



TU: Electives 2

Social Sciences and Human Context in the Elaboration of Energy Policies

Cobalt Mining and the Green Energy Revolution

Case of the Democratic Republic of Congo

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MOTIVATIONS

The role of cobalt in the green energy revolution

As the world races to find innovative and green energy technologies to combat climate change, its appetite for cobalt is only growing. Driven by a boom for its metallurgical and battery applications, the demand for cobalt has resulted in a positive and exponential growth. In order to reduce our dependence on fossil fuels, there is the need to make our renewable energy controllable and flexible, and energy storage is the best solution since renewable sources are intermittent¹. The use of cobalt in batteries is very essential in the production of various things portables such as laptops, computers, and tablets, which are all powered by lithium-ion batteries². Cobalt's unique properties in lithium-ion batteries make it possible to also power electric vehicles and store energy from solar, wind, and other renewable sources. Due to the increase in the production of batteries to meet the needs of consumer electronics, and electric buses, the demand for cobalt is set to rise worldwide as shown in the figure below³.

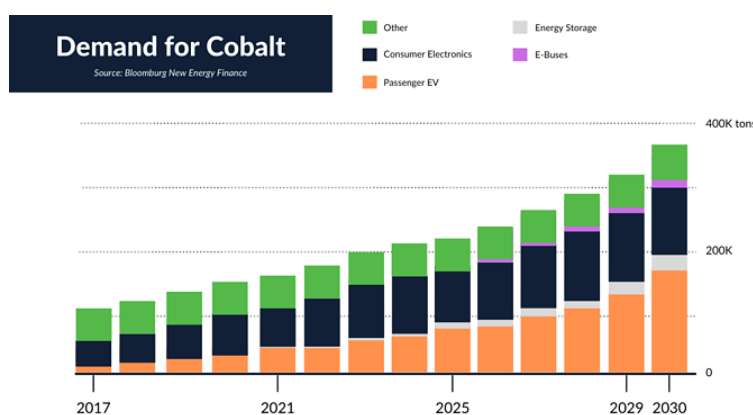


Figure 1. Demand of Cobalt worldwide

The role of cobalt in a battery

For us to understand the role of cobalt in a lithium-ion battery it requires a little bit of electrochemistry. A battery is simply made of a cathode, anode, and electrolyte. Cobalt accounts for 55 percent share of the Lithium Cobaltate cathode according to the statista⁴. The cathode helps store lithium ions as it is the place where lithium ions come from when the battery charged. In other terms, the role of cobalt improves the structure of the cell during electrochemical intercalation (charging and discharging) of the battery cell. The choice of selected cathode makes a big difference in the lifespan of lithium-ion batteries. A cobalt-enhanced cathode keeps the structure firm for a longer period of time and allows the battery to be useful for years to decades⁵. Also, lithium-ion battery uses cobalt in order to have a higher energy density. That is, it allows for the storage of a large amount of energy in a very small space, and it also releases a large amount

¹ Dalhousie University blog (Why we need to store renewable energy): <https://tinyurl.com/25yehre8>

² <https://fresh-energy.org/whats-up-with-the-cobalt-used-in-ev-batteries>

³ Source Intelligence blog (Could Cobalt be a conflict mineral): <https://tinyurl.com/327uukcj>

⁴ Cobalt composition share in selected lithium-ion battery cathodes as of 2017:

<https://www.statista.com/statistics/655948/composition-share-of-cobalt-in-lithium-ion-battery-cathodes/>

⁵ How Cobalt is Used in Lithium-Ion Batteries: <https://www.azomining.com/Article.aspx?ArticleID=1421>

of electricity when needed, making it possible to power big engines such as Tesla vehicles⁶. These features make cobalt a great deal in the battery industry. And a great boon of the green energy revolution!

The role of the Democratic Republic of Congo

One cannot discuss the role of cobalt in the green revolution without referring to the Democratic Republic of the Congo (DRC). DR Congo is the second-largest country in Africa and shares one of the longest land borders with nine countries and with a population of 105 million⁷. It is considered as the world's wealthiest country with regards to natural resource reserves⁸. DR Congo is blessed with rich mineral resources such as cobalt, gold, diamond, and copper. Currently, it contributes about 70% of the world's cobalt production shown in Figure 2. Published in March 2022, according to Statista, DR Congo is still leading in the worldwide cobalt production having produced an estimated 120,000 metric tons in 2021, as shown in figure 3.

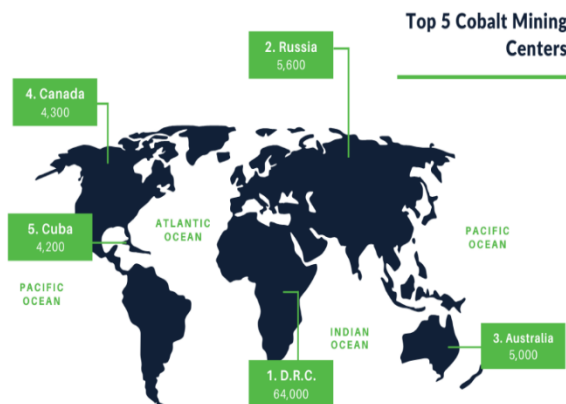


Figure 2⁹. Top 5 Cobalt Mining Centers

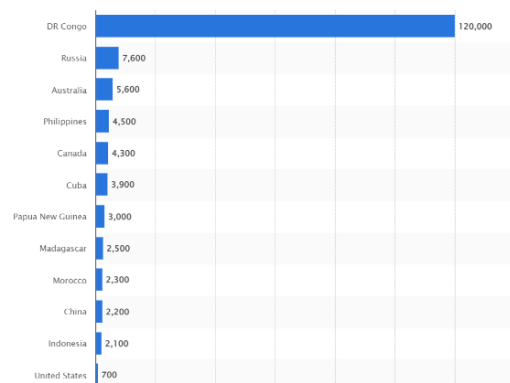


Figure 3¹⁰. Production of Cobalt per Country

⁶ Batteries: Why Does Cobalt Matter: <https://tinyurl.com/2p8zj5je>

⁷ Cue Africa Blogspot (Cobalt mining in Congo): <https://tinyurl.com/2p8rae4w>

⁸ <https://afrikta.com/biggest-natural-resources-in-congo-drc/>

⁹ <https://www.statista.com/statistics/264928/cobalt-mine-production-by-country/>

¹⁰ Could Cobalt Be A New Conflict Mineral? (sourceintelligence.com)

Adverse impact on Congo

Although DR Congo is considered as the world's richest country in terms of natural resources, it still struggles in its economy. Its resources are estimated to be about 24 trillion dollars in natural minerals - which is equivalent to the (GDP) Europe, and the United States combined¹¹, yet it is consistently rated lowest on the UN Human Development Index¹². Also, we plotted a graph to compare the GDP of various other countries that also produce cobalt. Results in Figure 4 showed Congo is ranked least in GDP per capita, lower than countries such as Morocco and Chad (both of which are African countries).

