

Unappreciated Costs in the Global Supply Chain of Lithium-Ion Batteries

by Claire Luff, Graduate Student

Schar School of Policy & Government, George Mason University

PUBP765, Spring 2022

The world is facing a clear and present climate crisis, worsening as the days pass. The environmental impacts of electric cars generally have been studied and compared to traditional gas-powered vehicles, but few studies exist about the social implications of automobile production, from the mine to the vehicle's arrival at the car dealership.

Many US citizens have taken to considering the environmental impacts of our purchases and daily activities, but how many of us consider the impact our purchases have on the workers in the supply chain for the products we purchase? Likely not many. The same is true for investigations of the social implications: "research on the socio-environmental impacts of lithium extraction at local level has been very limited" (Agusdinata et al 2018, 1).

This paper seeks to analyze the social impacts of the production of green transportation and asks the question: At whose expense do we purchase electric vehicles? What are the unaccounted costs associated with lithium-ion batteries? What price do we collectively pay in order to have "clean transport"? And is the transport truly clean?

Though the climate emergency is certainly pressing, citizens of the globe should not forget to consider the working conditions for those who produce their goods. Climate change should not be tackled without the consideration of human rights.

Introduction

We are in the midst of a global energy transition, a fourth industrial revolution, with broad global impacts ranging from environmental to geopolitical. Patricia Vasquez, a Global Fellow at The Wilson Center, believes that this transition "is comparable in scale and scope to the steam engine and fossil fuel-powered industrial revolutions that profoundly reshaped human civilization over the past two centuries" (Vasquez 2020, 1).

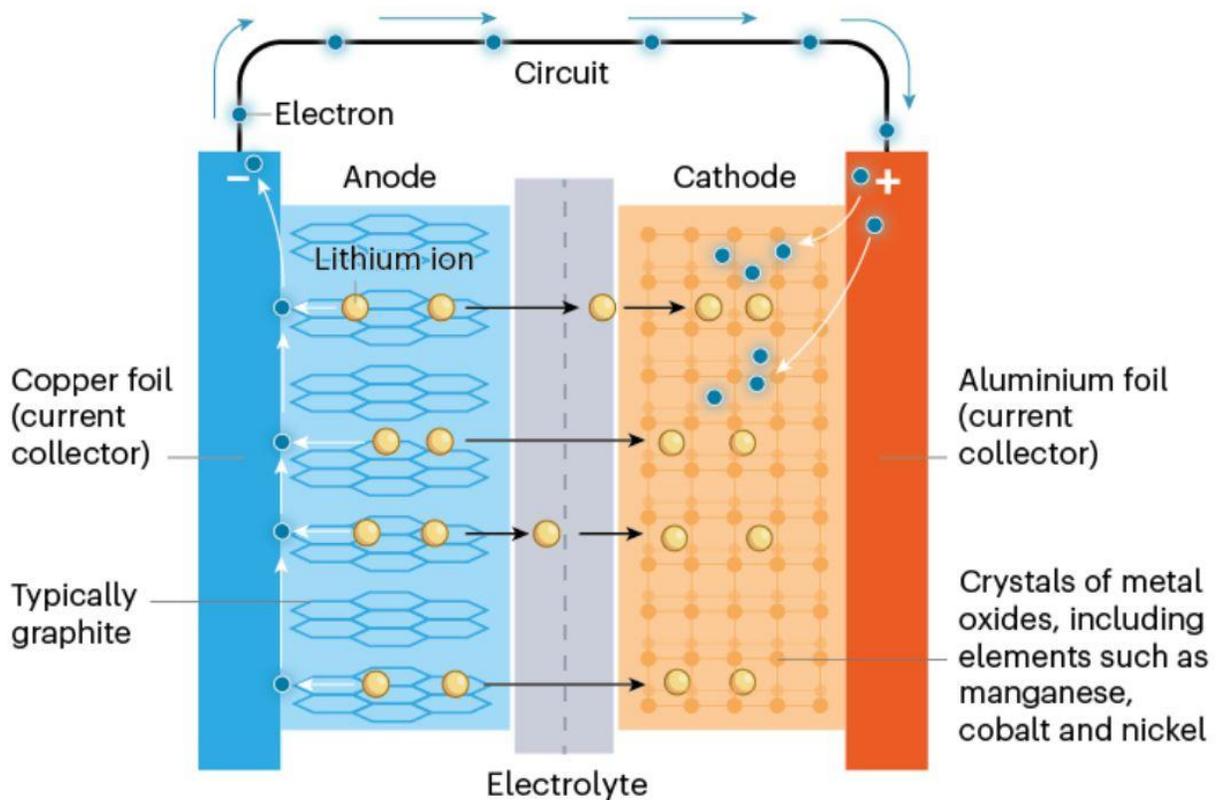
The transition to "green energy" or "clean energy" as some call it, requires a steady supply of minerals that are utilized to build green tech: cobalt, lithium, nickel, aluminum, graphite, iron, and steel. Many of these minerals - aluminum, cobalt, graphite, lithium and nickel - are considered to be "critical minerals" (U.S. DOI 2022, Federal Register, 1) deemed as such due to their supply chains being "vulnerable to disruption" and the fact that these "materials [are] essential to the functioning and production of applications without which the impact on the economy and security would be high" (Kalantzakos 2020, 1). These minerals have "limited or nonexistent" substitutes and they are found in "geographically concentrated" areas (Elkind et al 2020, 6).

Several reasons exist for these minerals to be considered critical: developed countries' on-going transition to a digital existence and the transportation industry's transition to electric vehicles (EVs), due to various governments' goals of reducing greenhouse gas emissions in general. The transportation industry's emissions "exceed 15 percent of global emissions" (Elkind et al 2020, 3).

The key to electric vehicles is a rechargeable battery. To create EV batteries, metals that are lightweight, yet strong and more powerful are in demand (Kalantzakos 2020, 7). The most-widely accepted technology is the lithium-ion battery. "Lithium-ion batteries operate by virtue of an anode made of graphite and a cathode made of varying combinations of cobalt, nickel, manganese, and several other alternatives" (Picarsic 2020, np). Lithium comes into play in the anode of the battery. The battery cell chemistry is illustrated below.

Cell chemistry

Lithium-ion cells generate electricity when lithium ions flow from the anode through an electrolyte to the cathode, forcing electrons to flow around an outside circuit. Charging reverses that process.



©nature

Source: Adapted from Castelvechi, Davide. "Electric Cars and Batteries: How Will the World Produce Enough?" *Nature (London)* 596, no. 7872 (2021): 336–339. - which was Adapted from G. Harper *et al.* *Nature* 575, 75–86 (2019) and G. Offer *et al.* *Nature* 582, 485–487 (2020).

In comparison to a smartphone or a laptop "the required lithium input per unit for a hybrid or

electric car is 100 to 1000 times higher” (Anlauf 2018, 167). As for cobalt, “EV batteries can have up to 20 kg of Co in each 100 kilowatt-hour (kWh) pack. Right now, Co can make up to 20% of the weight of the cathode in lithium-ion EV batteries” (U.S. DOE 2021, np).

The transportation industry’s transition to electric vehicles will require a large shift in infrastructure, a massive uptick in mining and manufacturing jobs, new technology, increased financing and policy revisions (Elkind et al 2020, 3). The United States government, businesses and consumers of electric vehicles would do well to consider “the potential impact of new demand for these minerals on the lives of people in the mineral-producing countries” (Elkind et al 2020, 3). When pondering sustainability of a product or process, considering the lives of the humans involved is often overlooked. How can we deem a product or process to be “sustainable” without considering how it affects the lives of those who produce it? If the person gathering the cobalt to be shipped cannot make enough to afford to live, then we cannot consider the product sustainable, even though it fits into the category of “green technology”.

Current Corporate Ethics and the Effects of Globalization

Along with globalization came the outsourcing of labor to areas with a cheaper cost of living, so that companies could pay lower wages to their manufacturing workers. But there are repercussions to these decisions - buyers cannot see the conditions in which goods are made and “value chains increasingly expand beyond national borders” (Kister & Peyre 2016, 128). When companies only care about the bottom line, it is not difficult for companies “to avoid assuming responsibility for the social and ecological consequences of production, processing and trading” (Kister & Peyre 2016, 128). Another consequence of a global economy and companies that only care about profit is that “ruthless competition heightens demand for cheap labor that can be obtained only through human exploitation” (Shelley 2010, 58).

At the same time, governments now decide their “their geopolitical strategies” at least in part “to secure access and control over natural resources worldwide” (Kister & Peyre 2016, 128).

Security Implications

The surging demand for lithium-ion batteries for use in hybrid and electric vehicles, “which began entering the market in the late 1990s” (Kalantzakos 2020, 7) has quickly hastened the need for natural resources, and thus lead to “an increasing competition for access” (Kister & Peyre 2016, 139) to these resources. The “rapid economic growth of emerging countries” (Kister & Peyre 2016, 139) based on the demand for “strategic mineral resources” (Kister & Peyre 2016, 139) contributed to the expedited shift of the transportation industry. Kalantzakos assesses the current situation - “China’s offer to become the one-stop-shop for the developing world” - as “a threat to the US, the EU and Japan” (Kalantzakos 2020, 11). A global race to procure these minerals for the new green economy is well underway, with the major players being “China and the Western powers (including Japan)” (Kalantzakos 2020, 4).

“China has demonstrated that it can dominate (or at least influence strongly) the global supply chain for electric vehicles (EVs), including lithium-ion batteries (LIBs), components and raw materials” (Graham et al 2021, 75). Chinese companies involved in the EV supply chain will “retain a competitive advantage globally” (Graham et al 2021, 75) because it will take years, if not a decade, for others to build the necessary infrastructure for their own vertically integrated supply chain (Kalantzakos 2020, 4).

