

Alternative Power Report

November 16, 2023

News on Alternative Power Sources



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Moving from ICE To Alternative Power

As manufacturers continue to shift their equipment production from ICE to alternative power sources, they need the latest information. That's why analysts at Power Systems Research continue to revise our global data and forecasts to provide the freshest picture available.

China Discovers Unique Battery Material

New Ore Named Niobobaotite



By Guy Youngs, Forecast & Adoption Lead

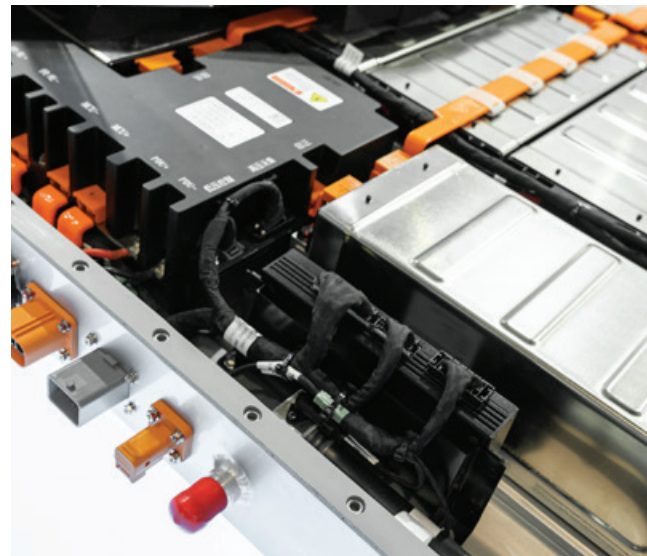
A newly discovered ore containing vast quantities of an element widely used in semiconductors has been found in China. The discovery could propel new advances in battery technology.

Geologists have found the rare earth metal niobium inside the new ore named niobobaotite from north China's Inner Mongolia. The rare earth metal is widely used in alloys for jet engines and rockets and has also been shown to have exceptional current conducting properties in low temperatures.

Researchers have said batteries made from niobium have several advantages over traditional lithium-ion batteries. The Brazilian Metallurgy and Mining Company (CBMM) has been working on new projects towards the use of niobium to make advanced lithium-ion batteries.

Source: *The Independent (via MSN)* [Read The Article](#)

PSR Analysis: China currently sources most of its niobium from Canada and if geologists can prove that sufficient



volume and of the correct quality can be extracted from niobobaotite, experts said it could help make China "self-sufficient", reported the South China Morning Post newspaper. Researchers believe that niobium-graphene batteries can last 10 times longer than traditional lithium-ion batteries, thus making them last for an estimated 30 years and make them more durable and reliable, as well.

Editor's Note: This monthly report includes news and analysis about EV and alternative power sources such as batteries and fuel cells from analysts at Power Systems Research.

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Toyota Joins Race To Mass Produce Solid-State Batteries

Toyota Motor Company is the latest automaker delving into solid-state battery technology, vowing to mass produce the safer and more energy dense cells in four years.

The Japanese automaker has recently changed its tune about building BEVs and is now claiming solid state batteries will be in vehicles starting in 2027.

Source: *Electrek* [Read The Article](#)

PSR Analysis: This sounds really good, but Toyota has been talking about solid state batteries since the mid 1990's and has promised their introduction several time already. We need to be cautious about this as Toyota also has said that their new ammonia engine could bring the end of EVs (see next article). Toyota is late to the EV party and is now sending mixed signals.

Could Toyota's Ammonia Engine Bring the End of EVs?

The technology is the result of a collaboration with the GAC Group, a Chinese state-owned manufacturer. The ammonia engine is a form of internal combustion engine (ICE) powered primarily by ammonia, (ammonia is comprised of a nitrogen atom and three hydrogen atoms). It does not contain carbon. As a result, when it's burned in an ICE, it does not release carbon dioxide, one of the major greenhouse gases. In the effort to decarbonize, the potential of this type of technology is considerable.

