

Darrin Gordon

From: Bill Schofield <bschofield@ces-ltd.com>
Sent: Tuesday, January 8, 2019 4:46 AM
To: Darrin Gordon
Subject: Revive Storage Project

Hello Darrin,

I hope you are doing great and that the New Year has started off well for you and the Lewes BPW.

I have some good news for you assuming Lewes BPW's continued interest in a storage project. Innolith, the company that has risen out of the ashes of the Alevo bankruptcy with new leadership is interested in reviving the Lewes storage project. We've been working with them for a number of months now providing consulting work on the economics in PJM (and elsewhere) to help them to determine the viability of doing so, and we very recently entered into an agreement to again facilitate project development discussions such as with Lewes.

I have been emphasizing to them strongly that out of respect to you and the time that was spent previously that we should come with as clear a plan as possible including clear value for Lewes. My intent, then, is to work with them on the documents that had been worked out with Alevo to use as the basis for new proposals to Lewes BPW. My goal is to help them offer you something that is at least as good as what you agreed to previously.

The new leadership incorporates those people who had developed the original technology that Alevo had bought, and R&D continued even during the bankruptcy. They have thus improved the technology further, learned from Alevo's mistakes, and this time around they are, in my opinion, going the wiser route of contracting with an experienced third party manufacturer to build their project rather than trying to stand up their own factory.

The initial focus is on upgrading the cells to their latest generation tech at the project that did get built at Hagerstown as well as reviving the other originally intended projects there, but nothing will get built sooner than mid-2020 and they are very interested to initiate discussion with Lewes also. That said, I don't expect we'd try to schedule a meeting with you before March. They would probably be interested in sooner but I want to make sure we do our work in advance in order to have as clear a plan and value proposition for Lewes as possible utilizing the information I still possess from our last attempt. I am very excited about the potential of making good on the what we originally proposed, but I am emphasizing to them that we need to work extra hard to demonstrate that they are "legit" and worth you spending time working with. I went through this process myself of making them demonstrate to me that it was worth CES investing time in this again which included them paying us to help them run the economics again given the changes that have occurred in PJM.

So, this email was just to ensure that you remain interested as you were even after Alevo fell through, and to otherwise let you know that we'll be reaching out more formally in the near future.

(Don't mind the crazy time that I'm sending this email, I'm actually in India on business.)

Best regards,

Bill

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Innolith launches non-flammable battery with 50,000 charging cycles

Inorganic electrolytes will do the trick the company says. For multi-MW grid-scale applications the company says its technology can boost battery life to 50,000 cycles and is non-flammable. It adds that the costs of the product are competitive with conventional battery systems. Innolith is taking over the baton from Alevo, including chief executive and engineers. Alevo, however, went bankrupt last year, making the same promises.

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The company says that through its inorganic electrolyte it can improve lithium-ion batteries by a great margin. Now in its third attempt, the company has outsourced battery manufacturing to a close partner.

Innolith AG

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Innovative battery technology provider Innolith AG announced the commercial launch of its inorganic electrolyte technology to improve lithium-ion batteries for grid-scale storage applications.

According to the company, the use of the new type of electrolyte allows mitigating the inherent limitations lithium-ion batteries have. Reportedly, the new battery electrolyte allows up to 50,000 charging cycles and eliminates flammability. This longevity would effectively reduce the costs per charging cycle, making it a more attractive solution for cycle intensive applications, such as grid storage systems providing frequency response.

At this first stage, Innolith says it will start commercial production of the batteries at an undisclosed location and with an undisclosed manufacturer. At the inquiry of **pv magazine**.

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the manufacturing deal, but “it is a very well established and known company as we are looking to work with strong experts.”

Innolith runs a site with 60 employees in Bruchsal, Germany, where chemists and engineers develop the technology. At this location, it performs basic cell research and development, battery management and cooling, as well as providing engineering support for the manufacturer and manufacturing process validation.

Innolith will supply its electrolyte to the undisclosed battery manufacturer, which will in turn produce the batteries. Greenshields highlights that through this partnership, the companies will be closely tied and that this is not just a supply deal.

When asked if the technology could be supplied to any manufacturer for integration into their lithium-ion batteries, he said that “the new electrolyte requires a different battery design. The higher conductivity means that the cells require electrodes that are ten times as thick. So, the modern flat layouts of lithium batteries are not applicable to the new electrolytes.”

