topics

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+1 608-238-6001 (Chicago [TEL]

greg@salgenx.com [Email]

Salgenx

SaltWater Flow Battery Topics

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Salgenx SaltWater Flow Battery Topics.

PDF Version of the webpage (first pages)

Press Releases

For the press releases for Salgenx Salt Water Battery, please follow the link below.

4/21/2024

Revolutionizing the EV Battery Landscape: The Emergence of Grid-Scale Saltwater Flow Batteries for Lithium Direct Lithium Extraction (DLE)

Unlocking a Sustainable Future in Lithium Production

In a remarkable leap forward for electric vehicle (EV) technology, a new grid-scale saltwater flow battery system has emerged, promising to revolutionize the EV battery materials supply chain. This innovative system stands out for its ability to extract lithium during its charging process, a breakthrough that could redefine how we approach lithium production for EV batteries.

Energy Savings

The integration of lithium extraction into the charging process of these batteries leads to more than 50 percent energy savings compared to standard lithium extraction methods. This efficiency is particularly noteworthy when paired with renewable energy sources like solar PV systems. When deployed with solar PV, the power can be stored during the day, then used for post-processing (refining) at night with the power already stored, resulting in huge energy savings.

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How the Salt Water Flow Battery Works

Operation:

1. An aqueous solution of NaCl is set in a tank and an organic liquid with high solubility of Chlorine gas and low miscibility in water is set in another tank.

2. Exits from these tanks flow in separate tubing and a pump sets the flow rate for each phase.

3. These two separate flows enter into a single flow (the reaction zone of the cell) and the flows will pass through and over their respective electrodes. The exit of these cells will be a flow combining the two flows. [Proprietary Device] separates the two flows and they return to their respective tanks.

4. After a steady state operation is achieved, the battery applies the voltage being provided from the power source. The battery is now charging and chlorine gas is being produced in the solution.

A. On the working electrode, [Proprietary catalyst] particles promote the well researched Chloride/Chlorine oxidation. Chloride ions from the NaCl aqueous solution oxidize into chlorine gas. This gas is then stripped from the aqueous phase by the organic phase.

B. On the counter electrode sodium ions are ejected from an active electrode of [Proprietary catalyst] into the aqueous solution and the electrode transitions to [Proprietary catalyst]. This boosts the average cell voltage from 1.3V to 1.8V

5. State of charge (SOC) is tracked by an inline concentration sensor of the organic phase. Once it reaches between 90-95 percent of its solubility limit of Chlorine gas the battery is considered charged. Pumping operation could cease. At no point is Chlorine gas outside of the closed loop system. A Chlorine sensor is provided and communicates instantaneously to command and control processor. In the case of a power failure, the system is flooded with NaCl to neutralize any Chlorine.

6. The energy storage of this design comes from a large amount of trapped Chlorine gas and dissolved sodium ions. Due to the separation of the tanks, discharge over time should be incredibly limited.

7. During discharge, the pumps are turned back on and a steady state operation is achieved. Then an opposite voltage is applied and the dissolved chlorine gas returns to chloride ions and the discharge is started.

A. On the working electrode, dissolved chlorine gas reacts on the [Proprietary catalyst] particles back into chloride ions. The low solubility of chloride in organic phases means these ions readily return to the aqueous phase. This is a safety factor which is inherent to the closed-loop system.

B. On the counter electrode sodium inserts back into the active material of the electrode.

8. Once again State of Charge (SOC) is tracked by the now diminishing Chlorine concentration in the organic phase. Once it reaches 0-5 percent of its charged value, the battery is considered discharged. Pumping operation ceases.

4/21/2024

NACS Tesla Plug for Charging AC and DC

Salgenx will be offering the NACS Tesla plug as part of its connectivity options to allow direct charging of electric vehicles.
From @Teslamotors #Tesla: With more than a decade of use and 20 billion EV charging miles to its name, the Tesla charging connector is the most proven in North America, offering AC charging and up to 1 MW DC charging in one slim package. It has no moving parts, is half the size, and twice as powerful as Combined Charging System (CCS) connectors.

4/21/2024

Modular Block Electrolyzers Provide Core Processing for the Grid-Scale Salgenx Saltwater Flow Battery

Salgenx, a division of Infinity Turbine LLC, is proud to announce the launch of its groundbreaking saltwater flow battery that leverages the power of electrolyzers for energy storage and discharge. This innovative energy storage solution has been made possible through the utilization of stackable modular blocks, a novel method of fabrication that promises to reshape the energy storage industry.

