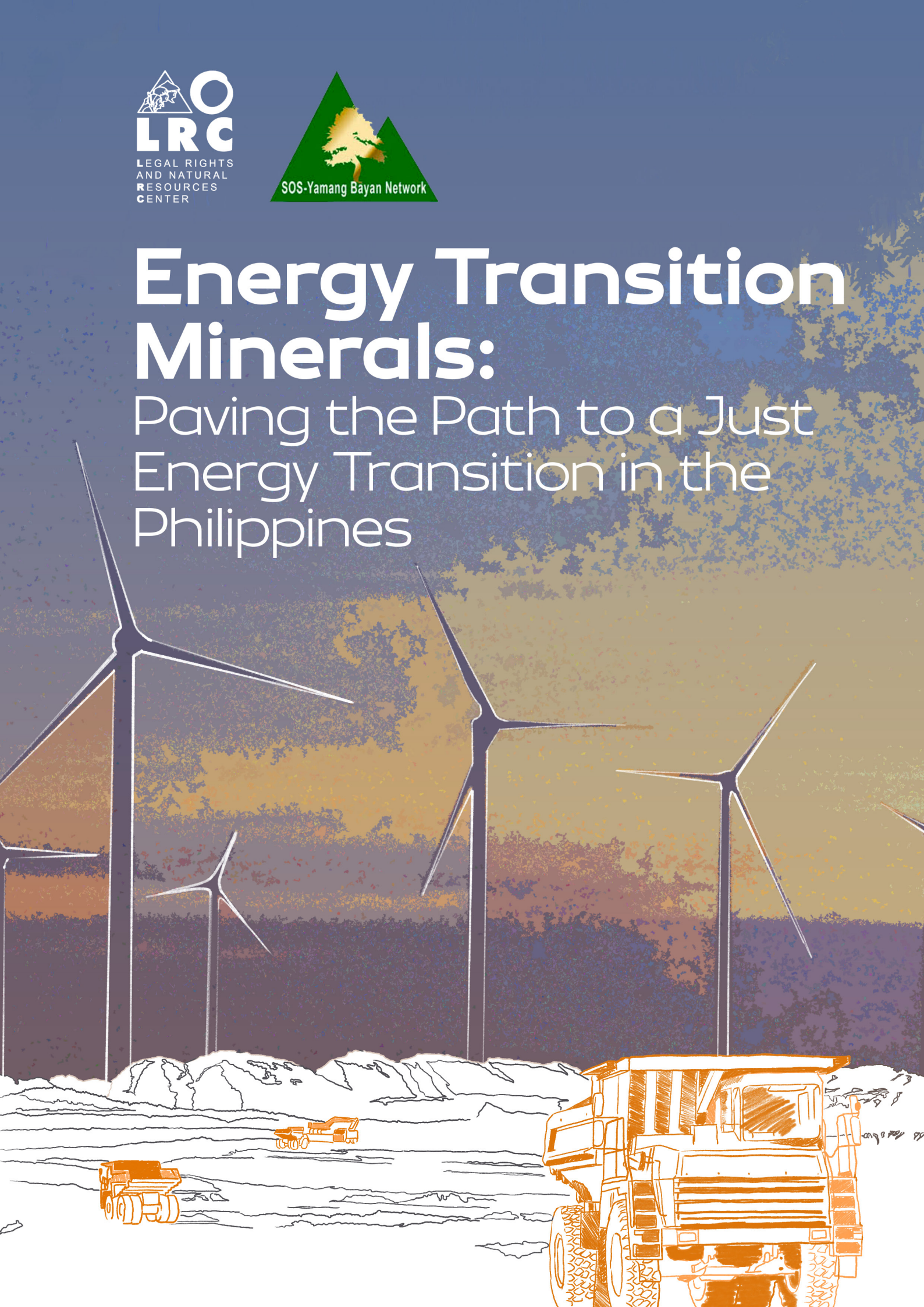
LRC
LEGAL RIGHTS AND NATURAL RESOURCES CENTER

SOS-Yamang Bayan Network

Energy Transition Minerals:

Paving the Path to a Just Energy Transition in the Philippines



Energy Transition Minerals:
Paving the Path to a Just Energy Transition in the Philippines

Copyright @Legal Rights and Natural Resources Center
September 2023

This paper was written by Marco Zaplan, EM Taqueban and Maya Quirino, and published by the Legal Rights and Natural Resources Center.

LRC
LEGAL RIGHTS AND NATURAL RESOURCES CENTER

The Legal Rights and Natural Resources Center (LRC) is a legal services, policy, and advocacy institution that works for the recognition and protection of the rights of indigenous peoples and upland rural poor communities to land and environment. LRC is the Philippines member of Friends of the Earth International. For more information or any clarification about this publication, send an email to lrckskfoeph@gmail.com.

Cover Design and Layout:
S. Villacorta

Table of Contents

Executive Summary

I. Introduction 4

II. Overview of Energy Transition Minerals in the Philippines 5

III. ETM Value Chain in the Philippines 6

IV. Key Players in the ETM Sector 10

V. Viability of Domestic and Regional Mineral Processing 12

VI. Human Rights, Environmental Concerns, and Extractivism 14

VII. Policy Options and Recommendations 17

VIII. Conclusion 21

Executive Summary

The vast reserves of energy transition minerals (ETMs) in the Philippines present significant opportunities, but they also come with risks and challenges for the country. Despite accounting for less than 1% of global greenhouse gas emissions, the Philippines has emerged as a key player in some ETM supply chains, even becoming a leading producer of nickel and cobalt.

ETM upstream and mid-stream production is spread across the country but concentrated to only a few locally owned corporations. According to the Mines and Geosciences Bureau (MGB), there are 165 active mineral production sharing agreements (MPSAs) and 56 mining operations in the country (Mines and Geosciences Bureau, 2023a). ETMs currently make up the majority of these operations. This trend is poised to increase with the ongoing construction and development of at least 16 other MPSAs. These companies are owned and operated by a few locally owned corporations that have the financial and technical capacity to invest in ETM production.

Social, environmental, and economic risks are inherent across the ETM value chain. Over the last few decades, the Philippines has experienced a complex and challenging relationship with the mining industry. High-profile social conflicts and environmental violations of mining operations have earned the ire of the public. With growing demand for ETM, these risks are expected to intensify unless mitigating policies and interventions are put in place.

An ETM strategy that engenders the principles of just energy transition (JET) and just minerals transition (JMT) is needed at both national and regional levels. Currently, strategic plans related to mining in the Philippines and its neighbors in the Association of Southeast Asian Nations (ASEAN) are limited relative to their US and EU counterparts. To maximize the benefits from ETM production and mitigate the risks across the value chain, the country and its regional peers need to make more strategic investments in developing more value-adding industries across the value chain, while also incorporating JET and JMT principles to ensure that no one is left behind.

I. Introduction

The global shift toward cleaner forms of energy relies significantly on the extensive use of minerals. Solar panels, wind turbines, and electric vehicles (EVs), among others, all require minerals to be manufactured. Demand for energy transition minerals (ETMs)—a collective term used to refer to minerals that are needed for the production and use of clean energy technologies—is projected to increase by three times, according to the International Energy Agency (2022). ETMs have also been dubbed as "critical minerals": critical as inputs into transition technologies and critical to maintain energy supply for the world's growing population and economies. The world's path to decarbonization creates significant challenges and opportunities for mineral-rich countries, mostly located in the Global South, such as the Philippines.

