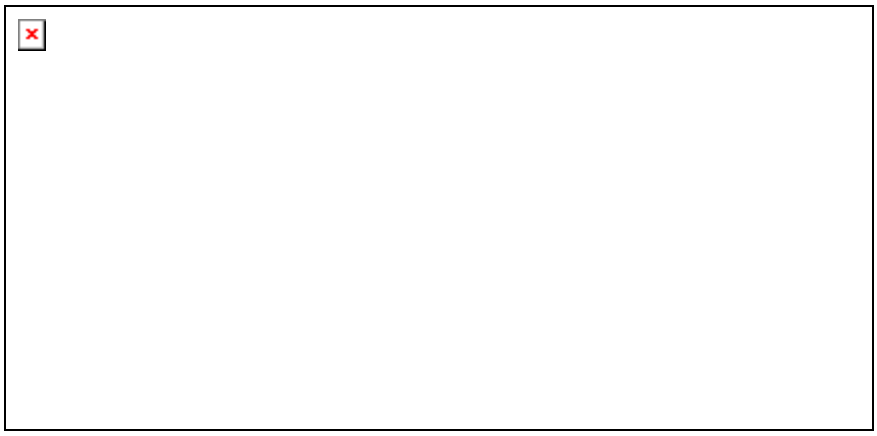

THE NITROGEN ECONOMY

This web site is dedicated to Eddie Sines, who has intensively investigated numerous fields of scientific research over the past 40 years, and whose generosity and compassion for humanity has made the timely release of this technology possible.

Nitrogen gas is found everywhere in the atmosphere of Earth. Air consists primarily of two gases: nitrogen (78%) and oxygen (21%), and less than 1% trace gases. Nitrogen plays many critical functions in our lives without most people knowing exactly how or why. Nitrogen gas is often overlooked as a worthwhile means of improving our quality of life, but over the last 20 years technology has progressed to a point where nitrogen can play a critical role in ways that will change the lives of everyone on the planet. Nitrogen will play a critical role in the alternative energy economy, while reducing environmental pollution. Mankind has learned how to manufacture and utilize an endless list of products, but still has difficulty producing the one commodity needed most (i.e., energy) to power these precious devices and gadgets: lights, cars, refrigerators, TV's, etc. News about most high technological breakthroughs is available to the public through the media and scientific journals, but few people have found new ways to use these new technologies. Scientists are always looking for ways to improve our lives through research and development.

If this new technology being developed by Potomac Energy Projects were adopted worldwide, we could eliminate the necessity of oil wars (right-click, save as - ~4.3 MB) within the next 10 years. Every person on the planet would have an avenue to prosperity in the global economy, with ample access to electrical energy and a means of producing it using proven methods. Our cities could fully embrace the Kyoto Protocols, as this technology would increase demands for liquid nitrogen while removing pollution from the air during the nitrogen production process. The only waste products are nitrogen gas, and once a cryogenics system is developed to act as a refrigeration cycle, no waste products whatsoever would be produced. Cost savings is also an attractive feature of this technology when you consider the present price of oil. There is a significant savings if we could switch our nation's energy infrastructure to liquid nitrogen. The computed equivalent energy cost of liquid nitrogen using this technology would result in a 99+% savings over direct fossil fuel costs, when taking into account indirect costs such as the effects of pollution and geopolitical and economic conflicts arising out of energy scarcities. In effect, this technology will change the world as we know it, as energy wars and global pollution would become a thing of the past. The hurdles are many and the technical solutions to implement new technologies are by no means simple; however, current research findings indicate that they are all solvable.

All hydrocarbon devices are now obsolete, including automobiles with first-generation hybrid technology, since these devices require large battery banks which have a high replacement cost. Even the hydrogen cars using the new fuel cell technology are obsolete, as hydrogen production only shifts the problem but does not solve the real problem of our dependency on oil -- imported oil to be more precise. The new "nitrogen economy" has many advantages. The concept has deep roots in real physics, with some 15 years of study to understand and refine this concept up to this point. We are in the process of making our first working prototype or proof of concept working model. In a way, companies like yours will play a very important role in the new model. Gone are the large distribution trucks and ships that need to cross the oceans to bring back oil, where Americans are not well liked. The economics of the LN2 system is considerably less expensive then the present system and preserves the integrity of the planet's ecosystem at the same time.