“China has already demonstrated its willingness to use price manipulation against foreign competitors, for example by manipulating export quotas on the rare earth element neodymium, which is crucial for electric motors” (Graham et al 2021, 79), so the world can expect more of the same in the years that follow, until other Western-aligned nations have further developed EV supply chains.

Perhaps with the recent massive supply chain slowdown due to COVID-19, the world has grasped the national security risks that come with relying on a supply chain controlled by one nation. Not to mention, the major human security implications that come with a concentration of ownership.

Current events are affecting the supply and demand for EV materials. Russia’s invasion of Ukraine has impacted the price of fossil fuels, so the already high demand for electric vehicles has gone into overdrive (Castelvecchi 2021, np). Automotive supply chains are behind because of COVID-19. Already vulnerable and poor people are now more so as a result of COVID-19 (ILO 2020). Climate change continues to get worse, unabated. One side effect of climate change is mass migration due to drought or similar issues out of humans’ control (Shelley 2018, 221). All of the realities listed in this paragraph are strong contributing factors to human trafficking, and it seems that conditions could be just right for the perfect storm to take place in the electric vehicle sector.

Factors Influencing the Risk of Labor Exploitation

Mines exist in extremely rural and poor areas with little to no economic development, or even basic infrastructure.

In the Democratic Republic of Congo (DRC) it is difficult to procure what the developed world would consider basic necessities: “the access rate to clean drinking water is 26%; the completion rate to the secondary level of school is 18%; the electrification rate is 6%” (Sovacool 2021, 272). Ironically, there are many Congo residents who mine cobalt for first-world electronics, but they likely do not have basic electricity themselves. Still, the DRC has “been endowed with prodigious natural resources” (Sovacool 2021, 272), of which many foreign nations and companies are looking to cash in on.

In South America, the region with the most prodigious lithium resources is deemed the Lithium Triangle. Lithium Triangle Countries (LTCs) include Chile, Argentina and Bolivia. (Vasquez 2020, 1) These countries border what is known as the Atacama salt flats, which border the Andes mountains and include the lands of native peoples. The land in Atacama “is among the most arid regions in the Andean highland, having only scattered grass and shrub vegetation while water sources are scarce” (Anlauf 2018, 170). In addition to water shortages, the Atacama communities “struggle to finance sewage systems and heating for schools” (Buratovic et al 2017, np). In the region of Susques, Argentina “67 per cent of the households lack basic needs. Basic infrastructure is often absent and Gobel even speaks of a ‘historic vacuum of the state’ in this peripheral region” (Anlauf 2018, 170).

China is a vast country, and the living conditions vary from region to region. The conditions in rural Xinjiang province are the most relevant to the topics explored in this paper. Xinjiang is “a semi-arid or desert climate” and primarily an agricultural area, which is a profession almost entirely dependent on the weather (Jianying et al 2012, 164). “Almost all villages [...] have access to electricity and to a phone network” (OECD 2009, 22), but “in absolute terms, as many

the situation road conditions in western provinces “are still mostly made of broken rocks and sand without any hardened surface” (OECD 2009, 22). As of the end of 2005, “about 312 million rural people did not have access to a safe water supply” (OECD 2009, 22-23) and up to 70% of the rural population do not have access to “safe sanitation” (OECD 2009, 23).

The living conditions described above, in which it is difficult to support one’s family, put people inherently at risk of being taken advantage of: “Traffickers prey on the vulnerable. Individuals without parents or with ailing parents, single mothers seeking ways to support their children, the desperately poor, and refugees from conflicts are common victims” (Shelley 2010, 95). Additionally, some sectors are more prone to forced labor than others due to the inherently hidden nature of the work: “domestic work, fish capture in open sea, agriculture or mining in remote areas where workers have no contact with the rest of the community, facilitates exploitative practices” (UNODC 2020, 110).

According to the UNODC, the elements that increase a persons’ susceptibility to labor trafficking include being an undocumented migrant or being unable to find other work to support one’s family, being a low paid worker, working in a physically demanding job, taking a short-term job, and working in sectors that are dangerous. Recruitment agencies and a shortage of labor also increase labor trafficking (UNODC 2020, 108). In her book “Human Trafficking: A Global Perspective”, Dr. Louise Shelley notes that “traffickers also travel to rural areas of many poor countries to recruit victims” (Shelley 2010, 97).

The most common pattern “recorded in different forms of trafficking for forced labor: the drastically asymmetric relationship between employer and employee, resulting in a lack of realistic alternatives for workers other than to accept risky job offers and remain in exploitative labor situations” (UNODC 2020, 108).

Sub-contracting also contributes to the labor trafficking issue because “there is no direct contractual link between the contractor and the workers, and the contractor has no responsibility for the working conditions of their employment. This often results in opacity and fragmentation of responsibilities, where it is unclear who is accountable for the labor conditions of the worker” (UNODC 2020, 114).

According to the International Labor Organization (ILO), there are “24.9 million people trapped in forced labor” worldwide (ILO 2020, np). Specifically in the areas this paper examines, labor trafficking and exploitation are common, especially in China, in which state-run labor trafficking occurs: “state-sponsored forced labor is intensifying under the government’s mass detention and political indoctrination campaign against Muslim minorities in Xinjiang” (U.S. DOS 2021, 178). Ethnically Uyghur people are being forcibly transferred for exploitative labor purposes to various factories across China (Xu et al 2020, 4). Within the world of human trafficking, trafficking for forced labor in factories is not uncommon.

In 2018, of 1531 victims of trafficking detected in Argentina, 972 were trafficked for forced labor, or 63% (UNODC 2020 South America Country Profiles, 5). Argentina is classified as a Tier I country in the U.S. Department of State’s 2021 Trafficking in Persons Report (U.S. DOS 2021, 88). There are four tiers defined by the U.S. DOS, and each country is placed into a tier: “This placement is based not on the size of a country’s problem but on the extent of government efforts to meet the Trafficking Victims Protection Act’s (TVPA) minimum standards for the elimination of human trafficking, which are generally consistent with the Palermo Protocol” (U.S. DOS 2021, 51). Tier 1 indicates that the country is in compliance with the minimum standards

set forth by the TVPA (U.S. DOS 2021, 51). Still, “adults and children from Argentina, particularly the northern provinces; Bolivia; Paraguay; Peru; and other countries are exploited in forced labor in a variety of sectors” (U.S. DOS 2021, 91).

Bolivia is listed in the Trafficking in Persons Report as a Tier 2 country. The Report notes that Bolivians who are “rural and poor” and indigenous “are particularly at risk for sex and labor trafficking” (U.S. DOS 2021, 131). Additionally, forced labor can be found in several industries, including mining (U.S. DOS 2021, 131).

Forced labor in Chile (listed as a Tier 1 country) also occurs in the mining sector (U.S. DOS 2021, 174).

As of 2021, The Democratic Republic of Congo (DRC) is not a party to the Palermo Protocol, meaning that it has not signed on to prevent trafficking in persons through the United Nations (U.S. DOS 2021, 60). DRC is listed as a Tier 2 country in the TiP Report, but the Report notes that “forced labor involving adults and children continues to be the primary type of trafficking within Congo” (U.S. DOS 2021, 190). The Wilson Center, a non-partisan policy forum, notes that the “extraction of [cobalt] is linked to child labor, safety risks, environmental abuses, and corruption” (Lawson 2021, np). One person interviewed in Mr. Sovacool’s research, a safety coordinator for a state-owned mine, stated that “ASM miners in the Congo are a textbook case of a vulnerable group. They literally rely on spades and buckets to mine cobalt, transporting it by bicycle or motorbike. They cannot even afford ladders, or trucks. Some even dig by hand” (Sovacool 2021, 280).

Before we get into the nitty gritty of where the mineral extraction takes place and the supply chain that follows, it is prudent to note that The Business and Human Right Research Centre, based out of the UK, has begun researching “six key commodities vital to the clean energy transition: cobalt, copper, lithium, manganese, nickel and zinc” using what they deem the Transition Minerals Tracker (B&HRRC 2021, 1). They researched practices of companies “who hold a majority market share in one of the six commodities” (B&HRRC 2021, 1). The Tracker researches the companies’ impact on local communities; environment impacts; corruption, mismanagement of funds, tax avoidance and workers’ rights, among other things (B&HRRC 2021, 3). The Tracker found that over a ten-year period (2010-2020), there were a total of 276 human rights abuses reported, even though almost half of the companies have created a corporate human rights policy. But 51 out of 103 companies studied “have an allegation of human rights abuse - which indicates “a significant disconnect between policy and practice” (B&HRRC 2020,1). Of the 276 allegations reported, 68 of the allegations specifically related to “workers’ rights, and of those just over half are about occupational health and safety (54%)” (B&HRRC 2020, 3). The London-based mining company Glencore PLC has “the worst human rights record among miners of metals used in renewable energy”, with 64 of the 495 allegations since 2010 listed in the Business and Human Rights Center Report (Squazzin 2022, np).

Issues in Mining

The battery component of Electric Vehicles is only one small part of a complex machine, yet even tracking the supply chain of the metals utilized in these batteries is extremely complex. To begin, we need to understand more about raw material extraction.