Although accounting for just 0.48% of global greenhouse gas emissions in 2019 (WRI, 2020), the Philippines has recently emerged as a major supplier of some ETMs in the global trade market. These minerals include copper, nickel, cobalt, manganese, and silver. Despite public distrust toward the mining industry (EON Group, 2022), the current Marcos, Jr. administration is keen to ramp up mineral production and even position the country as a mineral processing hub (Rivera, 2023). The administration's economic managers have frequently cited the potential contribution of mining to government coffers and as an economic growth driver in the countryside (DOF, 2022).

However, the extraction and processing of ETMs come with their set of challenges. These challenges are further exacerbated in countries that have weak natural resource governance. In a 2017 study of 34 mining countries around the world conducted by the Natural Resource Governance Institute (2017), the Philippines ranked 10th and rated 'weak' in the value realization and revenue management components, respectively. To unlock the potential of its natural resources, the country, along with its peers in the Global South, must depart from the prevailing extractivist paradigm in mineral extraction. A just minerals transition (JMT) is imperative to ensure that benefits redound to their rightful owners, the citizens, and risks are mitigated and managed.

This discussion paper seeks to provide an overview of the ETM landscape in the Philippines. More specifically, it:

- Summarizes information on ETM reserves and analyzes trends of production, including their respective areas;
- Enumerates key players and examines the significance of their role in the ETM extraction and processing industry in the country; and
- Identifies risks and challenges in the ETM extraction and processing, as well as opportunities for reforms and domestic or regional processing and utilization of ETM.

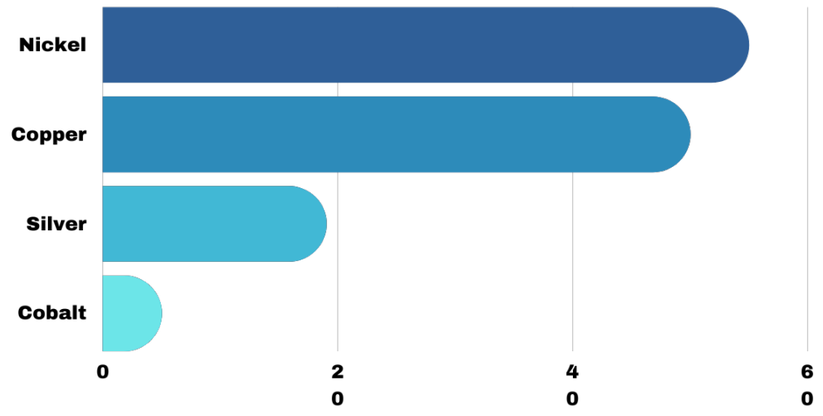
This discussion paper covers four ETMs (i.e., nickel, cobalt, copper, and silver) with existing and significant production as of 2021. The other ETMs that have reserves in the country but excluded from this paper are bauxite, chromite, manganese, and zinc (PSA, 2022). The data analyzed are primarily from the Mines and Geosciences Bureau (MGB), Philippine Statistical Authority (PSA) Compendium of Environmental Statistics, and United Nations Comtrade Database (UN Comtrade), covering fiscal year 2021 given the completeness of data for this period.

II. Overview of Energy Transition Minerals in the Philippines

Among the most significantly used ETMs in renewable energy (RE) technologies, four are currently produced in the Philippines: nickel, cobalt, silver, and copper. Globally, the country ranks among the top producers of nickel and cobalt (IRENA, 2023). Nickel and cobalt, alongside lithium, are used to manufacture EV batteries. Silver is used in many RE technologies, including solar panels and EVs, while copper—known as the "metal of electrification"—is used in almost every RE technology, including wind turbines and electrical wires.

Of the 165 active large-scale metallic mineral production sharing agreements (MPSAs), 35% include nickel, and 30% include copper (MGB, 2023a). It must be noted that most MPSAs have more than one mineral within its tenement. For instance, MPSAs may involve both nickel and copper, among other minerals.

Figure 1. Commodities found in active MPSAs



Source: Mines and Geosciences Bureau (2023a), "Mineral Production Sharing Agreement (MPSA) Statistical Summary Mineral Production"

Of the total MPSAs, 37 are under commercial production or some parts under commercial production, 115 are under exploration or some parts under exploration, 16 are under development and construction, and 2 are under rehabilitation or maintenance. Among those under commercial production, 26 involve nickel, 4 involve copper, and 3 involve silver. As provided in the Mining Act of 1995, MPSAs have a validity period of 25 years that is renewable for another 25 years. The most recently signed MPSAs date back to 2016, which means they are set to expire in 2041 at the earliest and 2066 at the latest.

III. ETM Value Chain in the Philippines

The production of ETMs follows a multi-stage process, consisting of upstream, midstream, and downstream phases.

In the upstream stage, geological surveys and exploration activities identify promising deposits of key ETMs like nickel, copper, and cobalt. Once located, mining operations extract these minerals. In the midstream phase, smelting and refining processes further purify the minerals, ensuring their suitability for clean energy technology production. These refined ETMs serve as essential raw materials for manufacturing various components, such as EV batteries and RE systems. This midstream phase is critical for producing high-quality materials that underpin clean energy transition. Finally, in the downstream stage, industries including EV manufacturing, RE infrastructure, and high-tech electronics utilize these ETMs to create end-use products.

The country currently engages mostly in the upstream phase and some midstream processes, while downstream industries remain nascent.

Production areas and reserves

The country is host to significant ETM reserves spread throughout the country. Nickel reserves are concentrated mostly in the Caraga Region, while copper and silver are most abundant in the Mimaropa Region. The regions with the highest production, however, vary, especially when it comes to silver and copper, as there is no ongoing extraction of these minerals in the Mimaropa Region. This will be discussed in more detail in the latter sections of this paper.

According to the Compendium of Environmental Statistics (PSA, 2022), the country has about 1.7 billion metric tons of silver reserves mostly in the Mimaropa Region, 2 billion metric tons of copper reserves mostly in the Mimaropa and Central Visayas Regions, and 715 million metric tons of nickel reserves mostly in the Caraga and Mimaropa Regions. Of the 165 large-scale metallic MPSAs, 104 are under exploration phase or have some parts of their tenement under exploration, and cover about 306,000 ha. The provinces with the largest expanse of MPSAs under exploration are: Cagayan Valley (30,562 ha), Surigao del Norte (21,577 ha), Surigao del Sur (19,599 ha), Davao Oriental (18,777 ha), and Samar (14,246 ha). Most MPSAs under exploration involve copper (80,054 ha), followed by those containing nickel (75,308 ha), silver (33,787 ha), and cobalt (17,757 ha).

Nickel is currently extracted in nine provinces. According to the MGB Metallic Mineral Production (2022b), the leading provinces in terms of production value for nickel are Surigao del Norte, Zambales, and Dinagat Islands. Copper is processed in three provinces, while cobalt is processed two. Silver is processed alongside gold in seven provinces.