4/21/2024

Desalination

A breakthrough in desalination technology has been announced today with the unveiling of a new system that uses a saltwater flow battery cycle to produce clean drinking water from seawater. This innovative solution has been developed by a team of scientists and engineers who have been working tirelessly 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, which involves the movement of ions between two electrodes to store or discharge electricity without a membrane (which is typical with Vanadium or Bromine flow batteries). In this case, the process is used to remove salt from brine or seawater. 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.

4/21/2024

Rocket Fuel From PV and Wind Energy Using the Salgenx Saltwater Battery

Saltwater finds its utility in a variety of applications, with its role in flow batteries being merely one example. By employing sodium perchlorate ($NaClO_4$) as its foundational ingredient, the Salgenx saltwater battery also serves as a precursor in the production of solid rocket fuel.

4/21/2024

Exfoliated Graphene

Under development using electrochemistry as a spinoff of this flow battery is making graphene.

There are many similarities and the use of sodium (Na) to exfoliate graphene from graphite.

We are also experimenting with electrostatic pulling to harvest layers of graphene from graphite.

4/21/2024

On Demand Factory Versus the Tesla Gigafactory

Grid-scale batteries are an essential component of our modern energy infrastructure, and their production has become a critical factor in our ability to transition to a clean energy future. As demand for grid-scale batteries continues to grow, the manufacturing process has become a key area of focus for companies in the energy sector. In this article, we will explore the on-demand factory model and the Tesla Gigafactory format for grid-scale battery manufacturing, and compare their advantages and disadvantages, as well as their impact on production efficiency, scalability, and cost-effectiveness for the production of a Tesla Megapack and a grid-scale flow battery.

4/21/2024

Gasification of Wood Waste to make Carbon for Battery Cathodes

Gasification is a thermochemical process that converts organic materials, such as wood waste, into a gas mixture known as syngas. During the process, the wood waste is heated in the presence of a limited supply of oxygen or air, resulting in the production of volatile compounds, bio-oil, and solid residue, which can be further processed to produce hard carbon or graphite for use in battery cathodes.

4/21/2024

Ultracapacitor Integration in Flow Batteries for Demand-Based Grid Applications

The integration of ultracapacitors with flow batteries presents a significant opportunity to enhance the performance and functionality of energy storage systems for demand-based grid applications. By leveraging the high power density, rapid response times, and long cycle life of ultracapacitors, flow batteries can effectively address the requirements of grid stability, load balancing, frequency regulation, and renewable energy integration. With continued research and development, this synergistic combination has the potential to revolutionize energy storage technology and accelerate the transition to a more reliable and sustainable grid infrastructure.

4/21/2024

Cavgenx Heat Pump Turbine

The heat pump turbine is a product which has been in development for some time. It is a hybrid between the Brayton Cycle and Organic Rankine Cycle.
This amazing device can also be used simultaneously as a heat pump, which only leverages its use in range extending for electric cars.
The unique part of this turbine is that it can be closed-loop using CO2 as the working fluid taking advantage of sonochemistry (cavitation). Most refrigerants can be used as the working fluid for the Cavgenx heat pump turbine. The benefit is the ability to perform work using hydraulics and simultaneous cooling of the refrigerant.
Ideal for industries leveraging both hydraulic and refrigeration systems, this approach promises enhanced efficiency and compact design.
The system can also be used for lithium harvesting and refining by the use of the spinning disc reactor, which is a add-on element to the device.

4/21/2024

Salgenx to Build Saltwater Cell Demo Units for Infinity

Salgenx is in the process of developing saltwater flow demonstration units specifically designed for the Infinity GPU (Ground Power Unit) using a hand truck platform.

These demo units consist of single cells that can be easily expanded to either 12V or 24V, depending on the vertical arrangement of the cells. The liquid electrolyte will be stored in Intermediate Bulk Containers (IBCs) for efficient management.

The Infinity Turbine GPU currently uses Lithium batteries, which will be replaced by the Salgenx Saltwater batteries.

To harness the system's potential, the Infinity GPU will be utilized alongside Victron inverters and charge controllers, enabling seamless integration and optimized performance.

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As a simultaneous Thermal Storage Device TES

Considered a hybrid between a standard flow battery and a thermal storage device, the battery provides simultaneous heat or cold liquid storage as well as electrical energy storage.