He does, however, say that the existing architecture for Nickel-metal-hydrate (NiMH) batteries would be suitable for the technology. In the medium-term, Innolith aims to provide licenses and the electrolytes to manufacturers which are willing to produce with the new type.

Just the right chemistry

Greenshields further explained that the electrolyte is non-reactive, which addresses the issued chemical decomposition intrinsic to lithium-ion batteries. Conventional electrolytes react with the materials of the anode and other components inside the battery cells, causing a chemical reaction, which leaves the materials with a lower capability to perform.

According to Innolith this non-reactive property allows the battery to maintain its capacity through 50,000 charging cycles. It says this is 10 times higher than for conventional lithium-ion batteries.

Furthermore, the new material renders lithium batteries effectively non-flammable, addressing a persistent issue in the technology. Greenshields says the problem initially occurred through a design flaw by Sony, which brought lithium-ion batteries to the market.

By his account, Sony addressed the issue with battery management systems, which would prevent overcharging and other causes for overheating. This works fine for consumer electronics. but has

Greenshields touts that the technology reflects the company's philosophy to fix issues on a chemical level, rather than continuing to work with flawed chemistry and build complicated systems around it to make it work.

Lower costs through more cycles

For now, the batteries will be used in grid-scale applications only, though Greenshields said that R&D processes are ongoing to bring the electrolyte into EV and residential storage applications. No more details could be shared, however.

When asked what the per kW/h costs of the battery are, Greenshields responded that "cost per kW/h as a metric made sense for smaller batteries in the past. However, with grid storage for frequency response, the cost of a battery should be determined in cost per cycle."

According to him, grid storage batteries would run through around two cycles per day, which gives batteries with a higher maximum cycle count an advantage – financially and from a sustainability perspective. Following up on that point, Greenshields was asked whether higher upfront investment costs might not prevent investors from buying into the technology, as return on investment (ROI) periods could exceed current standard investment practices. He responded that "our batteries have a shorter payback period and also win on that metric."

The company's board chairman adds that the batteries could have an operative life-cycle of 15 years. This would be higher than with conventional lithium-ion batteries. Already, there would be "many companies inside the U.S., but also many outside the U.S. that have expressed interest in the new batteries," he says. Though, he could not further specify which companies have expressed interest, or in which countries or continents these would be located in.

New game – new luck

The new inorganic electrolyte is in fact not a new technology. Alan Greenshields was already involved in fortu Powercell GmbH, a company working on inorganic electrolytes of that type, which was founded in 1997. Greenshields said that the company set out to produce a battery that is safe to use, meaning non-flammable, and is highly durable.

"With Innolith, we have finally achieved what we set out to do," he states. As fortu could not do it, the company was acquired by Alev Group SA, in 2014. Alev took over the patents and continued work on the electrolyte. However, in attempting to make the jump from small-scale production for

trial purposes in Germany, to large-scale commercial production in the United States, the company burned through its financial assets – at tax benefits it received in the US – and ultimately reported insolvency.

In the following Chapter 11 consolidation, assets such as the manufacturing site, were sold off for a fraction of the costs and are no longer at the disposal of Alevo, or Innolith. The latter managed to secure IP rights to the electrolyte technology and Greenshields, again involved in the third company, has a chance to give the technology another try.

Speaking about the likelihood of success on the third attempt, Greenshields responded swiftly that, “Rudolf Diesel never sold a Diesel engine.” According to him, new technologies need time to reach commercial maturity and the right strategy. With fortu and Alevo this was not the case, but learning from the past Innolith would be in a better position to bring the product to the market.

“Other than before, we are counting on an experienced manufacturing partner to manage the upscaling of the production for us. The technology and R&D will remain our core focus, as this is our main competence,” says Greenshields

With regards to the company’s major stakeholder Dmitry Rybolovlev, who is on the section 241 report list of foreign nationals to be sanctioned, issued by the U.S. Treasury Department, Greenfields refused to provide information. “Innolith is allowed to do business everywhere in the world, and I cannot give information on our shareholder structure.”