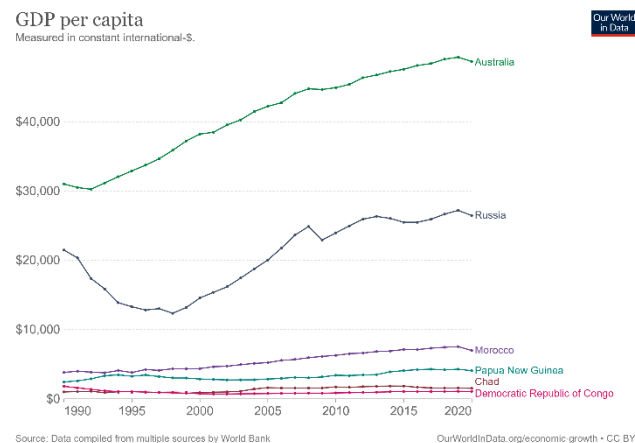


Figure 4. Congo's GDP per capita compared to some other African countries

Aside Congo's economic struggles, the extraction of the world's savior, cobalt, also comes along with a hefty human, social, environmental, and public governance concerns. This has raised and drawn international attention as world powers such as Apple, Samsung, Sony, and Volkswagen, among others struggle to take dominion over cobalt¹³. The process of extraction of this precious mineral has led to serious and major human risks through labor exploitation and child labor¹⁴. Observers worldwide agree that Congo should have been in a better place economically with endorsed resources; in the subsequent paragraphs, we explore more the reasons that most likely hindered its development.

THE INVESTIGATION

In this section, we adopt an analytical approach to understand the current state of DR Congo (DRC) as a result of cobalt mining. Also, we will examine different viewpoints in an attempt to investigate the possible factors that have led the country to this point; and finally discuss the controversies and opposing opinions related to the case.

¹¹ DR Congo: Richest Country in Resources Yet Poorest Country in the World (swaliafrica.com)]

¹² BBC news Magazine (DR Congo: Cursed by its natural wealth): <https://www.bbc.com/news/magazine-24396390>

¹³ <https://www.benchmarkminerals.com/cobalt-brings-tech-giants-supply-chains-into-the-spotlight/>

¹⁴ Cue Africa Blogspot (Cobalt mining in Congo): <https://tinyurl.com/2p8rae4w>

Historical Viewpoint

In a bid to get informed insights about DRC's current state in relation to cobalt mining, we start at the genesis of the country and observe its development through the years from its pre-colonial/colonial era till independence.

Precolonial – Colonial Era & Precedent for exploitation of DRC resources

From the 15th to the 17th century during the pre-colonial era of the Congolese society, the political institutions in place were mainly those of symbolic kingship and military force. Power chain flow was from the capital to the outlying areas through appointed chief or local clan heads¹⁵. This early set up of governance experienced major disruptions due to competition for kingship and the advent of the Atlantic slave trade. The two most important regions (Kongo kingdom in the west) and (Luba-Lunda in the east) competition for supremacy led to civil strife, and with the rise of slave trade, this led to fragmentation of the region which undermined their resistance to the colonial conquest of the Europeans.

In the wake of the colonial conquest by the Europeans, King Leopold II of Belgium, developed a personal agenda to control the region. His colonial ambitions paved way for the Berlin West Africa Conference (1884 – 1885) to set the rules for colonial conquest and establish his control over the region to be known as the Congo Free State (1885 – 1908). Under Leopold II's rule of the state, the region suffered several casualties mainly due to the brutal exploitation for rubber: with a book by Adam Hochschild¹⁶ estimating the numbers of death up to 10 million deaths during this period. The sources we have consulted believe that it is the façade of King Leopold II's African International Association's humanitarian mission which claimed to end slavery and bring religion and the perks of modern life to the Congolese people that made his atrocities go under checked for a long time.

However, intense criticism from international bodies after some missionaries exposed some of the happenings in the free state forced the Belgian parliament to take control of the region from Leopold II in 1908. However, the precedent of unfair exploitation of the country's resources had been set and the widespread social disruption by the regime made it difficult to establish a stable system of governance in the region.

DRC's Fight for Independence & Civil unrest that followed

This development is at the root of the anti-western sentiment harbored by the different regions in the Congolese state and on which subsequent generations exploited in further civil unrests. Even though the switch of power from Leopold II to the official Belgian government reduced the brutal aspects of the free state, the Belgian rule remain largely unreceptive to political reforms. The colonial rule still had a tendency for firm commitment to total political control above political education of the Congolese people. Therefore, when tensions started to rise among the different factions in their push for independence, the Belgian government had to give up power in June 1960 in an abrupt fashion due to the level of intensity of turbulence caused by these factions. This abrupt concession of power to grant DRC their independence meant the lack of proper structure in the

¹⁵ <https://www.britannica.com/place/Democratic-Republic-of-the-Congo/History>

¹⁶ Hochschild, A. (2006). King Leopold's Ghost: A Story of Greed, Terror, and Heroism in Colonial Africa. pp. 225–33. ISBN 978-1-74329-160-3.

political space would lead to series of civil unrests within Congo. The instability in the region prompted the intervention of the United Nations (UN) for peacekeeping missions, however these interventions have not enjoyed much success. This situation has led to the emergence of over 120 different armed groups in the country in a bid to provide security for the region¹⁷.

After independence, one of DRC prominent regions, Katanga (a southernmost province) was the center of attraction for control by the cold war powers. This was because the region possessed vast amount of resources and minerals. Most important amongst them was uranium, the jostle for control over the region led to period of market instability for cobalt and other critical industrial metals at that time. Sources argue that the country's leader at the time (Mobutu Sese Seko) and other political elites sustained themselves by diverting state's profit from these mineral mines.¹⁸

This trend persisted with the different changes in government as the political elites aimed to remain in power by funding their war by selling the state-owned mines to foreigners in controversial deals. This mismanagement of DRC's mining industry could be a pointer to explain the country's situation.

