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Nickel for the Energy Transition

A Developmental Perspective

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PROJECT:
Sector Programme Extractives and Development
Friedrich-Ebert-Allee 32 + 36
53113 Bonn, Germany

T +49 228 44 60-0
F +49 228 44 60-17 66
E rohstoffe@giz.de
I www.rue.bmz.de

AUTHOR
This report was written by Jannick Saegert, Vovia Witni and
Marie Nerreter (WINS Global Consult GmbH).

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This report has been finalised in November 2022 and does not fully reflect
the latest occurrences in the sector in Indonesia.

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AMDAL	Analisis Manajemen Dampak Lingkungan (Environmental Impact Assessment)
ASM	Artisanal and Small-scale Mining
BMZ	Federal Ministry for Economic Cooperation and Development
CCCMC	China Chamber of Commerce of Minerals Metals and Chemicals Exporters and Importers
CSO	Civil Society Organisations
CSR	Corporate Social Responsibility
DSTD	Deep-Sea Tailings Disposal
EITI	Extractive Industries Transparency Initiative
ESG	Environmental, Social and Governmental risks
EV	Electric Vehicle
OEM	Original Equipment Manufacturer
FDI	Foreign Direct Investment
GDC	German Development Cooperation
GDP	Gross Domestic Product
GHG	Greenhouse Gas
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit
HPAL	High-Pressure Acid Leaching
IBC	Indonesia Battery Corporation
IEA	International Energy Agency
IMIP	Indonesia Morowali Industrial Park
IUP	Izin Usaha Pertambangan (Nickel Mining Business Permits)
IWIP	Indonesia Weda Bay Industrial Park
LME	London Metals Exchange
M&E	Monitoring and Evaluation
MHP	Mixed Hydroxide Precipitate
NPI	Nickel Pig Iron
OHS	Occupational Health and Safety
RMAP	Responsible Minerals Assurance Programme
RMI	Responsible Minerals Initiative
RRA	Risk Readiness Assessment
SDG	Sustainable Development Goals
WTO	World Trade Organisation

1. Introduction

The global energy and mobility transitions have triggered a substantial increase in demand for basic, precious, and rare earth metals and will continue to drive demand and competition for critical resources. In particular, the demand for non-ferrous base metals which are crucial for battery technologies, such as cobalt, lithium, graphite, manganese, and nickel, will further soar in the near future. The rise in demand and the increasingly fierce global competition for those resources present far-reaching opportunities and challenges for those countries which are rich in reserves and production capacities of those resources.

Mining responsibly can make an important contribution to achieving the Sustainable Development Goals (SDGs). However, mining is also frequently associated with social and environmental challenges, such as contributing to health risks as a result of poor occupational health and safety measures, contributing to air, water, and soil pollution as a result of toxic emissions, as well as contributing to human rights abuses including the worst forms of child labour. While the developmental impacts of lithium and cobalt value chains have already sparked intense public scrutiny, reporting by global media outlets and engagement of international organisations and the private sector, nickel is just beginning to make its way into the global spotlight as demand from battery manufacturers is increasing. Supply is under pressure, not least due to the Russian invasion into Ukraine and subsequent economic sanctions over Russia. In the wake of the invasion in 2022, the nickel price at the London Metals Exchange (LME) increased drastically over a short period of time so that LME temporarily suspended nickel trading and cancelled nickel contracts.[1]

On the demand side, the substitution of cobalt by nickel and manganese in Lithium-ion batteries is becoming a major driver for the nickel demand surge. Following the allegations of widespread child labour and the proliferation of artisanal operators in the cobalt industry, prominent battery manufacturers like Samsung SDI and Panasonic as well as electric vehicle original equipment manufacturers (EV OEMs) like Tesla are increasingly leaning towards creating “cobalt-free” batteries. The shift towards more nickel-intensive batteries is further driven by certain technological advances, such as higher battery density and therefore vehicle range.

1 *https://www.reuters.com/business/lme-suspends-nickel-trading-day-after-prices-see-record-run-2022-03-08/*

In addition, nickel is crucial for wind turbines and nuclear facilities. According to the International Energy Agency (IEA), the demand for nickel is expected to rise from 2020 to 2040 by around 60-70 %.[2]

Indonesia is currently the largest nickel producing country, accounting for more than a third of global production and about a quarter of all nickel reserves.[3] Considering the supply crunch from Russia and the increasing demand, the nickel industry is likely to become of major strategic importance for Indonesia. The Indonesian government has formulated the strategic objective to develop an integrated electric vehicle (EV) supply chain and develop its battery cell industry and attract foreign investment for EV production.[4]
The ambitious industrial strategy aims at developing battery manufacturing capacities of 140 GWh by 2030[5], which almost equals the total global lithium-ion automotive battery manufacturing production of 160 GWh in 2020, according to the IAE.[6] However, certain government policies – such as banning raw exports of nickel ore – and reports over environmentally risky business practices – such as high-pressure acid leaching (HPAL) in combination with deep-sea tailings disposal – as well as other challenging environmental and social impacts of nickel mining, processing and battery material and steel manufacturing may foreshadow growing concerns over the role of nickel from Indonesia. A crucial concern is also directed at the proportion of coal in energy production, which is used for nickel mining and processing, which taints the greenhouse gas (GHG) footprint of batteries for E-mobility.
Hence, the GIZ sector project Extractives for Development III commissioned by the German Federal Ministry for Economic Cooperation and Development (BMZ) assigned WINS Global Consult GmbH to conduct a study about "Nickel for the Energy Transition – A Developmental Perspective". A focus of the study will be on the developmental impacts of the nickel value chain in Indonesia.

2 *https://www.iea.org/reports/the-role-of-critical-minerals-in-clean-energy-transitions/executive-summary*
3 *U.S. Geological Survey (2022), Mineral Commodity Summaries: Nickel.*
4 *https://www3.bkpm.go.id/en/publication/detail/news/indonesia-battery-cell-industry-electric-vehicle-battery-cell-factory*
5 *https://www.csis.org/analysis/indonesias-battery-industrial-strategy*
6 *https://www.iea.org/reports/global-ev-outlook-2021/prospects-for-electric-vehicle-deployment*


28
Ni
Nickel
58,6934

2. Objectives and Methodology

Objectives

The objectives of the study include:

- Analyzing the nickel value chain in Indonesia in the context of rising demand for battery-grade nickel, mapping the nickel supply chain, analyzing the legal landscape, and identifying positive and negative developmental impacts of nickel extraction and processing.
- Providing recommendations for stakeholders from government and businesses in Indonesia with regard to supporting responsible nickel value chains and upgrading the domestic value chain for nickel processing, battery materials manufacturing and EV production while maximizing the positive developmental impact and minimizing environmental, social and governmental (ESG) risks in the value chain, as well as recommendations for phasing-out coal as the primary energy source for nickel mining and processing.
- Providing recommendations for stakeholders of the international development cooperation on how to support responsible nickel value chains, both globally and in Indonesia, as well as identifying approaches which may contribute to a just transition in Indonesia, in particular regarding phasing-out coal as energy source in the nickel mining and processing.

Methodology

For data collection, a mixed-method approach was used, including desk research and semi-structured interviews, as well as a field visit to the PT Vale site in Sorowako, East Luwu District in South Sulawesi.

The desk research was informed by scientific publications, publications from nickel, battery, and EV industries membership groups, reports from industry analysts and consultancies, reports from international organisations, international initiatives, and reports from international and local civil society organisations in Indonesia.

Interviews have been conducted with key government officials in Indonesia, with experts from academia and civil society in Indonesia, and with global responsible mineral supply chain initiatives, the Responsible Minerals Initiative (RMI), and the Chinese Chamber for Minerals, Metals and Chemicals Importers and Exporters (CCCMC).

In addition, a field visit to PT Vale's Sorowako site in East Luwu District, South Sulawesi was conducted. The targeted respondents were local and provincial officials and stakeholders in mining communities.

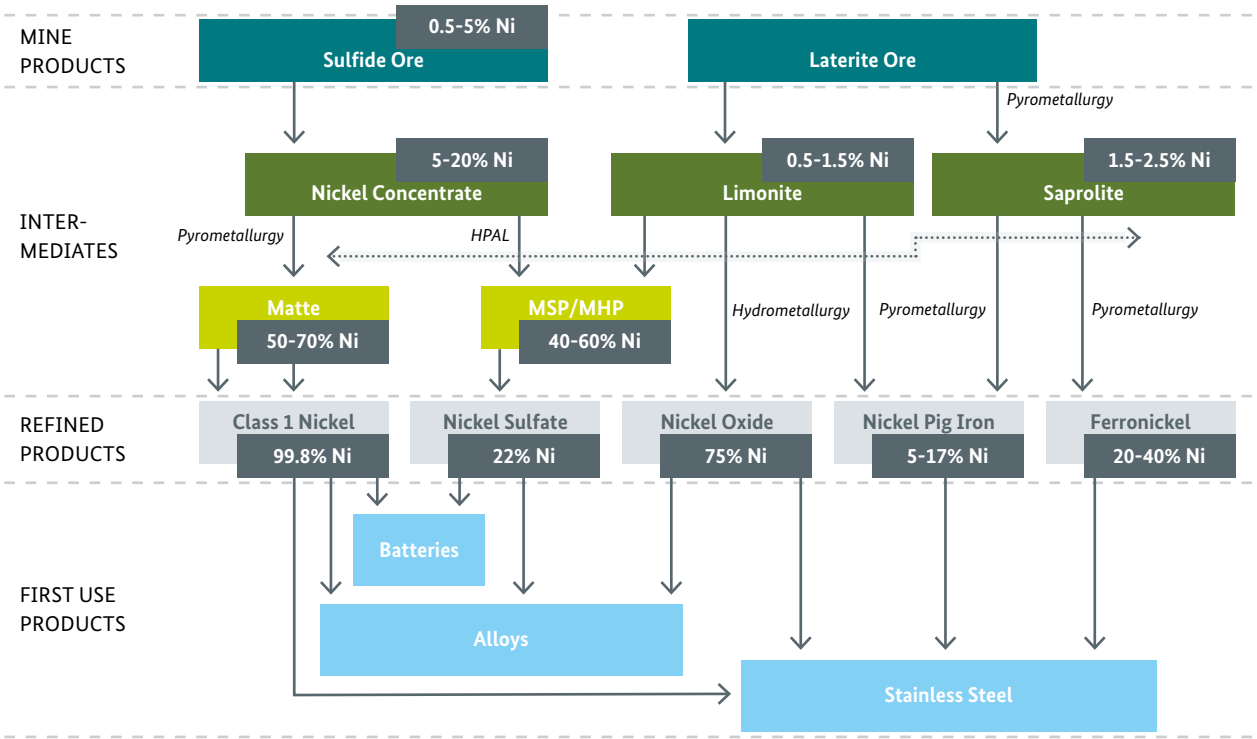
3. The Global Nickel Value Chain

This chapter provides context information on the sector, including major production countries, reserves and production volumes, processing volumes, trade statistics, etc. Furthermore, the chapter includes a prognosis of the future demand for nickel and the major trends in the industry, including the use in new technologies, an outlook on the role of nickel in battery supply chains, and the demand for nickel for the energy transition.

3.1. Nickel reserves, production, and trade

Discovered in 1751, nickel is the fifth most common element on earth. Nickel has an extremely high melting point at 1,453° Celsius, resists corrosion and oxidation and is highly ductile.[7] Nickel is predominantly used to make stainless steels, alloys, and lithium-ion batteries.[8]

Figure 1: Nickel Value Chain
(Source: Own illustration based on Szurlies (2022), Der Globale Nickelmetallmarkt – Zwischen Legierungselement und Batterierohstoff)



7 *World Nickel Factbook 2021.*
8 *World Nickel Factbook 2021.*

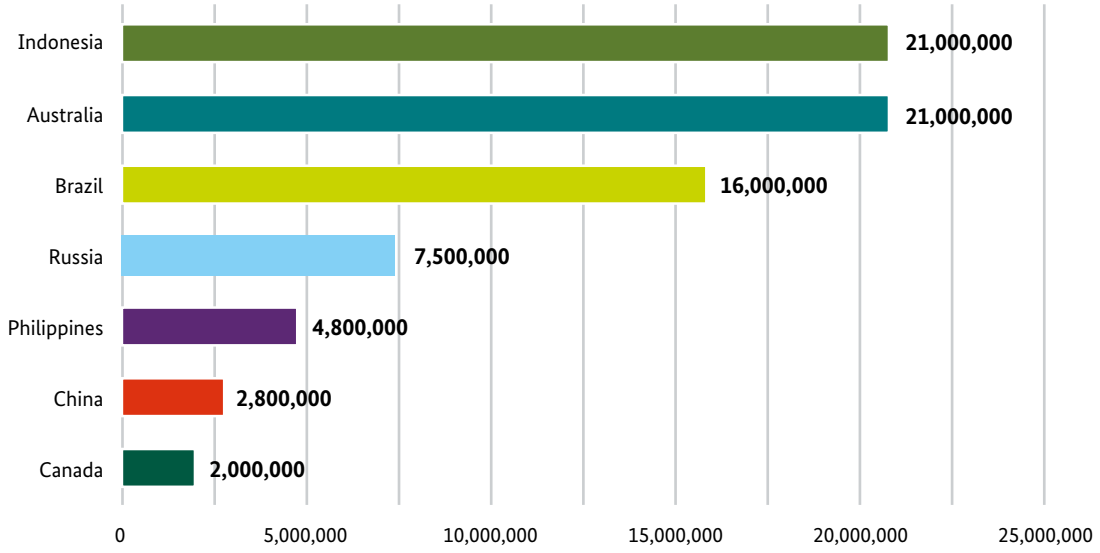
In 2021, the most important area for application for first-use nickel was the manufacture of stainless steel with 73 % of total consumption, followed by the use in batteries with 11 %, the manufacture of non-ferrous alloys with 6 %, and other applications for the remaining 10 %.[9] Nickel ores can be distinguished in sulfide ores and lateritic ores. There are different hydro- and pyrometallurgical processes to refine nickel ore to nickel intermediates and refined metal or chemical products which are further processed to steel, alloys or battery materials (see *Figure 1*).

Battery cathode production requires high grade nickel of 99.8 % purity (Class 1) which is usually refined from nickel matte generated from sulfidic nickel ores. As new technologies have emerged and due to the increased demand for battery precursor material, the processing of limonite to the nickel intermediate "mixed hydroxide precipitate (MHP)" as suitable as feedstock for nickel sulfate has become a viable and cost-effective alternative for producing battery grade nickel.[10] Producing battery-precursor material from lateritic ores requires hydrometallurgical processing through a HPAL.

Nickel Reserves

Indonesia and Australia possess the highest nickel reserves with 21 million tonnes each, followed by Brazil with 16 million tonnes (see *Figure 2*).[11]

Figure 2a: Nickel reserves, in metric tonnes
(Source: Own illustration)



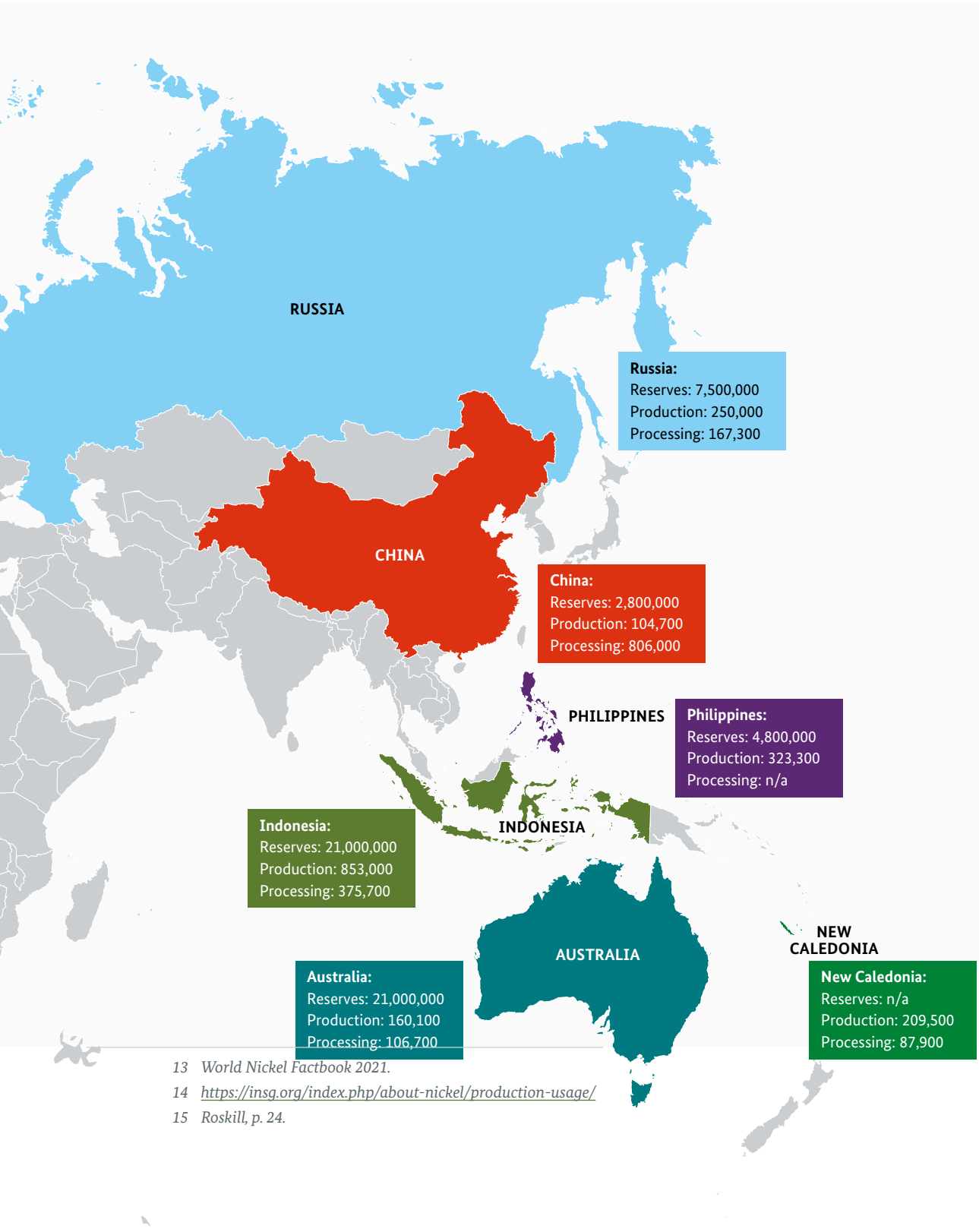
Economic concentrations of nickel occur in sulfide and in laterite-type ore deposits. In addition, significant nickel deposits are reckoned to be in the deep sea. Manganese nodules, which are found on the deep-sea floor, contain significant amounts of nickel. Recent estimates indicate that more than 290 million tonnes of nickel may be contained in such deposits. The development of deep-sea mining technologies would facilitate access to these resources in the future. However, many companies – such as Google, BMW, VW, AB Volvo, and Samsung SDI – have already endorsed the WWF-initiated commitment to effectively ban deep-sea mining.[12]

