



Islamic Republic of Afghanistan: Mining Sector Roadmap

Ministry of Mines and Petroleum
Islamic Republic of Afghanistan
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Foreword

The Government of Afghanistan is committed to open and accountable mining sector, as it represents the largest opportunity to increase growth rates in the country. To sustainably utilize our natural capital to create the financial capital to expand and ensure the freedoms, rights and securities enshrined in our constitution is the vision that guides us. We dedicate ourselves to utilizing the potential to create higher levels of economic growth for its citizens, generate fiscal resources for the government, and increase prosperity across generations. However, as is evident across many countries, it is not sufficient to simply have extensive natural resource endowments.

On the contrary, extensive natural resource endowments typically have the opposite effect: they generate a political economy with higher levels of conflict, lower rates of growth, and typically create a ‘natural resource curse.’ It is with this knowledge that the Government of Afghanistan has taken a long-term view of the country’s natural resource endowment. The right set of institutional structures, legal basis, and policies can create the conditions for Afghanistan to move from a low-income country to a middle-income country over the coming decades. The wrong set of decisions could shepherd Afghanistan back towards conflict and low growth rates.

In preparation of this document, we reviewed the performance of many countries and translated some key principles to the Afghan context. The first principle is transparency. The lack of transparency often invites actors to develop contracts to benefit individuals rather than to benefit the entire citizenry. Our first changes to the sector were therefore to ensure the online mining database was up to date and that all existing mining contracts were scanned and placed online. This sets the standard that all actors in the sector should expect transparency.

Second, we must prioritize our activities on mineral sub-sectors and areas of interest where we face the smallest number of binding constraints. For example, we will prioritize construction material contracts, industrial minerals, and precious metal tenders over bulk metals, as the required transport and power infrastructure is not yet in place for these heavier metals. Over time, as this necessary infrastructure is put in place, we will move towards tendering for these larger contracts.

Third, to implement this new strategy, we must configure the Ministry of Mines and Petroleum to focus on its core functions. At the current time, the ministry develops policy, regulates the mining sector, and has a number of state companies that operate across the coal, cement, natural gas, and fertilizer industries. We are of the strong belief that the regulatory and operational functions of the ministry should operate independently over time.

We believe that these principles, combined with Afghanistan’s extensive mineral resources, will create the right conditions to increase economic growth, widen the country’s tax base, create higher levels of geographic income equality, and produce intergenerational wealth for Afghanistan’s citizens.

H.E. President Mohammad Ashraf Ghani
President
Islamic Republic of Afghanistan

EXECUTIVE SUMMARY

Afghanistan has extensive mineral resources located in every province of the country. The country has world-class deposits of iron ore, copper, gold, rare-earth minerals, and a host of other natural resources. However, the government must create the right set of rules to be able to optimally extract these resources. This report provides a roadmap for how we aim to ensure that Afghanistan's natural resources benefit its entire citizenry. If we are successful, we should see an increase in fiscal resources, an improvement in the country's trade balance, and ensure that we provide for future generations.

This paper begins by providing an overview of Afghanistan's natural resource endowments. We find that, among other minerals, Afghanistan is expected to hold more than 2.2 billion metric tons (MTs) of iron ore, 1.3 billion MTs of marble, almost 30 million MTs of copper, 1.4 million MTs of rare-earth minerals, and 2,700kg of gold. Although these amounts are large in absolute terms, in the global context we should recognize that we are not the largest in any category (*e.g. Chile holds approximately 210 million MTs out of the world's close to 1 trillion MTs of copper reserves*). However, we can become a significant player across many markets.

The paper also reviews the constraints of the mining sector and then prioritizes various areas of interest (AOIs) and mineral interventions based on these constraints. Third, we review the legal basis of the mining sector and provide recommendations for changes. Fourth, we provide recommendations for the reorganization of the Ministry of Mines and Petroleum. Fifth, we provide a mineral development framework that takes into consideration the type of industry and region. And finally, we summarize our recommendations.

AFGHANISTAN'S NATURAL RESOURCE ENDOWMENT: AN OVERVIEW

It has been stated that Afghanistan holds greater than one trillion dollars worth of mineral resources. However, these resources have not been successfully developed during the 20th or 21st century. To move from only a conceptual understanding of Afghanistan's mineral resources to an initial classification of probable and proven reserves, a number of studies have been conducted.