Corruption

In the subsequent section, we argue that corruption represents both a cause of Congo's mismanagement of its mining sector and a consequence of its notorious weak governance. Furthermore, we find it necessary to divide Congo's 62 years of independence into two waves of corruption: the first wave (1960 - 1997) starting from the independence until the fall of the dictator Mobutu Sese Seko and the second wave (2000+) still ongoing as of today. We, therefore, propose to discuss these two waves of corruption and their consequences for the DRC.

The first wave of corruption

The external debt of Congo amounted to roughly US \$14 bn under the reign of the dictator Mobutu Sese Seko (1965 – 1997). During that same period, the well-being and living standards of most of the Congolese people deteriorated continuously. According to World Bank's 1992 report, Congo's per capita income declined at an annual rate of 2.2% from 1965 to 1990. Additionally, the United Nations estimated that by the eighties, 70% of the country's population lived in absolute poverty¹⁹.

While the country's economic situation appears to be in free fall despite substantial loans and inflow of cash, Mobutu and his associates gained remarkable personal wealth; it is reported that, in the mid-eighties, Mobutu's own assets accumulated to US\$ 4 bn.

Following the downfall of Mobutu's regime in 1997, several foreign governments agreed to help Congo reclaim Mobutu's money. However, these efforts succeeded to retrieve only a minor

¹⁷ "Thousands Flee Across Congo's Borders After Violence in East Rages". Bloomberg. 30 January 2018. Retrieved 5 March 2018

¹⁸ <https://www.newyorker.com/magazine/2021/05/31/the-dark-side-of-congos-cobalt-rush>

¹⁹ Congo's Odious Debt: External Borrowing and Capital Flight in Zaire. Leonce Ndikumana and James K. Boyce. Development and Change, 1998

fraction of it. As a US administration official put it back in 1997 «*Our folks don't have a clue where it is*»²⁰.

During Mobutu's dictatorship, despite no sign of economic nor social progress, the international community kept increasing support for his regime. For instance, in 1981, IMF provided Zaire²¹ with the largest loan to an African country in that institution's history (around US\$ 1 bn). Furthermore, M. Guy Penne, French President Mitterrand's adviser on African Affairs, explained that «Zaire is the most important francophone country after France»²².

In 1982, Blumenthal (who investigated the misfortunes of DRC) wrote «*For what reasons did Western countries persist in awarding not only loans but also grants? Moral obligations? Speculation? Political considerations? Zaire, a bastion against communism in Central Africa? Overcome the contradictions of the North-South conflict? Probably a little of that?*» L. Ndikumana and J. Boyce also reinforced that idea in 1998 stating that «*for the Western powers, economic and social progress was not the primary objective in lending to Mobutu's Zaire. Rather, the overriding aim was the pursuit of National Security. Mobutu was valued as a cold-war ally in the heart of the African continent.*»²³

Beside its strategic role as an ally against the Soviet Union in the cold war, the western powers believed that establishing warm relationships with Mobutu would give them priority access to Congo's mineral wealth. As a matter of fact, foreign investors started to get attracted by the immense profit that mineral trading in the central African country promised. When Mobutu was forced to exile in 1997 by rebel forces led by Laurent-Desire Kabila (father of Joseph Kabila)²⁴, the impoverished average citizen of Congo still had to contribute to pay back the loans contracted by the wealthy and corrupt Mobutu clan. Observers inside and outside of Congo repeatedly emphasize the opportunity cost of these 32 years of Mobutu dictatorship on the economic development of the country.

Resulting consequences of the early corruption

DRC's long record of political instability, civil wars and rampant corruption largely portrayed the country as an unreliable partner. After the collapse of the Soviet Union, the downfall of Mobutu's regime and the advent of the new millennium, very few were the foreign investors willing to invest in DRC with the sole purpose of helping in the development of the country. Consequently, what follows is an unceasing pattern of multinational deals signed behind closed doors between ruthless and greedy foreign partners and corrupt Congolese government leaders with at the deals' center DRC's mineral wealth. In the following subsection, two sets of deal closed after 2000 (the so-

²⁰ Congo's Odious Debt: External Borrowing and Capital Flight in Zaire. Leonce Ndikumana and James K. Boyce. Development and Change, 1998

²¹ Zaire or the Republic of Zaire was the name of the currently called Democratic Republic of Congo between 1971 et 1997 <<https://fr.wikipedia.org/wiki/Zaire>>

²² Reported by Leonce Ndikumana and James K. Boyce in their study on Congo's Odious Debt (see footnote ²)

²³ Attempt made by Leonce Ndikumana and James K. Boyce in their study on Congo's Odious Debt to explain the continuous support of Western powers for the Mobutu's regime (see footnote ²)

²⁴ <https://en.wikipedia.org/wiki/Mobutu_Sese_Seko>

called *Second Wave of Corruption*) in which foreign interests have benefited from the country's wealth at the expense of the Congolese people are highlighted and discussed.

The second wave of corruption

Adieu Mobutu! However, year after year, Congo still ranks near the bottom of the Corruption Perceptions Index²⁵ published by Transparency International. DRC failed to break away from its corrupt past and liberate itself from private individuals looting the public funds. Among the numerous corruption schemes unveiled in the 2000s, we focus on two of the most famous ones “*The DRC Corruption Scheme*”²⁶ and “*The Deal of the Century*”²⁷ to highlight how much a curse the mineral wealth has been for the country.

