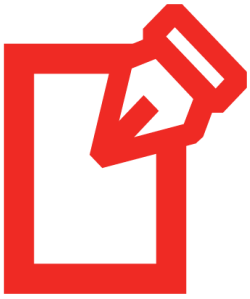
Global Witness

Toolkit for policy makers

A guide for decision-making around minerals for COP30

OCTOBER 2025



As the world races to decarbonise, the demand for transition minerals – such as lithium, cobalt, nickel, and rare earths – is surging. These materials are essential for technologies like batteries, wind turbines, and solar panels, but their extraction comes at a steep environmental and social cost. Mining projects are increasingly expanding into some of the planet's most critical ecosystems – forests, peatlands, wetlands, and permafrost – threatening irreplaceable carbon stores and placing frontline communities, particularly Indigenous Peoples, at grave risk.

These impacts often provoke social unrest, legal battles, or environmental backlash, which in turn destabilise the very supply chains needed for a fast and fair energy transition. Meanwhile, the emissions embedded in mining operations and mineral supply chains are frequently overlooked in climate accounting, undermining the net-zero ambitions they are meant to support.

This toolkit outlines a forward-looking policy agenda to align mineral sourcing with global climate goals, environmental justice, and Indigenous rights. It draws on science, law, and real-world case studies to recommend concrete actions that governments, financiers and corporations must take to avoid locking in new sources of emissions and conflict.

From establishing legally binding no-go zones to mandating climate-integrated impact assessments, from enforcing full emissions disclosure to boosting circular economy measures, the chapters ahead offer a roadmap to ensure that the transition to clean energy does not replicate the harms of past extractivism – but instead builds a just, transparent, and climate-resilient future.

Author: Roberto Stefani

Thanks go to Emily Iona Stewart and to Nicole Byrd and Eric Ngang for their collaboration and valuable knowledge throughout the process. Special thanks go to Lindsey Wuisan from Friends of the Earth and Robin Roels of the European Environmental Bureau, as well as all the organisations from the European Raw Materials Coalition for their insight, input and advice which greatly enriched this report.

Contents

1. Mining in Carbon-Rich Ecosystems 4

The Challenges 4

Recommendations 5

2. Indigenous Peoples' Governance & FPIC 6

The Challenges 6

Recommendations 7

3. Front-Loaded Impact Assessments 9

The Challenges 9

Recommendations 10

4. Emissions & Supply-Chain Transparency 12

The Challenges 12

Recommendations 13

5. Circular Economy, Demand Reduction & Recycling 14

The Challenges 14

Recommendations 15

Endnotes 18

A mine worker walks near the leaching pools near Pangwa (the Kachin Special Region 1), in Northern Myanmar, near the Chinese border in early 2024. Photo courtesy of Global Witness partner

1. Mining in Carbon-Rich Ecosystems

THE CHALLENGES

Transition mineral exploration is rapidly expanding into some of the planet's most powerful natural carbon stores – ancient and tropical forests, wetlands, and thaw-sensitive Arctic soils, among others. Disturbing these ecosystems releases vast quantities of carbon dioxide that cannot be reabsorbed quickly enough to keep the 1.5°C target within reach.

Protecting these landscapes offers one of the fastest, most cost-effective strategies for governments to stay on course with their climate commitments, while setting a global benchmark for smart, sustainable resource governance.

Key facts

- **Mines often sit on top of major carbon sinks:** A 2023 study by WWF-Norway and Rainforest Foundation Norway found that nearly half of all mining concessions lie in heavily forested areas, and over 58,000 intersect with protected areas.[1]
- **Mines clear forests:** Forests, including tropical, temperate, and boreal[2], have absorbed most of the carbon taken up by vegetation since the start of industrialisation.[3] Unfortunately, mining is already a major driver of deforestation, having cleared 1.4 million hectares of forest (an area roughly the size of Montenegro or Timor-Leste) and released 36 million tonnes of CO2 annually.[4] The International Energy Agency projects soaring demand for transition minerals by 2040,[5] raising concerns about the potential destruction of more forests and carbon sinks.

- **Wetlands punch far above their weight (and so do savannahs and scrublands):** Wetland areas, which include peatlands, mangrove forests, and marshes,[6] cover approximately 5% of land surface[7] and store approximately 20%[8] of organic ecosystem carbon, up to 10 times that of rainforests per hectare.[9] Draining even one hectare of peatlands for mining can release around 800 tonnes of CO2 in five years[10] – the same as the yearly emissions of 170 average cars in the US.[11] New evidence also shows that savannahs and scrubland regions have a decisive impact on fluctuations in the global CO2 balance.[12]
- **In the Arctic, the stakes are just as high:** Arctic mining is on the rise[13], and it risks unlocking vast carbon reserves frozen in permafrost, where as much as 2.5 times more carbon is locked than there is in the global atmosphere.[14] According to the IPCC's latest report, every degree of global warming could cause thawing permafrost to release as much carbon as humans emit over several years.[15]

RECOMMENDATIONS

1. **Adopt binding product due diligence regulations** that link market access to strong environmental and human rights safeguards across supply chains. These policies should require companies to identify, prevent, and mitigate deforestation, ecosystem degradation, and social harms, especially in the sourcing of high-risk raw materials.

   The EU Batteries Regulation and the EU Regulation on Deforestation-Free Products are strong models of how market access can be tied to enforceable sustainability and human rights standards. The Batteries Regulation, defined by many as a ground-breaking law to tackle global deforestation and forest degradation[16], requires companies to trace and address risks linked to minerals like cobalt and nickel, while the Deforestation-Free Products Regulation bans imports of products linked to recent forest loss. Both show how binding due diligence laws can drive accountability across global supply chains.

2. **Establish and enforce legally binding no-go zones in all ecosystems with irreplaceable carbon stores** (including but not limited to old-growth forests, peat bogs, tundra, mangroves) to prohibit mineral exploration and extraction[17] and tighten due diligence and traceability so minerals from "no-go" zones cannot reach markets, etc.

   For example, in 2020, Norway became the first country to exclude high-deforestation-risk feedstocks (e.g., palm oil) from its biofuel mandate, setting a global precedent for demand-side measures.[18]

3. **Integrate ecosystem-service valuation** into mining permitting processes, requiring full lifecycle-cost accounting of carbon emissions from land-use change in decision-making.

   In Acre, Brazil, ecosystem valuation helped strengthen already progressive environmental policies. Authorities used InVEST (Integrated Valuation of Ecosystem Services and Trade-offs)[19] to assess the impacts of land-use choices like deforestation or sustainable agriculture. By involving local communities from the start, results gained credibility and informed smarter policies. The process combined technical modelling

with public participation, reinforcing conservation efforts while supporting economic development.

