2000 Bar Beyond the Lithium Dilemma

Frey & Co GmbH, Bavarian manufacturer of special purpose industrial equipment, introduces new isostatic press, enabling the efficient production of environmentally friendly NaNiCl-battery storage units.
Undoubtedly, domestic solar panels are a crucial step towards individually becoming more independent from the energy markets in terms of price and security of supply – and to further moving away from fossil fuels. Once the panels are mounted on the roof, however, homeowners unfortunately still face an immanent problem: during daytime, sun is converted into electrical energy, but it is not necessarily consumed in the house. Instead, it is fed into the public power grid for just a few cents. In the evenings, when energy is needed for cooking, heating or lighting, the solar cells do not produce any electricity – which in turn has to be bought from the local energy supplier at rather high cost, and possibly from non-renewable sources. And: the less sunlight per day, the worse this ratio is!

The dilemma of storage

For becoming truly independent, there is no way around being able to store the sun's energy and use it when it is needed. With conventional lithium-ion batteries as electricity storage, the market offers a solution that undoubtedly raises questions in terms of safety, cost-effectiveness and sustainability. A massive dilemma for homeowners with a sincere interest in a sustainable energy concept.
Having in mind their increased demand for electric vehicles, lithium-ion batteries have faced heavy criticism: lithium and cobalt are highly toxic, deposits are limited, and mining is suspected to take place under questionable conditions and significant environmental impacts.
Moreover, also in domestic energy storage, lithium-ion technology reveals weaknesses: the performance is strongly dependent on the outside temperature, and any battery fire would only be extinguishable with complex halon systems, since lithium is known to burn without oxygen. Not to mention the fact that lithium-ion batteries are not recyclable – and thus anything but environmentally friendly.

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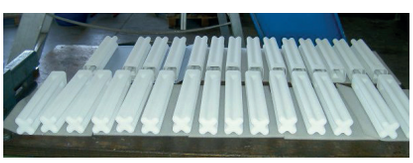

Fig. 1 Test production

NaNiCl storage – a green alternative?

Good news is now coming from the very south of Germany, where the developers at Frey & Co GmbH are currently arousing the interest of the industry with a special pressing process for sodium nickel chloride battery cells – and possibly showing a way out of the lithium-ion dilemma.
"Sodium nickel chloride cells are the ideal technology for storing energy in a safe, inexpensive and environmentally friendly way. Neither weight nor size play a decisive role in stationary use. For a single-family home, the "green" alternative to lithium-ion storage would have a capacity of 10 kWh, roughly the volume of a washing machine," illustrated Frey's Managing Director Dieter Lauber.
This green battery contains a ceramic cell as its core, which is to be connected with various metal parts and further ceramics at high temperature. As further chemical components, the NaNiCl battery contains only salt and nickel.

Fig. 2 Key component for "green" NaNiCl battery storage: high-pressure manufactured battery sleeves

Sustainable and safe

Whereas damage to a conventional lithium-ion battery can be fatal and a fire hazard, a short circuit in a NaNiCl battery merely causes the affected battery cell to heat up and, after cooling, to become so low-resistant that continued operation is possible, even with the loss of one cell's capacity. As a result, it is not necessary to replace the entire battery, as is the case with the lithium-ion system, but only that very one cell.
The NaNiCl battery runs at a temperature of around 280 °C and can therefore safely

handle the short-term temperature increase caused by an overheated cell. The technology is considered "intrinsically" safe – and reveals its advantages particularly wherever lithium-ion systems would have to be cooled.

With 2000 bar ahead

Dieter Lauber emphasized the relevance of the process for salt battery technology as a solar energy storage system: "We've engineered a press for the industry that forms solid sleeves from the beta-alumina granules, which are installed in the battery housings. They are produced under a very high-pressure of 2000 bar. For this, we are globally renowned specialists."

Dieter Lauber and his team consider this to show a significant market potential: in Germany alone, they say, 25 % more solar roofs have been installed during the last year. Nearly 2 million solar installations supplied 51,4 TWh (1 TWh = 10^9 kWh) or about 10 % of the entire energy produced in Germany in 2020. Nearly 30 Mt of CO_2 have been saved with this.

"With our dedicated isostatic press, we are now supporting the industry to complement renewable solar energy with a truly green battery", as Dieter Lauber sumed it up.

Frey's EasyIso/U special press

The battery housing pressing process is made possible by a special press for the production of aluminium oxide tubes closed on one side: The EasyIso/U is the latest evolutionary stage of a system designed and continuously refined since 1996. Now, it is proven to be capable of producing sophisticated components in high volumes, ensuring very tight tolerances. Designed as a stand-alone production system, the EasyIso/U's unit's compact design is ready to be lined up next to each other – for multiplying the short production cycle times even further. The two-column design in open construction allows quick and safe access at all times. The removal of press parts and their onward transport are handled by robots – just as the cleaning of the press tools or the upper die's handling.

The EasyIso/U comes with the in-house engineered hydraulic servo-pump system, which operates significantly more space-saving and quietly than conventional hydraulic systems – and requires up to 60 % less energy. The press is optionally equipped with the corresponding sensor technology for modern data management – and thus ready for "sustainability 4.0".

https://freysysteme.de/en/products/isostatic-presses/