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Re-examining "Green" Automotives: from a Southern Frontier Island to Western Freeways



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September 2023

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This report forms part of a two-country report focusing on nickel supply chains in the Philippines and Indonesia conducted by the Legal Rights and Natural Resources Center and Wahana Lingkungan Hidup Indonesia (WALHI).

The Philippine report acknowledges the contribution of Friends of the Earth Japan.

Cover Design and Layout:
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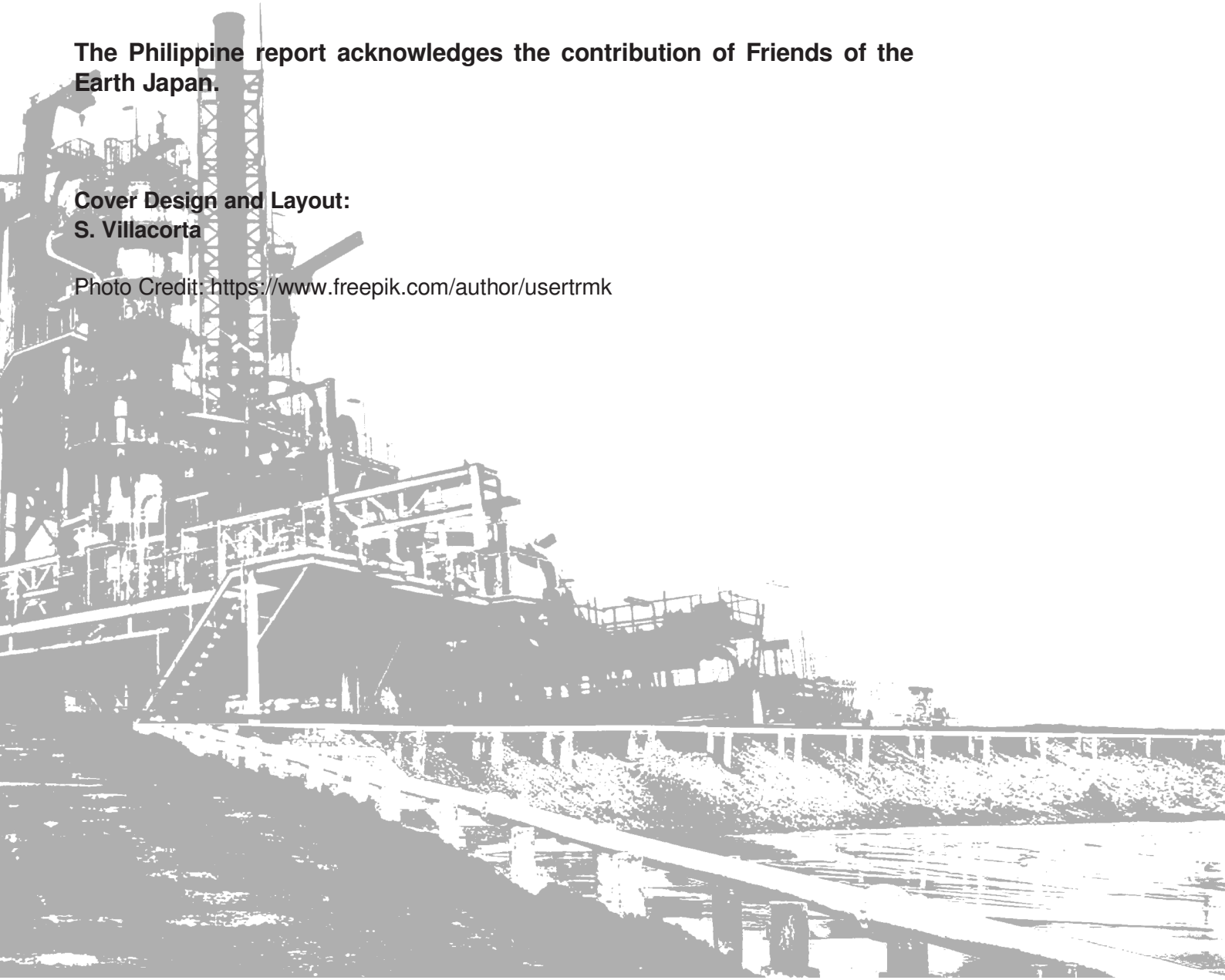


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As the consequences of the climate crisis continue to unfold, governments and corporations forwarded transition solutions, particularly renewable energy as solution, to abate the crisis. A critical element to the transition is to reduce the use of fossil fuels. Fossil fuels represent 80% of the total energy supply (TES) globally, with oil comprising 29%, followed by coal (27%) and natural gas (24%). Global emissions from fuel combustion were dominated by coal (45%), followed by oil (32%) and natural gas (22%).[1]

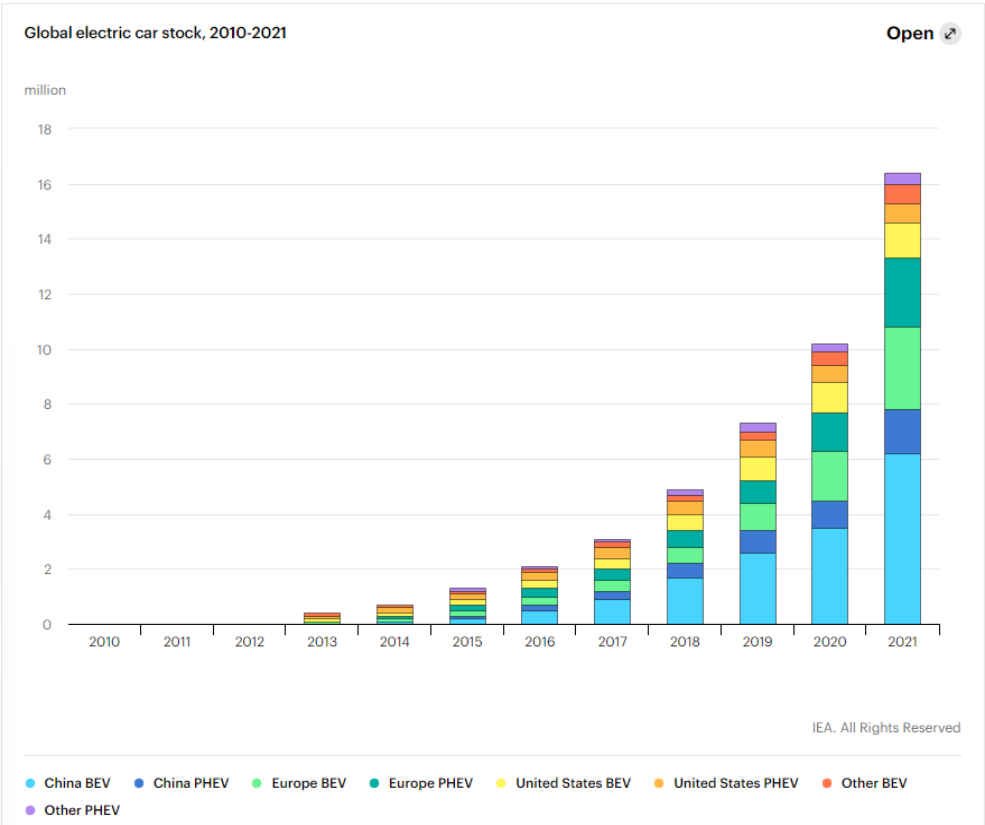
The global transportation sector is a major polluter, producing approximately 7.3 billion metric tons of carbon dioxide (CO2) emissions worldwide. The biggest source of emissions were found to be passenger cars (2020), which accounts for 41% of total global transportation emissions.[2] A typical passenger vehicle emits about 4.6 metric tons of carbon dioxide per year. This translate to every gallon or three liters of gasoline burned emitting about 8,887 grams of CO2.[3]

