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The Viability of EVs

The world is trying to move to electric vehicles (EVs) to try to create a carbon-neutral at a minimum or start to be carbon-negative. The question is how sustainable this idea is, between the amount of lithium and other precious metals needed for every car, the energy production, and the remanufacturing of the batteries. These processes are expensive not only monetarily, but also very dirty in the amount of carbon they produce. This is one of the drawbacks of trying to convert the world to electric without consideration of bettering the internal combustion engine (ICE).

The process for simply removing the lithium from the ground is not simple nor clean. Most of the lithium comes from salt flats that must sufficiently hydrated before the lithium can be unearthed. Water is pumped into the ground before it must evaporate and leave behind multiple types of salts, manganese, potassium, borax, and most importantly lithium salts. These must be then filtered and put into another pool to evaporate in. This process can take up to twenty-four months before the lithium carbonate is extracted. It is also a significant amount of water need to extract the lithium, about 500,000 gallons of water for a metric ton, which equates to just shy of two cubic meters of lithium. This is only part of the human cost as most of the lithium happens to come form one of the driest places on Earth, known as the South American Lithium Triangle. The mining in the Chilean part, the Salar de Atacama, uses about sixty-five percent of the available water and causes the local farmers to source water elsewhere.

When the water is filtered, most of the contaminates, including but not limited to hydrochloric acid, are added to the water supply and ground. This changes the color to an unnatural blue. Some estimates say that the water is dangerously polluted for 150 miles. There are also piles of the other salts that are deemed useless. And there is waste on the consumer side as very few people properly recycle lithium-ion batteries. Studies in Australia have found that only two percent of the e-waste is recycled. This puts about 3,234 metric tons of lithium into landfills where the casing will be destroyed and contaminate the environment.

Of the lithium that gets recycled only a small part is reused, this is due to corporate secrets making the cleanup difficult. The most common way is to burn the batteries, pyrometallurgy waste a lot of the lithium and all the other metals that get sent into the sky. There are other processes being researched, but they have not taken on a wide audience. One idea is to use bacteria and the other is hydrometallurgy. The issue with hydrometallurgy is finding a way of turning the brine back into pure and potable water.

The human cost has not ended yet as lithium-ion batteries for EVs require cobalt to increase the lifespan of the battery and to make it more energy dense. The issue is one of morals, human rights, and if the ends justify the means, the Democratic Republic of Congo is the largest producer of cobalt and has a large labor source doing it. 225,000 people work in the mines excavating, and of that almost 40,000 are children. There is also a lack of safety regulations and the cost of the land being destroyed. The mining process brings many diseases to everyone working, some children as young as six, and pollutes the ground and water. Scientists are currently researching a potential link to cancer as some of the mines have radioactive dust.

All in all, the process that creates the battery pack of an EV produces around seventy-three kilograms of CO2 per kWh. That figure does not include the recycling, the rest of the car, or the energy used to charge the car. This brings into question just how much cleaner it is to swap to EVs and how much it cost per ton of CO2. Current production of electricity means that over the life of the first battery, an EV will produce about three to six tons less over the course of its life.

The monetary cost is extreme to a large percent of people cannot afford the swap. Just lithium alone has nearly quintupled in price YTD, and cobalt has nearly doubled in the same period. While improvements in manufacturing can make a product cheaper, there is very little that can be done about the rise in cost of the raw products. The cheapest full EV is the Nissan Leaf, coming in at a cool $28,500. That gets you 147 HP and 150 miles of range. Comparatively, a new Corolla SE Hatchback, not the lowest model, but a comparable 170 HP, cost around $22,000. While it does cost more to fill up comparatively versus charging, some figures have estimated that you save about $600 per year to charge an EV. This means that it would take about 10 years to have saved money with an EV. This does not take into account the tax credit you receive for driving an EV because there is no way to create money, the cost is being passed to every other taxpayer, and it will only be so long until the government decides to end that program.

Sources:

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