Table 1. Provincial-level areas of ETM production

Nickel (9)	Cobalt (2)	Copper (3)	Silver (7)
Agusan del Norte, Davao Oriental, Dinagat Islands, Eastern Samar, Isabela, Palawan, Surigao del Norte, Surigao del Sur, and Zambales	Palawan & Surigao del Norte	Benguet, Nueva Vizcaya, and Cebu	Agusan del Sur, Benguet, Davao de Oro, Masbate, Nueva Vizcaya, South Cotabato, Zamboanga del Sur,

Source: Philippine Statistical Authority (2022), "Compendium of Environmental Statistics"

The country's metallic mineral production was valued at Php 181 billion in 2021 (MGB, 2022b), with the four ETMs covered in this study accounting for 60% of the total. Nickel made up 31% of total production, followed by nickel-cobalt sulfide, copper concéntrate, and silver, accounting for 18%, 10%, and 1% of the total, respectively.

The country's nickel production, and consequently cobalt, which is extracted and processed from nickel as a by-product, largely occurs in regions with the highest reserves. This is in contrast to copper and silver, where production is limited or nonexistent in areas with the highest reserves.

Table 2. Regional distribution of ETM reserves and production

Nickel

Region	% of reserves	% of production
Region XIII	69%	77%
Region XI	10%	0%
Region III	7%	6%
Region IV-B	6%	16%

Cobalt

Region	% of reserves	% of production
Region XIII	*	58%
Region IV-B	*	42%

Copper

Region	% of reserves	% of production
Region IV-B	84%	0%
Region VII	10%	68%
CAR	3%	27%
Region II	2%	5%

Silver

Region	% of reserves	% of production
Region IV-B	99%	0%
Region XIII	0.1%	4%
Region XII	0.1%	1%
Region IX	*	37%
Region IX	*	22%
Region V	*	15%

Source: Philippine Statistical Authority (2022), "Compendium of Environmental Statistics" and the Mines and Geosciences Bureau (2022b), "Philippine Metallic Mineral Production CY 2022 vs CY 2021"
*No data available

Volumes, values, and global trade of ETMs

Mineral exports account for a relatively significant share of the country's total exports, owing to the rising demand and price of these commodities. In 2021, the country exported a total of USD 6.6 billion worth of minerals accounting for 9% of total exports that year (MGB, 2022). This represents a 29-% increase from 2020 figures, which is significant considering the economic condition at the time.

According to UN Comtrade (2022), the country's 2021 mineral export earnings came mainly from nickel ore and concentrates (USD 1.5 billion), copper concentrates (USD 300 million), and cobalt ore and concentrates (USD 238,000). Globally, the country's nickel exports accounted for 34% of total, while both cobalt ores and concentrates and copper ores and concentrates accounted for less than 1% of the global total. During the same year, the country exported a total of 433 billion kg of nickel ores and concentrates, 88 million kg of copper ores and concentrates, and 331,000 kg of cobalt ores and concentrates.

Domestic midstream and downstream processing and manufacturing

The Philippines faces challenges in the ETM midstream and downstream processing and manufacturing. While the country has substantial reserves of ETMs, it has traditionally been more focused on upstream activities, primarily mining and extraction. The Philippines has been exporting a significant portion of its raw minerals without much value addition. For example, nickel ore exports have historically been a major revenue source, but the country has not invested significantly in the smelting and refining processes needed to produce higher-value nickel products. The country has only started processing some of its nickel with the opening of the Coral Bay Nickel Corporation HPAL in 2005 and the Taganito HPAL Nickel Corporation in 2013 (NAC, n.d.). The Philippine Associated Smelting and Refining (PASAR) Corporation—the country's only copper smelting and refining plant—sources its copper concentrates abroad (PASAR, n.d.), while domestic copper concentrate producers export their products. This has led to missed opportunities for greater economic gains and the development of a more sophisticated and integrated mineral processing sector.

The manufacturing of clean energy technologies and ETM-based products, such as EV batteries, remains nascent. The country currently does not manufacture solar panels, wind turbines, or EVs. In 2017, for instance, publicly listed company SP New Energy Corporation (SPNEC), then Solar Philippines, inaugurated the country's first solar photovoltaic (PV) module manufacturing plant (Publicover, 2017). As per its most recent annual report filing to the Philippines Stock Exchange, however, there is no more mention of the said manufacturing plant. In fact, the report states that "majority of spend as of 31 December 2022 is attributable to imported PV panels since the Company is still in development phase" (SPNEC, 2023, p.8). In essence, the country has yet to fully capitalize on its mineral resources to create a thriving domestic industry that can supply components to the growing global RE and ETM sectors.

Primary consumer countries of ETM

The country's ETMs are consumed primarily by countries with robust electronics and clean energy industries. China stands as a major consumer, with significant demand driven by its electronics and EV sectors. Japan and South Korea, leaders in high-tech electronics and automotive manufacturing, are also notable ETM consumers. These trends are expected to persist, given the ongoing global shift toward clean energy and technology, as well as the comparative advantages these countries have built in the midstream and downstream processing stages of the ETM value chain.

In 2021, according to disaggregated data from UN Comtrade, Japan and China accounted for 40% and 28% of total exports of copper concentrates, respectively. During the same year, China accounted for 95% of total nickel ore and concentrates exports and 100% of cobalt ores and concentrates exports (UN Comtrade, 2022).

IV. Key Players in the ETM Sector

The Philippine ETM industry is dominated by a few, mostly locally owned corporations that are engaged in the upstream and midstream phases. In 2021, a total of 30 companies were engaged in the upstream production of nickel. The top producers of nickel in the country include Taganito Mining Corporation (17% of total production volume) in Surigao del Norte, Rio Tuba Nickel Mining Corporation (11%) in Palawan, Platinum Group Metals Corporation (9%) in Surigao del Norte, Carrascal Nickel Corporation (8%) in Surigao del Sur, and CTP Construction and Mining Corporation in Surigao del Sur (8%) (MGB, 2022). Production of nickel-cobalt sulfide—carried out by two of the nickel processing plants mentioned above—coincides with the country's two largest nickel producers, which both belong to the same group (i.e., Nickel Asia Corporation or NAC). Wholly and partially owned companies of NAC accounted for 36% of nickel production volume and 100% of nickel-cobalt sulfide.

There were 14 mining companies involved in silver production in 2021. The top producers include Apex Mining Company in Davao de Oro, Philippine Gold Processing and Refining Corporation in Masbate, and Philex Mining Corporation in Benguet. Together, they accounted for 60% of total production volume in 2021 (MGB, 2022). Other notable producers include Lepanto Consolidated Mining in Benguet and FCF Minerals in Nueva Vizcaya.

Production of copper ore and concentrates is carried out by only three mining companies. Two of them—the Carmen Copper Corporation and Philex Mining Corporation—accounted for 68% and 27%, respectively, of production volume in 2021 (MGB, 2022). The other producer, OceanaGold Philippines Inc., accounted for the remaining 5%.

Role of refiners in the absence of vertical integration

Refiners take raw ETMs, such as nickel and copper concentrates, and process them into high-purity forms that are suitable for use in clean energy technologies. This often involves smelting and refining to remove impurities and create materials with the desired characteristics.

