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SUSTAINABLE MINING DEVELOPMENT

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Abstract

The mining sector continues to have a strong influence on the Mongolian economy through both internal and external factors. This study assessed mining contributions towards sustainability along the following four major avenues as suggested by the International Institute for Environment and Development: (i) economic sphere including impacts on the macro-economy, foreign trade, public finances, etc.; (ii) social sphere including impacts on education, employment and technology; (iii) environmental sphere including impacts on the supply chain of the mining sector and its assessment; and (iv) governance sphere such as impacts on the policy field and corporate governance

List of Abbreviations

ADB	Asian Development Bank
CNDS	Comprehensive Nation al Development Strategy
DBM	Development Bank of Mongolia
EBRD	European Bank for Reconstruction and Development
EITI	Extractive Industries Transparency Initiative
FDI	Foreign Direct Investment
FSL	Fiscal Stability Law
GDP	Gross Domestic Product
GIZ	German Corporation for International Cooperation
GoM	Government of Mongolia
ICMM	International Council on Mining and Metals
IIED	International Institute for Environment and Development
JICA	Japan International Cooperation Agency
LDF	Local Development Fund
MAP21	Mongolian Action Program
MDG	Millennium Development Goals
MSE	Mongolian Stock Exchange
MSE	Mongolian Stock Exchange
NRGI	Natural Resource Governance Institute
NSO	National Statistical Office of Mongolia
OTIA	Oyu Tolgoi Investment Agreement
Parliament	State Great Khural
PPP	Public-Private Partnership
SDC-2030	Sustainable Development Concept
SDGs	United Nations Sustainable Development Goals
SEEA-CF	System of Environmental-Economic Accounts Central Framework
UNDP	United Nations Development Program

1. Introduction

1.1 Sustainable development in mining globally

As natural resources are exhaustible and non-renewable, using the rents generated by the mining sector for the long-term sustainable development of the country is a vital issue for resource-rich countries. According to the World Commission on Environment and Development[1], sustainable development is the ability of current generations to meet their needs without compromising the ability of future generations to meet their needs. It should be noted that "the concepts of sustainable mining often focus on two key themes – resource depletion/availability and environmental/social impacts"[2]. The ideas of sustainable development originate from protests regarding overexploitation of forest reserves and the impact of mining on forests and other natural resources in 16-17th century Europe[3]. However, it was argued that the benefits of mining far outweighed the costs incurred by mining development.

In recent years, following the Brundtland report (Brundtland Commission, 1987) and the Rio Declaration (UNCED, 1992), the mining sector developed its own sustainable development policy frameworks such as the policies developed by the International Council on Mining and Metals (ICMM)[4]. The ICMM adopted the following set of 10 Sustainable Development Principles[5] in 2003 (revised in 2015):

1. Apply ethical business practices and sound systems of corporate governance and transparency to support sustainable development
2. Integrate sustainable development in corporate strategy and decision-making processes
3. Respect human rights and the interests, cultures, customs and values of employees and communities affected by our activities
4. Implement effective risk-management strategies and systems based on sound science and stakeholder perceptions of risks

1 WCED, 1987, World Commission of Environment and Development, "Our Common Future" (the Brundtland Report) report.

2 The Sustainability of Mining in Australia: Key Production Trends and Their Environmental Implications for the Future, Gavin M. Mudd, Monash University and Mineral Policy Institute, 2009.

3 G.Agricola, "De Re Metallica", 1555, J.Evelyn, 1662.

4 International Council on Mining and Metals (ICMM) was founded in 2001 by leading mining and commodities trading companies in the world to develop partnership for sustainable development. Its members are African Rainbow Minerals, Anglo American, AngloGold Ashanti, Areva, Barrick Gold, BHP Billiton, Codelco, Freeport-McMoRan Copper & Gold, Glencore, Goldcorp, Gold Fields, Hydro, JX Nippon Mining & Metals, Lonmin, MMG, Mitsubishi Materials, Newmont, Rio Tinto Group, Sumitomo Metal Mining, Teck and Xstrata companies.

5 Established in May 2003 the principles respond to the key challenges identified by the Mining, Minerals and Sustainable Development Project's (MMSD) agenda for change. MMSD was a research project looking at how the mining and minerals sector could contribute to the global transition to sustainable development. To ensure their robustness, the principles have been benchmarked against international standards such as the Rio Declaration, the Global Reporting Initiative, the Global Compact, OECD Guidelines on Multinational Enterprises, World Bank Operational Guidelines, OECD Convention on Combating Bribery, ILO Conventions 98, 169, 176, and the Voluntary Principles on Security and Human Rights.

5. Pursue continual improvement in health and safety performance with the ultimate goal of zero harm
6. Pursue continual improvement in environmental performance issues, such as water stewardship, energy use and climate change
7. Contribute to the conservation of biodiversity and integrated approaches to land- use planning
8. Facilitate and support the knowledge-base and systems for responsible design, use, re-use, recycling and disposal of products containing metals and minerals
9. Pursue continual improvement in social performance and contribute to the social, economic and institutional development of host countries and communities
10. Proactively engage key stakeholders on sustainable development challenges and opportunities in an open and transparent manner. Effectively report and independently verify progress and performance

These principles are an example of the support for sustainable development by the mining sector. Various countries have also supported sustainable development goals in mining. For example, a leading mining nation, Australia has supported sustainable development goals and the ICMM's Sustainable Development Principles by creating its own Australian Minerals Industry Framework for Sustainable Development (MCA, 2004).

Furthermore, the Sustainable Development Principles became official global development goals starting January 1, 2016. The United Nations Sustainable Development Goals (SDGs) endorsed 17 ambitious and integrated global goals to achieve progress across the three dimensions of sustainable development: economic prosperity, social inclusion and environmental conservation. The SDGs are to address issues of sustainable development[6] to coordinate global collective actions to "achieve a better and more sustainable future for all".

Application of the Sustainable Development Principles in mining thus became a policy goal globally for all countries with a developed mining sector. While developed countries and leading companies endorsed Sustainable Development Principles, developing countries were not able to implement these principles successfully. Satchwell (2014) showed that mining progresses through a number of stages, which are differentiated by the degree the sector adheres to sustainability principles. These stages are:

Stage 1: Only revenue maximizing

Stage 2: Efficient - Enhancing performance through individual activities

[6] There are varying definitions of sustainability for the mining sector. In general, miners can achieve sustainable development by embracing the social, environment and economic pillars, offsetting or reinvesting the benefits from the depleting mineral asset, or the simultaneous pursuit of sustained or enhanced: environmental quality, economic growth, and social justice (Guide to Leading Practice Sustainable Development in Mining, 2011). From an academic point of view, Hilson and Basu (2003) explored difficulties of applying sustainable development to a mining context. The reasons cited include the existence of innumerable frameworks and indicator sets and a multitude of interpretations of sustainable development.

Stage 3: Effective - Improve benefits and performance through the connectivity with the environment, communities and other sectors

Stage 4: Sustainable - Embedding sustainability in all decision making and business practices to consider the economic and environmental needs of current generations without compromising the needs of future generations.

1.2. Sustainable development and mining in Mongolia

Pre-mining development stage

The democratic Constitution of Mongolia approved in 1992 established the principles of policy planning in the country: The State Great Khural (Parliament) shall be mandated "to formulate the State's financial, credit, tax and monetary policies; to provide the guidelines for the country's economic and social development; to approve the Government's program of action, the State budget and the report on its execution."

Based on the 1992 Constitution, elements of sustainable development (at that time grouped under the UN's MDG or Millennium Development Goals umbrella) were included in such policy papers as the "Development Concept for Mongolia" (1996), "Master Plan for Mongolia's Population Settlement and Development" (1996), "Sustainable Development Action Program of Mongolia for 21st Century" (1998), "Mongolia's Regional Development Concept" (2001), "Pole cities for Regional Development (2003) and "Economic Growth and Poverty Reduction Strategy" (2003).

One specific policy that was particularly influential in Mongolia was the Sustainable Development Program of Mongolia, also called the Mongolian Action Program (MAP21) approved in 1998. It outlined environment-friendly, resource-based, sustainable development policies for the country for the first time and was strongly influenced by the 1992 United Nations Conference on Environment and Development held in Rio De Janeiro[7].When MAP21 was approved, Mongolia was experiencing a deep economic crisis as it was transitioning into a market economy. In addition, the 1997 and 1998 Asian financial crisis led to a sharp drop in the price of copper concentrate, a major export of Mongolia, leading to rising fiscal deficits. The need to balance the budget deficit caused severe resource constraints and led to a lack of capital available for development policy. These factors showed how important the mining sector is for Mongolia's development.

The "Economic Growth Support and Poverty Reduction strategy," adopted by the Government of Mongolia (GoM) in 2003, explicitly included the UN's MDGs as indicators for poverty reduction and social development. The 2003 strategic policy document formulated: "While promotion of economic growth will reduce poverty,

[7] The Rio declaration-based "Sustainable Development Program" had 59 targets, out of which there were 17 Social development targets, 13 Environment targets, 15 economic targets and 14 implementation targets.

human development policy undertaken in the education, health and social welfare sectors will in turn facilitate promotion of economic growth." Additionally, the Asian Development Bank (ADB) took an initiative to assist Mongolia by signing the Midterm Partnership Agreement. The agreement notes: "preparation of the presentation on progress towards to achieving MDGs by the GoM for 2000-2002 is ongoing" and "the GoM is making an effort to promote MDGs goals and gender equality through such actions as decreasing the number of the very poor by 25 percent in 2005, by 50 percent in 2015, decrease the number of people whose income level is lower than the minimum standard of living by 50 percent in 2005 and by another 25 percent in 2015, offer basic (primary) education to the entire population, reduce the mortality rate of children under 5 by 50 percent in 2015 (compared to 2005) and include gender indicators when measuring poverty". This was the first time embedded MDGs were noted in Mongolia's policies. The 2003 strategic policy document incorporated eight MDGs, set targets to reach by 2015 and included forecasts for economic growth as well as key indicators for next three years up to 2006. At the time, mining was not yet viewed as crucial part of economic development due to a lack of export markets and suppressed mineral commodity prices. As such, most of Mongolia's exports prior to 2005 were comprised of agricultural products and textiles.

The Parliament adopted 9 MDGs in 2005, including the Mongolia-specific Democratic Governance goal. Then, in 2008, the Parliament approved a comprehensive long-term development program titled the "Comprehensive National Development Strategy" (CNDS), based on the MDGs. This policy document was prepared by Presidential Decree as a part of the "MDG-based Comprehensive National Development Strategy" started in 2006.

Mining-based development stage: Major milestones

In general, the impact of mining sector on sustainable development in Mongolia can be distinguished by 3 major milestones.

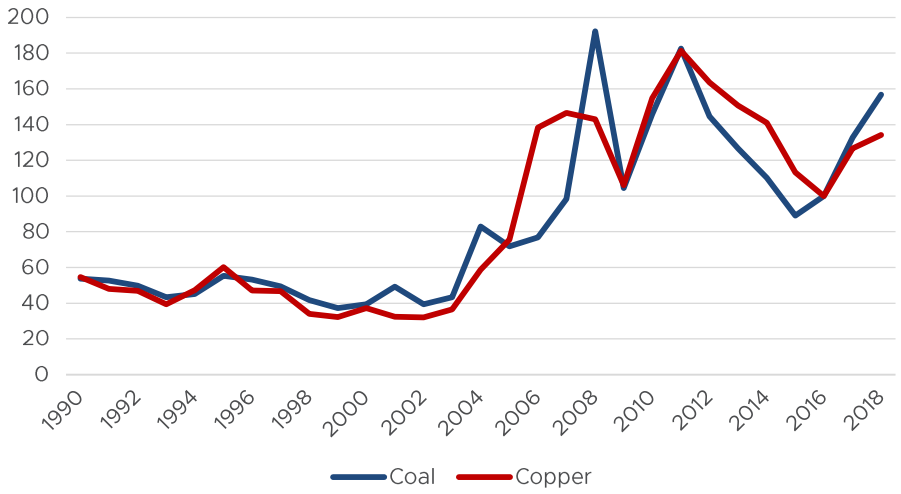
Milestone 1 (2006): Start of a mining-led economy

During the post transition period between 1992-2006, the mining sector actually had a limited impact on economic growth. The country had an abundance of natural resources, but most of them were not fully developed, closed for investment and lacked any commodity appeal. Even the ratification of the 1997 Minerals Law, which liberalized mining and exploration, didn't change much. While the law attracted increasing investment in exploration, actual production volumes didn't change much.

However, by 2005, the situation had changed drastically as a result of rising mineral commodity prices. Before this, the country's main exports were sewn goods and cashmere, the exports of which were not significant. The export of sewed goods also dried up after the opening of the US market as well.

The first major milestone was in 2006 as rising mineral commodity prices, especially of copper and gold, changed policy priorities. In Mongolia's case, the main impact was due to an increase in the prices of metals and coal.

FIGURE 1.1. PRICE INDICES FOR COPPER AND COAL (2016=100)



Source: IMF

As shown in the figure above, the prices for mineral commodities surged starting from 2003-2004. By 2006, the GoM was seeking a higher share of rents from the mineral commodities it sold. It ultimately led to the following institutional changes:

1. The Minerals Law was amended, giving the GoM rights to equity participation in large mineral deposits. The share was limited to 51 percent if the deposit was explored using state funds and 34 percent if private explorers found the deposit. The deposits' value had to be more than 5 percent of GDP (which was relatively small in 2006) and such high value deposits were labelled "deposits of strategic importance".
2. A list of deposits of strategic importance was approved by Parliament Decree #27 in 2007 and included 15 deposits. The second list included 39 reserve deposits. The government was tasked with providing detailed data on these deposits. The criteria defined included the deposits' size, importance, and use of state funds for exploration. In 2012, the Ministry of Mining selected an additional 10 criteria by which 64 deposits were re-assessed and 33 deposits were suggested to be included in the list of deposits of strategic importance. However, no formal decision was made and the list remains unchanged.
3. Following the definition of deposits of strategic importance, the government needed an entity to manage the equity. "Erdenes Mongol" corporation was founded in 2007 as a holding unit for these rights by Government Decree #266. It now has a number of daughter companies such as "Erdenes Oyutolgoi", "Baganuur", "Shivee Ovoo", "Mon-Atom", "Erdenes Shivee Energy", "Erdenes Methane" and "Erdenes Asset Management". Additionally, to address mineral commodity transportation issues, the GoM established "Gashuunsukhait Auto Road" company under the management of the holding. The holding also absorbed the Asgat silver deposit, formally owned by Russians. In 2017, the umbrella "Erdenes Mongol" corporation

created a joint company with the private coal and copper consortium MAK, called "Erdenes Ashid," "Erdenes Steel" with "Beren", a private iron deposit company, and "Erdenes Gold" in 2018, marking the GoM's entry into the gold market.

Although the GoM created a large holding company as a shareholder of all state-owned mining companies, there are some inconsistencies. The state owned "Erdenet" (copper) is formally a member of the holding, but currently is under special management of the GoM. "Erdenes Tavantolgoi", the largest state-owned coal mining company, was established in 2010 as a subsidiary of the holding, but it is no longer a subsidiary as of 2018 by Government Decree.

4. In 2006, the GoM imposed a 68 percent price windfall gains tax on copper and gold. The tax greatly damaged the domestic gold industry and was repealed in 2009.
5. In 2005, as rising copper prices resulted in a budget surplus, the GoM introduced the Child Money Program which provided a cash transfer to children of targeted groups. Eventually, the first domestic investment fund, the Human Development Fund, was created in 2009 for funding the Child Money Program as well as school lunches and infrastructure projects. It was a predecessor to the various sovereign funds created later.
6. As mentioned above, Mongolia adopted the CNDS in 2008. The CNDS was explicitly based on the development of large mineral deposits in the country. Prior to adoption of the CNDS, in 2006, the country brought forth the concept of mineral deposits of strategic importance in the Minerals Law. Afterwards, the CNDS's adoption officially approved the utilization of these deposits of strategic importance and reserve deposits. The CNDS included more specific features of Mongolia, including mining, described unique development factors and prescribes detailed mechanisms necessary to the strategy's implementation[8]. The CNDS also specifically stated that the development of the 15 deposits of strategic importance, such as Oyu Tolgoi for copper and Tavan Tolgoi for coal, would serve as the engine for Mongolia's economic growth.

Since 2006, Mongolia's mining sector has become its main pillar of the sustainable development, replacing textiles as the leading export sector. By 2008, the export share of mineral commodities was over 80 percent of Mongolia's total exports, with most going to China. In the following years, both the share of mineral commodities in exports and the share of exports going to China increased rapidly, reaching as high as 95 percent of exports in 2012.

Milestone 2 (2009): Oyu Tolgoi Investment Agreement (OTIA) and linkages to international financial markets

In 2010, Mongolia experienced a large increase in GDP, reaching USD 2,221.5 in per capita, owing to high world prices of key mineral commodities. In 2011, the mining sector accounted for 21 percent of the country's GDP and exported 3 tons of gold,

[8] The MDG framework had 8 goals originally, later 9 goals, and 48 indicators, whereas the MDG-based CNDS included 6 priority areas, 124 strategic goals and 523 activities with an intent to achieve the MDGs by 2015. Out of 35 expected outcomes of the MDG-based CNDS, 12 (35.2 percent) outcomes are directly linked with the MDG and 16 (47 percent) are indirectly linked (82 percent are linked to the MDGs in total).

573 thousand tons of copper concentrate, 21 million tons of coal[9], 5.7 million tons of iron ore and 2.5 million barrels of oil. This was due to two major events, a surge in the export of coal and the OTIA.

The signing of the OTIA in 2009, another major milestone, put Mongolia on the world investment radar. It should be noted that this was the third attempt to sign the agreement. In order to successfully pass the agreement through Parliament, a coalition government was formed in 2008 despite the Mongolia People's Party's majority victory in the elections.

Following this, starting from 2013, Mongolia began exporting copper concentrate from Oyu Tolgoi (OT). As reported by the Rio Tinto group, "from 2010 through the third quarter of 2018, OT spent more than USD 8.3 billion in the country in the form of salaries, payments to domestic suppliers, taxes, and other payments to the government. As of the third quarter of 2018, 93 percent of the workforce were Mongolians. In partnership with government and local organizations, OT has implemented a wide-ranging education program and training initiatives. The program became a transformative investment in the technical education sector, including the construction and enhancement of colleges and mining schools across the country. Through its extensive scholarship program, OT is preparing the next generation of Mongolia's leaders and experts, especially in the mining industry."[10]

As one of largest mining investments into Mongolia, OT has had an important role in the following areas:

1. OT linked Mongolia with international financial markets through equity participation in the investment agreement. As a result, the country began to actively seek financing from international markets.
2. The increasing mining revenue meant that the country could now invest and save more. This necessitated a system to manage fiscal resources for future development.
3. The project brought new underground exploration and production technologies into Mongolia.
4. The project invested heavily in the education of workers and the dissemination of professional knowledge.
5. The agreement allowed Mongolia to greatly increase its GDP and expand the economy.
6. The project created a demand for energy, which will be supplied via the construction of a power plant at the Tavan Tolgoi coal reserves.

Fiscal integration. As Mongolia's mining sector flourished, financial integration into international markets deepened greatly. Between 2011 and 2012 alone Mongolia issued USD 2.1 billion in sovereign and Development Bank bonds. At the same time, Mongolian companies such as Energy Resources, the Trade and Development Bank and Khas Bank managed to raise almost USD 2 billion in private financing. The trade integration of the country also increased dramatically with foreign trade turnover

[9] Since 2011, coal became Mongolia's most important export, bringing in more revenue than copper for the first time in history. Coal is exported by both public (Erdenes Tavan Tolgoi and Tavan Tolgoi JSC) and private companies (Energy Resources, MAK and others). These developments suggest that copper and coal will be Mongolia's top exports in the coming decade.

[10] Rio Tinto group, https://www.riotinto.com/mongolia/oyu-tolgoi-26400.aspx

exceeding GDP and totaling USD 11 billion with exports reaching USD 4.3 billion. Later a number of additional bonds were raised and successfully sold on international markets.

Development planning system. As mineral commodity prices continued to rise, it became clear that there was a need for better development finance management, strategy and investment planning. As a result, the GoM put a strong emphasis on putting legal and institutional frameworks for strategic planning, economic policy coordination and development policy implementation in place. Between 2008 and 2012, the GoM actively created development planning institutions, development financing institutions and amended fiscal system planning to prioritize development goals. After the 2008 Parliamentary elections, the National Development and Innovation Committee, a strategic planning agency, was established. The establishment was based on Parliament Decree #13 which approved the CNDS. After the 2012 Parliamentary elections, the committee was reorganized into the Ministry of Economic Development (2012-2014) and later the National Development Agency (2014 - present).

In the field of development planning, the GoM emphasized midterm investment planning in its policy documents. For instance, in February 2012, the Parliament amended budget legislation to allow for strategic priority development policies and included the Regional Development Index as a budget allocation mechanism in the new Budget Law. In May 2012, the GoM approved the first ever midterm development plan for 2012-2016 and the first midterm investment program for 2012-2017.

Financial system modernization. The Development Bank of Mongolia (DBM) was founded in 2011 to finance mid and long-term development projects. This was an important mechanism for financing development as a public-private partnership (PPP) mechanism. The corresponding Concession Law was ratified in 2010. The DBM was planned as a cornerstone for improving the financing of large projects. Following this, the annual budget reported a deficient in many circumstances as a result of strong policy-based interventions to create new industries or start large investment projects. However, the GoM lacked a specialized financial unit that could raise funds from overseas using revenues from the mining sector and channeling the funds into new large projects. The usual approach of allocating the task to ministry bureaucrats was inefficient as the officials lacked proper training. These projects were largely infrastructure and heavy industry projects as well as other policy-based projects based on the CNDS.

The DBM was planned to perform these tasks without relying too heavily on the annual budget cycle. The first Government Decree to establish the DBM was issued in 2009, simultaneously with the OTIA. In cooperation with the Japan International Cooperation Agency (JICA) and with assistance from German Corporation for International Cooperation (GIZ), the DBM was established in 2010. In 2010, corresponding legislation was passed and its capital was allocated from the state budget. The new law gave the DBM wider financing possibilities compared to a usual commercial bank. With the establishment of the cooperation agreement with the management team and the Korean Development Bank, the DBM officially began its operation in May 2011. In March 2012, the DBM raised USD 600 million from international markets and then proceeded to raise another USD 1.5 billion in DBM

and Government bonds in the autumn of 2012. Later, it became a major financier for large domestic industrial and infrastructure projects. In 2018, the DBM successfully raised USD 500 million without government guarantees. The DBM is currently financing several key projects such as housing construction in Ulaanbaatar and construction material plants.

