
Sustainable Bauxite Mining Guidelines

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Abstract

The demand for bauxite will be increased in the future due to the needs for aluminium products. The sustainable mining guidelines especially in bauxite mining industry is necessary to be implemented. The guidelines will help the mining company, environmental agency and government agency in addressing the sustainable issues related with the bauxite mining. This paper describes the development of the guidelines for sustainable bauxite mining by discussing the reasons why the guidelines must be developed and some key aspects that needed to be examined in order to have the sustainable bauxite mining.

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1. Introduction

The sustainable concept is becoming the integral part and has the major contribution in the mining activities. The requirement to have sustainable mining has been initiated since 2002 during the Johannesburg Earth Summit with the establishment of Global Mining Initiative ("History of ICMM," n.d.). The implementation of sustainability in mining is various based on the type of the mineral being mined, the locations and the type of mining method. There are five areas that must be addressed in order to achieve and ensure the sustainable mining : Environment, Economic and Community, Safety and Resource Efficiency must be addressed (Laurence, 2011). According to Mudd (Mudd, 2010), the sustainable report and data provided by the mining company can help in addressing the concern regarding the future of mineral resources. It is not only about whether the resources in limited but also whether the mineral resources are economically profitable in the future, the social and environmental cost of mineral productions, and also the critical links between economic, social and environmental aspects of mining. The sustainability in mining is not only implemented in the active mine site but also to the land which has been mined (legacy mine land). The legacy mine land can be benefited for environmental, socio-politic and economic (Worrall, Neil, Brereton, & Mulligan, 2009). In order to have specific procedure, guidelines on the sustainable mining need to be prepared. In the case of bauxite mining, the guidelines for sustainable bauxite mining have not been recorded. Therefore, it is necessary to prepare the sustainable bauxite mining guidelines that can be used for the mining company to be integrated in their strategies and policies.

2. Why Have Guidelines?

The sustainable bauxite mining guidelines is necessary to be made since the sustainable is highly affected to the product reputation of the mining companies. The sustainability programs have to give benefits to the community. The programs can be in the form of improving living standards, economic development, reducing environmental impact and creating sustainable communities. When applying the sustainability programs, the companies also need to consider the business model, the resource accesses, the cost of operation, the corporate reputation and the confidence in the supply chain need to be prepared in order to support the sustainability.

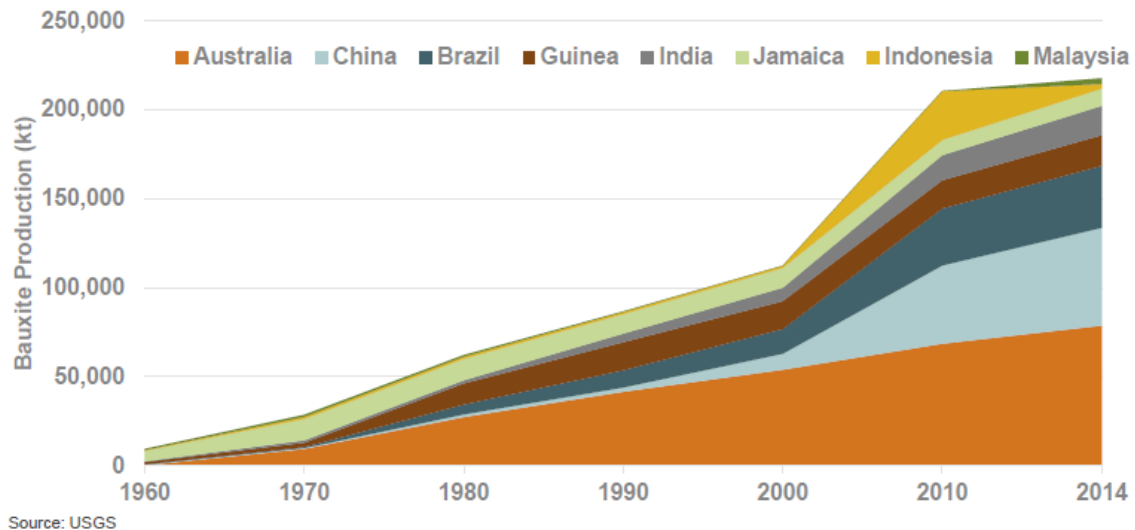


Figure 1. Major bauxite producers (1960 - 2014)