The “going green” solutions, including renewable energy sources and electric vehicles, however, need better scrutiny. The world runs the risk of utilizing supposedly carbon-free solutions that may create environmental issues of their own and put us no better than the state of things as they are. The hidden consequences of the current approach towards renewable energy and carbon neutral solutions are most apparent when examining the material components of the “renewables” and tracing the route and subsequent impact they have on ecosystems and communities.

This inquiry aims to illustrate the supply chains that go into the production of renewable things, particularly for electronic vehicles (EV).

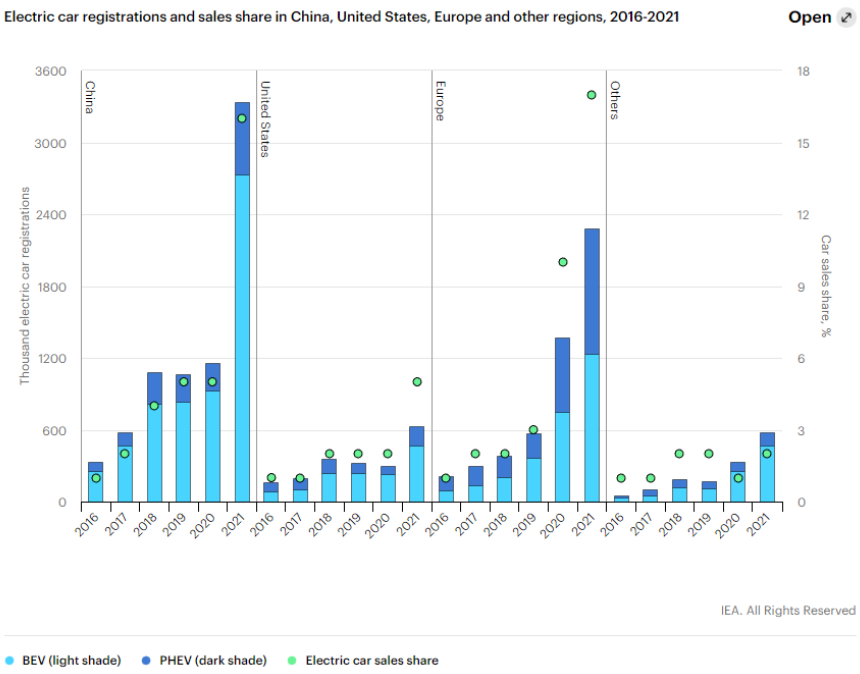
On Hybrid & Electric Vehicles

According to the Global EV Outlook 2022 report published by the International Energy Agency (IEA), the number of electric vehicles on the road globally stood at just over 16.5 million in 2021. This figure is nearly thrice as large as the number of electric vehicles being driven in 2018.



Global Electric Car Stock 2010-2021 (IEA Global EV Outlook 2022)

Electric vehicle sales in China doubled over the past year, with European and US markets making considerable advances as well.



Global Electric Car Stock 2016-2021 Regional Breakdown (IEA Global EV Outlook 2022)

Given the trend of exponential increase in the market share of electric vehicles and rising oil prices, it is fair to say that the demand for electric vehicles will continue to rise over the coming years. In fact, the market for its core component—the battery, is expected to grow from $17 billion to more than $95 billion between 2019 and 2028 globally.[4]



Crude Oil Prices (Trading Economics)

Asian suppliers continue to dominate the EV battery market: Chinese companies take the most share at up 56%, followed by Korean companies—LG and Samsung (26%) and Japanese—Panasonic and other manufacturers (10%).[5]

China relies on its own raw materials for manufacturing EV battery, but it has also been sourcing around the world to secure its future supplies of copper, cobalt, lithium and other raw materials.[6] Korea requires ores sourced outside of its borders and has been largely sourcing these from China. It is now poised to source traditional raw material such as iron ore and coal, and more recently lithium, nickel and graphite from Australia.[7] Japan too has been sourcing its ores outside the country,[8] mainly from China and also elsewhere, particularly in the Philippines where Japanese manufacturers have partnered with local mining corporations.

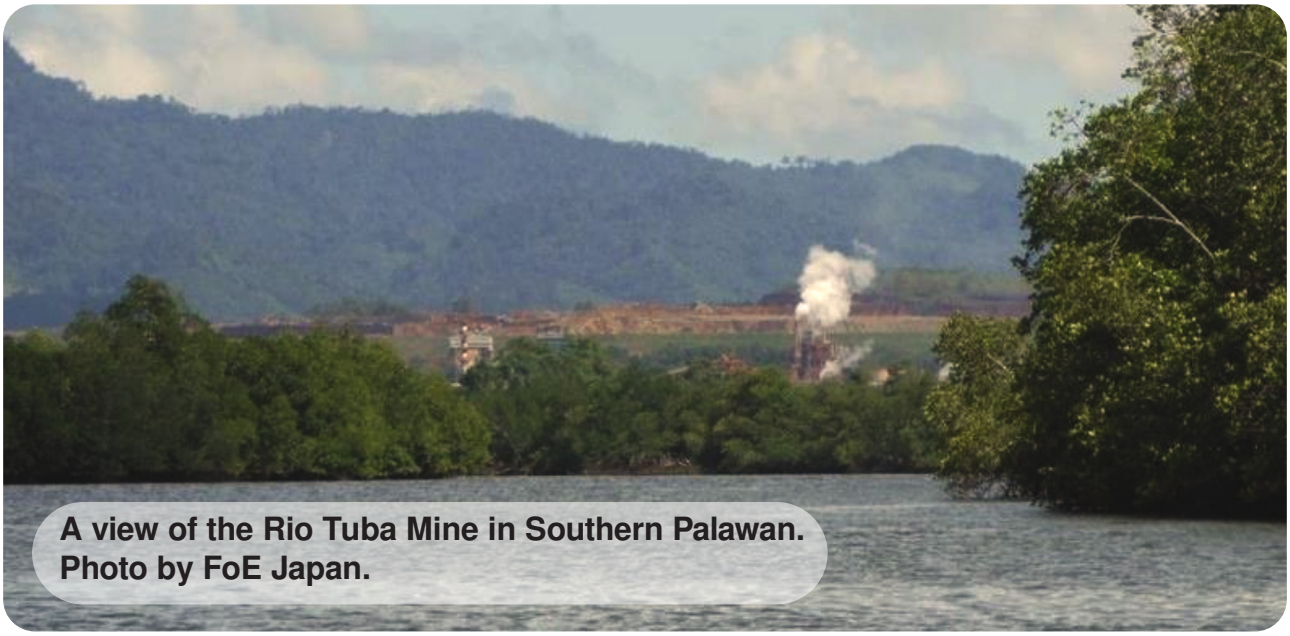
Newer electric vehicle offerings use lithium-ion batteries that are composed of lithiumcobalt oxide or lithium nickel cobalt oxide (Dragonfly Energy, 2022). Others use nickel-metal hybrid batteries composed lanthanum, nickel, cobalt, and silicone (Dragonfly Energy, 2022).

