

Commission

NAALAKKERSUISUT

GOVERNMENT OF GREENLAND



EU-Greenland Workshop on Raw Materials

Hotel Bloom Rue Royale 250, 1210 Brussels, Belgium June 19, 2015

Agenda (Hilton and Moussaid)

- Background
- Fundamentals
- NORM industries
- NORM ores, residues and wastes = life-cycle management
- Stakeholders and capacity building model and lessons learned
- New point of equilibrium win/win outcomes from Comprehensive Extraction and the Social Licence to Operate = safety, sustainability, social and economic resilience
- Lessons learned: new project UR Tanzania; End of Life project (EoL), Portugal



(2) Maximising the benefits, and minimising the negative impacts, of mining projects for society Dr. Malika Moussaid. CEO, Aleff Group, UK mmoussaid@aleffgroup.com

Objectives for EU-Greenland Collaboration

"Greenland and that the new EEAS, as well as the Commission, explore how the "EU and EUbased actors from science, technology and business can contribute to and assist in the sustainable development of Greenland so that both environmental concerns and the need for economic development are taken into account. European Parliament, European Parliament resolution on the EU strategy for the Arctic, March 2014." (Final Report p. 29).

NORM Residues – Concerned sectors

- 1. Uranium mining and processing
- 2. Rare earths extraction
- 3. Thorium extraction & use
- 4. Niobium extraction
- 5. Non-U mining incl. radon
- 6. Oil and gas
- **7**. TiO₂
- 8. Phosphates
- 9. Zircon & zirconia
- 10. Metals production (Sn, Cu, Al, Fe, Zn, Pb)
- 11. Burning of coal etc.
- 12. Water treatment incl. radon



Assessing the Need for Radiation Protection Measures in Work Involving Minerals and Raw Materials



"Smart" Mining = Social, Economic and Environmental Returns across the Whole Life Cycle

EU Report - Maximising benefits =

"As part of the mining licence application, the exploration company, has to make extensive social and environmental impact assessments – partly as the interaction between the mine and the local community is essential in order to increase the positive effects and reduce the negative effects of mining activities and partly to document and mitigate possible environmental issues connected to the mining operation and a local onsite processing plant". (Final Report, p.24)

- See also Annex Minutes of the meeting with Greenland's regulators
- Extensive guidelines for preparing EIAs and SIAs are available on the Greenland Government website: <u>http://govmin.gl/index.php/minerals/terms-rules-laws-guidelines</u>

The Triple Bottom Line (TBL)

- Introduced by John Elkington, 1994 in California Business Review¹
 - Businesses must measure performance and returns by 3 equally weighted indicators:
 - Economic
 - Social
 - Environmental.
- These are called the Triple Bottom Line
- Response to:
 - Direct response to the Brundtland/ Sustainability agenda (Our Common Future, 1987) – (sustainable development becomes an enterprise obligation)
 - Derived from John Nash's Nobel prize-winning cooperative game theory the "win/win"² equilibrium
 - Nash equilibrium theory (1950s) (cooperative/non-cooperative game theory applied to economics – Nobel Prize 1996)

1: ELKINGTON, J., "Towards the sustainable corporation: Win-win-win business strategies for sustainable development", California Management Review 36, **2**, 90-100, (1994).

2. NASH, J., Non-cooperative Games, Annals of Mathematics, 54, 286-295, (1950).

Triple Bottom Line

- Three variables must all apply to enterprise or organisational performance: –Economic/ financial
 - -Social
 - -Environmental
- Goes well beyond Corporate Social Responsibility

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Safety and Sustainability

- A strong mutual dependency has been identified between the objectives of HSE and sustainable development goals, such as the sustainable management and use of critical mineral resources.
- A practice cannot be described as sustainable that is not also safe.

SOCIAL LICENCE TO OPERATE - Example: Mining and Minerals (2002-13)

BREAKING NEW GROUND

Mining, Minerals, and Sustainable Development

The Report of the MMSD Project



2002



Earthscan Publications Ltd, London and Sterling, VA

http://62.50.73.67/DocRoot/ev8jEJvTiMYd4mJhGGHQ/fina



Shared Value: Oil and Gas + Minerals – Harvard Business School 2014





Extracting with Purpose

Treating Shared Value in the Oil and Gas and Mining Sectors' Companies and Communities

OREWORD BY MICHAEL E. PORTER



Extracting with Purpose

Creating Shared Value in the Oil and Gas and Mining Sectors' Companies and Communities

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The Waste Hierarchy

The EU Model Waste Hierarchy ("Zero" Waste objective)



Comprehensive Extraction

Comprehensive Extraction

CX is an integrated, technology-independent, continuously evolving procedure for optimising the recovery and use of single or multiple resources from a given basin, deposit or field and for their efficient and equitable management across the entire product life-cycle, including cyclical and end of life outcomes, in compliance with the objectives of the waste hierarchy.

