Global energy transition: Strengthening industrial safety to address emerging risks

A seminar in the framework of the **Thirteenth meeting of the Conference of the Parties** to the **Convention on the Transboundary Effects of Industrial Accidents**

Geneva, 27 November 2024, 10:20 a.m.–1:00 p.m.
with interpretation in English, French and Russian

UNECE

– Concept note –

1. Background

1.1 Industrial safety considerations in the energy transition

Decarbonization has become a high priority for many governments worldwide and for regional and international organizations. The United Nations 2030 Agenda for Sustainable Development, among other frameworks, comprises Sustainable Development Goal 7 "to ensure access to affordable, reliable, sustainable and modern energy for all." Meeting the objectives of the Paris Agreement requires rapid decarbonization to mitigate climate change and prevent temperatures from rising to more dangerous levels. Governments, cities as well as companies in the ECE region and beyond have set targets for climate neutrality, short-term goals targeting 2030 and long-term goals for 2040, 2050 or 2060. The European Union's (EU's) long-term strategy, for example, aims for the EU to be carbon neutral by 2050. In working towards such goals, many national governments, albeit with different priorities and trajectories, are rapidly transitioning from fossil fuels to low and zero-carbon energy sources across different sectors and, accordingly, developing policies, processes and technologies to produce, transport, store and distribute energy.

Some of the main energy sources and technologies being pursued in the energy transition include renewables (e.g. solar and wind), the use of ammonia, hydrogen and other hazardous substances and battery energy storage systems. While the hazards and risks are well-known and managed for some technologies (e.g. those using hydrogen), their large-scale production, storage, use and distribution is expected to create additional risks and require further control measures and more awareness for policymakers, operators and the public. At the same time, research and innovation are bringing new technologies with unknown hazards and risks that need to be considered in process safety. Furthermore, to produce renewable and battery technology, critical minerals (e.g. bauxite, cobalt, lithium and nickel) are required; estimates show the demands for these will significantly rise in the coming decades, resulting in more risks to manage throughout their lifecycles, including for mining, processing, refining and in technology production facilities and tailings facilities (ECE/CP.TEIA/2024/2). Moreover, some countries are using additional processes to curb emissions in the environment, such as carbon capture and storage, and decarbonizing and electrifying energy-intensive industrial facilities. These hazardous substances, technologies and processes can pose significant risks to people and the environment if not safely managed by regulators and operators.

As countries must urgently take action to decarbonize and mitigate climate change, it's crucial to ensure industrial safety measures are in place to protect people and the environment from any risks encountered regarding the energy transition.

1.2 Industrial accidents and risks

In countries worldwide, industrial accidents have occurred at: sites for the mining and processing of critical minerals needed for producing renewable energy and battery technology; related tailings management facilities; facilities containing critical minerals to produce renewable energy and battery technology (e.g. lithium and nickel); facilities containing hazardous substances used for energy production, storage, transport and distribution (e.g. ammonia and hydrogen); and large-scale battery energy storage systems (BESS). Many such accidents have had devastating impacts on people and the environment, including deaths, illnesses, biodiversity loss, harm to ecosystems and natural resources in addition to economic and socio-economic impacts. Below are a few such incidents listed:

- In 2024, explosions and a fire at a lithium battery factory in Hwaseong, Republic of Korea resulted in the deaths of over 20 workers, many injuries and concerns of the surrounding area being contaminated by hazardous chemicals.
- In 2023, an explosion of oxygen tanks and a fire at a nickel plant in South Sulawesi, Indonesia killed 18 and injured over 40 workers.
- In 2023, fires broke out at new lithium-ion battery energy storage facilities in Saucats (Gironde), France, causing fumes to be seen several hundred meters away, and in Gothenburg, Sweden, exposing workers to dangerous fumes and damaging the facility.
- In 2023, a hydrogen tank exploded in Lebring Styria, Austria, injuring a worker and causing massive damage.
- In 2019, thermal runaway of a lithium-ion battery energy storage system in Surprise, Arizona, United States led to dangerous air pollution, workers and firefighters injured and an explosion.
- Since 2015, 14 of the 39 major tailings dam failures worldwide have spawned from facilities extracting or processing critical minerals (e.g. Ujina copper-molybdenum in Chile, Cobriza copper mine Peru, Tedikardes zinc-copper mine in Türkiye, San Jose de Los Manzanos zinc mine in Mexico and Tieli molybdenum mine in China, among others), with many resulting in widespread water pollution and biodiversity loss.
- In 2014, a tailings pond breach in Mount Polley, Canada led to millions of cubic metres of water and tailings sludge leaking into Polley and Quesnel Lakes and Hazeltine Creek, inclusive of arsenic, lead and heavy metals (e.g. copper and nickel), affecting water quality, food, fish habitats and the health and traditional practices of Indigenous Peoples.
- In 2012, a dam leak at one of the largest nickel mines in Finland resulted in hazardous chemicals entering surrounding rivers and lakes, with high levels of hazardous chemicals contaminating the affected areas.
- In 2007, a massive hydrogen tank exploded at a power plant in Muskingum, Ohio, United States and resulted in one death and several injured personnel.
- In 1992, the worst ammonia release in history occurred at a peanut oil processing mill in Dakar, Senegal, killing 29 people and injuring 1,150.