Figure 1 shows the data of the quantity of the bauxite production produced by major bauxite producers since 1960 to 2014. It can be seen that the progressive production of the bauxite from the major quantity producer with Malaysia has the highest production in 2014. Due to the increasing bauxite production and the increasing applications of aluminum products around the world and the demand for recovery and rehabilitation of the mine area therefore sustainable bauxite mining guidelines have to be made immediately. With the major locations of the bauxite mining is in the Southeast Asia and Australia (Figure 2), the main focus of the guidelines has to be prepared based on the regions.

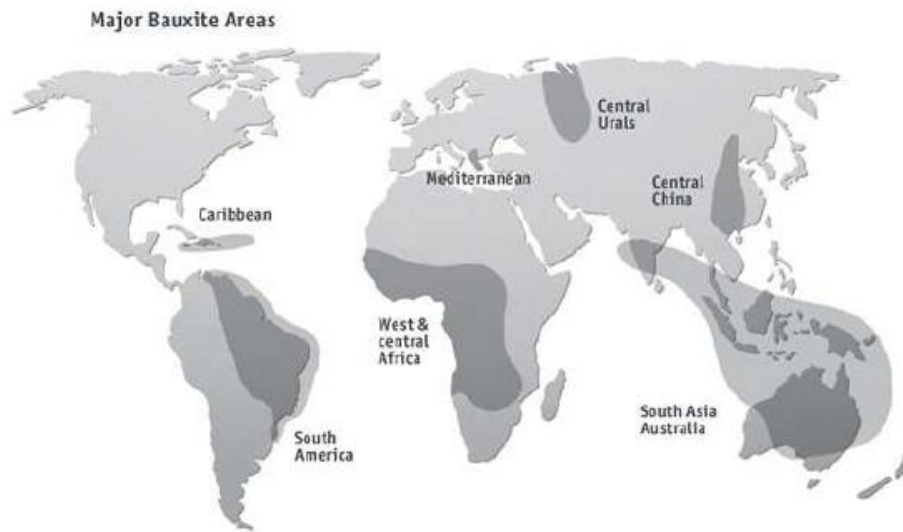
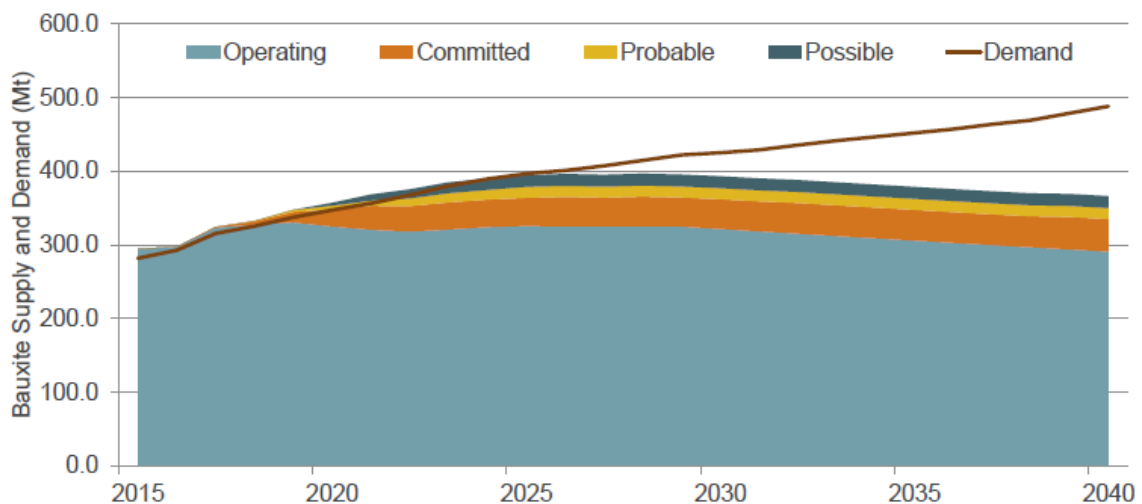


