Sustainability management in mining closure plan and its structural development demand in Mongolia

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Abstract– The main assumptions presented in this paper are the main assumptions that relate to the sustainable development of the mining sector, specifically mining closure that will significantly shape the development of country's environmental future. So that planning for mine closure should be undertaken progressively throughout an operation's life cycle by systematic policy, social participation and license holder's responsible. This paper will include correspondences between factors that are pillaring sustainable development and how should Mongolians implement international's standard and strategy of its. As case study, one of Mongolian first coal mining Nalaikh's negative condition is illustrating that how can mining without closure plan damage its environment but also economically. Some of suggestion implementation approaches based on developed countries standard for Mongolian mining industry will be given in this paper. Mongolian mining can be more environmental friendly by adopting those Social, Environmental, Economic and Responsible, Systematic development.

Key words – Sustainable development, mining closure plan, mining industry, financial surety, rehabilitation, strategic policy, license holders

1 INTRODUCTION

Due to world economic crisis that has starting since 2008, there comes large number of abandoned mining sites which stopped before their excepted closure date. Obviously, do mining is not only license holders and governments' business. It requires that social and economic development be achieved with the appreciation that resources are limited and that actions today will impact on the present and future generations. To sum up, sustainable development has grown into a distinct legal concept in these years.

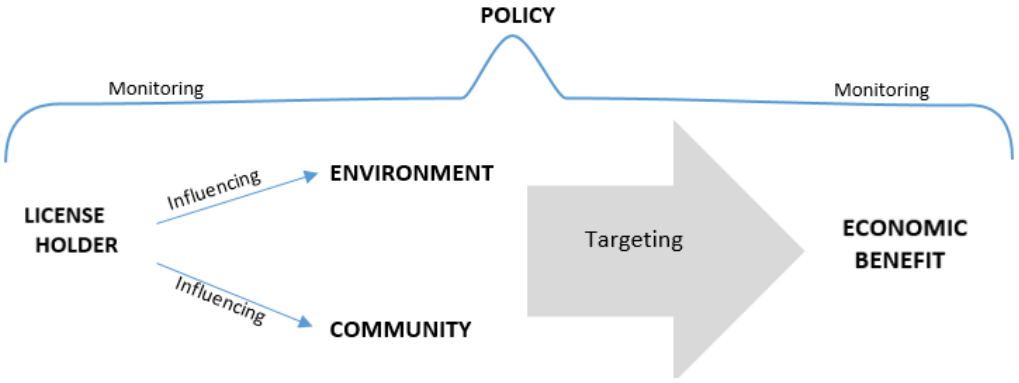


Diagram of connections of the sustainable mining contributors

The diagram shows that License holder has influencing Environment and Local community directly by achieving their goal which is working with economic benefit. Simply, Governments should organize and monitor this whole process of businesses by their integrated well-planned strategy. As case from most of developed mining countries, they are achieving sustainable developed mining strategy in every stage of the process. Excluding that, mining closure becomes biggest part of the mining mineral resources now since we are trying to achieve sustainable development of mining, specifically how to leave environment disturbed less after mining. In practice, mining affected area changes, more or less, condition of the natural environment in some way. These changes mainly include the following:

- Deformations of ground surface in the form of subsidence, horizontal deformations, discontinuous deformations, etc.
- Various changes of water relations impoverishment of soils
- Emission of gas and dust
- Noise and others

