

Comments on the Draft UNFC Supplemental Specifications for Minerals Projects

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Introduction

A changing world in need of a new economic paradigm

Humans are the key; to survive we need water, air, food, energy and shelter, other humans and a sense for life. We originated and currently live in a planet where, being adaptable and lucky, we are able to fulfil our material, gregarious, spiritual and cultural needs.

Living as hunters and gatherers is risky and involves strenuous work; doing it without tools, even if just stones and sticks, is close to impossible. In the best scenario, only a few are able to survive from the wild land; that's how we started.

In time, we developed more technologies, more diverse and specialized tools and new ways of life - herding and farming, allowing us to further adapt to the environment and, gradually, gaining a higher degree of control in our lives.

Our numbers grew, as the yield of the tools and technologies we developed.

Two centuries ago, we started the Industrial Revolution; our lifestyles change dramatically, the human impact on the planet starts to become visible. One Information Revolution later (in the XX century), our growing numbers and longer lives, powerful technologies, increasing production, consumption and wealth risk destroying Earth and us.

We now face a dilemma; either we change our ways of life – which is complex and not immediate, or our planet and our civilizations will collapse. Either way, we need minerals and a mining industry to develop a sustainable way of life for us and for future generations.

The future mining industry will be shaped by the interaction of two complex systems: Earth (and its geological, geographical, biological and climatic systems) and the Humans (and their social, economic, political, technological, cultural and spiritual systems).

A new mineral industry

Mineral resources are essential to human life. The human population growth (now 7.000 million and expected to reach 11.000 million by the end of this century), its increasing global spending power and the technological evolution demand ever increasing volumes and diversity of raw materials.

Mineral and non-renewable energy deposits are increasingly difficult to mine (with lower grades, complex mineral compositions and harder to find and access - deeper in the crust, on the deep seabed or in space). The growing need for minerals generates disproportionately higher impacts (with the increasing generation of residues, sub and by-products and use of increasing volumes of water and land); at the same time, society, especially in Europe, seems averse to new mineral projects.

We live in a time when ghosts from the past – the environmental, social and human impacts of greedy or just incompetent mining companies – haunt us in the form of collapsing tailings dams, contaminated soils and water streams (and their costs in terms of human health and safety). The social impact of these disasters (mostly originated in past activity) is amplified in the present by social media in a society that believes complex challenges have simple and cheap solutions.

The exploration and mineral and energy industries – or at the least their most successful companies - invested heavily in new technologies and a drastically changed behaviour. As a result of its effort, the industry evolved dramatically in the last generation; yet it's disruptive technologies and forces external to the industry that most decide its future – including digital technology and economy, data science, political risk, market volatility, climate

change, trade wars, circular economy, social license to operate, the world's population demographics and available income growth.

As result, the mineral and energy industries face a situation where they simultaneously have to address different challenges:

- Clean the mistakes and eradicate the bad practices of the past.
- Struggle to change public perception of the mining industry, facing ever more radical anti-everything activist groups (both with local and global reach).
- Embrace a new economic development paradigm, where sustainability is the key concept: leave it better than you found it.
- Obtain the funding needed to the capital-intensive exploration and mining projects.
- Satisfy the ever-increasing regulation issued by market regulators, national and international agencies and Governments.
- Supply the modern society with the raw materials it dearly needs.

We need a revolution in the mineral industry.

UNFC

The United Nations Framework Classification for Fossil Energy and Mineral Reserves and Resources 2009 (UNFC-2009) is a universally applicable scheme for classifying/evaluating energy and mineral reserves and resources - it is the successor to UNFC-2004. Designed as an all-encompassing framework, it enables the incorporation and unification of existing national systems, while allowing their classification units and glossary to be retained. The principal objective of UNFC-2009 is to enhance international communication by providing a simple, user-friendly and uniform format for the reporting of energy reserves and resources, using market-based economic criteria. It has been developed to meet, to the extent possible, the needs of applications pertaining to international energy and mineral studies, government resource management functions, corporate business processes and financial reporting standards. (UNECE, 2010)

Overall comments

The document is written in the line of previous documents, complementing the 2019 update of the UNFC. It is clear and useful. This said,

1. Still adopts a linear model in the exploration, mining and processing of mineral resources. Rather than a simple reporting framework, UNFC aims (and has the potential) to be a modern Resource Management System. I believe this document could have gone further, realizing the implicit ambition of UNFC, adopting circular economy paradigm.
2. In the same line, the document (and the set of UNFC documents) should specifically integrate UN's SDG 2030, at least when evaluating the social, economic and environmental feasibility axis. Mineral projects reports based on UNFC should specifically comment on how they contribute (or harm) the UN's SDG 2030 objectives.
3. Albeit part of the sustainability axis (comment above) social license to operate is currently a key issue (and will remain so in the foreseeable future) and should thus be specifically considered in the UNFC set of documents. The same should be said about legal feasibility of projects.
4. The inclusion of the circular paradigm in the document would stress the importance of a zero-residue objective and the full use (and re-use) of tailings,
5. Water use in mineral production is growing (in absolute and unit – per ton – values) at a point in time where water is increasingly scarcer. This should also be specifically considered in the UNFC set of documents.
6. At certain points - 6. Mining methods, the document is incomplete, dubious or too detailed:
 - a. Some examples are mentioned of conventional mining, but not of what are considered unconventional mining.
 - b. Is seafloor mining a conventional mining method?
 - c. The document mentions alluvial mining, specifying trenching. Alluvial mining methods are much more diverse than (what I guess you mean by) trenching. Dredging is an alluvial mining method and is not referred.
 - d. The document comments details recommendations on (estimates and parameters) of some specific mining methods. Comments should be on all mining methods (which, I agree, would be a daunting task) or be general to all.

Comments on Competent/Qualified Person

Reporting on mineral projects requires competence in a wide range of scientific and technical subjects. Even if only considering the strict classical technical reports (on exploration results, resources and reserves), reporting requires skills and experience in exploration, mining, metallurgy, economy and finance. Reporting was directed to (and their standards, templates guidelines and best practices designed thinking of) the average investor or market operator. Even in this narrow(er) definition the scope of skills is very wide, very difficult to find in a single person (competence and qualification being mostly based on experience in a specific deposit type).

The misalignment between the effectively necessary skills and the required expertise and experience can only result in subpar reporting. This gap widens considerably if you consider modern reporting trends with wider scope and increased complexity – directed into the much more diverse crowd of stakeholders (demanding additional knowledge in legal, social and environmental sciences), becoming impossible to bridge by single individuals.

Reports are now directed to stakeholders, rather than only stockholders and investors, facing and increased number of challenges. One CP/QP was not enough in the past, much less now and in the future. Rather than trusting in competent/qualified **persons**, standards should evolve into requiring multidisciplinary **teams**.

In a related issue, public reports are seldom verified, as stock market controlling boards consider it a task outside of their mission or are understaffed to even consider the possibility of a, even if random, thorough verification of the great number of issued reports. Standard designers (at CRIRSCO and UNFC and the national institutions adapting and issuing local regulations) should consider the possibility of introducing the need for report reviewers (in a role similar to journal paper reviewers).

We have to create the means to review reports or pay the price of unchecked reports written and published by less-than-fully-competent persons.

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