TO AVOID THESE PITFALLS:

Barroso lithium, Portugal: According to the revised 2023 EIA, northern Portugal's Mina do Barroso lithium mine could release up to 33.7 kt CO2-eq each year to produce 191 kt of spodumene concentrate – about 26 kt of lithium-carbonate equivalent at 5.5 % Li_2O. Such operations in this sensitive natural area would degrade the soil, irreversibly remove forest cover, and jeopardise the entire ecosystem.[20]

2. Indigenous Peoples' Governance & FPIC

THE CHALLENGES

Indigenous Peoples are the stewards of the planet's most powerful natural climate buffers – forests, wetlands, and other key ecosystems. But when projects move forward without their Free, Prior, and Informed Consent (FPIC), these landscapes are often damaged, releasing carbon and disrupting local climates.

Respecting FPIC is not only a human rights obligation, it's a climate-smart strategy. Where Indigenous communities have real decision-making power, ecosystems stay healthy, and carbon remains stored. Upholding their rights helps safeguard nature while reducing risks for governments and developers alike.

Key facts

- **Custodians of Biodiversity:** Indigenous Peoples – who make up just over 6% of the global population[21] – and local communities hold or manage, through customary systems, 54% of the world's remaining intact forests. Thanks to their stewardship, about 91% of these territories, intersecting with over 40% of Key Biodiversity Areas[22], are in good or moderate ecological condition.[23]
- **More than half of the projects extracting transition minerals overlap Indigenous Peoples' lands[24]:** Approximately 29% of these projects are located on or close to areas where Indigenous Peoples are acknowledged as playing a key role in land stewardship or exercising customary authority, particularly in relation to conservation efforts.[25]
- **Climate setbacks from neglecting FPIC:** Failing to secure the genuine support and trust of local communities doesn't just carry reputational and financial risks – it can also derail urgent climate action. When projects move forward without Free, Prior, and Informed Consent (FPIC), they often face conflict, legal battles, and community resistance that lead to costly delays or even cancellation.[26] Each stalled or abandoned clean energy project slows the just transition and undermines efforts to meet global climate goals. In the worst cases, the breakdown in trust results not only in missed climate targets, but in intensified conflict and tragic loss of life.

Ading Releno, anti-mining member of the Mangyan-Tagabukid indigenous community affected by the ongoing mining operations in Sibuyan Island, stands outside her house with a "No To Mining" sign in Sibuyan Island in Romblon province, central Philippines. May 3, 2023. Basilio Sepe / Global Witness

RECOMMENDATIONS

1. **Robust legal frameworks for Indigenous autonomy and FPIC**: Governments must uphold Indigenous Peoples' right to self-determination – including autonomy, self-government, and Free, Prior and Informed Consent (FPIC) – in line with international standards like UNDRIP.[27] This means recognising them as rights-holders with authority over their lands. FPIC must be a continuous, good-faith process, free from coercion and inclusive of the right to say no. Companies must respect FPIC when operating in or near Indigenous territories and securing consent from non-Indigenous frontline communities is increasingly seen as best practice.

   A 2024 study published in One Earth[28] analysed 648 conservation initiatives and found that higher levels of autonomy for Indigenous Peoples and local communities were strongly associated with better environmental outcomes. Specifically, 85% of cases where communities had full decision-making authority showed positive ecological results, compared to just 18% of cases where they had limited or no authority. The findings underscore that meaningful control – not just consultation – yields the most significant conservation benefits.

1. **Indigenous-Led Conservation**: Governments should prioritise the formal recognition of Indigenous Peoples' territorial rights, including land titling and support for Indigenous governance systems, as essential strategies for effective climate action. Providing legal security and resources for Indigenous-led conservation enables communities to manage forests and other ecosystems in ways that are both culturally

grounded and environmentally effective, with proven results for carbon storage, biodiversity protection, and climate resilience.

In Peru, from June 2023 to May 2024, a record 37 land titles were granted in the Amazon to communities. Studies show that providing titles to Amazonian communities slashed deforestation by 66% in those lands, averting significant CO2-equivalent emissions. This demonstrates how empowering Indigenous Peoples with secure tenure makes them even stronger guardians of their forests, delivering immediate and significant carbon savings.[29]

2. **Inclusion in Policymaking**: Ensure Indigenous Peoples' full and effective participation in the development and implementation of climate policies, nationally determined contributions (NDCs), biodiversity strategies, and energy transition plans. Their Traditional Knowledge and governance systems offer invaluable insights for sustainable resource management and climate resilience.[30]

   A growing number of countries are recognising this by embedding Indigenous rights and nature-based solutions into their climate plans. Through UNDP's Climate Promise[31], over 120 countries have received support to strengthen their NDCs by integrating forests, land use, and biodiversity, while promoting inclusive governance and Indigenous participation. This includes efforts to uphold customary tenure, elevate Traditional Knowledge, and align climate action with local priorities – demonstrating that when Indigenous Peoples are meaningfully included, national climate strategies become both more just and more effective.

3. **Address Climate Justice**: Acknowledge that Indigenous Peoples are often disproportionately affected by climate change and extractive industries.[32] Governments must prioritise climate justice by ensuring equitable distribution of benefits and burdens, and providing access to climate finance that empowers Indigenous-led solutions.[33]

TO AVOID THESE PITFALLS:

Fosen Vind windfarm, Norway: The case of Fosen Vind, Europe's largest onshore windfarm, highlights that proceeding without the consent of Indigenous communities carries risks that extend far beyond the construction phase. Despite being operational in 2020, the project encountered operational delays and material losses. This ultimately culminated in Norway's Supreme Court invalidating its licences in 2021, ruling that Sámi people's rights had been violated.[34] A partial agreement was only reached in 2024.[35] This outcome powerfully illustrates how the absence of FPIC can lead to sustained legal challenges and jeopardise a project's financial certainty even after it is built.[36]

Rare earths leaching pools near Pangwa (the Kachin Special Region 1), in Northern Myanmar, near the Chinese border in early 2024. Photo courtesy of Global Witness partner

3. Front-Loaded Impact Assessments

THE CHALLENGES

Mining projects that overlook environmental, climate, and social risks early on often face delays, community opposition, and stranded assets. Flawed or incomplete ESIAs can also lock in high emissions and erode public trust.

Front-loaded, climate-integrated, and participatory assessments help avoid these pitfalls. When governments require strong ESIAs from the start, projects are more accountable, resilient, and aligned with both local rights and global climate goals.