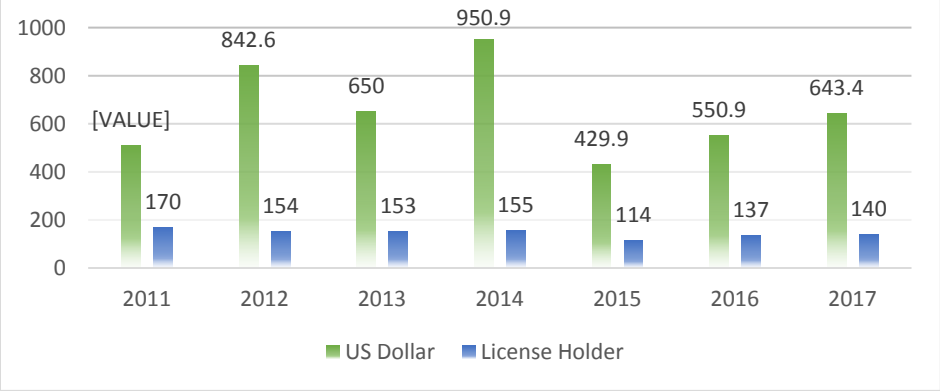
Typically, successful and effective mine closure is based on well-organized plan and sustainable implement as well. Achieving such a situation is simply a 'good way to do businesses. Specific issues through this life cycle, the initial ground work, even at the exploration phase, can impact on the effectiveness and success of closure planning. This is normally, how system works in mining closure.

2 CASE OF MONGOLIAN MINING CLOSURE FAILURE

Since 1970, Mongolian mining industry has been sparkling and accounting for approximately 20% of Mongolian 2016 GDP and 71% (worth 7 trilion MNT) of the Gross Industrial Output in 2016. From that time, couple of mine sites were abandoned without any closure or rehabilitation and it has still huge impacts social, economic and environmentally. In 1989, Nalaikh, Thermal coal mine site was closed temporary due to death of 175 miners by air gas explosion. Because of economic devastation in 1990, the government partially closed the mine. Since its partial closure, on average 10-17 people die annually in Nalaikh mines because of its' not restrict artisanal mining activities in underground shafts of mostly unemployed miners and their families. Meanwhile, no government attempted to enforce the mining law, standards, and regulations or to provide a long-term policy solution even though it is the closest mine to the capital city. Excluding that, due to many pits were digging by artisanal miners in local land and it is impacting badly to local residents such as ground broke down or earth split open. Lately, authorities assess 335, 2 hectare of Nalaikh's disturbed territory and concluded that 7 billion tugrik (approximately 2,9 billion USD) for biological, 1 billion 135 million tugrik (474,399 million USD) needs for technical rehabilitation for this territory. To clarify, subsidence has started not only residential area but also around of Nalaikh District's Railway Infrastructure area.

For Mongolia, its' general structure of institute is managed by Constitution, Law of Parliament, Law of the Mineral Resource, Law of Ministries' Legislation and Law of Agencies' Legislation. Ministry of Mining and Heavy Industry is main constitute of public administration to provide mining policy and Mineral Resource and Petroleum authority belongs to this ministry as implementing agency. General Inspection Bureau is that one institute which is monitoring and managing mining closure of the license holders. The Ministry of Environment and Tourism has responsibility for rehabilitation after mine closure and other environmental issues, Ministry of Fund is for flow of investment. Simply, there are many function commons and mutual duties from Mineral Resource and Petroleum authority, General Inspection Bureau and Ministry of Environment and Tourism, which work with lack of engagement and exchange information. Hence, letting license holders carry their responsibility is more complicated and monitoring, assessing mine closure and rehabilitation in country side becomes limited.

According to the ''Regulation for monitoring guarantee fund for protecting environment, rehabilitation during and after mining'', license holder must transfer reclamation expenses which equal 50% of Plan for Environment Management which has done in present year to local authority's Special Account. In September, 2017 the balance was only 1 billion MNT which is 0,4bollion USD as below:



Mongolian authority's Special Account In September

But how this expenses are managed, how does it monitored is not that clear in any regulations of authorities. But there 4000 hectare square which need of 3,3 – 4,1 Million US Dollar to rehabilitate, from 15 provinces are damaged as well as abandoned from Irresponsible Mining.

