to a prototype ready for manufacturing and testing.

Steven A. Selvaggio, an engineer in training with Hasz Consulting, LLC, has spearheaded the design of the Poncelet Kinetics Wheel. With a B.S. in Mechanical Engineering and eight years of experienee in foundation design and optimization with a high proficiency in finite element modeling, Mr. Selvaggio has taken the concepts and theories available and used his expertise and the experience and knowledge of the rest of the team to make the Poncelet Kinetics Wheel a reality. Mr. Selvaggio also has experience as a project manager, coordinating personnel and materials as well as other administrative aspects. He has been involved in grant writing and the permitting processes required at the state and federal levels of government for several other projects administered by WCA.

Samuel Woolfolk is a mechanical engineering student working with Hasz Consulting, LLC as a research technician. He collaborated in the design and specification of mechanical and electrical components for the Whitestone Poncelet Hydrokinetic Turbine.

Josiah Keller, a licensed CPA, volunteers his time and services to WCA, and is responsible for the daily bookkeeping operations and grant administration.

Brian Aklin, is the president, co-founder and majority owner of CE2 Engineers, Inc, a civil design ad force account construction firm with extensive experience throughout rural Alaska. Mr. Aklin is the Program Manager for Alaska Energy Authority/Rural Energy Group's rural power services upgrade in multiple communities and as such as provided off-site construction management, design constructability reviews as well as budget and contract management on a wide variety of bulk fuel and rural power system upgrades in many communities across Alaska.

Ian Griffiths started his engineering career in the Royal Navy, programming and maintaining Weapon Control Systems. He received his BTEC National Degree while serving his country. Arriving in California, he continued his career as an

Application's Engineer with Matsushita Corporation, integrating PLC, PC, Servo, AC/DC Drives, HMI's and many other control products. During this time Ian received his BSEE from UC Berkeley, CA. Upon completion, Ian entered into business management, becoming one of Mitsubishi Electric Automation's most successful Regional Sales Managers. Having spent over six years with the company, Ian joined a new business opportunity and started a very successful technical distribution enterprise. He joined the Parker SSD Drives team as Regional Sales Manager for the Western United States in 2002 where he gained his knowledge of the Grid Tie Inverter / Green Energy production market. He has enjoyed a successful career over two decades in engineering and business management. He has more than 1,000 systems integrated into the global Industrial Manufacturing industry.

5) Discussion of Commercialization of Funded Technology: The design of the funded technology was financed by DOE under a previous research and development grant. Under that project, the technology was advanced to a TRL 5 under DOE's specifications. Since then, the project has moved to a TRL 6 under the specifications of this RFA. This project will advance the technology through a TRL 9 and the technology will be ready for market integration at the conclusion of the project. The Poncelet Kinetics technology has broad application across the state. Under a previous study, WPC identified more than 100 potential sites for deployment in the state. This represents the potential to significantly reduce the cost of energy in many of Alaska's most energy-challenged communities while improving energy independence and diminishing the environmental impacts intrinsic to the generation of power through diesel engines which is the prevalent method in many of Alaska's communities.

6) By signature on this application, I certify that we are complying and will comply with the amount of matching funds being offered.

Steve Selvaggio, President
Whitestone Power and Communications