9 *Vasters, J./ Franken, G./ Szurlies, M. (2021): 'Nickel. Informationen zur Nachhaltigkeit', BGR.*
10 *https://www.fastmarkets.com/insights/mhp-emerges-as-preferred-route-to-sulfate-for-international-nickel-market*
11 *U.S. Geological Survey (2022), Mineral Commodity Summaries: Nickel.*
12 *https://www.noseabedmining.org*

Figure 2b: Nickel reserves, production and processing volumes, in metric tonnes
(Source: Own illustration, based on data on production and processing for 2020 from "BGR, Informationen zur Nachhaltigkeit – Nickel (2021)" and for reserves from "U.S. Geological Survey, Mineral Commodity Summaries (Jan 2022)")

Production Data

Nickel ores are mined in about 25-33 countries across the globe and are smelted or refined in about 30 countries.[13] In 2000, 1.1 million tonnes of nickel content in refined nickel products (see *Figure 1*) were produced. The amount increased to 1.5 million tonnes in 2010 and to 2.4 million tonnes in 2020 amounting to an average annual growth rate of 5.6 % over the last decade.[14] China and Indonesia were the main drivers behind the increase in refined nickel production. In 2019, nickel pig iron (NPI) from these two countries alone accounted for approximately 40 % of global production.[15]



13 *World Nickel Factbook 2021.*

14 *https://insg.org/index.php/about-nickel/production-usage/*

15 *Roskill, p. 24.*

In 2021, nickel mining output was by far the highest in Indonesia with 853,000 tonnes of contained nickel, followed by the Philippines with roughly 323,300 tonnes, Russia with 223,200 tonnes, New Caledonia with 209,500, Canada with 187,100 tonnes, and Australia with 160,000 tonnes (see *Figure 2*).[16] The largest nickel mining companies, based on 2021 production volumes, are:[17]

Table 1: Nickel production by company, 2021 (tonnes of nickel content)

Company	Country of Origin	Production in 2021, in tonnes of nickel content	Main Projects
PJSC Norilsk Nickel	Russia	178.000 tn	Kola MMC, Monchegorsk, Polar Division (Russia); Harjavalta (Finland)
Jinchuan Group	China	145.000 tn	Longshou (China)
Glencore Plc.	Switzerland	125.000 tn	Integrated operations in Raglan and Sudbury (Canada); Murrin Murrin (Australia)
Vale S.A.	Brazil	107.000 tn	Mines: Voisey Bay (Canada), Onça Puma (Brazil)[18] and Sorowako (Indonesia) Refineries (Joint Ventures, JVs): in China, South Korea, Japan, UK and Taiwan
Sumitomo Metal Mining Co. Ltd.	Japan	71.000 tn	Ambatovy nickel mine (Madagascar); Figesbal nickel mine (New Caledonia); Niihama nickel HPAL refinery (Japan); Coral Bay HPAL plan in Palawan and Taganito HPAL plant in Mindanao (Philippines)
BHP Group	Australia	65.000 tn	Integrated operations incl. Mount Keith Mine (Western Australia)
Nickel Asia Corporation	Philippines	60.000 tn	Rio Tuba, Taganito, Cagdianao (Philippines)
Nickel Industries Limited	Australia	40.410 tn	Hengjaya (Indonesia)
Anglo American	UK / South Africa	43.000 tn	Barro Alto and Codemin (Brazil)
South 32	Australia	36.000 tn	Cerro Matoso (Colombia)
Eramet	France	36.000 tn	Several operations in New Caledonia; Weda Bay, IWIP (Indonesia)
IGO	Australia	30.000 tn	Nova (Australia)
Terraframe	Finland	29.000 tn	Sotkamo (Finland)
MCC-JJJ Mining	China	29.000 tn	Ramu (PNG)

Nickel beneficiation and processing into nickel intermediates is usually done in integrated operations by the above-mentioned nickel companies.

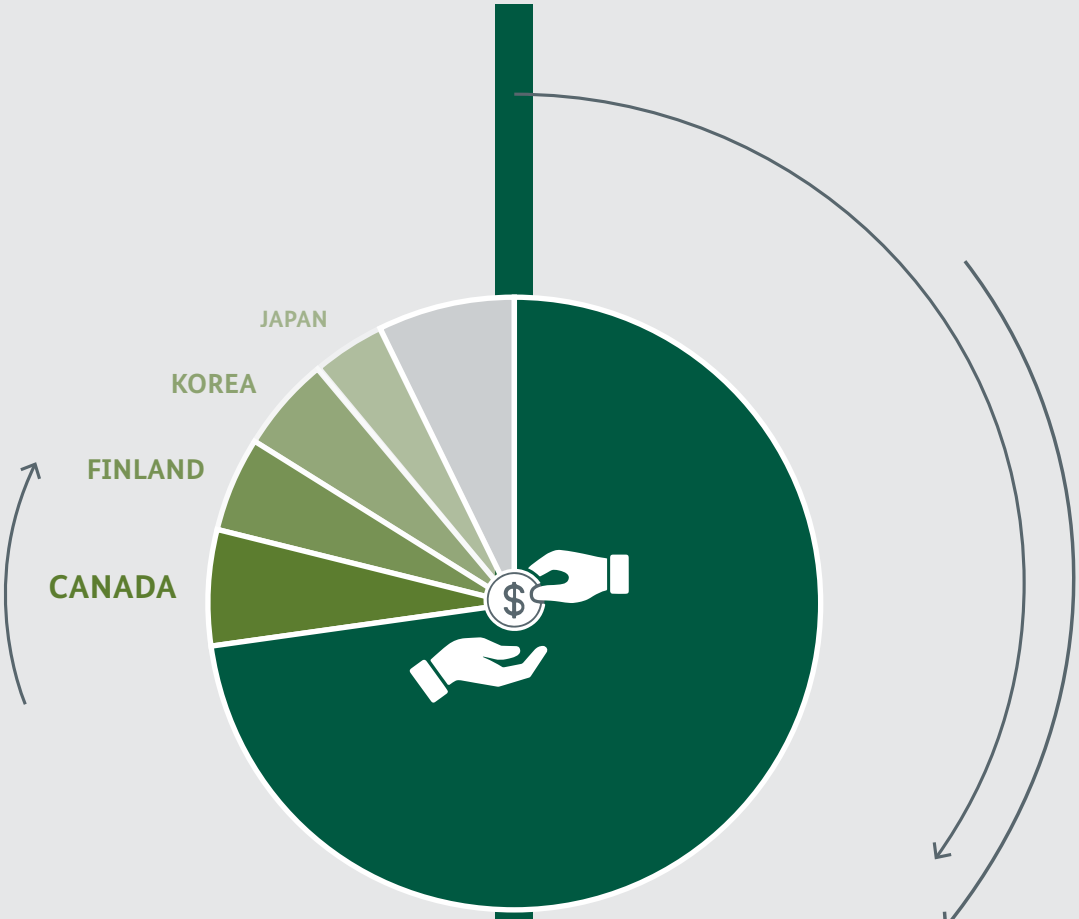
16 *Vasters, J./ Franken, G./ Szurlies, M. (2021): 'Nickel. Informationen zur Nachhaltigkeit'.*

17 *Compiled from company websites and reports.*

18 *In 2021 Vale stopped operations as their licence was suspended by the Environmental and Sustainability Office of Pará State.*

Nickel Trade

The world's largest importers of nickel ores and concentrates in 2020 were **China with 73%** of the world imports (USD 2.9 billion), **Canada with 6.18%** (USD 242 million), **Finland with 5.35%** (USD 209million), **Korea with 5.18%** (USD 203 million) and **Japan with 4.42%** (USD 173 million).



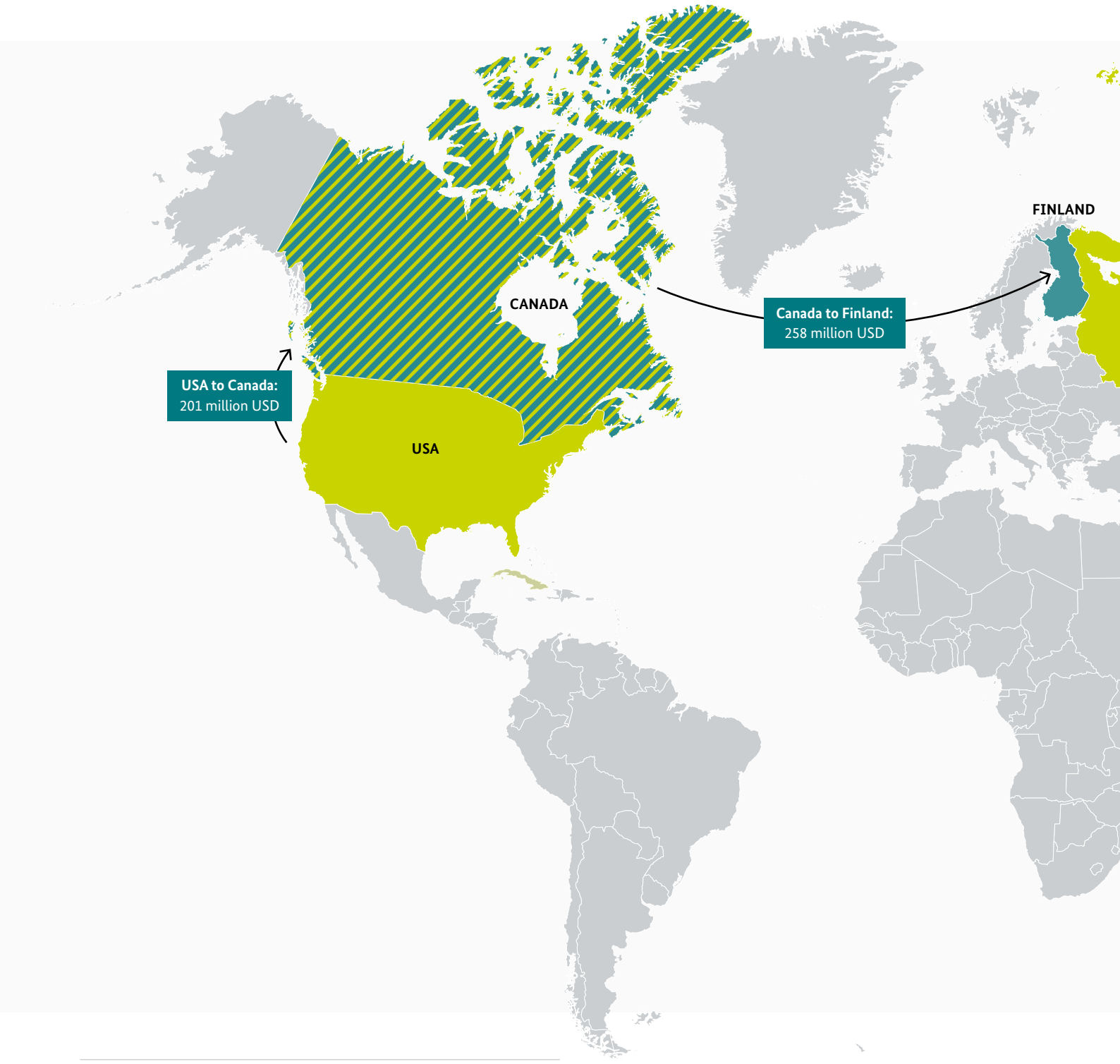
CHINA

USD 242 million
USD 209 million
USD 203 million
USD 173 million

USD 2.9 billion

Figure 3: Major trade flows of nickel ores and concentrates between countries 2020, in USD
(Source: trendeconomics.com)

Figure 3 illustrates the major nickel trade flows between countries in 2020. Indonesia imposed an export ban on nickel ore in January 2014. Following a budget deficit in 2016, a steep decline in Indonesian nickel production, and the construction of nine new nickel smelters, the export ban was relaxed in early 2017. In 2020, the government reimposed the export ban.[19] This affected the trade balance of unrefined nickel ore of Indonesia drastically.



19 https://www.csis.org/analysis/indonesias-nickel-industrial-strategy

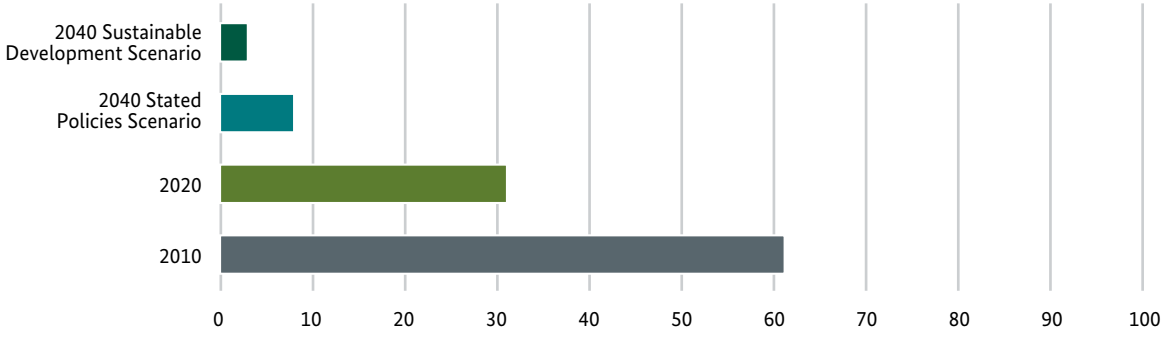

RUSSIA
KOREA
JAPAN
CHINA
Philippines to China:
1.76 billion USD
Indonesia to China:
193 million USD
PHILIPPINES
New Caledonia to Korea:
203 million USD
Australia to China:
258 million USD
New Caledonia to China:
240 million USD
INDONESIA
AUSTRALIA
NEW
CALEDONIA

3.2. Use in clean energy technologies

Clean energy technologies require more metals than fossil alternatives. A report on '*The Role of Critical Minerals in Clean Energy Transitions*' of the International Energy Agency (IEA) highlighted that all clean energy technologies use nickel to different degrees. The geothermal and hydrogen industry, as well as electric vehicle (EV) and battery storage, rely heavily on nickel.[20]
Depending on the stringency of climate policies the growing share of clean energy technologies in the total demand for nickel can vary between 31-61 % in 2040.[21]

One of the current restraints to EV uptake, the small range for vehicles, can be overcome by using nickel in car batteries. Nickel-containing batteries offer greater energy density and storage at lower cost which in turn deliver a longer range for vehicles.[22] Although EVs still amount to a small proportion of global automobile stock (4.6 % in 2020)[23], the current rapid growth will also affect the demand for nickel (global EV automobile stock more than doubled in two years from 7.3 million cars in 2019 to 16.4 million cars in 2021)[24]. Similarly becomes the growing nickel demand evident through the importance of nickel in rechargeable battery technologies e.g., for technical devices, or for energy storage systems which allow to capture and release wind- and sun-generated energy when needed.

Figure 4: Prognosis of nickel demand for clean technologies
(Source: IEA, https://www.csis.org/analysis/indonesias-battery-industrial-strategy)



20 *Kim, T.-Y. et al, 'The Role of Critical Minerals in Clean Energy Transitions' (2022), IEA, 'World Energy Outlook Special Report'.*

21 *IEA, 'The Role of Critical Minerals in Clean Energy Transitions. Executive Summary': https://www.iea.org/reports/the-role-of-critical-minerals-in-clean-energy-transitions/executive-summary*

22 *https://nickelinstitute.org/en/about-nickel-and-its-applications/nickel-in-batteries/*

23 *https://www.virta.global/en/global-electric-vehicle-market*

24 *IEA, 'Trends in electric light-duty vehicles': https://www.iea.org/reports/global-ev-outlook-2022/trends-in-electric-light-duty-vehicles, (access date 12.10.2022).*

Rising nickel demand

The two core sectors for nickel demand, predominantly for EVs and stainless-steel production, are forecast to drive the market growth over the coming twenty years. Batteries for electric vehicles require large amounts of nickel. For example, a 58 kWh battery in the current Volkswagen ID.3 model uses 36,8 kg of nickel (10 % of minerals used). An expected growth rate of 20-30 % for batteries and 5 % for stainless steel are set to shift the proportions of usage and leads to the prognosis that in 2030 25 % of the annual nickel demand (4 million tonnes) will be used for batteries.[25] According to the Global Battery Alliance the demand for Class 1 nickel for battery precursor will increase 24-fold between 2018 and 2030.[26]

Asia and particularly China plays a crucial role regarding the future nickel demand, since the highest global demand of first-use nickel comes from the Asian market with 82 %, where China alone accounts for 60 % of the world nickel demand. Also, the largest battery cell companies are predominantly Asian and include the following: LG Chem/LG Energy Solutions (South Korea), CATL (China), Tesla-Panasonic, SK Innovation (South Korea), SVOLT (China), BYD (China), Samsung SDI (South Korea), PSA-SAFT (France/Germany), Northvolt (Sweden), Farasis (China), Wanxiang Group (China), Beijing Easpring (China).[27]

Meeting the demand

According to a study by Roskill for the EU Commission, mine supply is expected to rise at an annual growth rate of 4.7 % between 2020 and 2030, with the majority of this growth to come from Indonesia to feed both NPI destined for the stainless-steel industry and also battery-grade nickel intermediates suitable for processing to produce nickel sulphate.[28] Roskill further estimates that by 2030, Indonesia will account for around 45 % of global mine supply, feeding its domestic NPI and ferronickel (FeNi) smelters as well as battery-grade intermediate nickel plants.

Demand for nickel from the battery industry will be met by nickel sulfate production, which can be produced from battery-grade intermediates, Class I nickel and recycled sources. Roskill expects total nickel sulfate production to reach approximately 2 million tonnes by 2040 growing 13.5 % annually, starting from 159 kt in 2020. During 2020-2030, the main feedstock source is expected to be MHP.

In order to secure access to nickel in this competitive market space, often joint ventures between battery manufacturers, precursor manufacturers and nickel mining and refining companies are concluded or those companies secure access to nickel through long-term offtake agreements (see a non-comprehensive list of current deals in *Table 2*).

