ODI Europe

Briefing Paper

Building sustainable critical raw materials supply chains

The use of joint ventures

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Key messages

Joint ventures are an important feature of the critical raw materials sector. They provide access to considerable capital, allow parties to share financial, environmental and political risks, and bring together the expertise required for complex mining and refining operations.

China has used joint ventures extensively to secure majority stakes and long-term supply agreements of critical minerals for its domestic industry, supported by domestic banks with large, often subsidised loans.

Japan has a unique strategy which includes investing directly through a state agency in joint ventures. The EU could create a similar agency to encourage joint ventures and foster cooperation in procurement, technology and environmental innovation.

A key benefit of joint ventures is technology transfer. However, for local firms to truly benefit licencing agreements need to allow independent use of the technology in future. There are also opportunities to use joint ventures to support more sustainable mining practices.

The benefits of joint ventures to host countries depend heavily on their regulatory frameworks. Chile's emphasis on majority domestic ownership exemplifies an effective strategy to retain control and value. Where this is not feasible, it is imperative to enforce rigorous tax policies and environmental and labour standards to ensure joint ventures contribute to sustainable and equitable development.

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About this publication

This briefing paper has been prepared in the context of the Second International Climate, Trade and Industrial Policy Dialogue, held in Brussels on 9 July 2025. This series of events, co-hosted by ODI Europe and the European Climate Foundation (ECF), aims to address challenges posed by EU climate, trade and industrial policies and to identify opportunities that can be harnessed through collaborative approaches. Opinions and any errors or omissions remain the responsibility of the author.

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Abbreviations and acronyms

CRM	Critical raw material
CRMA	Critical Raw Materials Act
DG GROW	Directorate-General for Internal Market, Industry, Entrepreneurship and SMEs
DG INTPA	Directorate-General for International Partnerships
DLE	Direct lithium extraction
DRC	Democratic Republic of Congo
EBRD	European Bank for Reconstruction and Development
EIB	European Investment Bank
EU	European Union
EV	Electric vehicle
HPAL	High pressure acid technology
IEA	International Energy Agency
IEEP	Institute for European Environmental Policy
IMIP	Indonesia Morowali Industrial Park
IWIP	Indonesia Weda Bay Industrial Park
JICA	Japan International Cooperation Agency
JOGMEC	Japan Organisation for Metals and Energy Security
MCC	Metallurgical Corporation of China
MHP	Mixed hydroxide precipitate
NCMI	Namibia Critical Metals Inc.
NDC	Nationally determined contribution
R&D	Research and development
SPV	Special purpose vehicle

1 Introduction

This briefing paper was developed in the context of ODI Europe's Second International Climate Trade and Industrial Policy Dialogue (ODI Europe, 2025). It provides background on the topic of joint ventures in the context of critical raw materials (CRM) supply chains. In particular, it looks at how joint ventures are being applied in CRM-rich countries and the associated challenges, and offers reflections for the European Union (EU) in its own efforts to enable partnerships in this area.

This briefing includes perspectives shared by participants in the second policy dialogue. This group included representatives from EU institutions, international agencies, think tanks and academia, as well as a very high level of participation from the private sector involved in the CRM sector (including both multinationals and smaller, specialist firms). Key points raised by participants are included in boxes at the end of the relevant sections.

1.1 The demand for critical minerals and joint venture arrangements

As the EU accelerates its green transition and aims to onshore some of the manufacturing of clean energy technologies, the demand for CRMs – such as lithium, nickel, cobalt, rare earth elements and graphite – is set to increase significantly. The EU is currently heavily import-dependent across the entire CRM value chain; its Critical Raw Materials Act (CRMA), adopted in 2023, sets targets to secure domestic, diversified and sustainable CRM supply. At the same time, resource-rich countries are reassessing their position in CRM supply chains, aiming to shift from raw material exporters to engaging in higher-value activities. New partnerships are being explored, with the EU committed to developing mutually beneficial arrangements (European Commission, 2023a) which contribute to the diversification of the EU's raw materials supply chain and enhance the sustainability and value addition of production in resource-rich countries.

Joint ventures have been an important feature of the mining sector for some time, with the mining exploitation licenses, land and any assets typically held through the joint venture structure set up (Norton Rose Fulbright, 2021). As noted by the Institute for European Environmental Policy (IEEP), value addition in third countries can be achieved by encouraging technology transfers through joint venture partnerships or licencing, capacity-building and knowledge sharing, in relation to both CRM processing and recycling (Blot, 2024). Joint

ventures may also be required by law in order to increase the economic benefits to the host country; this may include participation by a government-owned entity in the host country. Joint ventures are particularly useful in mining projects given their operational complexity and the considerable political, financial and environmental risks. The ability to access finance and combine operational know-how makes joint venture transactions attractive in this context (Norton Rose Fulbright, 2021).