Key facts

- **Lack of community approval undermines social licence and halts projects:** Global Witness and several other organisations have stressed that weak or absent informed consent and community engagement is a key factor in generating conflicts and derailing mining investments worldwide.[37] Those stoppages can cost mining operators over USD 20 million per week in idle expenses and deferred production.[38]
- **A prerequisite for International Project Finance:** Major global lenders now require a thorough Environmental and Social Impact Assessment (ESIA) before approving project finance. The World Bank's Environmental and Social Framework obliges borrowers to undertake a comprehensive assessment of environmental and social risks as a condition of any Investment Project Financing.[39]

The International Finance Corporation (IFC) applies the same requirement to private-sector clients through Performance Standard 1.[40] Likewise, the 130 financial institutions that adhere to the Equator Principles state explicitly that they will not finance Category A or B projects lacking an ESIA, making such assessments a de facto gateway to private and export-credit funding.[41]

- **Science-policy alignment:** Both the IPCC's 1.5°C Special Report (SR1.5) and the 2023 OECD Critical Minerals Review emphasise the critical need for integrating climate-pathway scenarios into project assessments. This integration is crucial to ensure new developments avoid locking in high emissions and remain aligned with global climate goals, particularly the 1.5°C target.[42]

RECOMMENDATIONS

1. **Inclusive, safe, and informed community participation must be ensured at every stage of project development**, from planning and design to implementation, monitoring, and closure. This includes meaningful involvement in Environmental and Social Impact Assessment (ESIA) processes, where affected communities must be proactively informed, their input genuinely considered, and their rights fully respected. Participation should go beyond formal compliance to serve as a mechanism for integrating local knowledge, strengthening social licence, and preventing harm. To ensure credibility and transparency, these processes should be independently audited or facilitated by third parties, thereby avoiding conflicts of interest inherent in industry-led assessments.

   In the Netherlands, the Environmental Management Act (2010) sets out clear procedures to ensure transparency and public participation in environmental assessments. Communities are informed early about proposed projects and invited to engage through public consultations, hearings, and the submission of comments. These mechanisms aim to incorporate local knowledge and concerns into decision-making, strengthening accountability and inclusive planning.[43]

2. **Governments should require that Environmental and Social Impact Assessments (ESIAs) systematically integrate climate considerations**, making climate-informed assessments a legal standard for all major projects. This includes the mandatory evaluation of a project's greenhouse gas emissions, climate resilience, and alignment with national and international climate goals. In parallel, authorities should promote the use of advanced methodologies and tools that enable a full accounting of climate-related impacts across the project lifecycle – establishing climate-integrated ESIAs as the gold standard for sustainable development.

   IIED's briefing – "Climate change in impact assessments: towards an integrated approach" – argues that although many ESIA laws treat "environment" broadly enough to cover greenhouse-gas impacts, the lack of explicit legal requirements leaves climate considerations too often sidelined.[44]

   Canada's Impact Assessment Act (2019) requires every federal impact assessment to examine "the extent to which the effects of the designated project hinder or contribute to the Government of Canada's ability to meet its environmental obligations and its commitments in respect of climate change", effectively embedding Paris-aligned criteria into every ESIA.[45]

3. **Governments should require that all Environmental, Climate, and Social Impact Assessments (EIAs, CIAs, and SIAs) be published in full** – alongside non-technical summaries and underlying data – in open, machine-readable formats, and backed by regular, independent audits and a public dashboard.

   The European Union's Environmental Impact Assessment Directive[46], aligned with the Aarhus Convention, guarantees public access to full EIA documentation, participatory decision-making, and legal remedies. A study commissioned by the European Parliament has also recommended the integration of social impact assessment (SIA) as well as Human Rights assessment as a compulsory element, in sectors like mining, to "further improve the implementation of public participation rights during permitting of mining activities".[47]

   The Initiative for Responsible Mining Assurance (IRMA)[48] offers a strong precedent: it conducts voluntary third-party audits of mining operations against a comprehensive standard covering environmental, social, and human rights performance, with full reports and scoring publicly available.

Active mining on Kawei island, Raja Ampat. Image taken from a Global Witness investigation into nickel mining in Indonesia, which is impacting globally-renowned wildlife and beauty spots. Auriga Nusantara / Global Witness

TO AVOID THESE PITFALLS:

The Roșia Montană project, in Romania, was halted after NGOs, including TERRA Mileniul III, Centre for Legal Resources, Greenpeace, and Bankwatch, criticised the ESIA for flawed public consultations, missing documentation, and a lack of transparency.[49] The International Finance Corporation (IFC) withdrew financing after global NGOs flagged serious risks.[50] The Romanian Parliament later rejected the project[51], and the site was granted UNESCO World Heritage status in 2021.[52]

4. Emissions & Supply-Chain Transparency

THE CHALLENGES

Mining's carbon footprint is no longer a side issue. Mining operations, including digging, shipping, freight, and processing of ores, use a significant amount of energy of fossil origin.

Accurately assessing both direct and indirect emissions from the production of batteries, wind turbines, and solar panels is essential to determine whether these technologies genuinely benefit the climate or simply address one issue while creating others. When every mine publishes transparent and comparable greenhouse gas (GHG) emissions data (Scope 1-3), it exposes polluting operators, prompting them to take steps to understand and mitigate climate change. This transparency can also help buyers and consumers choose low-carbon suppliers.

Key facts

- **EU disclosure wave:** Starting in 2025, large EU mining companies must report their site-specific climate data under the 2022 Corporate Sustainability Reporting Directive (CSRD).[53] Reports from mining operations producing metals reveal that emissions rates of CO2e can have significant variations, depending on production methods, ore grade, and energy source, underscoring substantial variability in climate impact. For example, emissions intensity linked to nickel's production can range from 20–80 tonnes CO2e per tonne of nickel product.[54]
- **Mining's embedded climate cost:** A recent peer-reviewed study found that, in conventional supply chains for battery-grade materials, upstream steps (mining and concentrate transport) contribute between 7.8% and 30.4% to total cradle-to-gate environmental impacts, including greenhouse gas emissions.[55]
- **Reporting gap:** The Deloitte Sustainability Action Report (2024) notes that while 74% of leading companies disclose Scope 1 emissions, only 15% report Scope 3 emissions data.[56]
- **Opacity breeds abuse:** A 2024 study by Global Witness revealed that with mining operations forecast to surge, in response to demand for transition minerals, current social and environmental issues – including unrest and harms linked to mining – are likely to be exacerbated, particularly if transparency and governance standards are not improved.[57]

RECOMMENDATIONS

1. **Adopt a standardised emission reporting protocol and make Scope 1-3 disclosure a condition for permits issued to mining companies**: Various standards are used by companies for their Scope 1-3 emissions reporting, including the Greenhouse Gas Protocol, which underpins the ICMM Mining Principles[58] and the Global Reporting Initiative (GRI), among other frameworks. By adopting a standardised protocol, organisations can precisely measure both their direct and indirect emissions, making it easier to compare their performance.

