MA DPU 21-90, 21-91, and 21-92 Comment of Patricia Burke

Attachment: Cradle to Grave EV Assessments

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Please enter the attached for the record for DPU 21-90, 21-91, and 21-92. Thank you. Patricia Burke

Letters to Greta is an on-going series of articles by Katie Singer, published by Wall Street International Magazine, also available at: https://www.ourwebofinconvenienttruths.com/letters/

Letter #5: Proposing Cradle-to-Grave Evaluations for All Vehicles why maintaining a gas-guzzler may cause less harm than buying a new e-vehicle

By Katie Singer

Dear Greta,

You know how manufacturers promote electric vehicles (EVs) because they have “zero-emissions?” I wonder if this is really true.

Evaluations of any vehicle’s ecological impacts usually don’t reach from cradle to grave. They focus on the car’s energy use and greenhouse gas (GHG) emissions while it operates.[1] Most evaluations do not include embodied energy or emissions—what’s used and emitted during manufacturing. They do not count GHGs or toxins emitted while extracting and smelting ores, producing the vehicle’s electronics, lubricants, brake fluid, solvents, body and tires. Evaluations do not count what is emitted while designing, forming, cutting and bending metals and plastics…and transporting materials between stations. They don’t count miners’ or assembly workers hazards. They don’t count the ecological and public health impacts of vehicle maintenance, repair, disposal or recycling.

If we determine a car’s environmental impacts by looking exclusively at its operational driving time, are we fooling ourselves?

How electric vehicles are different

Most electric vehicles power the motor by a battery that recharges by plugging into a source of electricity for several hours. Because EVs do not emit GHGs at the tailpipe (actually, they have no tailpipe), they’re called “emissions-free”—even though the source of the electricity used to recharge them may not be, and manufacturing them involves a variety of emissions.

Hybrids can drive short distances on battery-powered electricity, then switch to gas fuel for longer trips.

I found just one study that compares the energy used and GHGs emitted during manufacturing gas-powered and electric vehicles. It demonstrates that a battery-powered EV emits 30,000 pounds of carbon-dioxide before it arrives at a dealership. During manufacturing, a gas-powered vehicle emits 14,000 pounds.[2]

While the EV will likely make up this carbon debt within a few years of driving, I still could not call an EV "emissions free."

Mining and smelting

After a vehicle's design, ores and petroleum are extracted for the body, batteries, computers and motor.[3] In 2019, scientists from UK's Natural History Museum reported that "replacing all UK-based vehicles with electric vehicles…would take 207,900 tonnes cobalt, 264,600 tonnes of lithium carbonate, at least 7,200 tonnes of neodymium and dysprosium, and 2,362,500 tonnes of copper."[4]

Extracting ores endangers miners. Child-miners have been maimed and buried alive while mining for cobalt (used in EV batteries).[5] While manufacturers aim to replace cobalt with magnesium chloride (road salt), like any new technology, it should receive appropriately thorough evaluation before it's used.

In the Democratic Republic of Congo, mining for coltan (also used for batteries) has led to more murders than any other single event since WWII.[6]

No metal comes out of the Earth in usable form. Metal must be "reduced" from the ore. Smelting cobalt requires approximately 7000-8000 kWh of electricity for every ton of metal produced. Copper (for motors, batteries and computers) requires 9000 kWh.[7] For every kilogram of copper mined, at least 21 kilograms of waste are generated.[8]

Some EV motors' and speakers' magnets are made from neodymium and dysprosium. Production of these rare earths generates fluorine, waste gas containing dust, hydrofluoric acid, sulfur dioxide, sulfuric acid, acidic waste water and radioactive waste residue. According to the Chinese Society of Rare Earths, "All the rare-earth enterprises in (China's) Baotou region produce approximately ten million tons of wastewater every year." Most of it is "discharged without being treated, which contaminates potable water for daily living, the surrounding water environment and irrigated farmlands."

China controls at least 77% of the rare-earth market[9], making manufacturers dependent on international supply chains with minimal regulation.

Producing silicon for transistors (fundamental components in computers, which process and store data, provide software, proximity sensors, anti-lock braking systems, GPS, etc.) starts with smelting quartz in a furnace kept at 1800F (982C) for years at a time. Other steps required to manufacture silicon also demand extremely high heat and electricity from coal, hydro and/or nuclear power.[10] Who could call these steps "zero emitters?"