Extraction of resources from the earth, also known as mining, is and has been one of the most controversial issues in our world, due to its effects on local communities, the health impact on miners, the environmental degradation and pollution that comes with it, and some mining companies' unethical behavior. Since colonial times, entities have sought to access and control foreign lands and resources "to enrich the centers of the world economy" (Jacka 2018, 62). This continues today, but with a corporate-based framework (for the most part) rather than a nation-based framework (Jacka 2018, 62). Mr. Jacka argues that what mining companies often present as "development", the extraction of resources "ultimately benefits the wealthy countries at the expense of poorer ones" (Jacka 2018, 62). Additionally, mining has "been associated with human rights and governance challenges, however, and mining of EV battery materials is no exception" (Elkind et al 2020, 9), as we shall see.

Indigenous Land Issues

Resource mining sometimes encroaches on indigenous lands, who "both [engage] with resource extraction as artisanal miners or workers at large-scale mines and [resist] these encroachments on their lands" (Jacka 2018, 62-63), because they are in need of income. The relationship with indigenous groups and the rural poor communities is often multi-faceted, and the issues that arise can be anything from pollution of natural resources, access to natural resources, and the amount of compensation due.

Corruption

Mining has been identified as the sector with "the second-highest incidence of corruption, with 50 percent of respondents saying they had observed corrupt acts" second only to the oil and gas industry (Elkind et al 2020, 10). There exists a "predisposition for both miners and controllers to take a gamble for a one-time high-value transaction is big and stimulates corruption" (Kister & Peyre 2016, 138). One such example is the current conditions surrounding cobalt mining in the DRC.

Environmental Damage

Pollution to water and air is a well-known effect of mining. Diminishing existing natural resources necessary for a community's survival is another issue, such as the "salar-based lithium extraction" in lithium triangle countries (LTCs), which utilizes large amounts of fresh water. In the arid climate present in LTCs, the decreasing rate of fresh water is an immense problem related to the very survival of the community (Elkind et al 2020, 11). Additionally, "cobalt mining in Congo can cause water pollution, air quality impacts, and possible radioactive exposure, affecting both miners and surrounding communities. Nickel mining operations around the world have been responsible for toxic air pollution and other harms" (Elkind et al 2020, 11).

Poor Working Conditions

Miners face threats to their health and safety each time they enter an underground project, especially in mines that are not regulated by governmental bodies. Without proper personal protective equipment, "many workers inhale dust from mining that can in some cases cause deadly lung disease" (Buratovic et al 2017, np). Additionally, because mining takes place in very rural areas, labor, health and safety violations are difficult to uncover. In some mining

operations around the world, child labor has been discovered such as in mines “for cobalt mining in DRC and silver mining in Bolivia” (Buratovic et al 2017, np).

The other metals involved in lithium-ion battery production (nickel, graphite, copper, iron, lead, steel, manganese) (Wiechman 2010, 1) deserve research that considers human rights as well, but the scope of this paper is limited to cobalt and lithium, with limited information about aluminum.

COBALT: DEMOCRATIC REPUBLIC OF CONGO (DRC)

For all that is lacking in the living conditions of Congo, the DRC is rich in natural resources. It holds “some of the world’s most valuable minerals” (Lawson 2021, np). In addition to approximately 50 percent of the world’s cobalt reserves (Griffiths & York 2021, np), copper, gold, coltan and diamonds are embedded in the Earth’s crust within the DRC (Lawson 2021, np). Cobalt is crucial to the production of lithium-ion batteries “preventing them from overheating or even exploding” (Griffiths & York 2021, np). But “extraction of the mineral is linked to child labor, safety risks, environmental abuses, and corruption”, which will continue to grow if not addressed (Lawson 2021, np).

The U.S. Geological Survey indicates that in 2022 “Congo continued to be the world’s leading source of mined cobalt, supplying more than 70% of world cobalt mine production” with the vast majority of the mined mineral going towards lithium-ion battery production (U.S. DOI 2022, np). The recent increase in U.S. cobalt demand can be attributed to the demand for electric vehicles: “While a smartphone might contain five to 10 grams of refined cobalt, a single electric-car battery can contain up to 15,000 grams” (Frankel & Chavez 2016, np).

ASM vs LSM

Mines are categorized into two types: Artisanal and Small-Scale Mines (ASM) and Large-Scale Mines (LSM). The World Bank defines ASM as “low investment, labor intensive local production, informality, as well as no or low level of mechanization” (Jacka 2018, 63). Cobalt is extracted by ASM miners “digging small tunnels by shovel, pickaxe, or even hand” (Sovacool 2021, 273). Usually dug by adult men, the underground tunnels can be 90 to 120 feet deep (Sovacool 2021, 273), “often without any support to hold them up” and little to no ventilation (Amnesty International 2016, 6). Women and children also participate in ASM by searching through tailings (or discarded by-products) from LSM sites (Amnesty International 2016, 5).

Though the majority of mining in terms of output “takes place in corporate, securitized enclaves with capital-intensive modes of production” (Sovacool 2021, 273), research indicates that ASM mines employ “an estimated three-quarters of the active working population of sub-Saharan Africa” (Hilson et al. 2017, 80), or 20 million people (Sovacool 2021, 272). Another “100 million individuals who depend upon its activities indirectly for their livelihoods” (Hilson et al. 2017, 80). In terms of the number of people employed in the ASM sector in the DRC, the informal ASM sector far outweighs LSM. Clearly, artisanal mining is a critical source of income for rural Congolese (Sovacool 2021, 271). Shockingly, cobalt from artisanal mines supply 20% of DRC’s output (Lawson 2021, np).

Business arrangements for Artisanal and Small-Scale Miners vary. Some miners work for themselves, some work as “hired laborers”, and others “have a business arrangement with an

investor, who funds the digging of the tunnel and manages the sale of the product” (Amnesty International 2016, 5).

Laurent Kabila, the former president of Congo “encouraged people to dig for themselves as the government could not revive industrial mining” (Amnesty International 2016, 5) following the Second Congo War and subsequent collapse of the largest state-owned mining company. As a result of these events, many Congolese citizens took up ASM mining to bring in income (Amnesty International 2016, 5).

LSM mines have their own issues as well. Hiring workers via subcontractors is a common practice, which “can leave workers in an extremely precarious position: often hired on short-term contracts, or no contract at all, with limited benefits, low pay and the threat of terminations always hanging over them” (Pattison 2021, np). The Guardian found that some wages were as low as 30 pence an hour (Pattison 2021, np), or 37 cents per hour USD. Inevitably, the use of subcontracting allows the LSM mines the freedom to escape accountability for their labor practices.

Unregulated mines, of both the Artisanal Small-Scale Mine and the Large-Scale Mine varieties, inevitably come with consequences. From exploitative labor practices in LSM mines, to the physical danger of ASM mines, the negative consequences to miners’ health and safety abound. ASM cobalt mines in the Congo are also notoriously known to be the workplaces of children.

Child Labor / Labor Exploitation

The exact number of children mining for cobalt in the DRC is unclear (it is difficult to measure), but “UNICEF estimates that 40,000 children work in mining across the south of the DRC where cobalt is found” (Dummett 2017, np). Some of the children are “as young as six years old” (Lawson 2021, np). Sovacool’s interviews revealed the physical abuse of children, “manual labor and degraded health” among children in the cobalt mines (Sovacool 2021, 278). In 2016, Amnesty International had previously uncovered similar allegations:

“Child miners said they worked for up to 12 hours a day in the mines, carrying heavy loads, to earn between one and two dollars a day.”

“Several children said that they had been beaten, and seen other children beaten, by security guards employed by mining companies when they trespassed on those companies’ mining concessions.”

“Children who collected, sorted, washed, crushed, and transported minerals were paid per sack of minerals by the traders. The children had no way of independently verifying the weight of the sacks or the grade of the ore, and so had to accept what the traders paid them, making them susceptible to exploitation.”

- Amnesty International, “This is What we Die For: Human Rights Abuses in the Democratic Republic of the Congo Power the Global Trade in Cobalt. 2016, page 6.

The United States Department of Labor lists cobalt mining in the DRC among the worst forms of child labor in their List of Goods Produced by Child Labor or Forced Labor (U.S. DOL 2021). This is rightly so, as children should not be doing manual labor. However, child labor is more nuanced than most people realize: poverty-stricken families in the DRC are fighting for survival, so any family member who is able is sometimes asked to help bring in income.

Children are not the only exploited laborers among the cobalt mines. Miners “are constantly exploited and operate at the bottom of a hierarchy of Congolese power relations. According to the data, this occurs most often at the hands of the government, foreign firms, and the police and military, but it can also be by local firms or even other community members themselves” (Sovacool 2021, 278-279). Some ASM miners have reported being hassled by the police or military, and even “being taken advantage of by either the bosses that worked for the local companies they sold cobalt to, or LSM operations that artificially depressed the price of cobalt” (Sovacool 2021, 279-280).

In addition to being exposed to exploitation, harassment, the constant danger of collapse and poor oxygenation, many of the miners do not wear personal protective equipment, including face masks “that could prevent them from inhaling cobalt dust” (Dummett 2017, np), which “can result in potentially fatal lung disease, called ‘hard metal lung disease’” (Amnesty International 2016, 5). The DRC’s Mining Code, authored in 2002, and Regulations, authored in 2003, offer “no guidance for artisanal miners on safety equipment or how to handle substances which may pose a danger to human health, apart from mercury” (Amnesty International 2016, 5) and “very few provisions to protect artisanal miners’ labor rights” (Amnesty International 2016, 7).

When the abuses in cobalt mines were exposed on an international level approximately five years ago, it created a public outcry “forcing the western technology and automotive brands that rely on the mineral to look for ways to source ‘clean’ cobalt, free from human rights abuses” (Pattison 2021, np)

Clearly, the human rights abuses occurring in Congo’s cobalt mining sector are in part due to a lack of governmental guidance. Amnesty International also noted “a significant lack of capacity within governmental agencies to monitor and enforce safeguards and improve conditions for artisanal miners” (Amnesty International 2016, 7). There are not enough labor inspectors to monitor the entire Katanga region (Southern DRC), and “the government has been criticized by UN human rights monitoring bodies, ILO expert bodies, NGOs and others for its failure to put in place an adequate labor inspection system” (Amnesty International 2016, 7). Though the DRC government is unable to ensure mining safety or provide social services, it does not hesitate to collect mining royalties (Sovacool 2021, 272).