1.2 Challenges in setting up joint ventures

There are multiple challenges in negotiating and setting up joint venture arrangements in relation to CRM projects. These include (Norton Rose Fulbright, 2021):

- The need for specialised due diligence (e.g. to validate commercial viability and aspects such as security of title).
- Review of local law and the governance framework of the host country to understand how the parties would be affected if there is a significant dispute, as well as agreement on the acceptable forum for dispute resolution.
- Assessment of risks, such as the risk of nationalisation or expropriation.
- Agreement over practical terms such as the exploration schedule, budget and business plan, as well as the selection of contractors (and decisions on where unanimity between the parties is required).
- The need for assurances that any commercial agreements – such as the supply of products from the mining operation – will be administered on arm's length terms.
- The need for clarity on what the parties will do in cases of cost over-runs.

Whether, and how, a joint venture includes technology transfer is a complex issue. The default position in law, which is typically used in shareholders' agreements, is that 'the joint venture will have no rights to use any shareholder's intellectual property, and no shareholder will have any rights to use the joint venture's intellectual property, unless those rights are conferred under a separate licence' (Norton Rose Fulbright, n.d.: n.p.). As such, if the joint venture needs to use any intellectual property of any of the parties to the venture, a special licence will be required, with all terms of use agreed (including whether this is on a royalty-free basis or not).

Box 1 Stakeholder views regarding CRM-related joint ventures

Dialogue participants shared multiple examples of joint venture partnerships across a variety of countries, including France, the UK, Australia, Chile and South Africa. A mining company representative explained how they see joint ventures as a good tool to de-risk their investments and noted successful partnerships in several locations.

One global mining company highlighted that, for them, the technical expertise aspects of a joint venture partnership have proven even more important than the financial benefits of co-investment; this was in the context of moving into new areas with lithium extraction and processing. Another mining company noted that, the further down the value chain they move, the more important joint ventures can become, as the requirement for technology grows.

One participant noted that legal disputes around CRM joint ventures have grown in recent years. This was acknowledged as a difficult area; however, a mining company representative emphasised the importance of consulting extensively with local communities and 'bringing people with you' in order to reduce the risks of litigation.

Source: Participants' inputs from the Second International Climate, Trade and Industrial Policy dialogue

2 An overview of CRM-related joint ventures

2.1 China's joint venture strategy

AidData research documents almost $57 billion of Chinese investment in CRMs between 2000 and 2021, with copper, cobalt and nickel projects assigned the highest priority for investment over this period (Escobar et al., 2025). Rather than official lending to host governments, the use of special purpose vehicles (SPVs) and joint ventures is now a key feature of Chinese investments in the mining sector, representing 44% of China's financial commitments for 'mining and industry projects' in low- and middle-income countries between 2000 and 2021 (ibid.).

Chinese banks provide loans to joint ventures and SPVs where Chinese companies have equity stakes. This ensures that Chinese firms have access to raw or processed mineral ore based on their stakes and formalised through 'offtake agreements' that specify how much of the mine's output each shareholder receives (Escobar et al., 2025). This locks in China's long-term access to critical minerals. As noted in Section 2.2, there are multiple investments of this kind in Indonesia. China is also investing, often through Chinese state-owned enterprises and with similar joint venture (or SPV) arrangements, in countries such as the Democratic Republic of Congo (DRC), Argentina and Zambia (IEA, 2025). In the DRC, for example, Zijin Mining is involved in a joint venture – Manono Lithium – with the state-owned Congolaise d'Exploitation Minière (COMINIERE) holding a 39% stake (Zijin Mining Group, 2023).

China's approach to joint ventures can be summarised as follows (Escobar et al., 2025):

- First, state-owned banks typically offer substantial acquisition loans (which could, for example, be around $700 million to enable a Chinese firm to acquire majority ownership in a $1 billion project). This is important given the exceptionally high capital investment requirements of the sector.
- Second, Chinese banks provide subsidised loans to joint ventures in the minerals sector (something OECD countries' export credit agencies do not offer to domestic companies operating overseas); these concessional loans are offered at

all relevant stages (from mine acquisition through development to mine operation).
- Third, China also offers so-called 'package deals', such as infrastructure loans for unrelated projects granted in parallel to Chinese firms entering into joint ventures in a country. This was done, for example, in the DRC in relation to Sicomines, a copper-cobalt mine, with the infrastructure projects 'effectively collateralized against the mine's future revenues' (Escobar et al., 2025: 14).

These practices clearly distinguish China's approach from that of OECD countries.