Securities market. Another important step was the development of the Mongolian Stock Exchange (MSE). Founded in 1992, it was largely used to allocate shares of state-owned enterprises. However, its goal gradually changed as more portfolio investment came from abroad. Currently, more than 300 companies are listed on the MSE. To gear the MSE towards more development financing needs, its management team was renewed, a new specialized software was installed and an advisory team from London Stock Exchange helped its modernization. The MSE has become an important financing tool for Mongolian companies hoping to raise financing for its projects and its corresponding laws were amended in 2013. Currently, most Mongolian mining companies issue stocks abroad. However, as Mongolia's regulatory environment, legal infrastructure and trading opportunities gradually improve, more stocks of Mongolian mining companies are expected to be traded through the MSE. In 2019, the MSE's capitalization reached USD 1 billion.

PPP system. Stimulated by the OTIA and increased coal exports, concessions were created as another important vehicle for financing and implementing large infrastructure projects. The 2010 Concessions Law established procedures for PPP partnerships and led to increased investments on the basis of PPP. Completed projects under the new concession framework include a heavy-duty highway for mining trucks in South Gobi as well as a power plant.

Budget. As most infrastructure projects in Mongolia were financed by foreign aid and assistance following the country's transition to a market economy, budget financing in Mongolia was largely directed to funding social infrastructure[11]. However, beginning in 2005, Mongolia experienced rapid economic growth supported by a boom in mineral commodity prices. During this period, its mining sector expanded rapidly, closely related to the industrial boom experienced in China. This resulted in a drastic increase in mining revenue. In order to benefit more from this increase, the Parliament implemented a new windfall gains tax on copper and gold in 2006. This tax negatively affected gold producers as well as the state-owned Erdenet Mining Corporation on one hand, but also created an additional revenue stream for the GoM, a first significant increase in exports and tax revenue in the last 20 years. The new windfall gains tax levied on gold and copper served as a major source for increased state budget revenue for a number of years before it was abolished in relation to the OTIA signed in 2009.

This surge in mining revenue financed a sharp increase in budget expenditure, particularly for social needs, such as the Child Money Program, and the development of infrastructure, mainly in energy and roads. Both energy distribution and roads are especially important for Mongolia considering its vast landmass. It is particularly important for regional development as it requires an extensive network of energy lines and national highways to distribute products and raw materials.

[11] Types of social infrastructure include education (schools and universities), health care (hospitals), transportation (railways and roads) and facilities (community housing and prisons).

In 2012, Mongolia's budget investment reached USD 1 billion for the first time (in addition to USD 0.6 billion in the DBM and USD 1.5 billion in government bonds). These funds mostly went to infrastructure and urban development projects. Supplementing these financing sources, Mongolia also utilized foreign aid and loans, mainly concessional loans. In particular, in 2012, Mongolia used MNT 260.8 billion in loans and MNT 213 billion in foreign aid (a total of about USD 300 million) for various projects.

The mining boom during this period directly and indirectly boosted the overall Mongolian economy. As a result of this sustained growth, Mongolia's GDP per capita rose ten-fold from approximately USD 300 per annum in 2003 to USD 3500 in 2012 and almost USD 4000 in 2018. As its GDP per capita rose, Mongolia's Human Development Index also increased in tandem. Many new jobs were created and the poverty rate declined from 38 percent in 2008 to 27 percent in 2012. The country's Gini coefficient, a measure of income distribution, was also 0.327 in 2011, slightly better than its neighboring countries.

In addition, supported by strong taxation revenue from the mining sector, public investment into sectors such as infrastructure, education and healthcare increased rapidly. These very high rates of economic growth were fueled by one of the largest investment to GDP ratios (55 percent and 64 percent in 2011 and 2012). This made Mongolia one of the top 5 countries in the world in terms of investment according to CNN. In 2012, total investment into the economy was equal to almost USD 6 billion (NSO, 2013), from which foreign investment accounted for about 66 percent or USD 4 billion.

With the rising importance of mining in the country, Mongolia, as with many other developing countries, has recently started to apply the principles of sustainable development to the mining sector. In the last 10 years, a large number of policy documents and efforts by companies have been increasingly linked to sustainable development in the country.

Milestone 3 (2016-): Sustainable development long term vision

These efforts have become even more important with the global adoption of the UN's Sustainable Development Goals. Mongolia's Sustainable Development Concept (SDC-2030) was adopted by the Parliament in 2016. This document is Mongolia's long-term national development policy for the next 15 years. For this policy to be implemented successfully and effectively, it is important to ensure the correlation between mid-term policies and programs, particularly industrial/sectoral policies, and their implementation at the national and local level.

The SDC-2030 was developed with 44 objectives in the context of economic, social, environmental, and governance issues. Out of the 44 objectives of the SDC-2030, 39 objectives correlate with 169 objectives of the 17 goals adopted by the UN General Assembly. As mining becomes the country's leading economic sector, its adherence to principles of sustainable development is a crucial issue. The mining sector is essential for Mongolia to reach its sustainable development goals by 2030 and has a profound impact on all spheres of economic and social development.

Mongolia will achieve the following objectives through the SDC-2030:

1. Increase its Gross National Income per capita to USD 17,500 and become an upper middle-income country based on its income per capita.
2. Ensure average annual economic growth of not less than 6.6 percent through 2016-2030.
3. End poverty in all its forms.
4. Reduce income inequality and have 80 percent of the population in the middle and upper-middle income classes.
5. Increase the enrollment rate in primary and vocational education to 100percent, and establish lifelong learning systems.
6. Improve the living environment of the Mongolian people to lead a healthy and long life; increase life expectancy at birth to 78 years.
7. Rank within the first 70 countries by the Human Development Index.
8. Preserve ecological balance and to be placed among first 30 countries on the rankings of the countries by the Green economy index in the world.
9. Be ranked among first 40 countries by the Doing Business Index and among the first 70 countries by the Global Competitiveness Index.
10. Build professional, stable and participative governance, free of corruption that is adept at implementing development policies at all levels.

In order to achieve these objectives, the country will use the following 20 indicators to benchmark its development.

TABLE 1.1. SDG INDICATORS FOR MONGOLIA

#	Indicator	Measuring unit	Base level (2014)	Target level (2030)
1	Annual average economic growth	percent	7.8	6.6[1]
2	Gross national income per capita	USD	4,166	17,500
3	Human development index	rank	90	70
4	Life expectancy	years	69.57	78
5	Poverty rate	percent	21.6	0
6	Global competitiveness index	rank	104	70
7	Doing business index	rank	56	40
8	Environmental performance index	rank	111	90
9	Share of the population with social insurance coverage in the total economically active population	percent	84.4	99
10	Gini coefficient of inequality	score	36.5	30

11	Infant mortality ratio per 1,000 live births	ratio	15.1	8
12	Maternal mortality ratio per 100,000 live births	ratio	30.6	15
13	Number of students in a class at high school (national average)	number	27.3	20
14	Area of the land with disease free status for international trade certified by world Animal Health Organization	percent	0	60
15	Area of desertified land	percent	78.2	60
16	Area of specially protected land	percent	17.4	30
17	Number of foreign tourists travelling in Mongolia	million person	0.392	2.0
18	Share of the households using reliable electricity	percent	89	100
19	Share of the processing sector exports in total exports	percent	17	50
20	Share of main fuel products supplied from domestic production	percent	0	100

The SDC - 2030 includes the following 2 objectives directly related to the mining sector:

Objective 1. Support geological sector development.

Phase 1 - (2016-2020): Strengthen the capacity to undertake all types of comprehensive research in geology, geochemistry and geophysics, update research methodologies, guidelines and procedures conjunct with internationally accepted methods, draw a full map of Mongolia with a 1: 200,000 scale and draw geological maps on 1:50,000 scale for 40 percent of the territory, with ore zones and banks with mineral resources for general exploration[12].

Phase II - (2021-2025): Create a geological information database, create a favorable environment for investment in the mineral exploration sector and draw geological maps of 1: 50,000 scale for 50 percent of the territory, with ore zones and banks with mineral resources for general exploration.

Phase III - (2026-2030): Conduct in-depth explorations at all sites with mineral resource deposits and draw geological maps of 1: 50,000 scale for 60 percent of

[12] The GoM approved the decision to create the National Geological Service in October, 2019. Its predecessor, the Mongolian Geological Survey, was founded in 1939.

the territory, with ore zones and banks, with mineral resources for general exploration.

Objective 2. Encourage a transparent and accountable mining sector and improve its competitiveness.

Phase I - (2016-2020): Ensure a stable investment environment for the mining sector, develop environment-friendly infrastructure and transportation networks and establish a power plant with higher capacity in the Gobi region.

Phase II - (2021-2025): Implement projects on reliable water supply sources and ensure full functionality of large operating mining projects.

Phase III - (2026-2030): Start the development of new large mining projects and develop corresponding infrastructure.

Many other sustainable development goals and objectives included environment related goals have a connection with the mining sector (such as water resources policies).

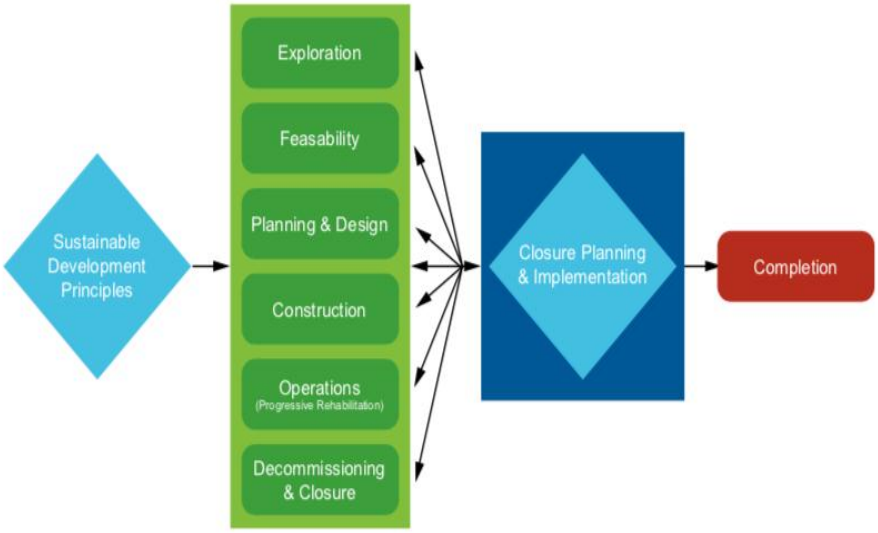
The 2016-2020 Government Action program was built based on the SDC-2030.

Mongolia's mining sector has become the country's main pillar for sustainable development and economic growth. Likewise, the importance of using sustainable development principles in the mining sector also become increasingly evident.

1.3. Overview of the report

The goal of this study is to assess the sustainability of mining sector development in conjunction with the country's mining development strategy. Mongolia's mining development strategy was specifically adopted to ensure that the mining sector positively contributes to the sustainable development of the country. In other words, if the mining sector is managed well, investments into the sector not only will generate significant revenue for the country, it will also indirectly contribute to the economy and thus should positively contribute to the livelihoods of citizens. According to international studies, the application of sustainable development principles in the mining sector can be grouped as shown it the figure below.

FIGURE 1.2. SUSTAINABLE DEVELOPMENT PRINCIPLES IN THE MINING SECTOR



On the other hand, mining has a significant socio-economic impact on the sustainable development of a country in general. This study reviews the issues related to sustainable development of the mining sector in Mongolia. As natural resources are inherently finite, mining can have a limited impact on the country's development for a finite period of time. Therefore, the question of how to benefit from the mining sector for a long period of time in a sustainable way is especially important.

According to the International Institute for Environment and Development (IIED), contributions towards sustainability should be assessed along the following four major avenues:

1. Economic sphere
    a. Macroeconomic impact
    b. Foreign trade impact
    c. Impact on public finances
    d. Other macroeconomic impacts
2. Social sphere
    a. Education
    b. Employment
    c. Technology
    d. Other spheres
3. Environmental sphere
4. Governance sphere
    a. Policy field
    b. Corporate governance

There are challenges in successfully achieving sustainability. According to the IIED, the following challenges are commonly faced:

- Viability of the mining industry
- The control, use, and management of land
- Minerals and economic development
- Local communities and mines
- Mining, minerals, and the environment
- An integrated approach to using minerals
- Access to information
- Artisanal and small-scale mining
- Sector governance

As such, the study covers these challenges and reviews how the country is addressing these issues.

In order to accomplish the objectives above, the study team reviewed research papers and reports on sustainable development and the mining sector, as well as related national policy papers. The team also collected primary and secondary data from publicly available sources and conducted interviews with relevant experts and organizations and performed the related analyses.

2. Economic Issues Of Sustainable Mining

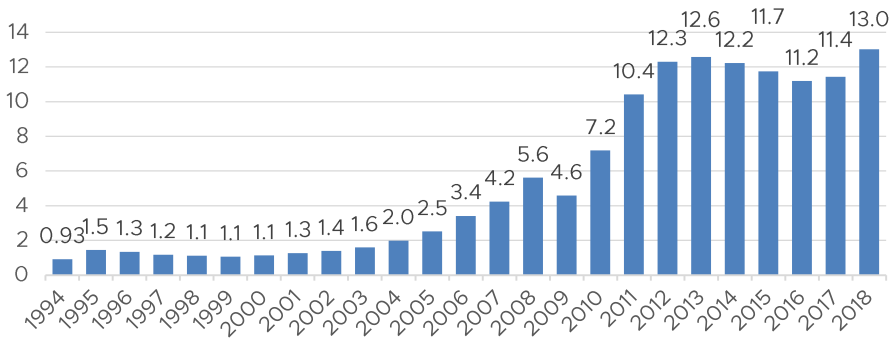
The development of Mongolia's mining sector, particularly in the last 10 years, has had a profound impact on the country's economy. This chapter will define the macroeconomic impacts of the mining sector on public and household finances as well as foreign trade.

2.1. Economic development and structural change

Mongolia adopted the CNDS in 2008 and officially included numerous mining development policies[13]. The CNDS consisted of two stages, one from 2008 to 2015 and one from 2015 to 2021. It was the culmination of two years of work by the GoM, Parliament and the President's office following the Parliamentary adoption of the MDGs in 2005 and the UN's call for implementation of national development strategies by member countries.

The Mongolian economy has experienced steadfast growth for the last 19 years. While the average annual GDP growth in 2000-2005 stood at 5.6 percent, between 2005 and 2010 it increased to 6.7 percent and further accelerated to 10.7 percent between 2010 and 2014. From 2014 to 2016, the country's economy has experienced a slowdown in growth, related to falling mineral commodity prices. Economic growth has since risen.

FIGURE 2.1 MONGOLIA'S GDP IN BILLION USD



Source: World bank

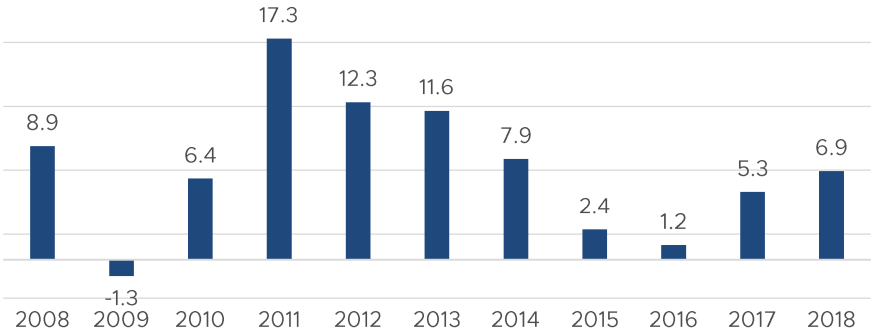
[13] Essence of CNDS:

- Use large mining deposits as engine of growth,
- Attract FDI,
- Use mining to build infrastructure, increase tax revenue, spur regional development,
- Gradually shift to higher value-added production chain
- Diversification
- Further development of non-mining industries.

As the figure above shows, Mongolia experienced a difficult period between 1990 and 2005 where GDP was just USD 2.5 billion. However, since the start of large mining projects, Mongolia's GDP increased drastically from USD 4.6 billion in 2009 to USD 13 billion in 2018. While it still remains small, the growth rate over the years (a ten-fold increase from 2000) is a notable achievement on its own.

In terms of growth, the peak came in 2011 with a reported real growth rate of 17.3 percent. Since the start of mining megaprojects in 2009, the GDP growth has reached double digits between 2011 and 2013. The growth rate has continued to maintain relatively high level from 2017 to 2018.

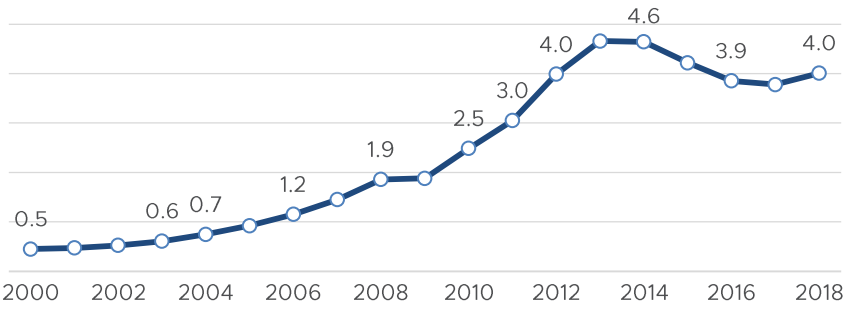
FIGURE 2.2 GDP GROWTH RATES IN 2008-2018



Source: World bank

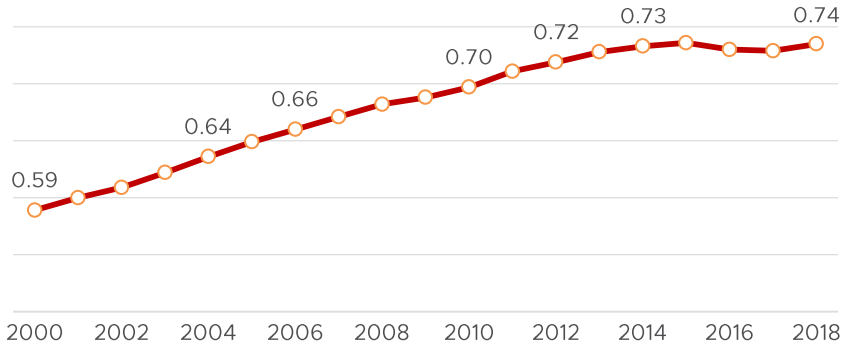
As a result of this economic growth, the World Bank estimated that Mongolia's GDP per capita reached USD 4657 in 2013 and it was no longer classified as a low-income country. Mongolia joined the rankings of lower-middle income countries in 2008, a major step forward for the country. Moreover, between 2000 and 2013, GDP per capita increased ten-fold. The GDP per capita in USD decreased from 2014 to 2016 due to a sharp depreciation of the MNT (but continued to increase in nominal terms in MNT), but grew again later, reaching USD 4009 per capita.

FIGURE 2.3 GDP PER CAPITA, USD, WB ATLAS METHODOLOGY



Source: NSO

FIGURE 2.4 MONGOLIA'S HUMAN DEVELOPMENT INDEX

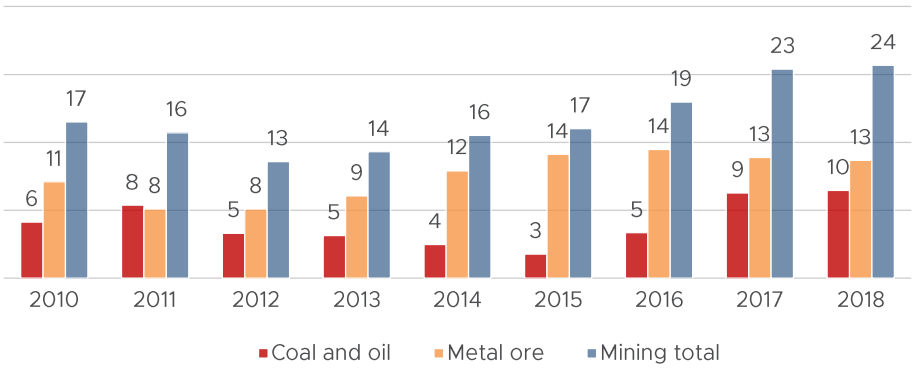


Source: UNDP

The World Bank estimated Mongolia's overall GDP based on purchasing power parity at USD 43 billion. Again, there was a sharp increase in GDP since 2009, when Mongolia started several mining megaprojects such as the OT and Tavan Tolgoi projects. These two projects significantly contributed to economic growth in last 10 years and, as a result, changed the GDP's structure of the country considerably.

Currently, Mongolia's mining sector accounts for 24 percent of total GDP. The largest contributors are coal and copper but other minerals such as crude oil, iron ore and gold have all contributed to GDP growth.

FIGURE 2.5 CONTRIBUTION OF MINERAL COMMODITIES TO GDP, PERCENT



Source: NSO and ERI calculation

In pursuing mining led development, the country followed examples of many mining led[14] economies, such as Chile and Australia. These countries benefited greatly from the mining sector and their mining development has brought numerous benefits, particularly in mining regions. If managed effectively, the mining sector has the potential to play an important role in national and local economic development. Chile is an example of successful mining led development whose copper production accounted for 28 percent of world output in 2018. It managed its mineral wealth efficiently and created lasting benefits for its population. Chile is now among the group of high human development countries and is ranked 44 by the UNDP. Mongolia currently has a Human Development Index (HDI) value of 0.741, ranking it 92nd in the world in terms of human development. It is notable that Mongolian policymakers have very actively studied the experiences of both Chile and Australia.

The structure of GDP also has drastically changed since 2009. Notably, the mining sector grew from accounting for 20 percent of GDP in 2008 to 23.5 percent in 2018, while the agriculture sector's share of GDP decreased from 19 percent to 10 percent. Other significant changes include a two-fold increase in construction as well as a sharp increase in the financial sector's contribution to GDP.

TABLE 2.1 GDP STRUCTURE EVOLUTION, IN PERCENTAGE OF GDP FOR SELECTED INDUSTRIES, 2008-2018

	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Agriculture	19.2	17.9	11.7	10.3	11.3	13.4	13.3	13.4	11.7	10.3	10.8
Mining quarrying	20.2	19.5	21.5	19.3	16.4	14.9	16.5	17.1	20.1	23.5	23.5
Manufacturing	8.8	9.2	9.1	9.0	9.3	10.5	10.6	9.7	9.8	11.2	11.6
Construction	1.9	1.3	2.6	3.1	5.0	5.1	4.4	4.2	4.0	3.7	3.6
Service and trade	39.7	43.1	44.8	45.8	46.9	44.7	45.8	47.5	46.1	42.3	39.6

Source: NSO

The increase in mining production is shown below. Crude oil and coal output increased 5-fold, copper output increased 2.5-fold and the output of iron ore grew 4-fold.

TABLE 2.2 OUTPUT OF MAJOR MINERALS, MONGOLIA

	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Coal (Mt)	10.1	14.4	25.2	32.0	29.9	30.1	25.3	24.2	35.5	48.1	51.4

[14] There are a number of ways of deciding which countries qualify as mineral economies, for instance, mineral output can be set against gross domestic product (GDP) and the dependence of foreign-exchange earnings on mineral exports can be considered. Mongolian mining export constituted 88 percent of total export and accounted for 24 percent of GDP in 2018. Mining activities generate new infrastructure such as roads, railway lines, electricity supplies, schools, and hospitals that, although providing for the mining sector and its work force, also benefit the rest of the population.