Our inquiry will focus on nickel, a mineral heavily mined in the Philippines, and is used in electric vehicles. As of 2021, over 400,000 tons of nickel are estimated to be produced by Philippine nickel mines (S&P Global Market Intelligence, 2021). The Philippines is the world's second largest nickel producer, supplying up 14% of the world's nickel, second only to Indonesia (S&P Global Market Intelligence, 2021).

Particularly, the inquiry will focus on Rio Tuba Nickel Mining Corporation (Rio Tuba) in the Philippines, and will attempt to examine the global supply chain surrounding its nickel.

Rio Tuba & Philippine Nickel Mining

Rio Tuba operates in Bataraza, a municipal coastal town located in southernmost tip of the island of Palawan in the Philippines.[9] It is home to protected landscapes.[10] Bataraza is identified as home to the endemic saltwater crocodile (crocodylus porosus), some which are known to consider the Rio Tuba River as their habitat.[11]



A view of the Rio Tuba Mine in Southern Palawan. Photo by FoE Japan.

The area is also home to many Pala'wan indigenous peoples. Palawan island is known as the Philippines' "last biodiversity frontier", called such because it is home to the few remaining old growth forests and endemic wildlife in the country.[1] [2]



Ore trucking constrantly generate air pollution in the Rio Tuba mine site. Photo by FoE Japan

The Rio Tuba[13] is a Filipino and Japanese mining project that produces nickel and cobalt sulfite ores extracted from open pit mines. In the data published by the Environmental Justice Atlas, over 270,000 metric tons of nickel are produced by the mine annually.[14] It is one of the biggest nickel open pit mining sites in the Philippines with 5,200 hectares, having exploited 658.39 hectares.[15] Nickel takes the largest proportion of the country's mineral metallic production at 49% with a total production value of US$2.12 billion.[16]

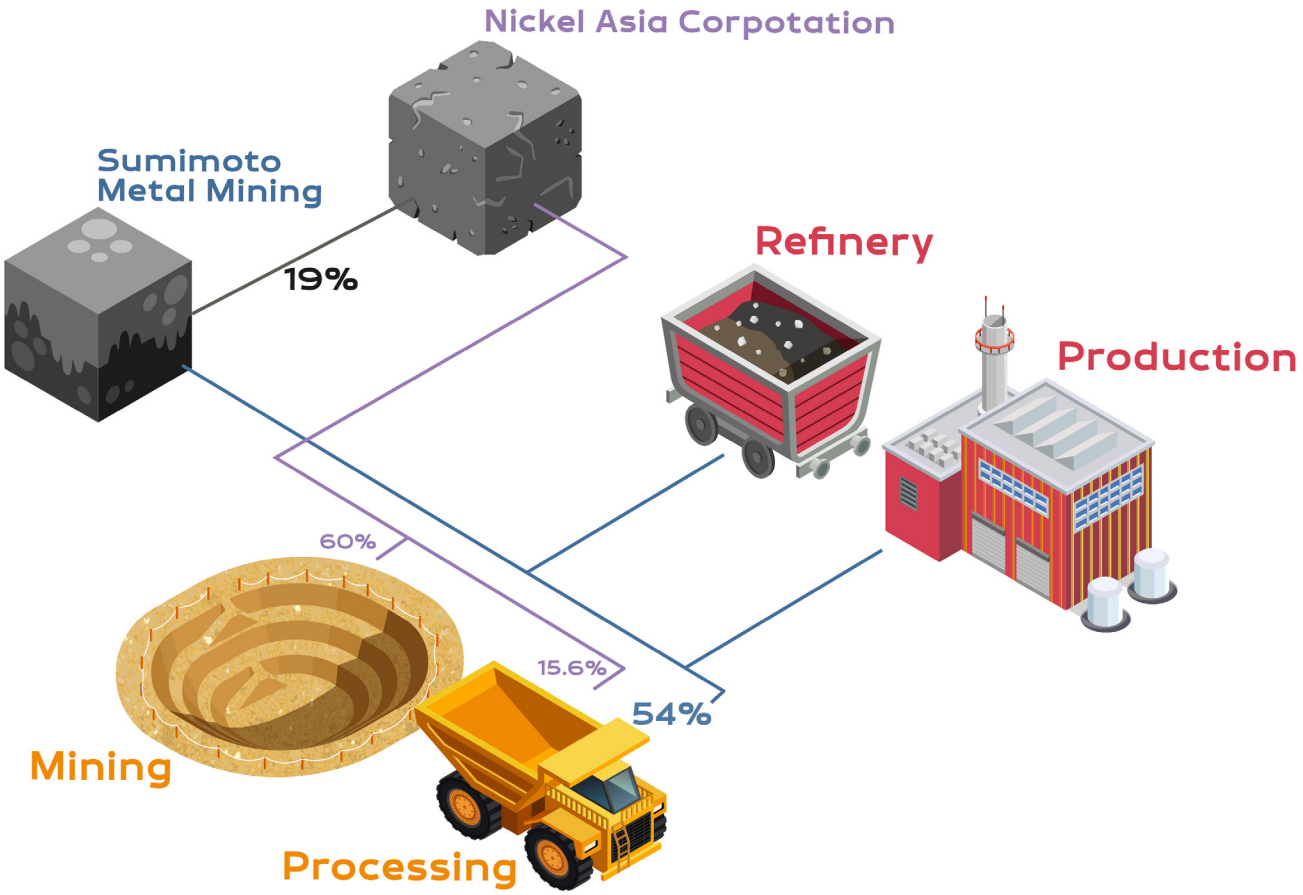
Nickel Asia Corporation (Nickel Asia) is Rio Tuba's main shareholder holding a stake of 60%. Pacific Metals Co. Ltd. (PAMCO)[17] owns 36%, while Sojitz Corporation[18] own 4%. Both PAMCO and Sojitz are Japanese corporations. PAMCO lists Sumitomo Mitsui Trust Bank Ltd. as one of its main banks.[19] PAMCO lists Rio Tuba and Taganito Mining Corporation, both of which are under the Nickel Asia umbrella of companies, as affiliated companies.[20]