Corruption

Corruption also plays an integral role in DRC cobalt mining. Amnesty International and other researchers have cited DRC officials failing to do anything about unsafe conditions and child labor issues in return for payment (Amnesty International 2016, 8 & Elkind et al 2020, 9). Another arrangement “involved the granting of stakes in mineral licenses at below-market value to well-connected intermediaries, who then sell them for a profit and distribute kickbacks to top officials” (Elkind et al 2020, 9). Transparency International ranks the DRC 169th out of 180 countries evaluated in their Corruption Perceptions Index, receiving a corruption score of just 19 out of 100 (with 0 being highly corrupt) (Transparency International 2021, np).

China’s involvement

No presentation of the DRC’s cobalt extraction industry would be complete without mentioning the investment of China, who as previously mentioned, is integrally involved in all aspects of the lithium-ion battery supply chain. Kalantzakos notes that developing nations may be happy to do business with a non-Western nation since “the network of relationships that China has created

offers both agency and alternatives to developing nations that felt constrained to rely solely on the neoliberal economic recipes for investment of Western powers” (Kalantzakos 2020, 11).

“If the road runs through DRC, it also runs through China. More than 90 percent of the DRC’s cobalt exports in recent years have gone to China [...] China is the DRC’s largest trading partner by a factor of five and is also a major provider of development grants and loans. Between 2007 and 2017, Chinese commitments to the DRC totaled around US \$5-7billion, with almost US\$4 billion of that focused on the mining sector”

-James Griffiths & Geoffrey York, “How China is Using Congolese Minerals to Dominate the Global EV Market.” 2021.

Even though the DRC law requires that mining contracts must be published, the publicly available contracts are “highly opaque,” so determining whether “promised infrastructure investments” have come to fruition is difficult if not impossible to determine (Griffiths & York 2021, np).

Not surprising to even a novice student of worldwide development, “mining giants employ craft tax-avoidance strategies, severely understating the value of their assets in African countries and assigning the bulk of their income to subsidiaries in tax havens such as Bermuda, the Cayman Islands, and the Marshall Islands” (French 2015, np). Of course, this has a brutal impact on the nation of Congo, as an inability to collect the corporate taxes owed to them affects their capacity to supply infrastructure and guarantee the health and safety of its constituents, among other things. Additionally, what was perhaps expected in the initial negotiation over mining rights - that having a foreign firm operate mines in the DRC would bring jobs to the area - is not always the reality, since “Chinese companies frequently bring in their own workers from China” (French 2015, np). Notwithstanding, human rights violations “connected to multiple Chinese mining companies” have also been reported (Buratovic et al 2017, np).

Cobalt Supply Chain

ASM Mines (DRC) → Markets (DRC) → Refiners/smelters (China) → Battery Component Manufacturers (China, South Korea) → Battery Makers (China, South Korea) → EV Car Companies (Worldwide) → Car Dealerships (Worldwide)

Compiled with information from: Dummett, Mark. The Dark Side of Electric Cars: Exploitative Labor Practices. Time Magazine. September 29, 2017.

After being removed from the mines, some of the ore supplied to Chinese smelters is sold through local markets, in which ASM miners must rely on Chinese buyers to evaluate the quality of the cobalt they are selling, since the miners do not have access to the high-tech machine necessary for evaluation (Frankel & Chavez 2016, np): “Independent traders at Musombo - most of them Chinese - buy the ore, regardless of where it has come from or how it has been mined” (Amnesty International 2016, 8). The “how” of cobalt mining is quickly lost in the supply chain, unverified and brushed under the rug.

Several Chinese owned mining companies have been investigated by reporters, including Congo Dongfang International Mining (CDM), owned by Huayou Cobalt which is “a Chinese conglomerate with interests in every step of the cobalt supply chain, from mining to cathode production” (Pattison 2021, np); and Tenke Fungurume Mining (TFM), one of the largest

copper and cobalt producers in the DRC. Labor exploitation has been uncovered in connection to these companies (Pattison 2021, np).

The ore is then shipped to China or South Korea for refining, though “China has 72% of the global cobalt refining capacity” (U.S. DOE 2022, 19). (There are obviously more steps in the supply chain before a vehicle is ready to sell which will be covered later in this paper.)

Though the allegations by Amnesty International were denied by many of the companies, “they are listed as customers in documents of other companies who are listed as buying from Huayou Cobalt - but did not explain whom they sourced cobalt from [...] it is unlikely that all these large companies are not sourcing any cobalt from the DRC” (Amnesty International 2016, 9)

Congo Lithium Mines?

Recent news that “three international companies have announced their intention to explore for or produce lithium” in Manono, Congo is concerning (Global Witness 2021, 3). These new mines in the Democratic Republic of Congo are at risk for all of the issues discussed in the Cobalt section of this paper, because the lithium is present in spodumene, a hard rock requiring traditional mining techniques to remove it.

Electric vehicle companies interviewed by Amnesty International “stated that they have a zero-tolerance policy when it comes to child labor in their supply chains” (Amnesty International 2016, 9) but because U.S. legislation does not cover cobalt under its “conflict mineral” definition, due diligence is not required for companies sourcing cobalt (Amnesty International 2016, 10). Multiple companies in the electric car industry interviewed by reporter Mark Dummett indicated “how difficult it is to map the cobalt supply chain” (Dummett 2017, np). But talk is cheap, and difficulty should not be an excuse that exempts companies from performing due diligence. Still, consumers should also take into account the impact that bad public relations could have on the already impoverished communities in the DRC that rely on income from cobalt mining.

(Suggested solutions to the issues presented in this section will be discussed at the end of the paper.)

LITHIUM: ARGENTINA, BOLIVIA, CHILE

Lithium is sometimes referred to as “white gold”. Elkind et al note that “worldwide lithium reserves are estimated at 14 million metric tons, compared to 2018 production of 85,000 tons” (Elkind et al 2020, 6).

Mining of lithium occurs in Australia, China, Zimbabwe, Portugal and Brazil and around the Atacama Desert in Chile, Argentina and Bolivia (Buratovic et al 2017, np). In Chile, “lithium has been mined since the 1980s” (Buratovic et al 2017, np). Chile has access to lithium in both of the forms in which it is mined today: lithium carbonate, which is extracted from brines, and lithium hydroxide, which is mined from hard rock minerals (Buratovic et al 2017, np). Argentina and Bolivia touch the Atacama salt flats, giving these nations access to the brine-based method of extraction as well. These three nations - Argentina, Bolivia and Chile - form what is referred to as “the lithium triangle” (Buratovic et al 2017, np).

The process of mining lithium from the salt flats is different from traditional mining, due to the fact that it is embedded in water, not hard rock. The brines are found underneath the salt flat, so it must be pumped to bring the brine to the surface “using fresh water, then placed in large ponds, where the sun evaporates the water” (Vasquez 2020, 7).

The traditional mining of lithium from hard rock “comes mostly from spodumene, a mineral derived from pegmatite rock that is known for its high lithium content. Pegmatite lithium deposits are mined using conventional open-pit or underground mining techniques” (Vasquez 2020, 7).

Economically, developing lithium mining could be valuable for the lithium triangle countries, but it does not come without challenges.

Political unrest is one challenge that the lithium industry faces. In Bolivia, former president Evo Morales resigned due to suspicion of election rigging; he was granted political asylum in Argentina. He had signed a contract with a German Lithium company which was later canceled. Since then, the new president has “repeatedly postponed the election, citing COVID-19 concerns” (Vasquez 2020, 12-13).

Argentina is clearly taking a business-friendly approach to lithium mining (Vasquez 2020, 2), but one wonders if these companies have a history of human rights abuse allegations. Chile and Bolivia are taking different approaches to lithium mining, which has resulted in slowed production. Bolivia would like to guarantee that the nation and people benefit as much as possible from their natural resources (Revette 2015, 155), whereas Chile has imposed “high barriers to entry” (Vasquez 2020, 2) that restrict which companies can access their lithium resources (Anlauf 2018, 167).

Sadly, native communities in South America (and throughout history) have been taken advantage of due to their naivete in regard to the Western world (Anlauf 2018, 174). Oftentimes, the communities are not given enough information in order to make an informed decision about allowing access to the resources present on native land (Anlauf 2018, 173). Other times, mining companies offer services that are lacking (recall the poor living conditions referenced in the introduction) in the rural, poor areas in which the mine would be located, such as “transport, health care, as well as education. However, many of these services stopped once the project was approved” (Anlauf 2018, 144). It seems fair to refer to a situation such as what happened in Olaroz, Argentina as manipulative and unjust.