   The Greenhouse Gas Protocol[59], developed by the World Resources Institute (WRI) and the World Business Council for Sustainable Development (WBCSD), is a widely recognised framework for measuring and managing greenhouse gas emissions. It provides standards and guidance for organisations to quantify, report, and reduce their emissions, promoting consistent, transparent, and credible accounting to track progress toward climate goals. While not specifically focused on transition minerals, it serves as a useful starting point for standardised emissions reporting in that sector.

2. **Link money to openness**: Public lenders (EIB, EBRD, GCF) and export-credit agencies should fund only mines with open GHG data and freeze support if watchdogs expose deception or intimidation.[60] This would push companies to invest in innovations that cut their emissions.

   The World Bank recently launched a $50m 'Climate-Smart Mining Facility' with partners including the German government to support companies involved in the mining and processing of metals and minerals, which are critical for the supply chain of the low-carbon economy. This is an opportunity for companies involved in mining and processing of metals and minerals to obtain green financing for their projects and operations.[61]

3. **Count mine emissions in climate pledges**: Invite the UNFCCC's Subsidiary Body for Scientific and Technological Advice (SBSTA) to write a template so governments can add mine-site data to their 2028 Nationally Determined Contributions (NDCs).[62]

   For example, Canada's Net-Zero Emissions Accountability Act (Bill C-12) seeks to push for transparency and accountability in Canada's efforts to achieve net-zero greenhouse gas emissions by the year 2050. The Government of Canada has established a planning, reporting, and assessment process to achieve this.[63] This is aligned with its 2035 NDC goal to reduce emissions by 45-50% below 2005 levels by 2035, building on the 2030 target of 40-45% below 2005 levels.

4. **Use digital traceability**: Implement digital traceability by requiring blockchain-style provenance technology for all imported transition minerals, building on Battery Regulation 2023/1542.[64]

   The EU Battery Regulation[65], effective from 2027, mandates digital traceability through a "Battery Passport"[66] for certain batteries sold in the EU. The digital passport will provide comprehensive information about the battery's origin, composition, carbon footprint, recycling information, and lifecycle. Some EU states are already implementing digital traceability, including Germany with its Battery Pass, which is regarded as groundwork for implementing the EU-wide mandatory battery passport,

providing technical guidance, pilot testing, and validation for the upcoming regulation.[67]

5. **Develop binding international guidelines** on responsible transition minerals sourcing that align with the goals of the UNFCCC and existing instruments such as the OECD Due Diligence Guidance and the United Nations Guiding Principles on Business and Human Rights to ensure that minerals supply chains do not exacerbate climate harms.

TO AVOID THESE PITFALLS:

In Azerbaijan, the host of COP29, gas flaring increased by over 10% from 2018 to 2023, reaching a decade-long high and posing severe health risks to hundreds of thousands of nearby residents.[68] This surge in pollution occurred alongside significant delays in the nation's climate reporting to the UN; while not a complete failure to report, the country's detailed emissions data for 2020-2022 was only submitted in 2024.[69] This opacity has allowed unchecked flaring to persist, underscoring how transparency failures can undermine climate action and harm public health.

5. Circular Economy, Demand Reduction & Recycling

THE CHALLENGES

The greenest tonne of metal is the one we never have to mine. We must prioritise recycled content and circular economy practices that reduce the need for new extraction, especially those that are fossil-fuel intensive, protecting both the environment and human rights.

Demand reduction, achieved by using less through smart product design, repair, reuse and high-quality recycling, keeps demand for transition minerals within safe planetary limits and bearing in mind the perspective of Global South mineral-rich partners on sufficiency[70] and demand reduction.[71]

A man walks in a coconut farm in Sibuyan Island in Romblon province, central Philippines. May, 2023. These photos document defenders on the island of Sibuyan, Philippines, who are standing up to mining operations. Basilio Sepe / Global Witness

Key facts

- **Recycling is an energy saver:** Turning scrap copper, aluminium, or nickel back into metal saves up to 95% of the energy needed for primary production.[72]
- **Demand-side wins are huge:** According to the UN International Resource Panel, material efficiency strategies in key sectors like buildings and vehicles can cut cumulative life cycle CO2e emissions in the period of 2016-2060 by up to 25 gigatonnes in G7 countries.[73]
- **Repair beats mining:** Extending product lifetimes through "right-to-repair" laws could lower the overall demand for electrical and electronic equipment (EEE) within the EU market, thereby easing environmental pressures linked to resource extraction – such as soil degradation, deforestation, greenhouse gas emissions, and water contamination – both within Europe and beyond its borders.[74]
- **Waste can fuel crime:** Poorly regulated e-waste exports funnel valuable metals into black-market supply chains, financing armed groups.[75]

RECOMMENDATIONS

1. **Set tough recycled-content quotas**: Governments should require stricter recycling quotas for metals. EU countries should go beyond the current requirements[76] and mandate that at least 25% recycled aluminium, nickel, copper, and lithium be used in electric-vehicle and stationary-storage batteries by 2030, rising to 40% by 2035.

   Amsterdam Circular Construction: Since 2023, Amsterdam applies circular criteria in city tenders for buildings, emphasising the use of recycled materials and design for disassembly.[77] Circular construction pilots in the city and other parts of the country have demonstrated substantial resource and emissions reductions. For example, the Brummen Town Hall project[78] in the Netherlands was designed for disassembly and achieved nearly 90% material recoverability, illustrating the principles now widely promoted in Amsterdam's circular construction strategy

2. **Design products for reparability**: Governments should adopt and enforce reparability and disassembly standards for consumer products, such as mandatory labelling systems that inform buyers about ease of repair and component replacement. Initiatives like France's Reparability Index or the EU Eco-Design for Sustainable Products Regulation offer a replicable model to guide future eco-design regulations and support circular economy goals.

   France's Reparability Index: Created in 2021 by the French government, under its anti-waste law for a circular economy, it enables producers of electronic goods and household appliances to assess and assign a repairability score to their products. For buyers, the score serves as an accessible indicator of how easily a product can be repaired, helping them make more informed purchasing choices.[79] The French Agency for Ecological Transition (ADEME) estimates that "France could avoid up to 2,218 tonnes of CO2 emissions per year related to the repair of smartphones and up to 5,704 tonnes of CO2 emissions per year for TVs".[80]

3. **Close the export loophole**: Ban shipments of e-waste containing critical minerals to countries without proven recycling capacity; align rules with tougher Basel Convention amendments.[81]

   Brussels-based Umicore, formerly Union Minière, moved away from a long history in heavy industry and concentrated on developing clean technologies such as emissions control catalysts, and recycling precious metals (Urban mining). Its commitment to a closed-loop business model, whereby it seeks to recover, recycle and reuse raw materials wherever possible, has seen the company reduce the impacts of metal emissions in the air and its water use by 37% and 44%, respectively.[82]

4. **Dedicate funds for recycling initiatives**: Dedicate at least 20% of the EU Innovation Fund and national climate funds to collection, remanufacturing, and high-purity recycling infrastructure.[83]

