United Nations

ECE/CP.TEIA/2024.2

Economic and Social Council

ADVANCE COPY

Distr.: General
29 August 2024

Original: English

Economic Commission for Europe

Conference of the Parties to the Convention on the Transboundary Effects of Industrial Accidents

Thirteenth meeting
Geneva, 27-29 November 2024
Item 3 (a) and (c) of the provisional agenda
Industrial safety of the energy transition:
(a) Seminar on the global energy transition: Strengthening industrial safety to address emerging issues
(c) Decision on work on the industrial safety of the energy transition under the Convention

Emerging challenges and trends for industrial safety: Decarbonization, energy transition, critical minerals and the role of the Industrial Accidents Convention

Note by the Secretariat

Summary

The energy transition is essential for the success of the decarbonization agenda. Due to the scale and pace at which said transition is unfolding, at its twelfth meeting (Geneva, 29 November–1 December 2022), the Conference of the Parties of the Convention on the Transboundary Effects of Industrial Accidents recognized the need to address emerging issues of concern for industrial safety, including the energy transition and changes of energy sources and the Convention's relation to those issues.[a] This paper has been prepared in direct implementation of this decision.

The energy transition depends, to a significant extent, on critical minerals, many of which are extremely concentrated in terms of their extraction and processing, to produce clean and renewable energy technology. Partly because of the costs and environmental impacts involved, with a few exceptions, United Nations Economic Commission for Europe member States at this stage are not among those with large shares in either mining or, especially, processing of these materials. Considering their pivotal role in the decarbonization agenda and in economic development, the urgency of climate change mitigation due to the increasing impacts of the climate crisis and also rising geopolitical tensions, the European Union and national legal and policy responses in several countries of the United Nations Economic Commission for Europe region are setting ambitious priorities and goals on this front. Many member States are also pursuing alternative energy sources in the transition, through the use of, among other things, hydrogen, and ammonia.

Industrial safety and the protection of people and the environment are foundational issues that need to be addressed effectively to ensure the sustainability of the transition and minimize trade-offs. Work under the Convention on the

Transboundary Effects of Industrial Accidents (Industrial Accidents Convention) since its inception has examined industrial safety from all angles, by addressing country needs through its international regulatory support, capacity development and analytical/knowledge generation workstreams. The Convention itself has led to the adoption and implementation of more effective industrial accident prevention, preparedness and response laws and policies and industrial safety tools and guidelines to address risks and has driven industrial safety governance and inspired the development of mechanisms for coordination among public authorities within and across national borders.

Several of the existing deliverables and workstreams under the Convention and its subsidiary bodies may provide immediate support on the above areas. Given the significance of the subject area and the rate at which the energy transition is anticipated to occur, several new lines of work and support may be initiated within the present and future workplans of the Convention, subject to adequate support by member States. The Conference of the Parties is invited to consider this note as background for the seminar Global energy transition: Strengthening industrial safety to address emerging risks (see the seminar concept note, ECE/CP.TEIA/2024/INF.1) and informal document Member States consultations and Industrial Safety of the Energy Transition (ISET) Survey results (ECE/CP.TEIA/2024/INF.2). It is also invited to consider the information outlined in this document for its decision-making on work on the industrial safety of the energy transition under the Convention (see ECE/CP.TEIA/2024/3, draft decision) under agenda item 3 (c).

[a] ECE/CP.TEIA/44, para.104.

I. Setting the stage: industrial safety in a fast-changing world economy undergoing multiple crises

1. Globalization, which started in the 1990s, was built on the advantages of shared prosperity stemming from an open international division of labour in multi-country production, based on international cooperation and trade openness. The years since 2020, however, have been marked by multiple challenges for the global economy, undoing decades of progress and development worldwide. The increasing frequency and impacts of extreme weather events, coronavirus disease (COVID-19) impacts, export restrictions, the war in Ukraine and increasing geopolitical tensions underlined a new stage in global affairs.

2. Supply chain weaknesses and geopolitical considerations in an increasingly uncertain environment have meant two key developments of high relevance for the United Nations Economic Commission for Europe (ECE) region and the Convention on the Transboundary Effects of Industrial Accidents (Industrial Accidents Convention).

3. First, following the energy shock that affected the ECE region and the world due to the full-scale invasion of Ukraine by the Russian Federation, the issue of accelerating the sustainability transition and decarbonization agenda became a top priority. This is not to say that these developments triggered the decarbonization agenda. Global commitments regarding climate change dynamics and impacts have been made since the signing of the 2015 Paris Agreement and the establishment of Sustainable Development Goal 13 (climate action). However, these developments certainly had a significant impact on the sense of urgency and top-priority status in national policies.

4. Second, precisely because of the top-priority status of the accelerated decarbonization transition, the dependence on critical minerals required for this transition and their extreme concentration have triggered national and international responses of high and direct relevance to the Industrial Accidents Convention and the broader environmental agenda.

5. As a result of the above-mentioned developments, it is highly likely that greater demand for minerals will lead to increased mining and processing activities and, therefore, more tailings. Higher numbers of tailings management facilities (TMFs) are associated with higher environmental and public health risks for failures and even accidents, underlining the importance of correctly designing TMFs from the beginning and retrofitting existing ones as

needed, in addition to providing for mechanisms strengthening the prevention of, preparation for and response to accidents.

6. In addition, the large-scale production, storage and distribution of hydrogen, among other hazardous substances, which will be important in achieving carbon neutrality, is expected to create additional industrial safety risks and hence require strengthened control measures. Research and innovation will result in new low — and zero — carbon technologies with unknown hazards and risks that need to be considered in process safety. Furthermore, many countries are pursuing policies to transition to alternative energy sources for industrial facilities, a shift that also requires attention to industrial safety.

7. The Industrial Accidents Convention provides a framework for addressing key industrial safety issues and environmental aspects of the decarbonization transition, namely mineral extraction and processing, the new and expanded uses of hazardous substances and technology production affiliated with the energy transition and mine tailings management.

