

Alternative Power Report

December 11, 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.

High Energy Density, Cobalt-Free Lithium-Ion Battery Developed

New battery yields about 60% greater energy density than conventional batteries.



By Guy Youngs, Forecast & Adoption Lead

Today's electric vehicles are predominantly powered by nickel-manganese-cobalt (NMC) lithium-ion batteries. However, the inclusion of cobalt in this type of batteries has been

considered as problematic due to its anticipated scarcity as well as the associated supply chain risks related to its single source, human rights and mining practices.

Japanese scientists have developed a high energy density, cobalt-free lithium-ion battery that yields about 60% greater energy density than conventional lithium-ion batteries for an equivalent weight and volume and sustains unprecedented 1,000 cycles.

Source: *PV Magazine* [Read The Article](#)

PSR Analysis: The use of cobalt in the current generation of Lithium Ion batteries has several problems notably the use of child labor in a lot of cobalt mines, its scarcity (over 60% of cobalt is sourced from the Democratic Republic of Congo) and its cost. While the battery is not yet ready for



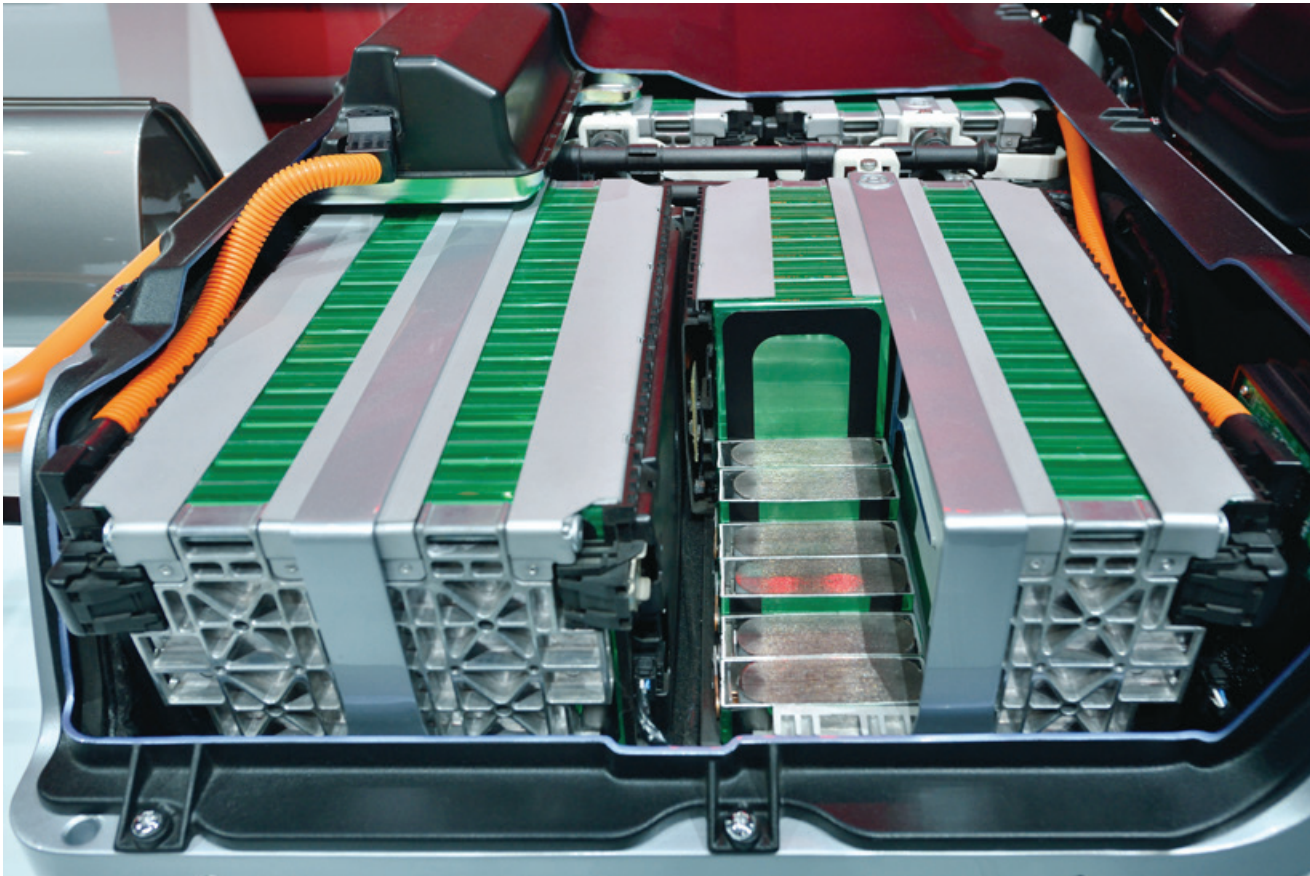
commercial use, any move to eliminate this metal (which can cause health issues and is possibly carcinogenic), is welcome. **PSR**

