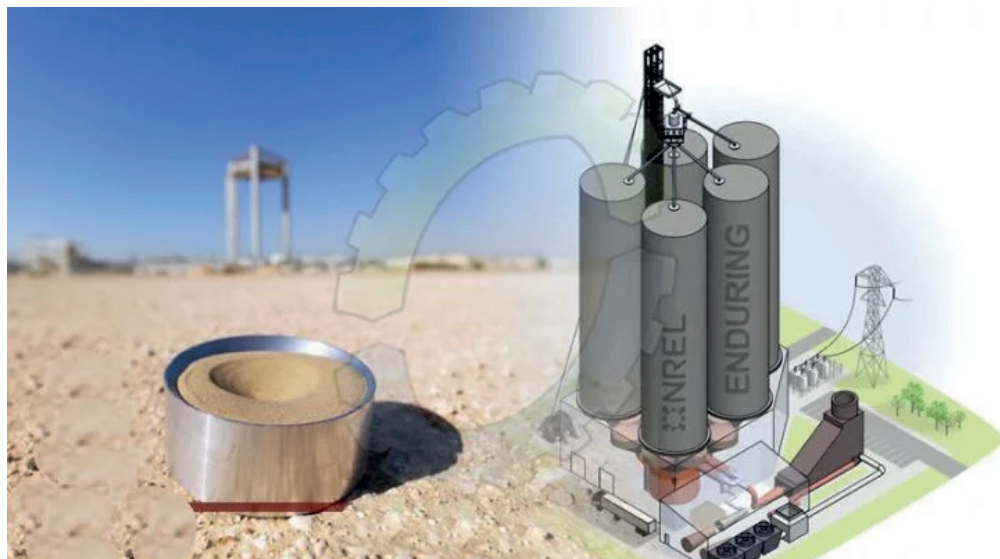


November 7, 2023

Report #3

High-Purity Quartz / Silica Sand in Brazil and Canada, Energy Storage



"Renewable energy sources such as solar and wind are changing the way we power our buildings, industries, and grid; yet, they are intermittent, and we want continuous electricity even when the sun goes down or the wind dies down. As a result, energy storage is important to maintaining continuous electricity and allowing energy producers to maximize on moments of over-generation on bright (or windy) days. Lithium-ion batteries are the market leader for short-duration energy storage, however they are not cost effective for extended periods of time." ([Source](#))

FIRST-OF-ITS-KIND REVENUE AND COST SAVING POTENTIAL

GAME-CHANGER FOR HOMERUN TO PROCESS ITS HIGH-PURITY SILICA SAND IN HOT SAND BATTERIES

Today, Homerun Resources Inc. [announced](#) the signing of a Multi-Party Shared Resource/Funds-In Cooperative Research and Development Agreement ("CRADA") with Alliance for Sustainable Energy LLC, which is the Manager and Operator of the National Renewable Energy Laboratory ("NREL") under a US Department of Energy Contract, and Babcock & Wilcox Enterprises Inc. NREL and clean-energy technology firm Babcock & Wilcox (NYSE: BW) have an exclusive intellectual property option agreement to licence the ENDURING particle thermal energy storage technology, which uses silica sand to store heat converted from excess renewable electricity.

Established in 1977 and located in Golden, Colorado (USA), [NREL](#) is a federally funded research and development center sponsored by the U.S. Department of Energy.

With a staff of 2,685 people and a budget of \$544.9 million USD (2020), [NREL](#) specializes in the research and development of renewable

energy, energy efficiency, energy systems integration, and sustainable transportation.

NREL has led the technology development using particle-based thermal energy storage aimed at enabling a scalable, low-cost technology for long-duration energy storage ("LDES").