25 *Szurlies, M. (2022): 'The global nickel metal market – between an alloying element and a battery raw material', BGR, Commodity TopNews, Nr. 68.*

26 *https://www3.weforum.org/docs/WEF_A_Vision_for_a_Sustainable_Battery_Value_Chain_in_2030_Report.pdf (p. 16).*

27 *Roskill, p. 59.*

28 *Roskill (2021), p. 24.*

Table 2: Nickel offtake agreements or joint ventures with battery material companies
(Source: Roskill, p. 58 and own additions)

Buyer (Country)	Industry of buyer	Type of material	Deal type	Seller company and location of the project
Beijing Easpring (China)	Cathode	Ni sulfate	Offtake	Clean TeQ Sunrise Nickel Mining Project (New South Wales, Australia)
Trafigura (Singapore)	Trading	MSP/Ni sulfate	200 Mio. USD Invest	Terrafame Oy Nickel Mining Project (Finland)
SK Innovation (South Korea)	Batteries	Ni sulfate	Offtake – dropped	Australian Mines Sconi Project (Queensland, Australia)
Beijing Easpring (China)	Cathode	Ni & Co sulfate	Offtake	Pacific Rim Cobalt Cyclops Nickel Mining Project (Papua, Indonesia)
GEM/CATL (China)	Precursor/Cathode	Ni sulfate	JV	Tsingshan (IMIP, Indonesia)
BASF (Germany)	Cathode	Ni sulfate	JV	Nornickel (Russia)
Ecopro (South Korea)	Cathode	Ni92 + Ni98 + NCA	Offtake	GEM (China)[29]
Ecopro (South Korea)	Cathode	NCM	JV	Fu An Qing Mei Energy Material, a subsidiary of GEM, and Ecopro to build joint high-nickel cathode precursor plant (Fujian, China)
Ecopro (South Korea)	Cathode	Nickel intermediate	JV	Econpro to buy 9 % of QMB, GEM's subsidiary (IMIP, Indonesia)[30]
Ecopro (South Korea)	Cathode	Ni sulfate	JV	Blackstone Minerals Ta Khoa Nickel Mining Project (Vietnam)
BYD/ Guoxuan (China)	Auto/Batteries	NCM precursor	JV	Minmetals built NCM precursor plant with investment from BYD and Guoxuan (Tangshan, China)[31]
GEM (China)	Precursor/Cathode	Ni MHP/sulfate	Offtake	PT Halmahera Lygend Nickel Mining Project (North Maluku, Indonesia) – owned by Japanese Harita Group and Chinese Ningbo Lygend

After 2030 recycled batteries could, in an ideal scenario, become the main source for nickel battery materials.[32]

29 https://www.thelec.net/news/articleView.html?idxno=2721
30 https://www.thelec.net/news/articleView.html?idxno=3956
31 https://www.reuters.com/article/china-metals-minmetals-idINL3N1YT1EP
32 Roskill (2021), p. 23.

3.3. Potential for recycling

A clear benefit from a sustainability perspective is the fact that recycling of nickel is often less energy intensive than producing it initially.[33] Furthermore, recycling does not only offer economic and ecological benefits, but also constitutes a second source of supply in addition to primary nickel in order to meet the growing demand in the future. Hence, with a view to the growing future demand and sustainability efforts, effective recycling is desirable.

In addition to the fact that nickel-containing stainless steel is designed for a long-term use (57 % of all mined nickel since the 18th century is still in use), it is fully recyclable as many other metals without loss of quality.[34] Hence, it perfectly fits the Circular Economy (CE) model. Examples are the processing of nickel-containing stainless-steel scrap into stainless steel or nickel from recycled batteries for the renewed production of batteries. In total, 68 % of nickel contained in consumer goods were recycled and began a new life cycle in 2010, while 15 % of the nickel return were reused in carbon steels as alloying components, but without the contained nickel having any functional benefit (down-cycling), and the remaining 17 % of nickel were improperly recycled or disposed in landfill sites.[35] To date, nickel recycling in the stainless industry is a standardised procedure and the largest percentage of recycled nickel comes from the stainless-steel industry.

Recycling of nickel in new technologies is more complex. While recycling of small lithium-ion-batteries for example from portable electrical and electronic devices such as smartphones or tools is already well established, EV battery (EVB) recycling faces difficulties. Since EVBs are larger and can store more energy, multi-complex separation processes are necessary, which makes environmentally friendly and safe recycling more complex and expensive. A standardisation is not possible yet, due to different cell chemistries and battery designs and the flammability and toxicity of some materials pose major challenges.[36] Currently, there is no standardised procedure due to the different battery designs and cell chemistries. Optimised recycling procedures are still under research and growing capacities of European recycling sites are expected. Further changes in recycling will be also guided by an amendment of the EU battery directive 2006/66/EC.[37] While European countries work on improving nickel recycling quantitatively and qualitatively, China and Indonesia, which dominate primary nickel production, do not focus on recycling to a large extent yet. This limits the general impact that recycling currently plays on a global scale.[38]

33 *Nickel Institute, 'Nickel recycling': https://nickelinstitute.org/en/policy/nickel-life-cycle-management/nickel-recycling/ (access date 15 July 2022).*

34 *Nickel Institute, 'About Nickel and its Applications': https://nickelinstitute.org/en/about-nickel-and-its-applications/#08-nickel-recycling*

35 *Nickel Institute, 'Nickel recycling': https://nickelinstitute.org/en/policy/nickel-life-cycle-management/nickel-recycling/*

36 *DERA, 'Batterierohstoffe für die Elektromobilität' (2021), DERA Themenheft.; Thielmann, A. et al., 'Batterien für Elektroautos: Faktencheck und Handlungsbedarf. Sind Batterien für Elektroautos der Schlüssel für eine nachhaltige Mobilität der Zukunft?' (2020), Fraunhofer ISI, Informationsbericht.*

37 *DERA, 'Batterierohstoffe für die Elektromobilität' (2021), DERA Themenheft.; Thielmann, A. et al., 'Batterien für Elektroautos: Faktencheck und Handlungsbedarf. Sind Batterien für Elektroautos der Schlüssel für eine nachhaltige Mobilität der Zukunft?' (2020), Fraunhofer ISI, Informationsbericht.*

38 *Vasters, J. / Franken, G. / Szurlies, M. (2021): 'Nickel. Informationen zur Nachhaltigkeit', BGR, Informational report.*

4. The Nickel Value Chain in Indonesia

4.1. Mapping the nickel value chain in Indonesia

This chapter introduces the main actors and projects in Indonesia regarding nickel mining and processing, as well as in the emerging battery industry in Indonesia.

Indonesia was the world's biggest producer of nickel ore in 2021 and will likely become the largest producer of refined nickel soon. Primary nickel production in Indonesia increased 4.5-fold over the period of 2016-2020. This can be attributed to the general rise in demand and Indonesia's policy of moving up the value chain, incentives in attracting foreign direct investment (FDI) in the nickel processing sector and the nickel ore export ban instituted from January 2020 onwards.[39]

While Indonesia is rich in laterite ore resources, it does not have sulfide ore resources. However, as described above, laterite resources can be used as feedstock to produce intermediate products like mixed hydroxide precipitate (MHP) which can be further refined to Class 1 nickel. Nowadays, MHP is also used directly to produce battery cathodes, skipping the step of refining Class 1 products, which allows for a better integrated supply chain from mine to cathode.[40] Hence, Indonesia's large nickel reserves will be an increasingly important source of nickel for the battery industry.

As of 2020, 292 nickel mining business permits (Izin Usaha Pertambangan, IUP) have been awarded in Indonesia. Most nickel mining operations are located in Southeast Sulawesi (Sulawesi Tenggara, Sultra) with 154 IUPs, Central Sulawesi (Sulawesi Tengah, Sulteng) with 85 IUPs and South Sulawesi (Sulawesi Selatan, Sulsel) with 34 IUPs. In addition, 46 IUPs are located in Maluku and a few others in Papua (see map in *Figure 5*). An overview and map of ongoing nickel mining and processing projects in Indonesia is published and regularly updated by the Ministry of Energy and Mineral Resources in the "Minerba One Data Indonesia (MODI)" and the "Minerba One Map" databases.[41]

The number of nickel smelters has risen from three, which were built in 2014 in parallel to the export ban of nickel ore, to eleven smelters in 2020 (see *Table 3* and Map in *Figure 5*).[42] 14 additional nickel smelters were in progress by 2021.[43] The Ministry of Energy and Mineral Resources forecasted to bring the number of smelters to 29 by 2022.[44] FeNi and NPI smelters are typically located close to the mining sites in Sulawesi and Maluku and are run as integrated operations. Much of the growth of nickel mining and processing in Indonesia in the last decade was driven by NPI demand, mostly from China. Indonesia started NPI production in 2014 and reached around 605,000 tonnes of nickel contained in NPI by 2020. Practically, all this is used in China and Indonesia for the production of stainless-steel.

39 *Nickel Factbook, p. 20.*

40 *https://www.csis.org/analysis/indonesias-nickel-industrial-strategy*

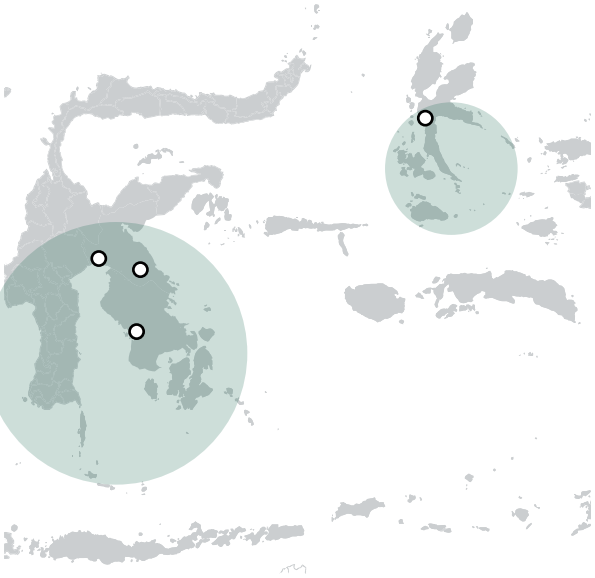
41 *https://geoportal.esdm.go.id/minerba/*

42 *Other sources report that there are currently 27 operational nickel smelters in operation in Indonesia, scheduled to rise to 81. Perhaps this refers to the number of smelting facilities or furnaces/kilns as opposed to smelting licences.*

43 *https://modi.esdm.go.id/smelter*

44 *https://www.spglobal.com/marketintelligence/en/news-insights/trending/rXcQhnFL5xJ0KfW37OAn3w2*

Table 3: Operating Nickel Smelters in 2020
Source: Ministry of Energy and Mineral Resources



Smelter company	Location
PT Vale Indonesia	East Luwu
PT Aneka Tambang Haltim	Halmahera
PT Fajar Bhakti Lintas Nusantara	Halmahera
PT Trimegah Bangun Persada	Halmahera
PT Gane Permai Sentosa	Halmahera
PT Waniatira Persada	**Halmahera**
Bintang Delapan Mineral	**IMIP**
Bintang Delapan Energi	**IMIP**
PT Mulia Pasific Resources	**IMIP**
PT Itamatra Nusantara	**IMIP**
PT ANTAM Tbk	**Konawe**
PT Gebe Sentra Nikel	**Konawe**

Indonesia's nickel industry landscape has been changing rapidly in the last eight years. In 2014, PT Vale Indonesia controlled 77% of nickel production, followed by Indonesian state-owned enterprise PT Aneka Tambang (ANTAM) with 19%. PT Vale mines laterite nickel ore in the Sorowako mine and processes it into the final product of nickel in matte. Its average volume of nickel production per year reaches 75,000 tonnes, which makes it still one of the biggest nickel operations in Indonesia. The nickel matte is exported entirely to Vale Canada and Sumitomo Metal Mining in Japan in a long-term special contract agreed upon by the two companies.[45]

The rise of Chinese investment in integrated nickel industrial parks

In 2013, China and Indonesia signed an agreement to develop integrated-industrial parks. This is part of a China-Indonesia comprehensive strategic partnership signed by two countries in that year.[46] Since then, Chinese-controlled nickel projects have taken over most of the nickel market in Indonesia. Three of the most relevant integrated industrial park projects are the Indonesia Morowali Industrial Park (IMIP) in Central Sulawesi which started in 2014 as well as Indonesia Weda Bay Industrial Park (IWIP) in North Maluku and Konawe Industrial Park, which both began operation in 2020 (see Map in *Figure 5*).[47]

45 https://www.vale.com/indonesia/about-pt-vale

46 *Tham Siew Yean and Siwage Dharma Negara, Chinese Investments in Industrial Parks: Indonesia and Malaysia Compared, Economics Working Paper No. 2020-08, ISEAS – Yusof Ishak Institute, Singapore, 2020.*

47 https://insg.org/index.php/about-nickel/production-usage/

Figure 5: Major integrated nickel mining and processing areas in Indonesia
(own graph, created with MapChart)

The cooperation to develop IMIP was first announced at a 2013 summit between China's president, Xi Jinping, and Indonesia's then-president, Susilo Bambang Yudhoyono, and can considered to be part of the Belt and Road Initiative. The industrial park IMIP itself is a joint venture between Tsingshan Steel Holding from China and Indonesian company PT Bintang Delapan Group. Nickel mining and smelting operations in the park are structured by a very complex net of project entities and subsidiary companies (see *Figure 6*). At its heart, there are five Chinese companies at IMIP that are driving the production of battery-grade nickel plants, namely Tsingshan Steel Holding – China's biggest stainless steelmaker, Contemporary Amperex Technology Ltd (CATL) – the world's largest producer of lithium-ion batteries, GEM Co Ltd., Zhejiang Huayou Cobalt, China Molybdenum and Indonesian conglomerate PT Bintang Delapan. Although IMIP is a private sector led initiative, it has been granted a status as a national strategic project (PSN).

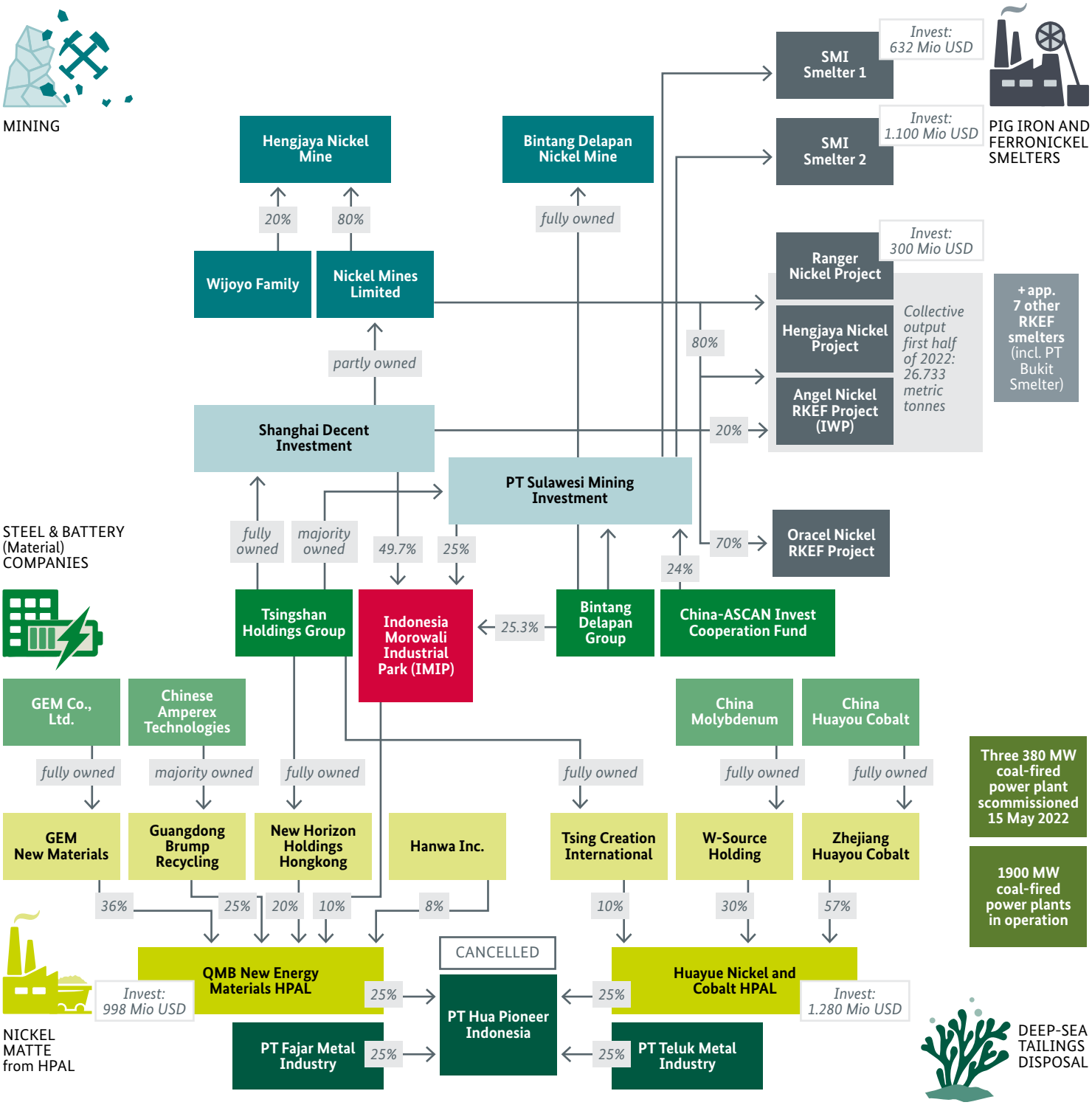
Nickel mining is conducted by the co-owner of the industrial park IMIP, PT Bintang Delapan Mineral, along with the Australian company Nickel Mines Limited at the Hengjaya mine. IMIP built its first FeNi smelter through its subsidiary PT Sulawesi Mining Investment and the second smelter through another subsidiary, PT Indonesia Guang Ching Nickel and Stainless-Steel Industry.[48] Today, there are 11 nickel smelting facilities for FeNi and NPI located in the park, including the Ranger Nickel Project and the Hengjaya Nickel Project. More recently, IMIP has also embarked on becoming the major production hub for battery-grade nickel. Currently, two HPAL projects – PT Huayue NiCo owned by Chinese companies Tsingshan, China Molybdenum and Huayou Cobalt and PT QMB New Energy Materials owned by Chinese companies Jingmen GEM (GEM), Guangdong Brunp (CATL) and Tsingshan – are under construction at IMIP and are expected to be commissioned in 2022. The total investment value of IMIP is estimated at USD 7 billion.[49] The investments are largely backed by Chinese banks, including China Eximbank and China Development Bank, which is currently the largest lender to the park. IMIP is estimated to employ approximately 43,000 people, of which 38,000 are Indonesian and around 5,000-6,000 Chinese workers.[50] While IMIP received approval from the Manpower Ministry for the use of foreign workers, there is anecdotal evidence that many migrant workers – at least previously – did not have proper work permits and their presence has triggered frictions with local workers.[51]

Indonesia Weda Bay Industrial Park (IWIP) on Halmahera Island in North Maluku Province is another integrated industrial area in Indonesia which integrates nickel mining and smelting to produce battery-grade nickel material via HPAL.[52] IWIP began construction in 2018 and commenced early production in 2020. IWIP is estimated to become one of the world's largest nickel production centres alongside IMIP. As IMIP, IWIP is owned by Tsingshan Steel Holding and operates projects with different joint venture partners, including with French mining and processing company Eramet, with Chinese Huayou Cobalt and Zhenshi Holding Group as well as with Australian mining company Nickel Industries Limited.