8. In delineating the scope of this paper, it is important to clarify what it does not cover. The list of priority considerations in relation to the industrial safety of the energy transition is not exhausted with the discussion of critical minerals. A more comprehensive list of themes and key member State considerations may be found in the informal document Member States consultations and Industrial Safety of the Energy Transition (ISET) Survey results (ECE/CP.TEIA/2024/INF.2), which contains the results of intergovernmental consultations on this topic undertaken under the aegis of the Convention's Bureau.

9. The present paper will try to make sense of these developments and structure them in terms relevant for the role and further development of the Industrial Accidents Convention. The paper is structured as follows:

(a) Section II presents the fundamental roles of critical minerals for the decarbonization agenda in the ECE region and globally;

(b) Section III presents key underlying characteristics of the extreme concentration of critical minerals and selected national responses and policies;

(c) Section IV explores environmental impacts resulting from the developments, the current position and potential future role of industrial safety and the Industrial Accidents Convention in this broader narrative;

(d) Lastly, section V concludes with suggestions and recommendations for the Conference of the Parties' consideration on the way forward.

II. Fundamental role of critical materials for the decarbonization agenda in the United Nations Economic Commission for Europe region and globally

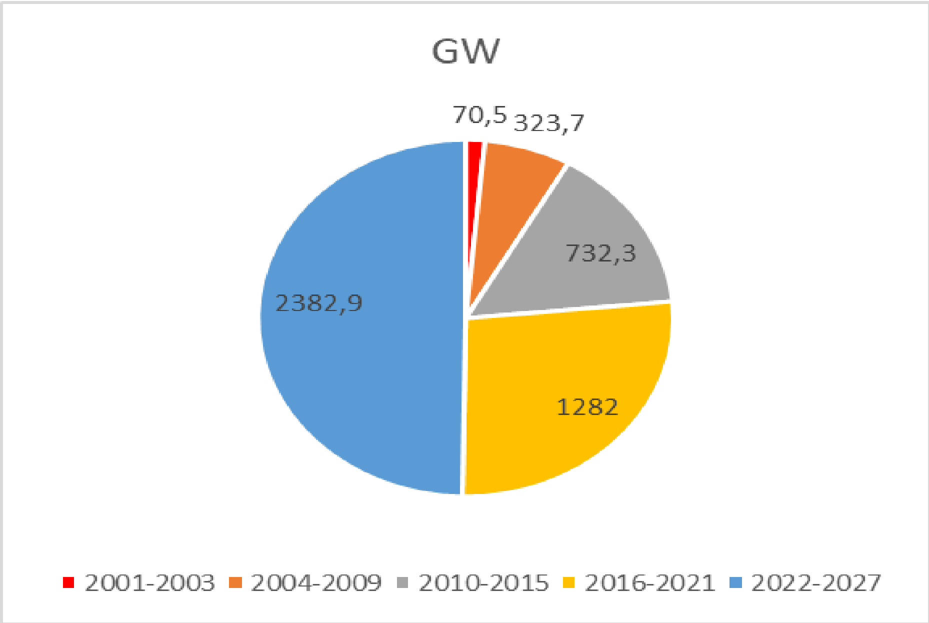
10. Pushed by the threat of climate change and geopolitical tensions, several countries around the world, including the ECE countries, have embarked on a large-scale electrification project.

11. In terms of future trends, according to figure I, International Energy Agency (IEA) projections suggest that total renewable electricity capacity additions for the period 2022-2027 will match equivalent additions in the preceding 20 years.

Figure I

Total renewable electricity capacity additions (2001-2027)

(Giga watts)



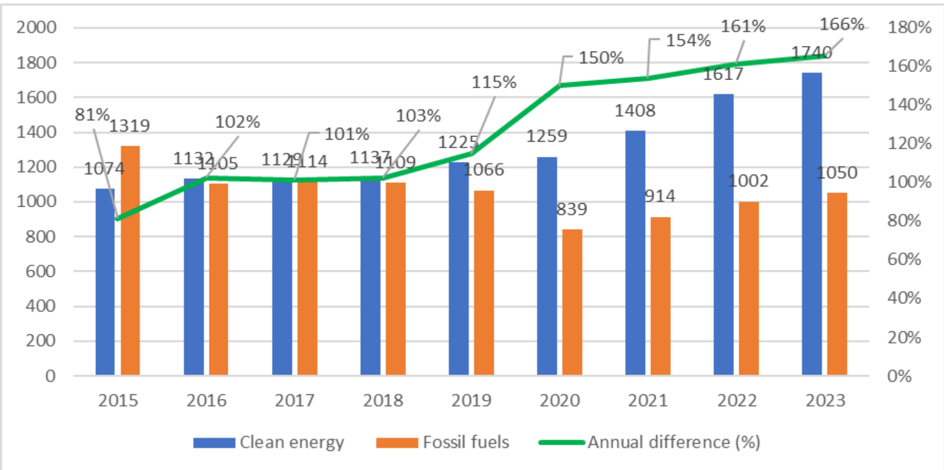
Source: IEA, "Total renewable electricity capacity additions", 2001-2027", 6 December 2022.

12. These exponential growth projections are backed by evidence on investment trends in the years since the signing of the Paris Agreement. Two trends highlighted in figure II are of direct interest. First, investments in fossil fuels are consistently lower than for the baseline year of 2015. Indeed, investments in clean energy[1] have been consistently increasing. Second, since 2016, total investments in clean energy have been consistently higher than total investments in oil and gas, and the year-on-year gap is growing.

