

ETAC RFI SUBMISSION FORM

Organization Name:

Tibbar Plasma Technologies, Inc.

Principal Contact:

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Description of Organization:

Tibbar Plasma Technologies, Inc. is a scientific research company based in Los Alamos, NM. We have experience with High Voltage DC electrical transmission, and in particular we have 5 patents for plasma-based electrical transformers.

Statement of Need Idea Addresses:

Both solar energy and wind energy have capacity factors of about 25%. Consequently, if these technologies are going to be extensively used they require energy storage. This is a major unsolved problem for renewable energy. We are proposing to solve this problem in a novel way using electric vehicles to provide this energy storage.

Qualifications and Credentials of Organization or Key Partners:

Dr. Richard Nebel has over 45 years experience as a research scientist with over 50 publications. He has worked on energy storage in the past, primarily tied to nuclear fission reactors. He holds 5 patents for plasma-based electrical transformers. He worked for 30 years at Los Alamos National Laboratory as a staff member and a group leader. He worked for three years as the President/CEO of EMC2 and has spent the past decade as President /CEO of Tibbar Plasma Technologies, Inc.

Dr. Nebel received his Bachelor's degree in General Engineering from the University of Illinois with highest honors in 1975. He received his Master's Degree in Nuclear Engineering from the University of Illinois in 1976. He received his Phd in Nuclear Engineering from the University of Illinois in 1980.

Keith Moser spent much of his career working for Exelon Corporation on nuclear reactors. He retired as the head of innovation for that corporation. He is very familiar with power generation and distribution. Mr. Moser has over 30 years experience designing, manufacturing, constructing and operating nuclear power plants. Mr. Moser developed and managed the Innovation Process at Exelon Nuclear. Since introducing the Innovation Process in 2006, Exelon Nuclear has developed over 170 innovations that represent 1080 person-rem of radiation exposure savings, over \$796 million in cost savings and a record 32 Nuclear Energy Institute Top Industry Practice Awards. As a result of Exelon's Innovation Management results, Mr. Moser was awarded the American Nuclear Society Utility Leadership Award in August 2012.

Prior to this assignment, Mr. Moser was the Exelon Nuclear Corporate Asset Manager for Reactors and Reactor Internals. In this role he developed programs, processes and techniques for inspection, evaluation, mitigation, repair/replacements for original and uprated operations. As a result of his involvement with Asset Management Mr. Moser has either been the Team Lead or Team Member on 9 Nuclear Energy Institute Top Industry Practice Awards. In 2005, Mr. Moser was honored by the World Association of Nuclear Operators (WANO) as the recipient of the Nuclear Excellence Award for his innovative approaches in resolving equipment degradation problems in Budapest Hungary.

Before to joining Exelon, Mr. Moser was the Chief Inspector for Chicago Bridge and Iron Company (CB&I) and responsible for quality for nuclear, military, petrochemical, water treatment and other fabricated product lines. While at CB&I; Keith Moser held various other position of responsibility in Design, Manufacturing and Construction of Nuclear Power Plants and Nuclear Navy components. This provided invaluable experience in understanding, developing and performing Asset Management for heavy equipment that include steam generators, reactor/internals, pressurizers and turbine generators

Mr. Moser received his Bachelor of Engineering from LeTourneau University in 1980 and Masters of Business from Olivet University in 1990.

Greg Mechels has over 20 years experience in design/installation of renewable energy systems, high-voltage distribution systems, high-voltage distribution systems, industrial/commercial/residential electrical services.

Licensed New Mexico Journeyman Electrician, JE98

Licensed New Mexico Electrical Contractor, EE98

Founder and Owner:

Get Wired Electrical Services, NM#83773, est. 2000

Select Solar LLC, NM#373363, est. 2011

Buddy Laird is an automobiles mechanic with over 40 years experience. He has extensive experience with modifications of vehicles, which makes him well suited for this program. He owns and operates Preventech Automotive

Description of Proposal/Idea:

We are proposing a novel energy storage project in collaboration with Los Alamos County. This project was motivated by the observation that a large residential battery backup supply stores about 16kW-hrs of energy. In contrast, a Tesla automobile stores about 80 kW-hrs of energy. So, why not develop a standardized hookup that would allow customers to hookup their electric cars to the grid and sell power to a utility?