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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New power source installations vary across industry segments. Contact PSR for data on your specific application needs.

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CATL Creates Fast Charging Electric Car Skateboard With 1000 Km Range

CATL, the world's largest battery manufacturer, is not waiting for customers to come knocking on its door to buy batteries for their electric models. It has created what it calls its CATL Integrated Intelligent Chassis, a skateboard design that incorporates all the bits and pieces needed to make a fully functional electric car

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

PSR Analysis: What is interesting here is that CATL is now talking like a Tier One supplier and it's easy to imagine many smaller companies that do not have the resources needed to create electric cars in-house might be tempted to let CATL do the heavy lifting so they can get competitive electrified products to market as soon as possible. All a customer would need to do is mount a body on top of the skateboard to have a finished product that could be sold to retail customers. This is a smart move and likely to move EVs along faster because they can make so many of these cheaply anywhere in the world. **PSR**

Record-Low EV Battery Prices in 2023

Thanks to a variety of factors (mostly base economics), lithium-ion battery packs are at record low prices. After dropping 14%, they are down to \$139/kWh vs 2022. Prices for key battery metals, especially lithium, have fallen sharply since January, due to significant growth in production capacity in all parts of the battery value chain, from raw materials and components to cells and battery packs. The steep price drop and record low average price come on the heels of price increases in 2022 that had brought battery prices back to 2020 levels. 10 Years ago, battery packs (including cells) cost \$780 per kwh. These figures represent an average across multiple battery end-uses.

Research by Blomberg and Goldman Sachs suggest that prices will drop further and reach \$80 by 2030.

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

PSR Analysis: There has been a lot of talk about battery packs reaching \$100 per kwh as a target and it looks as though this will be exceeded by 2030. This can only be

good news for the prices of all EVs as battery costs are a significant contributor to the cost of any vehicle. VW and Tesla (to name just two companies) are already talking about \$25k electric cars. **PSR**

US Discovers Local Lithium Bonanza For EV Batteries

A few years ago, the idea of manufacturing EV batteries in the US was fraught with hurdles, the key issue being the absence of a domestic lithium pipeline. The US had earned a reputation as the biggest producer of lithium in the world, as well as the biggest user of lithium in the world (it was even used in the drink 7Up), but this growth stopped over health concerns and the US dwindled down to just one operation by the time the EV market took off.

The lithium supply chain is still problematic to the extent that it involves digging new surface mines, but an alternative solution has been emerging in the form of geothermal brine, and the US Department of Energy is pulling out all the stops to promote it. In 2020, the US Geological Survey identified five states with major deposits: Arkansas, California, Nevada, North Carolina, and Utah.

The Salton Sea in California has been one key focus of Direct Lithium Extraction (DLE) activity in the US, and now the Department of Energy has put some hard numbers on the lithium resources at hand in this area. The Lawrence Berkeley National Laboratory found that new DLE technology could lead to the production of more than 3,400 kilotons of lithium, or enough to manufacture more than 375 million EV batteries.

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

PSR Analysis: While the presence of lithium has been known for years, this is the first time it's been properly analyzed and quantified. While this is great news, the problem that remains is the lack of refineries to process this into the lithium used in batteries. **PSR**

Europe's ICE Truck Ban Endangered by Fuel Loophole

MEPs of the European Union voted to adopt strict new rules regarding emissions from trucking and buses, seeking a 90% reduction in total fleet CO2 emissions by 2040, but there's a big loophole involved. While initial planning from



the EU Commission sought to categorize all ICE trucks and buses as CO2-emitting, the EU Parliament has other ideas.