Figure II

Global energy investment in clean energy and in fossil fuels, 2015-2023

(Billions of United States dollars)

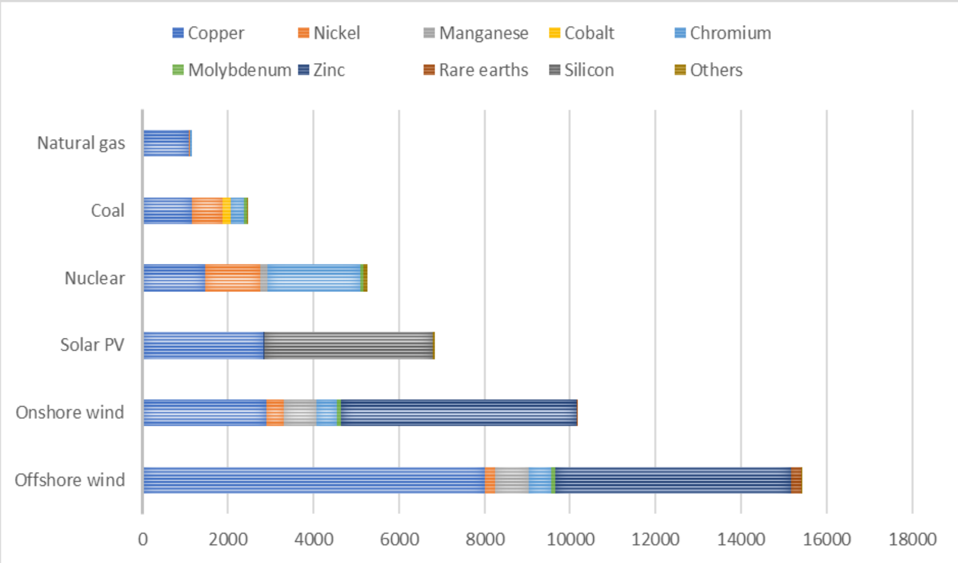


Source: IEA, "Global energy investment in clean energy and in fossil fuels, 2015-2023", 22 May 2023, and author's own calculations.

[1] For the purposes of this paper, clean energy technology comprises those technologies that result in minimal or zero emissions of carbon dioxide (CO_2) and pollutants (definition taken from International Energy Agency (IEA), Energy Technology Perspectives 2020 (n.p., 2020), p. 28).

13. Renewable energy technologies require a larger set of minerals and metals and in a much larger quantity than fossil fuel technologies, as shown in figure III. Looked at from this angle, figures I–III suggest that there is little doubt that the demand for raw materials critical for the energy transition will also grow exponentially in the years to come.

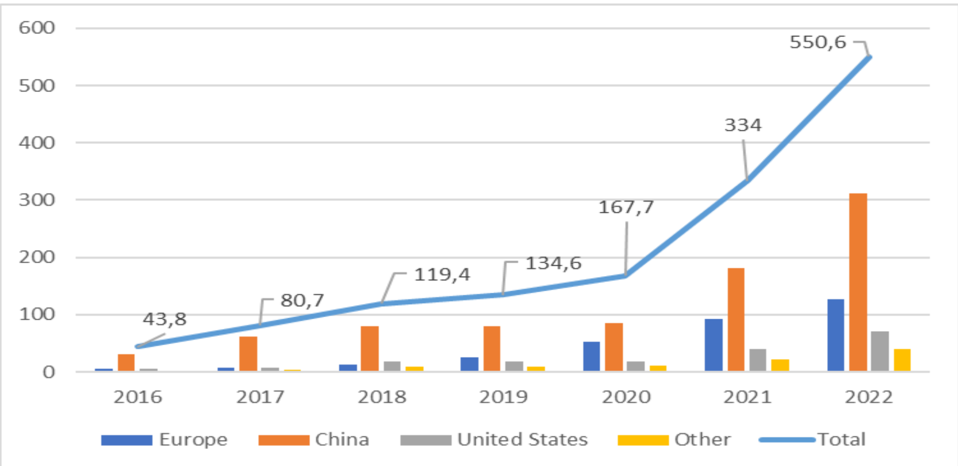
Figure III
Minerals used in clean energy technologies compared to other power generation sources
(Kilograms/megawatts)



Source: IEA, "Minerals used in clean energy technologies compared to other power generation sources", 5 May 2021, and author's own calculations.
Abbreviations: PV, photovoltaics.

14. One key metric on the demand side due to the heavy impact of the electrification of transport is the demand for batteries and, of course, for the critical materials required at this stage. As figure IV shows, demand for electric vehicle batteries has been growing exponentially, increasing more than 12-fold, from 43.8 GWh in 2016 to 550.6 GWh in 2022. The same obviously applies to the underlying critical minerals needed for these batteries. Depending on the year, China, the European Union and the United States of America account for 92-95 per cent of global demand for electric vehicle batteries.

Figure IV
Battery demand by region, 2016-2022
(Gigawatt hours/year)



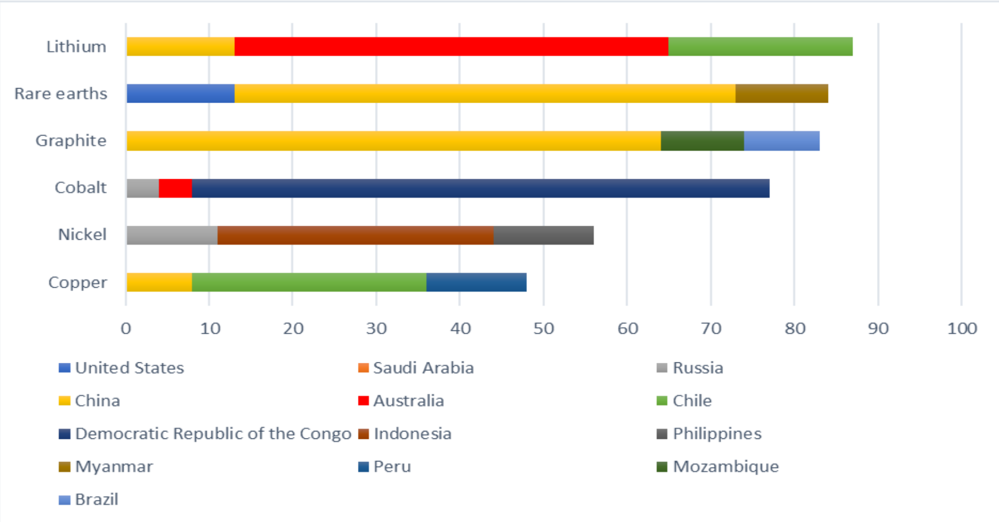
Source: IEA, "Battery demand by region, 2016-2022", 11 April 2023, and author's own calculations.