Furthermore, in 2020, the government established the Konawe Industrial Zone in Southeast Sulawesi, focusing on FeNi development. The two main companies operating there are nickel smelter Virtue Dragon Nickel Industry and Obsidian Stainless Steel (OSS).[53] In 2022, Nickel Industries Ltd. signed a binding agreement for the acquisition of a 100 % interest in the Siduarsi Nickel-Cobalt project in Papua province, Indonesia.

48 https://dinsights.katadata.co.id/read/2021/09/17/tsingshans-subsidiary-becomes-indonesias-top-nickel-producer
49 https://thepeoplesmap.net/project/indonesia-morowali-industrial-park-imip/
50 https://factcheck.afp.com/indonesias-morowali-industrial-site-employs-43000-people-only-5000-workers-are-china
51 https://thepeoplesmap.net/project/indonesia-morowali-industrial-park-imip/
52 https://iwip.co.id/en/about-iwip/
53 https://www.channelnewsasia.com/asia/indonesia-nickel-mining-electric-vehicles-environment-2680276

Figure 6: Ownership structure of IMIP



Construction of HPAL plants and the development of battery cell manufacturing capacities in Indonesia

Altogether, eleven HPAL plants which process MHP to Class 1 nickel and then to nickel sulfate for battery precursor material are currently under construction. Indonesia's first operating HPAL project operated by PT Halmahera Persada Lygend – owned by Chinese Ningbo Lygend and Japanese Harita Group – began operation in June 2021 on Obi Island.[54] Also, PT Vale is constructing an HPAL processing plant in Pomalaa, Southwest Sulawesi.

The progress of these HPAL projects will be key to future battery-grade nickel supply, at least in the near term.[55] While some of the MHP and nickel matte from these Indonesian projects will be exported for processing in China and Japan, it is the expressed objective of the Indonesian government to produce nickel sulphate and battery cells within Indonesia. At least, the companies PT QMB New Energy Materials (GEM/CATL/Tsingshan) and PT Halmahera Persada Lygend (Harita/Ningbo Lygend) are starting to produce nickel sulfate in Indonesia.

Indonesia's first EV battery cell plant, PT HKML Battery Indonesia, was opened in September 2021 by President Jokowi. It is the first EV battery plant in Southeast Asia. The project in Karawang, West Java, is a joint venture between Indonesia and South Korea's Hyundai Motor Group and LG Energy Solution.

The Indonesian Government's policies to encourage the development of an EV battery sector has stimulated interest and commitments from several leading battery producers, including Korea's LG Chem, Samsung SDI and Chinese CATL, BYD as well as Japanese Panasonic. Much of this battery manufacturing capacity is expected to be developed along the north coast of Java. Some additional processing of nickel inputs towards the final EV batteries could also be undertaken in the nickel-based industrial zones in Central Sulawesi and North Moluku.[56]

In addition, the Indonesian Government created a new state-owned enterprise (SOE), Indonesia Battery Corporation (IBC) in mid-March 2021. The vision is for this holding company to play a role along the value chain from nickel mining through to EV battery vehicle production.[57] Four SOEs that are investing in this holding company are: PT Pertamina (the state oil/gas company), PT Perusahaan Listrik Negara (the state electricity utility), PT Indonesia Asahan Aluminium (the state aluminium company) and PT Timah (the state Tin mining company). Each has a 25 % equity stake in IBC.

The establishment of IBC fits in the larger picture of the industrial strategy of the Indonesian Government, which seeks to become a major player in the global EV market by 2030. On September 2020, the government officially announced its Electric Vehicle (EV) roadmap, which was published as part of Minister of Industry Regulation No. 27/2020. The roadmap lays out the goal of producing 600,000 units of four-wheeled EV and 2.45 million units of two-wheeled EV annually.[58] In 2021, only 1,900 units of EVs were sold in Indonesia.

While the country has a long way to go to build up its EV ecosystem and fully integrated value chains from mining to EV vehicles, the momentum is clearly there and foreign and domestic investors are flocking in, as described above. Reportedly, IBC aims to invest USD 17 billion until 2030 and aims to establish battery production capacities of around 140 Giga-Watt-hour (GWh) of which 50 GWh will be exported and 90 GWh will be used locally to produce Electric Vehicles.[59] If this strategy is successful, the contribution of the EV sector to Indonesia's economy may become substantial.

54 https://pubs.usgs.gov/periodicals/mcs2022/mcs2022-nickel.pdf

55 https://www.csis.org/analysis/indonesias-nickel-industrial-strategy

56 *The Australia-Indonesia Centre, 'Electric vehicles: Powering Indonesia's next industrial growth', June 2021:* https://australiaindonesia.com/wp-content/uploads/2021/06/EV_062021_English_v2.pdf

57 *The Australia-Indonesia Centre, 'Electric vehicles: Powering Indonesia's next industrial growth', June 2021:* https://australiaindonesia.com/wp-content/uploads/2021/06/EV_062021_English_v2.pdf

58 https://indonesien.ahk.de/en/infocenter/news/news-details/indonesian-electric-vehicles-industry-development-gains-momentum

59 https://indonesien.ahk.de/en/infocenter/news/news-details/indonesian-electric-vehicles-industry-development-gains-momentum

4.2. Contribution of nickel to the Indonesian economy

This chapter compiles available data on key economic categories related to nickel mining, processing, and the emerging battery industry, including government revenue, employment data, FDI, and CSR spending in Indonesia.

Tax revenue

Generally, state revenues come from domestic revenues and grants. The domestic state revenues are divided into tax revenues and non-tax revenues. In 2018, the tax revenues from minerals and coal reached its highest number of almost 84 trillion rupiah (app. 5.6 billion EUR). In 2020, tax revenue from the mining and coal sector decreased by 44%, due to the decline in sales of minerals and coal as a result of the trade war between the US and China and the COVID-19 pandemic and declining commodity prices. Additionally, the government granted a fiscal stimulus in the form of relaxation of income tax and corporate taxes on sales of mining commodities for six months in 2020.

Overall, mining and coal operations in Indonesia have contributed to the Indonesian economy roughly by 4.5 % of the gross domestic product (GDP).[60] The share of nickel mining in the GDP contribution is much lower (though not published in detail) than the revenue realised from copper, coal, tin, gold and bauxite, which is due to the fact that Indonesia simply produces more coal, gold and tin than nickel in absolute volumes or value. However, Indonesia is uniquely placed as the country with the highest global nickel reserves to capitalise on their resource wealth. The intended development of nickel processing capacities, battery cell manufacturing capacities as well as an EV manufacturing sector and a domestic EV market will eventually lead to higher tax revenues in addition to growth and jobs. The government estimates that refining nickel in Indonesia can create up to 35 billion USD value added to the Indonesian economy.[61]

While revenues from exporting nickel ores have gone down, since the export ban was reinstated, export revenues from iron and steel exports (HS Product Code 72) have dramatically increased (difficult to determine the nickel portion of it). FeNi exports almost doubled in 2019 and continued to increase by almost 15 % in 2020. Currently, there are rumours that the Indonesian government is now planning to tax exports of FeNi and NPI. As a result, it would be likely that the tax would tilt the Indonesian product mix further towards nickel as a battery input rather than for steel production.[62]

60 https://eiti.org/news/new-report-shows-indonesias-extractive-revenues-decline

61 https://www.mining.com/web/indonesia-may-impose-nickel-export-tax-this-year-president-jokowi-says/

62 https://www.reuters.com/markets/commodities/indonesian-tax-will-shake-up-nickel-export-mix-again-2022-08-04/

Massive inflow of FDI in nickel refining and battery industry

The nickel ore export ban has already led to a massive inflow of FDI in Indonesia's industrial sector through the establishment of value adding initiatives, such as stainless steel and pig iron production, mainly from Chinese operators, as well as investments in HPAL processing plants and battery cell manufacturing plants. While it is difficult to calculate the exact price tag, the following recent examples illustrate the dimension of foreign (and domestic) investment in the sector:

FDI in production and refining capacities

- IWIP in North Maluku has reportedly had an initial investment of USD 5 billion, mostly by the Chinese owners, and is expected to grow to USD 11 billion.[63]
- IMIP investments are valued at more than USD 7 billion (HPAL facilities of PT QMB New Energy Materials and PT Huayue Nickel and Cobalt are valued at USD 998 million and USD 1.28 billion, respectively; four of the 11 smelters in the park are valued at a total of more than USD 2.3 billion)[64]
- In April 2022, PT Vale signed a deal worth USD 4.5 billion with Zhejiang Huayou Cobalt to develop an HPAL plant in Pomalaa, Southeast Sulawesi, to produce 120,000 tonnes of MHP
- In September 2022, PT Vale Indonesia signed an agreement worth USD 1.8 billion with Zhejiang Huayou Cobalt to build a second HPAL plant in Sorowako, South Sulawesi, to produce 60,000 tonnes of nickel in mixed hydroxide precipitate (MHP)
- PT Vale is also investing USD 2.1 billion together with Shandong Xinhai Technology Co. Ltd in a FeNi refinery in Bahodopi, Central Sulawesi

FDI in battery industry

- LG Energy Solution, the world's second-largest EV battery maker, is investing USD 9.8 billion as part of an agreement with Indonesian SOE's, including mining company PT Anteka Tamban (Antam) and Indonesia Battery Corporation (IBC). The investment volume includes a smelter for USD 3.5 billion, a precursor and cathode manufacturing plant in Central Java for USD 2.4 billion and the EV battery factory in Karawang for USD 1.1 billion[65]
- Antam and IBC also signed an investment agreement with LGs competitor Ningbo Contemporary Brunp Lygend, a subsidiary of CATL — the world's largest battery maker — worth USD 6 billion to further develop the battery value chain including nickel mining, processing, and battery manufacturing in Indonesia

These investments add up to dozens of billion USD and clearly will have a positive impact on the Indonesian economy. It is, however, yet unknown to what extent spillover effects, backward and forward linkages can be capitalized in order to generate widespread growth throughout the economy.

63 https://earthjournalism.net/stories/global-race-for-electric-car-components-is-threatening-indigenous-peoples-in-indonesia

64 https://thepeoplesmap.net/project/indonesia-morowali-industrial-park-imip/

65 https://www.mining-technology.com/news/lg-nickel-indonesia/

Job creation

The expansion of nickel extraction and processing capacities provide an opportunity for creating new jobs in Indonesia. The IMIP project alone has generated 38,000 mostly local jobs. Reportedly, Central Sulawesi province has a much lower unemployment rate compared with other provinces. The government estimates that the development of smelters and nickel mines will increase the opportunity to create up to 23,200 jobs for fresh graduates in the fields of engineering, geology, metallurgy, geophysics.[66]

Mandatory CSR spending

Since the government enacted the Law on Limited Liability Company (No. 40 of 2007), Corporate Social Responsibility (CSR) spending in Indonesia has become mandatory. Further provisions on CSR spending are included in Law No. 32 of 2009 on Environmental Protection Fund Management, Law No. 25 of 2007 on Investment, Regulation No 47 on Social and Environmental Responsibility for limited liability companies. CSR obligations of the coal mining and mineral extraction companies in Indonesia make reference to two models, namely the Partnership and Community Development Programme (PKBL) model implemented by state-owned mining companies (BUMN) and the Community Development and Empowerment Programme (PPM) model for general mineral and coal mining companies. The PKBL model refers to the principles and standards of sustainability reporting governed by the Global Reporting Initiatives (GRI). CSR-PPM is a programme aimed at improving both the individual and the collective economic, educational, socio-cultural, healthcare and living conditions of people around the mine in order to enhance the standard of living of the people around it. Article 38, para. 6 of Law No. 25 of 2018 states that in the case of increasing production capacity by holders of IUP or IUPK, these companies are obliged to increase the spending on Community Development and Empowerment (or abbreviated "PPM").[67]

66 *Ministry of Energy and Mineral Resources (2022), Peluang Investasi Nikel Indonesia, p. 20.*

67 *https://www.abacademies.org/articles/corporate-social-responsibility-community-development-and-empowerment-program-in-indonesia-12124.html*

4.3. National legal framework for nickel mining and processing in Indonesia

This chapter contains a brief compilation and discussion of the legal framework for nickel mining in Indonesia, in particular regarding regulating social and environmental issues, contribution to the economy, exports, and investment and foreign ownership.

Art. 33 (3) of the 1945 Indonesian constitution stipulates that "Earth, water and natural resources contained therein are controlled by the state and used for the greatest prosperity of the people." Nickel is a natural resource that cannot be renewed, and as a strategic commodity it needs to be managed by the state to ensure that revenues benefit the welfare of the population. The following section refers to the Indonesian Law No. 4/2009 which builds the basis for all mining regulations and the more current Law No. 3/2020 and 11/2020 under the Omnibus Laws[68], since these particularly affect environmental and social regulations, as well as investment regulations.

68 *The term Omnibus Law describes a law that covers a number of diverse and unrelated topics across sectors. It made extensive amendments through a single instrument, (Busyra Azheri et al, (2020), Laporan Akhir Analisi dan Evaluasi Hukum Terkait Pengelolaan Pertambangan Mineral dan Batubara yang Berkelanjutan, Pusat Analisis dan Evaluasi Hukum Nasional Badan Pembinaan Hukum Nasional Kementrian Hukum dan Hak Azasi Manusia, ISBN : 978-623-7918-14-1).*

Law No. 4/2009 concerning Mineral and Coal Mining

Mining in Indonesia is regulated under Law No. 4/2009 which stipulates that mining rights are granted through IUPs. Companies incorporated in foreign countries cannot hold IUPs, but instead must hold shares in an Indonesia-incorporated mining company as the licence holder. The law deploys a centralised and decentralised approach by delegating some of the authority related to Minerba regulations to the provinces and regencies, with the central government having supervisory power.[69]

Law No. 4/2009 was developed to improve mining governance and the development of mineral and coal downstream programmes but caused several problems for mining companies because they had difficulties to integrate upstream mining operations and downstream mineral processing operations both technically and financially.[70]

Pursuant to the law an IUP can only be granted if an Environmental Impact Assessment (AMDAL) or a less onerous Environmental Management Effort/Environmental Monitoring Effort (UKL-UPL) has been approved by the government. The AMDAL includes a continuous monitoring and reporting plan that needs to be followed. A company further needs to deposit a "mine closure guarantee" and a "reclamation guarantee" with the government prior to commencing production activities which oblige it to restore the land to a natural state afterwards. To protect forest areas even further, a "Borrow and Use" licence is also required. It prescribes obligations such as reforesting land or paying an additional government levy in state forest.[71] These environmental obligations are applicable to all nickel mining actors. Mining and nickel processing companies in carrying out their activities are required to implement an Environmental Management System (EMS). Several companies have implemented ISO 14001: 20015 which is an international standard published by the International Organisation for Standardisation (ISO) on environmental management.[72]

In 2020, the President of the Government of Indonesia, Jokowi, issued two laws, the Minerba Amendment Act No. 3/2020, and the Omnibus Law on Job Creation Law No. 11/2020 in order to simplify regulatory procedures.[73] According to the government, these two laws were issued to increase investor interest and improve job opportunities for Indonesian people.[74]

69 https://resourcehub.bakermckenzie.com/en/resources/global-mining-guide/asia-pacific/indonesia/topics/global-mining-guide

70 *Through the law, the government targeted the downstreaming of mining products, by requiring IUP holders and Contract of Work (KK) holders to establish domestic smelters. For that purpose, the government also prohibited mining companies from exporting raw minerals, which in turn left them without the financial capacity to build the smelters (Ika, S, 2017, Downstreaming Mineral Policy: Policy Reform to Increase State Revenue, Kajian Ekonomi & Keuangan http://fiskal.kemenkeu.go.id/ejournal, Pusat Kebijakan Sektor Keuangan, Badan Kebijakan Fiskal. Jl Dr Wahidin No.1).*

71 https://resourcehub.bakermckenzie.com/en/resources/global-mining-guide/asia-pacific/indonesia/topics/global-mining-guide

72 *Disnakertrans Provinsi Banten (2020), Mengenal ISO 14001 sebagai ISO Lingkungan, https://disnakertrans.bantenprov.go.id/Berita/topic/278#:~:text=Tujuan%20ISO%2014001&text=Membantu%20organisasi%2Fperusahaan%20untuk%20meningkatkan,dapat%20meminimalisir%20rintangan%20dalam%20berusaha.*

73 *Andri Saubani, (2019), Lima Prioritas Jokowi pada Periode Kedua Pemerintahannya, https://www.republika.co.id/berita/pzq7ap409/lima-prioritas-jokowi-pada-periode-kedua-pemerintahannya*

74 *Andri Saubani, (2019), Lima Prioritas Jokowi pada Periode Kedua Pemerintahannya, https://www.republika.co.id/berita/pzq7ap409/lima-prioritas-jokowi-pada-periode-kedua-pemerintahannya*

Amendment of Minerba law through Law No. 3/2020

Law No. 3/2020 includes among others key amendments of the determination of mining areas[75], centralisation of authority[76], and licensing of mining[77] businesses.

However, one year after its issuance, Law No. 3/2020 showed challenges in implementation. The now centralised formalisation process for communities or mining business actors decelerated because the Ministry of Energy and Mineral Resources (KESDM) and the Ministry of Investment (BKPM) as the sole managing authorities were overloaded by the amount of applications. Moreover, the distance between the provinces and the capital impeded accessibility and support structures for applicants.

To overcome this problem, the central government delegated the issuing of business licences to provincial governments by Government Regulation (PP) 96/2021[78] concerning the Implementation of Mineral and Coal Mining Business Activities Mining Business Permits.[79] The effectiveness of this regulation cannot be assessed yet because it has not been fully implemented yet.