Comprehensive extraction: Guide Principles (1)

- Is a new business paradigm based on an equitable distribution of benefits.
- Reinforced by an appropriate policy and regulatory framework, eg in line with new trends in NORM industry management strategies and "constructive regulation".
- It achieves this by focusing on continuous, beneficial, social, economic and environmental outcomes not one-off processes or particular technologies.
- The initial premise is that if you propose to mine at all, it is better when you do so to disturb the ground only once and leave no legacy waste.
- Then comprehensive extraction achieves equilibrium by optimising the returns and dividends from mining by a strategic, long-term approach to resource extraction, processing and conservation rather than focusing on a single target material.

Comprehensive Extraction: Guide Principles (2)

- This has profound implications for the way resources are assessed, classified and reported, for the sequence in which they are mined and the methods by which they are extracted.
- It delivers value-add across the entire resource life-cycle, which is in part cyclical, not just one-off generation of primary resources and products.
- As social and economic needs change, so comprehensive extraction adapts and responds to those needs.
- This approach is the more sustainable given the increasing difficulty all mining projects have in winning, and keeping, a social licence to operate

Social Licence to Operate

Core values

- Trust and credibility
- Transparency
- Good governance
- Accountability
- Empowerment

The Triple Bottom Line in Mining and Extraction

- TBL 1 Social licence to operate (SLO) (social)
- TBL 2 Comprehensive extraction (CX) (technoeconomic)
- TBL 3 Zero waste (OW) (environmental)

Scope: TBL/ the new equilibrium "Smart" Mining to Maximise (Optimise?) Benefit

- TBL 1 Social licence to operate (SLO) (social)
- TBL 2 Comprehensive extraction (CX) (techno-economic)
- TBL 3 Zero waste (OW) (environmental)



Case Study 1: United Republic of Tanzania (URT) Mkuju River uranium project

- Objective: social and economic development of SW Tanzania
- Environmentally sensitive area in the Selous Game Reserve, UNESCO protected site
- Stakeholders: "lift us out of poverty with this project"
- Synergy with related industries (oil, gas, geothermal, diamonds, gold, construction...) consolidated at meeting Arusha, March 1-5 2015
- Integration with wider socio-economic development plan, eg eco-tourism, other natural resources, diversification

SITE DUE DILIGENCE VISIT



Some key success factors

- Integration of stakeholders into planning
- Intergenerational objectives and vision
- Stimulus to SMEs and economic diversification
- Investment in education (capacity building)
 - Government, as operator and regulator
 - Schools
 - Technical competencies (future mining and processing employees)
 - Healthcare, prevention (eg AIDS/ HIV, STD) and well-being
- Won EU support (€4m for logistics strengthening and chain of custody management for product – yellowcake)
- Anticipated TBL returns

Capacity building plan: road map and milestones

Example tested in Tanzania, now being generalised

Building technical capability

- A comprehensive program is under planning at the Agency to address:
 - Roles and responsibilities (direct and indirect stakeholders)
 - New ("smart") processes and production methods (eg insitu leaching)
 - New regulations (and new regulators)
 - Technical competencies and infrastructure for accurate identification and characterisation of NORM residues
 - Safety assessment for management approaches
 - Reuse and recycle of NORM residues
 - Future-proofed disposal (long-term storage) of NORM residues

Stakeholder Map (by topic)



MRP Road-Map : Milestone Driven, with Quality Improvement



Project life-cycle

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UxPDASHBOARD: MILESTONE-DRIVEN, INTEGRATED SOCIAL LICENCE AND CAPACITY-BUILDING



Map milestones and competencies into an activity matrix

Case Study 2: End of Mine Life – Portugal

- ~150 mines in "remediation"
- 50% uranium
- Change in paradigm DURING THE PROJECT from mine "closure" to mine "future proofing"
- Trends to
 - resource conservation
 - circular economy
 - critical materials /safeguarding security of supply
 - Integration with social resilience, eg SMEs, tourism, heritage (mining museum/ centre of excellence)

Waste or Resource? EoL or Futureproofing?

Learning New Competencies: Future-proofing the mines

http://www.uxponline.com/resources/file/pdf/meet/uxp2013/UXP_Newsl etterLisbonUraniumMineRemediationMarch2013.pdf http://www.iaea.org/OurWork/ST/NE/NEFW/News/2012/repository/2012-11-09-Uranium-Meeting-Lisbon.html

Optimisation through a Smarter Value Chain

- Moving up the value chain
 - Mining + Processing

Primary + secondary

- Resource conservation
 - Primary
- Sustainability
 - Waste Zero waste
- Social Capital
 Physical labour —> Smart work

Conclusions

- Project finance institutions responding favourably
- Governments can apply fiscal levers (eg stimulus to SMEs, R&D)
- New entrant states reporting enhanced social acceptance
- Partnership and realistic expectations are key
- "Too big to fail"

Thank you

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