Company Details



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ISIN: CA43758P1080 / CUSIP: 43758P

Shares Issued & Outstanding: 48,730,525



▲ Chart Canada (TSX.V)

Canada Symbol (TSX.V): [HMR](#)
Current Price: \$0.70 CAD (11/06/2023)
Market Capitalization: \$34 Million CAD



▲ Chart Germany (Frankfurt)

German Ticker / WKN: [5ZE / A3CYRW](#)
Current Price: €0.466 EUR (11/06/2023)
Market Capitalization: €23 Million EUR

All \$-figures in CAD unless otherwise stated.

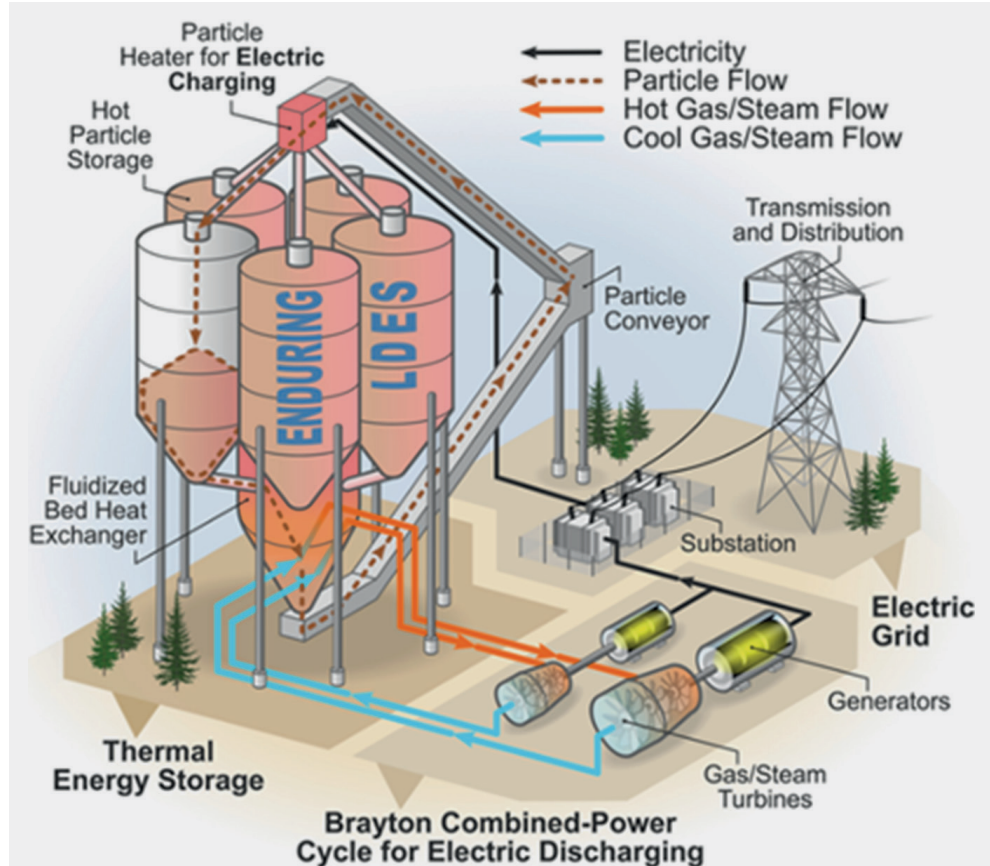


According to today's news:

"This technology is poised to have far-reaching impacts; it has applications in grid storage for renewable integration, and ultimately aims to compete with natural gas. The ENDURING project led by NREL and collaborated with industry partners has developed key components in the storage system and verified their operation mechanism through laboratory prototypes testing and modeling of the component and system performance. The development supports designs of an electric-charging particle heater, a fluidized bed heat exchanger driving a power cycle, and a particle storage design for storing hot particles at 1200°C. An integrated storage system was designed and analyzed for performance and cost to verify the technoeconomic goals of LDES applications."