Law No. 3/2020 was criticized by several non-governmental organisations, which initiated three lawsuits against the Law in the first year.[80]

75 *The terminology of the mining legal area was specified as comprising all land space, sea space, including space within the earth as one territorial unit, namely the Indonesian archipelago, land under waters, and the continental shelf. Moreover, it was guaranteed that the area where mining permits have been granted will not undergo any change. (Ibid)*

76 *It was specified that the supervision by mining inspectors and mining supervisory officers which are managing the budget, facilities and infrastructure, as well as their operations lies on the minister.*

77 *It was stipulated that the authority to manage mineral and coal mining lies only with the Central Government, whereas the authority to grant business permits can be delegated to the Provincial Governments. Furthermore, state revenue in the form of community mining fees was allocated as part of the regional income in the form of regional taxes and/or levies, which are in turn used for community mining management in accordance with the legal provisions. (Ibid)*

78 *The exact procedure is regulated in a derivative presidential regulation 55/2022 concerning the Delegation of Granting Business Permits in the Mineral and Coal Mining Sector. This regulation states that the delegated authority is given to the provincial government, which includes the granting of: (1) standard certificates and permits; (2) guidelines for the implementation of the delegated business licence; and (3) supervision over the implementation of the business licence that has been delegated. (Peraturan Presiden Nomor 55 Tahun 2022 tentang Pendelegasian Pemberian Izin Usaha di Bidang Pertambangan Mineral dan Batubara).*

79 *Indonesia, Peraturan Pemerintah Nomor 96/2021 tentang Penyelenggaraan Kegiatan Usaha Pertambangan Mineral dan Batubara.*

80 *Anisatul Ummah (2021), Baru Setahun, UU Minerba Berkali-kali digugat, https://www.cnbcindonesia.com/news/20210628160342-4-256522/baru-setahun-disahkan-uu-minerba-berkali-kali-digugat (access date 26 Juli 2022).*

Job Creation Law (Cipta Kerja) No. 11/2020

Law No. 11/2020 on Job Creation aimed to provide higher levels and quality of employment (including the protection and welfare of workers), empower micro, small and medium enterprises (MSMEs), simplify regulations and improve the investment ecosystem in the context of accelerating national strategic projects.[81]

Regarding the environmental aspect, Law No. 11/2020 weakened the precautionary principle[82] and forest conservation regulations.[83] With the enactment of the Indonesian Job Creation Law, the management of environmental permits has been changed from a "regulatory approach" to a "risk-based approach".[84] A risk-based approach means that the higher the potential risk posed by business activities is estimated, the tighter will be the control and supervision from the government, and the more requirements must be met. The aspects need to be considered for assessing the risk area type of activity, the size of the business and the history of the compliance.[85] Nickel mineral mining is categorised as high-risk mining, thus requiring the preparation of an AMDAL.[86]

In November 2021, the Constitutional Court concluded in Decision Number 91/PUU-XVIII/2020 that the law was unconstitutional and required the government to make amendments, based on extensive public consultation processes. In December 2022, the government issued an emergency regulation to replace the law, which was subsequently signed into law by parliament in March 2023, despite significant public protest from unions and student activists.[87]

81 *Teugeh P. T et al (2021) Kajian Yuridis Undang-undang Cipta Kerja dan Dampaknya Terhadap Dulia Ketenagakerjaan di Indonesia, Lex Privatum Vol. IX/No. 10/Sep/2021.*

82 *The precautionary principle is weakened by 1) replacing the requirement of an environmental mining permit into a vaguely formulated "approval" which abolishes the administrative lawsuit mechanism; 2) Risk-based licensing is stated in the Job Creation Law without any details or detailed explanations; 3) Changes to the definition of absolute liability (strict liability) for corporations that derogate from the principle of liability based on fault and include the potential to weaken public access to justice, and (4) a significant reduction of public access to participate in the decision-making process on activity plans that will have an impact on the environment. One such example is the preparation of the AMDAL (Environmental Impact Assessment), where the Law 11/2020 minimises the scope of the community by distorting their role as "people who are directly affected". Elements of the wider community that also have an interest in environmental sustainability such as universities and NGOs are completely eliminated. (Riyanto S, et al, 2020, Kertas Kebijakan Catatan Kritis terhadap UU No 11 Tahun 2020 Tentang Cipta Kerja, Fakultas Hukum Universitas Gajah Mada, Edisi 2, 5 November 2020).*

83 *Additionally, it also raised concerns about forest conservation by mentioning "strategic areas" which will be prioritised to be opened as investment space and by removing a 30% limit of forest area from watersheds, islands or provincial administrative areas. It was followed by the elimination of the role of the House of Representatives in giving approval for changes to the allocation and function of forest areas, and the use of forest areas for development outside forestry activities (road infrastructure, reservoirs/dams, mining, etc.). Both of the above items were instruments to protect forest resources from excessive exploitation. (Riyanto S, et al, 2020, Kertas Kebijakan Catatan Kritis terhadap UU No 11 Tahun 2020 Tentang Cipta Kerja, Fakultas Hukum Universitas Gajah Mada, Edisi 2, 5 November 2020).*

84 *Devaraa E., et al. Ibid.*

85 *Naskah Akademik Rancangan Undang-Undang Cipta Kerja. Februari 2020, hlm.87 .*

86 *Interview with the Head of Environmental Agency, South Sulawesi Province on 12 August 2022.*

87 *Fitria Chusna Farisa, „Sembilan Gugatan UU Cipta Kerja di MK Selama 2021, Hanya Satu Dikabulkan Sebagian, https://nasional.kompas.com/read/2022/02/11/20472591/sembilan-gugatan-uu-cipta-kerja-di-mk-selama-2021-hanya-satu-dikabulkan?page=all (access date 31 July 2022).*

4.4. Developmental impacts along the nickel value chain in Indonesia

This chapter explores the positive and negative impacts of nickel value chains on the environment and the economy – both globally and in Indonesia, in particular in mining communities. Several industry- and government-led sustainability initiatives have analysed which environmental, social or governance (ESG) related risks are of particular relevance for nickel supply chains from mining to processing the ores to nickel intermediate materials. Building on these analyses, this chapter focuses on the environment, human rights, labour rights, health and safety, and community relationships.

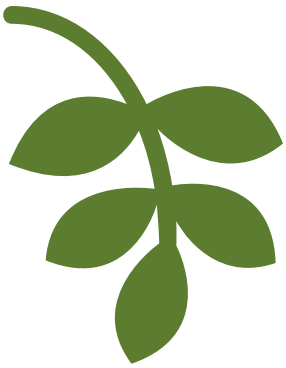
- → Environment and Climate
- → Community Relations
- → Human Rights
- → Occupation Health and Safety (OHS)
- → Labour Rights
- → Focus topic: Women in nickel supply chain

The following analysis puts specific focus on critical issues that nickel mining is associated with, such as heavy metal contamination of coastal waters, energy-use, illegal deforestation, and destruction of conservation habitats, among other things. Furthermore, a specific section is dedicated to the role of women in nickel supply chains in Indonesia and in mining-impacted communities and the impact on their livelihoods and wellbeing.
Due to its properties and applications, nickel mining and processing is mainly conducted by large-scale industrial operations. Artisanal and small-scale operators are less involved. Hence, many of the supply chain ESG risks are common to most large-scale mining operations and not specific to nickel.
An issue of specific relevance for nickel supply chains is that its processing is extremely energy intensive and produces a substantial amount of hazardous waste.

Environment and Climate

Environmental risks are by far the biggest risk category for nickel mining and processing. The OEKORESS II project of the German Environmental Agency (Umweltbundesamt, UBA), which provides an environmental threat assessment for 47 minerals, has found that nickel mining, in particular from acid drainage, has a very high environmental threat potential from heavy metal contamination and negative impacts on protected areas.[88] Also the analysis of Mineral Insights finds that risks of pollution (very high), negative impacts on biodiversity and conservation (high), and risks for land degradation (high) are particularly challenging in nickel mining and processing.[89]

The following section identifies the major environmental risks from nickel mining and processing globally and in Indonesia and provides concrete examples regarding pollution, negative impacts on biodiversity and deforestation, energy-use and GHG emissions, and issues related to mine closure and site rehabilitation.



Pollution

Air, soil, and water pollution are the most detrimental risks from nickel mining and processing. Nickel mining and processing generates an enormous amount of waste. Water and soil contamination with heavy metals and toxic substances can be the result of accidents or from phenomena such as acid leaching from chemical waste storage.[90] Groundwater and surface water contamination and air emissions can result in heavy metal contamination of flora and fauna, leading to a threat to species and also to a wider loss of ecosystem services for local communities and indigenous peoples. Air pollution from unloading and burning coal for power generation and dust from drilling and transportation can lead to an increase of respiratory diseases in mining communities.

88 *UBA, OEKORESS II, p.41 https://www.umweltbundesamt.de/sites/default/files/medien/1410/publikationen/2020-06-17_texte_79-2020_oekoressii_abschlussbericht.pdf*

89 *https://www.material-insights.org/materials/nickel/*

90 *For example, in 2019, a Chinese nickel mine operator (MCC) accidentally spilled an estimated 200,000 litres of toxic slurry into a bay in Papua New Guinea's Madang province.*

Challenging enforcement of environmental regulations

Indonesia's legal framework for regulating emissions in the mining sector is well-developed. For example, Decree No. 09 of 2006 of the Ministry of Environment concerning wastewater quality standards for nickel ore mining stipulates that every person in charge of a nickel ore mining business is obliged to treat wastewater originating from nickel ore mining and/or processing activities, so that waste discharged into water bodies does not exceed the established wastewater quality standards.[91] Tailings produced from nickel mining activities are categorised as hazardous and toxic waste according to Government Regulation No. 18 of 1999 jo. PP No. 85 of 1999 concerning Hazardous Waste Management and require appropriate handling.

However, enforcement of such regulations appears to be weak in certain areas. There are reports and evidence that most of the above-mentioned risks have become reality in many of the nickel mining and processing projects in Indonesia (see *Table 4*).

Table 4: Examples of air, soil, and water pollution in Indonesia

Pollution	Example
Water pollution	→ Off the coast of Obi Island in North Maluku Province, where PT Trimegah Bangun Persada (owned by Japanese Harita Group) operates a nickel mining and processing project, heavy metals have allegedly been found in at least 12 marine species, including saltwater clams, mangrove snappers, oxeye herrings, and yellow-striped trevallies.[92] According to press reports, the seawater turned red from land up to 30 metres from the shore.[93] → According to media reports, also local communities in Kurisa Village, close to the IMIP site, have been experiencing degrading seawater quality in their neighbourhood and decreasing fish numbers.[94] This is allegedly due to submarine wastewater disposal from the IMIP, which is permitted by Decree 259/2018 of the Ministry of Environment and Forestry of Indonesia.[95] The wastewater comes from the production process, runoff from coal stockpiles, hot water from the cooling process of coal-fired power plants, and domestic wastewater. → The water pollution has impacts on the people who depend on traditional sectors, including fisheries. Many fishers must take greater risks because of plummeting fish population, taking longer trips, which costs more fuel, and working longer hours. Alternatively, for instance in Morowali, fishers had to switch jobs and take up unskilled labour work.
Soil pollution and land degradation	→ Research conducted near the Konawe Industrial Park showed that after six years of post-mining the decline in physical, chemical, and biological conditions of the soil has not improved.[96]
Air pollution	→ According to media reports, residents of local communities near the Konawe Industrial Park are concerned about the environmental pollutants from the coal power plant and the nearby port through which coal is delivered to the plant.[97] Apparently, the coal dust is carried by the wind to residential areas within a radius of about 4 km.

91 *Maga L. et al, 2017, Merumuskan Kebijakan Dalam Mengatasi Kerusakan Lingkungan Akibat Aktivitas Tambang Nikel di Kecamatan Tinanggea Kabupaten Konawe Selatan, Risalah Kebijakan Pertanian dan Lingkungan Vol. 4 No. 2, Agustus 2017: 125-142 ISSN: 2355-6226 E-ISSN: 2477-0299.*

92 *Rabul Sawal, 2022, Red seas and no fish: Nickel mining takes its toll on Indonesia's spice islands, https://news.mongabay.com/2022/02/red-seas-and-no-fish-nickel-mining-takes-its-toll-on-indonesias-spice-islands/*

93 *Publish What You Pay Indonesia.*

94 *https://thepeoplesmap.net/project/indonesia-morowali-industrial-park-imip/*

95 *https://thepeoplesmap.net/project/indonesia-morowali-industrial-park-imip/*

96 *Barus B. et al, 2022, Development of a land stability index for land damage assessment: the case of a nickel mine, North Konawe, Indonesia, Journal of degraded and mining lands management, Volume 9, Number 4 (July 2022): 3695-3702, doi:10.15243/jdmlm.2022.094.3695 ISSN: 2339-076X (p); 2502-2458 (e), https://jdmlm.ub.ac.id/*

97 *https://www.channelnewsasia.com/asia/indonesia-nickel-mining-electric-vehicles-environment-2680276*

Deep-sea tailings disposal of particular concern

Of particular concern for the environment is the disposal method known as deep-sea tailings disposal (DSTD). Currently, less than 20 nickel mines worldwide apply this method of tailings disposal into the sea.[98] In 2020, two companies, PT Trimegah Bangun Persada in Obi Island in North Maluku and PT Hua Pioneer Indonesia in the IMIP presented plans to use DSTD. In the first instance, PT Trimegah Bangun Persada was granted the right to use DTSD, with plans to dispose 6 million tonnes of tailings waste into the ocean each year.[99] After protests from local fishers and the community, the company abandoned the plans. Also, PT Hua Pioneer Indonesia ultimately cancelled plans to use DSTD in Indonesia. In 2021, Indonesia officially banned the use of DSTD.[100] However, environmental advocates and researchers worry that the expansion of the battery industry in Indonesia will create pressure to lift regulations on DSTD or companies may be tempted to illegally use DSTD. IMIP, IWIP, and Konawe Industrial Zone are all near the bay in Morowali which stretches into the Coral Triangle, one of the global centers of biodiversity and priority area for conservation where 75 % of the world's coral species are located. The proposed collective waste from the HPAL facilities would have amounted to an estimated 25 million tonnes per year of slurry waste being disposed into the bay.[101] The risk that the expansion of the nickel value chain in Indonesia will come at a cost to marine life in the Coral Triangle is still prevalent.[102]

Biodiversity and Deforestation

In Indonesia, nickel mining encroaches in conservation areas and high biodiversity areas. Biodiversity is affected by nickel mining activities through changes in the structure and composition of flora/fauna and changes in the abundance of flora/fauna populations.

120 million hectares of land, or 64 % of Indonesia's land mass, is designated as State Forest Area. 22.1 million hectares are designated as Conservation Forests, 5.3 million hectares as Marine Conservation Areas and 29.6 million hectares are Protection Forests with watershed functions. Indonesia has over 15 million hectares of environmentally sensitive peatlands. These are to a large extent located in the four major Outer Islands – Sumatra, Kalimantan, Sulawesi, and Papua – which are also major mining areas. In 2011, the government issued a moratorium on the issuance of new licences for the utilization of primary natural forests and peatlands covering an area of 66 million hectares. However, illegal logging, forest fires, and other legal and illegal economic activities lead to increasing deforestation, including an encroachment into protected areas.[103]

98 *https://www.reuters.com/article/mining-deep-sea-tailings-idUSL5N26V03S*

99 *https://news.mongabay.com/2022/02/red-seas-and-no-fish-nickel-mining-takes-its-toll-on-indonesias-spice-islands/*

100 *https://www.reuters.com/article/us-indonesia-mining-environment-exclusiv-idUSKBN2A50UV*

101 *https://thepeoplesmap.net/project/indonesia-morowali-industrial-park-imip/*

102 *Ian Morse, 2020, Indonesian miners eyeing EV nickel boom seek to dump waste into the sea, https://news.mongabay.com/2020/05/indonesian-miners-eyeing-ev-nickel-boom-seek-to-dump-waste-into-the-sea/ (access date 23 August 2022).*

103 *The State of Indonesia's Forests 2020. https://balaikliringkehati.menlhk.go.id/wp-content/uploads/The-State-of-Indonesias-Forest-2020.pdf*

According to WALHI, an environmental NGO, the destruction of rainforests in South Sulawesi currently continues to expand due to nickel mining.[104] Allegedly, even though it has been protected by law, deforestation due to nickel mining is increasing from year to year.[105] According to Global Forest Watch, between 2002 and 2020, in Morowali in Central Sulawesi, where the major industrial nickel parks are located, 8.2 % of primary humid forest were lost. Rates of deforestation rose in the years following the Indonesian Government's resource export ban and the start of construction of the IMIP in 2013.[106] Komiu, a Central Sulawesi environmental NGO, calculated that irrecoverable land due to nickel mining until 2021 reaches 36,000 hectares or about half the area of Jakarta. Damaged forest area due to nickel mining also extends to Southeast Sulawesi.

A particular problem in this regard is the weak enforcement of existing environmental and land laws and regulations or the lax oversight over forest areas, as recent examples of corporate behaviour show (see *Table 5*). For example, according to a report from Tempo Magazine and the Rainforest Investigations Network of the Pulitzer Center, a dozen nickel mining companies in Central Sulawesi and Southeast Sulawesi obtained the "approval of land reservation" – a key document for becoming authorized to mine nickel ore – through inappropriate means,[107] including not participating in any bidding process, using forged documents, and through bribery. Similarly, Tempo reports several cases involving mining companies operating in Southeast Sulawesi without having a forest area utilisation permit (IPPKH).

According to an academic research report by Tacconi et al., structural problems in environmental law enforcement prevail, like the weak enforcement capacity of local forest authorities and inadequate monitoring.[108] Budgetary limitations and a shortage of field personnel are part of the explanation. For example in Papua, the personnel to forest ratio is only one to 500,000 ha of forest.

Besides strengthening law enforcement, spatial planning is key to avoid the worst impacts for biodiversity and local communities. Mining needs to respect local (customary) land rights, follow principles of free, prior, and informed consent (FPIC) procedures and be aligned with the regional development plans, including spatial plans. Unfortunately, too often local communities are excluded from decision-making, receive little to no benefits from adjacent mining activities and bear costs of environmental externalities.