   Northvolt's hydrometallurgical "Revolt Ett" plant in Sweden will recycle up to 125,000 tonnes of batteries annually.[84] Cathode materials made from these recycled metals have an up to 80% lower carbon footprint than those made with freshly mined metals, significantly reducing lifecycle emissions and supporting a circular battery economy.[85]

5. **Count circularity in climate pledges:** Ask the UNFCCC's SBSTA to let countries include avoided emissions from recycling and longer product lifetimes in their 2028 Nationally Determined Contributions (NDCs).[86]

TO AVOID THESE PITFALLS:

A stark example of the consequences of neglecting circular economy principles can be seen in Malaysia's 2024 seizure of more than 100 containers of illegally exported electronic waste from Western countries. Much of this e-waste, falsely declared as reusable electronics, was funnelled into black-market processing facilities operated by criminal networks. These sites, often lacking basic environmental or labour protections, exposed undocumented workers to toxic chemicals while irretrievably wasting valuable metals. The case highlights how the absence of responsible recycling systems and demand-reduction policies in wealthier nations can drive environmental injustice abroad, empower organised crime, and undermine the very goals of a green transition.[87]

Endnotes

[1] Rainforest Foundation Norway & WWF-Norway, 2024, *Forest-risk extractives: A global geospatial analysis of mining concessions in high-carbon forests* (p. 14), accessed 13 August 2025, https://media.wwf.no/assets/attachments/High_risk_extractive_assets_forests_final_compressed-1.pdf

[2] INRAE, *Boreal and temperate forests now main global carbon sinks*, accessed 13 August 2025, https://www.inrae.fr/en/news/boreal-and-temperate-forests-now-main-global-carbon-sinks

[3] Max Planck Society, *Climate Change Affects the Carbon Balance of Savannas*, *Max-Planck-Gesellschaft,* 6 October 2015, accessed 13 August 2025, https://www.mpg.de/9256873/climate-change-carbon-balance-savannahs

[4] World Resources Institute, *Mining Is Increasingly Pushing into Critical Rainforests and Protected Areas*, by Ralitsa Stanimirova, Nancy Harris, Katerina Reytar, Kejun Wang, and Mikaela Barbanell, 23 October 2024, accessed 13 August 2025, https://www.wri.org/insights/how-mining-impacts-forests.

[5] International Energy Agency, *Global Critical Minerals Outlook 2024: Outlook for Key Minerals*, Paris: IEA, 2024, accessed 13 August 2025, https://www.iea.org/reports/global-critical-minerals-outlook-2024/outlook-for-key-minerals

[6] World Economic Forum, "Wetlands: The World's Secret Weapon Against Climate Change" *World Economic Forum*, 12 December 2023, accessed 13 August 2025, https://www.weforum.org/stories/2023/12/wetlands-carbon-sink-climate-change-mitigation/

[7] NASA Jet Propulsion Laboratory, *NASA's Wetlands Monitoring Program*, *Jet Propulsion Laboratory*, accessed 13 August 2025, https://wetlands.jpl.nasa.gov/

[8] R. J. M. Temmink et al., *Recovering wetland biogeomorphic feedbacks to restore the world's biotic carbon hotspots*, Science 376, no. 6595 (2022): 594–598, accessed 13 August 2025, https://www.science.org/doi/10.1126/science.abn1479

[9] Wetlands International, *How Wetlands Sustain Life and Our Collective Future*, *Wetlands International Blog,* 1 February 1 2024, accessed 13 August 2025, https://www.wetlands.org/blog/how-wetlands-sustain-life-and-our-collective-future/

[10] Hooijer, A., Page, S., Jauhiainen, J., et al. (2012). *Subsidence and carbon loss in drained tropical peatlands* (p. 1067), Biogeosciences, 9, 1053–1071, accessed 13 August 2025, https://bg.copernicus.org/articles/9/1053/2012/bg-9-1053-2012.pdf

[11] U.S. Environmental Protection Agency, Greenhouse Gas Emissions from a Typical Passenger Vehicle, accessed 28 August 2025, https://www.epa.gov/greenvehicles/greenhouse-gas-emissions-typical-passenger-vehicle

[12] Max Planck Society, *Climate Change Affects the Carbon Balance of Savannas*, Max-Planck-Gesellschaft, 6 October 2015, https://www.mpg.de/9256873/climate-change-carbon-balance-savannahs.

[13] WWF Arctic Programme, *Leave It in the Ground: Arctic Resources Should Stay Where They Are*, Arctic WWF, 2023, accessed 13 August 2025, https://www.arcticwwf.org/magazine-issues/2023/leave-it-in-the-ground-arctic-resources-should-stay-where-they-are/.

[14] National Snow and Ice Data Center. (n.d.), *Why frozen ground matters* (permafrost carbon stock estimates), accessed 13 August 2025, https://nsidc.org/learn/parts-cryosphere/frozen-ground-permafrost/why-frozen-ground-matters

[15] Intergovernmental Panel on Climate Change, "Frequently Asked Questions—FAQ 5.2: Can Thawing Permafrost Substantially Increase Global Warming?", IPCC Sixth Assessment Report, Working Group I, page 30, accessed 28 August 2025, https://www.ipcc.ch/report/ar6/wg1/downloads/faqs/IPCC_AR6_WGI_FAQ_Chapter_05.pdf

[16] Multiple NGOs., *Member States of the European Union: Your Obligations to Implement the New EU Deforestation Regulation Start Today*, press release, 29 June 2023, accessed 13 August 2025, https://eia-international.org/wp-content/uploads/2023.06.29-EN_NGO-Statement-to-EU-Member-States-on-EUDR-implementation.pdf

[17] Greenpeace International. (2025). *Minerals for energy transition: Greenpeace's guiding principles*, accessed 13 August 2025, https://www.greenpeace.org/international/publication/75188/minerals-for-energy-transition-greenpeaces-guiding-principles/ and Global Witness. (2025, June 9). *Critical minerals: The one issue COP has forgotten about,* https://globalwitness.org/en/campaigns/transition-minerals/critical-minerals-the-one-issue-cop-has-forgotten-about/

[18] Rainforest Foundation Norway, *Norway will become first country to exclude high deforestation risk biofuels*, accessed August 28, 2025, https://www.regnskog.no/en/news/norway-becomes-first-country-to-ban-high-deforestation-risk-biofuels

[19] María José Pacha, *Ecosystem Services Valuation as a Decision-Making Tool: Conceptual Bases and Lessons Learned in the Amazon Region*, 1st ed. (Brasilia: Living Amazon Initiative, WWF Network, 2015), 55–61, accessed 13 August 2025, https://wwfint.awsassets.panda.org/downloads/wwf_lai_ecosystems_eng_16mar2015_web_final.pdf

