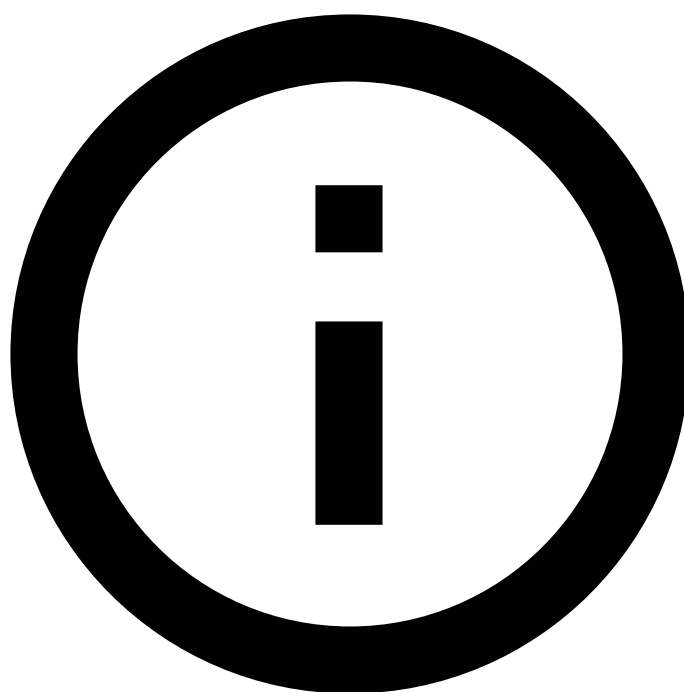


The Dirty Secrets Of Elon Musks 'Clean' Electric Vehicles

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How clean really?

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The widespread view that fossil fuels are “dirty” and renewables such as wind and solar energy and electric vehicles are “clean” has become a fixture of mainstream media and policy assumptions across the political spectrum in developed countries, perhaps with the exception of the Trump-led US administration. Indeed the ultimate question we are led to believe is how quickly can enlightened Western governments, led by an alleged scientific consensus, “decarbonize” with clean energy in a race to save the world from impending climate catastrophe. The ‘net zero by 2050’ mantra, calling for carbon emissions to be completely mitigated within three decades, is now the clarion call by governments and intergovernmental agencies around the developed world, ranging from [several EU member states](#) and the [UK](#), to the [International Energy Agency](#) and the [International Monetary Fund](#).

Mining out of sight, out of mind

Let’s start with Elon Musk’s Tesla. In an astonishing achievement for a company that has now posted four consecutive quarters of profits, Tesla is now [the world’s most valuable automotive company](#). Demand for EVs is set to soar, as government policies subsidize the purchase of EVs to replace the internal combustion engine of gasoline and diesel-driven cars and as owning a “clean” and “green” car becomes a moral testament to many a virtue-signaling customer.

Yet, if one looks under the hood of “clean energy” battery-driven EVs, the dirt found would surprise most. The most important component in the EV is the lithium-ion rechargeable battery which relies on critical mineral commodities such as cobalt, graphite, lithium, and manganese. Tracing the source of these minerals, in what is called “full-cycle economics”, it becomes apparent that EVs create a trail of dirt from the mining and processing of minerals upstream.

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A recent [United Nations report](#) warns that the raw materials used in electric car batteries are highly concentrated in a small number of countries where environmental and labour regulations are weak or non-existent. Thus, battery production for EVs is driving a boom in small-scale or “artisanal” cobalt production in the Democratic Republic of Congo which supplies two thirds of global output of the mineral. These artisanal mines, which account for up to a quarter of the country’s production, [have been found](#) to be dangerous and employ child labour.

Mindful of what the image of children scabbling for hand-dug minerals in Africa can do to high tech’s clean and green image, most tech and auto companies using cobalt and other toxic

heavy metals avoid direct sourcing from mines. Tesla Inc. [TSLA -0.8% struck a deal last month](#) with Swiss-based Glencore Plc to buy as much as 6,000 tons of cobalt annually from the latter's Congolese mines. While Tesla has said it aims to remove reputational risks associated with sourcing minerals from countries such as the DRC where corruption is rampant, Glencore assures buyers that no hand-dug cobalt is treated at its mechanized mines.

