Potomac Energy Projects, LLC

Potomac Energy Projects LLC Technology Description

Potomac Energy Projects is developing a new solid state device that will use methods of "Direct Energy Conversion", meaning no moving parts to produce massive amounts of free electrons without the emissions of CO2. Extensive research indicates a new method of static flux modulation is now possible. This new method of static flux modulation will provide significant cost and technical advantages over present day devices and technology. Potomac Energy Projects, LLC (PEP) has filed an International Patent Application (patent pending) on this concept.

Below is some basic background information regarding how we generate our present electrical energy so you can understand the main difference in what PEP is proposing.

In a conventional electric generator, mechanical energy (*e.g.*, from steam or falling water) mechanically moves a magnetic field relative to electrically conductive coils. These changes induce a difference in the magnetic flux crossing the coils over time. Changes in magnetic flux passing through these coils in turn induces an electromotive force ("**EMF**", or voltage) in the coils, this action sets up electric currents, *i.e.*, and generates electricity. Mechanical or electrical circuits capture and smooth these currents, allowing continuous extraction of electricity energy from an alternating or reciprocating source. PEP's device is solid state with no moving parts and will reduce the complexity of manufacture and maintenance of such a generating device.

The PEP generator, by contrast, would cause time-varying magnetic fluxes in coils, not by mechanical means, but rather, by altering the magnetic reluctance of magnetic path between the poles of a permanent magnet. Flux flows freely through areas of low reluctance, and is inhibited by areas of high reluctance. Changing the reluctance would modify the paths of the flux as it returns from the north pole of the permanent magnet, through space, to the south pole. Coils near the permanent magnet would then experience changes in flux, which would induce EMFs as though a mechanical means had been used. The process is extremely efficient and cost effective.

The means to modulate this static flux is provided by a Vortex cylinder made up of a bundle of cylinders coated with high-temperature (Type II) superconductive materials. This is the region of space whose reluctance is to be controlled. The cylinders will be cooled with liquid nitrogen, inducing a superconductive state in the coating material. Yttrium barium copper oxide ("**YBCO**") would be used as the coating material because of its favorable quantum properties, and since its critical temperature (T_c) of 94° Kelvin is above the boiling point of readily available liquid nitrogen. A pulsed laser deposition ("**PLD"**) system is required to produce this part and PEP has one operational PLD system in operations at this time.

PEP plans to harness electrons found in type II superconductors materials to help perform a "Solid State Work Function", meaning without moving parts. The electrons found in the superconductor crystal lattice structure are known to move together in weakly bound pairs, called "Cooper Pairs". PEP plans to use a controlled injection of photons from a coherent laser which will be used to induce a "Photon Cooper Pair Breaking" (a quantum effect whereby light interacts with the atoms of the superconductor) in the YCBO. This temporarily will disrupt the superconducting properties of the material, thereby modulating, or toggling, the magnetic reluctance of the superconducting materials, and inducing magnetic flux changes in the adjacent

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coils. Management expects the PEP prototype to include a permanent magnet, YBCO coated cylinders, optics and lenses, a pulsed solid state laser, induction coils, and control electronics, liquid nitrogen and a small battery to initiate operations. The device is very compact and should have a very high power density equal or greater then lithium batteries or hydrogen fuel cells making this technology ideal for mass transportation applications.

Advantages over Current Energy Technology

Management believes that an operational device would provide significant advantages over present-day energy technologies. Assuming PEP could successfully developed this device to generate electricity, management believes that these advantages would include the following:

• The DEC would not rely on fossil fuels, coal or other scarce resources in order to generate electrical energy.

The only resource that would be required to be added to the device on an ongoing basis would be liquid nitrogen. Liquid nitrogen would be used to cool the Vortex cylinder coated with YBCO, inducing the superconductive state in the YBCO so as to allow the modulation of static flux. Liquid nitrogen can be efficiently produced by compressing abundantly available nitrogen gas, which comprises approximately 78% of the Earth's atmosphere. Unlike compressing hydrogen to form a liquid for use in connection with fuel cell technology or producing ethanol from corn, compressing nitrogen to form a liquid requires only minimal energy and is free, with the exception of the small amount of energy required to convert it to a liquid. The cost advantages are to numerous to state in this paper.