2.2 Indonesia

Indonesia holds the world's largest nickel reserves (Huber, 2021). The country has undergone a significant transformation from being primarily an exporter of raw nickel ore to a key player in downstream processing and refining. After Indonesia's nickel export ban,[1] Chinese companies moved to invest heavily in domestic smelters. As a result, Indonesia has seen rapid growth in its nickel processing, as well as the development of a number of industrial hubs such as the Indonesia Morowali Industrial Park (IMIP) and the Indonesia Weda Bay Industrial Park (IWIP). China's Belt and Road Initiative has facilitated significant Chinese investment into local industrial zones, with joint investments in these parks undertaken by Chinese and Indonesian firms (Tritto, 2023). Industrial parks benefit from various incentives for processing including generous income tax holidays, low nickel ore prices and energy subsidies (Syarif, 2025).

One notable joint venture is Halmahera Persada Lygend, set up between Indonesia's Harita Group and China's Ningbo Lygend Mining. Harita Group owns 45.1% of the shares in the venture, with the majority share held by Ningbo Lygend (Durrant, 2022). The $1.5 billion project, which started production in 2021, includes construction of a nickel-cobalt processing plant that produces MHP (mixed hydroxide precipitate) nickel sulphate and cobalt sulphate, derivatives that are used in electric vehicle (EV) batteries (ibid.). The project marks the first use application of high pressure acid technology (HPAL) in Indonesia (Indonesia Miner, 2024). This complex technology means that low-grade nickel ore, instead of being dumped, can be processed into nickel sulphate. The project is considered particularly successful given a number of HPAL projects have failed in their efforts to convert low-grade nickel in the past (Ribeiro et al., 2021). Construction costs were well below those for similar plants in Canada, Madagascar, Papua New Guinea and Australia (Durrant, 2025). The plant was built and operational within a year (Bloomberg News, 2023).

[1] The export ban was introduced in 2014. It was relaxed in 2017 when nickel production declined, before a complete ban was reimposed in 2020 (Konewka et al., 2021).

Chinese investment and know-how is considered key to the success of the joint venture, not least due to the use of the latest HPAL technology (Durrant, 2022; Bloomberg News, 2023). The plant was designed based on the experience of the Metallurgical Corporation of China's (MCC) operation in Papua New Guinea (Durrant, 2022) and delivered by the China ENFI Engineering Corporation, a subsidiary of MCC, with some efficiency improvements in how chrome is removed from ore (Bloomberg News, 2023). Chinese participation in the joint venture has been extensive: the engineering contractors involved in procurement, construction, manufacturing and supervision are all Chinese firms, and an eight-year offtake agreement has been signed with China-based Shenzhen Green Eco-Manufacture (GEM) for purchase of MHP, nickel sulphate, cobalt sulphate and other raw materials (NS Energy, 2021).

New joint ventures to construct similar HPAL plants have followed, though these are mainly *without* domestic participation. For example, Huayue Nickel and Cobalt (HNC) is a joint venture between Huayou Cobalt[2] (owning 57% of shares), China Molybdenum (CMOC Group)[3] (30%) and Tsingshan[4] (10%) (with 3% of shares held by other companies) (Durrant, 2022). HNC is investing $1.6 billion in an HPAL plant located in the IMIP (ibid.).[5] Germany-based BASF and French nickel processor Eramet considered investing in a nickel and cobalt refining complex in Weda Bay but decided against going forward with the project (BASF, 2024). However, in partnership with Tsinghan, Eramet has a 43% stake in the holding company which owns 90% of PT Weda Bay Nickel, giving the French company access to nickel and cobalt derivatives (Eramet, 2022). Eramet also signed a cooperation agreement with Indonesia's Geological Agency in 2024, envisaging joint studies of critical minerals (including lithium potential), exploration and capacity-building initiatives (Djakarta Mining Club, 2024).

While Indonesia's nickel ore export ban has successfully driven downstream processing and the export of high-value-added derivative products (Fajar Anugrah, 2023), there are major concerns about these projects (and both industrial parks) in relation to environmental degradation and pollution, low wages and working conditions (Rosada et al., 2023; Al-Ayubby, 2024). The fact that Chinese buyers have monopolistic market influence in Indonesia, leading to downward pressure on prices paid to domestic mining firms, is another area of concern (Tritto, 2023).

[2] Huayou Cobalt is a Chinese manufacturer of cobalt, nickel and lithium materials, producing cathodes for consumer electronics and EV batteries.

[3] The CMOC Group is a global mining company, headquartered in Shanghai. It is a leading producer of copper, cobalt, molybdenum, tungsten and niobium.

[4] Tsingshan is a Chinese private mining company and a leading nickel (and stainless steel) producer.

[5] Another new joint venture investing in a HPAL plant in the same industrial park is QMB New Energy Materials (Durrant, 2022). It brings together several Chinese firms, with others including New Horizon International Holding Ltd (Australia) and Hanwa (a Japanese firm, with a primary metal division and expertise in metals recycling).