These began during the mid-20th century, when the USSR and its Eastern European allies gathered a great deal of mineral resource information. These mineral resource studies included systematic geological mapping, collection and analysis of rock and sediment samples, airborne geophysical surveys, and systematic mineral exploration.¹ Then, during the previous decade, USAID funded a number of surveys that were jointly conducted by the Afghanistan Geological Survey (AGS) and the USGS. These studies now provide the most comprehensive review of Afghanistan's mineral resources.

The first study was completed in 2007² and provides an overview of Afghanistan's mineral resources by type of mineral deposit.³ Each chapter of this first report covers a particular mineral deposit.

¹ Many maps and reports from this era remain in the libraries of the MoMP and AGS, but many had been taken to Russia or its allies by the end of the Soviet intervention

² "Preliminary Non-Fuel Mineral Resource Assessment of Afghanistan" by Afghanistan Geological Survey (AGS) and USGS (2007), i.e. referred to as initial report

Chapters #2-6 of the report covers magmatic-hydrothermal deposits, while the remaining chapters cover minerals that are not products of magmatism. Within each chapter, the report uses various geological information regarding tectonic environments, magma types, associated magmatic-hydrothermal mineral deposits, and intrusive stages corresponding to tectonic events, to identify potential mineral areas of interest.

To develop mineral forecasts in the report, the mineral teams used a three-part quantitative mineral-resource assessment methodology: (1) collecting data inputs, (2) conducting an assessment, and (3) providing analysis.⁴ The output of this process is used to project potential mineral supply, for environmental planning purposes, land planning, and economic forecasts.

In the first phase (*collecting data inputs*), the data inputs typically included data from known mineral deposits and occurrences, geochemistry data, and geophysics data. In Afghanistan, the main data used were the geological maps and mineral occurrence databases from Orris & Bliss (2002) and Doebrich & Walh (2006). Most of the deposit descriptions were derived from Abdullah and others (1977). The assessment teams then reviewed the geology of areas and selected appropriate deposit models for each mineral, and the relevant data was entered into each models.

In the assessment phase, a technical team (a) delineated permissive mineral resources tract maps (*for each type of deposit*) that shows predicted undiscovered mineral resource tracts and mineral-deposit types,⁵ (b) estimated the number of undiscovered mineral deposits, (c) and checked *local* grade and tonnage data against *worldwide* models of mineral deposits and decides whether or not the worldwide models are appropriate for each particular tract. Whenever possible, the teams estimated the number of undiscovered deposits of each type in the undiscovered tracks, based on expert judgment, deposit density estimates, Monte Carlo simulation models, and assumptions about exploration adequacy.

In the analysis phase, a technical and economic team then used a resource simulation program and economic files (*such as cash flow models, input/output analysis*) to generate economic and policy recommendations for policymakers. The primary output was twenty-four specific areas of interest (AOI).

These studies have revealed that Afghanistan has extensive availability of metals, industrial minerals, and building materials. Bulk metals, including iron ore, copper, aluminum, tin, lead, and zinc, are located in multiple areas of the country. There is also significant amounts of precious metals, including gold, silver, and molybdenum. Industrial metals, including gemstones, rare-earth metals, sulfur, talc, gypsum, chromite, are predominant across Central Afghanistan, Baghlan, Kunduz, Logar, Khost, among other places. And building materials are extensively located throughout the country. Let us provide a summary of the most important mineral resources, with a full table located at the end of this report.

³ Classification is according to metallogeny scheme adopted by Cox & Singer (1986), p. 13 of report

⁴ Page 7 of initial report

⁵ These are defined by the geologic environments of formation described in the deposit model; estimates of undiscovered resources were made to a depth of 1 km beneath the surface of the Earth, which is consistent with mining practice

(1) PRIMARY METALS

Let us begin our analysis by reviewing the primary metals, including iron, copper, gold, and aluminum:

- **Gold:** Gold deposits in Afghanistan are estimated to be close to 2,700kg. There are two main gold belts: one that runs from Badakhshan southwest to Takhar, and a second that runs southwest from Ghazni to Zabul. These deposits are located across Badakhshan, West Zabul, and Ghazni provinces. Additional discoveries are probable
- **Iron:** This is the most abundant mineral resource in Afghanistan. Sedimentary iron ore deposits in central parts of Afghanistan are abundant, The world class Haji Gak iron ore serve itself contains 2 billion MTs of ore at 63-69% iron. Total igneous iron ore reserves are estimated to provide an additional 178 million MTs of ore at between 47-68% iron, including the Furmorah deposit, which is estimated to contain 35 million MTs of ore. Additional discoveries of iron ore are likely
- **Copper:** This is the most substantial non-ferrous metal resource in Afghanistan. Total reserves of sediment-hosted copper are estimated at almost 30 million MTs (*12.3M MTs of known deposits + 16.9M MTs probable reserves*). These copper deposits are also estimated to contain significant amounts of related metals (*7,670 MTs silver + 601,500 MTs cobalt*). In addition, estimates of porphyry-based copper were made using a general porphyry copper deposit model in 12 areas of the country, which resulted in estimates of at least 8 estimated undiscovered porphyry copper deposits containing an additional 28.5 million MTs of copper, 724,010 MTs molybdenum, and 682 kg of gold.
- **Aluminum:** Deposits in Zabul and Baghlan provinces together contain 4.5 million MTs bauxite ore (*50.5% alumina, 12% silica*). However, their overall small size relative to deposits elsewhere, high silica content, and need for large amounts of electricity to produce aluminum make bauxite mining unlikely in the near term
- **Other Primary Metals:** Afghanistan also has significant amounts of lead, zinc, tin, tungsten, and mercury. The largest lead/zinc deposit is in Kandahar province and contains 90,000 MTs of these minerals. Tin and tungsten occurrences are abundant in Afghanistan, but require further studies to ascertain the size and style f these deposits. Mercury deposits in southwestern Afghanistan are estimated to be 32,000 MTs, large enough to support a local mercury industry.

(2) INDUSTRIAL METALS

Industrial minerals are broadly defined as nonfuel nonmetallic geological minerals of potential economic value.⁶ Let us review the primary industrial metals, including gemstones, rare-earth minerals, uranium, chromite, sulfur, and talc:

- **Gemstones:** Afghanistan was historically one of the world's premier sources of lapis lazuli, emeralds, and rubies. Prior to 1979, precious and semiprecious gemstones were a major industry in Afghanistan. Most of the gemstones come from northeast Afghanistan (*Badakhshan, Konar, & Nuristan provinces*). These include emerald deposits of the Panjshir Valley, ruby, sapphire, and spinel occurrences in the Jegdalek area of Kabul province, and lapis lazuli occurrences in Badakhshan.
- **Rare-Earth Minerals:** There are an estimated 1.4 million MTs of rare-earth minerals (REMs) and 3.5 million MTs of other REMs. This includes a large REM deposit located at Khanneshin in southern Afghanistan. Decisions regarding rare-earth minerals, including lithium and uranium, will be based on both economic and national security considerations. In particular, Afghanistan's National Security Council (NSC) will develop a rare-earth minerals policy. Within the constraints stated in this NSC policy, the technical and economic evaluation of REMs tenders will move forward in the same way as other mining contracts
- **Chromite:** There is an estimated 980,000 MTs of chromium oxide. Proven resources include 200,000 MTs (43% weight) in the Logar Valley
- **Sulfur:** Two known deposits in Bakhud and Badakhshan hold approximately 450,000 MTs of sulfur. Probabilistic estimates of significant bedded sulfur deposits in the Afghan-Tajik basin give a mean of 6 million MTs of undiscovered sulfur
- **Talc:** Metamorphic talc is present at the Achin deposit south of Jalalabad, which is the largest deposit of this type in Afghanistan. It has a measured resource of 1.25 million MTs of talc and 31,200 MTs magnesite. Additional deposits have been identified in other provinces but the precise amounts need confirmation.
- **Other Industrial Metals:** Additional deposits of asbestos (*13.4M MTs*), barite (*150M MTs*), celestite (*1M MTs*), clay (*2.2 cm of brick clay*), pegmatites (*3.8M MTs of lithium oxide*), and potash (*27.5M MTs*). These resources could provide a great deal of mining opportunities and employment disbursed throughout the country

⁶ These include barite, bauxite, carbonatite, celestite, clay, cloal, fluorite, gypsum, halite, limestone, magnesite, pegmatites, slat, sulfur, talc, and travertine.