About 26% of Nickel Asia is owned by Sumitomo Metal Mining Co. Ltd..[21] Sumitomo Metal Mining Co. Ltd. (Sumitomo) is part of the Sumitomo Group, a global business investment group, which is made up of approximately 900 companies.[22] Sumitomo Group lists 33 member companies.[23]

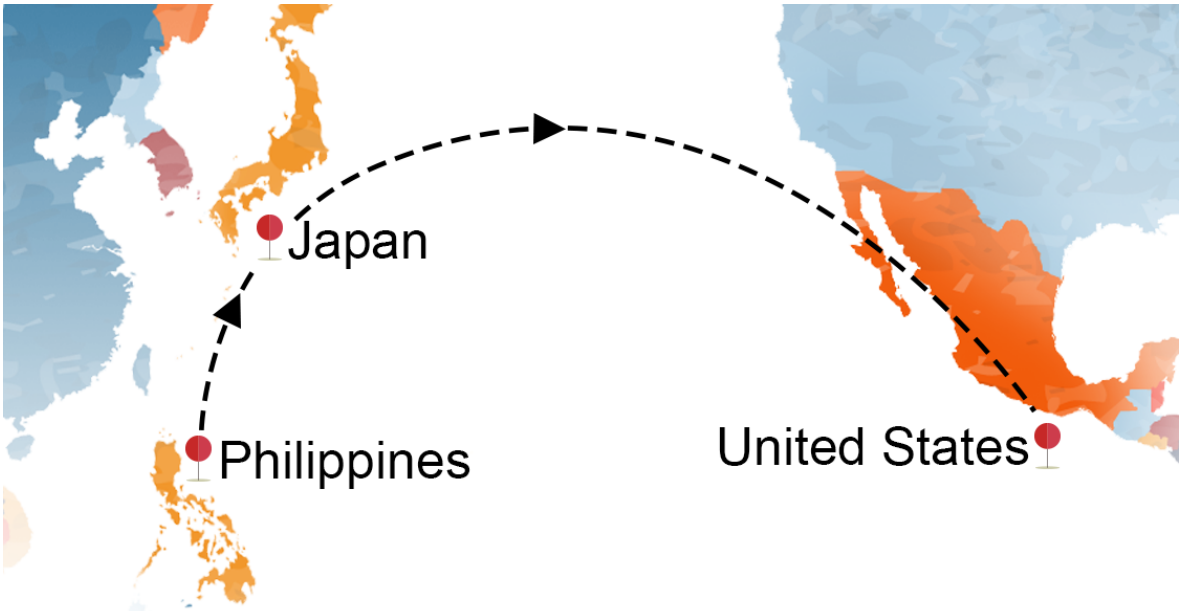
Rio Tuba has been in operation for over forty years. Exploration was began in 1969 and the mining operations commenced in 1977 with 22,000 WMT of the ore mined exported the Pacific Metals factor in Japan.[24] The operation in Palawan includes Coral Bay Nickel Corporation (Coral Bay), a hydrometallurgical processing plant (HPP). Coral Bay uses the process of High Pressure Acid Leaching (HPAL) to convert low grade nickel lateritic ores into Nickel and Cobalt Mixed Sulfide (MS). The mixed sulfide is an intermediate product (including nickel and cobalt) that is further refined to become components of particular steel products, and electric and battery materials. Coral Bay is owned by Sumitomo Metal Mining [25], Mitsui and Co, Sojitz Corp [26] and Nickel Asia, with Sumitomo as the majority shareholder (with 84.375% shares).[27]

Coral Bay is one of only two nickel processing plants in the Philippines (the other is Taganito HPAL in Surigao del Norte), and the first of the two. Sumitomo was funded by the Japan Bank for International Cooperation (JBIC).[28] JBIC is a Japanese financial institution providing loans, investments and guarantees Japanese corporations, and providing initiatives for international finance.[29] In October 2022, Nickel Asia bought 33.046 million common shares of Coral Bay from Sumitomo for $25.94 million, increasing its stake in Coral Bay from 10% to 15.6%.[30] Nickel Asia is the exclusive supplier of limonite ore to the Coral Bay plant. Rio Tuba produces saprolite and limonite ore from open pit mining, the only parts of which are utilized by Coral Bay. Coral Bay plants produce nickel and cobalt mixed sulfide from low-grade limonite, which cannot be exported as it is.

SUPPLY CHAIN OWNERSHIP LINKS



Ilagan et. al. added that the mine is likely to expand in size due to the demand for nickel, “(w)ith the demand for nickel expected to grow to at least 10 times what it is now by 2030, experts say companies will have no choice but to expand their mining operations...” It has been reported that the company is now currently processing FPIC and tree cutting permit in the proposed expansion area of Mt. Bulanjao (which covers 3548.44 ha).



1 Philippines
Nickel ore is mined and put through and initial refining process.

2 Japan
The refined nickel is turned into the cathode material that powers lithium ion batteries.

3 United States
The material is fashioned into batteries for electric cars.

Source: NBC News

Nickel ore supply chain (NBC News)

Initial reports show that the nickel ore mined and processed in the Philippines are used as primary raw material to manufacture nickel cobalt aluminum oxide cathodes for the lithium-ion batteries of Panasonic. These are then used to make batteries for electric cars.

As early as a decade ago, Sumitomo had already eyed the world automobile market, particularly electric vehicles and hybrid vehicles with aim of developing high-performance rechargeable batteries, and focusing on two of its key customers: Toyota Motor Corp and Panasonic Corp, supplier of car power packs to Tesla Inc.[31] Sumitomo Metal Mining intends to accelerate exploration of projects in the Pacific Rim region mainly to boost its battery materials output.[32]

Sumitomo reported that they had successfully developed high-performance lithium nickel oxidealongside Panasonic, having been Panasonic's supplier of lithium nickel oxide. Panasonic, for its part, had been using the mixed metal oxides to manufacture cylindrical lithium-ion rechargeable batteries. By 2018, it had invested 37 billion yen ($332 million) over the span of four years to boost capacity of the nickel-cobalt-aluminum (NCA) cathode materials used in Panasonic's lithium-ion battery that powers Tesla's Model 3 and Model X.[33] And in 2020, Sumitomo's chief of Battery Materials Division declared that, "there has been no change in our focus on expanding our business centered on Toyota Motor Corporation and Panasonic Corporation. Our basic stance at present is to maintain this focus even when we build a 10,000-tonnes monthly production system."[34] Panasonic remains Tesla's long-time and main battery manufacturer; it was also a key investor in the foundation of Tesla.[35]

Sumitomo is reported to be to be expanding its cathode production where a portion of its capital expenditure will be used to increase cathode materials for rechargeable batteries specifically for EVs. It projects to produce 10 thousand metric tons by 2028 and 15 thousand metric tons by 2031.[36]

For its part, Tesla's Elon Musk made a plea to mining companies to mine more nickel.[37]

According to Tesla's 2021 Impact Report, it now applies direct sourcing of its materials from mining companies do to away with reliance on "multiple midstream companies." It reported to have sourced >95% of lithium hydroxide, >50% of cobalt and >30% of nickel for nickel containing (NCA and NCM) cells directly from nine mining and chemicals companies. The report, however, notes that for cobalt, nickel and lithium, these go through multiple processing steps by different companies.[38] In the same Impact Report, it lists among others, Vale Canada as a direct mine site and refiner source for nickel.[39]

Sumitomo and Panasonic have intricate ties. An independent, but related general financing entity was established between the Sumitomo Mitsui Trust Bank, Limited (84.9%) and the Panasonic Holdings Corporation (15.1%) resulting in the Sumitomo Mitsui Trust Panasonic Finance.[40] Panasonic Energy Co. Ltd.,[41] which develops EVbatters is part of the Panasonic Group or the Panasonic Holdings Corporation, while Sumitomo Mitsui Trust Bank is part of the Sumitomo Group of companies.