Recently, nitrogen has been utilized as a means of propulsion in automobiles in recent research projects. Compressing and/or cooling nitrogen gas will convert the gas to a liquid. The concept uses nitrogen gas to drive an air motor. The expansion energy would be extracted from the surrounding atmosphere. Due to the number of inherent system inefficiency associated with converting the potential energy of liquid nitrogen into a mechanical energy as nitrogen gas is produced was found to not be feasible. Their were too many technical hurtles to overcome to improve process efficiency to a point where the technology could be implemented on a large scale. Once the dynamics of this process is better understood throughout the world, it is clear that adequate funding will become available to initiate full-scale production to satisfy our collective energy demands.

Sometimes researchers don't fully realize the implications of their own research findings. At the turn of the century, the groundwork was laid for the modern power grid as we know it today. These power grids were large systems and the electrical energy become available from power plants far from your home through what is now a fully developed transnational grid system. With the relative affordability of electricity through fossil fuel acquisition, funding to continue previous research efforts in alternative energy evaporated.

Liquid nitrogen (LN2) is relatively safe to use in a closed system. Only one example was found via online search where a death directly resulted from mishandling LN2, and that incident occurred in an enclosed space by an inexperienced college student. Researchers who regularly work with LN2 would almost have to intentionally create a hazardous condition...one wonders if that student committed suicide via nitrogen asphyxiation. One of the inherent properties of LN2 is its ability to expand into a gaseous state and quickly disperse into the air. In the event of an LN2 spill, simply ventilating the space will reestablish sufficient oxygen levels. Only an enclosed space containing LN2 poses any substantial health risk, unless one literally pours LN2 on oneself. Benefits over conventional technologies include nonflammability; in fact, in a typical car crash, instead of gasoline pouring all over the scene and igniting, LN2 would act as a fire retardant by displacing oxygen and cooling the vehicle (s). The latent heat of vaporization and diffusion rate of nitrogen at ambient temperature allows for normal oxygen levels to be reestablished within a short period of time. In normal circumstances where LN2 spills would most likely be outdoors (car crashes), there is minimal risk of asphyxiation. A vehicle utilizing this new technology eliminates the need for lead-acid (concentrated sulfuric acid) batteries. Sufficient safety measures would be easily implemented at minimal cost to virtually eliminate the possibility of accidental death. Anyone driving along the D.C. beltway must realize that there has to be a safer way to commute to/from work. If the Sines Reluctance Generator system were installed for home use, the LN2 component of the system would remain outside or even underground at ground temperatures that improve the efficiency of the system since underground temperatures are typically lower than outside air temperatures. The closer the ambient temperature is to the LN2 temperature, the longer it takes to 'burn off' the LN2; thereby, improving the efficiency of a system that requires LN2 to

generate electricity.

For the first time in the recorded history, mankind will now be able to generate and produce electrical energy on a large scale using only nitrogen, copper (or superconductor) windings, magnets and superconductors. The 1 watt laser is only necessary to initiate the process, after which point a feedback mechanism would allow the unit to be self-powering. To help meet our nation's energy demands, Potomac Energy Projects, LLC, has creatively combined various new technologies and publicly released the provisional patent application that outlines how anyone could utilize this technology to produce electricity. Magnets, superconductors and nitrogen are the backbone of this new technology. The Sines Reluctance Generator provides a means to cool the Type II superconductor YBCO components for energy production, while also neutralizing heat losses from the hand-held electrical generator. Now is the time to implement this technology on a large scale through full-scale production. Having already patented the technology, we can now make this technology available to the public without concern over legal ramifications initiated by adversarial third parties who wish to claim this technology as their own, solely for the purposes of financial gain and/or power (oil/energy cartel).