With ambitious commitments in place to decarbonize in countries worldwide and actions underway to transition energy sources, these and other related industrial accidents show that environmental, health-related and industrial risks cannot be side-lined – they must be urgently addressed to prevent and mitigate harm and pollution during this pivotal time period.

1.3 Challenges and needs

Key challenges in addressing the emerging risks associated with the energy transition have been identified through intergovernmental and expert discussions under the UNECE Industrial Accidents Convention and in other fora. Most recently, several Parties to the Convention convened the Small Group on the Industrial Safety of the Energy Transition (ISET-SG) under the Bureau to begin discussing challenges and needs in the prevention of, preparedness for and response to industrial accidents involving the above-mentioned hazardous substances, technologies and processes. They conducted a survey across the UNECE region, covering among others, questions on the energy sources countries are prioritizing, the extent to which their laws and policies cover the related hazards and risks, technical and policy gaps and the role of the Industrial Accidents Convention moving forward (ECE/CP.TEIA/2024/INF.2).

The ISET-SG acknowledged that work under the Industrial Accidents Convention, since its inception, has followed a 360-degree approach to industrial safety and the protection of the environment and human health, by addressing country needs through 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, industrial safety tools and guidelines and has driven industrial safety governance and inspired the development of mechanisms for coordination among public authorities within and across national borders. As such, ISET-SG concluded that past work under the Convention provides a solid basis to build on to support countries in enhancing, among other areas, risk assessment, land-use planning, decision-making on siting, public information and participation and safety standards specifically for the new and expanded uses and the new users of the hazardous substances, technologies and processes affiliated with the energy transition. Furthermore, the survey showed that governments will benefit from generating new and taking stock of existing information and knowledge on these topics at the technical and policy levels, inclusive of the various public sectors and levels of governance of concern, and by sharing related good practices. Addressing the emerging risks at the international level is key to ensuring that decarbonization efforts, which are essential for mitigating climate change, do not lead to more technological disasters, related human health impacts and environmental pollution.

2. Seminar overview

2.1 Scope of the seminar

The seminar, organized within the framework of the thirteenth meeting of the Conference of the Parties to the UNECE Industrial Accidents Convention (CoP-13), will introduce the audience to the rapidly changing global economic and environmental conditions related to decarbonization, focusing on the importance, goals and challenges of industrial safety of the energy transition. As countries move away from fossil fuels, presentations will provide technical expertise and safety considerations regarding the hazards and risks associated with new and increased uses of hazardous substances and technologies being used to produce, transport, store and distribute energy.

The seminar will first review interlinkages between industrial safety and the energy transition. A series of presentations will then cover emerging industrial safety hazards and risks in the energy transition, including with information on recent legal and policy developments, technologies available and/or good practices to address those hazards and risks. The presentations will be structured under five areas: (A) Lifecycle of critical minerals needed for renewable energy and battery technology (i.e. mining, processing, technology production facilities and related tailings management facilities); (B) Large-scale battery energy storage systems (BESS); (C) Carbon capture and storage technology; (D) Hydrogen and ammonia; and (E) Electrification and decarbonization of energy-intensive industrial facilities/processes. The SG-ISET decided the seminar should not be limited to hazardous substances and mixtures listed in Annex I of the Convention due to the need for a broad overview of industrial safety for other areas and processes.

The conclusions and recommendations of the seminar will equip the audience with knowledge of the hazards and risks and a basis for deciding on concrete actions to address them moving forward. It will provide a better understanding of how the Convention can further support policy development and knowledge generation to strengthen industrial safety and environmental and health protection in the context of sustainable development during the energy transition. Following the seminar, the CoP will be invited to consider the draft decision on the work on the Industrial Safety of the Energy Transition under the Convention (ECE/CP.TEIA/2024/3).