The issues when mining companies approach native communities are “how native communities are treated and to what degree they are allowed to share the profits of the extractions taking place on ‘their ground’” (Buratovic et al 2017, np), and also how the extraction will affect the community’s access to their own natural resources. These issues can understandably upset the locals: “Some lithium projects are already encountering domestic hostility due to concern about the water used for processing the lithium into commercially traded lithium carbonate” (Vasquez 2020, 13). The climate in the Atacama Desert is extremely arid, so water is a critical resource. Water is not only valuable to the people of the community, but also to the native wildlife of the region: “In Chile, a court upheld an appeal by indigenous populations living close to Atacama Desert brine operations, who argued that SQM’s remediation plan was insufficient to address environmental impacts, including to the region’s flamingo colonies” (Vasquez 2020, 13). This is one example of an externalized cost that the “historically marginalized, not accustomed to Western knowledge systems” residents did not receive from the partial information supplied by the mining companies (Anlauf 2018, 174). There are also cultural preservation issues

surrounding mining in the LTCs: historically, local residents embrace pastoralism as a way of life, so they “have a strong interest in a sound environment, [but] many also feel an urgent need for (immediate) improvements of their material well-being” (Anlauf 2018, 170), given the substandard conditions in which they live. The mining companies that are negotiating access to the mineral resources in South America clearly have an advantage over the native peoples, often resulting in imbalanced contracts that lean heavily in favor of the corporation (Jacka 2018, 69). In the case of Jujuy, Argentina, the corporation’s bad faith negotiation allowed them to take advantage “of the ill-designed autonomous administration as well as the historical vacuum of the state.

Beyond the initial contract negotiation regarding access to resources and impact, “working conditions and salaries” should also be examined as they remain controversial in mining (Buratovic et al 2017, np). Though 11 of the 14 South American mining companies researched by the Business and Human Rights Resource Centre have a human rights policy, they found 19 allegations of human rights abuses in their South America Deep Dive (B&HRRRC SA Deep Dive 2021, np). Additionally, “South America has some of the Transition Mineral Tracker’s most notorious cases of human rights abuses in relation to environmental damage and defense” (B&HRRRC SA Deep Dive 2021, np).

Yet, residents of communities near lithium mining are not always opposed to the extraction. Anna Revette’s interviews of Bolivian residents reveal that indigenous communities do not always view mining of their lands in a negative light - some see the economic opportunity that presents with resource extraction, but still take a cautious outlook (Revette 2015, 154).

Though the author was not able to uncover any specific instances of labor trafficking or exploitation in LTCs, human rights groups, governments and private citizens should be concerned about the possibility of this area becoming a trafficking hotspot due to the poor economic conditions in native communities surrounding the Atacama salt flats. Beyond the individual risk factors, as mentioned in the introduction, UNODC also identified the following factors that are currently present in the lithium mining sector: working in a physically demanding job and working in sectors that are dangerous. Recruitment agencies and a shortage of labor also increase labor trafficking. The current supply chain struggles, due to a backlog of demand for EVs that was built up during COVID-19 could also drive trafficking to lithium mines in less developed countries. The area of most concern is Chile’s lithium mines due to the fact that it is traditional hard rock mining, meaning the mine is located in a remote region and therefore trafficking or other abuses would be difficult to trace.

It is beneficial for readers to remember that just because nothing has been uncovered in the news or in academia does not mean it is not happening. Human trafficking is one of the most difficult crimes to detect as it is hidden in plain sight or hidden in remote parts of the world (U.S. DHS 2022, np). In addition to labor exploitation, we should also be on the lookout for corruption as the LTCs negotiate contracts with transnational mining corporations.

Along with its vast control of cobalt, China has its eyes set on the lithium triangle too: “Ganfeng Lithium participates in two projects in Argentina, Cauchari-Olaroz and the Mariana Project. In Chile, Tianqi Lithium holds a stake in the storied Salar de Atacama, one of the most established lithium brine locations in Latin America. As Bolivia tries to catch up to its neighbors, its vast lithium resources are also attracting interest from China” (Brown, Sophia 2021, np).

(Suggested solutions to the issues presented in this section will be discussed at the end of the paper.)

MANUFACTURING: CHINA

What do the Atacama Desert communities in the lithium triangle and the rural jungle communities of the Southern Congo have in common? China.

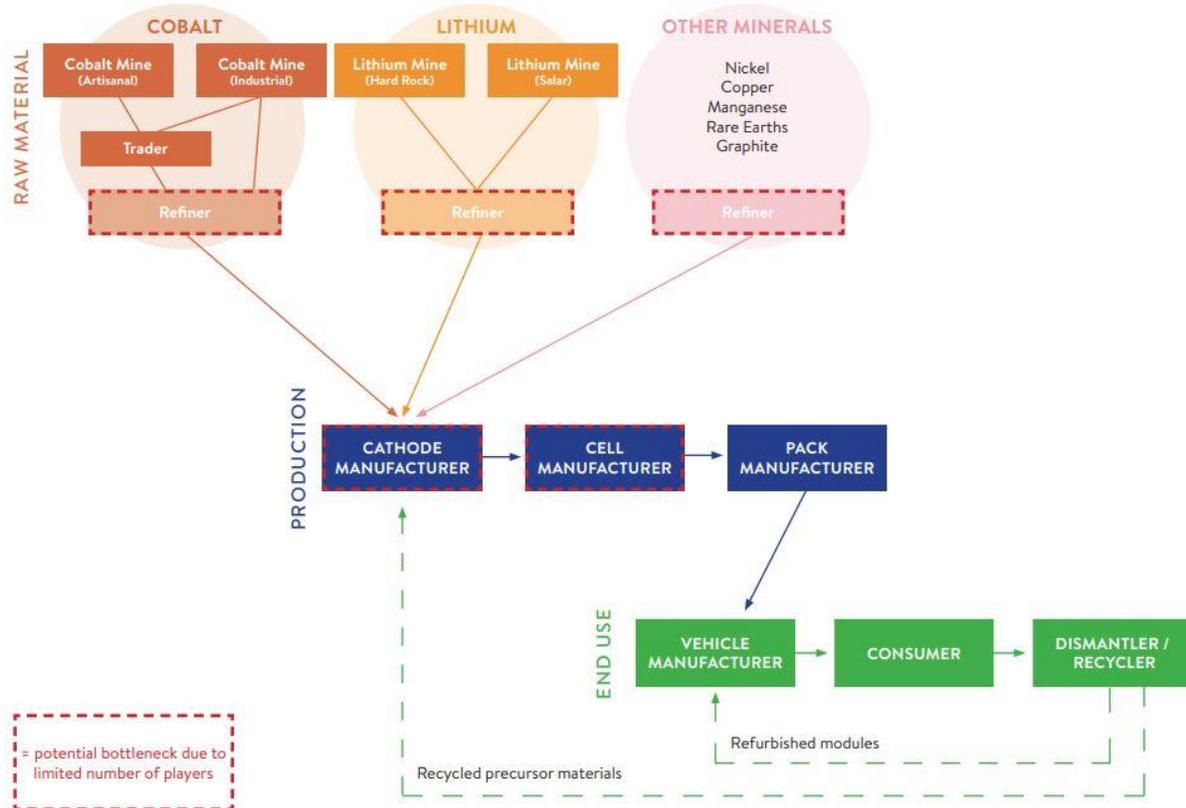
China has invested heavily in both the DRC and LTCs in an effort to control the supply chain for electric vehicles. Not only does China own a sizable number of mines in the DRC, but they are now investing in mines in the lithium triangle countries. China-owned lithium extraction companies Tianqi Lithium & Jiangxi Ganfeng Lithium are both fully “vertically integrated”, meaning that the company takes part in each step of the manufacturing process from raw material extraction to production, and finally the “processing and sales of a wide range of high-quality lithium products” (Kalantzakos 2020, 7). China controls the raw materials needed for green technology, and “it has an even more dominant role in the processing and refining of critical minerals” (Bordoff & O’Sullivan 2022, np) as well. These value-added companies and “their supply chains have been the beneficiary of substantial [Chinese] governmental support” (Graham et al 2021, 73).

To pursue the clean energy shift, in 2013 China developed and adopted the The Belt and Road Initiative (BRI), which “sets out to unite Eurasia and Africa and loop in South America into a seamless space of trade and high connectivity” (Kalantzakos 2020, 2). Because of China’s foresight and heavy investment into the “clean energy” sector, they are “at least a decade ahead of [sic] competitors” (Kalantzakos 2020, 5), given that the “lead time for a mine to be brought into operation requires at least a decade” (Kalantzakos 2020, 4).

China is now seeing the benefit of their BRI investments as “a 2020 World Bank report finds that production of lithium and cobalt may increase by 500 percent by 2050 to meet clean energy demand alone” (Kalantzakos 2020, 3). The demand for electric vehicles has recently vastly increased in America, but still “China has over 60% of the current global lithium refining capacity, followed by Chile with 26%. The United States has 3% of the global lithium refining capacity with two facilities” (U.S. Department of Energy (DOE) 2022, 19). China has also invested in the vertical integration of cobalt, as previously indicated: “About 90 percent of China’s cobalt originates in Congo, where Chinese firms dominate the mining industry” (Frankel & Chavez 2016, np).

Supply chain

WHAT DOES THE EV BATTERY SUPPLY CHAIN LOOK LIKE?



Source: Elkind, Ethan, Heller, Patrick & Lamm, Ted. "Building a Sustainable Supply Chain: Frequently Asked Questions" Natural Resource Governance Institute & Berkeley Law Center for Law, Energy & the Environment. April 2020.

This paper has demonstrated the dominance that China has over the green energy transition, and the lithium-ion battery supply chain specifically. Each step of the supply chain is examined below.

Mining

Congo DongFang Mining (CDM), a subsidiary of Huayou Cobalt, is one of the DRC's "largest mining companies, according to Congolese mining statistics. And CDM is by far Congo's top exporter of cobalt" (Frankel & Chavez 2016, np).

In response to child labor allegations at DRC mines, the president of Huayou Cobalt "told the Post that his company has never questioned how its minerals were obtained, despite operating in Congo and cities such as Kolwezi for decades [...] 'We didn't realize'" (Frankel & Chavez 2016, np). "Lithium-ion batteries were supposed to be different from the dirty, toxic technologies of the past. Lighter and packing more energy than conventional lead-acid batteries, these cobalt-rich batteries are seen as 'green'" (Frankel & Chavez 2016, np), but cobalt mining has

spoiled how clean it is by showing that a product can be good for the environment, but bad for the humans that produce it. Lithium extraction may well have the same effect.