III. Extreme concentration and national responses

15. As section II shows, both from the energy supply and demand sides, it can be expected that critical minerals will play an increasingly significant role in the decarbonization agenda in the near future.

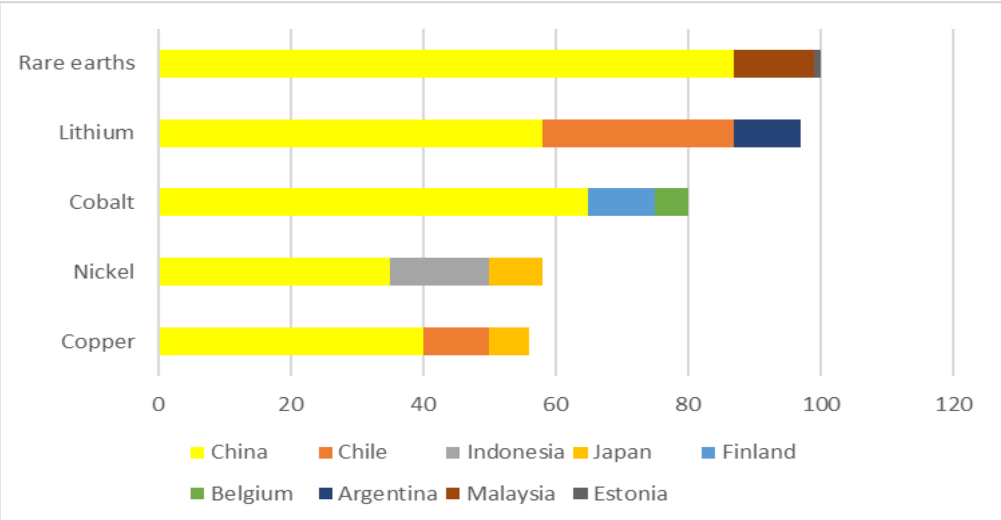
16. One of the strategically important underlying characteristics of the dynamics of critical minerals is their extreme geographic concentration, both at the extraction and processing phases (figures V and VI, respectively).

Figure V
Share of top producing countries in extraction of selected minerals, 2019
(Percentage)



Source: Based on IEA, "Share of top producing countries in extraction of selected minerals and fossil fuels, 2019", 5 May 2021.

Figure VI
Share of top producing countries in total processing of selected minerals, 2019
(Percentage)



Source: Based on IEA, "Share of top producing countries in total processing of selected minerals and fossil fuels, 2019", 5 May 2021.

17. In a tense international geopolitical environment, and with memories of COVID-19 pandemic period supply chain failures still fresh in their minds, Governments around the

world have opted for more control of these material assets – the term “strategic autonomy” has been evoked.

18. Rare earths and other critical minerals typically come in low-grade concentration and need highly polluting processes and huge quantities of water and chemicals for their production, which renders them difficult to extract in large quantities. Ore is of low value unless it undergoes the complex, often environmentally hazardous process of conversion into a usable form. Processing ore is therefore costly, energy-intensive, heavily polluting and leaves behind considerable volumes of waste, when looking at primary production.

19. With these points in mind, a number of international initiatives and national responses have been unfolding in the direction of strengthening domestic mining, processing and recycling/reusing capabilities. For example, in 2022, Australia, Canada, Finland, France, Germany, Japan, Norway, the Republic of Korea, Sweden, the United Kingdom of Great Britain and Northern Ireland, the United States of America and the European Union entered into the Minerals Security Partnership to strengthen investment in the critical mineral supply market. The Partnership focuses on four pillars:

(a) Information-sharing and cooperation;

(b) Investment networks;

(c) Raising of environmental, social and governance standards;

(d) Recycling and reuse.

20. Even more importantly, there have been several national responses of critical importance for the work of the Industrial Accidents Convention. This section will highlight three prominent cases among Parties to the Convention.

A. European Union

21. In March 2023, the European Union Critical Raw Materials Act was passed to secure the future supply of critical raw materials for the European Union. Regulation (EU) 2024/1252 of the European Parliament and of the Council on establishing a framework for ensuring a secure and sustainable supply of critical raw materials was adopted on 11 April 2024. The aim of the Act is to make the European Union more self-reliant in mining, processing and recycling of critical raw materials included in a list of 34 critical metals and minerals (see annex for list).

22. The targets of the Act to be achieved by 2030 are quite ambitious:

(a) At least 10 per cent of European Union annual consumption of mined strategic minerals must be sourced domestically;

(b) 40 per cent of processed strategic materials must be domestically produced;

(c) 15 per cent of recycled strategic materials must also be domestically produced;

(d) No more than 65 per cent of each strategic raw material — at any stage of processing — should come from a single third country.

B. Norway

23. The Government of Norway published the *Norwegian Mineral Strategy* in June 2023.[2] It addresses challenges relating to access to critical minerals and aims to facilitate increased profitability and sustainability in the land-based extraction of critical minerals.

24. Norway is a substantial supplier of critical minerals to the rest of Europe and other regions, including extraction and refining processes. Currently, three mature metal projects involve copper, titanium minerals/garnet and iron. Exploration projects for other materials, such as rare earth elements, are taking place at the same time.

[2] Norwegian Ministry of Trade, Industry and Fisheries (n.p., 2023).

25. Although a major supplier for the European Union, Norway is also dependent on imported critical minerals, and thus the Government is aware of the significance of cooperating with other countries for sustainable critical minerals supply.

26. Key aims of the Norwegian Mineral Strategy are:

(a) Accelerating the implementation of Norwegian mineral projects, including needed changes in relevant regulations, reducing processing times and facilitating permitting procedures (fast-track system);

(b) Ensuring the contribution to the circular economy through increasing reuse and reducing disposal;

(c) Mapping and characterizing the properties of tailing dams and landfills to facilitate possible future exploitation;

(d) Appointing an expert committee to assess the advantages and disadvantages of different types of mine waste disposal in the light of the development of new technologies;

(e) Requiring businesses to present circular plans for new mineral projects;

(f) Enhancing sustainability, including by actively contributing to the development of European Union emission regulations for mineral activities;

(g) Aiming for all new major projects to use zero-emission machinery and vehicles by 2030.