The rules adopted by EU Parliament in late November are not binding and must still be negotiated with EU member state councils into final legislation. But there's a substantial lobby pushing to keep ICE trucks on the road in Europe, and it's all but certain that the truck manufacturers and many of their largest customers are pushing hard on this.

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

PSR Analysis: Biofuels (fuels derived from organic waste products, crops, or biomass decomposition) and e-fuels (synthetically manufactured replacements for gasoline and diesel) are deeply controversial in the context of sustainable transportation as there are still emissions, and the EU Parliament is not clear on the definition of biofuels. **PSR**

Range Energy's EV Trailer Can Improve Mileage by 36%

Range Energy's electric trailer, which can "electrify" a diesel semi-truck just by adding a trailer, has been found to improve efficiency by 36% in independent testing.

The basic idea is that the trailer has a battery and motors in it and can sense acceleration through the trailer's kingpin. When the tractor unit pulls forward, the trailer's motors kick in to help carry the load, meaning the tractor doesn't have to do as much pulling. You can also potentially add this to an electric truck and extend its range.

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

PSR Analysis: By attaching this kind of trailer to a truck unit, it turns a diesel unit into a hybrid, providing fuel savings. This reduces the demand on the tractor unit, saving money and has the advantage that it can be added to any unit, so the owner doesn't have to buy a new electric truck to reduce emissions. It's a partial solution that could have a significant impact on tailgate emissions at much less cost than a new unit. It does offer a much faster and easier way to electrify many fleets. **PSR**

Shortage of Hydrogen Fuel Changes Opinion of H2 Vehicles

A recent rash of hydrogen fuel shortages in South Korea has many people in the country thinking again before buying a zero-emission vehicle powered by H2. South Korea is one of the countries with the highest adoption levels of these zero-emission vehicles.

The recent hydrogen fuel shortage was the result of a malfunction at Hyundai Steel's Dangjin factory where H2 is produced for vehicle fueling. This caused H2 fuel cell vehicle owners to be stuck in lines for hours as they waited to refuel.

This was not the first time drivers in the country found it difficult to refuel their zero carbon emission vehicles. Earlier this month, passenger cars and buses using hydrogen had engine troubles after fueling because of impurities in the station's hydrogen supply. In August last year, an oil price hike reduced hydrogen production, forcing a maximum on hydrogen purchases of 1 kilogram per driver at each station.

This series of problems has caused skepticism about switching from diesel-powered buses and trucks to hydrogen-powered vehicles. Also affected has been Hyundai Motor's plan to launch the next version of the NEXO, its hydrogen passenger car.

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

PSR Analysis: You could argue that these issues are symptomatic of limited and new infrastructure for hydrogen fuel and that things will improve over time, but unless these issues are resolved quickly and do not reappear, they will make things more difficult for those who are willing to shift away from diesel fuel as a source of power. **PSR**



Mobile EV Chargers Could Solve Some Infrastructure Problems

EV infrastructure is expensive to install, especially at remote sites. The question that needs to be answered is whether to bring the vehicle to the infrastructure or to bring the infrastructure to the car. Another question to resolve is to decide whether to deal with cost or inconvenience of this infrastructure.