The country's two nickel processing plants and one copper processing plant play a vital but relatively minor role in terms of mineral production value and beneficiation, respectively. The mixed nickel-cobalt sulfide produced by the two nickel processing plants mentioned above amounted to PHP 32 billion in 2021, which is 18% of the total metallic mineral production that year. The two plants utilized primarily nickel ores extracted from the mining operations near them. Official figures from the MGB (2022) show that production values for Rio Tuba Nickel Mining Corporation and Taganito Mining Corporation included nickel ore deliveries to Coral Bay Nickel Corporation and Taganito HPAL Nickel Corporation, respectively. These two upstream mining operations accounted for 27% of the total production volume that year. Data on the exact portion of the total production that was supplied to these processing plants are, unfortunately, not available. As previously mentioned, PASAR processes copper concentrates from abroad.

Role of commodity traders in the value chain

Commodity traders play a very significant role in the value chain. Their role is mainly to buy raw materials like nickel ores from mining companies for delivery to consumers, such as nickel processing plants in China. Their role in the value chain extends to sourcing, distributing, and pricing ETMs. Given this clout, commodity traders can also influence producers into complying with their standards (e.g., ethical and environmental). The US Dodd-Frank Act and the EU Conflict Minerals Regulation, for example, mandate companies and commodity traders to disclose whether their products contain conflict minerals. These policies consequently require covered companies to conduct due diligence procedures.

Mineral exports data on 11 mining companies reveal that 17 buyers are all commodity traders based mostly in China, Singapore, and Hong Kong (MGB, 2023b). In contrast to large publicly listed commodity traders, the entities engaged by local producers are often privately owned. This makes it challenging to access information about these entities, including details about their owners, sourcing policies, services, payments, and practices.

V. Viability of Domestic and Regional Mineral Processing

Options for domestic use of ETMs and resource nationalism

Over the last decade, the Philippines has been positioning itself to be a mineral processing hub, with multiple legislative proposals to ban the export of raw minerals as early as 2011 during the 15th Congress. Under House Bill 4808, filed by former Representative Francisco Matugas, an outright ban and tax incentives will be offered to mineral processing permit holders to entice investments. These policies are gaining ground elsewhere. In 2022, Mexico (Pulice and Bucanegra, 2023) nationalized their lithium industry, while Zimbabwe banned the exports of unprocessed lithium (Banya, 2022). This is a similar path that Indonesia took as early as 2009 (Mineral and Coal Mining Law No. 4, 2009). By following through with their export ban on raw ore in 2014 (Cochrane, 2014), it sent a signal to mining companies that the government is serious in establishing its downstream industry.

The Philippines can increase its stake across the ETM value chain. Similar to Indonesia's strategy to align their mineral roadmap with their 2015–2035 National Industrialization Development Master Plan, the Philippines should have an ETM strategic plan that aligns with a broader development plan. The key is to follow through with this plan, which should include how the government will consolidate and harmonize its existing policies to make the midstream and downstream industries viable. This gamut of policies should include equitable fiscal and nonfiscal incentives, infrastructure and human resource development, and a progressive fiscal regime for the extraction of ETM to generate revenues, which the government can earmark toward research and development for downstream industries, such as solar panel manufacturing.

Given the significant social, environmental, and economic costs of extracting ETMs, a more inward and conservative approach may be taken by the government. This includes forecasting the domestic supply and demand for ETMs, and extracting only the necessary amount of ETMs to achieve the country's requirements for national industrialization and the development of its ETM downstream industries. A simple illustration of what this approach may look like is projecting the ETM demand for domestic manufacturing of solar panels and allowing for the extraction of only the amount of ETMs required to meet that demand.

For instance, according to the Philippine Energy Plan 2020–2040 of the Department of Energy (2021), the country aims to add an additional 45,000 megawatt (mw) of solar power by 2040. According to the Copper Development Association, Inc. (n.d.), 5.5 metric tons of copper are required to produce 1 mw of solar power. Following this simplistic estimate, the copper content required to manufacture the needed number of solar panels to reach the 2040 target can be met by the country's copper reserves. In fact, it will only take more or less 1% of the country's reserves to meet the requirements of domestically manufactured solar panels

Regional cooperative arrangements and friendshoring

The Philippines alone cannot meet the ETM requirements of its energy transition. One option the country can take is to secure supplies from ally countries, following what other major economies are pursuing in order to reduce their dependence on ETM from China. In diplomatic circles, this policy has earned the name "friendshoring". The Association of Southeast Asian Nations (ASEAN), for instance, established the ASEAN Economic Community (AEC) in 2015 to increase economic integration among its ten member-states. The AEC aims to create a single market and production base, characterized by the free flows of goods, services, labor, investment, and capital within the ASEAN region, to create a competitive and dynamic economic bloc that can collectively compete globally.

One of the components of the AEC is the ASEAN Free Trade Agreement (AFTA), which dates back to 1992. The AFTA liberalized the trade of goods and commodities, including ETMs, among member-states by reducing tariffs and nontariff barriers to trade. The ASEAN Minerals Cooperation Action Plan (AMCAP) serves as the most relevant policy instrument within the bloc for integrating ETM value chains among member-states (ASEAN, 2021). Of the four program areas of the most recent AMCAP 2016–2025, one explicitly focuses on Trade and Investment in Minerals. Under this program area, the bloc aims to "boost domestic and international investments in all components of the minerals value chain across ASEAN member-states in order to continue building ASEAN's resource base and underpin mining and processing investment that leads to greater production and trade and value for member-states." (ASEAN, 2021, p. 13) Under the AMCAP, an ASEAN Minerals Trust Fund, supported by member-states' contributions, was also established to strengthen ASEAN institutions and human capacities on minerals sector development.

The AEC, AFTA, and AMCAP present possible opportunities for the Philippines and the bloc to establish regional cooperation agreements on ETM production across the value chain. An illustration of this regional cooperation could see mineral-rich countries, such as the Philippines, supplying raw nickel ores to midstream processing plants in Indonesia, which will later be further processed in EV battery factories in Vietnam. This approach can help in leveraging the comparative advantages of member-states, securing vital ETM supplies, and increasing economic opportunities within the region. Through increased intraregional commerce in Southeast Asia, AFTA is intended to produce trade creation.

The AMCAP, however, lacks long-term planning and funding. To fully realize the potential of the bloc's various policy instruments on mining, governments of member-states should go beyond doing research, capacity building, and information sharing. The bloc should identify specific long-term initiatives and projects across the value chain, such as nickel projects or smelting plants, which member-states can jointly develop and fund to further cooperation.

Just as the AFTA presents possibilities, it must also be approached with critical measures in place. Trade creation tends to enable the region's most competitive enterprises to outperform the region's least competitive ones. This explains why most of the FTA criticism comes from domestic firms in member-states. Moving forward, the Philippines must find a balance between the potential benefits of expanding its production and home market into a regional market and the possible costs of causing harm to local industry.

