Capstone Project – Liquid Piston Compressor

Inland Empire Technology LLC (IET) is an alternative energy startup focusing on energy production through recovery of waste energy in moving liquids. We have built several prototypes, this being the most recent. See also attached drawing. We have our Patent Pending and are waiting to complete the process pending any system changes we may have to make.

BACKGROUND OF THE INVENTION
Continued increases in energy costs have caused man to not only search for new reserves of known energy, but to also search for new sources of energy. These sources may lie in new technologies like wind, or solar power, or in the refinement of old energy technology as described in U.S. Patent Nos. 5,579,640; 6,145,311; and 7,832,207 B2. Alternatively, these new sources can stem from identifying and capturing lost energy such as energy lost as waste in manufacturing and production processes. A simple system that captures wasted energy in industrial processes could supply a versatile, affordable source of energy.

BRIEF SUMMARY OF THE INVENTION
The invention is a liquid pneumatic compressor that uses pressurized liquid to produce dry, compressed air. The dry, pressurized gas can be used on site to power generators and turbines or can be stored for later use. Pressurized liquid is released by a penstock into a manifold for distribution through inlet valves into gas filled compression chambers. As the liquid fills the compression chambers the gas inside is compressed. When the gas pressure in a compression chamber exceeds the pressure in a storage receiver, a one-way check valve opens transferring the compressed gas to the storage receiver. As the pressurized liquid approaches the top of the compression chamber, a check valve is actuated. The check valve enables the drain at the base of the compression chamber to open an exhaust valve. A one-way gas check valve breaks the vacuum and allow the chamber to drain. The liquid that drains from the cylinder is fed into a drain line and returned to the original feed source. A pressurized gas has been harvested and transferred to the storage receiver. A number of compression chambers in various stages of draining and filling are used to meet the energy needs of a project.

BRIEF DISCUSSION OF NEED
The system at this time is operating with a home made controller. We must address this with a simple straight forward platform so as to optimize the drain and fill cycles, to transfer the maximum quantity of air available. It needs to be simple and yet able to interact with a variety of configurations. Optimizing the system is held up by turbulent(s) at the point of discharge. It is imperative we have a manifold, both for the introduction of the fluids, as well as, the discharge that eliminates this. The manifold needs to improve flow eliminating any back pressure in the cylinder(s).
We need to address overall efficiency, but only as far as the compressor is concerned. Pictures as well as videos showing the use of air motors, and or generators, are for demonstration purposes only. We are building compressors that would have many applications, electrification being just one. On larger systems we have built, when the liquid pressurizes the air, and it transfers to the air storage tanks, lines between the cylinders and the storage tanks become to hot for the bare hand to touch. We want to take advantage of this in anyway possible. In understanding the heat generation inside the tank we want to know does this add significantly toward drying the air. Our experience is that it does. Does this in anyway scrub the air? Is there anything happening where the air and water make contact when pressurized? Would we gain anything heating the water even a little before contact is made in the cylinder with the air? If we insulate, and heat the tanks even a little what could we expect. What about heating and insulating the entire system? We have had good results in all of these areas, but lack the data to support it.

In every instance it is important that materials be off the shelf and components as well. One of the drivers of this is simplicity taking advantage of what is in the market place and repurposing it when possible.
We look forward the opportunity of meeting with you and discussing in more detail our needs and how we might work together mutually benefiting each other.

We have designed a similar system for larger scale operations. We mention this only to give you a better scope of the over all potential. We have built several small operating prototypes of this. We have not included that here. A drawing however may be viewed at the end of this. Once again, generators are a possible application; our objective immediately is dry compressed air. Data on this is first and foremost.

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