AGEMERA – University Courses: UNFC as Reporting Standard in Raw Material Sector

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AGEMERA - Agile Exploration and Geo-modelling for European Critical Raw materials

- HORIZON-CL4-2021-RESILIENCE-01-06 - Innovation for responsible EU sourcing of primary raw materials, the foundation of the Green Deal (RIA)
- Project number / Grant agreement number: 101058178
- 36 months, started in August - 2022, Ending July – 2025
- 20 Partners from 11 Countries
  - 7 Universities, 2 Research Institutions, 5 SMEs, 6 Industry
- Coordinator - University of Oulu, Kerttu Saalasti Institute
- Budget – 7.5 M€
AGEMERA

Geological CRM Potential Database in EDGI Compatible GIS Format

Novel, Non-invasive Mineral Exploration Methods

CRM Educational Material for Student and General Public

UNFC and UNRMS as Evaluation Tools for Future Experts

Improving Knowledge based on CRMs

Accelerate Development of RM Exploration Projects

Increase the Awareness of the Importance of CRMs

Promoting the Utilization of UNFC and UNRMS
University Courses

ECRMs - European Critical Raw Materials for the Green and Digital Transition

Future scientists and engineers: wide spectrum of the CRMs’ value chain

United Nations Framework Classification for Resources (UNFC)

Rare earth elements (REEs) and battery raw materials

United Nations Resource Management System (UNRMS)

Geology, engineering, geopolitics, mineral economics, social and environmental considerations

Sustainable and socially acceptable: application of innovative technologies
University Courses

1. Geology & Exploration of CRMs
2. Geo-Politics & Challenges
3. Extraction of CRMs in a Global Environment
4. Social Assessment
5. Environmental Assessment
6. Mineral Economics
7. International Frameworks
8. Bonus Content
University Courses

United Nations Framework Classification for Resources (UNFC)

Reporting Standard
E Axis – Environmental-Socio-Economic Viability

E - axis

- Confirmed the viability
  - E1

- Expected to be viable in near future
  - E2

- Not viable or too early to calculate
  - E3
F Axis – Technical Feasibility and Maturity

- Confirmed the feasibility (F1)
- Require further evaluation (F2)
- Limited data available (F3)
- No development identified (F4)
G Axis – Degree of Confidence

G - axis

- High level of confidence
  - G1
- Moderate level of confidence
  - G2
- Low level of confidence
  - G3
- Primarily on indirect evidence
  - G4
University Courses

UNFC Classes, Sub-Classes, Categories and Sub-Categories (from UNECE, 2021)

<table>
<thead>
<tr>
<th>UNFC Classes Defined by Categories and Sub-classes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Produced</td>
</tr>
<tr>
<td>Sold or used production</td>
</tr>
<tr>
<td>Production which is unused or consumed in operations</td>
</tr>
<tr>
<td>Class</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Viable Projects</td>
</tr>
<tr>
<td>Approved for Development</td>
</tr>
<tr>
<td>Justified for Development</td>
</tr>
<tr>
<td>Potentially Viable Projects</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Non-Viable Projects</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Remaining products not developed from identified projects</td>
</tr>
<tr>
<td>Potential Sources</td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>

(Source: [2])
## CRIRSCO Template and UNFC Categories

<table>
<thead>
<tr>
<th>CRIRSCO Template</th>
<th>Corresponding UNFC Category</th>
<th>UNFC Class</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Feasibility Study or Life of Mine Plan</strong> (for an operating mine)</td>
<td>Proved</td>
<td>E1</td>
</tr>
<tr>
<td>Mineral Reserves</td>
<td>Probable</td>
<td></td>
</tr>
<tr>
<td><strong>Pre-feasibility Study</strong></td>
<td>Mineral Reserves</td>
<td>Proved</td>
</tr>
<tr>
<td>Probable</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Feasibility Study, Life of Mine Plan</strong> (for an operating mine) or Pre-feasibility Study</td>
<td>Mineral Resources (exclusive of Mineral Reserves)</td>
<td>Measured</td>
</tr>
<tr>
<td></td>
<td>Indicated</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Inferred</td>
<td></td>
</tr>
<tr>
<td><strong>Scoping Study report or other Public Report on a Mineral Resource estimate</strong></td>
<td>Mineral Resources</td>
<td>Measured</td>
</tr>
<tr>
<td></td>
<td>Indicated</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Inferred</td>
<td></td>
</tr>
<tr>
<td><strong>Public Report on exploration stage projects</strong></td>
<td>Exploration Target</td>
<td>E3</td>
</tr>
<tr>
<td>Exploration Results</td>
<td>Estimates not published</td>
<td></td>
</tr>
<tr>
<td><strong>Not applicable</strong></td>
<td>Estimates obtained from historical reports</td>
<td></td>
</tr>
</tbody>
</table>

(Source: [2])
UNFC - Case Studies

- Mineral Intelligence for Europe (Mintell4EU)
  - UNFC application to sand and gravel resources in an Austrian pilot area
  - UNFC Case study – phosphates, Belgium
  - UNFC application to aggregates (limestone; gravel and sand) resources in the Croatia, Koprivnica - Križevci County case study
  - UNFC Case study – Marine aggregates, Denmark

UNFC application to sand and gravel resources in an Austrian pilot area
Assignment/Feedback from Students

- What is your opinion about the application of CRIRSCO and UNFC in achieving sustainability standards in the raw materials sector?

- Advantages and limitations of UNFC principles during classification of raw materials

31 students – handed in
Feedback of Students

Pros Parameters

- clear sources
- ensuring coal
- basing
- different approach
- makes
- raw reporting materials
- widely applicable
- ability to cover viability
- various
types
- provides economic sustainability
- allows aids
- across environmental projects
- holistic non-etc
- energy mineral
global
- stakeholders
- aspects
- comprehensive
- cooperation investment
- transparency
- responsible
- promoting
- recognised
- communities
- increased
- governance practices
- standardisation
- standards
Feedback of Students

Cons Parameters
First launch of the university courses – March 2024

Lectures – recorded and available

Relaunch – potentially in March 2025

Scope of development – UNFC & UNRMS

Follow the Lectures or Enrolment


Thank you!

UNECE

Date 22 I 04 I 2024, Geneva