C. United Kingdom of Great Britain and Northern Ireland

27. To improve the resilience of critical mineral supply chains and accelerate domestic capabilities, in July 2022, the Government of the United Kingdom of Great Britain and Northern Ireland launched its first-ever critical minerals strategy, entitled “Resilience for the Future: The UK’s Critical Minerals Strategy”[3] (updated in March 2023).

28. The Strategy aims to:

(a) Accelerate the domestic capabilities of the United Kingdom of Great Britain and Northern Ireland by:

(i) Providing financial support via government funding and an energy cost support scheme for energy intensive industries;

(ii) Creating a foreign direct investment proposition for critical minerals projects of the United Kingdom of Great Britain and Northern Ireland;

(iii) Developing regional clusters and training programmes (e.g., mining engineering degree apprenticeship programme);

(iv) Reducing barriers to domestic exploration and extraction of critical minerals;

(v) Developing a critical minerals research and development blueprint and positioning the country as a strategic location for refining and midstream materials manufacturing;

(vi) Increasing recovery, reuse and recycling, and creating a circular economy for critical minerals to both reduce waste and alleviate pressure on the primary supply;

(b) Collaborate with international partners;

(c) Enhance international markets.

[3] Available at www.gov.uk/government/publications/uk-critical-mineral-strategy/resilience-for-the-future-the-uks-critical-minerals-strategy.

IV. What are the roles for industrial safety and the Industrial Accidents Convention in the current dynamic environment?

A. Role of industrial safety

29. Despite their differences, all the national responses outlined above share two key elements. First, they seek to strengthen mining, processing and recycling/reusing of critical minerals domestically, in some cases with more explicit targets and time horizons than in others. Second, they aim to accelerate these processes, in order to meet top national priorities, inter alia, by fast-tracking permitting/licensing and strengthening financing as key enablers. These two elements combined indeed render ensuring industrial safety and environmental protection a key part of the discussion. From the trends and developments presented, significant impacts on the environment and the industrial/mining sector can be expected with relatively high confidence, including, inter alia:

(a) The increased demand for critical minerals and national responses, such as those examined in this paper, will almost certainly result in:

(i) An increase in the domestic mining of strategic minerals, and hence an increase in the number of mines and tailings in resource-rich countries and regions;

(ii) Increased numbers and capacities of battery storage or similar facilities;

(iii) An equivalent increase in tailings waste and hence in the number of TMFs, in the absence of innovations and new technologies;

(b) Increased risks to people and the environment in the ECE region, including through large-scale fires, leakages or dam failures;

(c) More mines and more TMFs will also mean that, in case of a failure or accidental release of hazardous substances and/or dangerous amounts of tailings sludge, a higher number of people will be affected by the negative consequences of an accident. Informing and involving affected populations early on in accident prevention, preparedness and response will be key in obtaining societal support and a “social licence to operate”;

(d) With the number of TMFs rapidly increasing, the use of international best practices and the latest environmental and safety standards for their design, siting, location and modification will be important for the safe management and governance of TMFs, in particular in view of more extreme and frequent weather events and natural disasters due to climate change, which pose additional risks of natural hazard-triggered technological disasters (Natech risks) and needs for climate change adaptation to ensure safety. Competing land-use or failure to ensure safety distancing regarding urban areas may also become issues;

(e) Given that demand for critical minerals will almost certainly outweigh supply, shortages or dependencies may occur: hence, countries are likely to explore the reprocessing of closed, abandoned or orphaned mines to ensure supply of critical minerals required for the green transition/electrification. This brings opportunities in terms of reducing the number of tailings, TMFs and new mines, as well as of improving safety in general. However, reprocessing requires additional safety considerations;

(f) Ensuring safety measures are implemented and complied with during the full lifecycle of critical minerals, including extraction, processing, the closure of mines, storing of tailings mixtures, transporting of critical minerals, production of energy technology and, in some cases, export of tailings, will be vital for ensuring the protection of people and the environment and sustainable development;

(g) In such a context, it will be particularly important to create a level playing field and ensure that resource — poor countries take responsibility for supporting the development and implementation of sector — specific safety standards and ensuring knowledge transfer and capacity-building in resource-rich countries, especially those with economies in transition.

30. Below are some further related considerations.

1. Mining for rare earth and critical minerals

31. Mining for rare earth and critical minerals can have significant environmental and social impacts. Here are some of the key considerations:

(a) Water pollution: Mining activities can contaminate water sources through various mechanisms. Surface run-off from mining sites can carry sediment, heavy metals and other pollutants into rivers and streams, affecting aquatic life and water quality. In addition, mining can expose sulfide minerals to air and water, leading to the formation of acid mine drainage, which is highly acidic and can leach out toxic metals;

(b) Groundwater contamination: Mining operations may encounter groundwater, which can become contaminated by the release of pollutants from mining activities. This can have long-term effects on local water supplies, making them unsuitable for drinking or agricultural use;

(c) Air pollution: Mining operations can release dust and particulate matter into the air, resulting in air pollution. The excavation and transportation of ore, as well as the use of heavy machinery and explosives, contribute to the generation of airborne pollutants that can have adverse effects on air quality and human health;

(d) Land degradation: Mining activities can result in major disruption and destruction of natural habitats, including forests and ecosystems. This can lead to loss of biodiversity and degradation of local ecosystems;

(e) Energy consumption and greenhouse gas emissions: Mining activities, including drilling, blasting, crushing and transportation, require significant energy inputs, often derived from fossil fuels. This energy consumption contributes to greenhouse gas emissions, exacerbating climate change;

(f) Community and social impacts: Mining operations can have social implications, such as the displacement of local communities, changes in traditional livelihoods and conflicts over land and resource rights. Additionally, the influx of mining personnel can put pressure on local resources and services, leading to social and cultural disruptions.