104 *Asiatoday Editor, 2022, Nickel Mining Destroys Rainforest in Sulawesi, https://asiatoday.id/read/pertambangan-nikel-hancurkan-hutan-hujan-di-sulawesi (access date 23 August 2022).*

105 *Anonymous, 2021, Walhi Kritik Ambisi Nikel: 67,4 Persen Hutan di 3 Provinsi Dikorbankan, https://www.cnnindonesia.com/nasional/20211227192943-20-739297/walhi-kritik-ambisi-nikel-674-persen-hutan-di-3-provinsi-dikorbankan (access date 23 August 2022).*

106 *https://thepeoplesmap.net/project/indonesia-morowali-industrial-park-imip/*

107 *Hidaya/Hermawan (2022), 'Tentacles of the Nickel Mines': https://magz.tempo.co/read/cover-story/38857/tentacles-of-the-nickel-mines*

108 *Tacconi et al. (2019), Law enforcement and deforestation: 'Lessons for Indonesia from Brazil, Forest Policy and Economics 108': https://www.sciencedirect.com/science/article/pii/S1389934118304623*

Energy Use and Greenhouse Gas Emissions

According to UNEP, Indonesia is the seventh-largest emitter of GHG emissions with over 1 Giga tonnes CO_2 equivalents of annual emissions.[109] The main contributing sectors were Agriculture, Forestry and other Land Uses (AFOLU) including peat fires (50.13%) followed by energy (34.49%) and waste (6.52%).[110]

Nickel mining is contributing to GHG emissions via deforestation, i.e. land use change and via energy use especially from nickel processing which is a highly energy intensive processes.[111] Current nickel extraction and processing technologies in Indonesia are associated with high carbon emissions.

To calculate GHG emissions of nickel products, a typical approach is to use a life cycle assessment (LCA) for the analysis and rely on accepted standards such as the GHG Protocol Corporate Accounting and Reporting Standard. According to estimates, on average, nickel mining and processing leads to the following emissions:[112]

- 1 kg of nickel content in nickel metal produces up to 13 kg of CO_2 emissions;
- 1 kg of nickel content in nickel sulfate emits 5.4kg CO_2;
- 1 kg of nickel content in FeNi emits 45 kg CO_2 per 1 kg.
- 1 tonne of nickel equivalent in nickel pig iron (NPI) emits up to 70t CO_2 per tonne.

Research by Wei et al. (2020) confirms similar estimates.[113] While the CO_2 footprint of nickel mining and processing is on average lower than for other comparable mineral resources, such as copper, it is still considerably large.[114]

As Indonesia is rich in lateritic nickel ores, which are of lower grade, nickel processing to battery grade nickel is more energy intensive and thereby has a higher CO_2 footprint. According to the International Energy Agency (IAE), on average, producing Class 1 nickel from Indonesia's laterite ore resources releases two to six times more CO_2 emissions than producing Class 1 nickel from sulfide deposits.[115] The footprint gets worse if the primary energy source for powering nickel mining and processing operations is coal, as it is the case in Indonesia, where most nickel projects are powered by coal-fired power plants. Indonesian industrial parks, which have become major hubs for nickel and aluminium processing, reportedly account for 15 % of the country's coal power output and may rise to 24 % if all planned capacity expansions are installed.[116] IMIP alone operates a 1.26 GW thermal coal power plant, which is currently being expanded to 2.9 GW.

The government is looking towards renewable energy to abolish fossils and is considering hydro, solar and biomass as primary energy sources. The goal was set to have a share of 23 % renewable energy by 2025 and to reduce GHG emissions by 29-41 % by 2030.[117] In 2021, the share of renewables in power generation was about 12%, while the share of fossil fuels was 80 % (62 % from coal).[118]

109 *UNEP (2021), 'State of the climate – Climate Action Note': https://www.unep.org/explore-topics/climate-action/what-we-do/climate-action-note/state-of-climate.html?gclid=CjwKCAjw2OiaBhBSEiwAh2ZSP-d-8f-vaYWKz21llFJ8e1PWreuXEHZ_n2X7JlM9IYdreN_uKiO8LBoCVN8QAvD_BwE*

110 *UNFCCC https://unfccc.int/documents/403577?gclid=Cj0KCQjwt_qgBhDFARIsABcDjOf5-lQVeETPOJqlo_nxk9-GPyiS6cp6sccNOLb95K3-8XINv5A2sRwaAhzvEALw_wcB*

111 *Research by Wei et al., 2020 shows the required energy for producing nickel metal, nickel oxide, ferronickel and nickel pig iron are 174 GJ/t alloy (174 GJ/t contained Ni), 369 GJ/t alloy (485 GJ/t contained Ni), 110 GJ/t alloy (309 GJ/t contained Ni) and 60 GJ/t alloy (598 GJ/t contained Ni), respectively. (Wei W. et al, 2020, Energy Consumption and Greenhouse Gas Emissions of Nickel Products, Energies 2020, 13, 5664; doi:10.3390/en13215664, https://www.mdpi.com/journal/energies).*

112 *Anonymous, 2020, Life cycle data Questions and Answers, Nickel Institute.*

113 *According to Wei et al., GHG emissions are 14 tCO_2-eq/t alloy (14 tCO_2-eq/t contained Ni), 30 tCO_2-eq/t alloy (40 tCO_2-eq/t contained Ni), 6 tCO_2-eq/t alloy (18 tCO_2-eq/t contained Ni), and 7 tCO_2-eq/t alloy (69 tCO_2-eq/t contained Ni). (Wei W. et al, 2020, Energy Consumption and Greenhouse Gas Emissions of Nickel Products, Energies 2020, 13, 5664; doi:10.3390/en13215664, https://www.mdpi.com/journal/energies).*

114 *https://www.mining.com/carbon-emission-curves-for-iron-ore-copper-met-coal-and-nickel/*

115 *https://www.iea.org/data-and-statistics/charts/ghg-emissions-intensity-for-class-1-nickel-by-resource-type-and-processing-route*

116 *https://chinadialogue.net/en/energy/coal-powered-industrial-parks-test-indonesias-climate-pledges-and-chinas-too/*

117 *https://ccpi.org/country/idn/*

118 *https://www3.bkpm.go.id/en/publication/detail/news/harnessing-renewable-energy-investment-sector-in-indonesia*

To reduce the dependency on coal and to achieve net-zero emission by 2060, the state-owned electricity utility Perusahaan Listrik Negara (PLN), which provides about 95 % of the electricity supply of the country, announced it would schedule the retirement of coal-fired power plants and would not renew their contracts, aiming to phase out the remaining capacity of 59 Gigawatt (GW) of coal-fired power plants by 2055.[119] In addition, no new coal-fired power plants would be built after 2023.

However, the efforts to reduce coal dependency are stalling. Apparently, 21 GW of new coal-fired power plants are under construction.[120] A recent report by research organisation Centre for Research on Energy and Clean Air (CREA) revealed that China could still be funding new coal plant projects for the nickel and steel complexes in Indonesia. In September 2021, President Xi Jinping announced China would not build new coal-fired power projects abroad. 26 overseas plants with a capacity of 21 GW were cancelled and some projects were transformed to creating renewable energy projects. However, at the time of the announcement, nine coal-powered plants with a total capacity of 7.8 GW funded by China were already near completion in Indonesia. This results in additional emission of approximately 35 million metric tonnes of CO_2 each year.[121]

If the nickel and battery industries do not find alternative ways to produce energy, the phasing out coal commitments can barely be met. However, there are positive developments in this direction. Companies and provinces are increasingly engaging in cleaner alternatives (see examples in *Table 5*). With Indonesia likely implementing a carbon levy and potentially a carbon tax by 2025, domestic demand for low-carbon technologies is generating a greater incentive for mining and processing companies to power their operation with greener energy. A more decisive push for greening power supply of nickel operation may come from the automotive sector, as consumers may be put off by the idea that EVs would be powered by batteries which were produced with a coal-induced heavy CO_2 footprint.

Table 5: Corporate examples of reducing the CO2 footprint in nickel mining or processing operations in Indonesia

How companies reduce their CO2 footprint in their Indonesian operations
→ In Morowali, Nickel Industries is building a 200MW solar plant for the Hengjaya Nickel, Ranger Nickel and Oracle Nickel processing operations.
→ In Weda Bay (IWIP), Tsingshan is planning to build a 1GW solar power plant with Eramet and a hydropower plant with Merdeka Copper Gold in the Konawe Industrial Park.
→ PT Vale has built and operated three hydropower plants over the past five decades with a total capacity of 365 Megawatts. The existence of these three hydropower plants enables the company to reduce the dependence on fossil fuels to supply energy to processing plants.[122]
→ PT Vale's Bahodopi project in Morowali, central Sulawesi, a FeNi-production plant currently under construction, will be exclusively powered through Liquified Natural Gas (LNG), with most of its other Indonesian assets also moving to natural gas in a phased manner by 2030.[123]

119 https://fiskal.kemenkeu.go.id/docs/CIF-INDONESIA_ACT_IP-Proposal.pdf

120 https://www.climate-transparency.org/wp-content/uploads/2021/10/CT2021Indonesia.pdf

121 https://energyandcleanair.org/publication/china-coal-ban-anniversary/

122 *Dien Noviany Rahmatika, 2021, Exploring the Relation of Environmental Disclosure, Environmental Performance and Company Characteristics in Indonesia: An Empirical Analysis, International Journal of Economics, Business and Accounting Research(IJEBAR), Peer Review – Internation Journal Vol-5, 2021 IJEBAR, E-ISSN: 2614-1280 P-ISSN 2622-4771.*

123 https://www.argusmedia.com/en/news/2354109-vale-targets-lng-switch-to-cut-indonesia-co2-emissions

In addition to reducing the carbon footprint from the use of energy for nickel processing it is crucial to also reduce the carbon footprint from deforestation, which requires spatial planning that minimizes emissions from forest and land conversion and emphasises the restoration of peatland, as well as a strong and effective environmental and climate governance at national, regional and local levels in Indonesia.

Mine Closure and Site Rehabilitation

The post-closure remediation of nickel mining and processing sites is often overlooked. This is because many projects that commenced operations in the last 50 years continue to operate. To reduce damage caused by nickel mining, challenging land rehabilitation activities are required. Revegetation of forests needs time and takes decades.[124] The most significant effort is to restore/reclaim degraded land after mining operations to recover various ecological functions once provided by the forest prior to mining. One of the activities in post-mining reclamation is through revegetation by planting native species on a large scale. In revegetating post-mined land, the natural regeneration of native plants is essential to complement active planting to accelerate vegetation succession.[125]

Land rehabilitation and mine closure are regulated by the government through the Decree of the Minister of Energy and Mineral Resources of the Republic of Indonesia No. 1827 K/30/MEM/2018 concerning Guidelines for Implementing Good Mining Engineering Rules. The Government requires IUP/IUPK holders to prepare a reclamation plan for the exploration and the production stage and to deposit reclamation guarantees and funds in advance. The Government can use the funds to carry out reclamation if the IUP/IUPK holder fails to implement their reclamation duties. The regulation also covers the post-mining phase. The holder of an exploration IUP/IUPK is required to submit a Post-mining Plan Document to the Ministry and deposit post-mining guarantees.[126] The level of compliance of mining companies varies greatly between the provincial and central level. Companies have only deposited 33 % of reclamation guarantee funds and 67 % of post-mining guarantees for permits issued by the provincial government. For permits issued by the central government, reclamation guarantees have reached 95 % and post-mining guarantees have reached 100 %.[127]

124 *S. E. Macdonald, S. M. Landhausser, J. Skousen et al., "Forest restoration following surface mining disturbance: challenges and solutions", New Forests, vol. 46, no. 5-6, pp. 703–732, 2015.*

125 *Purnomo D. W, et all, Diversity and carbon sequestration capacity of naturally growth vegetation in ex-nickel mining area in Kolaka, Southeast Sulawesi, Indonesia, Biodiversitas 23 (3): 1433-1442, March 2022 Volume 23, Number 3, March 2022, Pages: 1433-1442.*

126 *PINUS and DESDM Sumsel Ibid.*

127 *Yanita Petriella (2020), Jaminan Reklamasi dan Pascatambang IUP Masih Rendah, https://ekonomi.bisnis.com/read/20200121/44/1192367/jaminan-reklamasi-dan-pascatambang-iup-masih-rendah (access date 8 August 2022).*

Community Relations

Beyond environmental impacts, community relations are significantly impacted by nickel mining and processing. Community relations are affected both positively and negatively regarding livelihoods of the local communities, land use and rights, especially if indigenous peoples are concerned, as well as migration into mining communities.

Despite the jobs created by the nickel industry, most local people in the Sulawesi and Maluku nickel mining centres remain engaged in agriculture, as they often lack the skills or interest to work in those industrial projects. A decline in government investment in agricultural projects, coupled with environmental impacts from nickel mining and processing has caused hardship for farmers, fishers and small business, including in tourism.[128]

This has also led to conflicts over land use and support for creating alternative livelihoods. The large investments in and subsequent growth caused by the nickel industry has led to a large influx of migrant workers from overseas to mining communities, which resulted in an increase in tensions with the local population, including over unequal treatment and cultural differences.

As described above, mining companies are required to invest in local communities through Community Development and Empowerment ('PPM') and Community Social Responsibility initiatives to mitigate some of the risks described above.[129] However, there is hardly no data available on the effectiveness of such programs in responding to the negative impacts caused by nickel mining and processing on Indonesian mining communities.

Risks typically associated with artisanal and small-scale mining – such as child labour, mercury use, etc. – do not apply for nickel. Nickel mining and processing is capital intensive, requires expensive and large-scale drilling and metallurgical equipment. Moreover, the concentrations of nickel in the ore are very low (0.5-2.5 % Ni content). The combination of these factors prevents ASM of nickel to take place.[130]

128 https://thepeoplesmap.net/project/indonesia-morowali-industrial-park-imip/

129 https://nickelindustries.com/carbon/wp-content/uploads/2022/07/2411450.pdf

130 2021 The Copper Mark Company, the International Lead Association (ILA), the Nickel Institute (NI), the International Zinc Association (IZA), and the Responsible Business Alliance, Inc.

Human Rights

The use of force, including through the exertion of discipline or violence, constitutes one of the most serious forms of human rights abuse in the nickel supply chain. Its existence in a nickel processing context is usually associated with the operations of large nickel projects that include processing within their operations. They have had a wide range of other ESG and human rights impacts which led to confrontations between local populations and supply chain actors. This highlights the strong correlation between a project's environmental footprint and its social impacts in this respect. In the context of nickel projects, the use of force has entailed two major dimensions:

- the use of physical violence or threats of violence against individuals or community members contesting company operations
- use of political or legal disciplinary measures designed to stifle freedom of expression and dissemination of information in the public interest

Human rights violations in nickel mining and processing in Indonesia are not as common as in other battery-material supply chains, such as cobalt. However, there are reports of violence against human rights defenders and environmental protesters. Especially since the new mining law from 2020 was adopted, the clamp down on protests against mining operations have increased.[131] Article 162 states that "anyone who hinders or disturbs mining activities by permit holders who have met the requirements (...) may be punished with a maximum prison term of one year and maximum fines of 100 million rupiah (app. USD 7,000)." Of the 53 people subjected to criminal charges for opposing mining companies in 2021 (not only nickel), at least ten were charged with violating Article 162, according to the Indonesian Forum for the Environment (WALHI).[132]

A major bill strengthening indigenous rights is being held up in parliament since 2012. The passing of the bill would strengthen indigenous rights in land issues, which are often a source of conflict regarding the issuance of palm oil plantation and mining concessions.[133] Adherence to the principles of free, prior, and informed consent (FPIC) is reported to be rather weak. Conflicts with indigenous peoples are an issue in Papua, but more frequently relating to other commodities such as gold.

Nickel mining and processing is not directly known to be associated with child labour, as the operations are usually done with heavy machinery and lack artisanal and small-scale operators. Nevertheless, indirect jobs, such as supplying the mining sites with food and other services, may involve child labour.

131 https://news.mongabay.com/2022/02/in-indonesia-a-devious-policy-silences-opposition-to-mining-activists-say/

132 Ibid.

133 https://news.mongabay.com/2021/09/for-indonesian-member-parliament-indigenous-rights-may-be-bad-for-business-report-says/

Occupation Health and Safety (OHS)

Exposure to occupational health and safety risks is a relevant risk in nickel mining and processing. Industrial accidents, such as hydrogen sulfide poisoning, blast explosions, vehicle collisions and electrical accidents are not uncommon in nickel operations. All in all, the industry recording the highest number of accidents is not the extractive industry, but the construction sector.[134] There are no reliable estimates for workplace deaths or injuries in the nickel value chain. While the Indonesian government registered 104 accidents in 2021 and 145 in 2020, IndustriALL, a global union federation, estimates 1,800 accidents per year in Indonesian mines.[135]

Apart from accidents, the emissions released during mining can cause long-term health problems when they get deep into the lungs, such as asthma, and other lung diseases as well as heart diseases.[136] It is even more difficult to accurately identify causal relationships between mining activities and long-term health problems, so that no reliable numbers can be given for the Indonesian nickel mining context.

Indonesia has an extensive legal OSH framework on an international and national level. The country signed and ratified relevant ILO Conventions, such as Convention No. 81 on Labour Inspection, Convention No. 45 on Underground Work (Women), Convention No. 120 on Hygiene (Commerce and Offices) and the ILO Promotional Framework for Occupational Safety and Health Convention No. 187 (2006). The latter is one of the most essential instruments for safety and health at the workplace. The ratification reinforces prior commitment to improving OHS for example through the Government Regulation No. 50 prescribing the establishment of OSH management systems in companies with more than 100 employees or companies working in fields with high levels of hazard.[137] According to Law No.13 of 2003 a company without OSH Management Systems violates the law and can be sanctioned administratively.

However, the direct implementation of OHS measures eventually falls under the responsibility of employers. That emphasizes the need for the government to have a strong oversight mechanism in place to comply with its legal commitments. The Ministry of Manpower, which is responsible for OSH matters in Indonesia including audits, acknowledged that its efforts under the national OSH programme are weakened by a lack of accurate monitoring data which is caused by restrained governmental resources. Also, the number of auditors is not sufficient to comprehensively inspect companies' compliance. Workers unions therefore urge the government to address the weak enforcement.