(3) BUILDING MATERIALS

Next, let us review the building materials, including building/dimension stones and sand/gravel:

- **Building/Dimension Stones:** The mountains of Afghanistan contain abundant rocks suitable for use as building and decorative stone. Granite, marble, limestone, and sandstone occur in abundance. Limestone deposits suitable for cement production are widespread in Afghanistan, and deposits suitable for exploitation have been identified in Badakhshan, Baghlan, and Herat provinces
- **Sand/Gravel:** Afghanistan has abundant sand and gravel resources and abundant sources of rock for crushed stone and aggregate. Sand and gravel and aggregate material adequate for local industry are present adjacent to most existing population centers

(4) HYDROCARBON RESOURCES

Afghanistan has extensive hydrocarbon resources. In particular, the two largest hydrocarbon basins in the country are the Amu Darya and Afghan-Tajik basins. The two basins encompass approximately 515,000 square kilometers in those portions that lie within Afghanistan. Since the first oil field was discovered in Afghanistan in 1959, more than 150 million barrels of oil (*mmbbl*) reserves and more than 4,500 billion cubic feet of gas (*bcf*) reserves have been identified in 29 fields in the Afghan portion of the Amu Darya and Afghan-Tajik basins. Only a small portion of this resource base has been exploited. Using the latest techniques there is enormous opportunity for further substantial discoveries to add to Afghanistan's energy resource base. That resource base is essential to the economic development of the country.

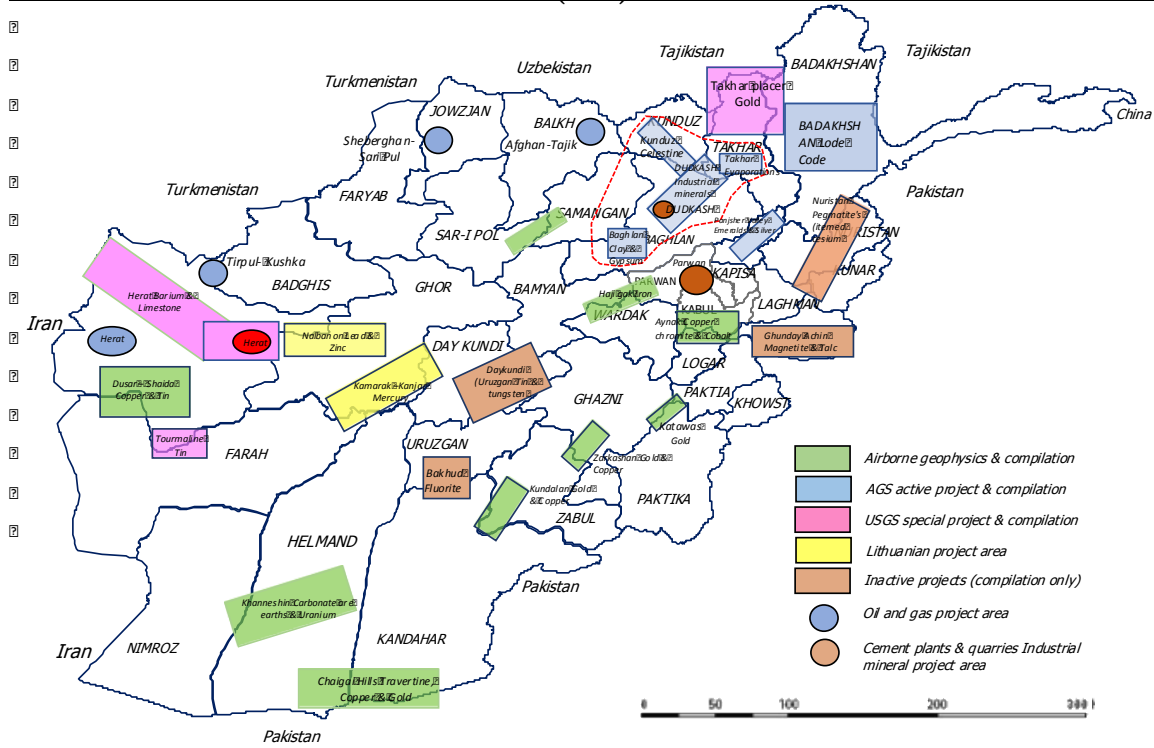
In the Amu Darya Basin Province, most known recoverable crude oil and natural gas were discovered in Jurassic clastic rocks, Jurassic carbonate reef- and platform-associated rocks, and Cretaceous clastic rocks (*down to a depth of about 5,500 meters*). Most known recoverable crude oil and natural gas in the Afghan-Tajik Basin Province have been discovered in Upper Cretaceous carbonate rocks and in Paleogene clastic rocks (*down to a depth of about 3,700 meters*). A 2011 study estimated undiscovered, but technically recoverable conventional resources of these two basins to be approximately 1.6 billion barrels of oil (*220 million MTs*) and close to 440 billion cubic meters of natural gas.