Environmental impacts are significant, including on forests and biodiversity (IUCN, 2024). Concerns are generally high, not least because the energy to process nickel comes mostly from coal,[6] but also because the HPAL method produces 'nearly double the amount of tailings that need to be treated and stored, raising the risk of severe contamination' in project zones (Bloomberg News, 2023: n.p.). Efforts to ensure smelters use renewable energy and initiatives to address hazardous waste management are priorities in Indonesia (Fagar Anugrah, 2023). In particular, there is a lot of attention to reducing the reliance on coal-fired power, driven in part by the EU's new sustainable battery regulations, which introduce a classification of batteries based on carbon footprint from 1 January 2026 (Digges and Brown, 2021). Local civil society activists argue that Indonesia should seek investments from countries with higher labour and environmental standards (Anandia, 2024); the lack of European investment directly in processing is considered a limitation in diversifying partnerships beyond existing Chinese investment.

While Indonesia has advanced significantly in more complex technologies, the majority of its nickel is still used to produce stainless steel, with less than 20% used to produce the MHP derivatives used in EV batteries (Syarif, 2025). As most products are processed and exported to China, these value-addition efforts are not yet actively supporting domestic industrialisation priorities, such as EV battery or vehicle production or domestic steel manufacturing (ibid.). However, the Indonesian government's ambition to increase its car manufacturing and develop a complete EV supply chain is notable, and there has been recent progress (Konewka et al., 2021). Two South Korean companies (Hyundai Motor Group and battery manufacturer LG Energy Solution) have entered into a joint venture (HLI Green Power) to build a $1.1 billion EV battery cell manufacturing facility in West Java (Agarwal, 2024). The plant will mainly supply batteries to Hyundai's car manufacturing plant located in the same area (Konewka, 2024). In June, the government announced a $6 billion investment in a major EV battery ecosystem project involving CATL (China's leading battery firm) and the state-owned Indonesia Battery Corporation, with multiple joint venture partnerships to develop smelters and manufacturing plants in North Maluku province (Al-Azhari, 2025). Following Indonesia's example, the Philippines is planning to introduce an export ban on nickel ore and develop downstream processing facilities (IEA, 2025).

Box 2 Views from Indonesia shared during the dialogue

Dialogue participants noted the dynamic transition in the Indonesian nickel industry and how the country is adapting to growing

[6] There are efforts to reduce carbon emissions by using natural gas sources in nickel processing plants. PT Vale Indonesia (a subsidiary of Vale, a Brazilian mining firm) working with PT Bahodopi Nickel Smelting Indonesia have constructed Indonesia's first plant of this kind using Rotary Kiln Electric Furnace (RKEF) technology (Vale, n.d.).

opportunities in the global market. Alignment with the EU's standards and requirements was highlighted as particularly relevant. One participant emphasised that the type of mining undertaken, and the specificities of Indonesian nickel, mean gaps remain in terms of technical knowledge. There are significant opportunities for research and innovation with European partners, including in relation to environmental improvements, an area ripe for joint venture partnerships. It was noted that Harita Nickel has been through an audit with the Initiative for Responsible Mining Assurance (IRMA) (the first company in Indonesia to do so) and that, generally, environmental challenges are becoming a higher priority in the country. A new framework to assess CRM-related biodiversity risk is also being developed, another first for the country. The need for more clarity on new European regulations was highlighted to EU representatives, alongside a request for more support to prepare for these given uncertainty on how measures will be implemented. More direct involvement from the European private sector, including new institutional partnerships, was also encouraged.

Source: Participants' inputs from the Second International Climate, Trade and Industrial Policy dialogue

2.3 Japan

For over a decade Japan has been diversifying its sources of CRMs, successfully reducing its dependence on China for rare earth elements (from 90% of supply in 1990 to 58% in 2020) (Isetani et al., 2022). Japan has adopted a comprehensive strategy which includes a strong focus on technological innovation (both to develop recycling technologies and to find alternative materials to substitute for rare earths), as well as acquiring interests in, and developing new, rare earth mines and stockpiling to ensure the country has its own reserves of CRMs (Terazawa, 2023). Japan is far ahead of efforts in Europe, not least because of the activities of its raw materials agency Japan Organisation for Metals and Energy Security (JOGMEC), which has provided capital through investment, loans and debt guarantees (Cernicky et al., 2024). In 2011 JOGMEC invested $250 million in loans and equity in Lynas (an Australian rare earths mining company) (NCMI, n.d.b). This was considered a key early step in reducing Japan's dependence on China for rare earths (Cernicky et al., 2024). Further investment of $134 million followed in 2023 (NCMI, n.d.b).

Japan has also been increasing its efforts to enter into joint ventures, particularly to secure supplies of rare earth elements (Chansoria, 2020). JOGMEC includes in its approach joint venture exploration activities, investing in satellite imagery analysis, geophysical exploration, geological and drilling survey methods (JOGMEC, n.d.). If these exploration activities produce promising results, JOGMEC's

position in the project may then be transferred to Japanese companies (ibid.).

