news-for-infinity-turbine-renewal-energy

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608-238-6001 [TEL]

greg@infinityturbine.com [Email]

Infinity Turbine LLC

Infinity Turbine Energy News

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News for renewable and waste heat to power.

PDF Version of the webpage (first pages)

Salgenx Energy Storage Simultaneous Desalination

A breakthrough in desalination technology has been announced today with the unveiling of a new system that uses a saltwater flow battery (BESS) cycle to produce clean drinking water from seawater. This innovative solution has been developed to create a sustainable and cost-effective way of storing energy while simultaneously producing fresh water.

The desalination system operates by using a saltwater flow battery cycle without the need for a membrane. The system can use a renewable energy source, such as solar power or large wind turbine, to charge the battery, making it both environmentally friendly and cost-effective.

4/15/2024

Infinity Turbine Products

Infinity Turbine develops and builds systems for making power from waste heat including industrial, biomass, geothermal, solar, crypto, sand batteries, and more. We are also working on innovative strategies for storing, making, and deploying energy.

4/15/2024

Simultaneously produce soft water and power from salt based water conditioners

Salt based water conditioners and water softeners can be used for small power production making home and commercial water processing a miniature power plant. Simultaneously produce soft water and power.
For homes may only be less than a kilowatt per day, but for commercial buildings may be 175 kW or more per day.
For large desalination plants, may amount to hundreds or thousands of kilowatts of power production per day.

4/15/2024

Hydro Electric Turbine in Davos Switzerland

Located in Davos, Switzerland, this is a decommissioned hydro electric turbine wheel.

4/15/2024

About Infinity Turbine LLC

Waste Heat Power: For years we've been hearing requests from customers who would like to use their waste heat to generate power, both on land and marine applications. To meet that demand, we formed Infinity Turbine LLC in 2008 and developed the IT10, the worlds first production 10 kw ORC (Organic Rankine Cycle) waste heat to power generator.

New developments in CO2 Brayton Cycle may allow efficiencies to reach 30-50 percent. This is a huge increase from the legacy ORC process which has a system efficiency (bottoming cycle) of 5-15 percent).

We now offer a CO2 Turbine Development Platform for educators and energy developers.

4/15/2024

Viktor Schauberger

Viktor Schauberger was a student of nature and more specifically water flows. He was gifted with the patient skills of observation and an appreciation of the outdoors.

His fascination of mountain streams and how water worked for the environment led to many innovations and inventions which pertain to flow control and the science of water. He realized that water flows were similar to air (just a different density) which led to his lift turbines and craft.

He was one of the first scientists to realize that water has many dimensions and structure. Water has surface tension and boundary layer mechanisms, which were revolutionary before 1900. Of course Nikola Tesla also realized this with his disc turbine around the same period.

Many of his early innovations were focussed around the transport of sawn timber and transporting and then sorting them by use of water and displacement. Back then, transporting timber from the mountains was not without problems. This was before helicopter lifts, trucks (and roads), and aerial cable lift lines.

4/15/2024

What is Brine

What is brine?
In general, brine is any solution with an extremely high concentration of salts, such as sodium chloride, which can occur either naturally (as with seawater, deep-water ocean pools, salt lakes, producer water from oil and gas drilling) or as a byproduct of industry. These byproducts, or brine waste streams, are typically highly concentrated salt solutions that, in some cases, contain more than twice the amount of concentrated salts than natural brine solutions.

Brine waste streams can also be highly concentrated with total dissolved solids (TDS), such as waste streams in many chemical manufacturing processes, and they can be some of the most challenging to treat or discharge because their composition and purification requirements are dynamic and complex.

Some examples of brine waste created as a byproduct of industry include:

-cooling tower and boiler effluent
-reverse osmosis (RO) and ion exchange waste/reject streams
-produced water from extracting oil and natural gas
chlor-alkali and chemical plant waste
-acid rock and mine drainage
-food preservation and manufacturing waste streams
-desalination waste from potable water creation
irrigation runoff

Our novel solution is treating this solution considered and expensive headache, into a battery technology system.

Elon Musk and Tesla even think that recovery of lithium from brine is worth patenting. However, they are not the first to do so. (1962 Lithium from Brine Patent)

Battery Technology: With the advent of the new USA tax credits for producing and selling batteries ($35/kW) we are focussing on a simple flow battery using shipping containers as the modular electrolyte storage units with tax credits up to $140,000 per system. We are focussing on the salt battery. This battery can be used for both thermal and electrical storage applications. We call it the Cogeneration Battery or Cogen Battery.
We are also looking into converting salt based water conditioners to simultaneously produce power.