Moreover, if the AFTA should be made a viable platform, simple "investor-friendly" laws promotion will not suffice. Additional guarantees must be available, such as a stable political climate, stable exchange rates, consistency in legislation, and sound infrastructure. Other considerations include project incentives, tax breaks, restriction for investment, profit repatriation, technology transfer, and export regulations. After all, foreign direct investments can be used to maintain monopoly profit and gain access in emerging markets around the world, especially at the regional level where there is already a disparity in economies (Verico, 2016).

In an analysis of the AEC Blueprint 2025, which includes the AMCAP in its purview, key challenges were noted and—if meaningful and equitable cooperation is to be realized—must be addressed. These include the absence of rule of law, transparency, and accountability systems in governance, including the unpredictability of public institutions and a lack of effective citizen participation; the uncertainties in regulatory frameworks resulting in corruption cases in several nations and enabling rent-seeking behaviors; and the highly fluctuating prices and severe competition among mineral producers in ASEAN markets hampering the sector's potential contribution to the expansion of ASEAN economies and structures (Irawan, 2017).

VI. Human Rights, Environmental Concerns, and Extractivism

Impacts on local communities and ecosystems

ETM production across the value chain comes with significant social, environmental, governance, and economic risks if not regulated and mitigated.

According to a global study, 51% of 5,097 ETM projects are located in or near indigenous and peasant lands (Owen et al., 2022). The Philippines is among the most dangerous places for environmental defenders, with mining among the key drivers of the killings (Global Witness, 2019). Amnesty International (2021, p. 2) also published a report on nickel mining companies in the province of Dinagat Islands that outlines violations of worker rights, including "workers being hired without contracts, delayed payment of wages and non-payment of compulsory employee benefits." In a report published by the Philippine Center for Investigative Journalism (Ilagan, 2022), rules on securing free, prior, and informed consent (FPIC), as provided for by the Indigenous Peoples Rights Act, were allegedly violated by the Ipilan Nickel Corporation during its pursuit of MPSA renewal in Palawan.

Mining extraction and processing also require significant amounts of water, which can impact local freshwater resources and compete with water use of local communities (Morillo & Magno, 2019). In a global geographic information system-based study on 2,800 mining operations across various minerals, it was found that "most regions mining predominantly results in very low water stress, not surpassing 0.1% of the basins' available water, there are also exceptional cases where the natural water availability is completely exceeded by the freshwater consumption of the mining sector during the entire year." (Meißner, 2021, p. 1)

ETM production also impacts biodiversity, which is an important issue given the Philippines' biodiversity hotspot status. In another global study that assessed the prevalence of mining, oil, gas, and power plant infrastructure in key biodiversity areas (KBAs), it was found that 28% of the country's KBAs already have existing infrastructure related to mines or oil-and-gas extraction (Simkins et al., 2023). Should planned projects under the pipeline continue, the researchers project that the rate could go up to 38% of KBAs.

High economic dependence on a single industry is one potential outcome of ETM production. This dependency makes the local economy exposed to the inherent price volatility and cyclical nature of ETM markets. When ETM prices are high due to increased global demand, the producing areas may experience an economic boom characterized by job creation, increased government revenues, and a surge in domestic economic activities. However, this prosperity can be short-lived, as the cyclical nature of ETM markets often leads to price downturns, triggering a bust phase. During the bust, mining companies may scale back operations, leading to job losses, reduced tax revenues, and a contraction of economic activity. Without economic diversification, these areas can struggle to adapt and diversify their economies, leaving them vulnerable during market downturns.

A global study of 100 real-world corruption cases related to the extractives sector conducted by the Natural Resource Governance Institute (Sayne et al., 2017) shows 58 cases exhibiting a company providing "payments, gifts, or favors to a politically-exposed persons with influence over the selection process". The substantial profits generated by ETM production open up opportunities for corruption and illicit activities, making ETM production susceptible to unethical practices, bribery, and embezzlement. Corruption not only diverts resources away from essential services for local communities but also hinders social and economic development in mining regions.

Findings on violations associated with ETMs

In 2021, the Mining Industry Coordination Council (MICC) conducted a government review of 45 large-scale metallic mining operations, looking into their legal, technical, social, environmental, and economic aspects. According to the experts hired by the Development Academy of the Philippines during the 2018–2019 period, mining operations, on average, scored lowest in the environmental (1.85 out of 3.00) and social (1.95) aspects, while scoring the highest in the economic (2.38) and technical aspects (2.33). Nickel mining companies, on average, scored 2.08, which is lower than gold, silver, and copper mining companies with an average score of 2.40 (MICC, 2021).

The said review generated a rating index that categorizes mining operations into four groups: good, need minor reforms, need major reforms, and poor. Of the total, 24 mining operations were rated "need minor reforms", 15 were rated "need major reforms", 2 were rated "poor", and only 4 were rated "good". Of the 28 nickel mining companies in the review, 13 were rated "needs minor reforms", 11 were rated "needs major reforms", 3 were rated "good", and 1 was rated "poor". In contrast, of the 11 gold, silver, and copper mining companies in the review, 8 were rated "needs minor reforms", 2 were rated "needs major reforms", while 1 was rated as "good".

The MICC (2021) review underscores that certain mining operations have been involved in violations that warrant a closer examination, while others have committed infractions that justify the suspension of their Environmental Compliance Certificate and the non-issuance of Ore Transport Permits and/or Mineral Export Permits. The review also surfaces issues in contractual arrangements of mining operations, with communities and indigenous peoples including non-compliance to standing contracts. Although the reviewed mining operations scored high in the economic aspect, the MICC recommends allocating revenues to building human capital, boosting local economies, accounting for local natural wealth, natural capital, and ecosystem services, among others.

Neocolonial tendencies of mineral production

While significant amounts of minerals have been extracted in resource-rich host countries, many of these countries—mostly in the Global South—remain poor. One of the major contributing factors to this phenomenon is the extractivist nature of the current setup of mining. Extractivism is an economic model that essentially extracts and exports natural resources with minimal processing in the host country, while more value-adding activities are done in developed countries. As a result, more developed countries—mostly in the Global North—enjoy more economic benefits from the natural resources of host countries.

Currently, there is a risk that this type of economic model is perpetuated, if not exacerbated, in the ETM value chain. Multilateral cooperative agreements are being signed left and right as the Global North—notably the US and the EU—scramble for ETM. The EU's Green Industrial Plan and proposed Critical Raw Minerals Act aim to diversify the Union's imported sources of raw minerals with interested countries. These policy instruments provide for the use of its international fund called the "Global Gateway for soft and hard infrastructure to deploy projects along the raw materials value chain and support connectivity" (European Commission, 2023). In the US, the counterpart policy is the Mineral Security Partnership (MSP), which brings 15 economies together to "pursue investment in mining, processing, and recycling development that maintains high environmental and social governance standards" (IEA, 2022). Of the current membership of the MSP, only three are mineral-rich or in the top producers of ETMs.

The EU and US have been open about their intentions to tap the Philippines' ETM reserves and potential. High-ranking officials no less personally visited the country, including US Vice President Kamala Harris and EU Commission President Ursula von der Leyen, to launch initiatives related to ETM value chains. During VP Harris's state visit in November 2022, the Critical Mineral Supply Chains Initiative, which aims "to support the development of a nickel and cobalt processing facility in the Philippines", was launched (White House, 2022). In a press statement during her state visit in July 2023, EU President von der Leyen stated: "So let us start by identifying projects that would develop your local mining industry, supporting your communities, and that contribute to a secure global supply of critical raw materials."