In Namibia,[7] JOGMEC is part of a joint venture with Namibia Critical Metals Inc. (NCMI), the Lofdal Heavy Rare Earth project. NCMI, a Canadian public company, holds 95% of the 25-year mining licence for Lofdal, a site with globally significant deposits of heavy rare earth metals used in permanent magnets for EVs, wind turbines and electronics (NCMI, n.d.a). The residual 5% is held by 'Philco 196', an arrangement that fulfils Namibia's requirement that there must be a 5% shareholding of Historically Disadvantaged Namibians (NCMI, n.d.b).

Under the joint venture JOGMEC has agreed to explore, develop, exploit and refine minerals by providing C$20 million in funding to earn a 50% interest in the venture, with the aim of securing at least a 50% share of the minerals produced for Japanese industry. This investment is structured in phases as follows (NCMI, n.d.b):

- Phase 1: C$3 million is provided for exploration. This did not earn JOGMEC a stake in the project.
- Phase 2: C$7 million is provided. This earned JOGMEC a 40% interest. This phase was completed in March 2025 (NCMI, 2025).
- Phase 3: an additional C$10 million is provided for further exploration and development. This will earn JOGMEC its full 50% share in the project.

After phase 3 is complete, JOGMEC can purchase an additional 1% share for C$5 million and 'has first right of refusal to fully fund the project through to commercial production and to purchase all production at market prices' (NCMI, 2025: 5). Although JOGMEC is making a comparatively high payment for 1% of shares to acquire majority interest, this is still highly beneficial to Japan and puts it in a privileged position to become sole off-taker going forward. The remaining (collective) share of NCMI and Historically Disadvantaged Namibians cannot be diluted to below 26% (ibid.).

This can be contrasted with the EU's experience in Namibia (Logan, 2024). The EU has signed a strategic partnership with the country and undertaken a Global Gateway investment related to CRMs. This has financed capacity-building for geological surveying and a pre-feasibility study for lithium processing to improve the environment for CRM development. However, with this partnership under way for over two years there is still no European company active in Namibia's CRM value chains. ECFR research concludes that the EU requires 'more focus on market economics' and 'less traditional development policy' (Logan, 2024: 15).

[7] Namibia is the third-largest producer of uranium globally, and also has deposits of lithium, graphite, copper and rare earth elements (Logan, 2024). Like Indonesia, the government has banned the export of unprocessed lithium ore and other CRMs.

JOGMEC also recently announced a new joint venture called Japan France Rare Earths. Together with Iwatani Corporation, a Japanese gas and energy business which imports rare earths, JOGMEC is providing $120 million in equity and debt financing to a French rare earths project (Reuters, 2023). The French partner is Caremag (a subsidiary of Carester founded in November 2020 by Carester and its employees), which is constructing a rare earth refining plant in south-west France. This will be Europe's first large-scale rare earth recycling facility and producer of purified heavy rare earth; it will be designed with the latest technologies to reduce CO_2 emissions, minimise water consumption and avoid the release of liquid effluents, as well as aiming to advance rare earth recycling (Carester, 2025). This is the first time JOGMEC has invested in a stand-alone refinery project; the offtake agreement with Caremag means it will secure half of the output of heavy rare earth oxides (primarily dysprosium and terbium) (Reuters, 2025). The French government is providing around €100 million of financial support to the project (ibid.).

Japan is also working in partnership with Kazakhstan, including direct JOGMEC involvement in geological exploration, extraction and processing (Minex Forum, 2025). A key element of this cooperation is the transfer of technology related to processing secondary raw materials, and specifically the technology used for the recovery of metals from tailings and end-of-life products (JOGMEC, 2024). This is in line with a five-point plan for critical minerals security agreed at the G7 Ministers' Meeting on Climate, Energy and Environment hosted by the Japanese government in 2023 (G7 Ministers' Meeting on Climate, Energy and Environment, 2023). The plan commits to technological innovation in mining and smelting, including in relation to tailings reuse, and gives priority to continuing technical exchanges in this area. The collaboration with Kazakhstan falls under Japan's Joint Crediting Mechanism (JCM), which aims to share decarbonisation technologies with developing countries. This is regarded as a contribution to Japan's nationally determined contribution (NDC) to global emissions reduction (METI, 2023). Kazakhstan is also developing strategic partnerships with others, including South Korea and the EU (European Commission, 2022; IEA, 2025).[8]

Japan has developed a number of initiatives regarding exploration and production of rare earths with India, including supply agreements to access monazite (a rare earth oxide) (Chansoria, 2020; Chadha and Bansal, 2024). India is a significant source of rare earth elements but has low output and requires foreign investment and technology transfer to increase domestic refining activity (Mishra and Mancheri, 2024; Isetani et al., 2025). Collaboration is considered highly advantageous given that Japan is a leader in 3D mapping technology