As recently as July 2022, Panasonic announced its intention to build its second factory in Kansas, USA. It's first factory, known as the Gigafactory,[42] is operated in partnership with Tesla in Sparks, Nevada.[43] It is one of the largest lithium-ion battery factories in the world. Panasonic has announced its development of a higher capacity EV—4,680 lithium-ion battery—for Tesla, which is slated for production by March 2024.[44] In fact, Panasonic has maintained its market share in the lithium-ion battery market almost exclusively through its relationship with Tesla.[45]

As per the Ilagan report, Sumitomo is increasing the production capacity of its Isoura Plant to meet the rising demand for lithium-ion oxide. Taganito Mining Corp. (Taganito) in Claver, Surigao del Norte in the southern island of Mindanao also supplies the Isoura Plant. Taganito is also owned and operated by Nickel Asia. Both Rio Tuba and Taganito outputs ultimately become parts of Sumitomo's battery products.

Nickel Asia owns and operates a total of seven mines in the Philippines[46]:

- Rio Tuba Nickel Mining Corp., in Bataraza, Palawan: exports saprolite and limonite ore and provides limonite ore and non-mining services to Coral Bay HPAL plant of Coral Bay Nickel Corp.

- Taganito Mining Corp., in Claver, Surigao del Norte: exports saprolite and limonite ore and provides limonite ore and non-mining services to Taganito HPAL plant of Taganito HPAL Corp.

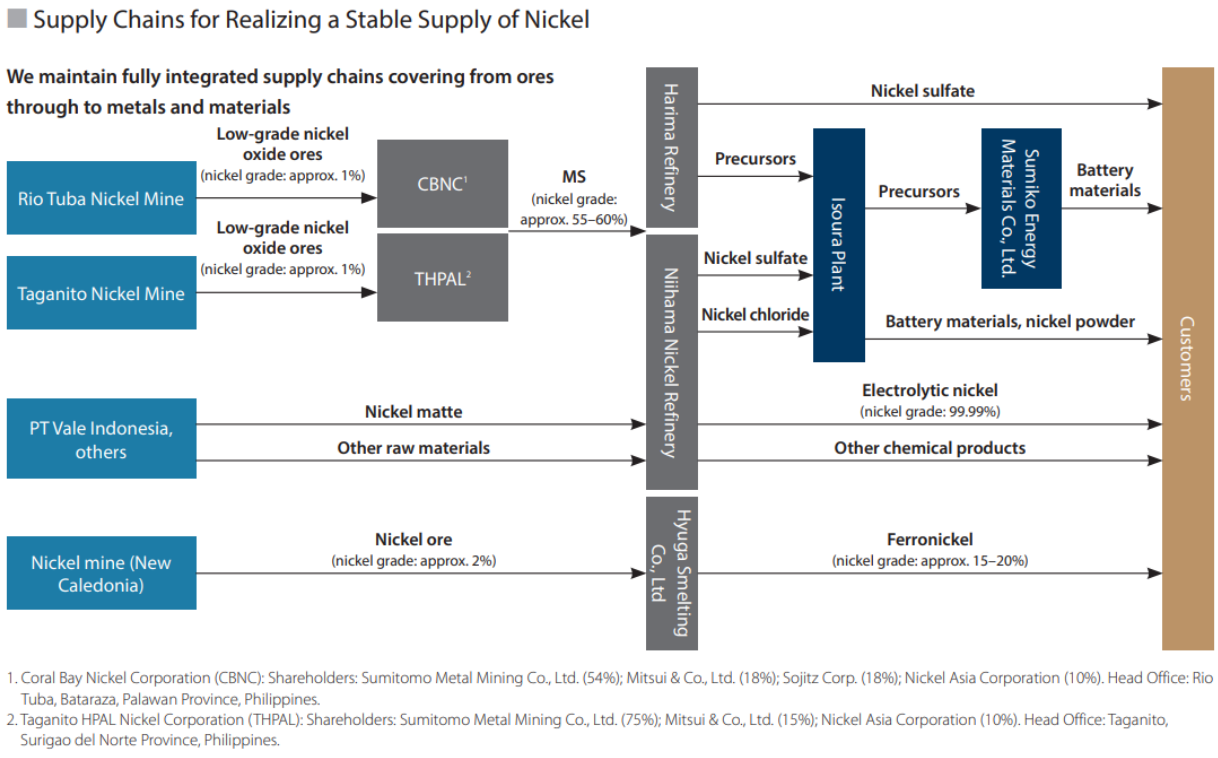
- Cagdianao Mining, in Dinagat Island: exports saprolite and limonite ore.

- Hinatuan Mining, in Hinatuan, Surigao del Norte: also known as "Tagana-an Nickel Project", exports saprolite and limonite ore.

- Dinapigue Mining, in Dinapigue, Isabela: nickel and iron bearing laterites[47]

- Cordillera Exploration Corp, Inc. (CEXCI), in Abra: at various stages of application and exploration for various mine sites. FTAA application covering Benguet, Ilocos Sur and Mountain Province; Exploration permits in Apayao Province and Abra).

- Newminco Pacific Mining Corp., in Zambales: copper, gold, and related base and precious metals.