• Operation of the DEC would not damage the environment.

The DEC would not emit carbon dioxide or noxious sulfur or other nitrogen compounds or result in the creation of nuclear waste or significant amounts of heat, or otherwise harm the environment. Effectively the DEC is a true green technology. The only byproducts of DEC operations would be nitrogen gas (emitted as the liquid nitrogen used to cool the bundles of cylinders coated with YBCO were converted back into a gas as it absorbed heat) and a small amount of waste heat. Furthermore, the DEC would not pose a hazard for fish, birds, bats, or other wildlife, or require the construction of vast structures, as may be the case with hydroelectric and wind power generation. The financial investment is massive for these types of generating plants all have other adverse side effect that often take years to uncover. The DEC would produce only a small amount of noise, emitting a humming sound during operation.

• The DEC would be a compact solid-state device that would be relatively inexpensive to produce and maintain.

Unlike solar power panels and related technology, the DEC would be relatively compact and inexpensive. Management expects the DEC prototype to fit into an area the size of a the spare tire and generate energy sufficient to operate an automobile or power a home. Management also believes that DEC technology would be fully scalable to the Megawatt range. Management anticipates that each DEC would include a permanent magnet, YBCO-coated cylinders, optics and lenses, a pulsed laser, induction coils, control electronics, and a battery for initiating

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operation. All of these components are relatively common and readily available in the United States. An investment of $350K was used to develop a working lab that will hold our PLD system and test equipment used to develop the first working DEC. The PEP lab is now in operations. Management believes our small lab could produce millions of DEC units in a given year with proper funding. Since DEC technology has no moving parts, maintenance also is expected to be relatively inexpensive.

- **The DEC is relatively safe to operate.**

The DEC would not contain fossil fuel, natural gas or other combustible materials or result in the production of dangerous substances like nuclear waste, and accordingly would be relatively safe to operate. Unlike nuclear power reactors and waste facilities, hydroelectric power dams, oil and natural gas pipelines, and oil, gasoline, and liquefied natural gas shipping vessels and tanker trucks, the operation of DEC technology could not cause disastrous accidents and would not present attractive targets for terrorists. The only dangerous substance associated with the operation of the DEC would be liquid nitrogen, which is extremely cold and could cause burns if handled improperly, or asphyxiation if nitrogen gas were released in an enclosed area. Liquid nitrogen dissipated very fast in the open, leaving no residual harmful chemicals behind, i.e. is self cleaning, and once it evaporates returns back to the atmosphere, thereby closing the loop.

- **The DEC would be flexible regarding how and where it could be utilized.**

Management believes the DEC could operate in a manner that is compatible with existing energy production technologies, allowing the DEC to assist energy companies in meeting rising energy demands and emissions standards. Management also believes that the DEC could operate independent of the existing power grid, enabling it to provide power directly for home and commercial use. In addition, management believes that DEC technology could be used to power automobiles and other vehicles. PEP believes that the applications for the DEC technology is almost unlimited and once it's developed will dominate the world energy markets.

Development of a Prototype

The Company's near-term goal is to demonstrate the viability of the DEC by developing a working prototype. The DEC prototype is based upon physics discoveries made over two decades of painful research, although actual development of the DEC prototype began just a year ago. The prototype is essentially complete, except for the production and installation of the YBCO-coated cylinders, which would create the regions of space where reluctance would be controlled. Management believes that it will take approximately 12 months to finalize development of a prototype, and most of the funding will be used to support this effort.

Commercialization

Ultimately, the Company hopes to commercialize or license its DEC technology in various markets. Management believes that its SRG technology could be utilized to provide electricity to utility companies for distribution on existing power grids, to provide power directly for home and commercial use, and to power automobiles and other vehicles.

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