The DRC Corruption Scheme

In 2002, the United Nations' Security Council appointed a Panel of Experts which published « *Report of the Panel of Experts on the Illegal Exploitation of Natural Resources and Other Forms of Wealth of the democratic Republic of Congo* » and identified corporations and unscrupulous businessmen helping to perpetuate conflict for control of Congo's vast natural resources and of profiteering from it. One of those businessmen of questionable standing named in the report was Israeli businessman Dan Gertler accused of having close ties with Joseph Kabila and monopolizing the diamond trade in exchange for money, weapons, and military training. Furthermore, the report clearly stated that « *these transactions, which are controlled through secret contracts and off-shore private companies, amount to a multi-billion-dollar corporate theft of the country's mineral assets.* »²⁸

An elaborate corruption scheme including Dan Gertler, Joseph Kabila and his advisor Katumba Mwanke, and the multi-billion New York hedge fund Och-Ziff (now renamed Sculptor) was thereby unveiled. It became clear that the Congolese government which voiced its will to put the mining sector in order following the legacy of wartime contracts was rather engaged in revoking mining companies' title to concession and sold the expropriated assets to Gertler who then resold them right after for much higher prices. In other cases, Gertler directly forced the original companies to renounce their assets and took over on advantageous terms. Some of losers of these « strip and flip » schemes include CAMEC (Central African Mining and Exploration Company), the Canadian companies Africo Resources and Quantum Minerals whereas one of those which benefitted is ENRC (London-listed Eurasian Natural Resources Corporation)²⁹. Additionally, the Africa Progress Panel assessing “*The DRC Corruption Scheme*” comments that « ...assets were sold at one-sixth of their estimated commercial market value. Assets valued in total at US\$1.63 bn

²⁵ <<https://www.transparency.org/en/cpi/2021/index/cod>>

²⁶ Term coined by US Department of Justice to refer to a series of DRC related corruption deals under investigation. Business, Corruption and Human Rights Violations, RAID 2020

²⁷ As dubbed by the news media to reference the bilateral deal signed in 2008 between Chinese companies and DR Congo

²⁸ Facts and quotes of this paragraph from the report titled “Business, Corruption and Human Rights Violations, RAID 2020” available at <

https://www.ohchr.org/sites/default/files/Documents/Issues/Business/2020Survey/Civil_society/RAID.pdf>

²⁹ As reported by “Business, Corruption and Human Rights Violations, RAID 2020”

were sold to offshore companies for US\$ 275 million. The beneficial ownership structure of the companies concerned is unknown.³⁰»

Countless allegations of corruption following these deals in DR Congo have prompted the US government to open investigations on New York hedge fund Och-Ziff (and its partners). In September 2016, the US authorities indicted the hedge fund Och-Ziff for violation of the Foreign Corrupt Practices Act (FCPA)³¹. The Court files show that Och-Ziff employees entered into agreements with Gertler to purchase shares in Congolese mining companies under his control. The Court further noted that Och-Ziff was fully aware that part of the funds would be used to bribe high ranking Congolese officials to pressure rival companies to give up their assets. More than \$ 100 million was paid in bribes in over 10 years³². Later in 2017, Gertler was hit by US Global Magnitsky Act³³ sanctions for being targeted as a corrupt actor « *who has amassed his fortune through hundreds of millions of dollars' worth of opaque and corrupt mining and oil deals using his close friendship with DRC President Joseph Kabila to act as a middleman for mining asset sales in the DRC* ». As part of the DRC Corruption Scheme, Glencore plc, Swiss-headquartered, London-listed mining and commodity giant and holding assets in DRC secured by Gertler, is currently being investigated by UK's Serious Fraud office (SFO) on suspicions of bribery. Glencore has also been subpoenaed by the US authorities under the FCPA³⁴.

Once more, we have observed the same pattern as in the Mobutu's days: a handful of western foreign actors in coalition with local political leaders looted the mineral wealth of the country at the expense of the average man of Congo living in extreme poverty.

The Deal of The Century

As of late 2021, Chinese interests own 15 of 17 cobalt operations in DR Congo. The main mining companies in the country are backed by Chinese state-owned banks' credit which amounts to US\$ 124 bn³⁵. This large dominance over the cobalt mining industry of DRC comes mainly from two deals: The Deal of the Century (2008) & the acquisition of the holdings of US Mining group Freeport-McMoran (2016). We will promptly detail the acquisitions made in 2016 to transition to “*The Deal of the Century*” since the latter relates more closely to our analysis.

1.- The Acquisition of the holdings of US Mining group Freeport-McMoran by Chinese interests

³⁰ Business, Corruption and Human Rights Violations, RAID 2020

³¹ Enacted in 1977 for the purpose of making it unlawful for certain classes of persons and entities to make payments to foreign government officials to assist in obtaining or retaining business. The anti-bribery provisions of the FCPA have applied to all U.S. persons and certain foreign issuers of securities. It also applies to foreign firms and persons who cause, directly or through agents, an act in furtherance of such a corrupt payment to take place within the territory of the United States. < <https://www.justice.gov/criminal-fraud/foreign-corrupt-practices-act>>

³² Business, Corruption and Human Rights Violations, RAID 2020

³³ Enacted in 2016 and authorizes the U.S. government to sanction foreign government officials worldwide who are deemed to be human rights offenders, freeze their assets, and ban them from entering the U.S. < https://en.wikipedia.org/wiki/Magnitsky_Act>

³⁴ Business, Corruption and Human Rights Violations, RAID 2020

³⁵ How China wrested control of the Congo's critical minerals. David Uren. The Strategist (2021) < <https://www.aspistrategist.org.au/how-china-wrested-control-of-the-congos-critical-minerals/> >

It is worth noting that the group Freeport-McMoran³⁶'s control over DRC's mineral resources dates back to 1960 when US's Richard Nixon administration decided to court DRC's rich mineral resources to prevent they come under the control of the Soviet Union. *The Strategist*³⁷ depicts a White House dinner in which Nixon hosted then-president of Congo Mobutu to conclude the deal. The mine under the control of the Freeport-McMoran group was abandoned for more than 20 years due to anti-government rebels shutting down the mines. In the 1990s, the operation restarted. However, following a Freeport's failed investment of US\$ 20 bn in the oil industry in 2012 (oil price collapsed in 2015), the company put its assets on the markets and, in 2016, China Molybdenum bought these assets for US\$ 2.65 bn and the remaining ones in 2020 for US\$ 500 million. Neither Obama nor Trump administrations weigh in to stop these deals. In fact, an Obama administration national security advisor even declared «*There's no one that's going to be interested in that.*»³⁸

2.- The Deal of the Century

At the center of this controversy is a deal signed secretly between two major Chinese construction companies (China Railway Group and Sinohydro) which agreed to "help rebuild and expand infrastructure in DRC, in return for a sizeable chunk of the country's mineral wealth"³⁹ and the Congolese national mining company Sicomin. Figure 2⁴⁰ shows the main highlights of the deal:

THE DEAL OF THE CENTURY		
WHAT THE CHINESE GET	vs	WHAT THE CONGOLESE GET
Privileged Access to Natural Resources		Infrastructure Works
Control of 70% of Congo's mining sector <ul style="list-style-type: none">- 6,813,370 tonnes of copper- 426,619 tonnes of cobalt- 372 metric tons of gold		<ul style="list-style-type: none">- 3 railways- 13 connecting roads- Road system in Kinshasa and other towns- 1 hospital in every province- 1 health center in every district- 2 universities- 5000 housing units
Total Profit: between \$39.7 and \$83.6 bn		Total Cost of These Investments: \$6.5bn

Figure 5: Comparison between the estimated profits of each party of the deal

It seems evident that the terms of the deal as displayed above are overly beneficial to the Chinese side. On top of that, the agreements allow the Chinese companies to continue exploitation until depletion of the concession and the said companies will be exempted from all possible taxes during first and second stages of the project. By doing so, the Congolese state surrenders around US\$1 billion in public revenues⁴¹.