[8] Under the EU–Kazakhstan partnership, German company HMS Bergbau AG is planning to invest in lithium extraction in a project involving technology transfer commitments (Blot, 2024).

that could be used to support critical minerals mapping in India (Isetani et al., 2025).[9] This is in addition to the potential for India to learn from Japan's expertise in deep sea mining technologies (Chansoria, 2020). However, questions have been raised about the rationale for deep sea mining and there are fears about the potential negative environmental impacts on marine ecosystems (Alger et al., 2025).[10]

Japanese firms Toyota Tsusho and Sojitz, in partnership with Lai Chau Vimico Rare Earth Joint Stock Company, have been involved in the extraction of rare earth elements in Dong Pao, Viet Nam.[11] However, this project was abandoned after low prices on the global market (influenced by China's near-monopoly) rendered the investment unattractive (Asia Financial, 2023). There are efforts to revive mining at Dong Pao (Diem and Yen, 2024), though to date Viet Nam has not been able to exploit its considerable mineral potential due to limited technologies and a lack of foreign investment.

Box 3 Stakeholder exchange regarding Japan's approach

During the dialogue, the complementary work of the Japan International Cooperation Agency (JICA) was highlighted. Alongside JOGMEC, JICA plays a role in the mining sector in partner countries, pursuing dual goals to ensure there is a stable flow of mineral resources into global markets and advancing partner country development. JICA's efforts include an educational exchange programme which supports students through undergraduate and Masters degrees and doctorates, preparing highly skilled professionals for the mining sector in their home countries. A representative from South Africa pointed out that South Africa would welcome a similar educational exchange initiative with the EU, building on the PhD initiative that the South African government recently launched to fund its PhD students overseas; an opportunity to leverage this initiative in collaboration with the EU and European universities, and targeting critical human capital needs in relation to the CRM sector, would be a welcome new initiative.

The representative from Japan highlighted opportunities for European and Japanese companies to work together, particularly in Africa, where Japanese companies typically have less exposure and would benefit from co-investing. The potential for trilateral (Japan–Europe–Africa) cooperation was generally emphasised, as was the

[9] Less than 40% of India's landmass is covered by geophysical surveys, while geochemical surveys cover only 4% of the country (Isetani et al., 2025).

[10] Alger et al. (2025) argue that the economic benefits of deep sea mining are overstated – the techniques required are very expensive and the minerals required for the energy transition are already abundantly available on land. In addition, they question the often-cited benefit that deep sea mining would reduce mining on land (and accompanying social problems), given mining companies plan projects that last for several decades, as well as the fact that labour violations are common in sea-based industries.

[11] The project agreement was to exploit 10,000 tonnes of rare earth before negotiation of a Viet Nam–Japan joint venture (Vietnam Investment Review, 2014).

opportunity for the EU to follow Japan's JOGMEC model, including to support more risky, less bankable projects (e.g. in relation to smelters).

Source: Participants' inputs from the Second International Climate, Trade and Industrial Policy dialogue

2.4 The Lithium Triangle

South America's Lithium Triangle straddles Chile, Argentina and Bolivia. While all three countries have considerable lithium reserves, they depend largely on joint ventures with foreign companies to develop their lithium mining activities (Jütten, 2024).

Chile is asserting greater state control and has launched a new National Strategy for Lithium which aims to expand production and promote value added industrialisation through local processing (Government of Chile, n.d.). The strategy mandates public–private partnerships, with Chilean state-owned entities taking a majority stake in strategic projects (Shaw, 2024). Currently SQM (a global mining company operating in Northern Chile) and Albermarle (a global mining and manufacturing company based in the US) are the only two lithium producers active in Chile. While Albermarle is exempt from the public–private partnership mandate due to the terms of its existing contracts (Zadeh, 2025), the state-owned copper mining company CODELCO has announced a new joint venture agreement with SQM. CODELCO owns 50% of the shares plus one, with SQM overseeing general management until the end of 2030 and CODELCO taking over until 2060 (SQM, 2024). The joint venture will include the use of direct lithium extraction (DLE) technology in the Salar de Atacama (IEA, 2025). DLE is an innovative technology, developed with significant R&D investment (including in Europe),[12] to extract lithium from geothermal brines more efficiently and more sustainably than conventional methods (ibid.).

In response to the new regulations related to mandatory public–private partnerships and more stringent water usage regulations, major Chinese firms BYD and Tsingshan have recently abandoned planned investments in lithium plants in Chile (Zadeh, 2025).[13] However, there has been major interest in initiatives in Chile and dialogue is under way with a number of other firms, including South Korean battery manufacturers regarding the establishment of local processing plants; an expression of interest from Germany's BMW in a joint venture with CODELCO, 'potentially trading upfront financing for guaranteed lithium supply' to its battery plants; and negotiations with Eramet to share its proprietary DLE technology with Chile, which

[12] The IEA (2025) reports that DLE technology has benefited from research and pilot project initiatives supported by both the EU and European countries in their efforts to advance geothermal lithium technologies.