[20] Friends of the Earth Europe, *Lithium mining in Barroso, Northern Portugal: Critical factsheet on strategic projects*, Brussels, 2024, p. 7, accessed 13 August 2025, https://friendsoftheearth.eu/wp-content/uploads/2024/12/Factsheet-Strategic-Projects-Barroso-021224.pdf

[21] World Bank, *Indigenous Peoples Overview*, Washington, DC: World Bank, 7 April 2025, accessed 13 August 2025, https://www.worldbank.org/en/topic/indigenouspeoples

[22] Peter Veit and Katie Reytar, *Indigenous and Local Community Land Rights Protect Biodiversity*, *World Resources Institute*, November 30, 2023, accessed 13 August 2025, https://www.wri.org/insights/indigenous-and-local-community-land-rights-protect-biodiversity

[23] WWF International, *The State of Indigenous Peoples' and Local Communities' Lands and Territories*, 2024, p. 7, accessed 28 August 2025, https://wwfint.awsassets.panda.org/downloads/report_the_state_of_the_indigenous_peoples_and_local_communities_lands_and_territor.pdf. See also: Indigenous Climate Hub, *The Healing Land: Indigenous-Led Conservation Efforts as Climate Change Mitigation*. December 2024, https://indigenousclimatehub.ca/2024/09/the-healing-land-indigenous-led-conservation-efforts-as-climate-change-mitigation/

[24] Sustainable Minerals Institute, *54% of Projects Extracting Clean Energy Minerals Overlap with Indigenous Lands*, *The University of Queensland*, 8 December 2022, accessed 13 August 2025, https://smi.uq.edu.au/article/2022/12/54-per-cent-projects-extracting-clean-energy-minerals-overlap-indigenous-lands

[25] James E. M. Watson et al., *Proximity of Mining to Conservation Areas*, Nature Sustainability 5, no. 5 (May 2022): 409–416, accessed 13 August 2025, https://www.nature.com/articles/s41893-022-00994-6.

[26] Oxfam America, Recharging Community Consent: Mining, Gender, and 'Free, Prior, and Informed Consent' in Indonesia, Peru, and Zimbabwe, 2023, p.9, accessed 29 August 2025, https://webassets.oxfamamerica.org/media/documents/2023_OXF_Recharging_Community_Consent_Report_FNL-AA.pdf

[27] United Nations, *United Nations Declaration on the Rights of Indigenous Peoples*, accessed 13 August 2025, https://www.un.org/development/desa/indigenouspeoples/wp-content/uploads/sites/19/2018/11/UNDRIP_E_web.pdf

[28] Neil Dawson et al., *Is It Just Conservation? A Typology of Indigenous Peoples' and Local Communities' Rights and Roles in Conservation Practice*, One Earth as cited in *The key to better climate outcomes? Respecting Indigenous land rights and autonomy*, Grist, 28 August 2025, accessed 28 August 2025, https://grist.org/indigenous/the-key-to-better-climate-outcomes-respecting-indigenous-land-rights-and-autonomy/

[29] Rainforest Foundation US, 17 July 2023, *Innovative strategy yields land titles for Indigenous communities in Peru* and Mongabay, *Record number of Indigenous land titles granted in Peru via innovative process* (commentary), September 5, 2024, accessed 28 August 2015, https://news.mongabay.com/2024/09/record-number-of-indigenous-land-titles-granted-in-peru-via-innovative-process-commentary/

[30] Cultural Survival. (n.d.). *Recommendations for UNFCCC COP26 Parties*. Retrieved June 11, 2025, from https://www.culturalsurvival.org/news/recommendations-unfccc-cop26-parties

[31] United Nations Development Programme, *Enhancing NDC Implementation Through Forests, Land and Nature*, Climate and Forests Stories, accessed 13 August 2025, https://stories.climateandforests-undp.org/enhancing-ndc-implementation-through-forests-land-and-nature/index.html.

[32] SIRGE Coalition, *The Impacts of Current Geopolitics and the New Mining Era on Indigenous Communities*, SIRGE Coalition, accessed 13 August 2025, https://www.sirgecoalition.org/news-and-articles/the-impacts-of-current-geopolitics-and-the-new-mining-era-on-indigenous-communities

[33] SIRGE Coalition, *COP29: Financial Commitments or Status Quo? What to Expect for Indigenous Rights and Climate Action*, SIRGE Coalition, accessed 13 August 2025, https://www.sirgecoalition.org/news-and-articles/cop29-financial-commitments-or-status-quo-what-to-expect-for-indigenous-rights-and-climate-action

[34] Sámi Council, *Sámi victory in Supreme Court - Illegal wind farm on Sámi land*, 2021, accessed 13 August 2025, https://www.saamicouncil.net/news-archive/smi-victory-in-supreme-court-illegal-wind-farm-on-smi-land

[35] Business & Human Rights Resource Centre, *Norway: Govt. and Sámi reach agreement to end the 3-year dispute over wind farm after Supreme Court ruling it violates their rights; incl. company responses*, accessed 13 August 2025, https://www.business-humanrights.org/en/latest-news/norway-europes-largest-onshore-wind-farm-continues-operations-despite-supreme-court-ruling-that-found-permits-violate-indigenous-s%C3%A1mi-rights-incl-company-responses/

[36] University of Colorado Boulder, *FREE, PRIOR AND INFORMED CONSENT DUE DILIGENCE FOR INSURANCE COMPANIES,* accessed 13 August 2025, https://www.colorado.edu/program/tallgrass/media/872

[37] Global Witness, *Critical Mineral Mines Tied to 111 Violent Incidents and Protests on Average a Year*, December 26, 2023, https://www.globalwitness.org/en/campaigns/natural-resource-governance/critical-mineral-mines-tied-111-violent-incidents-and-protests-average-year/. and Nicole Byrd & Emily Stewart, *High Standards in Mineral Supply Chains: A Business Case*, New Security Beat, March 11, 2025, visited 28 August 2025, https://www.newsecuritybeat.org/2025/03/high-standards-in-mineral-supply-chains-a-business-case/

[38] Rachel Davis and Daniel M. Franks, *Costs of Company-Community Conflict in the Extractive Sector*, Harvard Kennedy School & University of Queensland, 2014, accessed 13 August 2025, https://www.csrm.uq.edu.au/media/docs/603/Costs_of_Conflict_Davis-Franks.pdf

[39] World Bank, *Environmental and Social Framework* (Washington, DC: World Bank, 2017), Environmental and Social Standard 1, accessed 13 August 2025, https://documents1.worldbank.org/curated/en/383011492423734099/pdf/114278-WP-REVISED-PUBLIC-Environmental-and-Social-Framework.pdf.