U.S. smelters are regulated. Still, smelting silicon (for vehicles' windows and computers) in the U.S. has significant emissions. In 2016, for example, the New York State Department of Environmental Conservation issued a silicon manufacturer a permit to release, annually, 250 tons of carbon monoxide, ten tons of formaldehyde, ten tons of hydrogen chloride, ten tons of lead, 75,000 tons of oxides of nitrogen, 75,000 tons of particulates, ten tons of polycyclic aromatic hydrocarbons, 40 tons of sulfur dioxide, and seven tons of sulfuric acid mist.[11]

Processing lithium (for batteries) takes water from communities and farmers.[12] Discarded lithium batteries can contaminate water supplies, disturb homeostasis during a woman's pregnancy and possibly increase suicide rates.[13] Because lithium batteries can short circuit and/or be charged improperly, they can explode.[14] To date, lithium batteries are not recyclable.

Mining and smelting graphite (for batteries) can cover nearby crops, waterways, livestock, trees, indoor spaces and people in black soot. Exposure to fine-particle graphite pollution can cause breathing difficulties and heart attacks.[15]

Producing plastics (for car seats, interior and exterior bodies) from petroleum products emits GHGs. Plastics do not biodegrade easily and are difficult to recycle.

Greta, what do you think? Can we really call any vehicle emissions-free?

Processing, shipping and assembly

Like all manufactured products, an EV's materials require shipping between stations. If cargo shipping were a country, it would rank as the world's sixth biggest GHG emitter.[16]

Before a laptop owner turns it on for the first, time, a laptop has already consumed 81% of its cradle-to-grave energy.[17] One EV can have fifty or more computers.[18] A smartphone (a handheld computer) can depend on 1000+ substances,[19][20] each with its own international supply chain.

Computers contain circuit boards. One worker might clean 750 boards per day with solvents like benzene and n-hexane. Benzene can cause leukemia, and n-hexane has been linked to nerve damage.[21]

EMR emissions

An EV's computers, power systems, motors, active sensors and antennas emit electromagnetic radiation (EMR). The U.S.'s Federal Communications Commission determined that EMR exposure from such devices is safe because it has no significant, immediate effect on body temperature. However, EMR-exposure can cause non-thermal effects: it can damage DNA and increase risk of cancer and other diseases.[22]

A vehicle's EMR emissions can cause a deep brain stimulator (DBS) (a medical implant for neurological diseases like Parkinson's) to shut off or reprogram.[23] I know a woman who drove her hybrid car after she had a DBS implanted. Each time the car's battery-charger turned on at stoplights, the computers' magnetic fields shut off her implant. In 2000, 8-10% of the U.S. population had an implant.[24] If someone has a DBS, they cannot ride in an electric vehicle.[25][26]

Charging EVs

While Tesla calls its supercharging stations "free," scientists from UK's Natural History Museum report that charging EVs for the 252.5 billion miles that Brits currently drive annually would require a 20% increase in UK-generated electricity.[27] In turn, this would increase greenhouse gas emissions. Of course, EV charging stations also embody energy, extracted ores and GHGs—even when they're solar-powered.

Most EVs can drive 250-300 miles per charge. Building induction chargers into highways (as some policymakers propose) would allow electric vehicles to charge while driving. Depending on their power, frequency and dosage, induction chargers could reprogram a deep brain stimulator—and prove fatal for people who have them.

The EV graveyard

Annually, worldwide, we generate about 50 million metric tons of e-waste; this amount increases by about eight million tons each year.[28] EV-battery waste grows significantly. Further, while Europe and the U.S. are the main producers and consumers of electronics (including e-vehicles), Africa and Asia are the main receivers of e-waste.[29]

About 20% of electronics are recycled. Recycling also consumes energy and emits GHGs and toxins. While extending a vehicle's usable life depends on easily replaced and affordable parts, parts also hold embodied energy and GHGs.