[13] BYD, for example, uses more traditional technology that does not meet Chile's water regulations (Zadeh, 2025). In addition, BYD's preference is for control over mineral assets, making the majority share held by a Chilean state-owned entity unacceptable for the firm.

claims very high (90%) lithium recovery rates which could help further reduce the negative environmental impact of lithium extraction in the environmentally sensitive Atacama region (ibid.: n.p.).

Argentina is also at the forefront of the use of DLE technology for lithium extraction (IEA, 2025). Lithium mining-related deals are increasing rapidly with participation from a wide range of firms, including Rio Tinto, Gangfeng and Zijn (MHR, 2023). Eramet is the first European company to operate a large-scale lithium processing plant. Using DLE technology, the Centenario plant, based in Salta province, has successfully produced the first battery-grade lithium out of geothermal brine (Eramet, 2022). The plant started as a joint venture but is now fully owned by Eramet (Eramet, 2024). Argentina is attractive to foreign firms as it has no strict regulations on foreign investment and ownership of companies, and because it maintains tax incentives for large investments (Simionato, 2024). Foreign firm participation is high, although challenges remain given mines are in isolated locations, infrastructure is poor and logistics costs are high (ibid.). By contrast, Bolivia is perceived as a difficult environment for foreign companies following the government's cancellation of a partnership with German firm ACI Systems Alemania, which had planned an investment in lithium, due to protests from local communities (Jütten, 2024).

The environmental impact of lithium extraction is a major concern in the region, particularly given the significant amount of water used, which has created extreme water shortages and affected local farmers (Ahmad, 2020). Increasing environmental conflicts linked to CRM mining have been documented in the Lithium Triangle (Jütten, 2024).

Box 4 Stakeholder exchange regarding Chile's experience

A Chilean representative emphasised the strategic vision the government has for lithium extraction in the country. Processes to develop joint ventures are competitive and transparent and only implemented once consultations with indigenous communities have taken place and environmental permits have been processed. As well as commercial concerns, the sustainability of each venture is critical. In this regard, technology transfer is highly important, with specific interest in how best to exploit lithium reserves in the ecosystem of the salt flats; this remains a key priority for Chile in its work with the EU and European partners.

Another Chilean representative raised the point that the market is not yet appropriately valuing the production of minerals that meet high environmental and social standards, given these are not differentiated on the global market (including in Europe). The same point was strongly emphasised by a mining company representative

from Brazil, who highlighted the lack of premiums for sustainably produced lithium from Brazil (despite the company's achievements success in reducing the environmental impacts and carbon footprint of lithium production in this case). How best to establish incentives so that markets provide the necessary premiums for minerals produced to high standards remains a concern; this is equally appreciated by European Commission representatives, who acknowledged during the dialogue that this is a key area for EU action.

A mining company representative also emphasised that the nature of joint ventures in Chile – where partnerships are with the state – brings multiple benefits from a private sector perspective. This is particularly in relation to gaining the necessary licences to operate, but also in light of the benefits gained through more effective community engagement. Chile's approach has been especially helpful in building public acceptance of mining. The EU could learn from this example given the difficulties emerging around CRM mining operations in Europe (e.g. in Serbia). Participants felt the EU could play an important role in by committing to high environmental, social and governance (ESG) standards, building trust with local communities and garnering a social license to operate.

Source: Participants' inputs from the Second International Climate, Trade and Industrial Policy dialogue

3 Implications for the EU

Joint ventures bring in sizeable investments to CRM-rich countries and are supporting new undertakings in Europe. They can also increase domestic processing and enable critical technology transfer that supports both exploration and processing activities. The policies of the host government, and the regulation of foreign investment, are important determinants of whether domestic industrialisation priorities are advanced, the level of economic benefits retained in the country and the environmental and social impacts of joint venture projects.

Appropriate regulations relating to tax and royalties, and the incentives and subsidies offered to the industry, are vital. In the case of joint ventures in Indonesia, for example, some have questioned whether all of the current incentives are necessary given the significant losses to Indonesia as a result of the 10–15-year tax holidays granted to processors (Syarif, 2025). It is important to ensure that host governments receive favourable terms, including in relation to royalties and taxes, and that transparent agreements are in place around these (Escobar et al., 2025).