Figure 2. Bauxite mining locations

The Aluminium Stewardship Initiative (ASI) as a global, multi-stakeholder, non-profit standards setting and certification organization has been initiating the sustainable society since 2009. According to the ASI strategies, there are some aspects that need to be considered when applying the sustainability especially in the bauxite mining such as the market basis, the rewards for best practice, identifies the best performers and whether or not to prioritizing on smelting. In addition, the sustainability performance can be improved by capture global lessons and expertise this includes science and community engagement, and what is reasonable for all operations and also global guidelines.

3. DEVELOPMENT OF GUIDELINES

The development of the guidelines will be funded by industries which are the member associations and the member companies of the World Aluminium, *Associação Brasileira do Alumínio* and Australian Aluminium Council Ltd. The guidelines will be developed based on the input from bauxite industries which are site practices and from case studies, best practice bauxite mining, Aluminium Stewardship Initiative (ASI) and International Mining Guidelines. The guidelines will be used as practical guide to improve sustainability program in bauxite mining. The guidelines are also specific for bauxite mining industry since different mining types will have different issues. In addition, both theory and examples developed over 50+ years history at some mines will be studied in order to learn from past collective experience. However, the guidelines are not only best / leading / world class practices with unachievable / unattainable goals and one size fits all.



Source: Alumina Limited, 2017 Half Year Results, ASX

Figure 3. Graph on bauxite supply and demand (2015 – 2040)e

The guidelines are needed now because the demand for bauxite will be increased in the future based on the Alumina Limited, 2017 half year results (Figure 3). In Figure 3 can be seen that the demand for the bauxite will be higher than the possible supply starting from 2025 and keep increasing until 2040. The proposed guidelines will include geology and geography aspects, governance, and environment, social and economic aspects. Therefore, there are some aspects that involved in the sustainability related with environmental management and performance such as biodiversity, infrastructure, water management, soil management, air quality and noise, greenhouse and energy, tailings and residue, closure planning and rehabilitation.

One example of the sustainability in the bauxite mining is to minimize dust. In order to minimize dust, multiple strategies can be applied such as ripping and dozers eliminated blasting, dust suppression for crushing, surface water recovered from mined out areas used for dust suppression, vehicle dust suppression, speed limits applied and loads covered, and use of rehabilitation green belts to minimize dust.

There are two bauxite mine rehabilitation examples that can be implemented as guidelines for sustainable bauxite mining. First example is by making bauxite stacking, fresh topsoil spreading, and rehabilitated land. Alternatively, the rehabilitation can be done by conducting following these steps: pre mining, active mining, rehabilitation and nursery.

The social aspects and performance that need to be included as guidelines in the sustainability of bauxite mining are cultural heritage, community engagement, indigenous people, transport and traffic, labour and working conditions, emergency preparedness, health and safety, and lastly land acquisition and displacement. Whereas the integrated community health and wellbeing sector will include education, social projects, healthcare, infrastructure and livelihood.

One of the positive agendas that can be used as benchmark in sustainability of bauxite mine is Juruti mining by Alcoa. The company with the cooperation with the Municipal Administration of Juruti has successfully executed the mining rehabilitation and biodiversity conservation in the location ("Community Case Study, Juruti Brazil," n.d.).

3. CONCLUSIONS

As a summary, the key theme for integrated sustainability are integrated mine plan and financial outcomes, improved environmental performance and understanding stakeholder needs. This paper has sought the effort to develop the guidelines for sustainable concepts for bauxite mining.

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