In addition to these two large known hydrocarbon basins, there are likely smaller undiscovered hydrocarbon assets in three main basins located in western and southern Afghanistan: (1) the Tirmul Basin, which is a transpressional basin located in western Afghanistan, extending from near Herat in the east, to the Iranian border in the west, (2) the Helmand Basin, which is situated in southwestern Afghanistan, southwest of Kandahar, and (3) the Katawaz Basin in southern Afghanistan, which consists of accreted terrane in the collision zone of the Helmand and Indian tectonic plates. Initial resource estimates were not made for the Helmand or Katawaz basins, but an initial assessment (2009) of the Tirmul basin estimates undiscovered conventional, technically recoverable petroleum resources of 22 million barrels of oil and 1.3 billion cubic meters of natural gas.

(5) AREAS OF INTEREST

From the initial mineral studies, twenty-four areas of interest (AOIs) were identified. A number of these AOIs were then field checked by AGS and USGS geologies between 2009 and 2011, and then summarized in greater detail in two additional research volumes.⁷ The data includes GIS data, archival reports, maps, new research data, as well as a comprehensive bidding package for each AOI.

AFGHANISTAN: AREAS OF INTEREST (AOI)



These AOIs commonly contain known measured mineral reserves or resources that were calculated from sampling in trenches, drill holes, or underground workings. These AOIs contain a number of assets that should reduce investment risk, including road networks, so they are the most likely places to be tendered first.

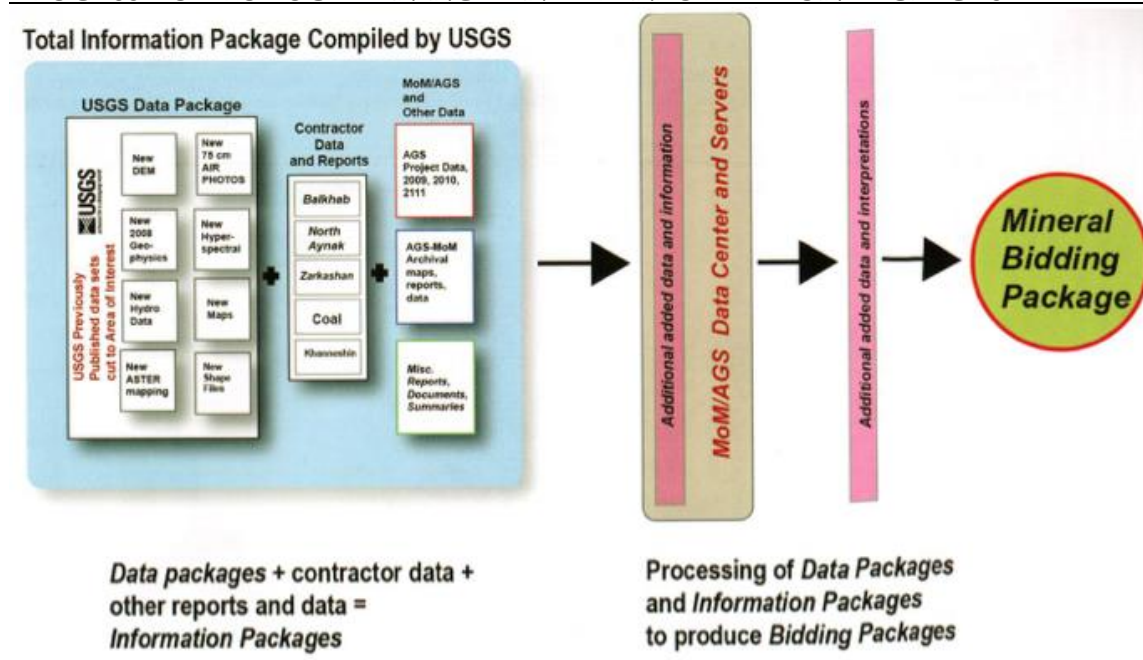
The research volumes provide a three chapters for each AOI: (1) '*A*' chapters: summarize the economic geology, (2) '*B*' chapters: summarize the hyper-spectral data and hyper-spectral anomalies that may indicate mineralized areas, and (3) '*C*' chapters: summarize the geohydrology.