He adds that such incidences show the importance of spreading manufacturing across the world, to avoid being at the will of politics. In this vein, he disclosed that the manufacturing site would be located in Europe, as close as possible to the R&D site in Bruchsal in Germany, to allow for seamless communication between R&D and manufacturing engineers. “We would produce in the U.S. if we found a positive business case to do so,” he concluded.

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Innolith is the only company in the energy storage market that has a deep and proven understanding of inorganic battery technology. Innolith has an unrivalled intellectual property and patent portfolio for the application of inorganic electrolytes for rechargeable batteries. This is based on 20 years of R&D, which represents hundreds of millions of Euros in investment.

Innolith uses a highly structured approach to R&D that has enabled fundamental discoveries to be made and breakthrough solutions to be delivered. Innolith research is focused on determining the underlying properties of materials to understand their behaviour in an inorganic environment. Its deep science approach led to the breakthrough discovery of a safe, stable electrolyte system that has been used to build high power and low-fade grid scale batteries.

Use of the inorganic electrolyte enables Innolith's batteries to be both long-lasting and safe. In its first application Innolith's electrolyte has been used to create a highly durable battery with almost no power fade over tens of thousands of cycles. This initial battery also has the advantage of being safe from the risks of combustion because the electrolyte will never catch fire.

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INNOLITH BATTERY PLATFORM



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Innolith has created an entirely new rechargeable battery technology platform based on inorganic electrolyte. Innolith has built batteries which have been tested over 50,000 cycles at half-hour charge / half-hour discharge with 0 to 100% depth of discharge.

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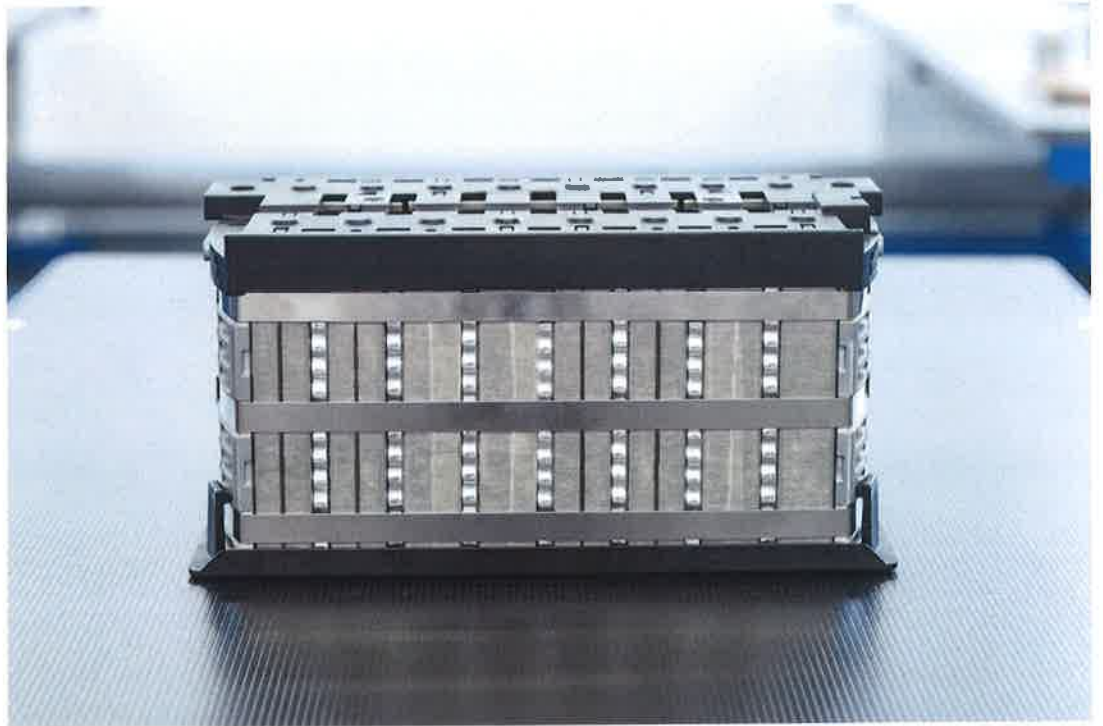
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- >50,000 charge cycles
- High power (>2MW)
- GW scalable storage
- Fast charge and discharge (2C/2C) for 0 to 100% depth of discharge
- Safety battery with no combustion risk

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