The Extractive Industries Transparency Initiative (EITI) assess Mongolian mining industry's progress by standards and its result of 2017 is MEANINGFUL. Mongolian current legal coordination of finance surety is doubtful, fund for mining closure and rehabilitation is insufficient, monitoring system is still inadequate. By comparing regulation of mining closure with its international standard, Mongolian situation is same as 1960's.

3 SUGGESTED IMPLEMENTATION APPROACH

3.1 Successful closure plan:

Mining sector regularly shall draw up and review a reorganization and decommissioning plan for mine closure to each mining facility. New facilities require a decommissioning plan from commissioning and existing facilities, must make a comprehensive plan as early as possible.

Shall consider on following:

- Closure planning should take place as early as possible in a mining project, identifying risks and unknowns and reducing them over time.
- The closure goals should be included in the plan, and should be used and updated throughout the mine life time.
- Well-qualified specialists need to be responsible for maintaining the rehabilitation and decommissioning plan throughout the mine life time.
- Closure plans must consider maintenance and monitoring programs for the temporary closure of operations to be re-opened in the future.
- Planning should also take into account residual effects of infrastructure, lowering or acid-producing materials.
- Plans should be referenced in corporate/site sustainability (or equivalent) documentation.

3.2 Strong engagement:

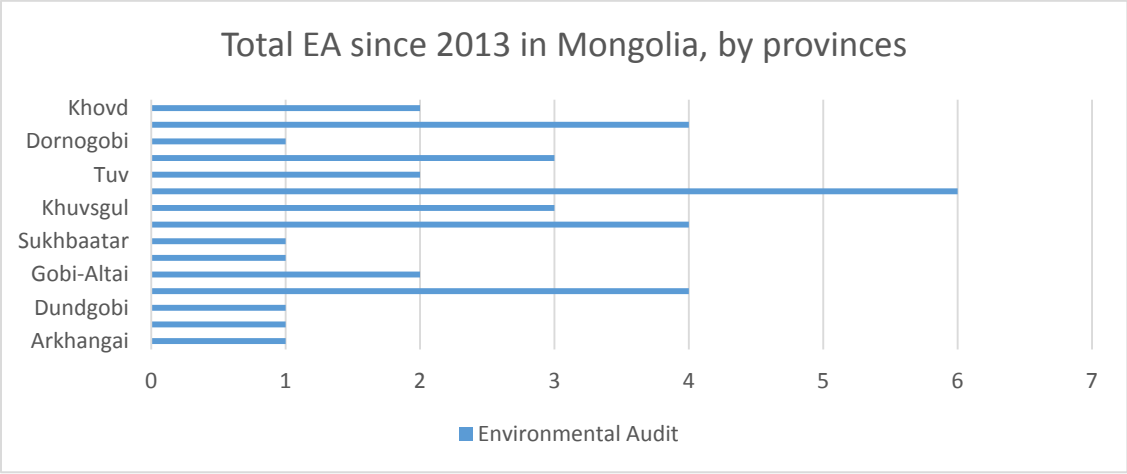
Mining sector must regularly work with local stakeholders in relation to the each of mining facilities, including indigenous peoples, communities, workers and regulators, with regard to the closure of mines and Rehabilitation plans.

Shall consider on following:

- Achieving successful mining closure can improve the relationship between license holder, investors and governance in a good way.

- Local community must be one of the biggest part of the mining closure plan. To fulfill social participation, information and plan of closure should be publicly and distinctness. Residents who might be influenced by mine site closure, discussed and reach a consensus and license holder have to guide principles which perform their closure plan respectful for local community's tradition, heritage, lifestyle and rights. License holder should report result of Environmental Impact Assessment and implementation of Environment Management Plan to local community at least once in year.

- In Canada, Environmental Assessment and Audits are playing main role of successful mining closure. An Environmental Audit and Environmental Assessments for the license holders need to be conducted for achieving main target.