As the West scrambles to diversify their ETM sources away from China, the Philippines has become an important player in the global ETM trade. If done under the prevailing extractivist model, the country and mining communities could lose out and, worse, suffer the brunt of extensive and unsustainable mining.

VII. Policy Options and Recommendations

Champion just energy transition (JET) principles across the ETM value-chain

To address the challenges and manage the risks that have hounded the mining industry for decades, government, industry, and civil society should advocate and institutionalize JET principles across the ETM value chain.

Heffron's (2022) JUST transition framework suggests several pillars within a "legal geography". First, the transition must be based on justice, where affected communities must be consulted (procedural justice), benefit from projects (distributional justice), and have access to remedies in cases of violations (restorative justice). Second, the transition is based on universal forms of justice, which recognize the rights of marginalized groups and the idea of cosmopolitanism, where impacts are considered beyond borders, and trade flows are accounted for. It must also be evaluated within space, where protecting critical areas for conservation is a must. Finally, the transition considers time, as in the speed required to shift to RE and prevent or mitigate the climate crisis.

The United Nations Development Program, through the Alliance of Just Energy Transition (2023), published a document that outlines eight core principles of a just energy transformation. This provides concrete proposals that illustrate JET. According to this document, a just transition must: (1) be guided by science and realize the urgency of cutting emissions; (2) be fair and must consider every group's needs, especially the most affected though least responsible; (3) be sustainable, ambitious, and holistic in limiting global temperature increases; (4) be comprehensive and where strategies developed nationally are co-designed locally; (5) observe social dialogue; (6) be anchored in climate justice and work toward supporting local jobs and communities and achieving wellbeing; (7) recognize energy access as being part of the larger goals of sustainable development, economic growth, etc.; and (8) uphold community and indigenous peoples' rights in pursuing investments, including compensation and meaningful participation for stakeholders.

These core principles provide a comprehensive framework that prioritizes science, fairness, and inclusivity, while also giving importance to addressing climate change. By promoting these principles, the ETM value chain can contribute to a just and sustainable transition to clean energy technologies, while prioritizing the welfare of communities, workers, and the environment.

A just minerals transition (JMT) has also emerged as a specific pathway for managing mineral resources. For the Legal Rights and Natural Resources Center, the production of minerals must be pursued based on: (1) the concept of Eduardo Gudynas's indispensable extraction, where only minerals needed for social wellbeing will be mined; (2) redistribution, where the Global North reduces its material footprint and allow the Global South to catch up; (3) circular economy, to reduce the need for new mining; and (4) a responsible minerals sourcing informed by robust protocols, such as those identified by the International Responsible Mining Assurance Index (Quirino & Taqueban, 2023).

A report published by the International Renewable Energy Agency (2023) identifies the specific risks associated with ETM production and their possible solutions (see Table 3).

Table 3. Selected social, environmental, and governance risks

Risk areas		Description	Solution
Social	Indigenous communities	Mining has been associated with land loss, displacement, and human rights abuses against indigenous communities.	Facilitate robust and proactive community engagement throughout the entire project cycle
	Labor conditions	Poor labor conditions have been persistent in the global mining industry, which lacks adequate social protection and labor laws.	Implement stringent safety regulations and ensure fair wages and social protection for workers
	Artisanal and small- scale mining (ASM)	ASM has been linked to hazardous conditions, child labor, low wages, and a lack of social protection.	Improve ASM oversight, engage in dialogue with ASM communities, and offer alternative livelihood opportunities
Environmental	Climate change	The metals and mining sector is responsible for 10% of the global greenhouse gas emissions.	Increase energy efficiency investments, shift to cleaner fuels and renewables, and foster circularity and recycling
	Biodiversity	Mining activities can harm biodiversity through deforestation, habitat loss, and soil erosion.	Integrate biodiversity considerations into mining practices through sustainable planning and resource management
	Waste and pollution	Mining waste can pose hazards for local environments and communities if not managed properly.	Adopt stringent waste reduction, management, and reclamation and rehabilitation programs
	Water stress	Mining and processing have significant water requirements and pose contamination risks.	Encourage water saving, reuse and desalination, and responsible water discharge
Governance	Corruption	Corruption risks can arise in many stages of mining projects, including licensing and revenue collection.	Improve transparency, accountability, public participation, and governance frameworks
	Inadequate tax collection	Tax avoidance and inadequate tax frameworks can lead to substantial revenue losses for host governments.	Strengthen fiscal frameworks, administrative capacities, and international tax co-operation
	Revenue management	Mineral revenues are not always allocated in the most effective way to support economic growth and industrialization.	Direct mineral rents toward industrial transformation and economic diversification

Source: IRENA (2023)

Improve overall mining governance in the country

To fully realize the potential of the country's ETM reserves and production, improving transparency, accountability, and citizen participation must be high in the government's agenda. This includes full disclosure of information, contracts, and documents related to ETM extraction and processing to enable citizens to hold companies and government accountable. The government should move to institutionalize, through legislation, and mainstream its reportorial requirement into existing processes of the government, with additional provisions on complementing and enhancing capacity to act on breaches or violations. This is a necessary step to improving transparency and ensuring that ETM policies are evidence-based.

According to the last Resource Governance Index (RGI) in 2017, the country scored lowest in the local impact subcomponent and the subnational revenue sharing, which are two critical areas given the significant impact of mining at the local level. More specifically, the RGI rated as "weak" the country's environmental mitigation plan, rules, and environmental compliance practice (NRGI, 2017). The government may use the RGI to benchmark its mining governance against other mining countries, leverage areas where it already performs well, and focus on governance areas that are critical and need improvement.

Engage in national and local accountability mechanisms related to mining

In the short-run, civil society organizations (CSOs) must harness existing ETM disclosures to push the envelope and come up with evidence-based advocacy. CSOs also need to actively participate in and use existing transparency and accountability mechanisms available at the international, national, regional, and local levels.

While these accountability mechanisms are limited, their efficacy is dependent on their ability to influence. Without any regulatory functions, they can serve as pressure points for demanding greater transparency and enhanced regulation.

At the international level, the Extractive Industries Transparency Initiative (EITI) and the Open Government Partnership (OGP) exist—both of which have national counterparts lodged under the Department of Finance and the Department of Budget and Management, respectively. CSOs should leverage the EITI Standard Requirements and the OGP National Action Plan (NAP) to further disclosures related to ETM, protect civic space, and engage other stakeholders in meaningful dialogues. The Philippine EITI is a multi-stakeholder platform for CSOs to engage in, given its growing focus on ETM transparency in light of energy transition and grievance mechanisms, among others. The co-creation process for the Philippine OGP NAP 2023–2028 is currently ongoing, giving CSOs a window of opportunity to embed JET principles in the commitment on the subnational EITI implementation. The Philippines will also be chairing the coming ASEAN Summit in 2026, which provides an opportunity for the country to set the agenda for the next phase of the AMCAP.