To develop each AOI data package, a number of research methods were used. First, existing data in the form of archived reports were compiled. Second, a digital elevation map (DEM) and database were created using Advanced Spaceborne Thermal Emission and Reflection (ASTER) satellites. Third, the teams generated hyperspectral data to identify the occurrence of selected materials at the surface based on characteristic absorption features. Fourth, geophysical data methods combined

⁷ "Summaries of Important Areas for Mineral Investment and Production Opportunities of Nonfuel Minerals in Afghanistan," by Afghanistan Geological Survey and USGS (Volumes I and II)

existing data with new aeromagnetic and ground magnetic surveys to produce a map and dataset for each EOI. Fifth, geohydrologic data was obtained to provide information on the seasonal availability of water. This included the completion of the analysis of historical streamflow for Afghanistan. Finally, mineral scoping missions were undertaken to visit various AOIs and verify mapping and historical data.

PROCESS TO PRODUCE MINING TENDER INFORMATION PACKAGES



Given this overview of Afghanistan’s extensive mineral resources and areas of interest, let us now turn to the constraints that have thus far limited the extraction of these natural resources. By identifying the key constraints, we will be able to develop strategies to overcome the constraints, and by doing so, will be able to leverage our natural resource endowment into a sustainable resource for our citizens.

CONSTRAINTS IN THE MINING SECTOR

Despite the preponderance of extensive mineral resources located throughout Afghanistan, minimal large-scale development of these resources has taken place during the 20th and 21st centuries. The primary reason has been a number of important constraints that have not yet been removed. This section will provide an overview of the main constraints.

SUMMARY OF MINING SECTOR CONSTRAINTS

Constraint	Summary
Infrastructure	
Transport	Many minerals, and all bulk metals, need extensive transport infrastructure to move the minerals to end markets. We can think of a spectrum of transport infrastructure that is required, from no infrastructure for small precious stones such as gemstones to extensive railroad network infrastructure for iron ore

	transport. The Afghan Government is currently moving forward with new rail and road projects to reduce this constraint over time
Power	Mining and processing ore requires the use of extensive power infrastructure. In the most extreme case, the production of aluminum requires significant investment in power generation
Land	The land acquisition process can be a complicated and uncertain process for investors in many jurisdictions. Afghanistan has created a single point of contact (<i>ARAZI</i>) for all land-related issues
Water	Processing of minerals requires the use of extensive water resources. A policy should be developed to clearly delineate the water usage and water environmental standards
Soft Infrastructure	
Rule of Law	Mining contracts can extend for up to 30 years. In such contracts, both the investor and the host government must be confident in the rule of law and contract sanctity. The GoIRA has made development of the rule of law a cornerstone of our development policy
Security	Mining requires high levels of investment, typically over a wide geographic area. Security for such investments must be ensured
Procurement	Procurement has been a significant constraint in the past. To overcome this problem, the Government has created a fully professional office and a High Council on Procurement, chaired by the President, that meets on a weekly basis.
Legacy Issues	Afghanistan's MoMP has a legacy of non-performing contracts. The Government of Afghanistan has recently taken decisions to settle and/or take action on these contracts
Community engagement	Social impact assessments are a common component of many mining projects. But whereas most countries do not have a community engagement framework, Afghanistan will deliver all social projects through our Citizens Charter program
Environmental Issues	Environmental impact assessments are an important part of any natural resource project. We have developed a clear impact framework, that are in line with international standards
Human Capital	We have lacked the human capital necessary to lead and manage the knowledge systems necessary for the development of our natural capital. Training and hiring has been often ad hoc, resulting in poor utilization of technical assistance. We will prepare and implement a human capital action plan to address this critical constraint.
Information	Information necessary and sufficient for decision-making by policy-makers and investment by the private sector is still unavailable for most of the natural wealth of the country. We will invest in the knowledge generation and information management systems, including exploration of oil and gas, to enable us to harness our natural wealth for equitable and sustainable growth.

