

Batteries - where are we now?

[INTRO]

In the tech world, it's hard to overstate the value of Lithium Ion batteries. [20s clip from BBC's Business Daily Podcast]. That was Paul Shearing of University College London and the Faraday Institution, one of the UK's leading battery chemists. But it's more than just phones and laptops. Every rechargeable consumer device likely has a lithium ion battery inside. Tablets, Music players, headsets, toys, vacuum cleaners, power tools, cameras, smartwatches, Handheld AND stationary gaming consoles (and maybe even the controllers!). Lithium Ion batteries are everywhere. And this is only the beginning. Forecasts show that the Lithium Ion battery market is set to double in size in the next 5 years! There are two main reasons for that. Firstly, [8s clip from BBC's Business Daily Podcast, Paul Shearing again]. But more than cars, battery storage is necessary to make renewable energy viable. You can stockpile, store, and use barrels of oil and lumps of coal as needed. That makes them incredibly convenient and easy to use. But there aren't barrels of solar power or lumps of wind lying around. Renewables rely on battery power to compete with fossil fuels.

[SUSTAINABILITY]

One way of meeting this growing demand is to just produce a **ton** more batteries -- the Tesla approach. Elon Musk is in the middle of building an insanely large battery factory in the middle of the Nevada desert. He calls it: the Gigafactory. [23s clip from Elon Musk]. With production ramping up, demand for materials is on the rise. The prime ingredient in Lithium Ion batteries is -- you guessed it -- Lithium. So where do Musk and others like him get their hands on the lightest metal in the universe? [12s clip about Lithium triangle]. Chile, Argentina, and Bolivia have had to cope with the pressure of a sudden influx of foreign companies. This pressure has caused political strain, especially in the nation with the most Lithium within its borders: Bolivia. The landlocked nation's unstable politics have only worsened under the demand to extract and sell the nation's mineral wealth. Additionally, the process by which lithium is isolated requires incredible amounts of water. At a rate of 500,000 gallons of water per ton of Lithium, production is causing severe water shortages in the Andes [15s clip on condition]. What's worse, chemical spills from Lithium production have caused massive environmental pollution in South America to processing plants spills in the Arctic.

[BATTERY TROUBLES]

If not more batteries, how about better batteries. Except, batteries haven't really gotten much better over the last two decades. [25s clip from Crash Course]. Battery tech has been incredibly stagnant compared to other tech Computer chips double in speed every two years. The typical personal computer's storage capacity has expanded 36,000 times since 1989. Internet-connection speeds climb at about 50% a year. But batteries are rising at a sluggish 10% per year. Part of this is technical and part of it is safety. Do you remember the Galaxy Note 7? The 2016 phone had a tendency to burst spontaneously into flames. Samsung quickly recalled the phones and identified the culprit as the Lithium-Ion batteries. Lithium Ion batteries have to be very carefully installed and designed because of their dangerous potential. Safety in mind, this limits engineers ability to shrink these batteries down further. But perhaps the worst -- or at least most frustrating -- aspect of Lithium-Ion batteries is their short lifespan. Think back to your own experience with smartphones, or any other rechargeable electronic. With each recharge, your battery degrades further and further until your whole life revolves around the plug.

[CONCLUSION]

But there's an even bigger problem. There is more energy in one week of fossil fuel usage in the United States than could be stored if every Lithium atom in every mine in the world could be made into battery storage. If you power double the amount of batteries produced by Tesla's Gigafactory in a year, it still wouldn't be enough to power an average American city for a day. Simply put, Lithium-Ion batteries are not enough. Lithium-Ion tech was invented in the 80s. For the last 30 years, they've been an industry standard. We are long overdue for a major battery breakthrough. And the need is urgent. The quest for renewable energy requires effective energy storage to compete with the ease and convenience of fossil fuels. But there are reasons to hope for innovation just across the horizon. Top scientists and engineers around the world are racing to break the battery code and help power the next generation of technology. For now, we'll just have to wait and see what the future holds.

[Outro Music]