³⁶ American mining company based in the Freeport-McMoRan Center, in Phoenix, Arizona

³⁷ How China wrested control of the Congo's critical minerals. David Uren. *The Strategist* (2021) <<https://www.aspistrategist.org.au/how-china-wrested-control-of-the-congos-critical-minerals/>>

³⁸ How China wrested control of the Congo's critical minerals. David Uren. *The Strategist* (2021) <<https://www.aspistrategist.org.au/how-china-wrested-control-of-the-congos-critical-minerals/>>

³⁹ The Backchannel. State Capture and Bribery in Congo's Deal of the Century. The Sentry. 2021 <<https://cdn.thesentry.org/wp-content/uploads/2021/11/TheBackchannel-TheSentry-Nov2021.pdf>>

⁴⁰ Stefaan Marysse and Sara Geenen (2009). Win-win or unequal exchange? The case of the Sino-Congolese cooperation agreements. *The Journal of Modern African Studies*, 47, pp 371-396 doi:10.1017/S0022278X09003978

⁴¹ Stefaan Marysse and Sara Geenen (2009). Win-win or unequal exchange? The case of the Sino-Congolese cooperation agreements. *The Journal of Modern African Studies*, 47, pp 371-396 doi:10.1017/S0022278X09003978

However, the “largest-ever leak of African financial records and data” called the *Congo Hold-up leak*⁴², reveals that the Chinese state companies colluded with Congolese officials to obtain the very lucrative deal in exchange for bribery and financial transactions directly with Congo’s president Joseph Kabila and his entourage. At the heart of this corruption scheme is the Congo Construction Company (CCC) whose intended role seemed to be the handling of public construction works in Congo with funds originated from the Chinese mining companies’ profit. Various sets of evidence have demonstrated that CCC through BGFIBank DRC (bank run by then-president Joseph Kabila’s brother) has funneled large amounts of money into the bank accounts of people



Figure 6. Reports on the corruption scheme by various media

very close to President Kabila. In its “The Backchannel: State Capture and Bribery in Congo’s Deal of the Century⁴³”, *The Sentry* mentions “...insufficient or inaccurate documentation to justify the transfers, companies with unclear ownership, intermediaries with conflicts of interest, and decisions made in secret with significant financial benefits for the provider of the illicit funds. This is a deal between state actors in the DRC and China, two countries known to have a high risk of corruption”. Figure 3 shows some reports on the corruption scheme by various media.^{44,45}

The ongoing controversies linked to the corruption schemes

By 2017, the Kabila family either partially or wholly owned more than 80 companies in the country and abroad and held 120 mining permits for cobalt and other minerals⁴⁶. In 2021, following the «Congo Hold-Up leak», a judicial inquiry has been opened by the prosecutor’s office at Congo’s Court of Cassation. Mr. Kabila and his family are accused of siphoning at least \$138 million from state funds⁴⁷. On the other hand, the communication office of the former president described the

⁴² The Backchannel. State Capture and Bribery in Congo’s Deal of the Century. The Sentry. 2021 <<https://cdn.thesentry.org/wp-content/uploads/2021/11/TheBackchannel-TheSentry-Nov2021.pdf>>

⁴³ The Backchannel. State Capture and Bribery in Congo’s Deal of the Century. The Sentry. 2021 <<https://cdn.thesentry.org/wp-content/uploads/2021/11/TheBackchannel-TheSentry-Nov2021.pdf>>

⁴⁴ The Backchannel. State Capture and Bribery in Congo’s Deal of the Century. The Sentry. 2021 <<https://cdn.thesentry.org/wp-content/uploads/2021/11/TheBackchannel-TheSentry-Nov2021.pdf>>

⁴⁵ How Chinese Cash Flowed to Congo’s Former First Family < >

⁴⁶ Business, Corruption and Human Rights Violations, RAID 2020

⁴⁷ DRC : Investigation opens on Joseph Kabila over \$138 million embezzlement. Redaction Africanews. 24 November <<https://www.africanews.com/2021/11/24/drc-investigation-opens-on-joseph-kabila-over-138-million-embezzlement/>>

investigation's findings as « Kabilabashing »⁴⁸ and an attempt to discredit the former president. Similar denials have also been made public from the Chinese side.

Conversely, organizations of the civil society such as the *African Resources Watch*⁴⁹ and the *Initiative pour la Transparence dans les Industries Extractives - RDC*⁵⁰ continue to pressure current Congolese President Joseph Tshisekedi to renegotiate the unbalanced deals and to launch criminal investigations against the Kabila clan and accomplices. In March 2022, at the current President Felix Tshisekedi's request, the DRC government has reached a compromise with previously mentioned businessman Dan Gertler. According to the terms of the compromise, Congo will get back various mining and oil assets (worth 2~3 US\$ 3bn) in exchange for dropping their lawsuits⁵¹. Critics have raised concerns regarding what they believe to be a “dodgy deal” between the two parties due to the Tshisekedi's administration reluctance to publish all details of the deal⁵².

Throughout this section, we have highlighted a system of grand corruption and state capture that has existed in Congo since its independence in 1960. Despite DRC's enormous potential, they have failed times and times again to free themselves from decades of wars, financial mismanagement, and greedy political leadership. Such situation puts Congo's future in jeopardy, raises significant concerns related to the continuous supply of cobalt critical for the energy transition and begs additional interrogations such as “Will it ever be possible for DRC to overcome national and foreign corrupt interests to shape its own future? What would be Congo's fate had they managed to properly utilize their natural resources?”