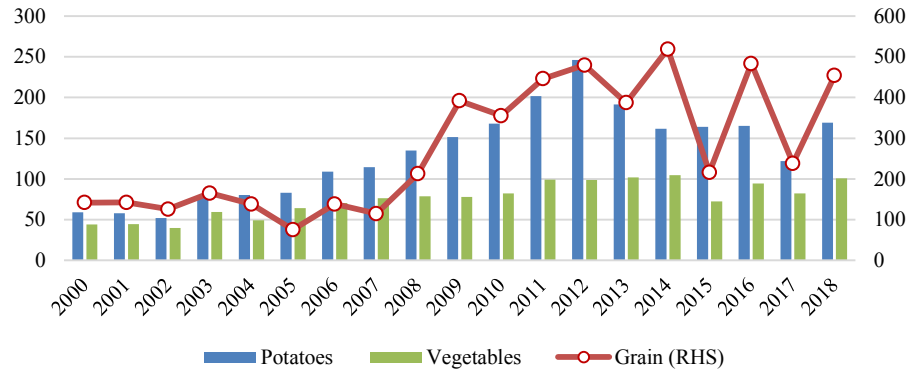
Crude oil /mln.brl/	1.2	1.9	2.2	2.5	3.6	5.1	7.4	8.8	8.2	7.6	6.4
Copper concentrate (Mt)	0.53	0.53	0.52	0.51	0.52	0.80	1.08	1.33	1.45	1.32	1.31
Gold /thou.kg/	14.5	9.3	6.0	5.5	6.0	8.9	11.5	14.5	18.4	19.8	20.7
Iron ore (Mt)	1.4	1.4	3.1	5.2	6.9	5.0	6.3	4.3	4.9	7.7	6.2
Zinc concentrate /thous.t/	143.6	141.5	112.6	104.7	119.1	104.1	93.2	89.6	100.2	82.7	87.9

Source: NSO

These developments made Mongolia a mining-based economy. Additionally, it also led to growth in other sectors as the mining sector has a strong influence on the economy through direct and indirect channels. When the mining sector experiences growth, the demand for labor and input materials increase and wages and input prices rise. Moreover, boosted tax revenue lead to increased government revenue. As such, the income of all participants in the economy increase, the aggregate demand of the economy grows and ultimately positively effects real GDP. On the other hand, a sharp slowdown of the mining sector will harm the economy as the multiplier effect increased the effect of the mining sector on the overall economy. According to the Impact Assessment of the Mining Sector on the Economy (ERI, 2018b), if mining production increased by MNT 100, total GDP increases by MNT 195. Out of the total impact, MNT 145 is from production increases and MNT 50 is from price increases. From earlier studies of mining multipliers, the development of mining in Mongolia has a significant impact on the growth of finances, construction, energy and imports.

Despite the decrease in the overall share of agriculture in GDP, in absolute terms the agriculture sector has a high growth rate. Generally, the production of key agricultural products like grain, vegetables and potatoes doubled in the last 10 years. Mongolia has a 100 percent self-sufficiency ratio for grain and potato and a 60 percent self-sufficiency ratio for vegetables.

FIGURE 2.6 OUTPUT OF GRAIN, VEGETABLES AND POTATOES, MONGOLIA



Source: NSO

The trade and services sector also boasts high growth rates.

TABLE 2.3 PRODUCTION GROWTH RATES OF AGRICULTURE AND TRADE AND SERVICE SECTORS, YOY

	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Agriculture	4.7	3.6	-16.6	-0.3	21.1	19.2	13.7	10.7	6.2	1.8	4.5
Trade and Services	13.9	0.3	10.9	17.8	10.3	7.8	7.8	0.6	1.1	7.7	5.0

Source: NSO

Interestingly, the share of the processing sector increased from 8.3 percent to 11 percent of GDP over the last 10 years as the country shifted to implementing large scale projects. The "Dutch disease" phenomena in mining countries usually suggests that mining-based development is detrimental to growth of the processing sector due to an appreciation of the national currency. However, this has not been the case for Mongolia so far. The growth of the processing sector may be attributed to national industrialization policies that are largely supported by increasing revenue from the mining sector. In current prices, metal production increased by 30 percent while the production of construction materials increased more than 3-fold in the past decade.

TABLE 2.4 INDUSTRIAL PRODUCTION

	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Metal production (bln. MNT)	166.4	67.1	90.9	106.9	188.9	167.0	266.5	161.8	116.2	173.4	215.2
Cement /thous.t/	269.3	234.8	322.5	425.8	349.3	258.8	411.3	410.1	432.4	675.2	933.8
Concrete /thous.m3/	91.9	35.9	36.9	68.9	176.2	317.8	432.6	129.0	75.6	102.5	170.7
Lime /thous.t/	43.3	43.1	50.2	45.3	68.2	56.7	58.0	52.3	47.6	56.2	58.7

Source: NSO

Currently, Mongolia has the capacity to produce close to 4 million tons of cement per annum, similar to the levels of Switzerland and Austria.

Some notable industrial projects are:

"Achit Ikht" LLC (2014), Copper smelter

In 2014, Achit Ikht LLC commissioned the construction of the largest copper cathode plant in Mongolia. It was Mongolia's first modern hydrometallurgical plant built by private investors and can produce 10 thousand tons of copper cathode a year. Achit Ikht produces copper cathode utilizing SX-EW technology and exports its output to Chinese copper refineries (Achit Ikht LLC, 2019).

"Moncement Building Materials" LLC (2015), Cement

Moncement Building Materials LLC, established in 2015, operates integrated facilities for the production of cement. It consists of a completely dry process production line with a capacity of 1750 metric tons per day of clinker in Urgun soum, Dornogobi province. The company is currently developing a grinding station and terminal that has a 120 tons per hour capacity. Moncement Building Materials LLC is owned by Monpolymet LLC, a company incorporated under the laws of Mongolia and the European Bank for Reconstruction and Development (EBRD). It is a pioneer in modern dry process cement technology in Mongolia and relies on practical training and knowledge from Tangshan Jidong Cement Co., Ltd. (SZSE: 000401), the 6th largest manufacturer of cement in the world (Moncement, 2019).

"MAK Euro Cement" plant (2017), Cement

MAK Euro Cement plant, established in 2017, is a fully automated plant with an annual production capacity of 1 million tons of cement and 0.9 million tons of clinker. It is equipped with advanced technology from FLSmidth, a leader in the cement industry. In addition, the plant has the capacity to produce 100 thousand tons of lime per year. The plant is equipped with the first robot laboratory in Mongolia and performs all actions encompassing the handling of raw materials to creating final products. The robot laboratory can analyze 50 samples simultaneously. MAK Euro Cement plant has created about 900 new jobs. The project was financed by more than USD 330 million through the Chinggis Bond, the BHF Bank and MAK LLC (MAK LLC, 2019).

Darkhan Metallurgical Plant, Iron ore

The Darkhan Metallurgical Plant JSC was established under the "Mining and Metallurgical Plant Complex" concept developed between 2010 and 2015. The Iron Ore Wet Magnetic Separator plant component of the project was opened in 2014. The iron ore processing plant is currently the largest in Mongolia and is capable of processing 1 million tons of iron ore a year. The Iron Ore Wet Magnetic Separator plant is the basis for the preparation of key raw materials for national mining and metallurgical companies. The "Mining and Metallurgical Plant Complex" project was financed by QSC LLC (Darkhan Metallurgical Plant JSC, 2019).

"Mongol Refinery" state-owned LLC, Oil refinery (under construction, joint project with India)

The GoM initiated the "Mongol Refinery" project in 2015. The comprehensive Feasibility Study of the project was executed by Euro Oil, a Hungarian company. The project aims to establish a petroleum refinery and petrochemical plants to refine domestically mined crude oil. Between 2008 and 2018, the Mongolian import of crude oil products increased more than 5-fold. The project plans to build a crude oil pipeline with the capacity to process 1.5 million tons of oil per year in line with crude oil production. The infrastructure construction work started in 2018 with USD 1 billion soft loan from the Government of India. The project is expected to have numerous positive impacts, including increasing employment and supporting other sectors through intermediate demand. However, whether the initial investment can be

recovered and a reliable supply of crude oil remains an issue. Mongol refinery is expected to reach its full capacity by 2023 (Mongol Refinery, 2019).

Macroeconomic Policy Adjustment to Mining-Led Growth

As the macroeconomic growth of the country continues to accelerate considerably, achieving a growth rate of 17.5 percent in 2011 (6.9 percent in 2018), there was an increasing need to analyze the trends and plan for further growth. As a result, the Parliament and GoM ratified a number of related policy documents.

In particular, the operations of mining megaprojects brought with it a need to improve Mongolia's energy supply and infrastructure, resulting in a need for increased coordination between sectors and better policy planning. The importance of intersectoral coordination, based on long term development plans, was reflected in the 2019 amendments to the Constitution. The policy documents, which outlined the coordination and projections of sectoral growth, were developed for the first time shortly after the start of mining megaprojects. These include:

- First national midterm development plan (2012-2017),
- First midterm public investment plan (PIP) (2012-2017),
- New construction midterm plan 2010-2016
- Industrial development policy (2015)
- Law on Development planning (2015)
- Sustainable development long term vision of Mongolia-2030 (2016)
- Changes in the Law on Election (2016) to support Development planning and Long term vision 2030
- The National three pillar midterm plan 2018-2020 (2018)
- PIP 2018-2021
- Amendments to the Constitution to support long term development planning (2019).

The overall macroeconomic impact of mining on Mongolia is very significant. It supported the accelerated growth of GDP since 2009 and Mongolia's GDP per capita reached levels of some Eastern European countries. It also resulted in significant changes in GDP structure, making mining the leading national sector. It also created a need to strengthen national development planning and coordination across sectors in order to accommodate the large changes brought by mining.

2.2. Foreign trade and investment

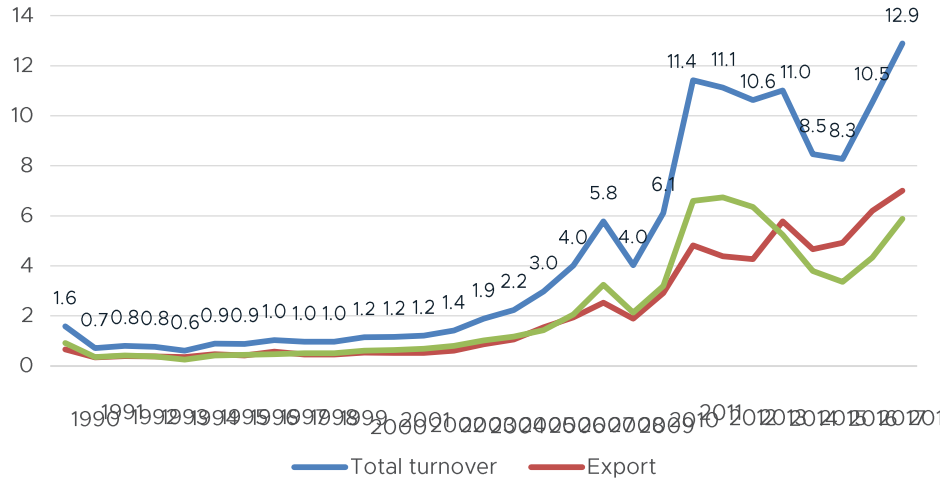
Mongolia's foreign trade has expanded tremendously over the last 15 years. Between 2005 and 2018, exports have expanded 7-fold while imports have increased 5-fold. A key factor to this impact was in the increase in the trade of mineral commodities. This increase in trade ranked Mongolia 34th in the world in terms of trade openness according to the World Bank.

TABLE 2.5 FOREIGN TRADE OF MONGOLIA, MILLION USD

	2005	2006	2007	2008	2009	2010	2011	2014	2015	2016	2017	2018
Export	1064	1542	1948	2535	1885	2909	4780	5774	4669	4900	6200	7011
Import	1177	1435	2062	3245	2138	3200	6527	5236	3795	3400	4337	5875

Source: NSO

FIGURE 2.7 FOREIGN TRADE OF MONGOLIA, TOTAL TURNOVER, EXPORTS AND IMPORTS



Source: NSO

There were also large changes in the geographical distribution of trade. Previously at the beginning of the transition to a market economy, Mongolia traded mostly with Russia and Eastern Europe. However, currently its largest partners are mostly from East Asia.

TABLE 2.6 LARGEST TRADE PARTNERS OF MONGOLIA, 2017, MILLION USD

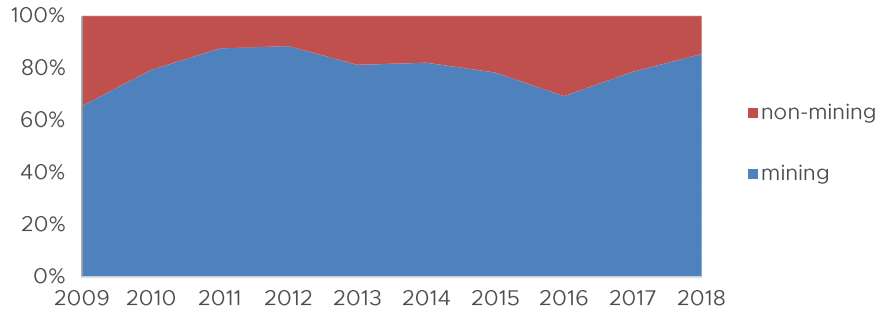
	Export	Import	Balance	Total turnover
China	5 307	1 428	3 880	6 735
Russia	68	1 219	-1 152	1 287
UK	661	29	632	690
Japan	15	363	-348	378
Korea	12	198	-186	210

Source: NSO

As the figure above shows, Mongolia has a large trade surplus with China and the UK and has trade deficits with Russia, Japan and Korea. In other words, the export revenue from China finances Mongolia's imports from Russia, Japan, and Korea. This switch to East Asian markets also happened during the development of mining as

China is the leading buyer of Mongolia's mineral commodities. Currently, while mining exports accounted for 66 percent of the country's exports in 2009, it was 88 percent in 2018.

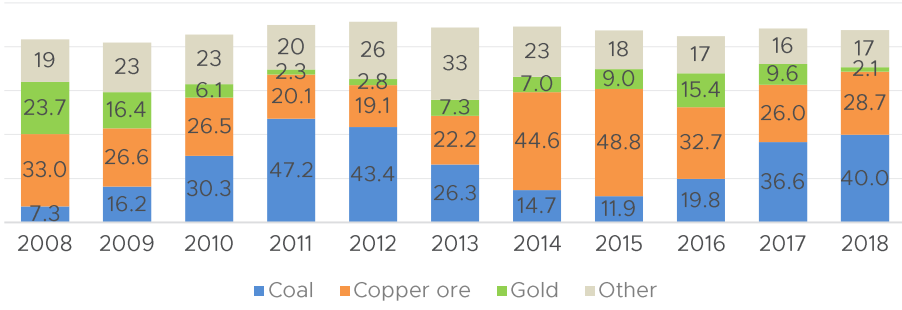
FIGURE 2.8 EXPORT BY MINING AND NON-MINING SECTORS



Source: NSO

An important external factor of foreign trade is the movement of prices in mineral commodity markets. As stated in the Study of Commodity Market (ERI, 2017a), the main export commodities are coal, copper, gold and iron ore. Therefore, the whole economy, not only mining sector, is susceptible to changes in the demand and prices of those commodities. Demand for gold for the purpose of reserve management by central banks and for investment purposes by investors are the main drivers of the price of gold. Currently, the price of gold is increasing due to growing risks in the world market. As for copper, although its price is expected to grow in the long-run mainly due to limited supply and increased demand from electric vehicle production, currently, price is falling due to slowing the growth rate of the global economy. Demands for Mongolian coking coal and iron ore are highly dependent on Chinese steel production. In the short term, the prices of these commodities are remaining high due to China's policy of subsidizing its steel industry during its trade war with the U.S. In contrast, thermal coal prices are gradually declining due to competition from other cheaper sources of energy as well as environmental policies in major importing countries like China and India.

FIGURE 2.9 CONTRIBUTION OF MINERALS (BY TYPE) TO MONGOLIA'S EXPORTS



Source: NSO

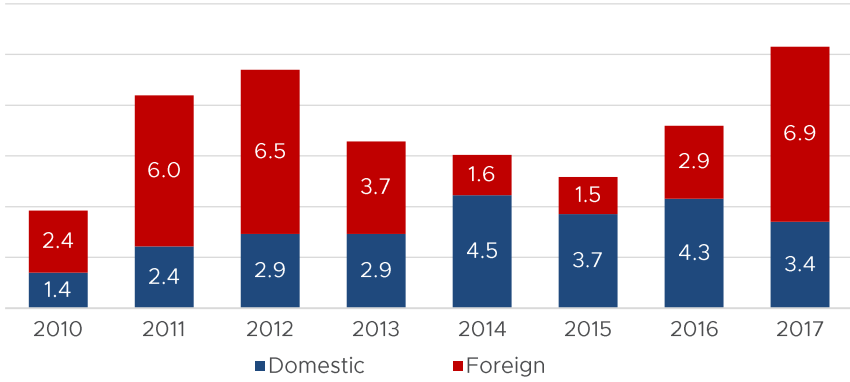
As shown in the figure above, in 2008, the main export items were copper and gold. However, since then exports have increased significantly and currently copper and coal are the main export items of the country. Together they constituted up to 70 percent of total exports in 2018. Iron ore, gold, crude oil, and other minerals (zinc, molybdenum, lead, fluorspar etc.,) make up another 18 percent of national exports.

The growth of mining-based exports, however, has hit increasingly challenging infrastructure barriers. The low quality of infrastructure is the main bottleneck of mineral commodity exports. According to the Marketing and Trading in Mining study (ERI, 2017b), coal and iron ore exporters face numerous challenges in transporting bulk materials and crossing borders. In case of coal, as traffic is heavy and the capacity of Chinese border control is limited, it takes a long time to cross the border leading to higher costs. A possible solution is the construction of railroad from coal mines such as Tavan Tolgoi and Nariin Sukhait to Chinese border ports as the cost of rail transportation is 2.8 times lower than the cost of road transportation (ADB, 2018). Unfortunately, due to political and financial issues, the rail road project has been delayed for the 10 years.

The mining sector depends on many external factors from exploration to extraction. Foreign direct investment (FDI) is one of the most important factors. After liberalization of the mining sector in 1997 the liberal economic regime for investments in the mining sector resulted in a rapidly increasing inflow of foreign investment into the mining sector. Initially investment into mining sector was mainly directed into exploration of natural resources and Mongolia became one of top 10 destinations in the world in terms of exploration investment. Gradually the exploration phase shifted to production and the amount of foreign investment grew multi-fold. FDI in Mongolia in 2009 was 4 times more than FDI in 2003. The current Mongolian mining boom was to a large extent financed by private sources and among them, foreign capital has been key for its development.

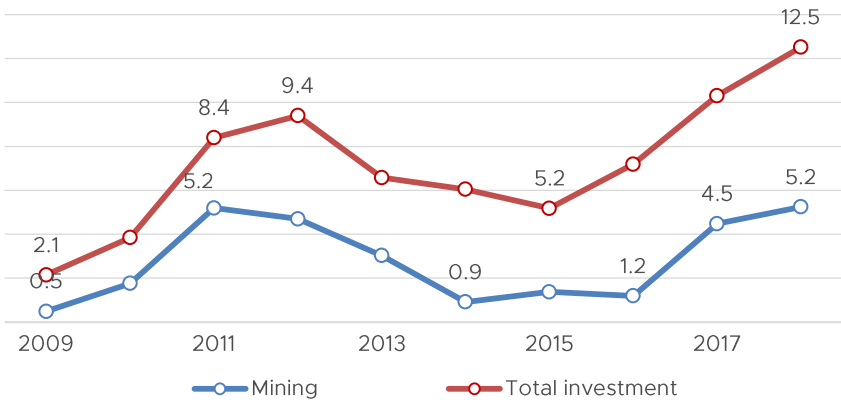
Foreign investors prefer a well-developed legal and policy framework, an acceptable level of political stability and well-defined property rights. Mining investment, particularly into a developing country, creates new development opportunities as well as challenges. The opportunities include hard-currency earning in economies where they are scarce, increased government revenues, jobs, improved education, skill growth and the development of infrastructure such as roads, electricity and construction. According to a study of FDI, (ERI, 2018a), the majority of Mongolia's FDI is through the mining sector. In 2011, due to the Oyu Tolgoi project, Mongolia's FDI inflows increased dramatically. Moreover, the flow of FDI depends on mineral commodity prices. However, Mongolia is a price taker and improving its investment environment is the main strategy for Mongolian policy makers to attract FDI. Between 2011 and 2013, FDI greatly contributed to an increase in overall investment; however, between 2013 and 2015 FDI fell sharply, increasing again since 2016. Support for FDI is very important for overall investment growth in the country.

FIGURE 2.10 OVERALL INVESTMENT (MNT TRILLION), DOMESTIC AND FOREIGN



Source: NSO

FIGURE 2.11 TOTAL INVESTMENT AND SHARE OF MINING INVESTMENT, MNT TRILLION, NSO



Source: NSO

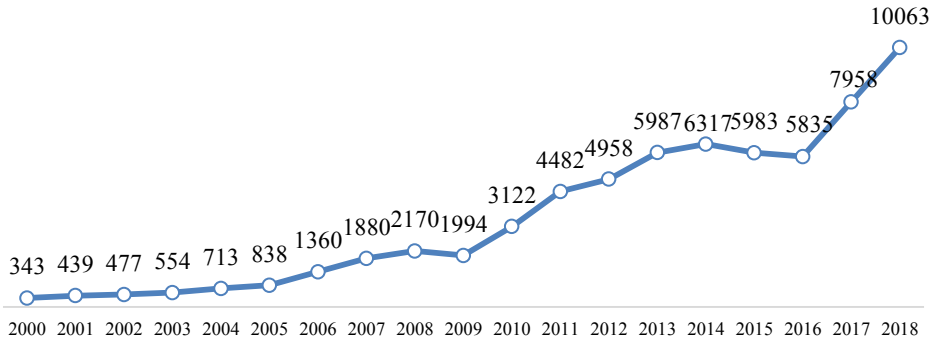
As the figures show, most FDI into Mongolia is concentrated in the mining sector. In the last decade, an average of 37 percent of total investment inflow went to the mining sector.

2.3. Mining contribution to public finances

In order to utilize its vast mineral resources, the GoM has taken a number of steps to increase its stake in mining reserves, simultaneously undertaking a tax reform to streamline its tax procedures in 2006 (called 4x10 or 4 flat tax principles). Since 2006, mining has contributed greatly to the public fiscal revenue. In USD terms, at the beginning of 2000, the budget revenue had been about USD 300 million per

year. In 2018, budget revenue reached about USD 4 billion at the current exchange rates. This growth rate in budget revenue is extremely high with budget revenue increasing about 13-fold since 2000. As the figure below shows, the increase mainly began starting from 2006 with slight falls in 2008 and between 2014 and 2016 when the world prices for mineral commodities were low due to global economic crises and stagnations.