These proposed connections would require an electrical hookup on the automobile, an electric hookup on the house, a DC-AC inverter, a production meter (like the one presently used on solar systems) a switch and a metering device to limit the current so the battery stored power could be slowly transferred to the grid. Our goal is to develop a package like this that could eventually be bought and installed for less than \$3000 per hookup. We are proposing a pilot program to see if this type of system can be successfully utilized on an existing grid, in particular the grid for the county of Los Alamos.

If New Mexico is to be a leader in renewable energy, we have to address the energy storage issue. Both solar and wind power have capacity factors of about 25%. Energy storage is a necessity if these renewable forms of energy are going to provide more than a small percentage of our electric power. The approach we are proposing has the potential to solve the energy storage problem.

When cell phones were first introduced, all they did was make phone calls. Now they serve as a tracking device, GPS, internet access device, etc. And they also can be used to make phone calls. Similarly, we are proposing that electric cars can be viewed as a portable energy storage device that also provides transportation.

If this pilot project is successful, it can provide a model for similar projects to be implemented around the state. This will provide opportunities for installers on both the electric automobiles and on homes and businesses. This will also require manufacturing some of the required electrical components. Although Los Alamos will be the test bed, the benefits will be distributed statewide. The manufacturing can be done in communities that have suffered from the loss of fossil fuel jobs.

What our company proposes to do is this:

1. Obtain a grant to finance the project.
2. Design and certify the components so they are acceptable on the grid (hopefully we can use off-the-shelf components that are already certified).
3. Test the concept using two Nissan Leaf kW-hr battery banks leased from Los Alamos County.
4. Procure and install the components for anyone in Los Alamos County requesting them free of charge.

For their part, the Los Alamos County Public Works Department will provide an incentive for people to use their electric vehicles in this matter. For instance, a nighttime rate that is higher than the daytime rate would encourage people to recharge their cars during the daytime and then use the power to power their homes during peak time periods that are monitored through the Automated Metering infrastructure net meter. They would save money on the rate difference which would be compensation for the wear and tear on the batteries in their electric vehicles while shaving peak loads for the County. This is a very opportune time to try this on the Los Alamos grid since by next Spring the county will have installed Smart meters throughout the county which will allow them to have time dependent rates.

The goal for this pilot project is to install these hookups on approximately 100 vehicles. We may also utilize existing batteries. That is how the bulk of the funding will be spent. This will provide us with enough data to determine if this approach is viable for energy storage. The questions we will seek to answer are:

1. How much incentive will be required to entice electric car owners to use their vehicles in this manner?
2. Can this be done with minimal battery lifetime degradation?
3. What is required to manage a grid with distributed energy storage devices?
4. What is the best way to extract energy from these batteries?
5. Is it cost effective?

There are significant advantages of this approach to both utilities such as the Los Alamos County Department of Public Utilities and the power consumer:

1. It can provide a large amount of energy storage which requires no investment in batteries by the utility.
2. No battery maintenance is required by the utility. This is provided by the consumer.
3. The technology would be updated free of charge (by the car owners) as the battery storage technology improves.

Los Alamos County is interested in working with us on this program. In fact, they will provide an in-kind contribution of some existing batteries at a lease rate of \$1.00/year. Tibbar Plasma Technologies will provide an existing commercial 20 kW solar PV array. We are presently constructing a 10kW residential array which will also be made available. We will utilize these two solar arrays and the Nissan Leaf batteries to test the concept of charging the batteries with a solar array during the day and discharging them back into the grid at night. This should give us information as to how this technology interfaces with solar PV energy on a real grid.

The primary value of this project is not in the immediate employment of people, but rather the potential for growing a new type of business. This idea is a paradigm change, and it could flourish into a large business. The major goal of this program is to see if this approach is viable.

Costs:

Hookups in the automobile have been estimated to cost \$1207 per automobile. The cost for the home installations is \$2000.

Jobs created:

3

Wage Range:

\$30.00/hour-\$60.00/hour