



Improved battery range

By 2030, scientists believe they can get more than 600 miles out of a single charge by using a gel to better optimize the “high charge capacity” of silicon anodes and cathodes in lithium batteries compared to current graphite chemistries. The gel allows for the expansion of silicon, which happens when it has charge running through it, protecting the longevity and safety of the battery.¹

Faster charging

Quantum charging

Researchers at the Center for Theoretical Physics of Complex Systems in Korea are working on quantum batteries and the “quantum charging advantage,” where cells within a battery are charged simultaneously rather than individually (as they are now). With the right charging infrastructure, this breakthrough could charge EVs within seconds.

The Korea Advanced Institute of Science and Technology is developing a sodium-ion super capacitor and battery to alter the traditional Li-ion graphite anode and cathode. This new battery promises a higher energy density than Li-ion batteries and rapid charging capabilities.²

Wireless charging

Companies like WiTricity are developing a wireless charging system. As a potential replacement for Level 2 at-home chargers, wireless charging systems could eliminate the need for physical connection to transfer charge from source to battery. Prototypes of this technology show pads on the ground where the EV parks. The pad and a receiver in the vehicle create a magnetic field to enable seamless and immediate power transfer to the vehicle.³

SonicEnergy (previously uBeam) is developing long-range wireless charging via ultrasound technology.⁴

¹ [Future electric cars could go more than 600 miles on a single charge thanks to battery-boosting gel.](#) LiveScience. February 16, 2024.

² [Researchers from Korea’s IBS suggest quantum charging could cut EV charge time to 3 minutes at home.](#) Green Car Congress. March 21, 2022.

³ [This Watertown Company wants to charge your EV wirelessly.](#) Boston Globe. Aug 22, 2023.

⁴ [New Sodium-Ion Battery Could Charge An Electric Vehicle In Seconds, Not Minutes.](#) CleanTechnica. May 2024.

Lighter weight

Stellantis is working to reduce EV battery weight by 50% by 2030. Li-sulfur batteries can quadruple the energy densities of Li-ion batteries: At a quarter of the weight, Li-sulfur batteries could deliver the current range, or deliver four times the range at the current battery weight. In addition, Li-sulfur batteries could provide a 30% increase in energy density compared to Li-ion batteries.⁵

Current EV batteries are not structural or load bearing. But researchers at Chalmers University in Sweden are working on a structural EV battery that can be an electrode, conductor, and load-bearing source integrated into the structure of the vehicle. With a breakthrough carbon-fiber material, the battery could be integrated into the actual structure of the vehicle. The energy density of this material is 24 Wh/kg, about 20% greater than current Li-ion battery technology.⁶

French company NAWA says they have created a vertically aligned carbon nanotube that provides three times the energy density and ten times the power of current EV batteries. They say that this could be the fastest electrode conduction in the world, with the components arranged vertically to allow for higher energy delivery by reducing the distance ions have to travel with no increase in volume. “Because the active material coating is directly connected to each nanotube, it establishes a direct lane to the current collector. For a battery, this would increase the power density by as much as 10 times, translating to more power and faster charge-discharge times.”⁷

Lower EV prices and costs

By 2027, BEVs will be cheaper to produce than ICE vehicles. Toyota announced that BEV production costs will decrease by 30% in the coming years. But research firm Gartner projects that while initial costs of BEVs could be drastically cheaper than ICE counterparts by 2030, repair and maintenance costs of BEVs will be 30% higher, on average, than for ICE vehicles.

These costs may come down, but it will take time for maintenance technicians to enter the workforce and for parts to come down in price. Also, because this is a new production process, there is currently a way for individual repairs; most repairs today involve totaling and scrapping the entire vehicle.⁸

⁵ [Stellantis Will Reduce EV Battery Weight By Half](#). CarBuzz. Sept 13, 2023.

⁶ [Big breakthrough for 'massless' energy storage](#). Chalmers. Mar 22, 2021.

⁷ [NAWA Technologies' Game-Changing Ultra-Fast Carbon Battery](#). AZO Materials. Nov 6 2020.

⁸ [Gartner Outlines a New Phase for Electric Vehicles](#). Gartner. Mar 7, 2024.



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