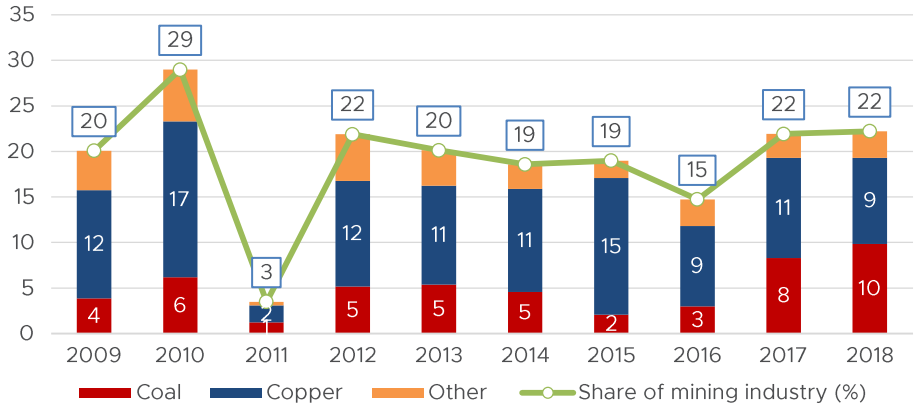
FIGURE 2.12 BUDGET REVENUE, MONGOLIA, NSO, MNT BILLION



Source: NSO

Mining development contributed greatly to this increase in public revenue. It is estimated that only the direct revenue from mining reached as high as 33 percent of total budget revenue in 2011. Its contribution is currently stabilizing at about 22 percent.

FIGURE 2.13 CONTRIBUTION OF MINERALS INTO BUDGET OF MONGOLIA, BY PERCENTAGE OF MAIN ITEMS, 2009-2018



Source: ERI estimation based on the data from Ministry of Finance and Ministry of Heavy Industry and Mining

With increased mining revenue and assistance from the DBM, the GoM actively began operations in international financial markets.

TABLE 2.7 GOVERNMENT BOND ISSUANCE ON INTERNATIONAL MARKET

	Bond name	Amount (mln)	Currency	Coupon (%)	Issue date	Maturity (years)	Bond rating (S&P/Fitch)
1	**Chinggis 500**	500	USD	4.125	12/5/2012	5	B/B
2	**Chinggis 1000**	1000	USD	5.125	12/5/2012	10	B/B
3	**Dim sum**	1000	CNY	7.5	6/30/2015	3	B-/B-
4	**Mazaalai**	500	USD	10.875	4/6/2016	5	B/B
5	**Khuraldai**	600	USD	8.75	3/9/2017	7	B-/B-
6	**Gerege**	800	USD	5.625	10/26/2017	5.5	B-/B-

Since the DBM's issuance of foreign bonds, private Mongolian companies also began to actively participate in bond issuance overseas.

TABLE 2.8 OUTSTANDING BONDS ON THE INTERNATIONAL MARKET AS OF NOVEMBER 2019

	Bond name	Amount (mil)	Currency	Coupon (%)	Issue date	Maturity (years)	Bond rating (Moody's)
1	**DBM (Samurai bond)**	30 000	JPY	1.52	12/25/2013	10	B3
2	**DBM**	500	USD	7.25	10/23/2018	5	B
3	**TDBM**	500	USD	8.375	5/19/2015	5	B3
4	**MMC**	440	USD	9.25	4/15/2019	5	B-
5	**MIK**	300	USD	9.75	1/29/2019	3	B3

Source: Khan Bank Daily Market News

Overall, the increase in public revenue, supported by the growth of the mining sector, created a necessity to modernize the public finance system. The following steps were undertaken to adjust the public finance system to mining led growth:

- Creating development financing: Development Bank of Mongolia (2010): Law, agency (bank), training, management team, raising finances (raised finance USD 2.1 billion in 2012 and USD 500 million in 2019)
- Amendment of fiscal system for better managing fiscal resources (Integrated Budget Law, 2011)
- Regional Development index for better distribution of funds (2011)
- Creation of Fiscal stability legal framework (2011)
- Creation of Stability Fund (2011) and preparation for Sovereign Wealth Fund (2017)

- Creating PPP or Concessions Framework (2009) for infrastructure projects: law, agency, training Preparation for better debt management system (2013)
- Debt repayment schedule (2015) and debt management law (2015)
- Sovereign Wealth Fund (Future Heritage fund) launched (2019)

Mongolia's mining revenues constituted about 22 percent of the total budget revenue on average for the last decade. The budget revenue fluctuations are associated with the changes in mining revenues and are determined by mineral commodity price fluctuations. Since 2011, the economic growth rate has been steadily decreasing from a very high 17 percent due to mineral commodity price declines. Consequently, budget revenues have fallen but costs remain high. Following this, the government's external debt rose sharply. The external debt of the government equaled MNT 18.9 trillion or 58.6 percent of GDP as of 2018. The large government debt causes a heavy burden on the budget.

To prevent economic risks from fluctuations in commodity prices and to properly manage mining revenues, the Parliament adopted the Fiscal Stability Law (FSL) in 2010. The FSL is enacted in the framework of ensuring fiscal sustainability, generating renewable resources from mineral revenues, investing in economic development and setting up fiscal reserves. However, the FSL was amended several times and its implementation has been delayed. In the Revenue Management study (ERI, 2017c), the impact of the FSL on the economy was assessed.

The Fiscal Stability Law legalized the following budgetary ceilings:

1. Total budget revenue must be calculated using an equilibrated method /based on average price of main minerals in last 20 years and average price of the subsequent 3 years/
2. The growth rate of total expenditure must not exceed the maximum of the growth rate of non- mining GDP in the same year and the average growth rate of non-mining GDP in the past 12 years
3. The budget deficit based on the equilibrated method must not exceed 2 percent of GDP in the same year or must become surplus
4. The net present value of government debt must not exceed 60 percent of GDP of the budget year

The updated version of the Revenue Management study (ERI, 2018d) finds that the FSL contributes significantly to the reduction of economic fluctuation; however, the implementation of the FSL needs to be stricter. Specifically, as suggested in simulations, the greatest negative impact on the economy is observed when the government's expenditure was not restricted.

The Future Heritage Fund (FHF), established by the GoM in 2017, is another measure made to encourage the sustainable development of the mining sector. The fund consists of a certain portion of the revenue from the mining sector. The revenue accumulated in the fund is used to cover debt repayments and any budget deficit in the future. In such a way, current surpluses from a booming mining sector can be used to reduce any fiscal burden on future generations. The FHF was previously known as the Human Development Fund used to finance social welfare programs

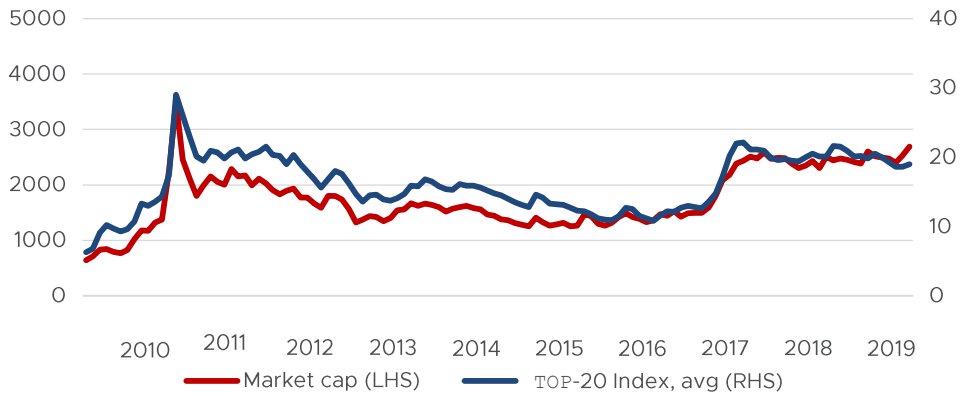
such as the Child Money Program. The fund had accumulated large amounts of debt from financing the Child Money Program, a fact that undermines the planned wealth accumulation goals. At the time of the FHF's inception, it had already accumulated MNT 1.7 trillion in debt from the previous Human Development Fund's programs. As a result, despite the government allocating MNT 357.7 billion and MNT 508.7 billion into the fund in 2017 and 2018 respectively, the fund is still in debt. However, the government plans to increase the funds allocated to the FHF in upcoming years and according to the Future Heritage Fund Law, the fund will be financed by the state budget until 2030. Starting from 2030 however, 10 percent of the returns from the fund will be allocated to the budget.

In addition to the changes in the budget, concessions created another important channel of investment. The new Concessions Law established procedures for PPP in investment and allowed for increasing investment into the country on the base of PPP. A number of infrastructure projects were implemented using PPP.

Financial sector development

The increased inflow of money from abroad, including portfolio investment, resulted in the need to modernize the securities market. Another important step was the development of Mongolian Stock Exchange (MSE). While the MSE was founded at the beginning of the 1990s, it was mainly used to allocate shares of state-owned enterprises. However, its goal gradually changed as more portfolio investment came in from abroad and more than 300 companies are currently listed on the MSE. To gear the MSE towards fulfilling development financing needs, its management team was renewed, new specialized software was installed and an advisory team from London Stock Exchange helped its modernization. The MSE has become an important financing tool for Mongolian companies hoping to raise financing their projects and its related laws were amended in 2013. A number of Mongolian and Mongolia-based mining companies made IPO overseas, including domestic oil exploration and coal companies.

FIGURE 2.14 MSE MARKET CAPITALIZATION, AND TOP 20 INDEX, BILLION MNT



Source: NSO

The expansion of Mongolian mining companies and mining-related companies led to a growth in the financial sector. Currently, many local banks are financing loans related to the mining sector.

TABLE 2.9 FINANCIAL SECTOR TOTAL ASSETS MNT BILLION

	2010	2011	2012	2013	2014	2015	2016	2017	2018
SCC	48.8	61.9	67.7	73.8	80.5	97.7	113.1	153.1	200.2
NBFI	128.6	205.4	252.1	379.7	507.9	623.2	787.2	969.2	1284.9
Insurance	56.8	81.2	107.4	126.4	152.5	173.2	208.4	244.7	331.9
Commercial banks	6245.6	9371.6	11992.2	20883.7	22582.4	21521.2	25338.4	28772.9	33053.3
Growth rate	-	50%	28%	73%	9%	-4%	18%	14%	16%

Source: Financial Regulatory Commission and Bank of Mongolia

Resource-rich countries should acknowledge the adverse effects of the mining sector on economic and social factors while simultaneously benefitting from their wealth. The governments should mitigate these adverse effects by distributing mining revenues effectively, protecting human rights and combating corruption. To do this, governments must use the mining revenues effectively with a long-term policy in the mining sector.

Mining contribution to the local government budget

Mining activities also have a significant impact on the local economy. For instance, the per capita budget expenditure in mining regions have been higher than that of non-mining regions over the past decade (except in 2013). Umnugobi aimag, for example, where major mines such as OT and Tavan Tolgoi are located, has the highest local budget expenditure and base revenue per capita in the country. Umnugobi aimag currently accounts for 5 percent of the local government budget alone (10 percent, excluding Ulaanbaatar).

Sharing mining revenues effectively between the central government and local governments is one of the most controversial issues for resource-rich countries. Although there is an opportunity to develop local area where mining companies operate through distributing revenues, revenue spending is usually ineffective due to weak governance and capacity of the local administration. Transferring mining revenue to the local government usually has a negligible or even negative impact on local social and economic development (Cust & Vaile, 2016). However, accruing mining revenues into the central government still could be followed by the aforementioned drawbacks and bureaucracy. Poor information flow among various government organizations can lead to ignoring local needs and development. In general, corruption, lack of transparency and poor accountability are major drawbacks that make distributing mining revenues ineffective.

The deliberate sharing of fiscal revenues among different levels of stakeholders is a common method for resource-rich countries. In Indonesia, local governments impose taxes, collect license fees and receive a share of some taxes. Most of the personal income and property taxes and tax on natural resources are distributed to the local

government. For instance, 30 percent of mining royalties are distributed to the local provincial government of which 33 percent are given to the local district government.

In Mongolia, local governments receive some of real estate tax, tax on vehicles and other fees. Specifically, tax on land is fully allocated to local government's budget. The Local Development Fund (LDF) was established in 2011 to promote local development with local citizen participation. The LDF is financed from 5 percent of royalties, 30 percent of crude oil royalty payments and 5 percent of VAT. The funds are distributed to local governments based on the local development index, population, territory and tax incentives. Between 2013 and 2017, the LDF allocated MNT 655.0 billion. Additionally, according to 2018 amendments to the Law on the State Budget, 50 percent of the revenue from mineral exploration fees will be transfered to the province and capital city's LDF starting 2019. From 2020, all the revenue from mineral exploration fees will be transferred to the fund. Additionally, 50 percent of revenue from mining license fees will be transferred to the province and capital city's LDFs starting 2020. In particular, the province and capital city's LDFs have to distribute 50 percent of their aforementioned revenue to the originating soum and district's LDF. In general, mining revenues are distributed from the central government's budget to local governments through the LDF where portions of mining revenues are accrued.

In cases of weak local administration, mining companies are responsible for parts of local development. This is an alternative to distributing mining revenues to the local level. In such cases, mining companies implement or directly finance local development projects. In Botswana, Debswana company, a joint venture between the Botswanan government and the international diamond producer De Beers, implemented education and health projects. Debswana company runs two primary schools and two hospitals. Health projects mainly focused on the treatment of HIV, a major problem in Botswana. Additionally, employees of the company receive free HIV treatment.

In Mongolia, mining companies donate money to promote local and national development. According to the EITI's annual report, mining companies donated MNT 30 billion at the national level in 2017. Most of the donation (89.5 percent) came from Oyu Tolgoi LLC, Usukh zoos LLC, Tsairtmineral LLC, Monenco LLC, Energy Resource LLC and Boldtumur eruu gol LLC. 1 percent of the donations were allocated to education, 7 percent to health, 3 percent to culture and sport and the rest (89 percent) to other activities.

Mining companies also implement local development projects by establishing a joint fund with local governments. Oyu Tolgoi LLC, the largest mine in the country, established the Gobi Oyu Development Support Fund in line with the Community Cooperation Agreement with the local government in 2015. The fund was financed by Oyu Tolgoi with USD 5 million annually going to support local development. This fund is regulated with participation from both Oyu Tolgoi LLC and local governments. Moreover, some mining companies finance the fund depending on their export amounts. Monenco, who operates at the Khushuut project in Khovd province, established the Khushuut development fund to promote local development in 2014. The Khushuut development fund collects USD 0.6-0.7 from every ton of exported coal. Monenco donated MNT 682 million to the fund in 2017.

Another local development fund is the Dornogobi great development fund which was established in 2016. The fund is financed by donations from mining companies operating in Dornogobi province.

Life after mining

Governments should have long term development plans that taking into consideration mine closures. This is why governments make various investment using mining revenues. In general, there are two investment options: investing in infrastructure, health and education sectors or financial assets such as bonds and shares. It is difficult to measure the benefits of the former investment option while it's much easier to consider the costs and benefits in the latter option. Resource-rich developing countries tend to invest in infrastructure, health and education sectors because it is difficult for them to create savings by cutting government spending due to economic conditions. However, creating a natural resource fund is becoming good practice for using mining revenues. In the "Managing public trust: How to make natural resource funds work for citizens" report, the Natural Resource Governance Institute (NRGI, 2014) stated the following benefits of establishing a natural resource fund:

- To stabilize the government spending in ways that improve public spending efficiency in long term and protect from volatilities of commodity prices
- To save mining revenues when weak governance has no capacity to spend all money efficiently in the short term.
- To mitigate Dutch disease by saving a portion of mining revenues in foreign assets
- To limit the discretion of politicians in making public spending decision that might help them to avoid from accountability mechanism
- To protect mining revenues from corruption and mismanagement by taking formal, effective oversight mechanisms for fund operation

In practice, natural resource funds don't always achieve their policy objectives. Issues of patronage and nepotism still persist in fund operations. For example, the Libyan and Kuwait funds lost money in avoidable situations due to financial transactions that benefited friends of the regime or investment managers. Experiences from Chile, Norwegian and Saudi Arabi are considered the most successful. In Chile, the Economic and Social Stabilization Fund has fulfilled its function to protect government revenues from copper price volatility.

Similarly, in Mongolia, the Fiscal Stability Fund is intended to stabilize the budget fluctuations of major commodities, such as coal and copper, and its prices to offset budget deficits. The Future Heritage Fund aims to provide for intergenerational equity by substituting the non-renewable natural resources with interest-earning financial assets and safeguarding a portion of the revenues generated from mineral wealth. These funds are financed by extra income from the mining sector. However, currently, the amount of money in the funds is not significant.

It is also extremely important to make the terminal costs of the mining project clear at the planning stage. It is difficult to require a mining company to pay terminal costs when profitability begins to fall. Terminal costs includes:

- Costs to maintain roads, electrical supply, and other infrastructure which have been previously done by a mining company
- Any social costs related to the sudden unemployment in the mining area
- Costs of ecological restoration

In Mongolia, according to the Minerals Law, a mining feasibility study must include an ecological restoration plan and terminal costs. For example, in the OTIA, investors must prepare a management program for mine closure and set aside funds starting 7 years before mine closure. Also, in Oyu Tolgoi's Technical Report 2016, terminal costs will be incorporated in the mine operation budget started 10 years before mine closure. Another controversial issue is the terminal and closure costs of state-owned mining enterprises because most of them don't have savings for closure and even have accumulated losses (Please refer to Section 4 of this report for the further discussion on mine closure).

Governments should take into consideration the depletion of limited resources when deciding to develop other sectors using mining revenues or making long term investments. The depletion of resources and the general degradation of the environment should be considered when calculating the economic contribution of the mining sector.

In order to implement the System of Environmental-Economic Accounts (SEEA-CF) Central Framework adopted by the United Nations Statistical Commission, the National Statistical Office of Mongolia (NSO) began to calculate the Environmental-Economic Accounts of Mongolia. Within this framework, energy, environmental tax and material flow accounts are calculated. These accounts are important for the estimation of relevant SDGs and green development indicators.

3. Social issues of sustainable mining

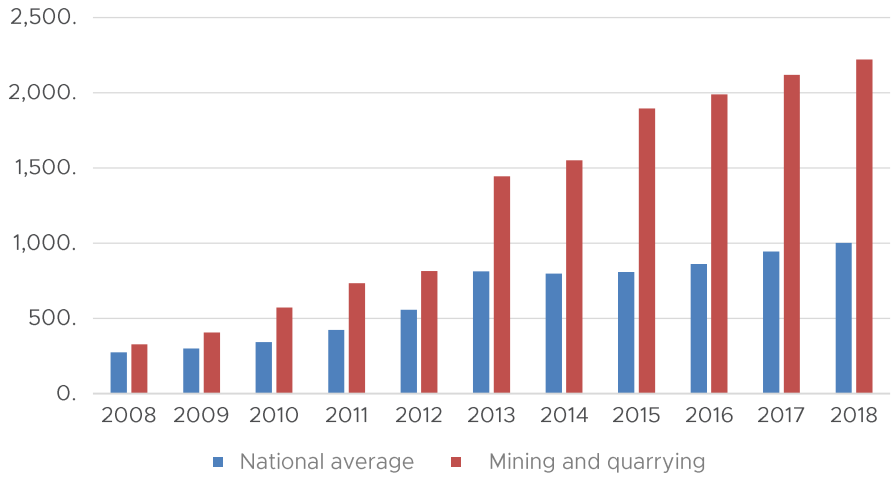
3.1 Employment and income

One of the major difficulties that a mineral economy with a booming natural resource export sector can face is a squeeze out of other industry sectors. A booming resource industry can raise the price of labor and other inputs, impacting and damaging the traditional export industries. This leads to an increase in cost for them which they cannot be covered by simply raising prices. Furthermore, natural resource exports can also harm traditional exports through the exchange rate. If a buoyant export causes the currency to accelerate, this too can render other exports less competitive. Economists have long warned resource-rich countries about the "Dutch disease" effect which could be harmful to the economy in the long-term.

With the growth of the mining sector, Mongolia saw major shifts in its overall GDP sector composition. A decade ago the agriculture sector represented 20 percent of the GDP compared to only 11 percent in 2018. This kind of structural change in the

economy brought subsequent changes in other sectors as well as income differences.

FIGURE 3.1 AVERAGE MONTHLY WAGE, MNT THOUSAND



Source: NSO

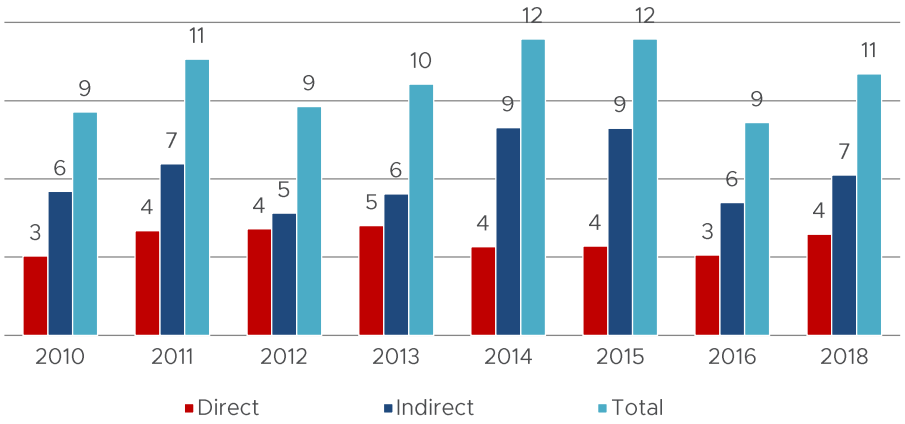
In 2018, employment in the agricultural sector decreased by 4 percent compared to 2008, while the employment of mining sector workers increased by over 66 percent. The average monthly salary in the mining sector is MNT 2.2 million, much higher than the national average. Manufacturing and construction workers, on the other hand, make half of what their mining counterparts make. With agriculture workers making even less.

FIGURE 3.2 NUMBER OF MINERS EMPLOYMENT BY MAJOR COMPANIES IN 2018, PERSONS

1	Oyu Tolgoi	17000
2	Energy resource MMC	1938
3	MAK	1600
4	Erdenes Tavan Tolgoi	772
5	South Gobi Sands	506
6	Mongolrostsvetmet	1300

The direct number of people employed by the mining sector was 3.3 percent of the total employed population in 2010 – this increased to 4.6 percent in 2018. As for the total number of people employed by the mining sector, both directly and indirectly, the share is around 11 percent of the total employed population. Currently, around 52 thousand people are working in sectors related to mining.