Silica sand has long been recognized as a stable and inexpensive medium for long-duration (10-100 hours) energy storage. Since last year, the world's first commercial sand-based thermal energy storage system is in operation in [Finland](#). "Finland isn't alone in analysing silica's energy potential," according to a [2022-article](#):

"The National Renewable Energy Laboratory (NREL) is in the late stages of prototype testing a new thermal energy storage technology that uses inexpensive silica sand as a storage medium. Economic Long-Duration Electricity Storage by Using Low-Cost Thermal Energy Storage and High-Efficiency Power Cycle (ENDURING) is billed as a reliable, cost-effective, and scalable solution that can be sited anywhere. Particles are fed through an array of electric resistive heating elements to heat them to 1,200°C (imagine pouring sand through a giant toaster). The heated particles are then gravity-fed into insulated concrete silos for thermal energy storage. The baseline system is designed for economical storage of up to a staggering 26,000 MWh of thermal energy. With modular design, storage



"Energy storage is key to decarbonizing the economy and reversing the use of fossil fuels for a clean energy future. Long-duration stationary energy storage is becoming a need in improving the resiliency of the grid, integrating more intermittent renewable energy resources such as wind and solar, and providing reliable energy supply to grid or industrial processes... The ENDURING technology works by heating stable, low-cost solid silica particles – which unlike molten salts, are stable at both high and ambient temperatures – to over 1,000 degrees Celsius. This charging process happens when electric power is cheapest, allowing the resulting energy to be stored for several days in large storage modules. To discharge this energy, the hot particles are fed through a heat exchanger, ultimately driving an electric generator. With more abundant renewable electricity available and electrification of the energy sector, thermal energy storage makes more and more sense for the broad decarbonization of the economy. The NREL technology focuses on using low-cost silica sand to provide broad application potentials integrating renewable generation." ([Source](#))

capacity can be scaled up or down with relative ease."

According to "New Thermal Energy Storage Methods Using Hot Sand" (2021):

"An innovative new energy storage technology that uses hot sand is being developed as an alternative in the field of renewable energy technologies. That feeling of hot sand on the soles of your feet is what sparked an investigation around the

ability of sand to absorb and retain heat, giving rise to new thermal energy storage processes. Finding ways to store excess energy produced by renewable technology is one of the main challenges researchers are trying to overcome. Teams at National Renewable Energy Laboratory (NREL) and an Italian firm, Magaldi Group, recently unveiled new systems to help tackle this precise issue. ENDURING has the capacity to store energy in a similar way to how a battery does and could be a revolutionary moment in



the renewable energy industry. The silica sand is superheated reaching temperatures above 1200 degrees C. It is then fed through the ENDURING system and transferred into a concrete silo which is insulated for long-term storage. When the stored energy needs to be released, the sand passes through a heat exchanger which powers turbomachinery with pressurized gas; this, in turn, spins power generators which can then produce new electricity. One of the most attractive features of the ENDURING system is its ability to be installed as part of the grid network. Furthermore, this system could help phase out traditional coal and natural gas plants and could even be placed on existing infrastructure on decommissioned sites respectively. NREL believes that a single baseline, ENDURING system can store up to 26,000 MWh of thermal energy; equivalent to the annual energy consumption of more than 400 households. Furthermore, the technology could be rolled out at costs ranging between 2 to 4 USD per kWh, making it a low-cost thermal energy storage solution."

HOW HOMERUN COMES INTO PLAY

The challenge around sand-based energy storage systems is particle stability at 1,200°C and subsequent particle interaction.

Silica sand predominately consists of silicon dioxide (SiO₂), also known as quartz in its crystalline form. Quartz not only has the lowest potential for weathering as it is a very hard mineral (only diamond, corundum and topaz have a higher [Mohs hardness](#)), it is also chemically inert and has a high melting point (1713°C) due to the strong bonding between its atoms.

Precisely these properties are highly valued in many industrial applications. However, high-purity silica sand deposits typically have impurities such as iron, aluminium, titanium and other elements which may behave negatively in high-temperature energy storage applications.