Source: *Hydrogen Fuel News* [Read The Article](#)

PSR Analysis: Ammonia is energy dense so there is potential here but like gasoline, ammonia is highly toxic so there are some concerns here. However, the article doesn't clarify how they will deal with the nitrous oxides emitted from the engine and these can be expensive to deal with.

White Hydrogen Could Reduce Decarbonization

Early this summer, scientists in northern France discovered what has the potential to be a huge white hydrogen deposit, (white hydrogen is naturally occurring H₂). Not all forms of the hydrogen are equally clean, and this depends on how hydrogen is produced. Brown, black and grey H₂,

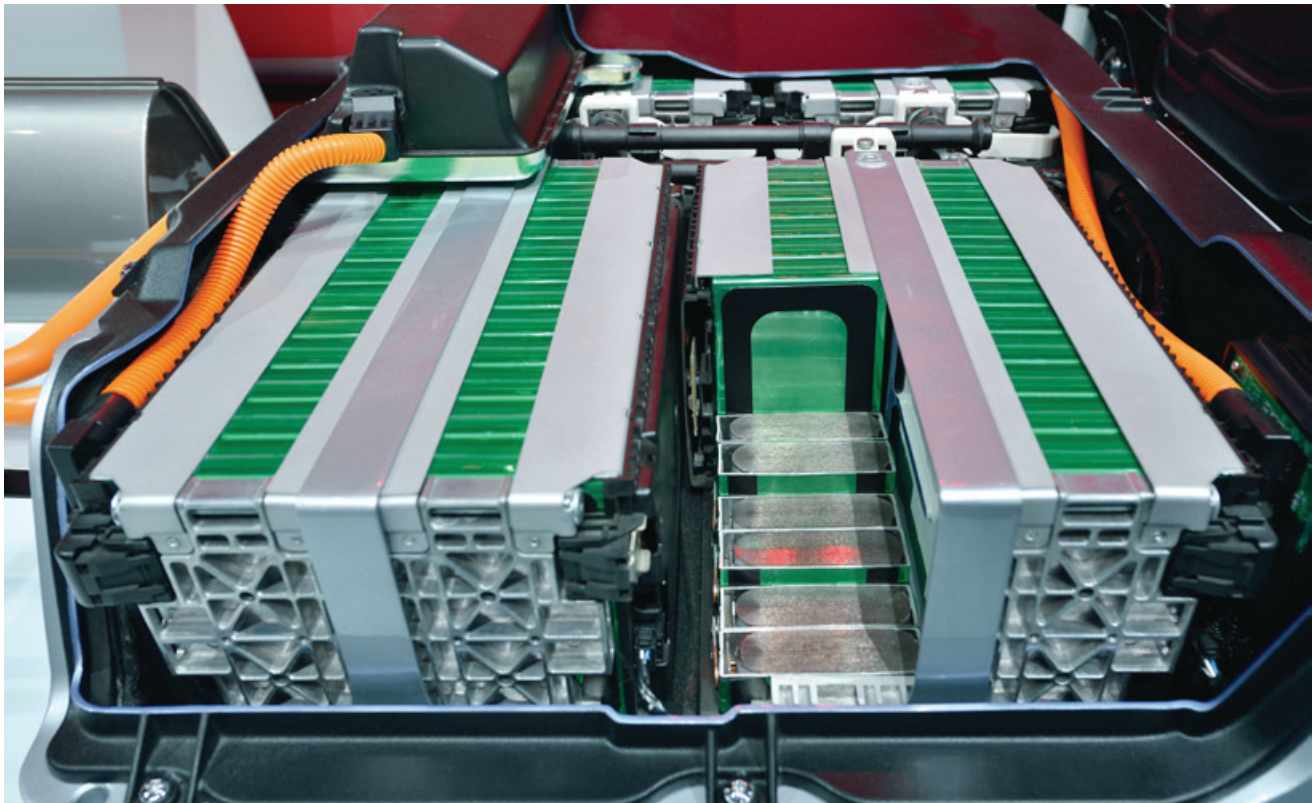


for instance, are all produced using processes with fossil fuels, such as coal or natural gas and are therefore not environmentally friendly.