The Cogen Battery has a variety of applications which include:
-storage of thermal energy (heating or cooling) from unused thermal resources
-storage of electrical power for backup power and grid strength
-utility grid power rate mining opportunities to store off-peak low cost power for later use during demand (on-peak) hours
-storage of thermal energy for Organic Rankine Cycle (ORC) power production while simultaneously storing the electrical output from the turbine generator
-using off-peak low cost power to make heating and cooling for later use
-reducing peak demand utility rates by peak energy shaving

Heat Pump

A heat pump is almost exactly like a ORC (Organic Rankine Cycle) system, which uses phase change to provide work to produce heat or cooling.
In the case of a ORC system, the pressure reducing valve is replaced with an expander which mechanically rotates a electrical generator to make power.
A heat pump has a high COP (Coefficient of Performance - is defined as the relationship between the power (kW) that is drawn out of the heat pump as cooling or heat, and the power (kW) that is supplied to the compressor) when compared to resistance heating.
We have also been able to have a high COP with our cavitating discs in liquids that cavitate (water, CO_2, and refrigerants).
The advantage of a heat pump is that you can use off peak power to produce heating or cooling into a liquid, and then use that thermal resource during the on peak hours for huge cost savings. We term this utility grid price arbitrage.

4/21/2024

Monetize the Tax Credit

Manufacturers can also monetize the tax credit through a direct payment from the Internal Revenue Service (IRS) is lieu of a credit against their taxes due, or opt to transfer the credit, as described below:

Direct pay option: Manufacturers can receive a refund for 45X MPTC tax credits for the first five years they are claimed, though are still subject to the 2033 credit sunset. The five-year limitation does not apply if the manufacturer is a tax-exempt organization (i.e. non-profit), state, municipality, the Tennessee Valley Authority, Indian Tribal government, any Alaskan Native Corporation, or any rural electric cooperative. A penalty of 20% may apply where excess payments occur.[3]
Transfer of credit: Manufacturers may also elect to transfer all, or a portion, of the tax credits for a given year to an unrelated eligible taxpayer. Payments for the credit must be made in cash and are not considered a taxable event (i.e. no taxes are owed on receiving the payment and no deduction is possible for making the payment). A penalty of 20% may apply where excess credits occur.[4]
[3] H.R.5376 – Inflation Reduction Act of 2022, Section 6417. Taxpayers may elect to stop receiving direct payments in subsequent years, however, once stopped, they cannot go back to direct payments.

[4] H.R.5376 – Inflation Reduction Act of 2022, Section 6418. The transferee cannot further transfer any credits it received in the transfer.

Tax Credits Waiting List

If you have battery tax credits to sell, or would like to be put on a tax credits available for purchase waiting list, please send us an email.
We anticipate having a minimum of $60 million worth of credits available by the end of 2023 from our various license holders and manufacturers.

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Levelized Cost of Storage LCOS

The superiority of Salt Water flow chemistry: lower levelized cost of storage (LCOS).
Utility Scale
The flexibility of large scale battery storage for wind and solar will prioritize grid stability. Salgenx salt water flow batteries meet these criteria with safe and nontoxic technology that is easier to site and permit than the competition with less maintenance and lower acquisition costs.
Micro grids, DERMS and VPPs
Distributed energy resources to maximize capacity, backup, and stability are a must. Stand-alone micro grids, oil and gas, or utilities balancing DERs all present ideal use cases for Salgenx salt water flow battery technology.
Commercial and Industrial (C&I)
Rapid growth in energy storage for commercial and industrial sites have been forecasted by industry experts. With Salgenx long-duration energy storage, you can manage demand charges and time-based rates while ensuring energy security. Buy low off-peak power and use during peak-demand.

Saltwater Battery

The Salgenx saltwater battery is a flow battery system, which requires two large tanks that hold fluid electrolytes. One tank is dedicated to salt water (just add NaCl to water). The saltwater tank may be used for thermal storage.
Fluids are circulated through electrodes, which regulate the input and output of electricity from the battery.
The battery does not use a membrane, which is common on other redox flow battery systems. The absence of the membrane saves huge up front purchase costs, maintenance, and consumable expenses.
The amount of electrolyte flowing in the electrochemical stack at any moment is rarely more than a few percent of the total amount of electrolyte present (for energy ratings corresponding to discharge at rated power for two to eight hours). Flow can easily be stopped during a fault condition. As a result, system vulnerability to uncontrolled energy release in the case of Vanadium or Bromine is limited by system architecture to a few percent of the total energy stored.
The energy capacity is a function of the electrolyte volume and the power is a function of the surface area of the electrodes.

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