Refining

CDM, one vertically integrated Chinese company, “ships its cobalt to its parent company, Huayou, in China where the ore is refined” (Frankel & Chavez 2016, np).

Parts Manufacturer

Following refinement, metals are shipped to cathode and anode makers, such as Hunan Shanshan, Pulead Technology Industry and L&F Material, who are “among Huayou’s largest customers” (Frankel & Chavez 2016, np) according to documents and interviews obtained by the Washington Post. The “plurality of global production of each of the key inputs to lithium-ion batteries: anodes, cathodes, electrolytes, and separators” can be attributed to Chinese companies (Graham et al 2021, 75).

Battery Maker

Samsung SDI, LG Chem and Contemporary Amperex Technology Ltd. (CATL) are well-known battery makers in the LIB supply chain (Frankel & Chavez 2016, np). The Guardian learned that “Chinese refineries supplied 85% of the world’s battery-ready cobalt” in 2020” (Pattison 2021, np) of which CATL “controls about 30% of the world’s EV battery market” (Pattison 2021, np).

The Washington Post found that “LG Chem, the world’s largest supplier of electric-car batteries” purchases cathodes from L&F Material, who sources their cobalt from Huayou. However, LG Chem indicated that “Huayou now supplies L&F Material with cobalt mined from the South Pacific Island of New Caledonia” instead of from the DRC (Frankel & Chavez 2016, np). A mineral analyst interviewed by the Post indicated that LG Chem would not be able to source from New Caledonia for long, since “LG Chem consumes more cobalt than the entire nation of New Caledonia produces” (Frankel & Chavez 2016, np).

Samsung SDI, another battery maker that provides their product to automaker BMW, among others, “said that its own ongoing investigation ‘has not shown any presence’ of suspect cobalt, although it does use cobalt from Congo” (Frankel & Chavez 2016, np).

Panasonic also manufactures car batteries, especially for Tesla. Panasonic “buys cobalt from Southeast Asia and Congo” (Frankel & Chavez 2016, np), though Tesla denied that the cobalt does not contain cobalt from DRC without indicating how they have this knowledge. (Frankel & Chavez 2016, np).

Car Manufacturer

The last step in the supply chain before going to market is the electric vehicle manufacturers.

Interestingly, “Tesla, more than any other automaker, has staked its reputation on ‘ethically sourcing’ every piece of its celebrated vehicle” (Frankel & Chavez 2016, np). Tesla recently explained that they have developed relationships directly with individual mines in an effort to keep an eye on the notorious labor issues common in cobalt mining. They have also released a list of mines with which they work (Lambert 2022, np).

The Post also interviewed Ford Motor who “said it has been told by LG Chem that Ford batteries have no history of CDM cobalt” (Frankel & Chavez 2016, np)

Amnesty International has linked the vehicle manufacturers that follow to child labor in the DRC: Daimler AG, Volkswagen, and Chinese company BYD (Amnesty International 2016, 9).

Pete Pattison and The Guardian have linked the following companies to child labor in the DRC: “Renault and Daimler, the parent company of Mercedes-Benz, name CDM among their suppliers” (Pattison 2021, np). Pattison verified links to Volkswagen, and additionally connected Tesla and Volvo to DRC child mined cobalt. (Pattison 2021, np).

It is not difficult to see how easily the illicit economy (labor exploitation and child labor) is seamlessly incorporated into the legitimate economy.

Labor Conditions, General and Specific

The scope of forced labor in China is unclear, partly due to the Chinese Communist Party’s tight control of information. But reports of forced student internships “in manufacturing industries - irrespective of the relevance of the industry for the students’ education” have come to light, in addition to reports of nonpayment of wages or significant wage deductions, payment of broker fees and the resulting debt bondage, the retention of identity documents and the lack of written terms or existence of terms that are not respected” (Bengsten 2018, np). Anita Chan documented “unsafe working conditions, brutally long hours, and involuntary confinement” in her 2001 report “China’s Workers Under Assault: The Exploitation of Labor in a Globalizing Economy” (Cooper 2001, np).

But Chinese authorities do not often act on forced labor allegations, despite forced labor having been outlawed in China (Bengsten 2018, np). Given that some of the forced labor in China is now state-sponsored, the failure of authorities to act on allegations is to be expected.

As reports such as the ones just mentioned surfaced in the early 2000s, transnational corporations with manufacturing plants located in China began to “introduce corporate codes of conduct into China as part of these companies’ strategic policies to secure the sale of their goods and services on the global market” (Ngai 2005, 102). Corporate codes of conduct outline the ethical standards of a company. The transnational companies are supposed to apply these standards to their own internal operations, as well as to any company from which they are sourcing. Typically, the code contains clauses stating, “that there should be no forced or bonded labor; no child labor; no discrimination in employment; adequate wages and benefits; limits against excessive hours of overtime work; no chemical or other hazards to safety and health; and a decent working environment” (Ngai 2005, 102).

But what good is having a corporate code of conduct if it will not be enforced either by the company or by the government? Ngai discovered that “no government departments, including the Labor Bureau, have seriously evaluated the corporate codes of conduct, assessed their influence on labor rights protection or monitored the process” (Ngai 2005 103) in his case studies. It seems clear, then, that company codes are indeed “public relations ploys” as critics suggest (Ngai 2005, 103-104). Sales appear to have been the motivating factor behind the introduction of corporate codes in Ngai’s case studies, as “the companies have demonstrated no genuine concern for labor rights, less still for workers’ representation or participation” (Ngai 2005 112). And since Ngai’s analysis of case studies that was conducted in 2005, the human

rights abuses in China have gotten worse, with the horrifying state-sponsored trafficking in Xinjiang.

According to the New York Times, “The U.S. State Department estimates that the Chinese government has detained more than one million people in Xinjiang in the last five years [...] under the guise of combatting terrorism” (Swanson 2022, np). At least some of the detainees are “forced or coerced into working in fields, factories and mines, in an attempt to subdue the population and bring about economic growth that the Chinese government sees as key to stability” (Swanson 2022, np). At a hearing in April 2022, various researchers and activists submitted “allegations of links to forced labor programs for Chinese manufacturers of gloves, aluminum, car batteries, hot sauce and other goods” (Swanson 2022, np) to the Biden administration.

A 2020 report by the Australian Strategic Policy Institute (ASPI) implicated the following companies involved in EV and automobile manufacturing in sourcing from the Xinjiang forced labor camps: BAIC Motor, BMW, Bosch, BYD, Changan Automobile, GAC Group, Geely Auto, General Motors, Jaguar Land Rover, LG, Mercedes-Benz, MG, Mitsubishi, Panasonic, SAIC Motor, Samsung, SGMW, and Volkswagen (Xu et al 2020, 27). A U.S. based company, Horizon Advisory, also released a report confirming the automotive companies’ links to Uyghur forced labor programs, and they further elaborate that “the concern centers around the production of aluminum, raising questions for another key industry about alleged human rights abuses in its supply chain” (Liu 2022, np).

It is nearly impossible to further investigate the forced labor camps in Xinjiang generally, and especially now that it has been uncovered, so “observers caution firms and others seeking to avoid complicity in forced labor against relying on auditing of supply chains in the XUAR given the impossibility of obtaining accurate information from the region” (U.S. CECC 2020, 7). The difficulties that exist in investigating supply chains in general, and specifically those supply chains intertwined with China shows how seamlessly products flow from the illegitimate economy (such as those goods produced utilizing forced or child labor) and into U.S. companies conducting licit trade.

Even outside of China’s border, abusive work conditions perpetrated by Chinese-owned companies has been uncovered: “Chinese national men in Africa, Europe and South America experience abuse in factories, at construction sites, in coal and copper mines, and in other extractive industries, where they face conditions indicative of forced labor, such as non-payment of wages, restrictions on movement, withholding of passports, and physical abuse” (U.S. DOS 2021, 179).

The effects of globalization are long-lasting and far-reaching. Just as the role of subcontracting contributes to increases in labor trafficking,

“The same principle applies when the supply chain is externalized and delocalized. Manufacturing corporations that import final or semi-final products from other companies located in other countries where labor costs are lower and where there is less enforcement may involuntarily become accomplices to trafficking for forced labor. While legal and well-reputed corporations may apply proper labor standards, those supplying services downstream may not. This mechanism is how trafficking in persons may infiltrate the globalized legal

economy.” -United Nations Office on Drugs and Crime, Global Report on Trafficking in Persons 2020, page 114.

AUTOMOTIVE INDUSTRY IN GENERAL

This paper’s exploration of the electric vehicle lithium-ion battery supply chain and subsequent criticism is not to say that gas-powered cars are free from human rights abuses. They are surely not. The more complex a product is, the more difficult it is to trace the supply chain, because every stakeholder must be investigated, so “depending on the number of actors involved, this process becomes complex” (Kister & Peyre 2016, 129).

In addition to automobile aluminum being linked to forced labor in Xinjiang, another example that was unearthed by doing a quick internet search shows that in 2016, The Guardian investigated the mineral mica, which is used in certain colors of paint on automobiles: “Some of the world’s biggest car makers including Vauxhall, BMW, Volkswagen and Audi are launching investigations into their paint supply chains after the Guardian linked their suppliers to illegal mines in India where child labor and debt bondage are widespread” (Bengsten & Kelly 2016, np). It would not surprise this author if additional parts of gas-powered automobiles were also linked to several types of labor exploitation and/or human trafficking.