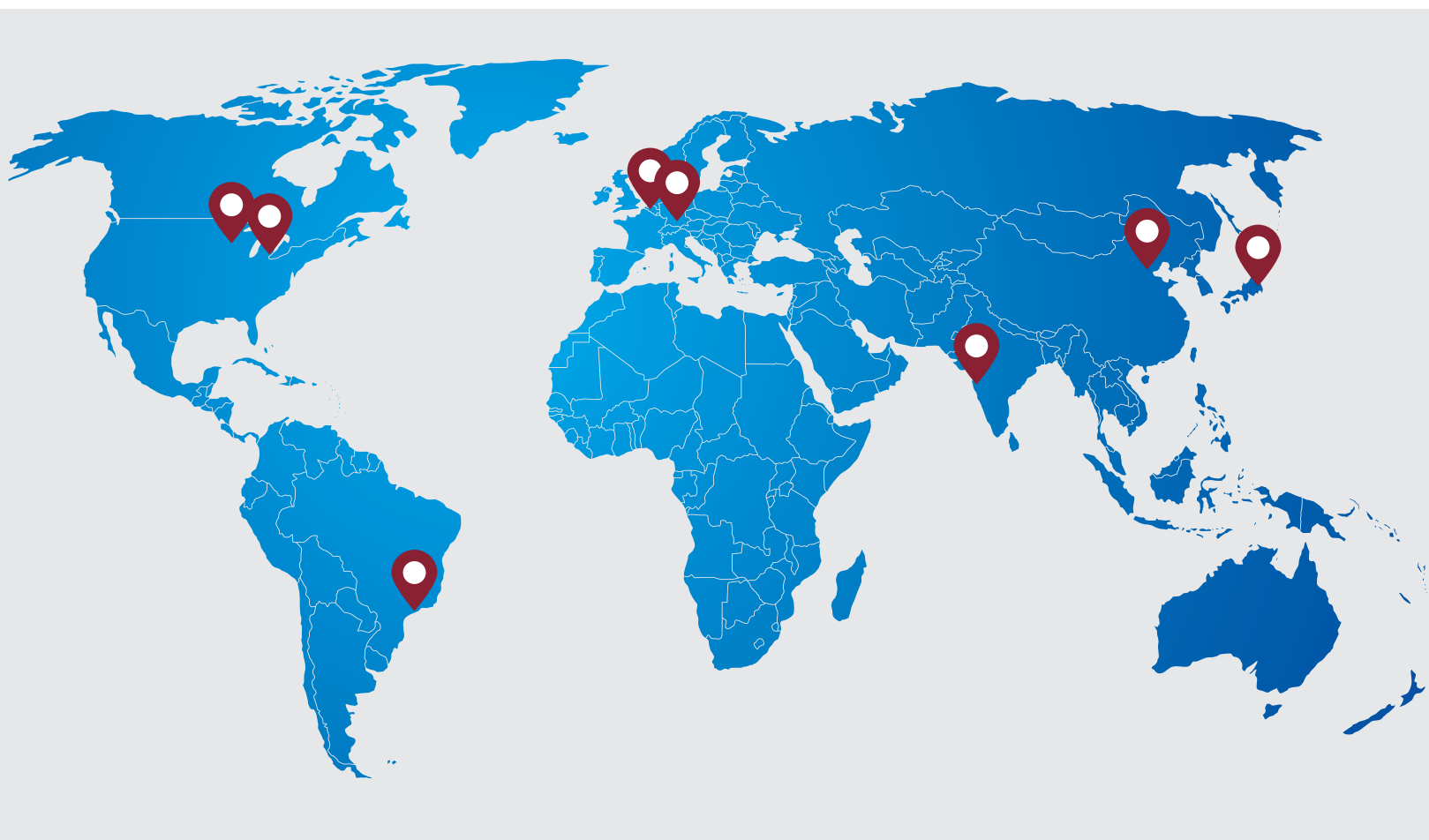
Lightning eMotors, a company more well-known for electric van conversions, is building a whopper of an EV charging station. It comes in at almost 10,000 pounds, and it can be rolled into parking lots or remote sites because it's built into a trailer. Energy storage capacity ranges from 210 kWh to 420 kWh, and up to five CCS-1 outputs which can simultaneously charge at up to 80 kW.

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

PSR Analysis: This article gives a potential solution for the lack of infrastructure in remote places and can be used to charge on-road and off-road vehicles. It can be used in a similar manner to mobile gen-sets. What is not clear at this stage is the costs. **PSR**

A Final Note

ExxonMobil begins lithium drilling in US to become an EV supply leader – [Click Here](#)... **New Carbon Material** sets energy-storage record likely to advance supercapacitors– [Click Here](#)... **UK government** investigating alleged dumping of subsidized Chinese excavators– [Click Here](#)... **Japan's first hydrogen** fuel cell hybrid passenger ship gets its H2 system– [Click Here](#)... **Hyzon** nails milestone in Texas with its liquid hydrogen truck – [Click Here](#) **PSR**



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