[40] International Finance Corporation, *Performance Standard 1: Assessment and Management of Environmental and Social Risks and Impacts* (Washington, DC: IFC, 2012), para. 5, accessed 13 August 2025, https://www.ifc.org/content/dam/ifc/doc/mgrt/ifc-performance-standards.pdf

[41] Equator Principles Association, *The Equator Principles (EP4)* (July 2020), preamble & Principle 2, accessed 13 August 2025, https://equator-principles.com/app/uploads/The-Equator-Principles_EP4_July2020.pdf; Equator Principles Association, "Signatories & EPFI Reporting," accessed 13 August 2025, https://equator-principles.com/signatories-epfis-reporting/.

[42] Intergovernmental Panel on Climate Change, *Global Warming of 1.5°C: An IPCC Special Report on the Impacts of Global Warming of 1.5°C above Pre-Industrial Levels and Related Global Greenhouse Gas Emission Pathways*, Geneva, IPCC, 2018, accessed 13 August 2025, https://www.ipcc.ch/sr15/chapter/spm/ and Organisation for Economic Co-operation and Development. *Critical Minerals Market Review 2023*. Paris: OECD Publishing, 2023, accessed 13 August 2025, https://www.oecd.org/content/dam/oecd/en/publications/reports/2023/07/critical-minerals-market-review-2023_9dcfb1a7/9cdf8f39-en.pdf

[43] Transparency International, *Strengthening the independence of EPAs and participation in EIAs*, by Patty Zakaria, reviewed by Caitlin Maslen, María Castro, and Gvantsa Gverdtsiteli, 5 September 2024, p. 19, accessed 29 August 2025, https://knowledgehub.transparency.org/assets/uploads/helpdesk/Strengthening-the-independence-of-EPAs-and-participation-in-EIAs.pdf

[44] International Institute for Environment and Development, *Climate Change in Impact Assessments: Towards an Integrated Approach*, Law, Climate Change Briefing (October 2023), accessed 13 August 2025, https://www.iied.org/climate-change-impact-assessments-towards-integrated-approach

[45] Impact Assessment Act, S.C. 2019, c. 28, s. 1 (Can.), accessed 13 August 2025, https://laws-lois.justice.gc.ca/eng/acts/I-2.75/FullText.html

[46] Directive 2011/92/EU of the European Parliament and of the Council of 13 December 2011 on the assessment of the effects of certain public and private projects on the environment (codification), 28 January 2012, accessed 29 August 2025, https://eur-lex.europa.eu/eli/dir/2011/92/oj/eng

[47] European Parliament, Social and environmental impacts of mining activities in the EU, by Tuija Mononen, Sonja Kivinen, Juha M. Kotilainen, and Johanna Leino, 23 May 2022, p. 9, accessed 28 August 2025, https://www.europarl.europa.eu/RegData/etudes/STUD/2022/729156/IPOL_STU(2022)729156_EN.pdf

[48] The Initiative for Responsible Mining Assurance, *Independent Assessment Timeline*, accessed 28 August 2025, https://responsiblemining.net/what-we-do/assessment/independent-assessment-timeline/#initial-audit

[49] Bankwatch, *Roșia Montană: No Improvement in Sight for Tarnished Gold Project,* CEE Bankwatch Network, 3 September 2013, accessed 13 August 2025, https://bankwatch.org/press_release/rosia-montana-no-improvement-in-sight-for-tarnished-gold-project

[50] Global Policy Forum, *IFC Withdraws from Controversial Romanian Gold Project. Global Policy Forum,* October 10, 2002, accessed 13 August 2025, https://archive.globalpolicy.org/socecon/bwi-wto/wbank/2002/1010romania.htm

[51] Romania Insider, *Romanian Parliament commission says 'No' to gold mining at Rosia Montana but legislators expected to draft new law*, editor@romania-insider.com, 11 November 2013, accessed 28 August 2025, https://www.romania-insider.com/romanian-parliament-commission-says-no-to-gold-mining-at-rosia-montana-but-legislators-expected-to-draft-new-law

[52] Reuters, *UNESCO names Romanian ancient gold mine settlement a world heritage site*, 27 July 2021, accessed 28 August 2025, https://www.reuters.com/world/europe/unesco-names-romanian-ancient-gold-mine-settlement-world-heritage-site-2021-07-27/

[53] European Parliament, & Council of the EU. (2022). Directive (EU) 2022/2464 amending Regulation (EU) 2014/815 on corporate sustainability reporting. Official Journal of the European Union, L 322, 15–64, accessed 13 August 2025, https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32022L2464

[54] CarbonChain, *Understand the emissions intensity of your nickel commodity*, accessed 28 August 2025, https://www.carbonchain.com/blog/understand-your-nickel-emissions.

[55] ML Machala et al., *Life cycle comparison of industrial-scale lithium-ion battery supply chains*, Nature Communications, 2025. https://www.nature.com/articles/s41467-025-56063-x

[56] Jasmin Jessen, *Deloitte: Only 15% of Companies Report on Scope 3 Emissions*, Onepak, 10 September 2024, https://www.onepak.com/deloitte-only-15-of-companies-report-on-scope-3-emissions/

[57] Global Witness, *Critical mineral mines tied to 111 violent incidents and protests on average a year*, 2024, accessed 13 August 2025, https://globalwitness.org/en/campaigns/transition-minerals/critical-mineral-mines-tied-to-111-violent-incidents-and-protests-on-average-a-year/

[58] ICMM, *Scope 3 Emissions Accounting and Reporting Guidance*, 1 September 2023, accessed 29 August 2025, https://www.icmm.com/en-gb/guidance/environmental-stewardship/2023/scope-3-emissions-accounting-and-reporting

[59] World Resource Institute and World Business Council for Sustainable Development, *The GHG Protocol Corporate Accounting and Reporting Standard*, 2004, accessed 13 August 2025, https://ghgprotocol.org/sites/default/files/standards/ghg-protocol-revised.pdf

[60] European Environmental Bureau, *Green mining is a myth: The hidden climate cost of Europe's raw-materials demand, 2023*, accessed 13 August 2025, https://eeb.org/library/green-mining-is-a-myth/

[61] World Bank, *Climate-Smart Mining Initiative*, 2025, accessed 13 August 2025, https://www.worldbank.org/en/programs/climate-smart-mining

[62] UNFCCC Nationally Determined Contributions Registry, https://unfccc.int/NDCREG, Intergovernmental Panel on Climate Change, 2022, AR6: Climate Change 2022 – Mitigation of Climate Change (Chapter 12), accessed 13 August 2025, https://www.ipcc.ch/report/ar6/wg3/. See also: Julie Michelle Klinger, Gwendolyn K. Murphy, and Coryn Wolk, *A Nationally Determined Contribution Framework for Energy Transition Minerals*, Nature Energy 9, no. 12, December 2024, 1452–54, accessed 13 August 2025, https://doi.org/10.1038/s41560-024-01661-0