Human rights Violation & Environmental Impacts

In the paragraphs that follow, we discuss the current mining situation in DR Congo and its consequences on the environment, the Congolese people and by extension the world.

Environmental Impact

As discussed in earlier sections, the mismanagement of the state-owned mines in DRC has allowed unregulated practices to persist in the industry. For instance, the neglect of some old mines has the consequence of introducing contaminants into the region's waterways.

In the study by Atibu, Emmanuel K., et al it is reported that: “*Abandoned mines and mining activities constitute important sources of toxic metals and Rare Earth Elements (REEs) affecting surrounding environmental compartments and biota*”⁵³.

⁴⁸ DRC : Investigation opens on Joseph Kabila over \$138 million embezzlement. Redaction Africanews. 24 November <https://www.africanews.com/2021/11/24/drc-investigation-opens-on-joseph-kabila-over-138-million-embezzlement/>

⁴⁹ <https://afrewatch.org/>

⁵⁰ <https://www.itierdc.net/>

⁵¹ DRC: The grey areas of the Dan Gertler deal. Joel Te-Lessia Assoko. 7 March 2022. The Africa Report <https://www.theafricareport.com/181805/drc-the-grey-areas-of-the-dan-gert>

⁵² <https://issafrica.org/iss-today/tshisekedi-does-a-dodgy-deal-with-gertler>

⁵³ Atibu, Emmanuel K., et al. "High contamination in the areas surrounding abandoned mines and mining activities: an impact assessment of the Dilala, Luilu and Mpingiri Rivers, Democratic Republic of the Congo."

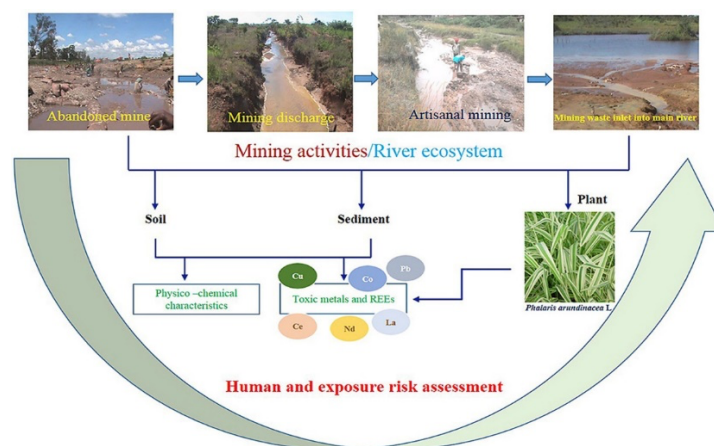


Figure 7. Environmental Impact

As presented in Figure 7, abandoned mines can still have some impact on the environment. When the mine is open, rain can dissolve some heavy metals inside it and this flows into the river/waterways which subsequently pollutes the soil and plants. Artisanal mines can affect the environment by washing the ores in the rivers and making the sediment, soil and plant polluted.

Human Impacts

The current situation of artisanal mining of cobalt in DR Congo has some impact on workers, local communities, and society:

- Impacts on workers of artisanal mines

The artisanal miners (small-scale miners with low-grade equipment), face a lot of problems that are the consequence of mismanaged mines because of ignored rules and standards of the mining industry. The working conditions of these miners have little/no regards for a safe and healthy working condition, also there are instances of child laborers, very harsh working hours, and absence of employment security etc.

- Safe and healthy working condition:

“Article 159 to 169 of the Congolese Labor Code make general provisions for health, hygiene, and security at work, and define obligations for the employer such as the enforcement of prevention measures, availability of occupational medicine professionals and establishment of a monitoring committee for health and safety issues⁵⁴”. However, “less than 10 % of the miners have any knowledge about these regulations⁵⁵”. For example, in MR (Mining regulation) Art. 9, it has been mentioned that the depth of the mining shaft should be limited to 30 m, but a lot of miners make it longer and that leads to accident.

- Child Labor

⁵⁴ Tsurukawa. "Social impacts of artisanal cobalt mining in Katanga, Democratic Republic of Congo.

⁵⁵ Tsurukawa. "Social impacts of artisanal cobalt mining in Katanga, Democratic Republic of Congo.

One of grave consequence of the human rights violation in the DRC as a result of cobalt mining is the issue of child labor. There are regulations in place to limit the age of workers in the mines to a threshold, however these regulations are constantly neglected. To be specific: “DRC ratified ILO⁵⁶ No. 138 Convention on the Minimum Age for employment, specifying a threshold of 14 years. The Labor Code enacted in 2002 raised this limit to 16 years old. Light and salubrious work can nevertheless be entrusted to workers from the age of 15, with parental authorization and derogation from the Labor Inspection (Art. 38). Work is strictly forbidden under the age of 15 (Art. 133), and article 26 of the Mining code underlines that only Congolese citizens of age are allowed to work as artisanal miner⁵⁷”.

However, “In the Copperbelt, 28% of the workforce or between 19,000 to 30,000 miners are children under the age of 15, some of them being as young as 6 years old. Another 14%, or between 9,000 and 15,000 workers are 15 to 17 years old. 15 younger children mostly carry out light tasks such as sorting, washing, and sieving of ores, and the young males are usually involved with more heavy work such as digging and transport since they are 15 or 16⁵⁸”.

As a result of neglecting these regulations coupled with the precarious nature of these mines, the child workers suffer injuries from mine accidents and in some extreme cases some of them even died. In 2019, a landmark legal case was launched against the world’s largest tech companies (Apple, Google, Dell, Microsoft, and Tesla) by Congolese families who claimed that their children were killed or maimed while mining for cobalt used to power smartphones, laptops, and electric cars⁵⁹ for these tech giants. “The case has been filed by the International Rights Advocates on behalf of 14 Congolese families⁶⁰”. “The lawsuit argues that Apple, Google, Dell, Microsoft, and Tesla all aided and abetted the mining companies that profited from the labor of children who were forced to work in dangerous conditions – conditions that ultimately led to death and serious injury.⁶¹”

“The families argue in the claim that their children were working illegally at mines owned by UK mining company Glencore. The court papers allege that cobalt from the Glencore-owned mines is sold to Umicore, a Brussels-based metal and mining trader, which then sells battery-grade cobalt to Apple, Google, Tesla, Microsoft, and Dell. Other plaintiffs in the court documents say they worked at mines owned by Zhejiang Huayou Cobalt, a major Chinese cobalt firm, which the lawsuit claims supplies Apple, Dell, and Microsoft and is likely to supply the other defendants.⁶²”

All of the companies that were accused, denied the unethical sourcing of cobalt. For example, Apple said: “Apple is deeply committed to the responsible sourcing of materials that go into our

⁵⁶ International Labour Organization

⁵⁷ Tsurukawa. "Social impacts of artisanal cobalt mining in Katanga, Democratic Republic of Congo.