2. Processing rare earth and critical minerals

32. The processing of rare earth and critical minerals can also have serious environmental impacts. Here are some of the key considerations:

(a) Water pollution: Many processing techniques involve the use of water for separation, washing and chemical reactions. If not properly managed, the wastewater generated can contain toxic chemicals, heavy metals and radioactive materials, posing a risk to water bodies and aquatic ecosystems;

(b) Waste generation: The processing of rare earth and critical minerals can generate large amounts of waste materials, including tailings, which are the leftover materials after extraction. If not properly managed, these wastes can contaminate soil, water and air, and may contain hazardous substances;

(c) Air pollution: Some processing methods, such as smelting and roasting, release pollutants into the air, including sulfur dioxide, nitrogen oxides and particulate matter. These emissions contribute to air pollution and can have negative impacts on air quality and human health;

(d) Energy consumption: Processing these minerals often requires significant energy inputs. Extraction, beneficiation and refining processes can be energy-intensive, contributing to greenhouse gas emissions and increased demand for fossil fuels;

(e) Land degradation: Similarly to mining, although on a smaller scale, processing activities can result in the disruption and destruction of natural habitats, including forests and ecosystems. This can lead to loss of biodiversity and degradation of local ecosystems;

(f) Radioactive materials: Certain rare earth elements, such as thorium and uranium, can be naturally occurring radioactive materials. During the processing of rare earth minerals, these radioactive elements can be concentrated in the waste streams, requiring special handling and disposal to prevent environmental and health risks;

(g) Indirect impacts: The extraction and processing of rare earth and critical minerals often require infrastructure development, such as roads, power supply and water access, which can have further impacts on the environment through habitat fragmentation, deforestation and land conversion.

3. Recycling and reuse of rare earth and critical minerals

33. Recycling of rare earth and critical minerals can have positive environmental impacts, primarily because it helps reduce the need for new mining activities, which are generally more polluting and impactful, thereby conserving natural resources. By recovering and reusing rare earth and critical minerals from discarded products, recycling can contribute to a more sustainable and circular economy.

34. However, recycling is not without considerable environmental impacts of its own, including:

(a) Chemical exposure: The recycling process may involve the use of chemicals and reagents to extract and separate rare earth and critical minerals from the recycled materials. If not managed properly, these chemicals can pose environmental and human health risks if released into the environment;

(b) Emissions and air pollution: Some recycling methods, such as pyrometallurgical processes, can generate emissions and air pollutants when recovering rare earth and critical minerals. These emissions may include greenhouse gases, particulate matter and volatile organic compounds, contributing to climate change, air pollution and potential health hazards;

(c) Water pollution: While recycling generally requires less water compared to primary extraction, some recycling techniques still involve water-based processes. Inadequate wastewater treatment or improper disposal of process water can lead to water pollution, particularly if it contains toxic chemicals or heavy metals;

(d) Complex recycling and reprocessing processes: Recycling rare earth and critical minerals from electronic waste and other products can be technically challenging due to the complex compositions and diverse materials involved. The separation and recovery processes require specialized technologies, which may have their own environmental impacts, such as energy consumption and waste by-product generation;

(e) Some metals are blended in a way that they cannot be retrieved and separated through recycling. In such cases, the only potential circular avenue is reuse (if applicable). Thus, repair is another circular avenue that avoids these issues, for example by lengthening the lifespan of the equipment by repairing its components and its material inputs.

4. New and expanded uses of hazardous substances and industrial facilities affiliated with the energy transition, and related land-use planning and siting

35. It is important to highlight some of the risks that new and expanded uses of other hazardous substances, such as hydrogen, ammonia and processed critical minerals — e.g., lithium and nickel — , and industrial facilities affiliated with the energy transition pose. The below points are non-exhaustive and are only intended to provide a starting point for understanding such risks:

(a) Information and knowledge on risks of handling, storing and transporting such hazardous substances need to be further generated and widely shared and exchanged to ensure that policies and safety measures can be adapted to meet the industrial safety and environmental protection needs of the energy transition;

(b) Policymakers should be made aware of the hazardous substances and facilities affiliated with the energy transition and their hazards and risks, as a means to inform decision-making, including for policy formulation, land-use planning, siting, permitting and contingency planning;

(c) Safety distancing criteria should be assessed to ensure that such hazardous substances and facilities do not harm people, especially those sited — or planned to be sited — in urban areas, or the environment and to avoid reactions with other hazardous substances and possible natural disasters that could trigger accidents – e.g., floods, extreme heat, wildfires;

(d) Operators and workers should ensure that they comply with legal and policy requirements and implement and, as needed, adapt their safety measures to ensure prevention of, preparedness for and response to industrial accidents;

(e) The public needs to be made aware of the risks of such hazardous substances and facilities and what to do in case of an accident and have the opportunity to participate in decision-making that could affect it.

36. The United Nations/Organisation for Economic Co-operation and Development (OECD) seminar in follow-up to the 2020 Beirut port explosion[4] (Geneva (online), 14 December 2021) covered the risks of hazardous substances, such as ammoniun nitrate, and related experiences, lessons learned and good practices, including in view of past accidents in densely populated urban areas. While not originally linked to the context of the energy transition, industrial safety risks and the conclusions of the seminar can be considered more broadly. The information collected and the envisaged work in the context of activities in the future workplan 2025-2026 to strengthen the safe and secure management of hazardous substances to prevent and mitigate industrial accidents worldwide, financed by the European Union in the framework of the Global Europe: Neighbourhood, Development and International Cooperation Instrument, will include the organization of a seminar on this topic in the framework of the fourteenth meeting of the Conference of the Parties to the Industrial Accidents Convention. This will cover some of the hazardous substances linked to the energy transition, and explore instruments and tools available to address related risks, providing the means to support the industrial safety of the energy transition workstream.

B. Role of the Industrial Accidents Convention

37. The Industrial Accidents Convention was created as a result of the severe transboundary effects of the 1986 Sandoz (Schweizerhalle) accident and the resulting pollution of the Rhine River, which affected several countries. Over the past few decades, numerous industrial accidents have served as constant reminders that industrial safety is paramount. While Governments and industry — operators, business associations, etc — have progressed in making operations safer, the damage caused by past accidents is proof that their effects can be far-reaching, sometimes across borders.