Silica Sand & Energy Storage

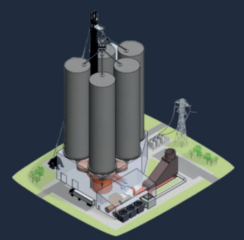
High purity silica sands play a crucial role in advancing the field of energy storage, offering significant importance and benefits. Homerun will work to be part of the solution to support renewable integration for future carbon-free energy supply. "Sand and concrete silos with refractory insulation are very inexpensive materials that can lead to low-cost energy storage. Traditional four-hour storage technologies don't scale well to the grid or city scale. Now that we are in need of large-scale energy storage, this technology makes a lot of sense." - Patrick Davenport, NREL Researcher

"We Are In a Global Energy Crisis"



CARBON FREE ENERGY SUPPLY

Silica, with its exceptional chemical and physical properties, serves as a key component in various energy storage systems. Its high surface area and porous structure enable efficient electrolyte penetration and enhanced ion conductivity, leading to improved battery performance and increased energy storage capacity.



Due to Homerun having supply agreements in place with one of the world's highest purity silica sand deposits, "NREL will test Homerun silica sand to determine the composition and suitability for use in energy storage and assess other applications of silica purification for photovoltaic (PV) glass, PV silicon or glass substrate for perovskite PV cells, and silicon anode for Li-ion batteries," the company stated in today's news-release and added: "The Parties will analyze the economic benefits of using Homerun's silica sand for energy storage, including energy arbitrage from energy storage and grid service, processing of the silica sand by using low-cost electricity in energy storage, and generating potential income from processed materials after its use for energy storage (e.g., high-purity silica sand for renewable materials)."

The purpose of the Cooperative Research & Development Agreement ("CRADA") between Homerun, NREL and Babcock & Wilcox as per today's news:

"The general purpose of the CRADA is a collaborative effort to jointly evaluate integrating a silica sand refinement process into the ENDURING Energy Storage Application. NREL, Homerun and B&W have recognized the potential of using the novel energy storage technology to process upgrade Homerun's silica sand while providing clean reliable energy. This

initiative supports Homerun's goal of refining their silica sand to serve various industrial sectors."

Although Homerun's silica sand from Bahia, Brazil, has [one of world's highest silica purities and lowest levels of impurities](#) (99.88% SiO₂, 48 ppm Fe, 160 ppm Ti in its raw form and 99.98% SiO₂, 2.4 ppm Fe, 21.5 ppm Ti after simple washing/scrubbing), the purity may be increased further with advanced processing methods, which typically involves heating the raw sand to high temperatures and applying acid leaching to reduce impurities. Such stand-alone silica sand processing plants not only have high CAPEX but also high OPEX as being very energy intensive to achieve such high temperatures.

The idea behind the collaboration between Homerun, NREL and Babcock & Wilcox is that the sand-based ENDURING energy storage system is already converting excess renewable electricity into heat (which is then stored in the sand for long durations), which in turn may also effectively "process" Homerun's raw sand into an even higher quality product, especially when combined with acid leaching. By this, Homerun could get its raw sand processed to higher purity levels – to achieve much higher sales prices – without having to finance and built its own processing facility.



Today's news-release concluded:

"The project is designed to support an advanced energy solution in long duration energy storage using particle-based thermal energy storage and overcome market hurdles for using this technology in broad decarbonization applications. It will help define a technology commercialization pathway that currently lacks first-of-its-kind use and lay groundwork for ongoing technology developments capable of enhancing U.S. industry and manufacturing jobs. If the particle thermal energy storage is realized by this collaboration, it can be deployed to train U.S. workers working on this energy solution for long term economic competitiveness. Additionally, particle thermal storage may enhance energy security and resilience by providing a potential low-cost and long-duration ability to overcome blackouts or weather events that may crumple local electric grids."