Depending on how this H₂ is extracted, it could prove to be one of the cheapest and cleanest forms of hydrogen. The natural H₂ deposit was found in July 2023 by Philippe de Donato and Jacques Pironon, scientists at the Université de Lorraine.

Source: *Hydrogen Fuel News* [Read The Article](#)

PSR Analysis: White hydrogen has the potential to be a game change, but this is still dependent on the necessary infrastructure being in place. In this matter, hydrogen is 10 to 15 years behind the EV infrastructure (at least). However, this discovery has triggered global searches for White H₂. Australian energy experts working to unlock natural hydrogen within the nation, have just secured approval for test drilling the first natural hydrogen-purposed well in Australia. [\(Click Here\)](#)



Mercedes-Benz Offers DC Fast Charging for Retail Shoppers

In January, **Mercedes-Benz**, along with EV charging network **ChargePoint** and clean energy provider **MN8 Energy**, announced plans to deploy 400 charging stations and over 2,500 DC fast chargers across North America by 2030.

Now Mercedes has announced that it's going to install 55 charging hubs at retail properties owned by **Simon**, a US real estate investment trust that owns a number of shopping malls. Each Mercedes-branded charging hub will feature around 8-10 DC fast chargers with dual CCS and NACS plugs, but the number of chargers will be tailored to the needs of each location. Each turnkey hub will be 100% powered by clean energy.

The chargers are open to all EV drivers, but Mercedes-Benz drivers will get preferential access and the ability to reserve chargers ahead of time.

Source: *Electrek* [Read The Article](#)

PSR Analysis: Every new charging point is a plus if you drive an EV, so being able to charge while you shop is another time saver and gives these charging points more

appeal. This is further evidence of the trend towards destination charging.

Are Chicken Feathers Key To Cheaper and Cleaner Fuel Cells?

ETH Zurich scientists have discovered a way to repurpose chicken feathers by turning them into a vital component for renewable hydrogen fuel cells. Instead of becoming incinerated waste, the feathers could replace the non-biodegradable and toxic “forever chemicals” used to manufacture hydrogen fuel cells, effectively solving two problems with one solution.

The scientists have come up with a way to extract keratin from chicken feathers and spin this tough protein into thin fibers known as amyloid fibrils. Once spun into these fibers, the fibrils can be installed as the vital semipermeable membrane in hydrogen fuel cells.

Source: *Hydrogen Fuel News* [Read The Article](#)

PSR Analysis: While this article appears a little unusual, it has the potential to solve two problems: first, the reduction of incinerated waste, and second, the reduction of “forever” chemicals in FCEV.

How Sustainable Are Alternative Fuels in Construction?

Callum Mackintosh, is the founder of the Scottish Highlands-based excavator attachment rental firm **HHH Equipment**. Last year he waded into a row with UK-based international infrastructure group **Balfour Beatty** over its decision to avoid the use of hydro-treated vegetable oil (HVO), a fuel made predominantly from used cooking oil, on its sites.

He argues that HVO offers a chance for contractors to reduce carbon and other emissions immediately. And as pressure continues to grow on individuals and firms to take immediate action to reduce their environmental impact at the same time that economic pressures are prompting many to look for ways to reduce costs, the row between Mackintosh and Balfour Beatty is typical of an ongoing public debate about just how 'green' alternative fuels really are.

Source: *International Rental News* [Read The Article](#)

PSR Analysis: On the face of things there isn't much new in this article, but what is interesting is at the end of the article, where a section looks at the pros and cons of HVO, Battery power and Hydrogen.