⁵⁸ Tsurukawa. "Social impacts of artisanal cobalt mining in Katanga, Democratic Republic of Congo.

⁵⁹ Annie Kelly, Apple and google named in US lawsuit over Congolese child cobalt mining deaths, 2019, The Guardian

⁶⁰ BBC news, Top tech firms sued over DR Congo cobalt mining death, 2019

⁶¹ Annie Kelly, Apple and google named in US lawsuit over Congolese child cobalt mining deaths, 2019, The Guardian

⁶² Annie Kelly, Apple and google named in US lawsuit over Congolese child cobalt mining deaths, 2019, The Guardian

products. We've led the industry by establishing the strictest standards for our suppliers and are constantly working to raise the bar for ourselves, and the industry⁶³".

- Impact on local communities

As stated previously, artisanal mines can affect the environment and make the soil, water and plant polluted and that leads to health hazard, "such as exposure to heavy metal through dust inhalation, water, and agricultural soil contamination. A biomonitoring study highlighted that populations living in a radius of 10 km from mine-related activities showed extremely higher urinary concentrations of Co, Pb, Cd and U respectively when compared to a control population⁶⁴".

According to Mining code and regulation (Article 451), there are some principles for miners and local communities to interact with each other. For instance, "Applicants for an exploitation license must provide a report on the consultations with the authorities of the local administrative entities and with the representatives of the surrounding communities as well as the plan as to how the project will contribute to the development of the surrounding communities (Mining Regulation, Article 451). This procedure includes information for local populations about negative and positive impacts of the project, consultation for the definition of appropriate measures to mitigate negative impact and to conduct site restoration, and compensation for directly affected people. Nevertheless, this procedure is not implemented: During a study by PACT⁶⁵ (2010) no example of any public consultations, or reports resulting from such procedures by any mining authorities could be found⁶⁶".

- Impact on society

Social impacts on the product basis

As it is mentioned in the part one, cobalt has an important role in electric devices such as notebooks and electrical vehicles. In this section, product specific social impact is going to be analyzed. "This approach is based on the life cycle thinking i.e., the concept that the economy of raw material extraction and further processing is closely linked to demand and consumption and that – according to the principle of extended producers responsibility (EPR) that is already routinely applied in end-of-life management – producers have a certain responsibility for upstream and downstream impacts of their products⁶⁷".

"The following calculation is based on the worldwide cobalt market data, on the assumption that 60-90% of the cobalt from Katanga Province is extracted by artisanal miners.⁶⁸"

⁶³ Annie Kelly, Apple and google named in US lawsuit over Congolese child cobalt mining deaths, 2019, The Guardian

⁶⁴ Banza, Célestin Lubaba Nkulu, et al. "High human exposure to cobalt and other metals in Katanga, a mining area of the Democratic Republic of Congo

⁶⁵ PACT 2010; PROMINES Study: Artisanal Mining in the Democratic Republic of Congo.

⁶⁶ Tsurukawa. "Social impacts of artisanal cobalt mining in Katanga, Democratic Republic of Congo.

⁶⁷ Tsurukawa. "Social impacts of artisanal cobalt mining in Katanga, Democratic Republic of Congo

⁶⁸ Tsurukawa. "Social impacts of artisanal cobalt mining in Katanga, Democratic Republic of Congo

“It can be calculated that about one third of the world’s cobalt supply come from artisanal mining in the Democratic Republic of Congo, meaning that on average one third of the cobalt in each application can be attributed to the specific social impacts described in this section⁶⁹”. In addition, “the generation of 2.5kg cobalt from artisanal mining in the DRC is associated with an artisanal labor input ranging between 11 and 26 hours. Thus, it can be concluded that the production of 1 kg of cobalt from artisanal mining on average is associated with 444 artisanal working minutes in the DRC and that 71% of these hours are worked by diggers, 6.5% by washers and 22.5% by sorters.⁷⁰”

The Li-Ion batteries of an average notebook needs about 65g of cobalt and that modern hybrid-vehicles demand 2.5kg of cobalt⁷¹, “this means that on average one notebook is associated with around 10 minutes of artisanal cobalt mining in the DRC, and a hybrid-vehicle with around 6 hours and 10 minutes⁷²”. Figure 8. , presents the apportionment of these working minutes between diggers, washers and sorters.

	Amount of Co in application [g]	Share of Co sourced from artisanal mining in the DRC	Working minutes for artisanal Co-diggers in the DRC (per product)	Working minutes for artisanal Co-washers in the DRC (per product)	Working minutes for artisanal Co-sorters in the DRC (per product)
Notebook	65	1/3	7	1	2
Hybrid-vehicle	2500	1/3	263	24	83

Figure 8. Working minutes of artisanal cobalt extraction in the DRC per product⁷³

In addition, “28% of this labor input is carried out by children under the age of 15. Thus, the cobalt of an average notebook is associated with nearly three minutes of child labor and an average hybrid vehicle with 104 minutes. In terms of remuneration, it can be estimated that artisanal miners earn on average US\$ 3.00 for a full working day of 10 hours. Thus, the income per notebook is around US\$ 0.05 and per hybrid-vehicle US\$ 1.83. Taking into account the death rates of 0.4 to 0.5% (average 0.45%) in some of the artisanal mines and assuming that these figures are representative for all artisanal cobalt mining in the DRC, given an average yearly working time of 3426 hours per artisanal miner, it can be estimated that the production of 4.7 million notebooks or 123,000 hybrid-vehicles are on average associated with one accidental death in artisanal cobalt mining in the DRC.⁷⁴” Figure 9 gives an overview on the calculated social indicator values on a product basis.