Excerpts from ["Innovative technology for the production of high-purity sand silica by thermal treatment and acid leaching process"](#) (2018):

"The production of high purity silica out of natural sand plays a critical role as a starting material in the industry of glass and high grade silicon. In this paper, we expose a novel processing method for the purification of sand silica. This method is a subsequent combination of thermal treatment and acid leaching. Firstly, samples of Tunisian natural sand were submitted to a rapid thermal annealing in an infra-red furnace under O₂ atmosphere at fixed temperature and time 1000°C and 1 h, respectively. Subsequently, the samples were soaked in an aqueous acid solution composed hydrofluoric acid and a hydrochloric acid concentration... The results show substantial reduction in all metallic impurities in silica after three successive purification cycles improving the purity from 99.7 to 99.9%."



Click above image or [here](#) to watch a video about NREL.

ABOUT NATIONAL RENEWABLE ENERGY LABORATORY (NREL)

At the National Renewable Energy Laboratory („NREL“), the focus is on creative answers to today's energy challenges. From breakthroughs in fundamental science to new clean technologies to integrated energy systems that power our lives, NREL researchers are transforming the way the nation and the world use energy. www.nrel.gov

ABOUT BABCOCK & WILCOX

Established in 1867, Babcock & Wilcox is a leader and innovator in the energy transition, making net-zero ambitions a reality today for a cleaner tomorrow. With 2,100 employees (2020), revenues of \$723 million USD (2021) and its proven clean-energy solutions, the publicly listed company continues to meet the challenges of the ever-changing energy landscape. www.babcock.com

ABOUT HOMERUN RESOURCES

Homerun Resources is focused on the development of its business within the critical and energy materials sectors. With a steadfast commitment to operational excellence, sustainability, and building shareholder value, Homerun is poised to make a lasting impact in these industries. www.homerunresources.com

PREVIOUS COVERAGE

Report #2: "Homerun in Bahia: At the forefront of one of the world's highest quality silica sand districts: Comparison of silica sand projects globally" ([Web](#) / [PDF](#))

Report #1: "The Energy Transition is Running Low on High-Purity Silica Sand: The Elephant in the Room" ([Web](#) / [PDF](#))



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All statements in this report, other than statements of historical fact should be considered forward-looking statements.

Much of this report is comprised of statements of projection. Statements in this report that are forward looking include that today's news-release is a game-changer for Homerun to process its high-purity silica sand in hot sand batteries, and that first-of-its-kind revenue and cost saving potential exists; that NREL has led the technology development using particle-based thermal energy storage aimed at enabling a low-cost technology for long-duration energy storage; that this technology is poised to have far-reaching impacts; it has applications in grid storage for renewable integration, and ultimately aims to compete with natural gas; that ENDURING is billed as a reliable, cost-effective, and scalable solution that can be sited anywhere; that the baseline system is designed for economical storage of up to a staggering 26,000 MWh of thermal energy, and that with modular design, storage capacity can be scaled up or down with relative ease; that ENDURING has the capacity to store energy in a similar way to how a battery does and could be a revolutionary moment in the renewable energy industry; that one of the most attractive features of the ENDURING system is its ability to be installed as part of the grid network; that this system could help phase out traditional coal and natural gas plants and could even be placed on existing infrastructure on decommissioned sites respectively; that NREL believes that a

single baseline, ENDURING system can store up to 26,000 MWh of thermal energy; equivalent to the annual energy consumption of more than 400 households; that the technology could be rolled out at costs ranging between 2 to 4 USD per kWh, making it a low-cost thermal energy storage solution; that NREL will test Homerun silica sand to determine the composition and suitability for use in energy storage and assess other applications of silica purification for photovoltaic (PV) glass, PV silicon or glass substrate for perovskite PV cells, and silicon anode for Li-ion batteries; that the Parties will analyze the economic benefits of using Homerun's silica sand for energy storage, including energy arbitrage from energy storage and grid service, processing of the silica sand by using low-cost electricity in energy storage, and generating potential income from processed materials after its use for energy storage (e.g., high-purity silica sand for renewable materials); that the purity of Homerun's silica sand may be increased further with advanced processing methods; that the ENDURING energy storage system may effectively "process" Homerun's raw sand into an even higher quality product, especially when combined with acid leaching, and that Homerun could get its raw sand processed to higher purity levels – to achieve much higher sales prices – without having to finance and built its own processing facility; that the project will support this advanced energy solution in long duration energy storage using particle-based thermal energy storage and overcome market hurdles for using this technology in broad decarbonization applications; that the project will help realize the technology commercialization that currently lacks first-of-its-kind use; that the technology development will enhance U.S. manufacturer and U.S. industry and manufacturing jobs; that if the particle thermal energy storage is realized by this collaboration, it will train U.S. workers on working on this energy solution for long term economic competitiveness; that particle thermal storage improves energy security and resilience with its low-cost and long-duration ability to overcome blackouts or weather events that may crumple local electric grids; that Homerun will work to be part of the solution to support renewable integration for future carbon-free energy supply.