As regulation about environmental audit adopted in 2013, Mongolia, license holders must conduct environmental audit every two years. Since then, there only 36 audits are conducted in whole country which equals 5 percent of license holders as seen above.

- Process against closure plans should be certainly reviewed in conjunction with main stakeholders which include local communities, workers and regulators. Engagement should occur throughout the life of the mine, and should be up-to-date with changes in mine development, and changes affecting relevant interest groups.

3.3 Financial Surety:

Mining sector should estimate the cost of implementing the mine closure and decommissioning plan for each mining facility and lay down financial provisions to ensure the availability of sufficient resources to meet closure requirements.

Shall consider on following:

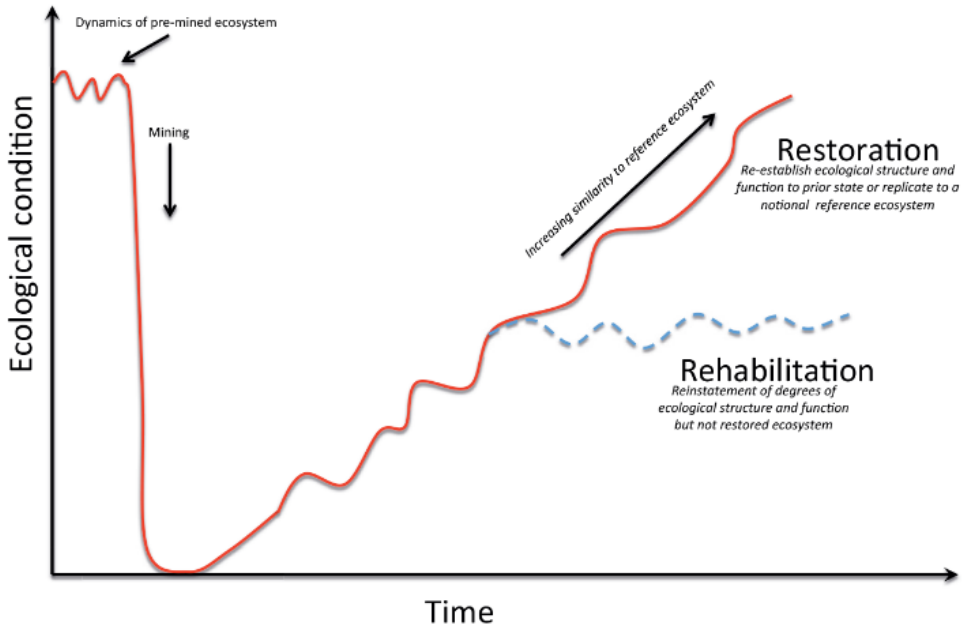
- Cost estimates should be initiated and updated on a regular basis as early as possible. Unless required by law, the closing costs should be based on reasonable estimates of actual costs, taking into account local circumstances and cost structures.

- The financial provisions should at least comply with the applicable law. Or absence in such laws, provisions may be made in the form of bonds, letters of credit or other financial instruments or by self-insurance or self-guarantee.

- Financial assurances must be discrete legal instruments or sums of money that can only be solved with the specific approval of the regulatory authority. For their part, regulators must obtain financial assurance up front before a mine project is approved. While regulators, as determined by their periodic reviews, must have the authority to secure financial assurance during the course of mining, waiting until late in the mining process to obtain substantial assurance is unwise, since reduced cash flows at this stage may make it difficult for operators to secure bonding from a surety, bank, or other guarantor.

3.4 Carefully planned rehabilitation:

Various terms have been used to describe the repair of land disturbed by mining and other forms of land use, including rehabilitation, reclamation, reconstruction, repair, restoration and revegetation. For consistency with the National Standards for the Practice of Ecological Restoration in Australia (Standards Reference Group SERA 2016), the two main terms used in this handbook are rehabilitation and restoration.



Differences between rehabilitation and restoration (from Standards Reference Group SERA (2016)

Source: after Bradshaw (1987).