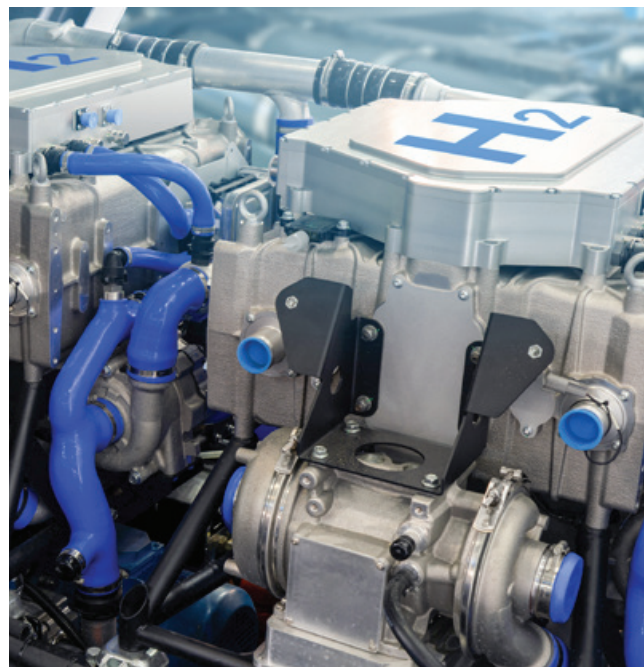
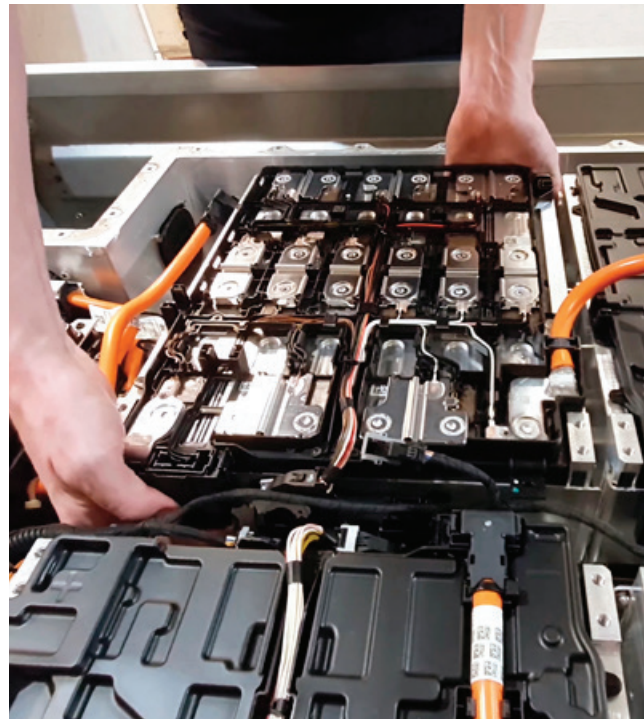
How Are EV Batteries Actually Recycled?

EV battery recycling is crucial to a sustainable and circular, electrified transportation system. A substantial portion of key minerals for electrifying could come from recycled batteries by 2050, dramatically reducing the need for new mining. And with Lithium rates so high (153.5k CNY/T as this is written), there is potential for significant savings.

But the manner in which those batteries are recycled can make a big difference. We must use recycling processes with high mineral recovery rates and low environmental impact. There are three main methods of recycling: Hydrometallurgical recycling, Direct recycling and Pyrometallurgical recycling (or smelting)

Source: *CleanTechnica* [Read The Article](#)

PSR Analysis: This article gives the advantages and disadvantages of each of the three main methods of recycling EV batteries and gives some useful terms to know in a glossary at the end.



A Final Note

Study reveals effects of fast charging on electric car battery health – [Click Here...](#) **Volkswagen** delays fourth EV battery plant over 'sluggish' sales – [Click Here...](#) **ClearVue** to add 82 kW of solar glass to greenhouse in California – [Click Here...](#) **EV Demand** is not growing as fast as hoped, but this can be fixed – [Click Here.](#) **PSR**



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