At the regional level, CSOs must be able to harness regional fora and coalitions, including regional movements to help influence regional advocacies toward a common goal. This entails having a unified voice in integrating JMT principles in regional pacts, such as the AMCAP.

Lobby robust social, economic, and environmental disclosures and policies

The impact of ETM extraction is felt most at the local level. This is why CSOs must engage development councils at the regional, national, and local levels, particularly in areas where there are rich ETM deposits, to ensure that development plans, including local council ordinances and resolutions, reflect JMT principles. Local ordinances, such as environmental codes, should have robust social and environmental protection policies in light of the growing demand for ETMs and rehabilitation of mining operations down the line. Local CSOs must have the space and capacity to engage in multi-partite monitoring teams (MMTs), which are mandated by law to monitor the social and environmental impacts of critical projects, including mining operations. Local CSOs should have the competency to access and understand MMT reports to ensure mining projects follow government rules and environmental thresholds.

National government, particularly the Department of Environment and Natural Resources through the Environmental and Management Bureau and the MGB, should issue guidelines on how mining operations can achieve net-zero operations. These interventions should include setting the baseline, phased targets, reporting and accountability mechanisms, energy efficiency measures, and technical and financial support from the government. Additionally, such operations must pass through stringent cost-benefit analysis, especially as they impact on the environment and communities. These guidelines may build on existing government policies, such as the Republic Act No. 11285, otherwise known as the Energy Efficiency and Conservation Act, and the Securities and Exchange Commission Memorandum Circular 04, series of 2019, which mandates all publicly listed companies, including large-scale metallic companies, to report their greenhouse gas emissions among other environmental indicators.

Lastly, local government units (LGUs) hosting significant mining operations should have economic diversification policies that set out a course of action for LGUs to take in ensuring that the local economy is not put at risk of being overly dependent on just mining. Economic diversification policies may include revenues being channeled to develop other nascent, local industries, such as agro-industrial processing. This is to ensure that the local economy is not overly dependent on mining alone and that future generations can benefit from the extraction of the country's natural resources.

Integrate JET and JMT principles and an ETM strategy provision in the Alternative Mineral Management Bill (AMMB)

Institutionalizing JET principles across the ETM value chain does not necessarily require a new advocacy, as there are already existing CSO-led policy reforms around mining, such as the AMMB. In fact, the AMMB has already integrated JET principles and a JMT lens in its most current iteration.

Strategic investments in midstream and downstream processing and manufacturing, along with policy initiatives to encourage value addition and the development of a skilled workforce, are needed to address the current limitations of the domestic ETM sector. On top of the AMMB's proposed National Industrialization Program and the Mineral Management Plan, the country should have a separate ETM strategy similar to the critical minerals strategy. This is to account for the specific policy requirements of ETM extraction and processing that should (1) mandate the government to develop ETM value chains, (2) incentivize domestic midstream and downstream processing, and (3) earmark mineral revenues toward diversifying the local economy and developing a skilled workforce that is able to participate in RE technology manufacturing. These policies can help the Philippines maximize the economic benefits of its mineral resources and better participate in the global shift toward clean energy and technology.

The country's ETM strategy should establish specific targets for identifying the total ETM requirements of the country that will be domestically extracted and processed, recycled, and imported. These targets could serve as a basis for government planning. They also send a clear signal to the private sector about the country's intentions and expectations in the ETM industry. Lastly, the ETM strategy should be flexible enough to account for multiple scenarios under various assumptions, including trends in RE technological innovations and resource substitutions

VIII. Conclusion

The Philippines is endowed with significant natural resources, including ETMs, which are critical to develop technologies needed for energy transition. The prevailing extractivist model—in which the country's benefits are confined to upstream production and some midstream processing—limits the gains for both present and future generations. Yet, it is these generations that bear the full weight of the significant social, environmental, and economic costs associated with mining. The country should break away from this paradigm and put forward interventions to develop the its midstream and downstream industries, while simultaneously institutionalizing JET and JMT principles in its mining governance. An ETM strategy at the national and regional levels is necessary to help guide and harmonize these interventions in the long term.

While ETMs, as nonrenewable resources, offer citizens an opportunity to translate their natural resources into sustainable development, caution must be exercised moving forward. Energy is a necessary input in modern economic activities that lead to gains. However, it is important to note that many of these gains have been achieved through mostly unsustainable practices. If ETMs are to meaningfully address the problem of fossil consumption in the energy sector, harnessing them must be accompanied by innovations rooted in sustainability rather than just economic opportunity.

Issues about energy security may arise as more people demand more energy resources, while, at the same time, many Filipinos still lack access to energy. If abating the strain on the rapidly heating planet is to be achieved, ETMs as ingredients to low-carbon transition must be founded on energy sufficiency. Their use must be rationalized within the context of a more ecological definition of development; otherwise, alternative sources of energy may inadvertently perpetuate the same unsustainable practices we aim to address.

References

Alliance for Just Energy Transformation (AJET). (2023). The 8 core principles of a just energy transformation. United Nations Development Programme. https://www.undp.org/energy/publications/8-core-principles-just-energy-transformation.

Amnesty International. (2021). Philippines: Undermining workers' rights: Labour rights abuses in nickel supply chains. Amnesty International. https://www.amnesty.org/en/documents/asa35/4389/2021/en/.

Association of Southeast Asian Nations (ASEAN). (2021). ASEAN Minerals Cooperation Action Plan 2016–2025 (AMCAP-III) Phase 2: 2021–2025. ASEAN. https://asean.org/wp-content/uploads/2021/11/AMCAP-III-Phase-2-Final.pdf.

Cochrane, Joe. (2014, January 12). Indonesia announces export ban on raw ore. https://www.nytimes.com/2014/01/13/business/international/indonesia-announces-export-ban-on-raw-ore.html. (accessed on 5 Sep 2023)

Copper Development Association Incorporated. (n.d.). Renewables. Copper Development Association. https://www.copper.org/environment/sustainable-energy/renewables/ (accessed on 6 Sep 2023).

Department of Energy (DOE). (2021).

Department of Finance (DOF). (2022). Diokno banks on mining for continuous economic recovery and expansion. https://www.dof.gov.ph/diokno-banks-on-mining-for-continuous-economic-recovery-and-expansion/ (accessed on 5 Sep 2023).

EON Group. (2022). Philippines Trust Index. EON Group. https://eon.com.ph/services/the-philippine-trust-index/.

European Commission. (2023). The Green Deal Industrial Plan: putting Europe's net-zero industry in the lead. https://ec.europa.eu/commission/presscorner/detail/en/ip_23_510 (accessed on 5 Sep 2023).

Heffron, R. (2022). Achieving a just transition to a low-carbon economy.. https://doi.org/10.1007/978-3-030-89460-3_1 (accessed 13 September 2023)

Global Witness. (2019). Defending the Philippines. https://www.globalwitness.org/en/campaigns/environmental-activists/defending-philippines/ (accessed on 7 Sep 2023).

Ilagan, K. (2022, July 20). Palawan IPs seek to stop consent process for 2 nickel mines in Brooke's Point. Philippine Center for Investigative Journalism. https://pcij.org/article/8903/palawan-ips-seek-to-stop-anomalous-consent-process-for-two-nickel-mines-in-brookes-point (accessed on 7 Sep 2023).