Rehabilitation aims to reinstate ecosystem functionality and land productivity, although it will probably assume a different land-use and species composition from the original ecosystem. The new ecosystem may be simpler in structure than the original but more productive, such as when a woodland is replaced with a plantation or grazing land. Alternatively, the new ecosystem can be simpler but less productive in the form of a hybrid or novel ecosystem, such as planted eucalypts over a weed–grass understore.

As suggestion, mining sector need to adopt good practices to rehabilitate environments that are disrupted or occupied by mining facilities in order to establish a sustainable ecosystem, or other uses developed after mining, which are affected by the commitment with the key in planning of closure processes.

Shall consider on following:

- Where rehabilitation is the most significant critical control for dealing with impacts, there should be high certainty of success, from either similar rehabilitation exercises elsewhere or trials run as part of the project. Failure to start rehabilitation early in the life of the operation (or in the later stages of project development) may create an obstacle to building the knowledge and capacity necessary to deliver a sustainable outcome that meets agreed success criteria. At worst, initiating closure operations when the site has not developed the skills, equipment and necessary technical knowledge to successfully carry out a large rehabilitation program can result in very poor outcomes requiring very costly remediation, and with greatly reduced probability of successful closure.
- Rehabilitation and closure should be carried out gradually, wherever possible, as individual sites within a mining facility are shut down or exhausted and are no longer able for use.
- The performance results for such sites should be reviewed and taken into account in regular reviews of mine remediation and the closing plan.

3.5 Strategic policy:

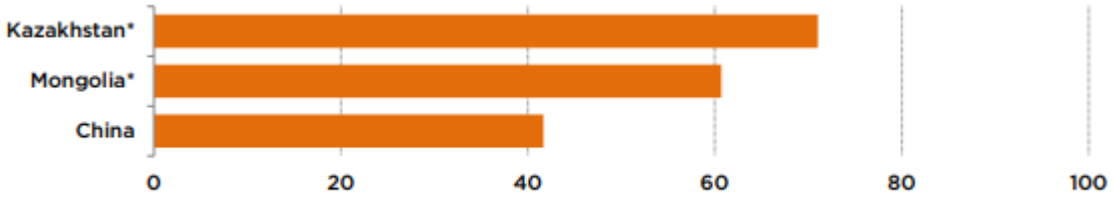
Core framework of sustainable development requires that the specific legal mechanisms associated with mine operations must align these interests and promote the community's present and the future needs. The first compulsory requirement by governance and monitoring authorities to license holder which is about to restore land after mining, must be depend on how many percent of the land have been rehabilitated, recovered after close mining. A new policy and regulatory framework for mine site closure planning and rehabilitation has recently been established in Western Australia building on existing mining and environmental protection legislation. Key features of the overall policy framework are:

- A strong regulation system to enforce mine site rehabilitation, implemented via approval conditions
- Requirements for mine closure plans to be prepared prior to the commencement of mining which encourage adaptive management and must be maintained throughout the life of the operation
- Legislation and regulations governing how abandoned mines should be funded and managed and funded in the event that the government needs to intervene, including provision of a funding mechanism that can be used for legacy abandoned mine-sites predating the new policy provisions.

4 Concluding remark

The sustainable development of mining mineral resources is a major challenge for today's global world, addressed to mining companies, people of science associated with mining and many other institutions and organizations. In addition, the sustainable development of mining is the key to the safety of raw materials and energy for many countries of the world.

In Mongolia, the economy has increasingly focused on the mining sector its share of GDP today stands at 20percent. The economy took off in 2017, especially on the back of positive developments in the mineral sector, and the growth prospects continued to be positive for 2017 and 2018.