The World Benchmarking Alliance published a Corporate Human Rights Benchmark (CHRB) Report in 2020, whose purpose was to “assess the human rights disclosures of 230 global companies across five sectors” (World Benchmarking Alliance 2020, np), including the automotive industry for the first time. The findings of the CHRB Report in relation to the auto industry are disturbing: “Two thirds of companies scored 0 across all areas of human rights due diligence” (World Benchmarking Alliance 2020, np). Additionally, the report notes that “nine out of ten automotive companies failed to set core expectations through contractual arrangements with suppliers for risks such as forced labor and child labor, and only one mapped its direct and indirect suppliers for major components” (World Benchmarking Alliance 2020, np).

One other important fact to consider regarding cars powered by fossil fuels: “fossil fuel exploration and extraction has also been associated with some of the most severe problems of human rights abuse, conflict, and corruption in the world” (Elkind et al 2020, 10). As mentioned in the introduction, “the sector with the highest incidence of corruption was oil and gas, at 63 percent” (Elkind et al 2020, 10).

SOLUTIONS

For the electric vehicle industry to truly be considered sustainable, “the human rights and governance challenges” present in the supply chain must be addressed “while looking for win-win solutions that bolster global supply and promote development within the producer countries” (Elkind et al 2020, 10).

Therefore, the following recommendations are suggested as potential steps towards a solution, though no one recommendation will fix the entire system. To fix the problem of labor

exploitation in the electric vehicle supply chain, a multi-stakeholder approach is necessary. The guidance is laid out below by each stakeholder.

World Governments

- Enforce existing (or create new) Extractive Industries Transparency Initiatives, such as the one in the UK
- Examine supply chains and enforce due diligence of companies involved in concerning situations
- Pressure “the Chinese government to end the use and facilitation of Uyghur forced labor and mass extrajudicial detention, including through the use of targeted sanctions on senior officials responsible for Xinjiang’s coercive labor transfers” (Xu et al 2020, 15)
- Require “the assessment and reporting of Environmental, Social and Governance considerations and risks”, as the EU does (Salaheldin & Larkin 2022, np)
- Ban goods produced with forced or child labor from entering the country
- Produce (or continue to produce) a list of goods produced by child labor and forced labor
- Introduce a Transparency Initiative similar to the one in the UK “which proposed that governments should publish reports showing their income from resource development and that companies should report all taxes and fees paid to governments. The key idea behind the EITI was to reduce “the corruption, conflict, and environmental degradation” inherent to the extractive industries sector while promoting ‘wise management’ of the resource” (Jacka 2018, 65)
- Investigate global supply chains and take necessary action when wrongdoing is found
- Pressure the DRC and other developing countries to regulate mining

U.S. Government

- Require “the assessment and reporting of Environmental, Social and Governance considerations and risks”, as the EU does (Salaheldin & Larkin 2022, np)
- Continue to produce the *List of Goods Produced by Child Labor and Forced Labor*
- Expand and incentivize the manufacturing of EV batteries and electric vehicles in the United States: “Congress is considering a tax credit that would favor companies that manufacture electric vehicles in the US with union labor” (Bordoff & O’Sullivan 2022, np)
- Continue to enforce the Uyghur Forced Labor Prevention Act, which “bans all goods made in Xinjiang or with ties to certain entities or programs that are under sanctions and transept minority workers to job sites, unless the importer can demonstrate the to US government that its supply chains are free of forced labor” (Swanson 2022, np)
- Enforcement of the Dodd-Frank Act
- Introduce a Transparency Initiative similar to the one in the UK “which proposed that governments should publish reports showing their income from resource development and that companies should report all taxes and fees paid to governments. The key idea behind the EITI

was to reduce “the corruption, conflict, and environmental degradation” inherent to the extractive industries sector while promoting ‘wise management’ of the resource” (Jacka 2018, 65)

- Provide training to border agents about fake records, and then enforce confiscation of fraudulent paperwork and goods

- “Counteract China’s dominance of the supply chain” (Graham et al 2021, 79) through ensuring the United States has access to the EV battery supply chain and its materials via diplomacy and development both at home and abroad.

- Pressure the DRC and other developing countries to regulate mining

- Add cobalt to the list of minerals that must be proven as free of child labor and forced labor. If it does not qualify as a “conflict mineral,” then it needs to be categorized as something else, but it should not be allowed to enter the United States. This will encourage China and the DRC to address the problem.

- Expand the efforts “to prevent illicit financial flows involving other countries as well, reducing the amount of revenue that African countries lose owing to tax havens” (French 2015, np)

- Investigate global supply chains and take necessary action when wrongdoing is found

Corporations

- Create and enforce Company Codes of Conduct, which apply to internal practices as well as sourcing practices

- Adopt Corporate Social Responsibility measures and take them seriously. Transform your bottom line “into ‘the triple bottom line’: profit, people, and the planet. In this new formulation, economic growth had to be balanced with an awareness of the environmental damages and social disruptions that mining often produce” (Jacka 2018, 65)

- Hire a consultant firm to perform due diligence of the supply chain and provide training to employees (Buratovic et al 2017, np)

- Be transparent. Be responsible. Stop greenwashing and being opaque about the supply chain.

- Take part in initiatives such as Cobalt for Development, which “solicits local input to ensure sustainability and enhance local ownership” and increases “access to education and holding workshops on topics ranging from bread-making to women’s rights, positive parenting, and conflict resolution” (Lawson 2021, np) (Author’s Note: The success of such initiatives remains to be seen.)

- Conduct due diligence of global supply chains

- Take remedial action when harm has occurred (Xu et al 2020, 15)

- End contracts with companies that utilize forced labor

- Research, develop and utilize recycling for EV batteries (and anything else that can be)

-Consider Fair Trade Certifications, which Kister & Peyre suggest applying to minerals (Kister & Peyre 2016, 140)

-Continue to research and develop alternatives to utilizing cobalt in lithium-ion batteries

NGOs

-Create fair trade certification standards for minerals

-“Push brands to be more transparent about the makeup of their supply chains” (Xu et al 2020, 14-16)

-Stipulate that companies create and/or uphold existing commitments “to not use forced and coerced labor in their global supply chains and that they act quickly and publicly when such cases are identified” (Xu et al 2020, 14-16)

-Demand due diligence from companies where there is a particular risk of forced labor practices such as China and DRC, as well as in certain sectors such as mining & manufacturing

-Conduct more supply chain research into the EV industry and the automotive sector in general

Media

-Conduct more supply chain research into the EV industry and the automotive sector in general, name and shame those who are uncovered as having unethical labor practices.

Individuals

-Seek increased awareness

-Realize the unappreciated costs that may present in the supply chain of products purchased

-Be prepared to pay more for electronics and EVs, as changes and improvements to the labor system and supply chains of these items are improved over time

-Believe that fairer conditions can be achieved and are necessary (Kister & Peyre 2016, 141)

-Realize that what you perceive to be ‘fair’ might not be what producers view to be ‘fair’, and that you may not have all the information (Kister & Peyre 2016, 133)

-Support companies with clean and fair labor records

-Demand due diligence, especially from companies operating where there is a particular risk of forced labor practices such as China and DRC (as well as in certain sectors such as mining & manufacturing)

-“Push brands to be more transparent about the make-up of their supply chains and the preventative measures they have put in place to ensure forced labor does not occur” (Xu et al 2020, 14-16)

-Stipulate that companies create and/or uphold existing commitments “to not use forced and coerced labor in their global supply chains and that they act quickly and publicly when such cases are identified” (Xu et al 2020, 14-16)

Individuals would do well to remember that when goods are surprisingly cheap, it may be a sign that costs are being externalized - in other words, that someone could be being taken advantage of, or even enslaved.

And lastly, individuals can spread the word about labor exploitation and abuse in the world’s supply chains. If individuals speak up, it could “affect conditions further down the chain if there are problems associated with the material” (Buratovic et al 2017, np).

Any company that is involved with metal refining and the downstream corporations in the supply chain must conduct due diligence and be willing to share the results (Amnesty International 2016, 9). Dummett notes that Apple was the first company to be transparent about their cobalt suppliers and asks, “Which carmaker will win the race to do likewise?” (Dummett 2017, np).

For the electric vehicle industry, transparency is the way forward.

CONCLUSION

It is imperative that citizens and corporations of Western, more developed nations consider the impact of their actions on a global scale. We, as purchasers of products, need to question our values: Is cheaper always better? Is “cheap” the most important value?

We cannot afford to continue our neglect of the 24.9 million human beings “trapped in forced labor” worldwide (ILO 2022, np). We cannot and should not continue to produce goods “at the expense of livelihoods of marginalized people in the Global South” (Anlauf 2018, 175).

The Global North needs to come to terms with the following idea of a necessary shift in our thinking, as “a shift from fossil fueled to electric cars still relies on the exclusive access to (strategic) resources. Based on a green economy strategy and corresponding regulation, societal nature relations are moving away from the dependence on fossil fuels and becoming ‘greener’. *However, there is no significant alteration in the patterns of production and consumption...*” (Anlauf 2018,176) (emphasis mine). Consumption, by its nature, is not a green way of living. Materialism will not solve the climate crisis, and on top of that, often contributes to human rights issues: “The climate crisis [...] is already threatening human rights around the world. Similarly, any action taken to achieve a net zero-carbon economy, without consideration for human rights, will only exacerbate existing inequalities and increase the potential for exploitation of already vulnerable groups” (World Benchmarking Alliance 2020, np).

The climate crisis is not a separate issue from the human rights crisis our world faces. Therefore, when pondering the sustainability of a product, consumers should expand their awareness of production methods, and always factor in whether they truly need the items. We can and should be able to make decisions not only based on environmental factors, but with consideration for the implications on our fellow humans as well.