International Energy Agency (IEA). (2022). Minerals security partnership – Policies – IEA. https://www.iea.org/policies/16066-minerals-security-partnership (accessed on 5 Sep 2023).

International Renewable Energy Agency (IRENA). (2023). Geopolitics of the energy transition: Critical materials. IRENA. https://www.irena.org/Publications/2023/Jul/Geopolitics-of-the-Energy-Transition-Critical-Materials.

Irawan, B. (2017). AEC Blueprint 2025 Analysis: An analysis of the ASEAN cooperation in minerals. CIMB ASEAN Research Institute. https://www.cariasean.org/AEC_Blueprint_2025_Analysis/AEC_Volume1_Paper24.pdf.

Meißner, Simon. (2021, November 26). The Impact of Metal Mining on Global Water Stress and Regional Carrying Capacities—A GIS-Based Water Impact Assessment. Resources, MDPI, vol. 10(12), pages 1, November. https://ideas.repec.org/a/gam/jresou/v10y2021i12p120-d689015.html (accessed 5 Sep 2023)

Mineral and Coal Mining, Law No.4/2009. (2009) https://faolex.fao.org/docs/pdf/ins85947.pdf (accessed 5 Sep 2023)

Mines and Geosciences Bureau (MGB). (2022a). Mineral industry statistics. Mineral Statistics Corner. https://mgb.gov.ph/attachments/article/162/MIS-Qtrly-2020-to-S1-2023-for-UPLOAD-as-of-24-Aug-2023.pdf.

———. (2022b). Philippine metallic mineral production CY 2022 vs CY 2021. Mineral Statistics Corner. https://mgb.gov.ph/images/Mineral_Statistics/2022/PHILIPPINES-METALLIC-MINERAL-PRODUCTION-2022-VS-2021_15_MARCH_2023.pdf.

———. (2023a). Approved mining contracts and permits. Mineral Statistics Corner. https://mgb.gov.ph/attachments/article/50/AUG_2023_MPSA_2A.pdf.

———. (2023b). Mineral Ore Export Permits. Mines and Geosciences Bureau - Central Database. http://databaseportal.mgb.gov.ph/#/public/mineral-ore-export-permits.

Mining Industry Coordinating Council (MICC). (2021). Review of Philippine large-scale metallic mines. DOLE. https://www.dole.gov.ph/php_assets/uploads/2022/06/MICC-Mining-Technical-Paper-Online-Version.pdf.

Morillo, J. and C. Magno. (2019). Case studies on the water use of large-scale mining in the Philippines. UPSE Discussion Papers. https://econ.upd.edu.ph/dp/index.php/dp/article/view/1522/1002.

Natural Resource Governance Institute (NRGI). (2017). Resource Governance Index. https://resourcegovernanceindex.org/data/mining/issue?region=global&years=2017 (accessed 5 Sep 2023).

Nickel Asia Corporation (NAC). (n.d.). About us – Nickel Asia Corporation. https://nickelasia.com/about-us (accessed 4 Sep 2023).

Owen, J., D. Kemp, A. Lechner, J. Harris, R. Zhang, and E. Lèbre. (2022). Energy transition minerals and their intersection with land-connected peoples. Nature Sustainability, 6, p. 203–211. https://www.nature.com/articles/s41893-022-00994-6.

Philippine Associated Smelting and Refining (PASAR). (n.d.). What we do. https://pasar.com.ph/what-we-do/#smelting (accessed 4 Sep 2023).

Philippine Statistical Authority (PSA). (2022). Compendium of Philippine Environment Statistics (CPES). PSA. https://psa.gov.ph/statistics/environment-statistics.

Publicover, B. (2017, August 25). Solar Philippines inaugurates country's first PV panel factory. PV Magazine. https://www.pv-magazine.com/2017/08/25/solar-philippines-inaugurates-countrys-first-pv-panel-factory/ (accessed 4 Sep 2023).

Quirino, M. and E. Taqueban. (2023). Toward a just minerals transition in the Philippines. Legal Rights and Natural Resources Center. (accessed on 13 Sep 2023).

Pulice, Carolina and Bocanegra, Nelson. (2023, February 18). Mexico's Lopez Obrador orders ministry to step up lithium nationalization. https://www.reuters.com/world/americas/mexicos-lopez-obrador-orders-ministry-step-up-lithium-nationalization-2023-02-19/ (accessed on 5 Sep 2023).

Banya, Nelson. (2022, December 21). Zimbabwe bans raw lithium exports to curb artisanal mining. https://www.reuters.com/world/africa/zimbabwe-bans-raw-lithium-exports-curb-artisanal-mining-2022-12-21/ (accessed on 5 Sep 2023). Reuters.

Rivera, D. (2023, June 13). Philippines aims to become mineral processing hub. Philippine Star. https://www.philstar.com/business/2023/06/13/2273361/philippines-aims-become-mineral-processing-hub (accessed on 5 Sep 2023).

Sayne, A., A. Gillies, and A. Watkins, A. (2017). Twelve red flags: Corruption risks in the award of extractive sector licenses and contracts. Natural Resource Governance Institute. https://resourcegovernance.org/sites/default/files/documents/corruption-risks-in-the-award-of-extractive-sector-licenses-and-contracts.pdf.

Simkins, A.T., A. Beresford, G. Buchanan, O. Crowe, W. Elliott, P. Izquierdo, D. Patterson, and S. Butchart. (2023). A global assessment of the prevalence of current and potential future infrastructure in key biodiversity areas. Biological Conservation, 281. https://www.sciencedirect.com/science/article/pii/S0006320723000538?via%3Dihub

SP New Energy Corporation (SPNEC). (2023). Annual Report 2023. EDGE Philippine Stock Exchange. https://edge.pse.com.ph/openDiscViewer.do?edge_no=dde47904186e453a9e4dc6f6c9b65995.

UN Comtrade. (2022). UN Comtrade Database. https://comtradeplus.un.org/TradeFlow?Frequency=A&Flows=X&CommodityCodes=2603&Partners=0&Reporters=all&period=2021&AggregateBy=none&BreakdownMode=plus (accessed 5 Sep 2023).

Verico, K. (2016). The Impact of ASEAN FTA: Regional analysis. The Future of the ASEAN Economic Integration, p. 25–111. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7120520/.

White House. (2022, November 20). Fact sheet: Vice President Harris launches new initiatives to strengthen US-Philippines alliance. https://www.whitehouse.gov/briefing-room/statements-releases/2022/11/20/fact-sheet-vice-president-harris-launches-new-initiatives-to-strengthen-u-s-philippines-alliance/ (accessed on 5 Sep 2023).

World Resources Institute (WRI). (2020). Climate watch (CAIT): Country greenhouse gas emissions data. WRI. https://www.wri.org/data/climate-watch-cait-country-greenhouse-gas-emissions-data.



LRC
LEGAL RIGHTS AND NATURAL RESOURCES CENTER

Legal Rights and Natural Resources Center-
Friends of the Earth Philippines
lrcksk.org | lrckskfoeph@gmail.com
@lrcfoeph