2.2 Objective

The main objective of the seminar is to enhance governments' understandings of the industrial and environmental risks linked to decarbonization and the energy transition. The speakers will identify key

risks of the predominant hazardous substances and industrial facilities being used for the energy transition, share information on national laws and policies in place to address those risks, outline the gaps that remain and define the UNECE Industrial Accidents Convention's role to support countries in the UNECE region and beyond moving forward. As a strategic event organized within the framework of CoP-13, the seminar aims to contribute the Convention's unique assets and knowledge in setting the global agenda for international cooperation, including through the development of standards and approaches under the Convention in the years to come.

2.3 Target audience and format of the seminar

The target audience of the seminar is public authorities and agencies that oversee aspects of the energy transition and related environmental protection, including policy and technical experts, and industry representatives, civil society organizations and academia. Given the cross-sectoral nature of the energy transition, this could entail a range of communities, including *inter alia*: chemicals, climate change, disaster risk reduction, emergency services, energy, environment, health, industrial safety, international affairs, labour, transport and water.

The seminar will be held at Palais des Nations in Geneva, Switzerland on 27 November 2024, 10:20 a.m.–1:00 p.m. with interpretation in English, French and Russian. The participants of the COP-13 will be invited to participate in person, and the public will be invited to follow the seminar on UN Web TV.

– Programme –

Session 1 – Setting the stage — *10:20–10:35am*

> Welcoming by the moderator	***Torill Tandberg**, Specialist Director, International Relations, Directorate for Civil Protection, Norway; outgoing Chair of the Conference of the Parties and the Bureau's Small Group on Industrial Safety of the Energy Transition (ISET-SG)*
> Keynote: Decarbonization and the energy transition in a fast-changing world economy and industrial safety aspects	***Luisa Samarelli**, Deputy Head of Unit, Industrial Emissions and Safety, Directorate-General for the Environment, European Commission*

Session 2 – Interlinkages between industrial safety & the energy transition — *10:35–11:10am*

> Emerging challenges and trends for industrial safety in decarbonization agendas and UNECE ISET-SG survey results	***Joseph Orangias**, Environmental Affairs Officer, Secretariat of the Industrial Accidents Convention, United Nations Economic Commission for Europe (UNECE) and* ***George Georgiadis**, former Secretary of the Industrial Accidents Convention, UNECE*
> Understanding hydrogen fuel risks: Joint work by the Organisation for Economic Co-operation and Development (OECD) and European Commission Joint Research Centre	***Eeva Leinala**, Head of Chemical Accidents Programme, Environment Directorate, Organisation for Economic Co-operation and Development (OECD)*
> Overview of emerging risks and risk governance of energy technologies at industrial facilities	***Valerio Cozzani**, Department Head of Civil, Chemical, Environmental and Materials Engineering, Professor of Chemical Engineering, University of Bologna*

Questions & discussion

Session 3 – Emerging industrial safety hazards & risks in the energy transition — *11:10am–12:50pm*

A. Lifecycle of critical minerals for energy and battery technology

> Decision-making on permits for dangerous chemical facilities: The case of nickel production plants	***Anna Pääkkönen**, Senior Officer, Industrial Processes, Safety and Chemicals Agency (Tukes), Finland*
> Environmental safety and mining in the context of decarbonization	***Aidar Abdualiyev**, Deputy Chair, Committee on Environmental Regulation and Control, Ministry of Ecology and Natural Resources, Kazakhstan*

B. Large-scale battery energy storage systems (BESS)

> Risks of BESS and the development of a regulatory framework to prevent accidents	***Thibaut Marty**, Policy Officer, Industrial Risks and Pollution, Ministry of Ecological Transition and Territorial Cohesion, France*

Questions & discussion

C. Carbon capture and storage technology

> Major accident scenarios and hazard zones for the storage of carbon dioxide and its transport in pipelines	***Raphaël Gonzalez**, Prevention of Major Accidents and Earthquake Mitigation, Federal Office for the Environment (FOEN), Switzerland*

D. Hydrogen

> Regulations, codes and standards for enabling the safe deployment of hydrogen technologies	***Gill Smart**, Team Lead of Chemicals & Land Use Planning, Health and Safety Executive (HSE), United Kingdom of Great Britain and Northern Ireland*

E. Decarbonization of energy-intensive industrial facilities/processes

> Using hydrogen in high-polluting industrial sectors and abandoning non-renewable resources	***Romualdo Marrazzo**, Service for Risks and Environmental Sustainability of Technologies, Chemical Substances, Production Processes and Water Services and for Inspections, National Institute for Environmental Protection and Research (ISPRA), Italy*

Questions and discussion

Session 4 – The way forward for ISET — *12:50–1:00pm*

> The way forward and final remarks	***Torill Tandberg**, Specialist Director, International Relations, Directorate for Civil Protection, Norway*