Bibliography

Agusdinata, Datu Buyung; Liu, Wenjuan; Eakin, Hallie; and Romero, Hugo. Socio-environmental impacts of lithium mineral extraction: towards a research agenda. *Environmental Research Letters* 13 123001. November 27, 2018.

Amnesty International. Electric cars: Running on child labor? September 30, 2016. <https://www.amnesty.org/en/latest/news/2016/09/electric-cars-running-on-child-labour/> Accessed January 28, 2022.

Amnesty International. This is What We Die For: Human Rights Abuses in the Democratic Republic of the Congo power the Global Trade in Cobalt. 2016.

Anlauf, Axel. Greening the imperial mode of living? Socio-ecological (in)justice, electromobility, and lithium mining in Argentina. *Annual Review of Anthropology*, Volume 47, 2018.

Bengsten, Peter. China's Forced Labor Problem. *The Diplomat*. March 21, 2018.

Bengsten, Peter and Kelly, Annie. Vauxhall and BMW among car firms linked to child labour over glittery mica paint. *The Guardian*. July 28, 2016.

<https://www.theguardian.com/global-development/2016/jul/28/vauxhall-bmw-car-firms-linked-child-labour-mica> Accessed May 15, 2022.

Bordoff, Jason and O'Sullivan Meghan L. Green Upheaval: The New Geopolitics of Energy. *Foreign Affairs*. January/February 2022.

Brown, Sophia. Heavy Competition for the Lightest Metals. *The Wilson Center*. October 15, 2021.

Buratovic, Emma, Cocalic Dervis, Danestig Matilda, Eliasson Kasper, Everlid, Linus. *Controversial Minerals: Ethical issues in the production of mineral based raw materials*. Uppsala Universitet. June 2017.

Business & Human Rights Resource Centre. South America Deep Dive. March 2021.

Castelvecchi, Davide. Electric Cars and Batteries: How Will the World Produce Enough? *Nature (London)* 596, no. 7872 (2021): 336–339.

Cooper, Richard. Capsule Review: China's Workers Under Assault: The Exploitation of Labor in a Globalizing Economy. *Foreign Affairs*. November 2001.

Dummett, Mark. The Dark Side of Electric Cars: Exploitative Labor Practices. *Time Magazine*. September 29, 2017. Accessed January 27, 2022.

Elkind, Ethan, Heller, Patrick & Lamm, Ted. Building a Sustainable Supply Chain: Frequently Asked Questions. *Natural Resource Governance Institute & Berkeley Law Center for Law, Energy & the Environment*. April 2020.

Frankel, Todd C. & Chavez, Michael Robinson. The Cobalt Pipeline. *The Washington Post*. October 2, 2016.

French, Howard W. Review Essay - The Plunder of Africa: How Everybody Holds the Continent Back. *Foreign Affairs*. July/August 2015.

Global Witness. Renewable Energy at What Cost? December 2021.

Graham, John D., Belton, Keith B, and Xia, Suri. How China Beat the US in Electric Vehicle Manufacturing. *Issues in Science and Technology*. Winter 2021.

Griffiths, James & York, Geoffrey. How China is using Congolese minerals to Dominate the Global EV Market. *The Globe and Mail*. Toronto, Ontario. November 1, 2021.

Hilson, Gavin; Hilson, Abigail; Maconachie, Roy; McQuiklen, James; & Goumandakoye, Halima. Artisanal and Small-scale mining (ASM) in the sub-Saharan Africa: Reconceptualizing formalization and 'illegal' activity. *Geoforum* 83 (2017) 80-90.

International Labor Organization. ILO Monitor: COVID-19 and the world of work. April 7, 2020.

International Labor Organization. Topics: Forced labour, modern slavery and human trafficking. 2022. <https://www.ilo.org/global/topics/forced-labour/> Accessed May 15, 2022.

Jacka, Jerry K. The Anthropology of Mining: The Social and Environmental Impacts of Resource Extraction in the Mineral Age. *Annual Review of Anthropology* Issue 47: 61-77. 2018.

Jiaying, Chen, Sun Hu, Wang Zhe, and Wang Yan. An Analysis of Income Components of Rural Households in Xinjiang, China. *Outlook on agriculture* 41, no. 3 (2012): 163–169.

Kalantzakos, Sophia. The Race for Critical Minerals in an Era of Geopolitical Realignments. *The International Spectator*. 2020 Vol 55 No 3 1-16.

Kister, Jutta & Peyre, Fernando Ruiz. Increasing fairness in global value chains? Possibilities and limitations of fair-trade standards for the agricultural and mineral sector. *Fairness and Justice in Natural Resource Politics*. Routledge, August 5, 2016.

Lambert, Fred. Tesla explains its approach to sourcing lithium, nickel and cobalt directly from mines in impressive detail. *Electrek*. May 9, 2022. <https://electrek.co/2022/05/09/tesla-sourcing-lithium-nickel-cobalt-directly-mines-details/> Accessed May 16, 2022.

Lawson, Michele Fabiola. The DRC Mining Industry: Child Labor and Formalization of Small-Scale Mining. *The Wilson Center*. September 1, 2021.

Liu, Lucille. China Call Charges Carmakers Have Ties to Forced Labor 'Smears'. *Bloomberg News*. April 11, 2022. Accessed April 20, 2022.

Ngai, Pun. Global Production, Company Codes of Conduct, and Labor Conditions in China: A Case Study of Two Factories. *The China Journal*, No. 54, July 2005.

OECD Rural Policy Reviews: China 2009. Paris: OECD Publishing, 2009.

Pattison, Pete & Firdaus, Febriana. 'Battery arms race': how China has monopolized the electric vehicle industry. *The Guardian*. November 25, 2021. Accessed May 1, 2022.

Pattison, Pete. 'Like slave and master': DRC Miners Toil for 30P an hour to fuel electric cars. *The Guardian*. November 8, 2021. Accessed May 1, 2022.

Picarsic, Nathan. Risky business: the hidden costs of EV battery raw materials. *Automotive World Magazine*. November 23, 2020.

Revette, Anne C. This time it's different: lithium extraction, cultural politics and development in Bolivia. *Third World Quarterly*, 2017. Vol 38. No 1. 149-168.

Salaheldin, Maram T. & Larkin, Patrick J. Clark Hill 2022 Automotive & Manufacturing Industry Outlook: ESG. February 1, 2022. <https://www.clarkhill.com/news-events/news/clark-hill-2022-automotive-manufacturing-industry-outlook-esg/> Accessed May 15, 2022.

Shelley, Louise I. *Dark Commerce: How a New Illicit Economy Is Threatening Our Future*. Princeton, New Jersey: Princeton University Press, 2018.

Shelley, Louise I. *Human Trafficking a Global Perspective*. New York: Cambridge University Press, 2010.

Sovacool, Benjamin K. When subterranean slavery supports sustainability transitions? Power, patriarchy, and child labor in artisanal Congolese mining. *Extractive Industries and Society* 8, 271-293. 2021.

Squazzin, Antony. Glencore Rights Record Worst in Green Metals, Group Says. *Bloomberg News*. May 4, 2022. <https://www.bloomberg.com/news/articles/2022-05-04/glencore-human-rights-record-worst-in-green-metals-group-says> Accessed May 15, 2022.

Swanson, Ana. Supply Chains Widely Affected by Forced Labor in China, Panel is Told. *NY Times*. April 8, 2022. Accessed May 1, 2022.

Transition Minerals Tracker: Global Analysis of Human Rights Policies and Practices. *Business & Human Rights Resource Centre*. 2021.

Transparency International. *Corruption Perceptions Index*. 2021. <https://www.transparency.org/en/cpi/2021/index/cod> Accessed May 15, 2022.

U.S. Congressional-Executive Commission on China (CECC). *Global Supply Chains, Forced Labor, and the Xinjiang Uyghur Autonomous Region*. March 2020.

U.S. Department of Energy (DOE). *Grid Energy Storage: Supply Chain Deep Dive Assessment*. February 24, 2022.

U.S. Department of Energy (DOE). *Reducing Reliance on Cobalt for Lithium-ion Batteries*. Office of Energy Efficiency & Renewable Energy. Vehicle Technologies Office. April 6, 2021.

U.S. Department of Homeland Security (DHS). U.S. Immigrations and Customs Enforcement. "What is Human Trafficking?" March 11, 2022. <https://www.ice.gov/features/human-trafficking> Accessed May 16, 2022.

U.S. Department of the Interior (DOI). *Cobalt*. U.S. Geological Survey. Mineral Commodity Summaries. January 2022.

U.S. Department of the Interior (DOI). Final List of Critical Minerals. U.S. Geological Survey. Federal Register. February 24, 2022.

U.S. Department of Labor (DOL). List of Goods Produced by Child Labor or Forced Labor. June 23, 2021.

United Nations Office on Drugs and Crime (UNODC). Global Report on Trafficking in Persons. 2020.

Vasquez, Patricia I. The Lithium Triangle: The Case for Post-Pandemic Optimism. The Wilson Center. October 2020.

Wiechman, Michele. What's In a Hybrid Car? Fact Sheet. Society for Mining, Metallurgy & Exploration & Minerals Education Coalition. 2010.

World Benchmarking Alliance. Automotive Manufacturing. 2020.

Xu, Vicky Xiuzhong; Cave, Danielle; Leibold, James; Munro, Kelsey; & Ruser, Nathan. Uyghurs for sale: reeducation, forced labor, and surveillance beyond Xinjiang. Australian Strategic Policy Institute. Canberra, Australia. 2020.