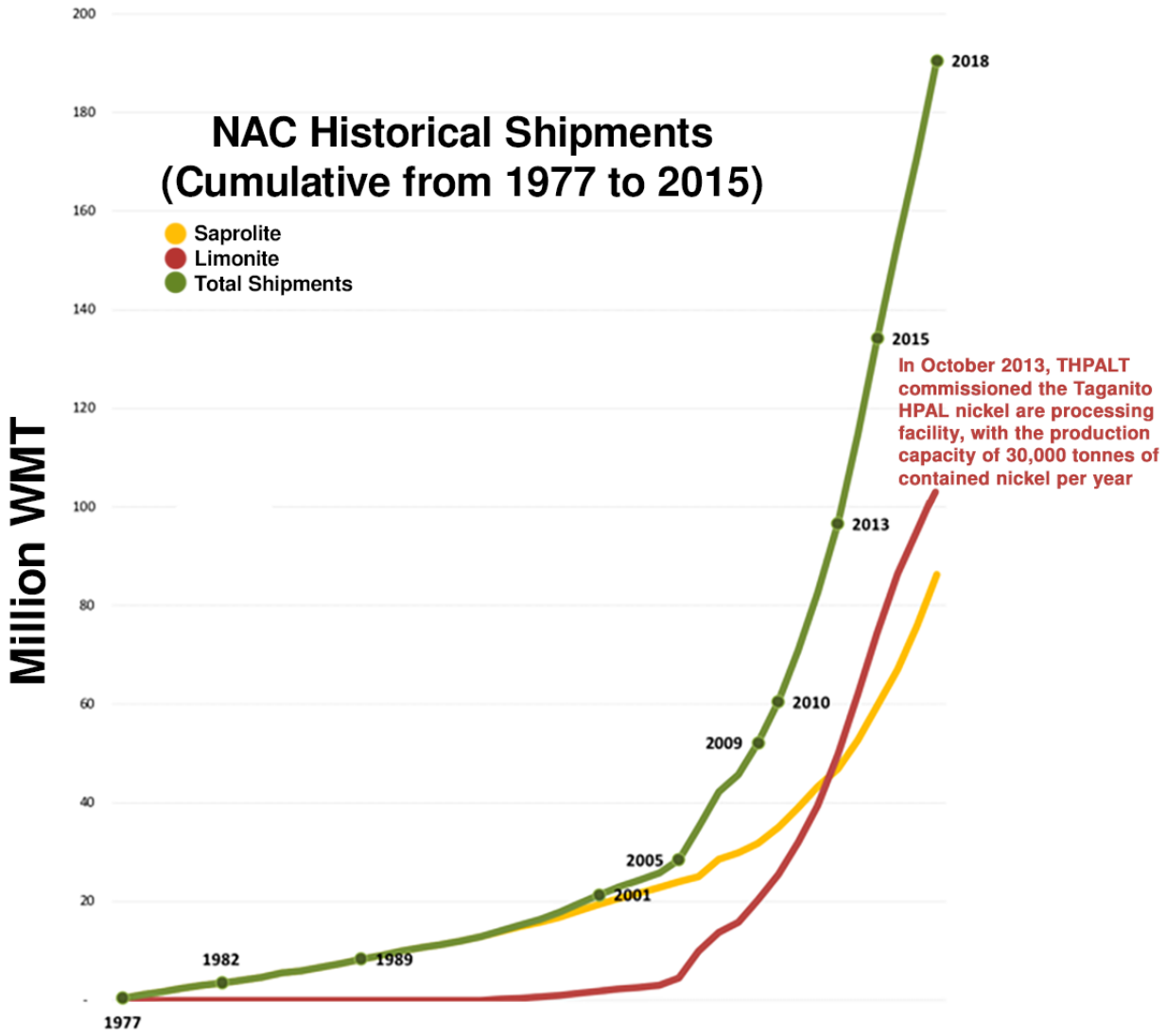


1. Coral Bay Nickel Corporation (CBNC): Shareholders: Sumitomo Metal Mining Co., Ltd. (54%); Mitsui & Co., Ltd. (18%); Sojitz Corp. (18%); Nickel Asia Corporation (10%). Head Office: Rio Tuba, Bataraza, Palawan Province, Philippines.
2. Taganito HPAL Nickel Corporation (THPAL): Shareholders: Sumitomo Metal Mining Co., Ltd. (75%); Mitsui & Co., Ltd. (15%); Nickel Asia Corporation (10%). Head Office: Taganito, Surigao del Norte Province, Philippines.

Supply chain diagram from Sumitomo 2021 Integrated Report

As illustrated in the above figure from Sumitomo 2021 Integrated Report, the Isoura Plant, receives materials from multiple mines, including nickel ores from Rio Tuba.

Nickel Asia's historical shipment of ore has been on a continuously increasing trend since its establishment in the 1970's.



Nickel Aisa Corporation Historical Shipment 1977-2015 (Nickel Asia Corp.)

In fact, during the height of the covid19 pandemic, when majority of the businesses where suffering loses in the Philippines, Nickel Asia profits rose by 41%.[48] As of August 2022, from the Rio Tuba and Taganito mines, Nickel Asia delivered a total of 3.83 million WMT of limonite ore to Coral Bay and Taganito HPAL plants for processing. In 2021, the Corporation reported a 168% increase in net income.[49] By 2022, nickel global prices went up by more than 35%.[50]