There are [7.2 million battery EVs](#) or about 1% of the total vehicle fleet today. To get an idea of the scale of mining for raw materials involved in replacing the world's gasoline and diesel-fueled cars with EVs, we can take the example of the UK as provided by [Michael Kelly](#), the Emeritus Prince Philip Professor of Technology at the University of Cambridge. According to Professor Kelly, if we replace all of the UK vehicle fleet with EVs, assuming they use the most resource-frugal next-generation batteries, we would need the following materials: about twice the annual global production of cobalt; three quarters of the world's production lithium carbonate; nearly the entire world production of neodymium; and more than half the world's production of copper in 2018.

And this is just for the UK. Professor Kelly estimates that if we want the whole world to be transported by electric vehicles, the vast increases in the supply of the raw materials listed above would go far beyond known reserves. The environmental and social impact of vastly-expanded mining for these materials — some of which are highly toxic when mined, transported and processed — in countries afflicted by corruption and poor human rights records can only be imagined. The clean and green image

of EVs stands in stark contrast to the realities of manufacturing batteries.

Zero Emissions and All That

Proponents of EVs might counter by saying that despite these evident environmental and social problems associated with mining in many third world countries, the case remains that EVs help reduce carbon dioxide emissions associated with the internal combustion engines run on gasoline and diesel fuels. According to the reigning climate change narrative, it is after all carbon dioxide emissions that are threatening environmental catastrophe on a global scale. For the sake of saving the world, the climate crusaders of the richer nations might be willing to ignore the local pollution and human rights violations involved in mining for minerals and rare earths in Africa, China, Latin America and elsewhere.

While one might question the inherent inequity in imposing such a trade-off, the supposed advantages of EVs in emitting lower carbon emissions are overstated according to a [peer-reviewed life-cycle study comparing conventional and electric vehicles](#). To begin with, about half the lifetime carbon-dioxide emissions from an electric car come from the energy used to produce the car, especially in the mining and processing of raw materials needed for the battery. This compares unfavorably with the manufacture of a gasoline-powered car which accounts for 17% of the car's lifetime carbon-dioxide emissions. When a new EV appears in the show-room, it has already caused 30,000 pounds of carbon-dioxide emission. The equivalent amount for manufacturing a conventional car is 14,000 pounds.

Once on the road, the carbon dioxide emissions of EVs depends on the power-generation fuel used to recharge its battery. If it comes mostly from coal-fired power plants, it will lead to about 15 ounces of carbon-dioxide for every mile it is driven—three ounces more than a similar gasoline-powered car. Even without reference to the source of electricity used for battery charging, if an EV is driven 50,000 miles over its lifetime, the huge initial emissions from its manufacture means the EV will actually have put more carbon-dioxide in the atmosphere than a similar-size gasoline-powered car driven the same number of miles. Even if the EV is driven for 90,000 miles and the battery is charged by cleaner natural-gas fueled power stations, it will cause just 24% less carbon-dioxide emission than a gasoline-powered car. As the skeptical environmentalist [Bjorn Lomborg](#) puts it, “This is a far cry from ‘zero emissions’”.

As most ordinary people mindful of keeping within modest budgets choose affordable gasoline or diesel-powered cars, experts and policy advisors the world over have felt compelled to tilt the playing field in favor of EVs. EV subsidies are regressive: given their high upfront cost, EVs are only affordable for high-income households. It is egregious that EV subsidies are funded by the average tax-payer so that the rich can buy their EVs at subsidized prices.

The determination not to know or to look away when the facts assail our beliefs is an enduring frailty of human nature. The [tendency towards group think and confirmation bias](#), and the will to affirm the “scientific consensus” and marginalize sceptics, are rife in considerations by the so-called experts committed to advocating their favorite cause. In the case of EVs, the dirty

secrets of “clean energy” should seem apparent to all but, alas, there are none so blind as those who will not see.