38. The vision of the Parties to the Convention, as enshrined in the Convention's long-term strategy until 2030,[5] is to significantly increase industrial safety and reduce the risk of technological disasters. One of the key objectives in order to achieve this vision is to use the Convention as a flexible and modern instrument capable of addressing new and emerging risks. The broader setting, as outlined in this paper thus far, would require nothing less, in order to enable the work under the Convention to support Governments in ensuring that they meet their national and international obligations while achieving their national economic and industrial priorities for the improvement of the well-being of their citizens and the environment, including for climate change mitigation.

39. Thus, the Industrial Accidents Convention undoubtedly has a key role to play regionally and likely beyond, in this dominant narrative, to ensure industrial safety while national policy responses pursue national priorities. The knowledge generated under its auspices can be used to further inform decision-making by Parties and member States within and beyond the ECE region, enabling them to confidently embark on the energy transition while minimizing accidents and mitigating their effects on the population and the environment. The recognition of the Convention's role can be seen in the favorable references

[4] Information from and the conclusions and recommendations of the seminar are available at https://unece.org/info/Environmental-Policy/Industrial-Accidents/events/358445.

[5] ECE/CP.TEIA/38/Add.1.

to both it and ECE in the Co-Chairs' report[6] of the Global Intergovernmental Meeting under United Nations Environment Assembly of the United Nations Environment Programme (UNEP) resolution 5/12 on environmental aspects of minerals and metals management and also in the negotiations under the sixth session of the United Nations Environment Assembly of UNEP (Nairobi, 26 February–1 March 2024) and the UNEP report entitled "Knowledge Gaps in Relation to the Environmental Aspects of Tailings Management",[7] prepared for said sixth session.

1. Deploying existing workstreams and deliverables

40. Indicative existing workstreams and deliverables that could be readily applicable in guiding and/or advising national efforts include:

(a) Promoting:

(i) Use of the ECE Online Toolkit and Training for Strengthening Mine Tailings Safety;[8]

(ii) Use of the ECE *Safety Guidelines and Good Practices for Tailings Management Facilities*;[9]

(iii) Use of the TMF Methodology to implement the ECE *Safety Guidelines and Good Practices on Tailings Management Facilities*;

(iv) Implementation of decision 2020/1 on strengthening mine tailings safety in the ECE region and beyond (ECE/CP.TEIA/42/Add.1);

(v) Implementation of the Road map for action to strengthen mine tailings safety within and beyond the ECE region (ECE/CP.TEIA/2022/7);

(b) Collecting data of and monitoring TMFs covered by the Convention through national implementation reports and the anticipated round table at the thirteenth meeting of the Conference of the Parties;

(c) Provision of capacity-building and technical support to current and future Parties through the Convention's Assistance and Cooperation Programme, Working Group on Implementation and Joint Expert Group on Water and Industrial Accidents;

(d) Building on the work carried out by the Joint Expert Group, in cooperation with the Working Group on Implementation and the Bureau, in the biennium 2023-2024, to assess whether there is a need to revise and update the Guidelines to facilitate the identification of hazardous activities for the purposes of the Convention (ECE/CP.TEIA/2, annex IV, decision 2000/3) to cover more comprehensively the hazards and risks arising from TMFs and its conclusions to prepare an update of the above-mentioned Guidelines in the biennium 2025-2026, for consideration by the Conference of the Parties at its fourteenth meeting (see ECE/CP.TEIA/2024/10), in line with the related draft decision (see ECE/CP.TEIA/2024/11);

(e) Identifying and promoting synergies between the Convention, the United Nations Framework Classification for Resources and the United Nations Resource Management System to support their adoption and harmonized implementation;

[6] United Nations Environment Programme (UNEP), Environmental Aspects of Minerals and Metals Management: Implementing UNEA Resolution 5/12 – Co-Chairs' Summary Report of the Global Intergovernmental Meeting, 7-8 September 2023 (n.p., 2023). Available at www.greenpolicyplatform.org/sites/default/files/downloads/tools/Report-UNEA 512 Global Intergovernmental Meeting-V2.pdf.

[7] Available at www.greenpolicyplatform.org/sites/default/files/downloads/tools/Final Knowledge Gaps Report_Environmental Aspects of Tailings Management %28January 2024%29_1.pdf.

[8] Available at https://unece.org/environment-policy/industrial-accidents/online-toolkit-and-training-strengthening-mine-tailings#accordion_1.

[9] United Nations publication, ECE/CP.TEIA/26. Available at https://unece.org/environment-policy/publications/safety-guidelines-and-good-practices-tailings-management-facilities.

(f) Promoting the use of the ECE *Guidance on Land-use Planning, the Siting of Hazardous Activities and Related Safety Aspects*[10] and knowledge collected and information exchanged under the Convention's auspices on land-use planning and siting, including through subregional workshops in Eastern and South-Eastern Europe and the Caucasus, as well as through a survey, and available through the ECE-European Investment Bank joint Information Repository of Good Practices and Lessons Learned in Land-use Planning and Industrial Safety[11] and further developing it in relation to the hazardous substances and facilities affiliated with the energy transition;

(g) Using the information and knowledge gathered within the context of the United Nations/OECD seminar in follow-up to the 2020 Beirut port explosion — see para. 36 — on existing instruments, lessons learned and good practices in addressing the risks of the handling, storage and transport of ammonium nitrate to address the risks of hazardous substances more broadly, including through the development of awareness-raising and training materials and events to exchange knowledge and develop recommendations that address these topics;

(h) Maintaining or establishing partnerships with international organizations, research institutes, non-governmental organizations (NGOs) and/or other key partners on tailings safety and governance, the storage, handling and transport of hazardous substances, land-use planning and siting and other industrial safety-related aspects amid the energy transition.