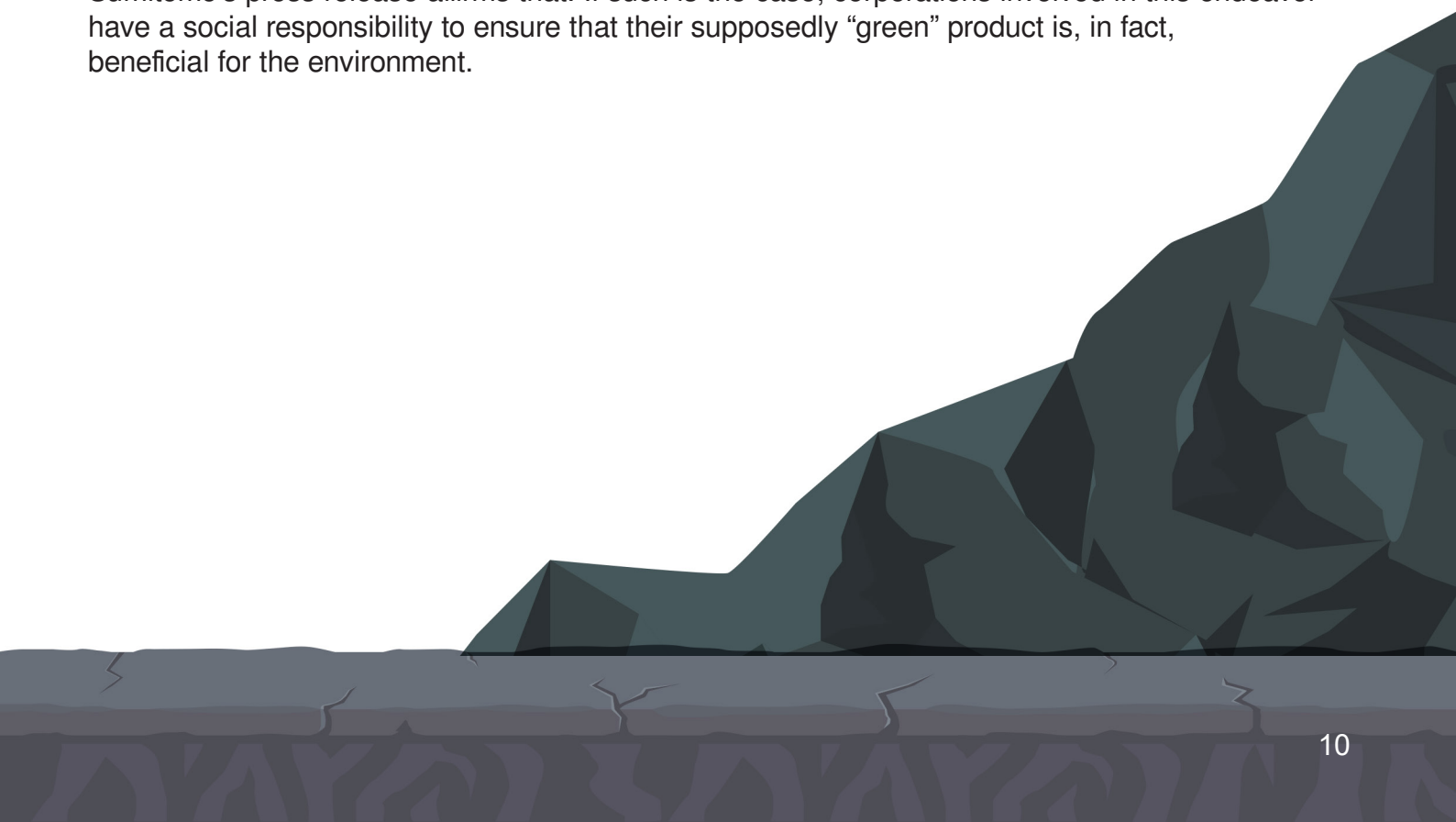
Mining in the Philippine Context

Mining, especially in the case of the Rio Tuba and Taganito,[51] both part of the Nickel Asia umbrella of mining companies, have direct negative effect on the health and welfare of communities. In addition, their activities have damaged water supply and the surrounding rainforests, affecting the environment and food security. Extractive activities in Bataraza have had extensive negative impacts on the town and its communities.

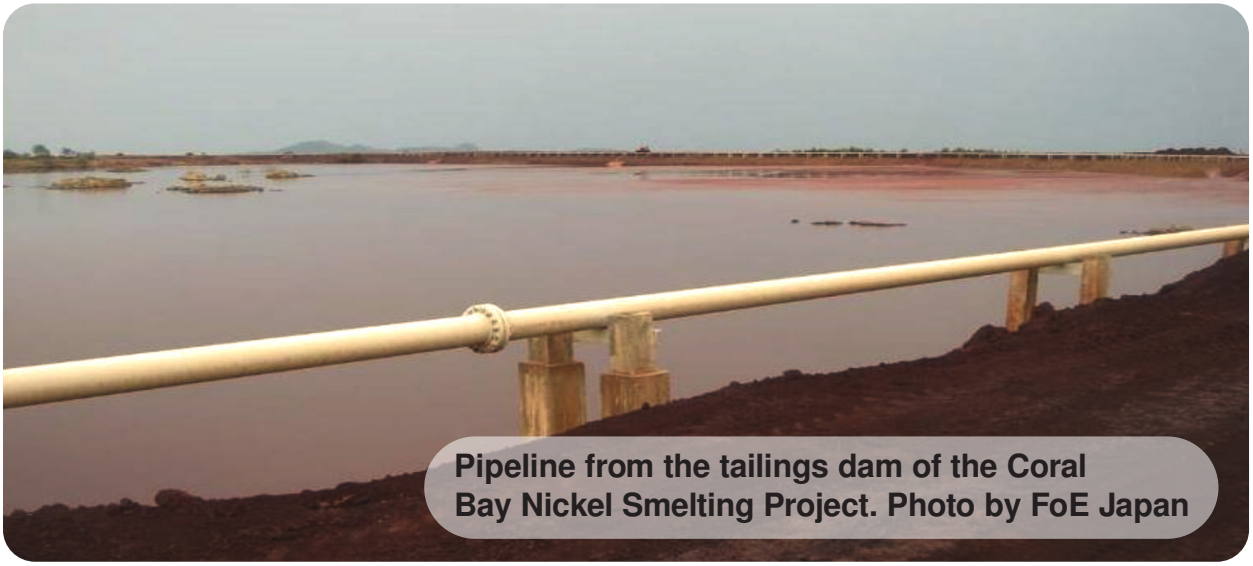
Environmental groups have raised concerns regarding water contamination (FoE Japan and Environmental Legal Assistance Center, 2019) and increased social unrest due to mining in the area (Carmona).[52] Among other issued raised was the displacement of local communities and indigenous peoples, loss of food security, and destruction of the surrounding rainforests (Ilagan, Lehren, and Shapiro, December of 2021).[53] Three water tests, conducted separately, confirmed the presence of unsafe levels of hexavalent chromium in waterways where Rio Tuba's wastewater is discharged.[54] Hexavalent chromium is listed as a known human carcinogen, which means that it can cause cancer. According to the U.S. Occupational Safety and Health Administration, repeated exposure to hexavalent chromium can cause a number of respiratory conditions, including asthma, bronchitis, itching, physical trauma to the respiratory tract, and lung cancer. In particular, the test by Friends of the Earth Japan, which covered the period from 2009 to 2019,55 found that especially during the rainy season the hexavalent chromium in the Togpon River exceeded above 0.05 milligrams per liter (mg/L) safety limit set by the World Health Organization.[56] A test conducted in 2020 by the government's Multipartite Monitoring Team (MMT) found the same results of hexavalent chromium exceeding Philippine water quality standards.[57]

If the shift toward electric vehicles is premised on a desire to mitigate the consequences of the climate crisis, meaningful changes must be made to how mining is done. In the Philippines, the type of nickel available is found just below vegetation and the thin topsoil. Mining for nickel is therefor done horizontally (not going deep), so that mining more nickel means having to destroy more vegetation above it. Driven by high market demand, increase in mining will mean more rapid deforestation—at a rate that no reforestation program will be able to compensate.[58]

It has already been established that electric vehicles are reliant on products of the mining industry. Sumitomo's press release affirms that. If such is the case, corporations involved in this endeavor have a social responsibility to ensure that their supposedly "green" product is, in fact, beneficial for the environment.



Corporate disregard of the link between supposedly “green” EV’s and the ecological destruction wrought by mining is negligent at best, and at worst, is active participation in greenwashing. The Philippines’ Mines and Geosciences Bureau (MGB) under its Department of Environment and Natural Resources projects that as much as 190 new mining projects could be granted approval in the next four years, beginning 2022. One-third of which will be nickel. Of the projected mining projects, 40% will be open-pit, mostly mining for nickel.[59]



Pipeline from the tailings dam of the Coral Bay Nickel Smelting Project. Photo by FoE Japan

The Bureau also identified “three big ticket mining projects”: the Silangan copper and gold project under Philex Mining Corp., the Tampakan gold copper facility under Sagittarius Mining Corp. and the King-king copper and gold project under NADECOR and St. Augustine Ltd..[60] All three threaten rich biodiversity in the island of Mindanao. These mine sites are home to vulnerable or critically endangered endemic animal and plant species. Particularly for Tampakan and King-king, they have also been sites for human rights violations where indigenous leaders protesting the projects have been reported killed. [61]

Proponents of the mining industry argue that tradeoffs must be made given the needs fulfilled by the mining industry. Figures will show that mining has minimal economic benefits for the Philippines, accounting for less than one percent of the country’s GDP (PSA 2021).62 In most cases, as in the case of Rio Tuba, most of the country’s extracted ores, if not all of it, go overseas, thus contributing nothing to national industrialization. It is an unjust tradeoff, especially considering the social and environmental costs and other negative outcomes.