[63] Government of Canada, *Legislative Summary of Bill C-12: An Act respecting transparency and accountability in Canada's efforts to achieve net-zero greenhouse gas emissions by the year 2050*, accessed 13 August 2025, https://lop.parl.ca/sites/PublicWebsite/default/en_CA/ResearchPublications/LegislativeSummaries/432C12E

[64] European Union, *Regulation (EU) 2024/1252 of the European Parliament and of the Council of 11 April 2024 on establishing a framework for ensuring a secure and sustainable supply of critical raw materials and amending Regulations (EU) No 168/2013, (EU) 2018/858, and (EU) 2018/1724*, Official Journal of the European Union, L 202, 23 May 2024, 1–62, accessed August 13, 2025, https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32024R1252 ; European Parliament, & Council of the EU. (2023). *Regulation (EU) 2023/1542 concerning batteries and waste batteries* (Art. 77), accessed 13 August 2025, https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32023R1542

[65] Regulation (EU) 2023/1542, *Regulation of the European Parliament and of the Council of 12 July 2023 concerning batteries and waste batteries*, amending Directive 2008/98/EC and Regulation (EU) 2019/1020 and repealing Directive 2006/66/EC, Official Journal of the European Union, L 191/1, 28 July 2023, current consolidated version 18 July 2024, accessed 28 August 2025, https://eur-lex.europa.eu/eli/reg/2023/1542/oj/eng

[66] Rizos V., and Urban P., *Implementing the EU Digital Battery Passport: Opportunities and challenges for battery circularity*, accessed 13 August 2025, accessed 13 August 2025, https://circulareconomy.europa.eu/platform/sites/default/files/2024-03/1qp5rxiZ-CEPS-InDepthAnalysis-2024-05_Implementing-the-EU-digital-battery-passport.pdf

[67] Battery Pass Consortium, PowerPoint Presentation (Project Overview), accessed 29 August 2025, https://thebatterypass.eu/wp-content/uploads/2022_Battery-Pass_Project-Overview.pdf.

[68] Global Witness, *Hundreds of thousands in COP29 host country at risk from gas flaring pollution*, 14 November 2024, https://www.globalwitness.org/en/campaigns/fossil-gas/hundreds-thousands-cop29-host-country-risk-gas-flaring-pollution/

[69] United Nations Framework Convention on Climate Change, First Biennial Transparency Reports, accessed 29 August 2025, https://unfccc.int/first-biennial-transparency-reports

[70] NegaWatt, *Lithium: towards a necessary sufficiency*, 2023, accessed 13 August 2025, https://negawatt.org/IMG/pdf/221104_note_lithium_final__en.pdf

[71] PowerShift, *Connecting the Raw Materials Transition and the Energy Transition: Improving the Circular Economy in the Renewable Energy Sector*, accessed 13 August 2025, https://power-shift.de/raw-materials-transition/

[72] EuRIC AISBL, Recycling: Bridging Circular Economy & Climate Policy, Metal Recycling Factsheet, 23 October 2024, accessed 28 August 2025, https://circulareconomy.europa.eu/platform/sites/default/files/euric_metal_recycling_factsheet.pdf

[73] United Nations International Resource Panel, *Resource Efficiency and Climate Change: Material Efficiency Strategies for a Low-Carbon Future*, 2020, *Summary for Policymakers*, p. 7, accessed 28 August 2025, https://www.resourcepanel.org/reports/resource-efficiency-and-climate-change

[74] Institute for European Environmental Policy, *The 'right to repair': Addressing social and environmental spillovers in the electrical and electronic equipment sector*, July 2022, 20, p. 10, accessed 29 August 2025, https://ieep.eu/wp-content/uploads/2022/12/Policy-brief_The-right-to-repair_IEEP-2022.pdf

[75] INTERPOL, *Electronic Waste and Organized Crime: Assessing the Links*, Pollution Crime Working Group, 2009, accessed 13 August 2025, https://www.interpol.int/content/download/5174/file/Electronic%20Waste%20and%20Organized%20Crime%20-%20Assessing%20the%20Links.pdf

[76] European Commission, Critical Raw Materials Act, accessed 28 August 2025, https://single-market-economy.ec.europa.eu/sectors/raw-materials/areas-specific-interest/critical-raw-materials/critical-raw-materials-act_en

[77] Gemeente Amsterdam, *Amsterdam Circular: Strategy 2020-2025*, City of Amsterdam, 2020, accessed 29 August 2025, https://assets.amsterdam.nl/publish/pages/1043702/amsterdam-circular-2020-2025-public_version.pdf

[78] Ellen MacArthur Foundation, *A building that can be reused: Brummen Town Hall*, accessed 28 August 2025, https://www.ellenmacarthurfoundation.org/circular-examples/brummen-town-hall

[79] Daan Tech, *What is the repairability index? Fighting against programmed obsolescence*, accessed 29 August 2025, https://daan.tech/eur/what-is-the-repairability-index-fighting-against-programmed-obsolescence

[80] Halte à l'Obsolescence Programmée, *The French repairability index: A first assessment – one year after its implementation*, by Marcus Bergmann, Ronan Groussier, under the supervision of Laetitia Vasseur, 17 February 2022, p. 19, accessed 29 August 2025, https://www.halteobsolescence.org/wp-content/uploads/2022/02/Rapport-indice-de-reparabilite.pdf

[81] European Parliament, & Council of the EU, *Regulation (EU) 2023/1542 concerning batteries and waste batteries*, 2023, accessed 13 August 2025, https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32023R1542

[82] The Guardian, *The smelting company that became an urban mining pioneer*, 2013 accessed 13 August 2025, https://www.theguardian.com/sustainable-business/blog/umicore-smelting-company-clean-tech

[83] European Environmental Bureau, *Closing the loop: How recycling transition minerals can slash Europe's carbon footprint*, 2023, accessed 13 August 2025, https://www.europarl.europa.eu/RegData/etudes/BRIE/2016/573899/EPRS_BRI(2016)573899_EN.pdf

[84] Northvolt, Revolt: closing the loop on batteries, accessed 28 August 2025, https://northvolt.com/articles/revolt/

[85] Northvolt, Northvolt Revolt, accessed 28 August 2025, https://northvolt.com/recycling/

[86] United Nations Framework Convention on Climate Change, Nationally Determined Contributions (NDCs), accessed 28 August 2025, https://unfccc.int/process-and-meetings/the-paris-agreement/nationally-determined-contributions-ndcs

[87] Richard Lloyd Parry, *Malaysia Seizes 100 Containers of Electronic Waste Dumped by West*, The Times, 21 June, 2024, accessed 13 August 2025, https://www.thetimes.co.uk/article/malaysia-seizes-100-containers-of-electronic-waste-dumped-by-west-lk8jcxh8h