FIGURE 3.3 MINING RELATED EMPLOYMENT (% OF TOTAL EMPLOYMENT)



Source: ERI estimation

3.2. Education

As the mining sector gained traction and construction of the mines began, there was a large influx of modern technology, machinery and equipment. The operation of these machineries and equipment required specific personnel training. Some of the new technologies which were brought in were:

- In 2016, the bulk excavation component of the convey-to-surface system was completed, followed by the commencement of decline tunnel work in January 2017 at Oyu Tolgoi. The convey-to-surface system is the eventual route of the full 95,000 tonnes per day underground ore delivery system to the concentrator. The expected completion of the convey-to-surface system is 2022, which will facilitate the mine's full production by 2027 (Turquoise Hill, 2017).

- Turquoise Hill relies on secure and adequate operations of the information technology system in the conduct of its operations. The company depends on Rio Tinto to manage the information technology systems of Oyu Tolgoi. The information technology systems are fully protected from cybercrime. The systems protect and prevent cyber risks, including security breaches, power loss, theft, computer viruses, cyber-attacks, and natural disasters (Turquoise Hill, 2018).

- Oyu Tolgoi's Shaft 2 uses the world's largest production hoist motor and can carry 300 people in the service hoist and lift 60 tonnes skips in the production hoist. When operating at maximum capacity, the production hoist has the ability to lift 35,000 tonnes of material to the surface daily (Ciston pr newswire, 2019).

- Water reusage technology:

    - Oyu Tolgoi: 0.42 cubic meters water is used to process a tonne of ore – significantly below the global average of 1.2 cubic meters for

comparable copper businesses. More than 85 percent of the water used is recycled (Oyu Tolgoi, August 2018).

  - Energy Resource: The wastewater treatment plant in Tsogttsetsii which has a capacity to treat 1,200 m3 of wastewater per day continues its operations. The facility's treatment capacity of contaminated water stands at up to 95 percent, making the treated water quality fully in compliance with the requirements of the national standard MNS 4943:2015 (Mongolian Mining Corporation, April 2019).

- Safety: Since 2010, Oyu Tolgoi has been developing a Health, Safety and Environmental (HSE) Management system in compliance with ISO 14001 Environmental and OHSAS 18001 Occupational Health and Safety management standards. In 2013, Oyu Tolgoi was independently audited and received a certification to these standards (Oyu Tolgoi, 2019).

- SX-EW technology: 4 mining companies, operating out of the Erdenet mining site, produce refined copper in Mongolia. The two largest refined copper producers in Mongolia are Erdmin LLC and Achit Ikht LLC. These companies use Solvent Extraction workshop (SX) -Electrowinning workshop (EW) technology and produce copper cathode (Achit Ikht LLC, 2019b). SX-EW technology is a hydrometallurgical process since it operates at ambient temperatures and the copper is in either an aqueous environment or an organic environment during its processing until it is reduced to the metal (Copper Development Association INC, 2001).

These technologies are essential for the development of the mining company and sector and as such, skilled and experienced workers are coveted. From the perspective of Mongolia, there is a lack of skilled labor which hinders the incorporation of local workers into the mining sector. On the other hand, this labor shortage for mining companies is causing delays in the implementation and progress of projects, increasing cost and hampering compliance with local content requirements.

Peek and Gantes (2008) identified four main causes of the shortage of skilled workers in the oil and gas industry:

- Scarce educational facilities;
- Weak vocation and technical training;
- Lack of school accreditation; and
- Increasing demand for higher skilled workers in the industry.

In order to address those issues, the governments must undertake capacity building measures such as creating an education base to support development in the long run and improving the direct participation of the local workers with companies in the industry value chain.

The development of an education base includes reforming primary, vocation, secondary and university education syllabus in line with the development of

specialization to support the extractive industries. Revenues during periods of high commodity pricing usually provide opportunities for governments to invest in education; however, in that regard, revenue management is crucial.

In terms of improving the current local workers' participation in extractive industries, countries must take the following measures:

- Research and development programs, funds, and specialized institutions. ? In this aspect, developing a link between major mining companies, local universities and training institutes is key in designing a proper syllabus
- Introduction of local content provisions for training and hiring national workforce at different levels of the value chain
- Creation of industry linkages and extensive supplier development programs, including training, product development, testing and auditing

A major necessity in furthering the education of the whole country and industry is the role of the government in linking the relevant stakeholders and the mining companies to coordinate the training of human capital. There are several countries with concession agreements with extractive companies concerning hiring quotas or targets for local workers. However, some companies may encounter difficulties in achieving these targets. The concession clauses tend to be more effective when complemented with training programs supported by the mining sector. Through this action, companies are able to ensure the availability of skilled workers for the necessary positions and requirements of a mining company.

For instance, in Brazil, the National Petroleum Agency Human Resources Program (PRHANP) encouraged the inclusion of specialization disciplines related to oil, natural gas, and biofuels for master and doctorate students. The PRHANP is funded by the Oil and Gas Sectoral Fund, they collect royalties from the production of oil and natural gases. The research and development clause in the concession agreement requires concessionaires and oil companies to allocate 1 percent of their gross revenue from fields that pay Special Share Tax for research and development. Other natural resource-rich countries such as Nigeria and Angola have set targets of participation to increase the number of local employees in extractive projects. However, companies tend to struggle in meeting those targets due to the lack of skilled workers.

In the case of Mongolia, the Oyu Tolgoi project launched a Certificate in Mining Studies. This certificate is in collaboration between the University of British Columbia, EduMine and the School of Mining Engineering at the Mongolian National University of Science and Technology. The program helped Mongolia to provide and educate young professionals with the right skill sets needed for the mining sector. Previously, Mongolia's educational system focused more on theoretical science rather than applied sciences. However, this program acted as a catalyst for the development of education and training programs for the future that put more emphasis on applied sciences.

In addition, Oyu Tolgoi has invested USD 78.78 million into the retraining of 400 thousand workers (accumulated number since 2010). 60 teachers from TVET (Technical Vocational Education Training) colleges in Mongolia were trained to Australian training standards. Upon completion, the retrained teachers and OT staff

received the Australian CERT3 and CERT4 certificates. Additionally, 277 repair experts were trained, another 36,000 staff were trained in safety compliance. Other investments were also made into the training environment of the VTPC.

Together with OT new research programs were initiated at Mongolian universities.

Theme	Instituion	Period	Funding, thous, dollars
Grinding ball hardness testing	Orkhon, MUST	2013-2018	12.0
Grid mesh quality improvement study	MUST	2017	0.8
Preventative maintenance opportunities at Primary crusher, application of AI and machine learning (and others, contractors)	NUM	Since 2017	100.0
Tailings thickener and transportation system optimization study	Mineral Processing LLC	2017	50.0
Study for alternative reagents for flotation and dosage optimization	Orkhon, MUST	2017	50.0
Pilot plant flotation testwork for plant optimization	Orkhon MUST	2015-2016	15.0
Research work on oxidation issue of OT Cu concentrate	NUM	2017-2018	10.0

The total investment amount is hard to estimate, but OT alone has invested about USD 173 million into education, including the abovementioned TVET[15] - USD 78.78 million, and in addition

- Schools – USD 27 million
- Equipment donation – USD 3.9 million
- 3300 Scheme – USD 36 million
- Apprenticeship program – USD 3.5 million
- TVET Teacher Training – USD 5.4 million
- Pre-employment – USD 210 000
- Pre-apprenticeship – USD 1.2 million
- Pilot program – USD 20.000
- 3D program – USD 1.5 million
- World Skills - USD 50 000

In 2014, based on the donations of OT, a new Mongolian German Institute of Mining Technology was founded. Faculty members from Germany, Canada, the USA, and

[15] Impact of OT on economy of Mongolia, 2019, NUM IEP report.

Mongolia teach students programs related to mining engineering. The University is operated by GIZ and DAAD and has close cooperation with other German partner universities and other international educational institutions. With its strong application-oriented education, and focus on the comprehensive personal development of its students, GMIT is unique in Mongolia. GMIT has become a pioneering model for the reform of Mongolian higher education. Students of GMIT join study programs adhering to German academic standards in engineering and technical sciences. English is the language of instruction at GMIT, with German tough as a second language. The curricula of the study programs enable students to become skilled and knowledgeable in broader engineering sciences as well as in specialized fields. GMIT currently offers the following study programs (GMIT will offer Master's and Ph.D. programs in the future):

- B.Sc. Raw Materials/Process Engineering, Bachelor of Science: 4-year program
- B.Sc. Mechanical Engineering, Bachelor of Science: 4-year program
- B.Sc. Environmental Engineering, Bachelor of Science: 4-year program
- Basic Engineering Program 1-year preparatory program

Other Technical colleges in Gobisumber, Dalanzadgad and Darkhan have expanded and build new dormitories for respectively 950, 150 and 240 students. With new investments, they were able to equipped and renovate labs and equipment, which improved and modernized their teaching programs. It's estimated that OT alone has enrolled 13500 workers into 40 various training programs with certificates. Other Mongolian companies such as Energy Resources have also significantly invested in training their employees.

In partnership with the Japanese government, the leading Mongolian universities, NUM and MUST were able to expand their technology programs. 1000 Mongolian engineering students took part in this program, which introduced the Japanese Kohsen system to Mongolia improving the technical skills of young workers. This strong shift into technical training, improvement of the TVET system, more technology-based university training and research are one of the most important social contributions that the mining sector has brought to Mongolia.

Other social impacts

Other social impacts related to the increasing impact of mining on the lives of the people include:

- resettlement;
- land claims of indigenous peoples;
- social tensions between local communities and mines;
- public participation in the decision-making and in this regard, communities' access to information;
- artisanal and small-scale mining;
- educating of local work forces;

- balancing local and national benefits.

Some of these social issues have been discussed and reviewed in our previous studies. For instance, in "Contracting in Mining Sector" (ERI, 2018c), issues of community engagement, displacement of communities, vulnerable groups such as indigenous people and women were reviewed on an international and local (Mongolia) scope. In "Taxation and Financial Reporting" (ERI, 2018e), tax contributions to the local government as well as clauses requiring contribution to local development voluntarily or non-voluntarily were analyzed. "Mining Development Strategy" (ERI, 2017d) considered the national strategy documents pertaining to the mining sector and whether those considered the long-term impact of resource extraction on future generations. The "Mining Development Strategy" report mainly considered the various documentations and strategies set by the government in regards to the future of sustainable mining development, which includes consideration of future generations, local communities, and their participation.

As large-scale mining projects can cause adverse social impacts, most environmental impact assessment (EIA) guidelines require a social impact analysis. Factors that are generally included in the social impact analysis are:

- characteristics and influence on local populations in the project areas: population location, age distribution, population growth rate, and ethnic group composition
- relevant information about access to education and health services
- sanitation
- development trends (some communities have community life plans and/or local development plans)
- employment and income
- social-economical stratification
- housing (infrastructure, number of house)
- land uses and land property
- presence of indigenous communities, customary land uses, and territorial rights
- relevant health data (most prevalent diseases, causes of death)
- access to information and knowledge about the project, and attitudes towards the project
- artisan infrastructure (roads, transportation)
- migration
- rural/urban population distribution
- urban development trends

In the case of involuntary resettlement, the EIA must also include detailed information about compensation, relocation plans, alternative relocation sites, and information about conditions that would guarantee people the same quality of life.

As some of these issues have been covered in the "Contracting in the Mining Sector" study (ERI, 2018c), we have chosen to focus on and provide analysis of other issues such as artisanal and small-scale mining, community health and education.

3.3. Protecting and promoting human rights

Due to some mining companies purely focusing on profits and their advantages some end up violating the rights of the indigenous people. Violation of human rights is one of the most common issues. For instance, recently in Brazil, a dam burst and released a torrent of toxic mud that killed 19 people in the Samarco mine, a joint venture of Vale and BHP. The UN's Special Rapporteur stated that "this disaster serves as yet another tragic example of the failure of businesses to adequately conduct human rights due diligence to prevent human rights abuses."

Civil societies and public fostering companies have started to put more pressure on companies to respect human rights and show effective compensation systems once human rights are violated. For instance, the Democratic Republic of Congo (DRC) supplies more than half of the cobalt of the world. 20 percent of the cobalt export is extracted by artisanal miners. These artisanal miners mine the cobalt by using the most basic tools without any special equipment. Amnesty International found out that children as young as seven are working in the mines and are paid less than USD 2 a day. Due to pressure from Amnesty International and other organizations, several downstream companies formed a body called the Responsible Cobalt Initiative (RCI) to help the industry conduct due diligence on their supply chain and eradicate child labor in the DRC. The Government of the DRC made it a priority to eradicate child labor in the mining sector by 2025.

In 2011, the United Nations Human Rights Commission approved the guiding principle on business and human rights for governments and companies to prevent human rights violations in business environments. This document has three sections. Section one, states organizations must respect and protect human rights and ensure the interest of companies are complying with the public interest. Section two, states there is an obligation of business enterprises to respect human rights. The last section describes how to remedy human rights after its violation. These guiding principles are a major breakthrough in regulating human rights issues in a business environment.

Rights that are most commonly violated in the mining sector are the right to live in freedom and safety, the right to a good standard of living and the right to own property. Some mining companies forcefully relocate indigenous people without compensation when preparing their mining sites.

According to the results of the human rights impact assessment in mining sector conducted by the National Human Rights Commission of Mongolia and UNDP, mining companies, in the Umnugobi province, one of the biggest mining regions, don't take herders' suggestion into account and impose their sides of terms on herders. Many herders involved in the survey were dissatisfied with the amount of the compensation of relocation. On the environmental side, mining operations and transportation have a heavy impact on traditional pastoralism. Mining is causing degradation of pastureland and creating water shortage. According to the survey, indigenous people were not receiving full information on budgeting and local government actions, which is another violation of human rights.

Smaller artisanal mines are another controversial issue. Informal, difficult working conditions and harmful methods for exploring minerals are creating a mass violation of human rights. In 2005, in order to formalize and regulate artisanal mines, the Swiss Agency for Development and Cooperation established the Sustainable Artisanal Mining Project (SAM). The project is currently going through its last stage. In 2010 as a result of the project, governments around the world adopted the Regulation on the Extraction Operation of Minerals from Small-scale Mines. This resolution was the first formal regulation on small artisanal mining. It also brought attention to government agencies to artisanal mining and created opportunities for artisanal miners to be incorporated in social insurance and health care.

SAM and National Human Rights Commission of Mongolia conducted a research for "The Human Rights Situation in Small-Scale Mining in Mongolia 2012". According to the research, the implementation of regulation on the extraction operation of minerals from small-scale mines is insufficient. With local governments having no incentive to implement the regulations. Miners usually have no opportunity to form partnership and carry out mining along with the above-mentioned regulations because local administrations often refuse to register miners without good reason. Therefore, miners' right to live with dignity, right to employment, right to possess and own land, right to health and social services, and the right to adequate living standards are being violated. Local hospitals and doctors do not provide health service for them except in the event of emergency and severe injuries, because miners are not covered by social and medical insurance. Another important issue that should be noted here is children labor in Mongolian artisanal mining. Children usually work in mines to support their parents' work. As a result, children's right to receive an education is denied. Local schools aren't able to register those children as they not legally registered in that community. Many of the artisanal miners are accusing the local administrations for prioritizing mining companies' interest rather than local people and artisanal miners.

3.4. Artisanal and small-scale mining (ASM)

Artisanal and small-scale mining (ASM) is defined as "formal or informal mining operations with predominantly simplified forms of exploration, extraction, processing and transportation". ASM is normally low capital intensive and uses high labor-intensive technology. ASM can include men and women working on an individual basis as well as those working in family groups and in partnerships, Some are members of cooperatives or other types of legal associations and enterprises with hundreds or even thousands of miners. For example, it's common for workgroups of 4-10 individuals, sometimes in family units, to share tasks at one single point of mineral extraction (e.g. excavating one tunnel). At the organizational level, groups of 30-300 miners, extracting jointly one mineral deposit (e.g. working in different tunnels), and sometimes sharing processing facilities." (OECD, 2016).

Throughout the world, an estimated 30 million artisanal and small-scale miners extract about 30 mineral commodities across most developing countries. Out of them, an estimated 10-15 million people are directly involved in artisanal and small-scale gold mining (ASGM) sector. Gold is the main resource mined by artisanal miners and contributes to around 15-20 percent of the world's annual gold production.

The relationship between large scale mining companies and ASM miners tend to be very poor and riddled with mistrust and conflict. To some extent, miners and formal mining companies are competing for the same resources. Large companies may consider artisanal miners as trespassers, while artisanal miners may see the grant of a concession to large companies as a deprivation of their land and livelihood. So in some cases, artisanal miners may be displaced from their land; while in other cases, the development of an area may attract migrant miners due to business incentives.

In a number of resource-rich developing countries, ASM is a major source of income for rural and regional communities. As ASM is largely an informal sector, there is limited available information on production, revenues, operations or even locations. The sector is often inadequately regulated and their economic contributions are hard to estimate. However, the EITI requires reporting countries to make an estimate of the informal sector's activity under Requirement 6.3 of EITI reporting countries, the Democratic Republic of Congo, Ghana, Guyana, Mali, Philippines, Senegal, Suriname, Tanzania, Togo and Zambia have already decided to include ASM in their reporting and are conducting studies to map out challenges and design a reporting process applicable to the ASM sector. Other countries such as Afghanistan, Ethiopia, Liberia, Madagascar, Mongolia, Mozambique, Papua New Guinea, Philippines, Tanzania and Zambia have started discussing ASM issues.

While ASM may make significant contributions to the economy and employment, it also has adverse impacts of the same magnitude on the environment. ASM creates poor environment, health and safety conditions, degrades crops and farmland thereby affecting food production, pollutes streams and rivers which results in costly water treatment to produce safe drinking water. As it's an informal sector, there's a lack of mechanization, use of rudimentary techniques, low levels of occupational health and safety practices, lack of a skilled workforce, lack of social security and lack of awareness about the above-mentioned issues.

A particular concern in gold mining specifically is the use of mercury and cyanide. Mercury provides a relatively cheap and fast way to capture fine gold from ores. The gold mining process using mercury is as follows: (1) the rocks or sediments containing gold are mined; (2) the ore is crushed to liberate gold particles; (3) the mass of the ore is usually concentrated; (4) mercury is added to the ore to form an amalgam (a mixture of gold and mercury); (5) the amalgam is heated to evaporate the mercury and obtain a porous gold product; (6) this is melted to produce the "gold doré"; (7) the doré is refined in gold processing shops and sold on the global market (UN Environment, 2012). Cyanide is usually used in large scale mining operations but it has been increasingly used in ASGM. Cyanidation is often used to process the residual gold from tailings after mercury has been used first. However, the main factor why cyanide is not as widespread is due to the high cost and the required technical training.

A majority of ASM miners operate informally and illegally. Due to the sector's informality, there is a wide range of damaging socioeconomic, health, environmental impacts and development challenges that trap most miners in a cycle of poverty leading to whole communities in poverty (Hilson, Pardie, 2006). Furthermore, it leaves the sector open to corruption, embezzlement and loss in revenue for local and national governments. Also, miners are not afforded the benefits of legal protection nor are they able to access support services. Therefore, formalization is a

key progressive step. Formalization is the "process of bringing informal income-earning activities and economies such as ASM into the formal sector through legal, regulatory and policy frameworks" (IGF, 2017). The following factors need to be considered for formalization:

- Legal frameworks that remove barriers to formalization and are supportive and accessible rather than punitive
- Streamlined licensing processes that make it easy, cost-effective and rewarding to obtain a license
- Access to finance for miners, potentially using geological information as collateral for loans
- Technical and financial support to meet the licensing requirement and, once licensed, to continue to improve performance

According to the IGF's Mining Policy Framework, the government should consider the following things to enhance the quality of life of those miners working out of the legal framework and to enhance their contribution to sustainable development:

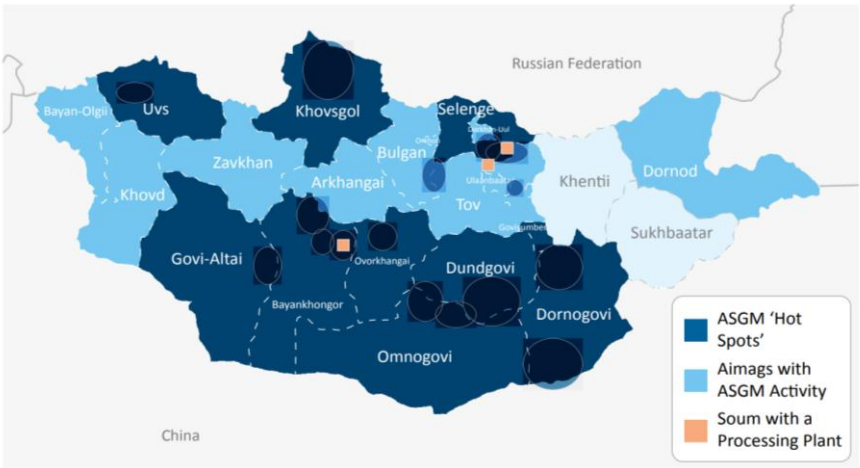
- Ways of integrating informal ASM activities into the legal system by:
    - o Creating clear legal frameworks and regulatory mechanisms to facilitate the organization of ASM, access to property rights and ensuring obligations for ASMs;
    - Providing technical support to build the capacity of government or other bodies tasked with regulating and supporting the sector; and
    - Developing and replicating formalization strategies on the basis of lessons learned.
- Ways of integrating informal ASM activities into the formal economic system by:
    - Improving savings in the artisanal mining community, establishing more acceptable forms of financing and encouraging responsible investment;
    - Strengthening the appropriateness, viability and transparency of policies and systems for collection, management and reinvestment of ASM revenue;
    - Encouraging initiatives for standards and certification of ASM "fair trade" conflict free minerals to harmonize and grow in scale; and
    - Encouraging, through the permitting process or at other times, entities to explore ways to collaborate with ASM when ASM is present or can reasonably be anticipated to follow the development of a mine.
- Reducing the social and environment impacts of ASM by:
    - Providing technical training to improve productivity and to safeguard the environment , and developing, disseminating and enforcing regulations with a particular emphasis on safeguarding water resources, reducing deforestation, ending or reducing the use of mercury, and improving the management of mercury and other toxic substances when it is not possible to eliminate them, including safe working conditions, access to health case, etc.;
    - Having national programs that provide minimal standards of health and education to ASM workers and their families;
    - Making a significant and verifiable reduction in the number of children employed in artisanal mining and improvements in the

nature and scheduling of their work so as to accommodate educational needs;
- Strengthening, monitoring and enforcing laws on child labor in artisanal and small-scale mining areas;
- Strengthening the role and security of women in ASM; and
- Promoting the inclusion of ASM in rural development and job creation policies such that where desired and realistic, alternative livelihoods are promoted.

