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In Response: Better batteries 'on the way' for electric vehicles

From the column: "These cells are able to recharge faster than their lithium-ion cousins and have much better low-temperature performance, a significant factor in Duluth and the Northland."



Pat Byrnes/Cagle Cartoons
By Tom Anderson
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Electric vehicles are the current rage in transportation, and for good reason. The new electric motors can be greater than 90% efficient compared to gas vehicles, which today have efficiencies in the 20% to 30% range. Electric motors are also simpler, with fewer

parts and lower maintenance costs. Wear and tear on brakes is also minimized, and there's no gasoline to buy. You can charge your electric vehicle while you sleep, right at your home.

The fly in the electric-vehicle "ointment" is that they need affordable, energy-dense batteries. Currently, there is no battery technology that can match the energy density of gasoline.

But hope is on the way.

Today, the most energy-dense electric-vehicle batteries use lithium along with nickel manganese cobalt or nickel cobalt aluminum. However, nickel and cobalt are expensive. This makes these batteries suitable only in long-range vehicle models most of us can't afford. Auto manufacturers realize this and are now using lower-cost lithium iron phosphate batteries that have no nickel or cobalt in their standard and midrange electric-vehicle models. In July, Tesla owner Elon Musk noted that his company is making a "long-term shift" toward this older, cheaper battery technology for its standard and mid-range products. In addition to lower costs, lithium iron phosphate batteries offer several other advantages, including higher thermal stability and better cycle life.

Ford CEO Jim Farley and Volkswagen CEO Herbert Diess have said their companies will use lithium iron phosphate batteries as well. By eliminating nickel from the battery mix, these companies are achieving more reasonable cost points for electric vehicles while increasing battery safety and improving battery life, despite the decrease in power density.

But the story does not stop there. CATL, the world's largest supplier of batteries for electric vehicles, recently announced it's launching a sodium-ion alternative in 2023. These cells are able to recharge faster than their lithium-ion cousins and have much better low-temperature performance, a significant factor in Duluth and the Northland. The energy density of sodium-ion batteries still falls short of the best lithium-ion batteries, but CATL says it plans to increase energy density to be on par with lithium iron phosphate-based batteries next year.

But we still need batteries with higher energy density to compete with gas-based vehicles. To that end, a number of companies are working on next-generation lithium-sulfur (Li-S) battery technology. The Lyten company says its lithium-sulfur batteries are safer than Li-ion packs. These batteries can potentially have three times the energy density of conventional lithium-ion batteries — without the use of nickel or cobalt.

Lyten is not alone. Oxis Energy has already produced a first-generation Quasi Solid-State Li-S cell which far outpaces nickel-based lithium-ion batteries currently in production.

Most automakers also have their eye on solid-state lithium batteries. Many industry players are placing a big bet on this technology going forward. QuantumScape, a leader in solid-state battery technology, has a market value of \$9.3 billion, even though it has no revenue.

Solid-state lithium-metal battery technology has the potential to lower costs, significantly increase cell energy density, reduce charge time, and enable longer battery life. Production lines for solid-state electric vehicle batteries are expected to ramp up in 2023 and be fully online by 2025.

With many affordable, high-energy technologies in the works, it's clear nickel will soon lose its luster in the battery marketplace for electric vehicles, as cheaper, more reliable, and more energy-dense battery technologies move into production.

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