Such statements involve known and unknown risks, uncertainties and other factors that may cause actual results or events to differ materially from those anticipated in these forward-looking statements. There can be no assurance that such statements will prove to be accurate, as actual results and future events could differ materially from those anticipated in such statements.

Risks and uncertainties include that the proposed technology is not commercially viable and that the collaboration turns out fruitless; that Homerun will not find adequate buyers for this silica sand supply; uncertainty of future production, uncertain capital expenditures and other costs; financing and additional capital requirements for exploration, development, expansion of the mine may not be available at reasonable cost or at all; mineral grades and quantities on the project may not be as high as expected; samples found to date and historical drilling may not be indicative of any further potential on the properties; that mineralization encountered with sampling and drilling will be uneconomic; that the targeted prospects can not be reached; the receipt in a timely fashion of further permitting; legislative, political, social or economic developments in the jurisdictions in which Homerun or its partners carry on business may hinder progress; there may be no agreement with neighbors, partners or government on developing infrastructure; operating or technical difficulties or cost increases in connection with exploration and mining or development activities; the ability to keep key employees and operations financed; share prices of these companies may fall as a result of many factors, including those listed here and others listed in the companies' and other mining exploration company disclosure; and the resource prices available when the resource is mined may not be sufficient to mine economically.

Accordingly, readers should not place undue reliance on forward-looking information.

Rockstone and the author of this report do not undertake any obligation to update any statements made in this report except as required by law.



Note that silica sand grades and mineralization described in similar deposits on other properties are not representative of the mineralization on Homerun's or its partner's properties, and historical work and activities on its properties have not been verified and should not be relied upon.

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Part of the author's responsibilities at Zimtu Capital is to research and report on companies in which Zimtu Capital has an investment.

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The author also owns equity of Homerun, as well as an equity position in Zimtu Capital Corp., and thus will also profit from volume and price appreciation of those stocks.

Homerun pays Zimtu to provide this report and other investor awareness services.

As per Homerun's and Zimtu's [news \(06/22/2022\)](#): "Zimtu Capital Corp. (TSXv: ZC; FSE: ZCT1) (the "Company" or "Zimtu") announces it has signed an agreement with Homerun Resources Inc. to provide its ZimtuADVANTAGE

program (<https://www.zimtu.com/zimtu-advantage/>). Zimtu shall receive \$12,500 per month for a period of 12 months for the duration of the contract." [The duration of the contract may have been mutually extended.]

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Stephan Bogner studied Economics, with specialization in Finance & Asset Management, Production & Operations, and Entrepreneurship & International Law, at the

International School of Management (Dortmund, Germany), the European Business School (London, UK) and the University of Queensland (Brisbane, Australia). Under Prof. Dr. Hans J. Bocker, Stephan completed his diploma thesis ("Gold In A Macroeconomic Context With Special Consideration Of The Price Formation Process") in 2002. A year later, he marketed and translated into German Ferdinand Lips' bestseller "Gold Wars". After working in Dubai's commodity markets for 5 years, he now lives in Switzerland and is the CEO of [Elementum International AG](#) specialized in the storage of gold and silver bullion in a high-security vaulting facility within the St. Gotthard Mountain in central Switzerland.

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