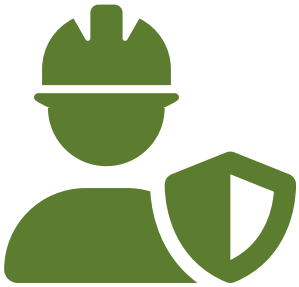
134 https://www.matec-conferences.org/articles/matecconf/pdf/2019/07/matecconf_scescm2019_02021.pdf

135 https://modi.esdm.go.id/kecelakaantambang; https://www.industriall-union.org/urgent-need-to-stop-mine-accidents-at-indonesia-morowali-industrial-park

136 Report from PC.

137 https://www.ilo.org/jakarta/whatwedo/publications/WCMS_711991/lang--en/index.htm

Labour Rights



Indonesia is committed to implement the ILO standards governing conditions of work and employment. The country signed all eight core conventions[138] which oblige the country to regularly report on measures taken to effectively implement the prescribed norms.[139]

In addition to gaps and retrograde developments in the national labour law, a poor governmental oversight and law enforcement weaken existing legal frameworks.[140] The law foresees penalties for violations, including fines or imprisonment (e.g., for violation of minimum wage law) which ought to be enforced by local officials from the Ministry of Manpower. However, a reduction of budget and personnel capacities as well as insufficient technical expertise on the side of the officials resulted in weak enforcement. Accordingly, labour right violations contrary to commitments on the international level are ongoing.[141]

In the nickel industry, there are reports from NGOs and Foundations of mistreatment of workers in terms of regularity of payments, salary levels, job security.[142] Among other things, this is a result of high investment and production costs of nickel mining and processing and volatile prices. The Rosa Luxemburg Foundation issued a report on difficult working conditions in the IMIP project, including strikes over low pay, lack of formal contracts, sexual harassment, among other.[143]

Labour disputes, strikes, and protests sparked by low wages and complaints about exploitative conditions, including occupational health hazards, have been alleged by NGOs since the inception of IMIP. In recent years, workers from South and Central Sulawesi have claimed racial discrimination based on allegations that Chinese migrant workers are hired illegally and receive higher wages.
Unionised and non-unionised workers have made some gains since 2013, including a nominal increase in wages and a reduction of the workday from eleven to seven hours for striking miners at a nickel mine supplying the IMIP.[144]

138 *Freedom of association; collective bargaining; forced labour; abolition of forced labour; minimum age; child labour; equal remuneration; discrimination.*

139 *ILO Country profile Indonesia, https://www.ilo.org/dyn/normlex/en/f?p=1000:11110:0::NO:11110:P11110_COUNTRY_ID:102938*

140 *https://www.hrw.org/news/2019/09/22/indonesia-indigenous-peoples-losing-their-forests*

141 *Country Reports on Human Rights Practices for 2021, United States Department of State.*

142 *Rosa Luxemburg Foundation, Road to Ruin.*

143 *Ibid.*

144 *https://thepeoplesmap.net/project/indonesia-morowali-industrial-park-imip/*

Focus topic: Women in nickel supply chain

Alongside children, people with disabilities and indigenous peoples, women have been identified as being disproportionately affected by the environmental and social impacts of nickel mining and processing in a number of contexts. Such impacts often compound pre-existing forms of discrimination and inequality that serve to exclude or minimise such persons when it comes to consultation, decision-making or benefit sharing. The Indonesian government ratified the Convention on the Elimination of All Forms of Discrimination Against Women (CEDAW Convention) and issued Law Number 7 of 1984 concerning the Ratification of the CEDAW Convention.[145] The principle of gender equality has further been included into Indonesia's development planning documents, as contained in Law Number 17 of 2007 concerning the National Long-Term Development Plan (RPJPN) of 2005-2025.[146]

Although many efforts have been made by the government to improve the quality of life of women and strengthen institutional capacities for gender mainstreaming, data shows that there are still gaps between women and men in terms of access, participation, control, and benefits, as well as control over resources, in education, health, economics, socio-cultural, and other strategic fields.[147]

In the context of mining, one such example is ILO's Underground Work (Women) Convention from 1935 (No. 45) which is in Indonesia in force since 1950. It prohibits women from employment in underground mining to prevent them from hazardous work. The Convention is criticised for reinforcing traditional gender stereotypes of women seen as vulnerable, with the effect of excluding them from work and contributing to make the work of women in the mining sector invisible.[148] Gender norms are widely used to explain the gender divide of the next chapter.[149]

Gender divide in the Indonesian nickel mining sector

In Indonesia, according to data from the Central Statistics Agency (BPS), the number of female workers in the mining sector is less than 6.7 % of roughly 1.4 million workers in the sector.[150] Another aspect of inequality is that women face difficulties to reach management positions in mining companies because of their traditional roles including care and domestic work. In contrast to male managers, the responsibility as a mother and wife remains with women regardless of how high her position in the company would be.[151] Instead, they often work in the provision of services and goods at mine sites, such as cooks and administrators.[152] As the *figure 7* show, the discrepancy between female and male staff in the nickel mining company PT Vale in Indonesia is quite large – of the roughly 3,000 employees less than 10 % are women. Especially, the number of women in management and senior management positions remains at a low level.[153]

145 *Undang-Undang Nomor 7 Tahun 1984 tentang Ratifikasi Konvensi Penghapusan Segala Bentuk Diskrimnasi terhadap Wanita, https://peraturan.bpk.go.id/Home/Details/46978/uu-no-7-tahun-1984 (access date 17 August 2022).*

146 *Undang-undang Nomor 17 Undang-Undang Nomor 17 Tahun 2007 tentang Rencana Pembangunan Jangka Panjang Nasional (RPJPN) Tahun 2005-2025, https://peraturan.bpk.go.id/Home/Details/39830 (access date 17 August 2022).*

147 *Anonymous, (2022), Keseteraan Gender, Perlu Sinergi Antar Kementrian/Lembaga, Pemerintah Daerah dan Masyarakat, https://www.kemenpppa.go.id/index.php/page/read/31/1667/kesetaraan (access date 17 August 2022).*

148 *ILO, 'Women in mining. Towards gender equality' (2021), ILO report.*

149 *The World Bank, 'Expanding the role of women in Indonesia's Extractives Sector', 21 March, 2022: https://www.worldbank.org/en/news/feature/2022/03/21/expanding-the-role-of-women-in-indonesia-s-extractives-sector (accesse date 23 August 2022).*

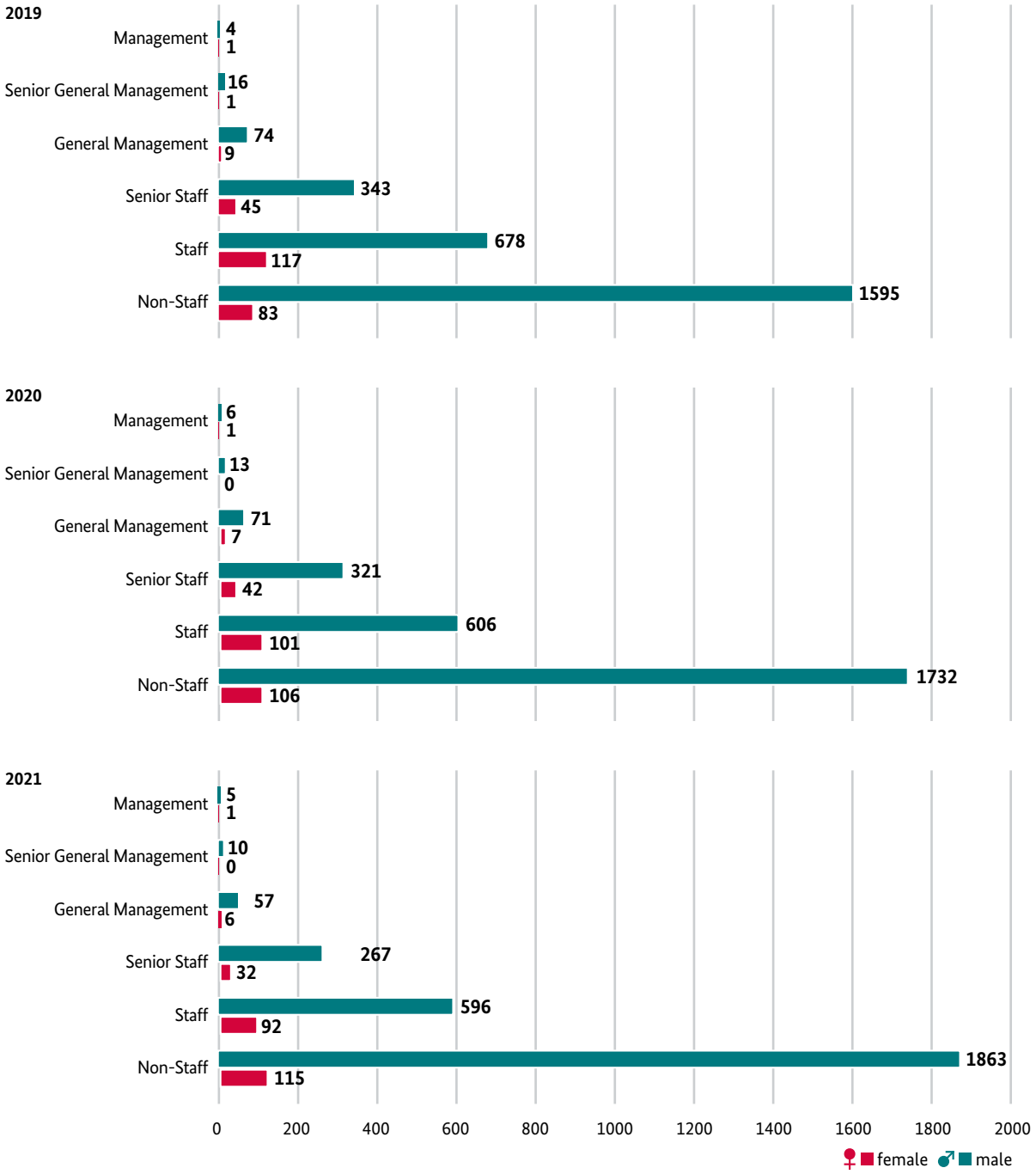
150 *https://www.coaltrans.com/insights/article/outlook-of-women-in-mining-and-energy-in-indonesia*

151 *Balada Amor, Hera Susanti, Safura Intan Herlusia, Pengarusutamaan gender di industri tambang di Indonesia, https://blogs.worldbank.org/id/eastasiapacific/pengarusutamaan-gender-di-industri-tambang-di-indonesia (access date 17 August 2022).*

152 *ILO, 'Women in mining. Towards gender equality' (2021), ILO report.*

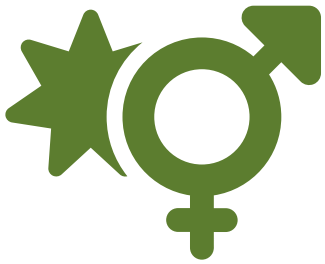
153 *Anonymous (2021), Sustainability Report 2021, PT Vale.*

Figure 7: Number of Employees by Position and Gender PT Vale for 2019 – 2021
(Source: Sustainability Report 2021, PT Vale)



This also affects wages, which are lower for women than for men. Based on BPS data as of February 2019, the average salary received by women in the mining and quarrying sector is IDR 4.26 million, while that of men is IDR 5.12 million.[154]

154 *Patresia Kirnandita, Ibid.*



In addition to these economic disadvantages, the occurrence of larger mining projects generally impacts communities' structures negatively. One such typical development is that the traditional roles and responsibilities of women become marginalised as the community becomes more dependent on the cash-based economy created by mining development. Since men rather tend to be given formal employment, they can continuously contribute to a family's income generation, for instance if they are taken over by a new employer of an industrial park. Women, on the other side, are often dependent on land when their source of income is subsistence farming. With large mining projects that diminish agricultural land, they lose their previous source of income generation and have fewer chances to create value. The resulting need to purchase groceries of the daily need in turn makes them more dependent on men who have money at their disposal.[155]

In the Community Resistance against Nickel Mining of PT Gema Kreasi Perdana on Wawoni Island, Southeast Sulawesi Province, the resistance carried out by the residents was met with intimidation and threats of violence using weapons or other tools from the company, Kendari Police and Polairud.[156] These caused trauma and depression because PT Gema Kreasi Perdana has several times entered the residents' agricultural land.[157] Women as land-owners who are single breadwinners will find it much more difficult to keep their property rights. The involvement of the police and the military in securing the activities of mining companies is easier to target women landowners. Women are more easily pressured by parties who are pro-nickel mining companies. In an open letter to TESLA, WALHI calls on Elon Musk to terminate Tesla's planned investment in Indonesia's nickel industry because of devastating impacts on the environment and "severe consequences of the nickel industry for women".[158]

The presence of nickel companies greatly impacts vulnerable groups, including women, children, and people with disabilities. Mining activities cause water, soil, and air pollutions. Women who are burdened with domestic needs are often the ones who are predominantly exposed to these pollutants e.g., when water is polluted, and women are predominantly exposed to it because they are in charge of washing clothes and dishes and cleaning the house. Another example of higher exposure for women are contaminated soils that increase the risk of diseases for women who work predominantly in subsistence farming. This exposure to pollution entails the risk of causing dangerous diseases for women, for instance cervical cancers, etc. [159]

155 *ILO, 'Women in mining. Towards gender equality' (2021), ILO report.*

156 *Mustafainah A. et all, Ibid.*

157 *Aryo Bhawono (2022), Izin Pertambangan PT Gema Kreasi Perdana Dinilai Layak Dicabut, https://betahita.id/news/detail/7300/izin-pertambangan-pt-gema-kreasi-perdana-dinilai-layak-dicabut.html.html (access date 17 August 2022).*

158 *WALHI, Open Letter to CEP Elon Musk and the shareholders of Tesla Inc: https://foe.org/wp-content/uploads/2022/07/2022.07.25_Letter-to-Tesla-re-nickel-mining_WALHI.pdf (access date 25 July 2022).*

159 *Anonymous (2022), Surat Terbuka kepada Elon Musk dan seluruh Investor Tesla Inc, WALHI; Interview with representative of Central WALHI on 12 August 2022.*

Companies' responsibility in promoting women

Several mining companies have started to implement gender mainstreaming in their companies, such as providing equal access and opportunities to men and women in recruitment processes, providing services to female employees by building lactation rooms, or developing work clothes that are also comfortable for women to wear. The matter of protection of women also gained importance in capacity building and awareness raising measures to promote gender equality between male and female employees.[160]

However, gender equality is still difficult to implement through mining companies' CSR programme as they need to be aligned with regulations of the regional government, often dominated by men. The company PT Kaltim Prima Coal experienced such obstacles when it wanted to implement its CSR gender equality programmes and community activities but was hindered by the local government.[161] This was confirmed during WINS' visits to the villages in the concession area of PT Vale and/or PT Citra Lampia Mandiri (PT CLM) in East Luwu Regency, South Sulawesi Province. According to the Village Heads of Magani and Harapan, PT Vale's CSR policy does not foresee special women's programmes anymore, although women's groups had the right to submit proposals for capacity building training in the past. PT Vale's CSR programme still encompasses renting school buses for children in Harapan Village, while PT CLM provides compensation by building infrastructure in the village.[162]

A further interesting point was conveyed by the Head of Sorowako Village, which is the location of PT Vale's mine site. *"Right now, there is no special empowerment programme for women in the village (Sorowako), but all of PT Vale's empowerment programmes involve women. Only women want to be involved in empowerment programmes, because all men are busy working in the companies. Men are also embarrassed to be involved in empowerment activities, which are predominantly focusing on the development of Small and Medium Enterprises (SMEs)".*[163] This statement was confirmed by the Department of Trade, Cooperatives, Small Medium Enterprises and Industry of East Luwu Regency.

Regional governments and companies as major stakeholders in impacting women's situation in the nickel sector either offer supportive programmes, remain passive, or inhibit women empowerment programmes. Despite direct or indirect economic benefits, women are mostly vulnerable to society-internal changes that often follow mining activities and hence bear a large share of negative impacts of mining activities. At the current stage, a clear gender gap in nickel mining is visible.

160 *Balada Amor et all, Ibid.*

161 *Mahy P. (2011), Gender Equality and Cooperate Social Responsibility in Mining: An Investigation of the Potential for Change at Kaltim Prima Coal, Indonesia, Resource Maangement in Asia Pacific Program Crawford School of Economics and Government ANU Collage of Asia and the Pacific, the Australia National University.*

162 *Interview Head of Mangani Village and Head Harapan Village, 12 August 2022.*

163 *Interview Head of Sorowako Village, 12 August 2022.*

5. Towards more Sustainability in Nickel Supply Chains: International Developments and Approaches

5.1 Implications of international due diligence laws and regulations on global nickel supply chains and Indonesian exports

This chapter includes a review and analysis of major new and upcoming laws at national and EU level, such as the German Supply Chain Due Diligence Act, the EU Regulation 2017/821 (EU Conflict Minerals Regulation) as well as the EU Commission's Proposals for a Regulation concerning batteries and waste batteries (Draft EU Battery Regulation) and for a Directive on Corporate Sustainability Due Diligence (Draft EU Corporate Sustainability Due Diligence Directive, EU CSDDD) and discusses possible implications for the import of nickel ores, cathode material, or battery components from Indonesia or from third countries when parts contain raw material from Indonesia.

On 1 January 2021, EU Regulation 2017/821, laying down supply chain due diligence obligations for Union importers of tin, tantalum and tungsten, their ores, and gold originating from conflict-affected and high-risk areas (EU Conflict Minerals Regulation), came into force across the EU. The EU Conflict Minerals Regulation requires EU importers of tantalum, tin and tungsten, their ores, and gold to identify, assess and mitigate risks of adverse impacts in their mineral supply chain consistent with Annex II of the OECD Due Diligence Guidance, including human rights violations, e.g. child labor, and contribution to conflict and terrorism financing. Furthermore, Union importers of 3TG minerals or metals shall carry out third-party audits or participate in and conform with a supply chain due diligence scheme recognised by the EU Commission and make available to Member State competent authorities (NCAs) summary audit reports or proof of conformance. In addition, they need to publicly report on their supply chain due diligence policies and practices for responsible sourcing. While nickel is currently not covered by Regulation 2017/821, the Regulation lays the groundwork for several other legal initiatives relating to mineral supply chain due diligence.

At the European level, three ongoing legal initiatives are relevant in the context of nickel and battery materials: (1) the EU Commission's Proposal for a Regulation concerning batteries and waste batteries, repealing Directive 2006/66/EC and amending regulation (EU) NO 2019/1020 (Draft EU Battery Regulation), (2) the Proposal for a Directive on Corporate Sustainability Due Diligence amending Directive (EU) 2019/1937 (Draft EU Corporate Sustainability Due Diligence Directive, EU CSDDD), and (3) the Proposal for a Corporate Sustainability Reporting Directive amending Directive 2013/34/EU, Directive 2004/109/EC, Directive 2006/43/EC and Regulation (EU) No 537/2014, as regards corporate sustainability reporting.