4/15/2024

Progress and Applications of Seawater-Activated Batteries

Nearly 50% of the world's population lives by the sea. Of the 17 largest cities in the world, 14 are located near the coast, and they consume most of the electricity. The required electricity is transmitted from long distances, increasing costs and reducing energy efficiency. Recently, renewable energy technologies such as solar, wind, wave, and tidal energy generators have been deployed offshore and by the sea to reduce energy transmission distances. However, large-scale EES systems are necessary to provide stable electrical energy, and rechargeable seawater-activated batteries can be a better option for large amounts of electrical energy storage. It is expected that offshore and waterfront deployments of rechargeable seawater-activated batteries may be very easy, since they operate in seawater as the main battery component. (reference article below)

Energy Density Chart:
Vanadium 22-43 Wh/L
Zinc Bromine: 60-70 Wh/L
Saltwater Flow Battery: 125 Wh/L
Lithium 90-160 Wh/kg
Lithium Ion: 140-160 Wh/kg
Magnesium Flow Battery: 300-500 Wh/L
Magnesium-Air Battery (MAB) with Nanostructured Polymeric Electrodes: 545 Wh/kg
Magnesium Metal H2 Peroxide Seawater Activated Battery: 100-500 Wh/kg

4/15/2024

Modular Flow Battery Licensing Production and Sales

Home Based Flow Battery: 10-100 kW ($35,000 tax credit)
Commercial: 4 MW ($140,000 tax credit per module)
Utility Scale Bank: 400 MW ($14,000,000 tax credit per bank)
Note: The tax credit becomes effective 2023, so you have four months to get production started.

Infinity Turbine is now developing commercial scale flow batteries, based on organic electrolytes, including Curcumin and Blackseed.

The initial development will include standard membranes, and then expand into spinning disc reactor mechanical membranes instead of expensive fabrics currently used.

4/15/2024

PureCycle 280 Evolution

The Generation 1 ORC utilized near-off-the-shelf components without modification. The expander was a Carrier 19XR225 centrifugal compressor running with reverse flow and the condenser was a pair of Carrier 09DK094 air cooled condensers.

Radial Outflow 1MW Turbine AC Induction Generator Plans and Blueprints

Infinity Turbine now has available blueprints for a 1 megawatt ORC radial outflow turbine.

4/15/2024

Sand Battery Basics

A sand battery is simply a thermal storage device that accepts and rejects heat. While its current use is primarily heating, it can also be used for cooling. Silicon dioxide (sand) is thermally stable up to around 1000 C, and has a high heat capacity.

The goal is a cost effective method of storing energy. With properly insulated storage containment, thermal energy can be stored for months.

The basic setup is a insulated container of sand, with a arrangement of conduit (pipes) embedded in the sand. That simple. The commercial prototype in Finland projects a investment cost of less than 10 Euros per kWh of storage capacity.

The concept of a sand battery is similar to using geothermal cooling (putting fluid conduit, including liquid or gas in the ground) but in this case, it's using sand instead of Earth.

Other forms of using Earth materials for thermal storage:

Ocean Thermal Energy Conversion (OTEC) has been used commercially for air conditioning (commonly referred to as Sea Water Air Conditioning or SWAC). It is used at The Brando Resort in Tahiti where the temperature of sea water is 4 -5 C at 960 meters down. In Switzerland Lac Leman (Geneva) and Lake Walensee (Densitas AG) are utilizing 6 C deep lake cooling.

A commercial ice storage method called CalMac has been used for decades which uses off peak evening power to make ice, which is stored in huge insulated tanks, for later use as air conditioning.

4/15/2024

Utilizing waste heat from Diesel Generators to make free power.

Taking waste heat from diesel generators can produce free power in a Organic Rankine Cycle (ORC) system. The sources of waste heat are engine cooling (replacing large coolant system fan) and stack exhaust which is normally waste heat to the atmosphere.

The ORC does require a cool liquid condenser flow, but generally can utilize the waste heat from the diesel engine to provide 28 percent savings. Generally a 500 kW diesel or larger are prime candidates for utilizing waste heat to make power. Those savings may be greater than $200,000 USD per year for a 500 kW or larger generator running 24/7.

Exhaust to Power: With an additional waste heat to thermal oil heat exchanger, you can capture the diesel exhaust from the pipe to supply heat to the Infinity turbine. This is about 40 percent of total fuel savings as shown in chart below.

Coolant to Power: Pipe straight to the Infinity turbine. This is about 32 percent of total fuel savings as shown in chart below.

4/15/2024

IT Micro Redstone 3D Metal Turbine with 2 inch Diameter Counter-rotating Pump

The goal of the Redstone project was to incorporate all moving and rotating functions into one component. This is done by using a layered up rotating assembly, or 3D printed in metal or cast carbon fiber.

Expander (turbine): CO2, ORC, Rankine Cycle, refrigerants, CO2, compressed air, water

Compressor (pump): water, CO2, air, refrigerants

Shaft Free: Turbine assembly is the shaft (magnetic bearings or perimeter bearings).

Cavitation Disc: Can be used for making fluids go supercritical (ex. CO2), or can be plugged with magnets to produce induction heating.