Investment Attractiveness Index – Asia, (Fraser Institute Annual Survey of Mining Companies 2017)

Plus, Mongolia's PPI score also increased by 26 points in 2017 and its ranking improved from 101st (of 104) last year to 70th (of 91) this year as respondents' ratings showed decreased concern over its geological database (-39 points), availability of labour and skills (-32 points), and uncertainty concerning protected areas (-27 points). Thus, to ensure sustainable and economic growth and reduce failed mining closure case, Mongolia must strengthen governance.

The public awareness that mineral resources are non-renewable assets is unfortunately low, and therefore improving or changing the situation in this area is another important challenge. Modern mining, which is generally detrimental to the environment, and also causes more or less discomfort for people living in mining areas or their immediate environment, must have public acceptance for their activities. Thus, the real concern about the environment becomes an important factor for procurement. Excluding this, equivalent expertise is needed for addressing the multiple social aspects of mine closure, such as workforce planning, housing, town normalization, post mining economies, issues associated with infrastructure and services for a resident population, stakeholder engagement, heritage management, and agreements with local and Indigenous communities.

Reference

[1] Drebenstedt C. (2008): Responsible mining – approaches and realization. Proc. 22nd World Mining Congress – Innovations and Challenges in Mining, Vol. 1, Istanbul, pp. 135–147.
[2] Dubiński J. (2005): New safety technologies in underground mines. Proc. of the 20th World Mining Congress – Mining and Sustainable Development, Vol. 1, Teheran, pp. 21–31.
[3] Józef Dubiński1. (2013): Sustainable Development of Mining Mineral Resources. Journal of Sustainable Mining, J. Sust. Min. Vol. 12 (2013), No. 1, pp. 1–6
[4] ANZMEC, Minerals Council of Australia (2000) Strategic Framework for Mine Closure.
[5] DITR (2006) Best Practice Mine Closure and Completion Booklet (Draft). Department of Industry Tourism and Resources, Australian Government.
[6] Wilson, Ian. (2006) Pers Comm. Environmental Protection Agency, Queensland, Australia.
[7] DIIS (Department of Industry, Innovation and Science) (2016b). Mine closure, DIIS, Canberra.

[8] DEHP (Queensland Department of Environment and Heritage Protection) (2014). Rehabilitation requirements for mining resource activities (EM1122), DEHP, Brisbane.
[9] WA EPA (Western Australian Environmental Protection Authority) (2015). Guidelines for preparing mine closure plans, WA EPA, Perth.
[10] Dr HB Prinsloo & Mr F Pieterse. (2015): Sustainable mine closure – a new paradigm, 35th Annual Conference of the International Association for Impact Assessment - www.iaia.org
[11] Angus Morrison-Saunders, Jenny Pope (2013): Mine closure planning and social responsibility in Western Australia: Recent policy innovations. 2nd International Conference on Social Responsibility in Mining.
[12] ICMM - International Council on Mining & Metals 2008, Planning for Integrated Mine Closure: Toolkit, ICMM, viewed 19Aug2013, http://www.icmm.com/document/310
[13] Validation of MONGOLIA, Validation Report. Sustainable Development Strategies Group (SDSG), Independent Validator 10 October 2016
[14] Fraser Institute Annual Survey of Mining Companies 2017, page 42
[15] Mongolia Extractive Industries Transparency Initiative (MEITI) Mongolia 11th EITI. Report 2016
[16] Leading Practice Sustainable Development Program for the Mining Industry (Australia) - Mine Closure and Completion (2006) www.ret.gov.au/resources/Documents/LPSDP/LPSDP-MineClosureCompletionHandbook.pdf
[17] Mining Association of Canada (MAC) – Towards Sustainable Mining, Tailings Management Protocol www.mining.ca/site/index.php/en/towards-sustainable-mining/performance-measures-aprotocols.html
[18] Mining Feature: NIOSH Exhibit at the 2018 SME Annual Conference, https://www.cdc.gov/niosh/mining/Features/NIOSHExhibitatSME2018.html
[19] Social and economic situation of Mongolia (As of February 2018) Language: English