The U.S. alone generates 246 million waste tires per year. Tires are made from natural and synthetic rubber, chemicals, polymers and steel (for reinforcement), and fillers like silica and carbon. Most wasted tires are burned. Because they contain chemicals and synthetics, burning tires increase health risks when people inhale their smoke, particles and chemicals. Left in dumpsites for long enough, decaying tires can pollute soil and groundwater.[30][31]

Regulating EVs

While technologies (including those used in electric vehicles) change constantly, we know of no U.S. agency that evaluates EVs with appropriately thorough due diligence.

The U.S. 2010 Dodd-Frank Act requires publicly-listed corporations that use tin, tungsten, tantalum and gold (minerals commonly mined under abusive conditions and used in computers) to report efforts to locate the mineral's source to the Securities and Exchange Commission (SEC). In 2017, the SEC

suspended enforcement of this regulation. In 2021, The European Union Conflict Minerals Regulation will begin regulating mineral importers.

The U.S. Environmental Protection Agency (EPA) evaluates the energy used and the fluids, gases and carbon monoxide emitted by a vehicle while it operates. EPA does not evaluate energy used or toxins emitted during manufacturing. It does not evaluate labor standards of corporations that purchase raw materials.

No U.S. agency regulates or monitors the energy required to repair, recycle or dispose of a vehicle.

In January, 2020, Transportation Secretary Elaine Chao announced that the U.S. will not regulate manufacturers of self-driving vehicles.[32] The government will promote only voluntary standards.

Without government oversight, consumers and municipalities seeking cradle-to-grave evaluations of vehicles' ecological impacts are on their own.

Driving forward

Let's acknowledge that no vehicle can be manufactured while abiding by economist Herman Daly's principles: Don't take from the Earth faster than it can replenish. Don't waste faster than the Earth can absorb.

Rather than aiming for unrealistic "zero emissions," let's commit to lowering our overall consumption and emissions.

To reduce our vehicles' ecological impacts (not just give them lip service), let's include extractions and embodied energy, emissions and toxins in vehicle evaluations.

Instead of "Which vehicle does the least damage," let's ask: "Is this vehicle truly within our ecological means?"

To provide for a resilient future with significantly decreased ecological impacts, could vehicle manufacturers, regulators and consumers:

prioritize reduction of consumption, extraction and emissions over technological progress and profit?

improve public transportation and redesign cities to encourage walking and biking?

enact regulations that require safe working conditions and limit ecological impacts throughout supply chains?

require manufacturers to design vehicles that are easily repaired and recycled?

invest in mechanics who can maintain and repair the vehicles we already have?

When a car-loving engineer-friend wondered if we should limit every household to one car, I thought he was getting somewhere. I also wonder: if decreasing our ecological footprint is our priority, then isn't maintaining an old gas guzzler better than buying a new vehicle? (My Saab is 25 years old.)

Yours,

Katie

P.S. Just before Wall Street International went to press with this letter, I learned that French civil engineer Jean-Marc Jancovici (co-founder of the SHIFT Project) reports that if all French cars were replaced by EVs, keeping them charged at night would require doubling the country's guaranteed electric power. To produce this much electricity with low-carbon emissions, new nuclear plants would virtually be the only option.[33] (Solar nor wind provide guaranteed power; nuclear, gas, coal and hydro can.) There's more to say here. Janovici also writes about the significant CO2 emitted by manufacturing EVs and their batteries. U.S. cars weigh significantly more than European cars (and therefore embody more energy and consume more electricity to keep charged). Indeed, before we enact more policies based on the assumption that EVs will reduce our GHG emissions, we need to review cradle-to-grave evaluations.

References

Alternative Fuels Data Center; www.afdc.energy.gov

Hawkins, Troy R., Bhawna Singh, et al., "Comparative Environmental Life Cycle Assessment of Conventional and Electric Vehicles," J. of Industrial Ecology, Vol. 17, No. 1, 2012.

Sovacool, Benjamin K., et al., "Sustainable minerals and metals for a low-carbon future," Science, Vol. 367, Issue 6473, 3 January 2020.