The structure of ownership and negotiation of terms within a joint venture are also important. However, ensuring a joint venture is developmental and confers benefits to the host country does not translate straightforwardly into a preference for majority domestic ownership in all cases. There are multiple ways to approach these ventures, many of which will be specific to each context and the host country's policy approach. In some cases, domestic majority ownership (including by state-owned companies) is appropriate; in others it may not be, including because the burden of risk could be perceived as unfeasible for the domestic partner to bear. The lack of majority ownership can be balanced by robust policies on tax and revenue.

Given the environmental challenges facing CRM-rich countries, there are plentiful opportunities to focus on joint venture efforts that promote low-carbon manufacturing, improved hazardous waste management and reduced water use, as well as other environmental improvements. This is equally important in Europe, where joint ventures (such as the Japan–France example) can help on the processing and recycling side, using advanced, sustainable technologies. For overseas investments, higher environmental and

labour standards and more transparency are critical and would differentiate the EU's offer from China's; these are considered key in making 'mutual benefits' a reality (Escobar et al., 2025).

Japan's commercially savvy approach may be instructive. JOGMEC has created a model which enables a smooth transition from being government-led to private sector-led. JOGMEC lays the groundwork, including through exploration joint ventures, creates the relationships and essentially buys down the risk, directly enabling Japanese firms to come in and take commercial opportunities to scale.

While cooperation between the EU and Japan is advancing (European Commission, 2023b), it has been recommended that the EU establish a European raw materials agency as a counterpart to JOGMEC, to increase collaboration, including for joint procurement, stockpiling or joint environmental and technological initiatives (Cernicky, 2024). Such an agency could also enable the EU's direct commercial involvement in joint ventures and investment in European firms' joint ventures, mirroring JOGMEC's joint venture approach. There are also implications for European export credit agencies, which are 'increasingly being called upon to provide financial support for overseas raw materials projects on which European importers rely', with some experimentation in this area (IEA, 2025: 262).[14]

While technology transfer can be facilitated within joint ventures, this is a complex issue depending on the patents held and licencing negotiations. Just because a technology is used within a joint venture does not mean participating domestic firms can benefit from the same technology in their own projects in future. China has recently expanded its restrictions on the export of technologies, including in relation to rare earth separation and DLE, further limiting the transfer of knowledge within Chinese joint ventures (IEA, 2025). However, it is clear that there is significant prioritisation of this area by host governments, especially where technologies relate to more sustainable mining practices. In this area, the terms of the licences negotiated within joint ventures are critical to ensure partnerships are truly mutually beneficial, with longer-term developmental impacts. Equally, ongoing investment in R&D related to next-generation technologies for more sustainable CRM mining remains a priority (IEA, 2025).

Box 5 Stakeholder exchange regarding the EU's role

DG GROW emphasised how partner countries can help the EU reduce its dependence on China for CRMs and committed to

[14] For example, the Dutch export credit agency has set up a new loan guarantee facility for CRM imports to the Netherlands (Trade World News, 2025). It is in its pilot phase and will focus on securing minerals such as lithium, nickel and copper.

mutually beneficial partnerships in relation to mining and extraction, as well as processing and refining activities. DG GROW also acknowledged that there is no dedicated CRM fund for implementing the EU's strategic plans, or the strategic projects that have been announced under the CRMA.[15] While this may change in the future EU budget, for now the EU will remain reliant on DG INTPA's efforts via the Global Gateway (and on financing from the European Bank for Reconstruction and Development (EBRD), the European Investment Bank (EIB) or from Member State initiatives). This implies some limitations in the EU's ability to innovate in relation to CRM investments and potentially the growth of joint venture partnerships.

While multiple stakeholders welcomed the CRMA, particularly the nomination of (EU and non-EU) strategic projects under the Act, concerns were expressed around financing and time horizons. A mining company representative explained that the Commission's offer to 'facilitate access *to* finance' is not the same as an offer *of* finance. The offer is not clear to the private sector and concerns about finance remain a key limitation given the very high capital requirements of these projects. It was also clear from the dialogue that concerns about financing differ significantly between multinationals and smaller mining companies. Time horizons are also considered a challenge to meeting the CRMA targets, given the length of time it takes to move from exploration to an operational mine. While funding for exploration cannot be ignored, capital is urgently required for projects that are ready or close to being operational.

A global mining company representative pointed out that the EU's limited investment budgets mean that it should focus more on supporting processing projects, rather than higher-cost mining and extraction projects. As noted earlier, it was also pointed out that EU support would be particularly valuable in areas where projects are less commercially feasible (i.e. smelters), following Japan's approach of intervening when projects are less bankable. Similarly, offering long-term financial guarantees was noted as a strategic choice in the context of the EU's more limited budgets for direct investment.

Source: Participants' inputs from the Second International Climate, Trade and Industrial Policy dialogue

[15] In June 2025, the European Commission officially announced 47 Strategic Projects under the Critical Raw Materials Act (CRMA). Thirteen will take place outside the EU, with four in Africa (Malawi, Namibia, South Africa and Zambia).

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