History: The Redstone project was made into 3D printed metal (sintered) steel. What we found was that larger parts tended to lose tolerance as the parts grew in size, so the turbine was designed at 2 inches or less in diameter and turned to true for high speed rotational tolerance. The housing castings needed to be machined to tolerance on the inside and trued for surface mounting.

Final Project: The project was printed by X-One when the larger housing tolerance problems were found. We received boxes of these castings, which were ultimately thrown away. A few surviving parts remain (which are solid metal and extremely heavy). There are a total of three parts, which reduces build time and has a huge time savings from standard metal machining. Ultimately, the best method we found (most cost effective and fast) was cutting basic parts with a waterjet, then layering up for 3D effect, and to achieve the internal chamber structure (complex counter-rotating screws).

Plans and licensing available.

4/15/2024

Radial Outflow Turbine 1MW AC Generator Hermetically Sealed

Using a scaled up version of existing ROT technology, this design may produce 1 megawatt of power. Turbine would operate at full load speed of 3600 rpm. Turbine is direct mounted to an induction generator (2-pole). Due to the large size of the generator, it is likely a higher voltage than typical (2400V+) and would probably need to be direct grid connect because grid tie controllers cannot be found in this size or voltage. Size of generator likely to be 31in OD and needs a custom cast iron housing for direct refrigerant cooling.
Construction of plates and turbine are possible using current manufacturing capabilities. Large cast iron housings are likely to be outsourced to a vendor (several available). Generator may be an induction motor from a chiller motor supplier (operating in reverse) if no generator suppliers can be found.

4/15/2024

Infinity Turbine Introduces ROT12 Experimental Turbine Generator

The ROT12 Radial Outflow Turbine with DC Generator was designed for the IT10 system. It is designed for ORC working fluid such as Honeywell Genetron R245fa.

4/15/2024

Desalination

Infinity Turbine is currently working on the development of incorporating Teflon with SDR (Spinning Disc Reactor) technology to implement a commercial scale shock electrodialysis process (a recently developed electrokinetic process, which can be used to continuously desalinate artificial seawater).
Concept: Infinity is working within its developed technologies to utilize the amazing qualities of Teflon, static electricity, and cavitation (sonochemistry) to further promote simple low cost solutions for removing salt from water.

4/15/2024

Introducing the Cogeneration Salt Flow Battery a cutting-edge energy storage solution

The Cogen Salt Flow Battery represents an innovative hybridization of a standard flow battery and a thermal storage device. It offers a unique combination of simultaneous heat or cold liquid storage alongside electrical energy storage.

This versatile technology finds application in various domains, including:

1. Thermal energy storage: Enables the storage of unused thermal resources, providing heating or cooling capabilities.
2. Electrical power storage: Facilitates backup power supply and enhances grid resilience.
3. Utility grid optimization: Offers opportunities for storing off-peak low-cost power for later use during high-demand (on-peak) hours.
4. ORC power production: Stores thermal energy for Organic Rankine Cycle (ORC) power generation while simultaneously preserving the electrical output from the turbine generator.
5. Heating and cooling optimization: Utilizes off-peak low-cost power to produce heating and cooling for later use.
6. Peak demand reduction: Helps reduce peak demand utility rates through peak energy shaving strategies.

The Cogen Salt Flow Battery is available in various sizes ranging from 3,000 kWh, to a staggering 18 MW, catering to diverse energy storage requirements as a contender for the Tesla Megapack.

4/15/2024

Using Supercritical CO2 for Vapor Deposition of Sulfur on Carbon Nanofiber

Lithium Sulfur Battery Research using Vapor Deposition of Sulfur on Carbon Nanofiber: One interesting application may be for the research and production of lithium sulfur batteries. Using CO2 may be one possible route to commercialization of production. (The team found that during the process of depositing sulfur on the carbon nanofiber surface, changing it from a gas to a solid, it crystallized in an unexpected way, forming a slight variation of the element, called monoclinic gamma-phase sulfur - link below.)
The modular construction of the Infinity experimenters system allow easy integration for new technology developments, and multi-role add-ons. The heart of the system is the phase change liquid pumping techniques, flow bar, and tribo effect electrostatic precipitation collection system. Many of these deployed technologies were developed by Infinity since 2015 making this system the most advanced in the industry. More than 100 of these commercial systems have been built and out around the world.

4/15/2024

Curcumin as a Gamma-sulfur Substitute for Lithium Sulfur Battery Electrodes and Hydrogen Production

Curcumin reduces poisoning because of reaction intermediates in battery applications.

See link below: Curcumin is used to decorate the gold nanoparticles to stabilize them, forming a porous network around the nanoparticles. Researchers deposited the curcumin gold nanoparticle on the surface of the electrode at a 100 times lower electric current than in previous studies. But the research could have broader implications than improved fuel cells. The electrode's unique properties could lend itself to future applications in sensors, supercapacitors and more, Ventrapragada said.

Curcumin can be extracted from Turmeric using Supercritical CO2.

4/15/2024