The current condition calls attention to the need to revamp policies that relate to natural resources and enable their continued exploitation. For one, business as usual mining practices and levels are no longer sustainable, biodiversity loss in Palawan illustrates this. Second, the solution to the climate crisis—curbing the emissions from traditional fuel sources through EVs could very well supplant its own issues—mining, in fact, is a driver of the climate crisis. Approximately 8% of global carbon emissions is from mining.[63] The figure rises to 28% when other indirect emissions from mining are factored in.[64] An irony of the clean energy transition is its consequent minerals intensity.

Third, it is often the case that those whose habitats are destroyed are not able to benefit from the resource exploitation. Nor do they approve of these projects that threaten their lifeways and result in the violation of their rights. In the case of Rio Tuba, it has been decades since local communities have protested against its operations. The tensions have only intensified. Indigenous Pala'wans are worried over the looming expansion of Rio Tuba in Mt. Bulanjao.[65] The forest of ecosystem and river network that intersect Mt. Bulanjao link various Pala'wan communities. They worry about losing their source of water, the lifeline of indigenous and farming communities.

Recommendations

Just minerals transition is an important lens in articulating minerals governance in the Philippines, which has been identified in various critical and transition minerals mapping reports. The following specific recommendations chart practical and paradigmatic shifts to prepare the country for the shifts in transition minerals.

- **Integrate just minerals transition in existing policy blueprints.**

Government policy blueprints such as the Philippine Development Plan and the Philippine Energy Plan could be updated to include a just minerals transition. The proposed sunset review of the Renewable Energy Act could also interrogate the role of transition minerals. In including a just minerals transition, which proceeds from an "alternative to development" framework, the development or economic frameworks used by such blueprints would also need to be reconstituted. Such that not only energy security but is considered, but demand reduction interventions are also considered, in line with the principles of energy sufficiency and efficiency initiated. An efficient energy system would imply greater material efficiency, and therefore, demand less energy minerals.

- **Legislate local no-go zones.**

Several no-go zone bills have been filed in Philippine Congress. In any case, there is another route, one that is perhaps even more promising, because it does not need an act of Congress. This is the creation of local ordinances that ban aspects of mining inimical to environmental considerations. No-go zones are a logical result of reconstituting the world away from extractivism. Where Rio Tuba operates, for example, is a critical biodiversity area as such mining should not be allowed.

- **Investigate human rights violations.**

Conduct an investigation on the human rights violations of corporations such as Rio Tuba and hold the corporation, along with its value and supply chain, accountable.

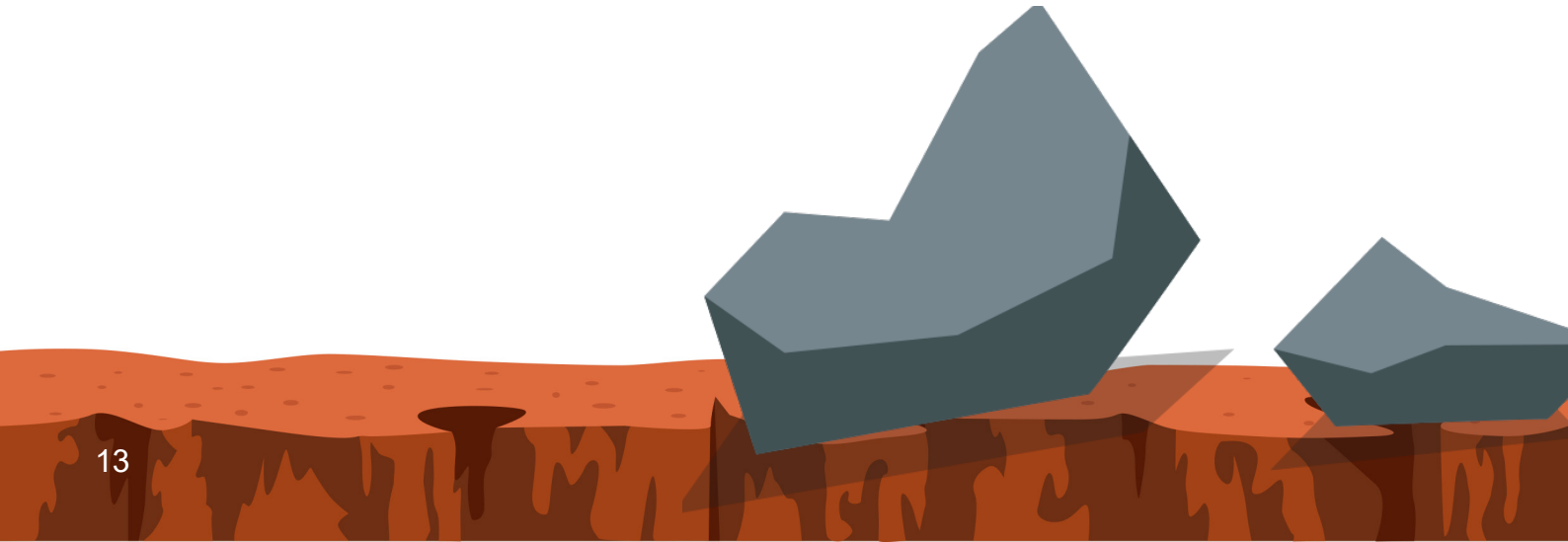
- **Adopt a just minerals transition in the country's policy regulatory framework.**

Legislation in support of a just minerals transition is necessary. Pending in the Philippine congress is the Philippine Mineral Resources Act (PMRA), also known as the Alternative Minerals Management Bill (AMMB), which proposes a transformation of the present minerals regime by balancing the need for minerals with environmental, social, and economic considerations. Moreover, such a legislative measure should include an accountability mechanism not only of the mining operation itself but across its supply and value chain. The AMMB contests the chief policy covering minerals extraction presently, the 1995 Mining Act, which is not rationalized within a low-carbon development pathway, nor within just energy transition.

Having been passed in 1995, the present Mining Act is not anchored, for example, in the climate discourse. As such, minerals extraction in the country primarily serves an
export- oriented regime of unprocessed low-value mineral ores.

- **Adopt a legally binding accountability mechanism for transnational corporations**

Adopt a legally binding treaty to hold transnational corporations accountable for all violations in their global production and value chains Given the nature of transnational corporations—their extraordinary rights and disproportionate economic power and complex legal and administrative structures that enable them to skirt national jurisdictions—proving it difficult to hold them accountable for violations across their global production operations, a legal framework to hold transnational corporations (TNCs) legally liable for human rights violations committed directly or through their global production and value chains will help ensure community rights. Through a legally binding treaty TNCs with direct obligations can thus be held directly liable should they violate human rights. The treaty can (also) serve as the legal foundation for decisions made by judges and juries in sub-national, national, and international courts, as well as administrative legal bodies, in the absence of national legislation or when national legislation is defective or inadequate.



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