Firstly, the proposal for an EU Battery Regulation, tabled by the European Commission in December 2020, is currently under negotiation. It includes ESG due diligence requirements for economic operators making certain types of batteries available or placing them on the market or putting them into service.

The proposal's objectives are threefold:
1) strengthening the functioning of the internal market (including products, processes, waste batteries and recyclates), by ensuring a level playing field through a common set of rules;
2) promoting a circular economy; and
3) reducing environmental and social impacts throughout all stages of the battery life cycle.

These three objectives are strongly interlinked.[164] The Proposal tabled in December 2020 includes a scope encompassing cobalt, lead, natural graphite, lithium and nickel as well as chemical compounds based on these minerals. The geographical scope is global (no restriction to CAHRAs). The Proposal contains far-reaching transparency requirements for battery manufacturers and OEMs which would also lead to strengthened compliance with ESG issues along the value chain:[165]

- Starting 1 July 2024, all traction batteries and rechargeable industrial batteries that have internal storage with a capacity greater than 2 kW must include a carbon footprint statement and will have to comply with maximum CO_2 footprint thresholds from 1 July 2027.
- Capacity greater than 2 kW will require technical documentation indicating the recycled cobalt, lead, lithium, and nickel content they contain from 1 January 2027. Beginning 1 January 2030, batteries must fulfil the required recycling quota of 12 % cobalt, 85 % lead, 4 % lithium, 4 % nickel. From 1 January 2035, the percentages will increase: 20 % cobalt, 85 % lead, 10 % lithium, 12 % nickel.
- By 1 January 2026, the electronic exchange system for battery information will be established. Every industrial battery and traction battery with a capacity greater than 2 kWh is to receive an individual digital file (battery passport). The Battery Passport conveys information about all applicable ESG and lifecycle requirements based on a comprehensive definition of a sustainable battery.[166] The battery passport will contain information on ESG performance based on a global reporting framework and manufacturing history.

164 https://eur-lex.europa.eu/resource.html?uri=cellar:4b5d88a6-3ad8-11eb-b27b-01aa75ed71a1.0001.02/DOC_1&format=PDF
165 https://www.mcg-gmbh.de/en/product-compliance/eu-batteries-regulation.php
166 https://www.globalbattery.org/battery-passport/

Secondly, the European Commission shared its proposal for a horizontal 'Corporate Sustainability Due Diligence Directive' on 23 February 2022.[167] This is the first horizontal and cross-sectoral initiative which includes ESG Due Diligence requirements for all EU companies and non-EU companies, subject to certain conditions (including value and employee thresholds).[168] Under this proposed legislative framework, in-scope European and non-European companies will need to conduct human rights and environmental due diligence in their supply chains, including prevention, identification, and mitigation efforts. The ESG criteria are specified in Annex I of the proposal and include far-reaching environmental obligations.[169] Automotive companies and battery manufacturers would almost certainly be in scope of the Regulation and would have to take the following actions:

- Integrate due diligence procedures into company policies;
- Identify adverse human rights and environmental impacts arising from their own operations and those of their subsidiaries, and from their established business relationships in their value chains;
- Prevent potential adverse impacts and bring actual adverse impacts to an end;
- Establish and maintain complaints procedures that enable third parties to submit complaints relating to potential or actual adverse impacts; and
- Monitor the effectiveness of their due diligence periodically and at least every 12 months.

Thirdly, the proposed EU Corporate Sustainability Reporting Directive ('CSRD') amends the Non-Financial Reporting Directive (NFCRD). The Proposal extends the scope of the NFRCD to all large companies and all companies listed on regulated markets, requires the audit of reported information, introduces more detailed reporting requirements, and a requirement to report according to mandatory EU sustainability reporting standards. Large undertakings and, as of 1 January 2026, small and medium-sized undertakings, shall include in their published management reports information necessary to understand their impacts on sustainability matters, including a description of their due diligence processes regarding sustainability matters, the principal adverse impacts connected with their value chains and any actions taken to prevent, mitigate or remediate such adverse impacts.

Also, bilateral laws may affect companies which are using nickel products originating from Indonesia. The German Act on Corporate Due Diligence Obligations in Supply Chains was published in the Federal Law Gazette on 22 July 2021. This is the first time the responsibility of German enterprises to respect human rights in global supply chains has been put on a legal footing. The due diligence obligations apply, in a graduated manner, to an enterprise's own business area, to the actions of a contractual partner and to the actions of other indirect suppliers. If enterprises fail to comply with their legal obligations, administrative fines may be imposed. These can amount to up to 8 million euros or up to 2% of annual global turnover. In terms of ESG risks, the Supply Chain Act contains an exhaustive list of eleven internationally recognised human rights conventions and references relevant environmental conventions, including the Basel Convention and Minamata Convention. These are relevant ESG risks that occur in the nickel value chain in Indonesia, as the next Chapter will show.

167 https://eur-lex.europa.eu/resource.html?uri=cellar:bc4dcea4-9584-11ec-b4e4-01aa75ed71a1.0001.02/DOC_1&format=PDF

168 According to current estimates, around 13,000 EU companies and 4,000 non-EU companies would fall within the above criteria.

169 https://ec.europa.eu/info/sites/default/files/1_2_183888_annex_dir_susta_en.pdf

5.2. The role of sustainability standards and initiatives in global nickel value chains

This chapter provides an overview of sustainability standards and initiatives which are relevant for nickel supply chains.

Sustainability Standards and Initiatives

In recent years, several sustainability standards and initiatives that aim at stimulating collective action towards assessing, managing, and mitigating mineral supply chain risks have emerged. Those standards are relevant either to large-scale mining in general, or to nickel mining and processing, or standards which represent an industry norm related to any of the identified major nickel ESG supply chain risks.

The most relevant comprehensive sustainability standards for large-scale mining companies, including nickel mining companies, include the Initiative for Responsible Mining Assurance (IRMA), the Performance Expectations of the International Council on Mining and Metals Sustainable Development (ICMM), the Responsible Sourcing Requirements of the London Metals Exchange (LME), Towards Mining Sustainability of the Mining Association of Canada, as well as the International Finance Corporation's (IFC) Performance Standards and Environmental Health and Safety Guidelines. These standards have in common that they formulate rather comprehensive expectations in terms of sustainability topics for large-scale mining companies and thereby collectively constitute the industry standards for the mifning sector.

In addition to those comprehensive standards, there are numerous topic-specific internationally recognized sustainability standards, initiatives, and guidelines. For example, ISO 14001 provides guidance for implementing environmental management systems, while ISO 45001 is the globally accepted standard for occupational health and safety. The landscape for issue-specific sustainability standards is rather broad. Standards Map, a tool developed and maintained by the International Trade Center (ITC), currently lists more than 300 sustainability standards.

The German Bundesanstalt für Geowissenschaften und Rohstoffe (BGR) has published a comparative overview on *Sustainability Standard Systems for Mineral Resources to provide guidance on the most relevant sustainability standards for mining*.

For this report, representatives of the Responsible Minerals Initiative (RMI), of CSR Europe and of the China Chamber of Commerce for Minerals Metals and Chemicals Importers and Exporters (CCCMC) were interviewed and presented the sustainability initiatives relevant to nickel supply chains operated by them and expressed their views on the relevance of nickel supply chain sustainability initiatives to their members.

While other sustainability initiatives are equally relevant, these three organisations were chosen as they represent or have as members/participants a critical mass of key stakeholder groups, including OEMs, international battery manufacturers, and Chinese nickel mining, processing and battery manufacturing companies.

According to RMI, a survey among their members has revealed that nickel supply chains are of particular interest for them.[170]
RMI operates three relevant sustainability initiatives for nickel supply chains:
1) the Risk Readiness Assessment,
2) the Responsible Minerals Assurance Programme (RMAP), and
3) the Environmental, Social and Governance (ESG) Standard for Mineral Supply Chains.

170 RMI has 400+ member companies, mostly downstream companies from a range of industries, and 260 conformant smelters and 44 active smelters.

The Risk Readiness Assessment (RRA) is a voluntary self-assessment and self-reporting tool for minerals and metals producers and processors to communicate their environmental, social and governance practices and performance. Its main objective is to promote a common understanding of good practices and a means to consistently assess risks and actions to manage risks in the mineral supply chain. The RRA is composed of a set of 32 environmental, social and governance 'issue areas'. For each issue area, the RRA specifies a management practice known as the 'industry norm' which is derived from the requirements of voluntary sustainability standards that are commonly used in the minerals and metals supply chains.

The Responsible Minerals Assurance Programme (RMAP) provides independent third-party assessments of smelter and refinery management systems and sourcing practices to validate conformance with RMAP standards. The RMAP standards are developed to meet the requirements of the OECD Due Diligence Guidance, the EU Conflict Minerals Regulation and Section 1502 of the U.S. Dodd-Frank-Act. Originally focusing on tin, tantalum, and tungsten, RMI meanwhile has released additional mineral-specific standards and assurance tools and, in 2021, RMI released the Global Responsible Sourcing Due Diligence Standard for Mineral Supply Chains which is applicable to all mining, trading, and processing companies of other than the aforementioned minerals and metals. With regard to nickel, RMI has issued jointly with the Nickel Institute and Copper Mark a Joint Due Diligence Standard for Copper, Lead, Nickel, and Zinc. Currently, only the Murrin nickel mining and smelting operation in Australia has undergone the full validation process. Two nickel smelters in Russia and Madagascar are currently in the process.

The ESG standard sets forth the criteria for determining conformance with the RMI programme requirements for environmental, social, health & safety, governance at mineral processing companies. The standard was benchmarked against and is consistent with the RMI's Risk Readiness Assessment and nineteen other existing international ESG standards.

CSR Europe facilitates Drive Sustainability,[171] an automotive partnership for advancing responsible supply chains, and operated the Raw Material Outlook.[172] The Raw Material Outlook is a platform helping users manage and remediate human rights risks and the ESG impacts of raw materials through value chain mapping and ESG risk identification. It is a first step for unpacking each material value chain by mapping each stage, outlining principal actors, and identifying the most salient ESG risks. The United Nations Guiding Principles (UNGPs) on Business and Human Rights have been used as the main reference framework for risk identification, analysis, and prioritisation. Identified risks have been categorised following the Consolidated Framework of Sustainability Issues for Mining which resulted from the comparison and synthesis of sustainability issues and requirements in the mining sector done by the Federal Institute for Geoscience and Natural Resources (Bundesanstalt für Geowissenschaften und Rohstoffe, BGR). According to CSR Europe, nickel is one of the priority minerals for the Raw Material Outlook, including engagement on the ground.

China Chamber of Commerce for Minerals Metals and Chemicals Importers and Exporters (CCCMC) is a membership organization of Chinese mineral, metal, and chemical companies under the supervision of the Chinese Ministry of Commerce (MofCom). In 2014, CCCMC has published the Guidelines for Social Responsibility in Outbound Mining Investments which includes comprehensive expectations regarding ESG risks which can be found in the nickel sector in Indonesia. Furthermore, in 2016, CCCMC has launched the Responsible Cobalt Initiative (RCI) together with key international and Chinese upstream and downstream stakeholders from the global cobalt value chain in response to allegations from Amnesty International and other NGOs relating to child labour in cobalt mining in the DRC. Meanwhile, CCCMC has expanded RCI to the "Responsible Critical Minerals Initiative", which also includes nickel value chains. CCCMC counts as members or has collaborated with key Chinese players in the Indonesian nickel value chain, including Zhejiang Huayou Cobalt, Jinchuan, Beijing Easpring, CATL, and others. CCCMC is confirming that they are in dialogue with relevant companies regarding concerns over environmental issues in the context of nickel mining and processing in Indonesia.

171 *Drive Sustainability is an automotive Partnership between BMW Group, Daimler AG, Ford, Honda, Jaguar Land Rover, Scania CV AB, Toyota Motor Europe, Volkswagen Group, Volvo Cars and Volvo Group facilitated by CSR Europe.*

172 *The Raw Material Outlook methodology was developed by Levin Sources.*

6. Recommendations

This report shows:

- The biggest supply chain risks from nickel are environmental and climate-related risks. In particular, the carbon footprint of nickel mining and especially of nickel processing is considerable and estimated to increase drastically.
- Regarding the transition from coal to renewables, a large part of the energy needed for nickel mining and processing is generated by power plants that are operated by the nickel industry themselves, including in the industrial parks in Morowali, Weda Bay, and Konawe.
- Heavy metal contamination of coastal waters and other waterways is a threat to flora and fauna, as well as to the health of the population in mining communities. Livelihoods of communities relying on agriculture, fisheries and/or tourism are threatened.
- Deforestation due to mining is still occurring and threatening flora and fauna, particularly in protected areas. In addition, it is affecting the livelihoods of people. Dust and other emissions are a hazard for the workforce and local communities and can lead to a rise in respiratory diseases.

This chapter provides recommendations for stakeholders from government and businesses both in Indonesia and globally in regard to supporting responsible nickel value chains. This includes recommendations for upgrading the domestic value chain for nickel processing, battery cell manufacturing and EV production while maximizing the positive developmental impact and minimizing ESG risks in the value chain. In addition, recommendations concern the phasing-out coal as the primary energy source for nickel mining and processing.

Finally, this chapter provides recommendations for stakeholders of the international development cooperation on how to support responsible nickel value chains, both globally and in Indonesia, as well as identifying approaches which may contribute to a just transition in Indonesia, in particular regarding phasing-out coal as energy source in the nickel mining and processing, and about battery industries.

6.1 Recommendations for the Indonesian Government

The Government of Indonesia may consider to:

- Maintain and follow through with the commitment to not approve new coal-fired power plants: This would be in line with the pledge to close all of Indonesia's coal-power plants by 2055 and achieve carbon neutrality by 2060.[173]
- Make stronger use of instruments such as fiscal incentives and financial guarantees to support the transition from coal to renewables in the nickel sector. In particular, implement the roll-out of the carbon tax.
- Promote the increase of local content in nickel mining, processing and battery manufacturing investment projects through regulatory action, through qualification and promotion of SMEs and local mining equipment and energy companies, as well as other service providers.
- Further develop the infrastructure and campaigns for creating a local market for EVs, including public transportation based on EVs, and other measures.
- Enforce its commitment not to provide permits for deep-sea tailings disposal in Indonesia or ban the method.[174]
- Proactively conduct research in collaboration with academic institutions and companies on the reuse of tailings from mining activities, for example as construction materials, in order to avoid tailings negatively impacting the environment.[175]
- Strengthen enforcement of environmental laws and regulations by increasing the technical and financial capacity of environmental protection authorities, to allow e.g. for more regular on-site checks. A particular focus could be capacity building of local forest authorities in monitoring and conflict resolution.
- Publish data on emissions and water and soil quality in mining and processing areas on a regular basis.
- Be more restrictive in granting licences for forest conversion (either inside or outside state forest land) for mining activities. Guide the development of mining concessions by spatial planning which balances environmental, social and economic objectives.
- Continue and deepen efforts in the prevention of corruption (e.g. through the Komisi Pemberantasan Korupsi, KPK – Corruption Eradication Commission) with regard to the granting of mining business permits and land use rights.
- Respect local (customary) land rights and livelihoods of local communities. Ensure sound FPIC processes, involving all relevant stakeholders before granting new concessions. Consider integrating FPIC in the national legislation to ensure the protection of (human) rights of local communities.
- Improve education and awareness of the public about long-term environmental impacts of the mining and mineral processing industries.

173 https://www.esdm.go.id/en/media-center/news-archives/speaking-at-cop26-energy-minister-gives-indonesias-commitment-to-net-zero-emission. *An analysis released in August 2022 by the Center for Global Sustainability (CGS) at the University of Maryland and the Institute for Essential Services Reform (IESR) shows Indonesia can accomplish an accelerated coal phase-out if it decreases coal power generation by 11% over the next eight years and then ramps up retirement by over 90% before 2040 to retire the country's 72 coal-fired plants.* https://cgs.umd.edu/news/first-ever-just-transition-plan-coal-retirement-indonesia-finds-feasible-pathway-2045-phase

174 *Apparently, some of the HPAL projects under construction are still considering using DSTD as disposal method.* https://www.reuters.com/article/us-indonesia-mining-environment-exclusiv-idUSKBN2A50UV

175 *Based on interview with Director of Environmental Damage Control Directorate General of Environmental Damage Control and Supervision at the Ministry of Environment and Forestry.*

6.2. Recommendations for businesses in the nickel value chain

- Nickel mining and processing companies, especially in industrial parks in Indonesia, shall pledge not to build new thermal coal power plants and gradually transform existing thermal coal power plants to renewable sources.
- Companies should comply with all applicable laws and regulations in Indonesia, including with environmental regulations.
- Companies along the supply chain may voluntarily publish on a regular basis, at least annually, data on emissions as well as on water and soil quality in mining and processing areas.
- Battery cell manufacturers and OEMs should work towards establishing the battery passport and meet recycling quotas, as foreseen by the EU Battery Regulation, and in particular work with mining and processing companies towards reducing the carbon footprint of nickel from Indonesia.
- Companies in the battery value chains should commit to not pursue deep seabed mining.
- Companies in the battery value chains should commit to not pursuing deep-sea tailings disposal methods.

6. 3. Recommendations for stakeholders of the International Development Cooperation

Stakeholders of the international development cooperation may collaborate – among others with the Indonesian Government – on:

- Strengthening und supporting the transition from coal to renewable sources of energy provision for nickel mining and processing.
- Protecting the environment and biodiversity in mining areas in particular through strengthening environmental governance and law enforcement as well as supporting the rehabilitation of closed mining sites.
- Supporting the implementation of the governments' commitments towards increasing the share of renewables in the energy mix and strengthen the CO_2 trading mechanism in Indonesia.
- Engaging at central and provincial levels in South, Southeast and Central Sulawesi as well as in Maluku to work with local governments on strengthening environmental monitoring and inspections. Strengthen environmental information disclosure systems in nickel mining and processing companies.
- Sensitizing on selected supply chain sustainability initiatives to increase awareness in the down-stream industry (in particular in the automotive industry) for the need for responsibly mined and processed nickel and strengthen due diligence systems, including providing access to remedy.
- Establishing the framework conditions for creating a domestic EV market through supporting e-mobility concepts and infrastructure, e-mobility-based public transport, etc.
- Working with tertiary and secondary education institutions on strengthening job skills of Indonesian to work in the battery industry (as engineers, chemists, etc.), to strengthen the local supplier base and potentially create jobs in other industries beyond nickel mining.
- Supporting mining communities affected by mining and processing operations in developing alternative livelihoods (e.g. if jobs in other industries, such as tourism and agriculture, have been crowded out) in order to facilitate a just transition.