A mining cadaster and mineral rights management system was developed by Spatial Dimension called FlexiCadastre, which launched in 2003 after winning a World Bank-funded project to implement a new computerized mining cadastre system for Mozambique. The system uses a web portal for data management and GIS technologies to facilitate the administration of mineral titles in multiple jurisdictions. The aim is to improve stakeholder communication, reducing corruption and improving transparency. The FlexiCadastre system is currently used in the Democratic Republic of Congo, Ethiopia, Ivory Coast, Kenya, Libera, Mozambique, Rwanda, Senegal, Tanzania, Uganda and Zambia.

According to a 2016 Asia Foundation study, there are an estimated 100,000 small-scale artisanal miners who work independently and makeup around 20 percent of Mongolia's rural workforce. 80-90 percent of miners are gold miners, while the other 20-10 percent mine fluorite, tungsten, semi-precious stones and coal (UNICEF, 2017).

FIGURE 3.4. MAP OF ASGM ACTIVITIES IN MONGOLIA



Source: UNICEF

Although Mongolia has made strides to formalize the ASM sector, informal practices continue – especially the clandestine use of mercury, which actually has been prohibited in Mongolia since 2008. Legally, processing plants in Mongolia cannot process ore or smelt gold contaminated by mercury. Due to this restriction, gold mined from ASM operations are processed using mercury at home. This contaminated gold is then sold in the informal sector before it is either smuggled out

of the country or laundered into the formal supply chain. Tracking of these activities is difficult as the gold supply chain is intrinsically entangled with little to no traceability.

In 2010, the Government of Mongolia legalized ASM and recognized it as an official occupation. Regulation 308 "Regulation on Extraction of Minerals from Small-Scale Mines" (2010) is the main governing legislation of the Mongolian ASM sector. The regulation defines the methods by which miners can legally access mining land and income tax levels of formal ASM miners. The 2014 changes to the Minerals Law approved the trading of gold from the ASM sector – this move has shifted the perception of ASM miners as lawless and harmful to responsible citizens that contribute to the country's development and economy. Additionally, the government has been working with the Sustainable Artisanal Mining (SAM) project by the Swiss Agency for Development and Cooperation to enable formalization.

However, the rights of AMS often conflict with those of local communities. In particular, Article 16.2 of the Constitution of Mongolia, protection against environmental pollution and ecological imbalance is a key clashing point with AMS miners. Many rural communities depend on natural resources for jobs and food and as such, environmental degradation can destroy traditional livelihoods.

3.5. Community health

As the large influx of foreign direct investment leads to the rapid development of the mining sector and economy, it puts a considerable amount of pressure on public health and health systems, especially around mining areas. Health issues that arise due to mining can range from occupational health and safety to the surrounding communities' health as well. In this section, the main focus will be on the health of the community.

According to the IGF's Mining Policy Framework, community health should be addressed by:

- Including health considerations in the baseline socioeconomic assessment required by mining entities during the permitting process;
- Working with mining entities as well as with communities in the planning and priority setting for health services that the entities may have undertaken to provide; and
- Leading with other stakeholders to gradually assume responsibility for this activity from mining entities so that when mine closure approaches the physical and human public health infrastructure can make the post-closure transition with a minimum of disruption.

Health impacts occur during every phase of the mining project's life cycle. During the mining project's process of blasting, mining, excavating, pumping, maintaining and cleaning, employees may be exposed and vulnerable to health hazards and serious accidents. According to the International Labour Organization (ILO), currently there are 10 international standards which are applicable to the occupational safety and health in the mining sector and 9 codes of practice related to the safety and health of mining sector employees.

Australia's mining sector is well known for its development of the best practices for health and safety solutions – the government of Australia and the industry work in conjunction to achieve "zero harm," an industry free of fatalities, injuries, and diseases. The Minerals Council of Australia believes:

- All fatalities, injuries and diseases are preventable
- No task is so important that it cannot be done safely
- All hazards can be identified and their risks managed
- Everyone has a personal responsibility for the safety and health of themselves and others
- Safety and health performance can always be improved.

Each state and territory have their own legislation, but they all implement a general duty of care, which requires the operator of a mine to ensure the health and safety of workers and other persons. Their legislations are based on a risk management approach that requires continuous identification, mitigation and monitoring of all risks present at a mining operation. Based on this approach, the identification and addressing of hazards are unique to each workplace as each mining operation varies.

Despite the ratification of a number of ILO international standards, Mongolia's OSH legislations are poorly enforced. According to a 2013 report by the National Human Rights Commission of Mongolia, "the number of industrial accidents and occupational diseases is increasing [in the mining sector]. Due to poor enforcement of occupational safety & hygiene legislations, and an unhealthy and unsafe working environment" (NHRCM, 2013). Some of the common infractions include a lack of regular inspection of equipment and machinery, a lack of proper lighting at night, and a failure to ensure electrical safety. In 2016 the United National Development Programme commissioned an assessment on the "Implementation of rule of law: Legal regulation of environment in the mining sector" and the conclusion was that the Mongolian "environmental legal framework is unpredictable and its implementation is insufficient."

Since 2016, the National Statistics Office of Mongolia started to include data about occupational accidents. These accidents can be categorized by region or industry. In 2016, there were 61 injuries reported for the mining sector out of a total of 332 accidents. Over the past few years, the mining sector has reported the most injuries at the workplace out of all other industries.

TABLE 3.1 INJURED PERSONS BY INDUSTRY

Industry	2016	2017	2018	2019-H1
Mining and quarrying	61	55	73	30
Processing industries	32	62	26	11
Construction	21	15	17	12
Transportation and storage	19	21	27	13
Defence and public administration	43	36	34	7
Other sectors	156	143	106	63
Total	332	332	283	136

Source: NSO

Direct occupational health risks of being exposed to toxic chemicals include an increase in the chance of contracting a respiratory disease. Exposure to regular blasts can also lead to hearing loss, other common injuries are back and neck injuries from the use of industrial vehicles and power tools. As mining projects also utilize the resources of surrounding areas – it can cause contamination of the soil, water, and air. Soil erosion and deforestation can significantly impact the communities' livelihoods while the dumping of hazardous waste can potentially contaminate and release toxins into the environment which is ingested directly or indirectly by communities.

Another common occurrence as a result of mining is the emergence of the sex trade. Sex trade often arises around mining communities as men relocate to work at mines, leaving behind their families. Due to this, transmission of HIV and other sexually transmitted diseases increase among the communities and miners. However, most mining communities only provide primary health, major injuries and diseases must be treated elsewhere in public hospitals around the country, which can cause unnecessary burden on rural hospitals and the healthcare system.

An environmental impact assessment for a mining project in Madagascar identified HIV and sexually transmitted infections as a potential negative impact of the project. A monitoring system was developed; however, at the time when the impact assessment was conducted, there was no formal agreement between the project and health authorities, and therefore no monitoring activities were actually carried out. The project later undertook a health impact assessment. This assessment was supervised by a steering group consisting of regional and district health authorities, civil society representatives and health impact assessment team leaders. The presence of health authorities in the steering group increased the motivation and encouraged participation in the health management plan. One of the immediate results of this was the development of a data-sharing system between the project and health authorities.

In case of mining projects in most countries, a health management plan is usually implemented upon a health impact assessment and the establishment of a committee which includes representatives of the project, community, civil societies, and health authorities. Only through the involvement of these relevant parties can an effective plan and system be placed for the benefit of the mining community and surrounding rural communities.

The World Health Organization in Mongolia noticed these challenges and introduced a program on "Mining and Health," which aims to develop a set of essential tools and guidelines on health impact assessments in mining areas. In relation to this, the WHO created a mid-term strategy of strengthening the health system in Umnugobi province, which has a number of mining communities.

The first meeting of "Mining and Health" was jointly organized by the three ministries: the Ministry of Health, the Ministry of Nature, Environment and Green Development, and the Ministry of Mining. This meeting discussed and modified the draft Strategy on Mining and Health for 2015-2020. The target of this strategy is to protect the health of the local population in the mining areas. Additionally, to strengthen the capacity of local health sectors that are confronted with a growing demand on healthcare and to mitigate mining-related negative impacts. Another

target is to improve risk transparency, response capacity and advance partnerships with all relevant stakeholders including government, health professionals and others for monitoring mining impacts on environment and health.

4. Environmental issues of sustainable mining

The environmental sphere is a crucial part of ensuring sustainable development of the mining sector. Economically, mineral resources provide significant development opportunities for the host country, through either direct or indirect means. However, mining operations can also have large negative impacts on the host country's environment.

If environmental issues are disregarded during the mining operation period, it may result in significant adverse impacts, such as climate change, in both the short- and long-term. These impacts not only affect the ecosystem but also the economic and social capitals of the host country. In the long-term, the economic gains from the mineral resources may be gradually outweighed by the damaging effects on the environment capital, which is a fundamental source of input for other non-mining sectors of the economy. An example of one of the negative environmental effects is climate change. Climate change cause repercussions for both the mining sector and non-mining sectors. Climate changes poses both direct (operation and performance) and indirect (securing supply and rising energy costs) impacts on the mining sector. Other risks include reputational risks, possible revocation of social license to operate, and the inability to adapt to climate change may jeopardize investor confidence and impact insurance dynamics over the long-term (Climate Diplomacy, 2016).

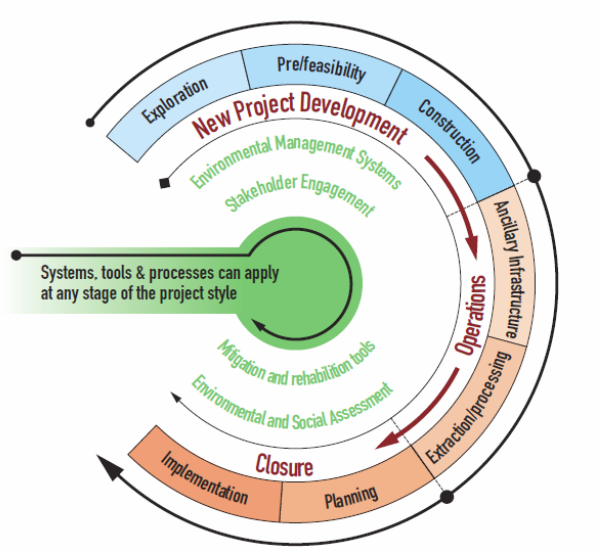
The Potosí silver mine in Bolivia is an example of an instance where the environmental damages eventually exceeded the economic gain. The mine is one of the largest silver deposits in world and is still being extracted today. It was discovered in 1545 and within a year of discovery, thousands of Spaniards and native prospectors gathered to form a makeshift camp at the foot of the mountain. This makeshift camp eventually led to the formation of the city of Potosí. Estimates of Potosí's total silver production ranges from 1 to 2 billion ounces. Of this, 756 million ounces were shipped to Spain during the colonial period (Potosi mines, 2015). During the colonial times, the possible environmental impacts of a mining project was not something that was considered nor was it common. Due to this neglect, the health of the communities surrounding the mine were affected as mercury vapors, acid mine drainage and processing plant effluents condensed and contaminated the above and underground water, soil and air. An estimated 8 million people died around the Potosí mines during the colonial times (Watson, 2015). The contamination of Potosí's environment even affected other South American countries such as Argentina since Potosí is located near the headwaters. The Potosí mine collapse in 1996 spilled 235 thousand tons of toxic tailings into the tributary river of the Pilcomayo. Investigations showed that the effects of the spill were apparent 800 kilometers downstream (Garcia-Guinea & Harffy, 1998).

Environmental issues associated with the mining sector are becoming increasingly important for all stakeholders as climate change has accelerated and local communities have begun to protest mine productions, citing environmental and social concerns. The main cause for resistance against mineral exploration by the public and government is environmental concerns. In the following sections, the environmental impacts and relevant regulations of mining projects are discussed.

4.1 Environmental impacts of supply chain of mineral sector

Mining projects usually take several decades and have several phases. These phases can be divided into three: new project development, operations and post-operations or closure (FIGURE 4.1). Each of these phases have different sets of environmental effects and minimizing the adverse impacts in each phase is crucial.

FIGURE 4.1. MINING PROJECT CYCLE



Source: International Council on Mining and Metals, 2016

Exploration

The exploration phase conducts research to find location, grade and value of mineral ore deposits. The phase is comprised of surveys, field studies and test drilling boreholes and other exploratory excavations. In order to drill and excavate, wide areas of vegetation and land must be cleared for heavy vehicles and other equipment – this causes soil erosion. Due to the high levels of uncertainty about the location of mineral deposits, the process of drilling and excavating may require several iterations before it's successful. If the exploration is unsuccessful, the subsequent phases will not proceed. However, whether the exploration is successful or not, a separate environmental impact assessment (EIA) for the exploration phase may be required (Climate Diplomacy, 2016).

In Mongolia, review surveys may be conducted without an exploration license; however, the legal entity conducting the survey must inform the state or local administrative organizations about the survey field locations and their personal information. However, for any other type of exploration activity besides review surveys, an exploration license is required if the exploration is being conducted by a legal entity. During the review survey, drilling, excavation and removal of vegetation is not allowed. In the case the exploration is financed by the state budget, an exploration license is not required. This means that all exploration activities can be conducted without a license, fees or payments.

According to the Mineral Law (2006), mineral exploration is prohibited within State Special Protected Areas. Exploration in protection zones of headwater, watershed and forestry areas also prohibited by the Law to Prohibit Mineral Exploration and Mining Operations at Headwaters of Rivers, Protected Zones of Water Reservoirs and Forested Areas (2009). However, exploration is allowed in these special areas if the mineral deposit is of strategic importance. Boundaries for these areas are set by the Government of Mongolia. In the case that a license holder operates in an area beyond that which is outlined, control over the activities shall be transferred to the local government and community.

When requesting for an exploration license, an applicant must develop an environmental management cost plan. This plan must be produced within 30 days after consultation with the local administration and relevant environmental administrative division. Then, the plan must be approved by the local governor and submitted to the local environmental monitoring authority. In addition to this paperwork, the applicant is obligated to make payments – for instance, 50 percent of the annual total expected environmental expenditure must be transferred to a specific account opened by the local governor as a guarantee for environmental protect. Once all the activities outlined in the environmental protection plan is completed, the transferred funds will be refunded.

Development

Once the exploration of high-grade mineral deposit is completed successfully, the development phase can commence. This phase is comprised of feasibility study, site preparation and clearing, construction of access roads and other necessary preparations.

The feasibility study determines the viability and implementation of the project. For the study, detailed information regarding proven and probable reserves is collected, which is then used to develop production plans including quantity of ore and waste. The study also includes mine development and design options, potential environmental impacts, and management and closure plan.

During the mine development, substantial areas of land are cleared of vegetation to accommodate the project facilities. Also, to facilitate the operation of the mining project, permanent and temporary workers settle around the mine site. According to the Minerals Law of Mongolia, mineral exploitation license holders need to establish the boundaries of the mine site within 3 months after registering the license. The clearing of land for mineral extraction has a notable impact on the local

community, especially in Mongolia, where the livestock sector is highly vulnerable to pastureland degradation.

Another part of the development phase is the construction of access roads. Access roads are built to provide heavy equipment and supplies to the mine site or to ship out process metals and ores. In addition to the usage of access roads, the shared use of rail lines and paved roads also have negative environmental impacts. According to the International Council on Mining and Metals (ICMM), "roads across the sensitive areas may result in the isolation or fragmentation of habitats, which can have a significant impact on biodiversity. Interruption to the natural linkages between populations of plants and animals can create significant, sometimes irreversible, changes. It also results in habitat fragmentation, whereby separated smaller areas are less resilient to change. Edges provide greater potential for pest plants and animals to invade, and isolated areas of land frequently become degraded."

Therefore, construction of rail lines and paved loans should include wildlife crossings such as underpass tunnels, overpasses or viaducts. However, in Mongolia, most of the paved roads do not have any wildlife crossings. In Mongolia, most mining projects are located in Gobi, which is home to a number of endangered species such as the Mongolian gazelle, saiga antelope, Mongolian khulan goitered gazelle and mountain sheep. Also, the main coal transportation road of Ukhaa-Khudag-Gashuunsukhait passes through a State Special Protected Area and an area which is popular with wildlife. Most mines in Mongolia transport their products from the mine site to the border via gravel and/or paved roads, which is the most environmentally hazardous way to transport. For instance, Altao Khuder transports iron ore from its mine site to the Chinese border for export by using gravel roads, which generates significant amount of dust and noise pollution (Steinweg & Schuit, 2014).

Operation of mining

Once the development phase is completed, the mining project can become operational. Mining projects can be active for several decades. During this phase, the mining operation can be modified and enhanced to ensure efficiency and rehabilitation of the environmental damages associated with the project should be done progressively.

There are three methods of mining: open-pit, placer and underground. The most commonly used method in Mongolia is open-pit, which requires removal of a layer of overburden and ore. Before overburden and ore can be removed, the land must be cleared of vegetation and a pit must be dug which extends below the ground water table. In some cases, the groundwater is pumped out to allow for the continuation of mining operation (International Council on Mining and Metals, 2016).

Currently, Oyu Tolgoi is developing the only underground mine in Mongolia. The amount of overburden is lower for the underground mining than open-pit mining. Although, the overburden is less and the access to ore deposit is less environmentally destructive in underground mining, it is also costlier than open-pit mining. For example, in order to produce 29 kilograms of copper from the Oyu Tolgoi open-pit, 17 tons of materials must be extracted – of which, 12 tons are waste

and the remaining 5 tons of ore is transferred to concentration plants for further processing. After processing the 5 tons of ore, only 122 kilograms of copper concentrate is produced, which contains 29 kilograms of copper. In an underground mine, 1.7 tons of material is extracted and as there is almost no waste, the material is transported directly to the processing plant. After processing, 96 kilograms of copper concentrate or 29 kilograms of copper is produced.

Waste

The large volumes of waste generated from mining projects is one of the main pollutants of the environment. Typically, copper and gold mining generate more waste than coal and iron ore mining. According to the International Institute for Environment and Development (IIED), mining projects produce these types of waste:

- Overburden – the soil and rock that must be removed to gain access to a mineral resource,
- Waste rock – rock that does not contain enough mineral to be of economic interest,
- Tailings – a residual slurry of ground-up ore that remains after minerals have been extracted,
- Heap leach spent ore – the rock remaining in a heap leach facility after the recovery of the minerals (IIED, 2002).

As of 2017, Mongolian mining companies generated 43.1 thousand cubic meters of waste. Of this, 39.9 thousand cubic meters was ordinary waste and the remaining 3.2 thousand cubic meters was hazardous waste.

TABLE 4.1. MINING WASTE, 2017

	Non-Hazardous waste (m^3)	Hazardous waste (m^3)	Total waste (m^3)	Actual Payments (mil.MNT)	Recycled hazardous waste (m^3)	Burial of hazardous waste (m^3)	Exported hazardous waste (m^3)
Performance	39,880.1	3,232.7	43,112.8	318.5	1,780.4	802.9	484.0

Source: EITI Mongolia

The safe disposal of waste is one of most critical issues of the mining sector. In Mongolia, wastes from mining projects are simply disposed on land. Overburden and waste rocks are broken down and dumped at an allocated disposal site, where any excess is bulldozed over the edge, forming slope at the natural angle of repose. Wet and other toxic wastes are disposed in dams, which are built near the mine site.

Erdenet mine, one of two copper mines in Mongolia, is an open-pit mine. It accumulates 10-12 million tons of overburden and waste rock per year and wet wastes are discarded in a dam 4 kilometers from the mine site. Alternatively, Oyu Tolgoi thickens its tailings and reuses the liquid from the tailings in its processing and disposes the remaining amount in a dam.

Another serious environmental problem associated with waste disposal is acid drainage, which "is characterized by depressed pH values and elevated

concentrations of dissolved heavy metals; the sulphuric acid easily dissolves metals such as iron, copper, aluminum and lead" (IIED, 2002). Acid drainage can potentially have long-term, severe impact on the surface and ground water and in some cases, may begin after mine closure.

Water usage

In rural areas, local communities are highly dependent on the local environment for their livelihood and one of the recurring issues in mining is the use of water and the risks of pollution (ERI, 2018c). As of 2017, Mongolian mining companies have utilized 68.2 million cubic meters of water, 92.5 percent of contracted volume of usage. Of this, 8 million cubic meters were surface water and the remaining 60.2 thousand cubic meters were underground water. Additionally, 3.4 million metric cubes of greywater have been recycled and reused by the mining sector.

TABLE 4.2. WATER USAGE, 2017

	Contracted water usage (m^3)	Surface water usage (m^3)	Underground water usage (m^3)	Total water usage (m^3)	Reusage of grey water (m^3)
Performance	73,695,603.4	8,003,409.5	60,179,913.9	68,183,323.3	3,408,628.6

Source: EITI Mongolia

EITI Mongolia (2017) reported that Oyu Tolgoi, Erdenet, Baganuur and Shivee-Ovoo are the largest consumers of water. According to the Law on Water Pollution Payment, mining companies are obligated to pay fees for water pollution. In 2017, mining companies paid MNT 38.8 billion for water usage and MNT 773 million MNT for water pollution to the local budgets.

Of the mines in Mongolia, Oyu Tolgoi is the most efficient in terms of water usage. Oyu Tolgoi aims to be one of the most-water-efficient copper mines in the world. "Its water usage has been optimized during the first years of mining, with only 0.42 cubic meters used per ton of ore processed – significantly below the global average of 1.2 cubic meters for comparable copper businesses. More than 85 percent of water used is recycled and reused to its operation" (Ergo Strategy Group, 2018).

Water pollution from mining activities is also generated by illegal artisanal miners, not just big mining projects. Specifically, some artisanal gold miners live along the banks of a river and use mercury (the use of which is illegal) to separate gold from its ore.

Rehabilitation

Rehabilitation is an integral part of the mining project operation. Open-pit mines, in particular, should do progressive rehabilitations as it minimizes mine closure costs and environmental risk as opposed to rehabilitating at the end of the project life. The following table is the rehabilitation statistics of the Mongolian mining sector.

TABLE 4.3. STATISTICS OF REHABILITATION, 2018

	2016	2017	2018
Area of mineral activities (hectares)	703.5	1,002.3	584.0
Rehabilitated area (hectares)	876.4	677.2	608.0

Rehabilitation cost (million MNT)	2,167.2	2,966.4	2,772.5
Technical rehabilitated area (hectares)	954.0	698.5	560.0
Biological rehabilitated area (hectares)	718.0	595.8	570.0
Environmental protection cost (million MNT)	5,180.0	5,155.0	2,005.0

Source: MRPAM

Mine closure

A mining project's closure objectives and impacts need to be considered from the very beginning of the project. The closure plan must be included within the environmental management plan, which was completed during the exploration phase. According to the IIED, "the closure plan defines a vision of end result of the process and sets concrete objectives to implement that vision." Additionally, the "mine closure plan is designed to ensure that:

- Future public health and safety are not compromised;
- Environmental resources are not subject to physical and chemical deterioration;
- The after-use of the site is beneficial and sustainable in the long term;
- Any adverse socio-economic impacts are minimized; and
- All socio-economic benefits are maximized" (IIED, 2002).