2. Developing new or reactivating existing but inactive areas of work

41. The importance of the subject for national policies and the broader decarbonization agenda for the foreseeable future may warrant further work with an impact on several levels, including:

(a) The Convention and related knowledge generation and dissemination. Indicative topics could include:

(i) Conducting a comprehensive analysis of the emerging environmental and industrial risks linked to decarbonization and the energy transition, their prevalence and how national Governments seek to address them with legal, policy and technical tools and governance, including through a survey and desk review and in cooperation with partner organizations, national Governments and experts, as a basis for raising awareness, building knowledge and preparing recommendations to address regulatory and technical weaknesses at the international and national levels, as envisaged in the draft workplan for 2025-2026 (ECE/CP.TEIA/2024/8);

(ii) Detailed study of known industrial accidents or near-misses related to existing mining, processing and recycling activities and facilities;

(b) Developing new legal instruments to address gaps in existing regulatory frameworks, for example a protocol to supplement the Convention by more comprehensively covering the specific hazards and risks of TMFs and related pollution and to establish a corresponding intergovernmental forum;

(c) Institutional/intergovernmental support: a standard ECE practice in keeping pace with emerging challenges and issues of sufficient gravity is to use existing or create either standing or ad-hoc intergovernmental structures that would convene regularly and enable member States, with the support of the secretariat and the involvement of multiple stakeholders — e.g., private sector, academia, associations — , if desired, to monitor developments, regularly exchange information and address issues of a technical, policy, regulatory and/or harmonizing nature, systematically and in-depth through well-established procedures;

(d) Expanding targeted capacity and technical support, if/as warranted;

[10] United Nations publication, ECE/CP.TEIA/35. Available at https://unece.org/guidance-land-use-planning.

[11] See https://unece.org/environment/press/eib-and-unece-establish-information-repository-good-practices-and-lessons-learned.

(e) Facilitating the exchange of information and technologies, supporting innovation and actively promoting scientific and technological cooperation, including research into less hazardous processes aimed at limiting accident hazards and preventing and limiting the consequences of industrial accidents (in line with arts. 14-16 of the Convention and its annex XI). This may also include opportunities through digitalization — e.g., satellite-based monitoring — or related threats (cybersecurity) and waste prevention or reduction — e.g., using ore sand or reprocessing tailings — ;

(f) Organizing high-level and technical conferences to raise awareness of risks, agree on and promote concrete actions to address risks and facilitate an exchange of knowledge and good practices from national Governments, experts and civil society, including to ensure a coherent approach across public sectors, national Governments and experts and to capture perspectives from diverse stakeholders;

(g) Promoting the ratification and entry into force of the Protocol on Civil Liability and Compensation for Damage Caused by the Transboundary Effects of Industrial Accidents on Transboundary Waters, making operators liable for accidents at industrial installations, including tailing dams and during transport via pipelines;

(h) Developing new sector-specific policy and technical guidelines, principles, standards, methodologies, checklists or other tools at the demand of Parties to strengthen industrial safety and address risks of the new and expanded uses of hazardous substances — e.g., hydrogen, ammonia, critical minerals — and facilities affiliated with the energy transition — e.g., tailings management facilities, large-scale energy storage systems — , such as on current issues regarding land-use planning, siting and safety distancing for the prevention of industrial accidents and control and mitigation of environmental pollution should they occur and to promote coordinated approaches across relevant public sectors involved, expert communities and the public, as envisaged to begin in the draft workplan 2025-2026.

V. Conclusions and recommendations on next steps

42. A key aim of the energy transition is environmental sustainability, with safety as an integral part. Industrial safety is a critical element for the success of the complex and highly prioritized transition. In this regard, the Convention is a key means to successfully manage this transition. The role of the Convention has already been recognized in global intergovernmental forums and by partner organizations — e.g., see para. 39 regarding relevant UNEP process and publication —.

43. The Convention plays a role in increasing safety and environmental standards. As this paper has argued, several key areas in the lifecycle — even “cradle-to-cradle” — of critical minerals and hazardous substances and facilities linked with the decarbonization agenda are already addressed, to some degree, within the existing workstreams of the Convention and the secretariat. However, the sheer scale and speed of the aspired transformations outlined in the paper mean that several aspects and risks for industrial safety are not fully covered under existing workstreams – see also “Member States consultations and Industrial Safety of the Energy Transition (ISET) Survey results” (ECE/CP.TEIA/2024/INF.2). Thus, in building on previous work done on mine tailings safety, land-use planning and siting and the safe and secure management of hazardous substances, the Convention can play a more active role in the energy transition, particularly by bringing national Governments and other stakeholders together to exchange experiences, lessons learned and good practices and develop related policy and technical products for enhancing industrial safety.

44. The Conference of the Parties is invited to take this information into account in its deliberations on future work under the Convention on industrial safety-related aspects of the energy transition, in follow-up to the seminar on the global energy transition: Strengthening industrial safety to address emerging risks (see seminar concept note, ECE/CP.TEIA/2024/INF.1), as proposed in line with the draft decision on the work on the industrial safety of the energy transition under the Convention (ECE/CP.TEIA/2024/3).

45. Lastly, Parties and other member States may wish to consider extending financial or in-kind (expert) support to enable the secretariat to better develop the above-mentioned substantive areas of work in the biennium 2025-2026 and beyond.

Annex

List of 34 critical metals and minerals included in the Critical Raw Materials Act[1]

1	Aluminum/bauxite	18	Light rare earth elements
2	Antimony	19	Magnesium
3	Arsenic	20	Manganese
4	Baryte	21	Natural graphite
5	Beryllium	22	Niobium
6	Bismuth	23	Platinum group metals
7	Boron/borate	24	Phosphate rock
8	Cobalt	25	Phosphorus
9	Coking coal	26	Scandium
10	Feldspar	27	Silicon metal
11	Fluorspar	28	Strontium
12	Gallium	29	Tantalum
13	Germanium	30	Titanium metal
14	Hafnium	31	Tungsten
15	Helium	32	Vanadium
16	Heavy rare earth elements	33	Copper
17	Lithium	34	Nickel

[1] The assessment screened 70 candidate raw materials, comprising 67 individual materials and 3 materials groups: 10 heavy and 5 light rare earth elements and 5 platinum group metals. In all, 4 new materials were assessed: neon, krypton, xenon and roundwood. Titanium metal was assessed, in addition to titanium. Aluminum and bauxite were merged for reasons of consistency. Copper and nickel do not meet the critical raw materials thresholds but are included on the critical raw materials list as strategic raw materials, in line with the Critical Raw Materials Act.