Magnetic flux can be channeled through copper (or superconductor) wire windings with a properly configured system. When the path of magnetic flux changes, the interaction between the magnetic flux and wire windings wrapped around the region of varying magnetic flux generates electrical energy. Utilizing a novel design, one can create a simple and inexpensive system that utilizes a magnet on one side of the small device and a bundle of ~500 um-sized diameter quartz tubes with a length of approximately one inch that are coated with YBCO superconducting material. The cylinders channel the magnetic flux through the tubes at cryogenic temperatures. Small tubes of YBCO-coated quartz create a vortex that can channel a large amount of flux through the tubes without compromising the superconductive effects of the YBCO layer. If you heat up the cylinders above the critical temperature at which the YBCO coating is no longer superconductive, the path through the quartz tubes becomes an insulator as far as the magnetic flux is concerned, rather than a perfect conductor. If you oscillate the temperature of the tubes above and below this critical temperature, T_C, you can change the path of the magnetic flux without a photon stream. That process is known as thermal cycling, a phenomena that would significantly limit the frequency (number of times per second) that this device channels magnetic flux from the far end of the quartz tubes to the near end (adjacent to the magnet).

Electrons in a superconductor move together in weakly bound pairs, called Cooper pairs. Under certain conditions, YBCO exhibits a unique phenomenon called Cooper pair breaking. Because the Cooper pairs are bound together so weakly, with binding energies of only a few milli-electronvolts (meV), these pairs can be easily broken apart, so that the superconducting state is locally disrupted. One can capitalize on this effect by mounting a small laser through a hole drilled in the middle of the cylindrical magnet that is producing magnetic flux. The laser beam is dispersed uniformly to direct photons at all the YBCO-coated quartz cylinders, showering photons at the end of the cylinders adjacent to the magnet, producing an avalanche effect through the quartz cylinder in the YBCO layer. This avalanche effect disrupts the vortex and forces the magnetic flux to find a more circuitous route, as the cylinder acts as an insulator to the magnetic flux following an avalanche of Cooper pair breaking. An optical photon with a specific wavelength of 930 nm can disrupt up to 340 Cooper pairs in YBCO. In other words, a quantum efficiency of 340 results. That means a small amount of photon energy is required to disrupt the superconductor state and therefore the vortex channel. By winding conductive wire windings around the two paths through which the magnetic flux travels, each cycle produces a net change in magnetic flux in both the long and short paths, which in turn produces energy in the form of electricity. This is a direct form of energy conversion. The only physical change in the closed system at the macroscopic level occurs when LN2 is converted to a gaseous phase as it absorbs heat generated from the device, as well as from the environment. Electrical energy generated from this process can be used to convert nitrogen gas into LN2. Using magnetic flux gates and vortices, the efficiency of the

LN2 system increases significantly, thereby allowing for continued research in LN2-based propulsion systems. Again, closing the loop in the refrigeration cycle would allow for self-sustaining energy generation, compliments of Mother Nature through the Cooper pair breaking and resetting process.

The remaining question is how efficient is this new system? There is no concern over how much energy can be produced, because the device is scalable up to MW-level energy production, so the magnitude of electrical generation is no longer an issue. Therefore, efficiency must be clearly defined and measured. The prototype performance must be determined. Resulting data can be analyzed to determine actual efficiency based on a correct definition of efficiency. One critical aspect of the system is YBCO Tc relative to the temperature of the system. To maximize efficiency, the system temperature should equilibrate to within one degree below Tc. Maximizing efficiency will maximize the number of cycles (Cooper pair breaking and reformation), and therefore the electrical output of the system versus the amount of liquid nitrogen converted to nitrogen gas. The prototype operates just above the evaporation temperature of liquid nitrogen (77.8K), by using nitrogen to cool the YBCO tubes to approximately 78K during system operation by flowing nitrogen gas through the tubes as it is converted to a gas from the liquid nitrogen pool. As the magnetic flux channeling frequency increases, more nitrogen gas flows through the tubes to offset heat energy emanating from YBCO Cooper pair breaking/reformation. The heat energy is a small fraction of the total amount of electricity generated. The second to the last slide of the Potomac Energy Projects collaborative research proposal presentation (right-click, save as) provides information on the theoretical efficiency of the system. The plot appears as a straight line because the effects of AC losses do not outweigh the energy output of the device, as is often the case with conventional technologies.

Two 2006 Toyota Priuses have been provided to Potomac Energy Projects to show the feasibility of implementing the Sines Reluctance Generator technology. Prototype units will also be installed in several homes throughout the Washington D.C. area. Additional information will be made available at a later date.

Potomac Energy Projects, LLC
9801 Cisler Lane
Manassas, VA 20111

Return to Home Page