The mine closure plan should be a dynamic and iterative process throughout the mining project life cycle. During the mining operation, relevant stakeholders assist in the continuous update of the initial mining closure plan, which was drafted with the environmental management plan. Mine closure plan should consider the environmental legacy after the closure of the mine.

Unless the closure of a mine is fully executed, the negative environmental impacts will continue to have a social impact in the long-term. Incomplete closures are not only harmful for the environment and local communities, but also damage the reputation of the mining sector thereby affecting all future mining endeavors. According to the Ministry of Environment and Tourism, as of 2015, there are 566 abandoned mines which have not undergone closure or rehabilitation in 56 soums (sub provinces) of 15 provinces in Mongolia. On average, the percentage of successful mine closure in Mongolia is about 30 percent (Ministry of Environment and Tourism , 2017). The Nalaikh coal mine is one of the abandoned mines that did not go through proper closure or rehabilitation. Nalaikh covers 68.7 thousand hectares of area, 3.6 thousand hectares of which is abandoned. A resolution to close the Nalaikh mine was approved by the Government of Mongolia (GoM) in 1995. However, as the closure was improperly executed, artisanal miners have settled near the mine and have been operating and mining there. As of 2017, there are about 1500 artisanal miners at the Nalaikh mine site and since 1995, 205 miners have died. In 2014, the GoM attempted to continue the closure of the mine site but the local community opposed the resolution and the ordeal resulted in conflict.

Boroo gold mine was the first instance in Mongolia where a mine closure was completed. It's a hard rock gold mine located in Mandal soum of Selenge province. The mine began its operations in 2003 and was completed in September 2012 due to reserve depletion. The mine was an open-pit mine covering 888.5 hectares of

land. Boroo mine commenced rehabilitation of mined areas as soon as it became operational and conducted technical and biological rehabilitation of 435.7 hectares of land between 2003 and 2015. The remaining 370.8 hectares of land is planned to be rehabilitated between 2020 and 2022 (Boroo Gold LLC, 2019). Even their tailings dam is considered a good example of proper environmental management. Since 2009, rehabilitation of one of Boroo mine's tailings dams has been executed in accordance with its rehabilitation and closure plan. Included within the mine closure plan is not only soil rehabilitation but also biodiversity. Recolonization of animal species is one component of the successful biological rehabilitation of Boroo. The mine's closure and rehabilitation of the land is still continuing. However, Boroo mine's experience provides a valuable guideline of large-scale mine closures for the future.

According to the Minerals Law of Mongolia, the mine project shall carry out the following activities in order to partially or completely shut down the mining operation:

- Notify the state central administrative body about the closure of mine at least a year prior to closure;
- Rehabilitate all damaged areas and make the mine site safe for community use;
- Take preventative measures in the case the mine site is not available for public use,
- Remove machinery and equipment, vehicles, and other technologies from mine site unless it is allowed to be left by the local governor.

In Mongolia, the closure of mines is regulated by the Regulation on Temporary and Permanent Mine Closure (2003) and issues related to waste is regulated by Regulation on Management Radioactive Waste Derived from Ore Extraction or Processing (2015). However, these regulations only provide a general guideline rather than specific obligations. There are some cases which have argued that the legal environment of mine closure is not sufficient in Mongolia. For instance, in August 2019, the Prime Minister made a decision to revoke 23 gold and coal extraction licenses of 19 mining companies due to insufficient environmental management. As stated in the Government Action Plan for 2016-2020, the government will aim to ensure sustainable development of the mining sector by "creat[ing] a legal environmental to exploit secondary mineral resources and bring the process of mine rehabilitation and the closure up to international standards." This goal of bringing regulations regarding mine Mineral rehabilitation and closure up to international standard is reiterated in the State Minerals Policy. However, new regulations about closure of mines have still not been adopted.

Despite the lack of new regulations, the GoM is taking strides towards addressing the mine closure issue in Mongolia. For instance, within the Constitutional amendment being currently discussed by the Parliament of Mongolia (PoM), it is declared that local citizens shall be informed of the environmental impacts of the mining projects.

According to the regulations on Environmental Impact Assessment (EIA), mine closure plans should be drafted within the environmental management plan prior to exploitation. Exploration licenses are granted based on the thoroughness of the

environmental management plan. Additionally, all stakeholders – mining company, local community, local and central administrative bodies and authorized environmental assessment organizations – shall be informed and involved in the mine closure plan.

As mentioned in Section 2, the closure plan shall be included on the mine's feasibility study. It is stated in the Oyu Tolgoi Investment Agreement that Oyu Tolgoi shall "set aside funds commencing 7 years prior to the closure in an escrow account." In 2017, South Gobi Sands announced that the mine closure plan for Ovoot Tolgoi Mine was completed. The key proponents of the mine closure were determined to be:

(i) Long-term management of permanent engineered structures (for example: spillways, roads, waste dumps);
(ii) Achievement of environmental closure standards;
(iii) Orderly retrenchment of employees and contractors; and
(iv) Relinquishment of the site with associated permanent structures and community development infrastructure and programs to new owners. (South Gobi Sands, 2019)

Due to the lack of transparency of investment contracts or feasibility studies, information about closure funds or closure plans are not publicly available. Currently, there is no specific fund for mine closure as designated by the GoM except the funds accumulated annually for environmental protection,

4.2 Environmental Impact Assessment

Host country should weigh the economic benefits from the mining project against its environmental and social impacts. In other words, maximizing benefits from mineral resources is crucial but mining projects must be implemented in an ecological and environmentally safe method. Measuring economic benefits to the host country is well-developed relative to the measurement of environmental impact. There is a widely used tool for measurement of environmental impact: the Environmental Impact Assessment (EIA). NRGI (2019) defined 8 guiding principles for measuring environmental and social impacts as follows:

TABLE 4.4. GUIDING PRINCIPLES FOR MEASURING ENVIRONMENTAL AND SOCIAL IMPACTS

Who	**Principle 1.** Ensure inclusive multi-stakeholder measurement processes that enable meaningful participation of affected communities, with due regard for gender dynamics and the views of minority and marginalized groups. **Principle 2.** Involve interdisciplinary teams from the start.
When	**Principle 3.** Begin measurement of environmental and social impacts before extraction and continue through the life of the project and after closure.
What	**Principle 4.** Identify material impacts across capitals (built, financial, human, natural or social capital), project scenarios, geographic scales and time horizons. **Principle 5.** Include in stakeholder dialogue and decision-making frameworks both quantifiable impacts and those that cannot or should not be measured; and consider who bears the costs and benefits of these impacts.
How	**Principle 6.** Ensure measurement approaches are appropriate to the policy question at hand and to the country and local context. **Principle 7.** Protect legal and customary rights throughout the measurement process, including free, prior and informed consent where applicable. **Principle 8.** Ensure measurement processes and results are transparent, timely and understandable.

Source: NRGI, 2019

For Mongolia, an EIA is mandatory for all mining projects according to the Law on Environmental Impact Assessment. This law was adopted in 2011 and amended in 2017 and is comprised of 20 articles.

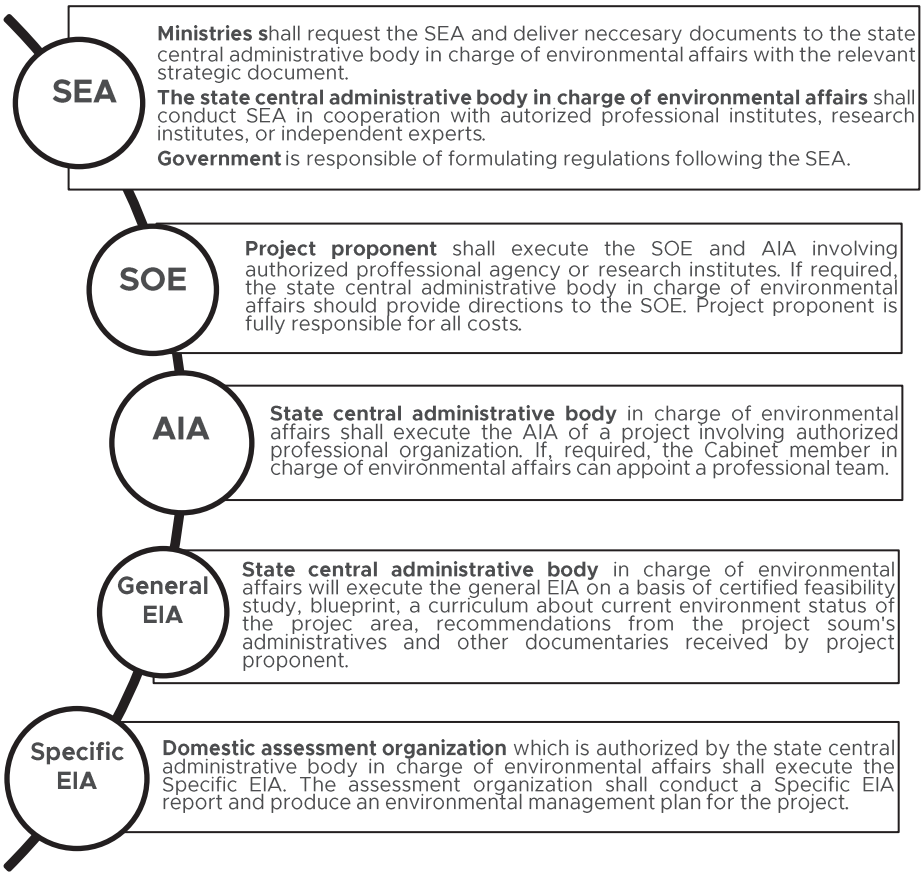
According to the law, the EIA must include the following four types of assessments:

1. Strategic environmental assessment (SEA): Assessment of the project's environmental impacts in the context of social and economic factors and provides critical systematic considerations at the sectoral, regional and national levels to promote environmental sustainability, growth and pollution prevention.
2. State of the environment (SOE): During the formulation of the project's technical and economic development plans, on a national and provincial scale, an analysis of the environmental conditions of the area is required to be defined in order to clearly develop the the project's plan and policy within the scope of notable aspects of current environmental situation.
3. Accumulated impact assessment (AIA): Assess cumulative and simultaneous impacts of mining projects on community health and determining actions against these negative impacts.
4. Environmental impact assessment (EIA): Identify potential negative environmental impacts and consequences of projects and determine necessary actions to diminish these impacts. The EIA has two components:
    a. General EIA, which shall be executed prior to granting of exploration or extraction license, or before starting the project implementation.
    b. Specific EIA shall be executed in the case of the General EIA concluded as specific assessment is needed.

Stakeholders in EIA

Law on EIA requires participation of stakeholders and provides a guideline on their roles for each type of assessment. According to the law, EIA shall be conducted in the manner dictated by ministries, project management team and state central administrative bodies in charge of environmental affairs. Whereas assessments shall be executed by independent experts, research institutes, professional institutes, which are authorized by the state central administrative body, or the state central administrative itself (*FIGURE* **4.2**). As of September 2019, there are 96 authorized organizations that are authorized by the Ministry of Environment and Tourism to conduct the EIA of mining projects.

FIGURE 4.2. STAKEHOLDERS IN CHARGE OF EIA



Source: Law on Environmental Impact Analysis

Public participation is also outlined in the law. The state central administrative body is responsible for the promotion of public participation in the EIA process through the use of its website. During the national and regional strategy formulation for the SEA, public feedback is required to be taken within 30 days by paper or verbally. Additionally, the authorized domestic assessment organization responsible must disseminate the contents of the Specific EIA and accept recommendations from the local administration and the project affect communities.

In the context of the NRGI principles, Principle 1 seems to be reflected in the legislations. Principle 2 mentions the involvement of an interdisciplinary team; however, there is no interdisciplinary criteria in the requirements for an assessor. According to the Regulations on Environmental Impact (2013), the professional council must comprise of representatives from the environmental, social, health, economic and development sector. Although the first two principles seem to be partially reflected in the legal framework, its implementation is not clear.

Continuity and transparency of EIAs in mining project cycle

The EIA and the environmental management plan should integrate environmental responsibilities into the mining project's everyday management practices and throughout all phases of the project life cycle. After obtaining an exploitation license, the license holder must conduct an EIA and produce an environmental management plan. The plan should be based on the results of the EIA and should encompass every phase of the mining project life. Included within the plan should be a comprehensive set of measures to minimize the environmental damages identified in the EIA such as air and water pollution and negative impacts on the local community and wildlife. Additionally, according to Article 39 of the Minerals Law, the environmental management plan shall include the following actions:

- Storage and regulation of toxic and potential toxic substances and materials;
- Protection, exploitation and accumulation of surface and underground water;
- Construction of mine tailings dam, and measure ensuring site safety;
- Rehabilitations of damaged environmental capitals or community health due to mining operations;
- Other mitigative actions against negative environmental and social impacts; and
- Preliminary mine closure plan.

The cost and implementation schedule of these activities must be reflected in the plan in a detailed manner. The mining company must also draft its own plan according to the environmental management plan, and this draft plan must be approved by the local governor. The mining company must frequently report its environmental impacts to the local central environmental administrative organization. The local governor or local central environmental administration must assess the implementation of the environmental management plan on an annual basis. In the case of unexpected impacts, the mining company must notify the local administration and revise the EIA and environmental management plan as appropriate.

EIA results in Mongolia are disclosed on the Environmental Information Center website (www.eic.mn). On the site, 1645 general EIA conclusions of mining projects are published. Of these, 1551 projects have concluded that a further Specific EIA is required, 20 projects may be implemented upon the fulfillment of some conditions, 60 projects require additional clarification and 5 projects were concluded as infeasible. The website provides a detailed conclusion and assessment for each project.

5. Governance issues of sustainable mining

Governance in the mining sector is a key component of ensuring sustainable mining in Mongolia. The GoM's stance on mining sector governance is defined by several key policy documents. These include the Action Program of the Government of Mongolia 2016-2020, the State Minerals Policy 2014-2025 and the Sustainable Development Vision 2030.

In the State Minerals Policy 2014-2025, the GoM included goals to improve the legal environment of Mongolia to promote investment, sustainable development and more transparency in the mining sector. In terms of improving the legal environment, the document included actions to promote integrated state and regional development, introduce and adhere to international governance standards, develop Mongolia's system of resolutions as well as actions to train qualified lawyers, economists, analysts and arbiters (State Minerals Policy 2014-2025).

The Action Program of the Government of Mongolia 2016-2020 also includes policies to be implemented in the geological, mining and heavy industry sectors. In terms of governance, the policy document included provisions to improve the legal environment to attract investment, maintain an appropriate level of state involvement in mining production, improve the cadaster registration and licensing system, improve coherence among related economic sectors and bring the process of mine rehabilitation and closure up to international standards (Action Program 2016-2020).

According to the Sustainable Development Vision 2030, one of Mongolia's key objectives is to "build professional, stable and participative governance, free of corruption that is adept at implementing development policies at all levels". This includes encouraging a transparent and accountable mining sector while ensuring stable and sustained governance. According to the document, the principles for governance for sustainable development include implementing stable state policies through consistent activities and strengthening inter-sectoral coordination, judiciously complying with the principle of 'rule of law', ensuring transparency in administration, ensuring the participation of all stakeholders in decision making, enforcing ethics in the public sector and eliminating corruption (Mongolia Sustainable Development Vision 2030).

5.1. Government participation

Ratified in 2006, the Minerals Law of Mongolia is the main piece of legislation governing the mining sector. In addition to establishing the legal environment for mining exploration and subsequent activities, it is vital in defining and classifying mineral deposits as well as determining the scope of the GoM's involvement in the mining sector.

According to Article 6 of the Minerals Law, mineral deposits are classified as deposits of strategic importance, common minerals and conventional minerals. Deposits of strategic importance are defined as "deposits whose scope may impact national security and the economic and social development of the country at the

national and regional levels; produces or has the potential to produce more than five (5) percent of total GDP in a given year." Given their level of significance, the GoM may own up to 34 percent of the shares of an investment into a deposit of strategic importance made by a license holder if the exploration activities that determined the deposits were funded by non-governmental sources. In such cases, the ownership percentage of the government can be determined by a mining deposit use agreement with the GoM's level of investment taken into consideration. If the exploration activities that discovered a deposit of strategic importance was conducted using government funds, the GoM is entitled to own up to 50 percent of the shares of an investment into the deposit. In this way, the Minerals Law determines the basis for government involvement in the mining sector as well as its level of equity and accountability. Moreover, the term "deposits of strategic importance" was officially included in the Constitution via amendments made by the Parliament of Mongolia in November 2019. According to the amendments, Mongolia will create a legal environment that ensures that the majority of the benefits accrued from using deposits of strategic importance are allocated to the general public (A.Tuguldur, 2019).

According to the Minerals Law, in order to be active in the mining sector, a mining company must be incorporated in Mongolia, be registered as a taxpayer, and operate under Mongolian laws. This ensures that any legal entity interested in Mongolia is registered, allowing for the enforcement of regulations and accountability measures. Moreover, the license holder of a mineral deposit of strategic importance must sell at least 10 percent of its shares on the Mongolian Stock Exchange.

These legislative regulations ensure that when dealing with deposits of strategic importance, the GoM is guaranteed a stake in the proceedings to ensure that mining activities of such a scale benefit not only the investing legal entity but the entirety of the Mongolian population via government policies. Therefore, utilizing these regulations, the Minerals Law attempts to institutionally spread the economic benefits of the mining sector to the entire country.

However, as mentioned in the "Contracting in the Mining Sector" (ERI, 2018c) report, while government equity arrangements increase the government's involvement in the mining sector and give the government representation on the company's board, it may also result in an undue debt burden. For instance, if the government becomes a shareholder in a company via free carry shares, the government must invest heavily in the project. In many cases, most governments of developing countries do not have the funds to invest and resort to either loans from banks or the mining company itself. This increases the country's overall debt burden and can have negative long-term economic consequences.

5.2. Investment

In addition to the Minerals Law, the Investment Law of Mongolia is also vital when discussing governance in the mining sector. As mining projects are long term ventures that require vast amounts of capital investment, they are regulated to a degree by the Investment Law. In particular, the most pertinent part of the Investment Law is that it outlines the criteria needed for a legal entity to be eligible

to enter into an investment agreement with the GoM as well as the process to get a stabilization certificate.

According to the Investment Law, a stabilization certificate guarantees that the holder is subject to fixed corporate income tax, customs duties, value added tax and royalties throughout the duration of the certificate. The valid period of a stabilization certificate depends on the level of investment as well as the area of investment. Currently, in order to get a stabilization certificate that is valid for a minimum of 5 years, an investment of at least MNT 30 billion must be made over a span of 2 years. The table below shows the breakdown of the investment needed to get a certificate in their respective regions.

TABLE 5.1. CONDITION OF GETTING STABILIZATION CERTIFICATE

Investment (billion MNT)	Duration of Stabilization Certificate					Timespan of investment (years)
	Ulaanbaatar	Central region	Khangai region	East region	West region	
30-100	5	6	5	7	8	2
100-300	8	9	9	10	11	3
300-500	10	11	11	12	13	4
500 and above	15	16	16	17	18	5

Source: Investment Law of Mongolia, Article 16.2.1

In terms of investment agreements, any entity planning on investing over MNT 500 billion into a venture in Mongolia is eligible to negotiate an investment agreement with the GoM. Investment agreements are regulated according to Government Resolution 52 (ratified in 2014) and Government Resolution 255 (ratified in 2015). While these resolutions provide a general structure of investment agreements and include sections on supporting local development and ensuring environmental protection, they are very general. This means that rather than having a standard model contract, both the GoM and the investing entity have leeway to negotiate and create specialized contracts. As these negotiations are not fully public, this makes public participation and regulation difficult.

Currently, the Oyu Tolgoi Investment Agreement is the only publicly available investment agreement. An in-depth analysis of the Oyu Tolgoi Investment Agreement is available in the "Contracting in the Mining Sector" report (ERI, 2018c). While older stabilization agreements are also available for public viewing, they are very general and made under the now nullified Foreign Investment Law.

5.3. Conflict resolution - Arbitration

Additionally, another key factor of mining contracts and investment agreements lie in their regulation of how to resolve conflicts. In most cases, the easiest and least costly way to resolve a potential conflict between the government and mining companies is by including provisions for arbitration in their investment agreements. By doing so, investing mining companies are protected from injustices suffered at the hands of the government while also ensuring a speedy resolution. Arbitration also allows for the conflict to be handled by institutions that the expertise needed to effectively resolve potential conflicts.

In Mongolia's case, as discussed in detail in the "Marketing and Trading" report published by ERI in 2018, arbitration in Mongolia is regulated by the Arbitration Law ratified in 2003 and amended in 2017 and conducted through the Mongolian National Arbitration Court established in 1960. The law was created based on the United Nations' Arbitration Law and while there are a limited number of arbitration cases in Mongolia, for instance 41 cases in 2014, 70 cases in 2015 and 58 cases in 2016, it is still a cost effective option favored by mining companies (Amarjargal, L., 2017). Additionally, with the enactment of the revised law in 2017, international and domestic arbitration regulations are more consistent with international best practices, the time and cost of conflict resolution decreased and the cost of running a business in Mongolia is reduced. As a result, the workload of Mongolian courts are expected to decline as case settlement through arbitration is encouraged with the improvements made to the law (MDS KhanLex , 2019).

Overall, the option of conflict resolution by international arbitration acts as another safeguard for investors who would otherwise be wary of Mongolia's legal institutions. For instance, in one such case, Khan Resources, a Canadian mine operating in Mongolia, turned to the Permanent Court of Arbitration in the Netherlands to resolve a conflict between the company and the Mongolian government concerning the revocation of its uranium mining licenses by the Government of Mongolia in 2009 (World Nuclear News , 2016). The tribunal decided in favor of Khan Resources however, before the award was to be given both sides came to an agreement to settle the matter out of court. According to the settlement, the Government of Mongolia agreed to pay Khan Resources USD 70 million in damages (Edwards, 2016). In this way, international investors are better able to safeguard their rights and mitigate risks by relying on arbitration and other alternative conflict resolution methods. Moreover, the number of cases settled through arbitration are slated to increase as the process becomes more refined. A detailed analysis of arbitration and alternative conflict resolution can be found in the Economic Research Institute's Foreign Direct Investment update report (ERI, 2019b).

5.4. Fighting corruption

Corruption is a major drawback to the efficient allocation of natural resource revenues. It is a detriment to democracy and the rule of law. The damages of corruption can be classified into four main categories: political, economic, social and environmental. The IMF has identified the following negative economic effects of corruption:

- Weakened fiscal performance through distortions in both revenues collection and expenditure
- Decreased levels of domestic and foreign investment due to the costs and uncertainty created by corruption
- Increased inequality because of distortions in public spending (e.g., health and education)
- Social conflicts that might lead to detrimental humanitarian and economic consequences when corruption becomes sufficiently systemic

Corruption also erodes trust in the government and may lead to a lack of enforcement of key regulations. For instance, corruption may lead to breaches of environmental regulations and careless extraction that ultimately causes environmental degradation. Corruption is a problem in all countries and is especially harmful to developing countries.