⁶⁹ Tsurukawa. "Social impacts of artisanal cobalt mining in Katanga, Democratic Republic of Congo

⁷⁰ Tsurukawa. "Social impacts of artisanal cobalt mining in Katanga, Democratic Republic of Congo

⁷¹ Morley, N.; Eatherley, D.: Material Security – Ensuring resource availability for the UK economy.

⁷² Tsurukawa. "Social impacts of artisanal cobalt mining in Katanga, Democratic Republic of Congo

⁷³ Tsurukawa. "Social impacts of artisanal cobalt mining in Katanga, Democratic Republic of Congo

⁷⁴ Tsurukawa. "Social impacts of artisanal cobalt mining in Katanga, Democratic Republic of Congo

	Average notebook	Average hybrid vehicle
Labour input per product	10 min	370 min
Child labour input per product	3 min	104 min
Remuneration	0.05 US\$	1.83 US\$
Fatal mining accidents	0.00000021	0.0000081

Figure 9. Social indicator values of artisanal cobalt mining in the DRC for selected cobalt containing products⁷⁵

POTENTIAL IMPLICATIONS IN THE FUTURE

In this final section, we discuss the potential implications of the cobalt controversy in DRC and how this can impact the world at large in the push for green energy as an alternative to fossils. Furthermore, we also discuss current research efforts in a bid for an alternative to cobalt-based battery technology and finally we conclude by mentioning some of the limitations we faced during the course of this study.

Future implications for the Energy Industry

- Classification of DRC's cobalt as a "conflict mineral"

With more investigations into the human rights situation in DRC coming out, there are speculations that the cobalt mineral may be classified as a conflict mineral. Conflict minerals refers to raw materials that are mined in conflict-prone regions and their sales are used to perpetuate these conflicts. The US regulations (Section 1502 Dodd Frank Act) requires US companies to monitor their supply chain for classified minerals (tin, tungsten, tantalum and gold) if they originate from Congo to ensure that they do not fund the conflicts in those regions⁷⁶. Similar laws like this have been put into effect in the European union last year (2021)⁷⁷. Therefore, if it happens that the cobalt from DRC falls into this category, the global supply chain will be affected, and demand will outmatch the available supply of conflict-free cobalt. This would mean that companies in the green energy industry would spend more to clean up their supply chain and the high costs would be borne by the final consumers. This may mean that the prices of our mobile gadgets of electric vehicles would skyrocket, and this would put a dent in the world's urgent push for green technology.

Furthermore, no where would the hardship of this ban be more impactful than on the economy of the Congolese people. Given that a major source of revenue for the country is from the exports of these minerals, if the DRC's cobalt were to fall under this classification the poverty effects on the people would be grave.

- Potential substitutes for cobalt

A common ideology in the technological sphere is the concept that the first solution to a problem is usually the best until a newer invention comes along, this is true in the case of cobalt-based

⁷⁵ Tsurukawa. "Social impacts of artisanal cobalt mining in Katanga, Democratic Republic of Congo

⁷⁶ DaSilva, Jeremy, Master's Thesis: Conflict Implications of Rising Cobalt Demand and the Effects of Classifying Cobalt as a Conflict Mineral on the DRC

⁷⁷ EU Conflict Minerals Regulations. https://policy.trade.ec.europa.eu/development-and-sustainability/conflict-minerals-regulation_en

batteries. Even though the development of alternative solutions has been slow, there has been some signs of progress.

According to recent research studies, two alternatives have shown the most promise: Recycling worn-out Lithium-ion batteries and the use of conversion materials such as (Copper and iron fluorides or silicon) as electrodes. Studies have shown that these methods have the capacity to replace cobalt's use in batteries without any significant drops in performance.⁷⁸

- Issues related to the development of alternatives.

However, there are some challenges with this development; in the case of recycling, future projections for battery demands would exceed the replenishing capacity of recycling. Also, in the case of transition to conversion materials as electrodes, there are issues with technology for the cell design, safety concerns, slow charge time and low number of charge and discharge cycles when compared to the cobalt-based counterpart.

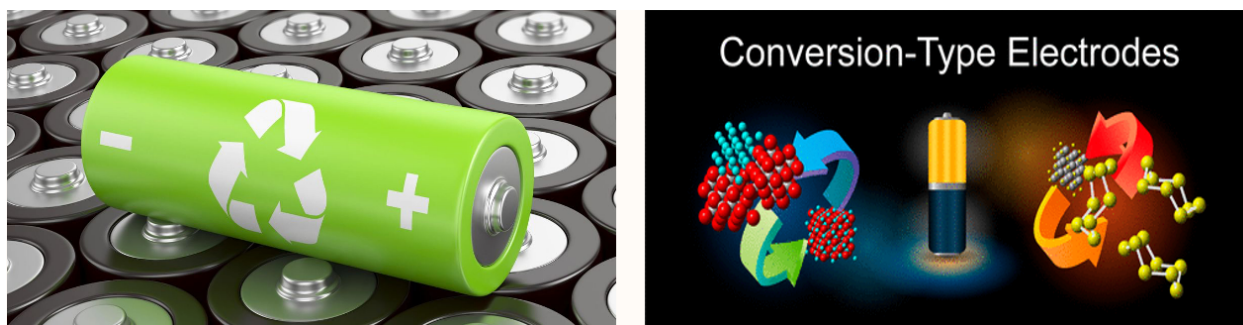


Figure 10. Alternatives to Cobalt-based Battery Technology

LIMITATIONS OF THE CURRENT ANALYSIS

While we have had access to a large variety of documentation -be it local and international newspaper articles, documentaries, books, and research papers- throughout our investigations on cobalt mining in Congo and have developed a detailed map of all factors playing a role in the country's mineral curse, we believe that additional studies are necessary to shed light on complementary topics such as:

- 1) Answers to why there has not been official charge to sanction former president Joseph Kabila directly as of today
- 2) The problem of accounting for all the individuals or companies involved in the grand corruption schemes
- 3) Answering the question of what Congo's fate would be if they had managed to properly utilize their resources
- 4) Analysis of a possible scenario where Congo can overcome local and foreign influences to shape its own future.
- 5) The issue of finding accurate estimates on number of casualties related to the mines

⁷⁸ Ten years left to redesign lithium-ion batteries. Reserves of cobalt and nickel used in electric-vehicle cells will not meet future demand. Refocus research to find new electrodes based on common elements such as iron and silicon, urge Kostiantyn Turcheniuk and colleagues. <https://www.nature.com/articles/d41586-018-05752-3>

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