"Leading scientists set out resource challenge of meeting net zero emissions in the UK by 2050," 5 June 2019; https://www.nhm.ac.uk/press-office/press-releases/leading-scientists-set-out-resource-challenge-of-meeting-net-zer.html

https://www.cbsnews.com/news/apple-google-microsoft-tesla-dell-sued-over-cobalt-mining-children-in-congo-for-batteries-2019-12-17/; https://www.theguardian.com/global-development/2019/dec/16/apple-and-google-named-in-us-lawsuit-over-congolese-child-cobalt-mining-deaths

Eichstadt, Peter, Consuming the Congo, Lawrence Hill Books, 2011.

https://www.nhm.ac.uk/press-office/press-releases/leading-scientists-set-out-resource-challenge-of-meeting-net-zer.html

Goonan, Thomas G., "Flows of selected materials associated with world copper melting," U.S. Geological Survey, Open File Report, 2004-1395.

https://smallcaps.com.au/rare-earth-stocks-asx/ultimate-guide/ Cullinane, Danica, “Rare earth stocks on the ASX: The Ultimate Guide,” September 11, 2019.

Troszak, Thomas, “Why Do We Burn Coal and Trees for Solar Panels?” https://www.researchgate.net/publication/335083312_Why_do_we_burn_coal_and_trees_to_make_solar_panels

Permit ID: 9-2911-0078/00009. Renewal Number:3; 4.22.16.

Katwala, Amit, “The spiraling environmental cost of our lithium battery addiction,” 8.5.18; https://www.wired.co.uk/article/lithium-batteries-environment-impact.

Choi, Hye-Bin, et al., “The impact of anthropogenic inputs on lithium content in river and tap water,” Nature Communications, 2019.

https://www.washingtonpost.com/technology/2018/09/11/explosive-problem-with-recycling-ipads-iphones-other-gadgets-they-literally-catch-fire/?noredirect=on&utm_term=.1a455bbe165e

https://www.washingtonpost.com/graphics/business/batteries/graphite-mining-pollution-in-china/

https://www.weforum.org/agenda/2018/04/if-shipping-were-a-country-it-would-be-the-world-s-sixth-biggest-greenhouse-gas-emitter

https://spectrum.ieee.org/energy/environment/your-phone-costs-energyeven-before-you-turn-it-on

www.aamcocolorado.com

Needhidasan, S., et al., “Electronic waste–an emerging threat to the environment of urban India,” J. Environ Health Sci. Eng., Jan. 20, 2014; http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3908467.

www.ourweb.tech/campaign

https://www.cbc.ca/news/technology/apple-bans-toxic-benzene-n-hexane-from-iphone-ipad-final-assembly-1.2736214 See also the documentary “Complicit” by Heather White and Lynn Zhang, 2018. www.complicitfilm.org

www.bioinitiative.org; www.saferemr.com; https://www.microwavenews.com/

Professor Olhoeft speaks on “Electromagnetic Interference and Medical Implants” at http://www.electronicsilentspring.com/electromagnetic-interference-medical-implants/

https://consensus.nih.gov/2000/2000medicalimplantsta019html.htm

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Harenveny, Ronen, et al, “Characterization of Extremely Low Frequency Magnetic Fields from Diesel, Gasoline and Hybrid Cars Under Controlled Conditions,” Int. J. Environ. Res. Public Health, 2015. 1651-1666; doi:10:3390.

https://www.nhm.ac.uk/press-office/press-releases/leading-scientists-set-out-resource-challenge-of-meeting-net-zer.html

https://www.unenvironment.org/news-and-stories/press-release/un-report-time-seize-opportunity-tackle-challenge-e-waste

Sovacool, Benjamin K., “The decarbonisation divide: Contextualizing landscapes of low-carbon exploitation and toxicity in Africa,” Global Environmental Change, 12 Dec 2019.

https://www.etags.com/blog/happens-old-tires-replace

Berendsohn, Roy, “Our Waste Tires Problem is Getting Worse,” Popular Mechanics, August 14, 2018. https://www.popularmechanics.com/cars/car-technology/a22553570/waste-tires/

https://www.boston.com/cars/car-news/2020/01/09/new-u-s-plan-keeps-

https://jancovici.com/transition-energetique/transports/la-voiture-electrique-est-elle-la-solution-aux-problemes-de-pollution-automobile/

Katie Singer spoke about the Internet’s footprint at the United Nations’ 2018 Forum on Science, Technology & Innovation, and, in 2019, on a panel with the climatologist Dr. James Hansen. Her most recent book is An Electronic Silent Spring. www.DearGreta.com; www.ElectronicSilentSpring.com

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