Mining and corruption

In resource rich countries, mining companies may be tempted to offer bribes to politicians and public officials in order to obtain mining licenses and gain an upper hand on competitors. According to the Combating Corruption in Mining Approvals report conducted by Transparency International, an international NGO focused on combating global corruption, corruption risks exist in mining approvals regimes across the world regardless of economic development, political context, or the size and maturity of the country's mining sector (Caripis, 2017).

Meanwhile, Andrea Petermann and et.al (2007) showed that fuel exports increased corruption whereas non-fuel exports affected corruption differently depending on the economic development of the country. In particular, higher non-fuel exports in less developed countries, especially the export of high value commodities such as gold and diamonds, increased corruption while increased non-fuel exports in rich countries decrease corruption.

According to the IIED's Mining, Minerals and Sustainable Development report, the following factors make the mining sector especially susceptible to corruption:

- Large capital expenditure – Mining is capital intensive and starting a mining project requires huge amounts of investment. Capital flows, royalties and taxes on this scale may entice underpaid or unscrupulous officials to take bribes, especially less transparent systems.
- Extensive regulation – Mining projects usually have widespread social, economic and environmental impacts. Therefore, governments try to regulate this sector as much as they can by requiring various types of permits and approvals. A lack of transparency in mining approvals regimes and the discretion of government officials are likely to foster corruption.
- Fixed location – For companies in other sectors, it is possible to choose to operate in countries with well-developed institutions and favorable economic conditions. However, mining is location based and companies can only operate in resource rich countries.

Corruption can also lead to animosity between mining companies and the general public. If corrupted politicians or government officials continuously divert mining revenues away from public investments, such as investments into the education and health sectors, the general public will begin to doubt the contributions of the mining sector on the economy.

Fighting corruption at home

In 2018, Mongolia had a Corruption Perception Index score of 37 (a higher score indicates less corruption) and ranked 93 out of 180 countries. This was a 1 point and 10 rank improvement from 2017. Moreover, it was a positive shift from the continuous declines observed in 2016 and 2017.

Mongolia has been improving its legal environment to combat corruption and in 2006, the Parliament ratified the Anti-Corruption Law. This led to the creation of the Independent Authority Against Corruption and the National Anti-Corruption program was launched. Moreover, in 2012, Parliament ratified the Public Service Law in order to better regulate public and private interests. This was especially important as issues of conflicts of interest are a major reason for corruption among public officials.

As mentioned above, transparency is essential when combating corruption. In order to improve the transparency of government organizations, the Glass Account Law was ratified in 2014. Under this law, all government organizations are required to publically publish their spending. Moreover, after joining in 2005, the GoM fully complied to the EITI's standards to promote transparency and accountability in the mining sector in 2010.

Transparency International assessed the risks that might lead to corruption in mining approvals regime in 18 resource rich countries. According to their findings, Mongolian mining approvals regimes are vulnerable in terms of beneficial ownership. In other words, there is a risk that applicants for mining licenses may be controlled by hidden beneficial owners. In a similar vein, IRIM (2016) assessed corruption risks in Mongolia's mining sector. The corruption risk was assessed at 4 different phases of the mining process; exploration, pre-operation, extraction and post-extraction phases. According to the study, collateral for reclamation had the highest corruption risk among all 15 risks. Receiving responses from local governors, relations between local civil society organizations and mining companies and the lack of clarity of legislation on mining closure were also identified as key corruption risks.

According to the Anti-Corruption Law, the Independent Authority Against Corruption conducted a survey to assess the integrity levels of government agencies and ministries. In 2018, the overall integrity level was 68.7, a 1 percentage point decreased from 2016 and a 5.1 percentage point decrease from 2015. The survey showed that government organizations related to the mining sector reported lower integrity levels compared to organizations in other sectors. In particular, in 2018, the Ministry of Mining and Heavy Industry had an integrity level of 64.6, the lowest among all ministries while the Mineral Resources and Petroleum Authority had an integrity level of 65.9, third last among all government agencies.

Fighting corruption in international level

According to the 2018 Corruption Perception Index, countries in western Europe and European Union countries have the lowest corruption whereas Sub-Saharan African countries have the highest corruption.

In order to combat corruption, the United Nations Convention Against Corruption was adopted by the United Nations General Assembly in 2003. Recently, governments, international organizations, companies and NGOs have been making an effort to address the global issue of corruption. One of the largest organizations taking action to combat corruption is Transparency International, an NGO established in 1993 in Germany. Transparency International has branches in over 100 countries and combats corruption by cooperating with governments and social communities.

Moreover, international organizations such as the World Bank and the IMF have been making efforts to combat corruption by enhancing transparency and accountability. The World Bank considers corruption a major obstacle to ending extreme poverty. As such, the World Bank actively fights corruption within its own activities and debars corrupted individuals and firms from World Bank-financed activities. Currently, the World Bank has sanctioned more than 700 firms and individuals due to fraud and corruption. Additionally, the IMF engages in initiatives to promote the reform of economic regulations and enhance fiscal transparency and accountability.

5.5. Exploration and development

Licensing – Citizen Participation

In order to take part in the mining sector in Mongolia, a legal entity must first obtain a reconnaissance, exploration and extraction license. Mining exploration licenses are also given through a tender process in which the land in question is publicly announced and everyone interested is encouraged to take part in the tender process via media outlets. The tender bids are scored according to a regulation published by the government with the highest scoring bidder winning. Licenses are given for a period of 3 years and can be extended. Additionally, when deciding the area of land available for reconnaissance and mineral exploration, the Mineral Resource and Petroleum Authority sends potential geographical coordinates to the governor of the province in question. The governor is then responsible for getting opinions from the province's Citizens Representative Khural. After taking these opinions into account, the governor has 45 days to relay them back to the Mineral Resource and Petroleum Authority while also having the right to veto their geographical coordinate suggestions. The local government also has the right to ensure the correct usage of land in accordance with the Minerals Law and pertinent environmental laws should the local community find that the license holder is acting outside its legal rights and unduly harming the local community and the environment.

Moreover, according to Article 42 of the Minerals Law, cooperation between the local government and the community is legally required. The resulting local cooperation agreement will cover issues of environmental protection, employment, infrastructure development and overall mine usage. For instance, in terms of employment, according to Article 43.1 of the Minerals Law, foreigners can compose up to only 10 percent of the mining license holding company's total workforce. If license holders fail to abide to this regulation, they are subject to a fine of 10 times

the minimum wage per foreign employed above the enforced cap. In this way, the law is regulated such that local community participation is necessary when operating mining projects. In general, the local community and government has the right as stakeholders to confer with the mining company on key issues to ensure that they benefit from the project.

Access to Information

Another key dimension of governance in the mining sector is stakeholders' access to information. While the government and operating mining companies may have access to pertinent information, other stakeholders such as the local community, the general public and other interested mining companies need to have information in order to ensure the effective governance of the mining sector. In this respect the EITI works to bring mining contracts into the public eye. By doing so, the general public has the opportunity to fully exercise its right to oversee mining contracts and ensure the effective use of natural resources for the public good. Mongolia became a signatory of the EITI in 2006, resulting in the establishment of a stakeholder working group consisting of representatives from the government, mining companies and the general public. The initiative works to encourage the public publishing of mining contracts and purchasing agreements while also compiling information on licenses and other mining related information in an easy to access online database.

However, despite these efforts, there are no consequences for mining companies that do not publish their contracts, reducing the public's ability to oversee the activities of the mining sector. While the EITI Mongolia does successfully collect the data of mining companies operating in Mongolia, this is a far cry from the level of transparency recommended for good governance according to international standards.

In 2016, the EITI revised and published its new standards which detailed 12 basic principles as well as 7 requirements for member countries (these include: oversight by the multi-stakeholder group, legal and institutional framework, including allocations of contracts and licenses, exploration and production, revenue collection, revenue allocation, social and economic spending, outcomes and impact) (EITI , 2016). All members of the EITI are also periodically checked via a process called the Validation in which a country's compliance with the EITI's requirements are assessed. Following the implementation of the EITI's new standards in 2016, Mongolia underwent its first validation in which the country displayed meaningful and satisfactory progress in most of the EITI's requirements. However, there was inadequate progress observed in state participation concerning licenses and contracts, in which the retained earnings and reinvestments of state owned enterprises were not fully detailed and unclear. Moreover, the quasi-fiscal expenditures of state owned enterprises were also not comprehensively detailed, pointing out the inadequate efforts of state owned enterprises in promoting transparency and good governance in the mining sector. This was mitigated in Mongolia's second validation in which the country was found to have made satisfactory progress in all requirements of the EITI (EITI , 2018). The next validation is scheduled to be completed within 3-18 months of the previous assessment.

However, despite these improvements, while Mongolian mining license holders must report product sales and tax payment information to the general public according to the Minerals Law, Petroleum Law, Nuclear Energy Law, and the Law on Widespread Minerals, contracts transparency in the mining sector is not a legal requirement. Despite this, initiatives like the creation of a resource contract database established by the Open Society Forum with participation and guidance from the EITI Secretary of Mongolia as well as the Ministry of Mining and Heavy Industry have compiled published mining contracts in Mongolia including "production sharing agreements in oil and gas sector, investment agreements, concession and local development agreements in mining, as well as former stability agreements established prior to the 2006 Minerals Law" (Resource Contracts Mongolia, 2019). While the legal requirements for contract transparency are inconsistent, as more contracts are published and available for public viewing, the sector is more likely to promote good governance.

5.6. Active mining

Taxation

As the mining sector makes up a significant portion of Mongolia's economy, revenue from the mining sector constitutes a substantial part of the state budget. According to the Corporate Income Tax Law, all companies in Mongolia must pay a 10 percent tax on income ranging from 0 to MNT 3 billion. For income above MNT 3 billion, an annual corporate income tax of 25 percent in addition to a payment of 300 million MNT is applied. There is no difference between mining and non-mining companies, showing that while the government does not apply special corporate income tax incentives in the mining sector, it also does not operate under a different tax system for the mining sector. Additionally, there are no special withholding taxes for mining companies along with a flat 10 percent VAT on non-final products. With the exception of specialized crude oil licensing fees and air pollution fees on the extraction of raw coal, most taxation legislation in Mongolia is not geared towards the mining sector.

This type of general tax system has the advantage of clarity and ease of implementation. For instance, many mining intensive countries such as Chile and Peru both have a specific mining tax in addition to a general corporate income tax applied to all companies. While this type of tax regime might boost government gains from the mining sector, it requires more administrative prowess, may be unclear to foreign investors and result in confusion. For its effective implementation, ample administrative resources are needed. Though Mongolia can consider a specialized taxation regime for the mining sector in order to promote better governance and sustainable development, this requires institutional developments that are not yet available to Mongolia. In light of these requirements, Mongolia's unified, general tax system is most suitable for the country's current situation.

Royalties

Another key issue regulated by the Minerals Law is the royalty rate for mineral commodities. As detailed in the "Taxation and Financial Reporting" (ERI, 2018e),

Mongolia has a "tax-and-royalty" system in which a mining license holder pays a royalty based on the sales value of all products extracted, sold or shipped for sale. The sales value is calculated using international benchmark prices, utilizing a sliding scale royalty system. Moreover, the royalty rate levied increases as the international price of mineral commodities rise and as the level of processing decreases. This ensures that Mongolia benefits from positive fluctuations in international prices and also incentivizes companies to increase their level of processing when extracting mineral commodities.

Royalties are an important way for governments to influence and regulate the mining sector. For instance, in accordance with Mongolia's national Gold-2 program, in order to promote domestic gold production, the Parliament of Mongolia amended the Minerals Law such that the gold royalty rate was decreased from 5 percent to 2.5 percent from the law's implementation in 2014 to January 2019 (ERI, 2019). During this time, gold production surged and gold purchases made by the Bank of Mongolia increased in tandem. After January 2019, while the Bank of Mongolia made an official request to the Government of Mongolia to extend the amendment for another 5 years, the request was not fulfilled and the new gold royalty rate came into effect (B.Misheel, 2019). Since then, gold purchases by the Bank of Mongolia have fallen.

Moreover, on March 26 2019, the Parliament of Mongolia made amendments to the Minerals Law such that "any legal entity that has sold, shipped for sale or used mineral resources or sold gold to the Bank of Mongolia or any commercial bank authorized by the Bank of Mongolia is a mineral royalty payer" (Minerals Law , 2019). This is a change from the previous law in which only mining license holders were defined as mineral royalty payers. Through the ratification of new legislation, the government increased the base of people and legal entities that pay royalties. However, this brought along issues of double taxation and the Constitutional Court of Mongolia found the amendments unconstitutional via Constitutional Court Resolution #4 published on October 30 2019, voiding their implementation. This created confusion as the legal basis of paying royalties have been voided and until the Parliament of Mongolia made the appropriate changes to the law, mineral commodity producers in Mongolia were no longer obligated to pay royalties (Ariunbold, 2019). While the situation surrounding who is considered a royalty payer and whether royalties are being collected remain muddled, we can expect future changes to the Minerals Law and how it legislates mineral royalty collection.

5.7. Closure

As discussed in section 4.1 of this report, when first applying for a mining exploration license in Mongolia, the applicant must include an estimate of the cost of environmental management expected during the duration of the mining project. After getting a license, the license holder must also submit a detailed environmental projection plan. The plan must be made after consulting with the province's governor as well as the local government's environmental protection unit. Mining license holders must place 50 percent of the funds for annual environmental protection costs with the local government. This acts as a type of insurance to make sure that proper environmental protection measures are implemented and funded. By involving the local government more than the central government, the local

community has the chance to watch over the operations of the mine and demand due recompensation. Additionally, contracts made with the Ministry of Environment and Tourism as well as local government under the Law on Prohibiting Mineral Exploration and Exploitation in Water Heads and Protected Zone of Rivers and Forested Areas centered on environmental rehabilitation are registered in the Resource Contract Database established by the Open Society Forum. These contracts can be easily accessed by the public allowing for additional oversight (Resource Contracts Mongolia , 2019).

The most important aspect of mining sector governance lies in how to effectively allocate and use the revenue collected from mining activities. In order to effectively tackle this issue, the Parliament of Mongolia approved the Fiscal Stability Law (FSL) in 2010 and the Future Heritage Fund law in 2016, as discussed in sections 2.1 and 2.2 of this report. However, while this law provides the government with clear cut goals and regulations for maintaining fiscal discipline, the law has been amended almost annually in order to accommodate the government's inability to meet its budgetary targets. For instance, articles 6.1.1, 6.1.2, 6.1.3 and 6.1.4 of the FSL contain important provisions pertaining to the budget revenue, budget deficit, budget expenditure and the net present value of government debt. The implementation date of these articles however have been delayed from 2013 and 2014 to 2021 and 2023. Moreover, the ceiling on the net present value of government debt has been continuously changed, amended from 40 percent of GDP in the original 2010 law to 60 percent in its 2016 amendment. Thus, while the existence of this law highlights Mongolia's focus on better dealing with fluctuations in commodity prices and increasing its overall economic robustness, the clear lack of implementation points to the Mongolian government's lack of fiscal discipline and the economy's continued fragile state. However, in November 2019, the Parliament of Mongolia amended the Constitution, adding provisions to Article 6 such that Mongolia's State Minerals Policy is linked to the government's long term development policy and income from the mining sector is collected in a sovereign wealth fund for future usage (A.Tuguldur, 2019). While the exact specifications of the sovereign wealth fund have not been detailed yet and it is too soon to assess the effects of the Constitutional changes, this amendment shows Mongolia's commitment to sustainable mining development and could lead to better policy implementation. A more detailed analysis on the implementation of the Fiscal Stability Fund and the Future Heritage Fund can be found in the Economic Research Institute's Revenue Management update report focused on the economic effect of sovereign welfare funds (ERI, 2019c).

As with the Fiscal Stability Fund, while the conception of the Future Heritage Fund displays Mongolia's willingness to invest in sustainable development in the mining sector, its actual implementation faces problems. As the Future Heritage Fund is financed by mining sector activities, its projected funds are based on exalted estimations of Mongolia's commodity exports. This is especially the case for coal, where the Ministry of Finance has cited unusually high targets that might not be met and in turn hurt the stability of the fund. Therefore, rather than focusing on the legislation behind the fund, the institutional implementation of government policies remain the main obstacle to sustainable development.

6. Conclusions and Recommendations

The mining sector continues to have a strong influence on the Mongolian economy through both internal and external factors.

There were three major mining development milestones in Mongolia. Milestone 1 was the 2006 amendment to the Minerals Law, creating state-owned mining companies and laying the foundation for strategic planning based on mining revenue. Milestone 2 was the OTIA which greatly expanded Mongolia's economy and created a large number of institutional changes. The agreement opened Mongolia up to international financial markets and resulted in a more complex financial system that continues to rapidly develop in order to meet the needs associated with accelerated economic growth. There were also large improvements in the quality of human resources, training and investment systems. Milestone 3 was the adoption of the UN's SDG goals by the Long-term Sustainable Development Vision of Mongolia 2030 and the strengthening of its planning system by explicit inclusion of long-term planning in the Constitution with the goal of diversification.

It is increasingly clear that the country will need a new system for diversifying its economy and creating reserves as mineral commodity prices are inherently unstable. Currently, mineral commodities dominate Mongolian export and changes in commodity prices fluctuate government revenues. Thus, Mongolia needs to develop its non-mining sectors and focus on export diversification.

To prevent the economic risks associated with commodity price fluctuations and to manage mining revenues properly, the Parliament adopted the FSL and established the FHF. However, their implementation and abidance to the rule of law are deficient. Accomplishments of the Fiscal Stability Fund and the FHF will depend on establishing context-appropriate rules and broad-based acceptance of the rules governing the funds. Breaking the rules undermines confidence in the public financial management system and can lead to financial mismanagement, corruption and poor development outcomes.

Allocating mining revenues effectively between the central government and local governments is essential to promote local development. In Mongolia, mining revenues are allocated through the LDF and starting in 2020, revenues from mining fees will be transferred to local governments.

In addition to obtaining legally required licenses to operate from the government and other regulatory agencies, a "social license" is also becoming increasingly necessary. There have been several instances where mining developments have been delayed, interrupted or even shut down due to opposition from the public and/or local communities. Thus, in order to avoid these costly conflicts, mining companies need to obtain and maintain a "social license" to operate from local communities. Some of the most commonly cited means of maintaining a civil and respectful relationship with the public is through ongoing communication with stakeholders, transparent disclosure of information and community development agreements.

Another controversial issue in the mining sector is the issue of human rights. Mining activities sometimes violate human rights to own property, land and free movement. Small artisanal mining is another important human rights issue. In order to address this issue, the GoM adopted a special resolution to formalize these miners and give them an opportunity to form partnerships. However, the implementation of this resolution is not sufficient due to lack of incentives for local administrations to perform coupled with a lack of information for miners. Therefore, these circumstances create opportunities in which the rights of small artisanal miners are violated.

Artisanal and small-scale miners are also included in local communities in the informal sector. The impacts of this sector have the same level of adverse impacts on the local environment and communities, perhaps worse in some cases. As such, ASM should be formalized without penalizing these miners and their livelihood. As a result, the adverse impacts of their operational activities can be managed and minimized.

Although there are legislative requirements set in the Minerals Law and concession agreements, mining companies should strive to go above and beyond to assist in the advancement of the local economy as a whole. One of the key areas where mining companies can assist is in healthcare and education. Mining operations have significant adverse effects on the employees and surrounding communities so the companies should utilize a case specific approach to address each need and communicate and collaborate with local health officials and authorities. Another is to contribute to the national educational system and work with local universities and schools to offer courses in specialized areas so as to help the companies meet the local employee requirements and to help the country produce qualified and skilled individuals.

The environmental side of the mining sector is the most crucial sphere of sustainable development. If environmental issues are ignored, other benefits from the mining sector would wane eventually. In Mongolia, while mining activities continue to grow, the legal environment for environmental issues concerning mining continue to be underdeveloped. Furthermore, the implementation of existing environmental regulations is not sufficient. Most critically, as a result, the mining closures are not made properly and many environmental and social issues such as informal artisanal mining, pasture degradation, legacies of environmental hazards and community health problems continue to persist.

In terms of governance, at all points of the mining process from its reconnaissance and development to active mining and closure, Mongolia has legislation in place to encourage and enforce good governance in the mining sector. However, despite the existence of these policies and laws, the largest issue remains their implementation and usage in real life. For instance, while the Minerals Law and the Investment Law detail how the mining process needs to be regulated, the general provisions in the laws allow for leeway when negotiating investment agreements with real companies. This puts more importance on closed door negotiations which the public are not privy to. In addition to the general lack of transparency regarding purchasing agreements and mining activities, it is hard to say that the general public is fully integrated into the mining sector as a stakeholder.

As for revenue collection and management, while Mongolia's taxation regime does not treat the mining sector differently from other industrial sectors, overall taxation is clear and fairly easy administratively. The collected revenue is then consolidated into the Fiscal Stability Fund and the FHF for future use. The existence of these funds and the laws that govern them are well thought out and greatly support better governance in the mining sector. However, their implementation and the abidance to the rule of law regarding mining laws in general are found lacking. As such, while the policies and the legislation governing the mining sector may be deemed satisfactory, their practical usage remains the main problem plaguing Mongolia.

Another major drawback that hinders the efficient sharing of mining revenue and sustainable development is corruption. Although, Mongolia is improving its legal framework for fighting corruption by adopting important laws and establishing an independent agency, the implementation of these laws are still insufficient. The mining sector in particular, is vulnerable to corruption and numerous studies have shown that corruption risks are high in the Mongolian mining sector.

Recommendations and suggestions

Based on the results of this study, the researchers have put forth the following policy recommendations and suggestions:

- The necessity to "balance" the mining with the rest of economy through more linkages, based on sustainable development – that is, to address the issues of water usage, illegal mining and management of environmental damage.
- The country needs to have a better understanding of mining resources, should pay more attention to studying the price fluctuations, competition and changes on minerals market, and should have better facilities to correctly predict mineral prices as now they are such an important part of the economy.
- The country needs to truly support mining by developing further soft and hard infrastructure for the industry itself. Currently, there is lack of infrastructure and educated personnel.
- FDI is an important part of the mining development. Further supporting and improving FDI is crucial for sustainable growth of the mining and the country itself.
- As Mongolia's economy is at the beginning stage of transformation into a truly mining-based economy, diversification is an increasingly important long-term goal. Studying examples of many mining economies, such as the United Arab Emirates, Saudi Arabia, Norway and Australia, is a good way to find ways of managing revenues from the mining sector for diversification goals. This requires further studies of possible diversification projects and their sustainability.
- Economic sustainability itself is an important issue, as the country needs to create better fiscal, monetary and financial systems to cope with the instability of revenues from the mining sector. Again, examples of the

Norway's pension fund and other sovereign wealth funds are important for optimal resource management as the resources themselves are exhaustible.

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