Over the long-term, the constraints listed above must be resolved for Afghanistan's mining sector to improve. In the current climate, we must sequence reforms that take into account the existing constraints, while taking account of the progress that has been made in relaxing these constraints over the past few years. In sum, we have a coherent national development plan to relax these constraints. Let us highlight a few of these changes:

INFRASTRUCTURE

- **Transport:** The GoIRA has invested in improving transport infrastructure by signing multiple trade and transit agreements, as well as investing in road, rail, and airport infrastructure. These show that transport constraints have largely been removed for high value goods such as emeralds and gold, and that over time transport constraints for bulk minerals will also be removed.

In terms of international, regional, and bilateral trade and transit agreements, we have made a number of recent strides. Most importantly, we have joined the WTO, which integrates Afghanistan with international trade systems and rules. In terms of regional agreements, the Lapis Lazuli agreement gives Afghanistan direct access to European markets through Turkmenistan, Azerbaijan, Georgia, and Turkey. The Chabahar Agreement provides direct access to the sea via Iran and its Chabahar port. In terms of bilateral agreements, we have signed a trade and transit agreement with Uzbekistan that will allow for greater use of the Uzbekistan rail line for exports all the way to Kazakhstan and further to China. We will also move to hold discussions with Pakistan (*within the WTO framework*) regarding land access rights to India.

Road investments include finalizing the completion of the national ring road between Qasiar and Laman in Northwest Afghanistan, increasing the amount of interconnections with neighbors (*e.g. the 2nd highway from Jalalabad to Pakistan*), and greater integration of Central Afghanistan with the ring road (*northwards with the Yankalangi to Dar-e-Suf road, southwards with the Bamyan to Maidan road, the Dushi to Bamyan road, the East-West highway, and the Bamyan-Uruzgan-Kandahar road*). Tertiary roads are also being quickly built throughout the country.

In terms of railways, Afghanistan now has three railway connections with neighboring countries: (1) Uzbekistan at Hairaton in Balkh province, (2) Turkmenistan at Aquina in Frayab province and by Mrach 2018 at Torghaundy in Herat province, and (3) Iran close to Herat. Railway feasibility studies have been completed for the Northern Rail link connecting Tajikistan (*at Sherkhanbandar*) with Mazar-e-Sharif and Uzbekistan (*at Hairaton*). We are moving forward with a feasibility study for the portion of the railway to connect this northern line with Iran. Longer-term, we will implement our vision to extend these rail network to significant mineral areas of interest.

In terms of airports, Afghanistan has a significant asset base of airport infrastructure. Our eight airports are world class in terms of capabilities, and we are developing a strategy to transform these to free economic zones over time. We have inaugurated the air corridor strategy, which provides quick transit for high value-to-weight goods to regional markets. We have used this program to increase exports of Afghan fresh and dried fruits, but this could just as easily be used to transport goods such as gold, talc, or precious stones quickly to international markets.

- **Power:** Significant amounts of power are required to mine and process minerals. Afghanistan previously operated under nine separate islands of electricity. Within three to four years, these islands will be connected to each other, as well as with regional electricity

markets. This strategy will provide sufficient power to Afghanistan's population, as well as for all commercial and mining needs.

In terms of imports, we have signed a number of agreements with Turkmenistan and Uzbekistan that will provide up to 4,500MWs of power to Afghanistan. Furthermore, we have invested heavily in transmission networks to distribute this power throughout the country. In terms of power generation, we recently opened up the power generation market to private sector investment, and this policy shift has already paved the way to two completed power IPP contracts. These activities have already relaxed the power constraint in Afghanistan's northern provinces. The 300MW Doshi-Bamyan electricity line will help remove the electricity constraint in Afghanistan's central provinces. And the implementation of the TAPI natural gas pipeline and TAP500 projects will provide power generation capabilities for Western and Southern Afghanistan. Finally, for smaller-scale and off-grid locations, we are working to implement renewable energy projects.

- **Land:** Land acquisition can be a complicated process in most countries. Although most of Afghanistan's mineral resources are located in uninhabited areas, some of these mineral assets are located in agricultural, industrial, or perhaps even residential areas. If land acquisition becomes necessary, Afghanistan has passed the required legislation and designated one organization (*ARAZI*) as the sole point of contact for land acquisition needs.
- **Water:** Water is essential to the mining and processing of minerals, as well as for local communities in mining areas. The GoIRA is developing a water policy that will clearly delineate the water rights for all stakeholders. This will include prioritizing economically viable projects for dams, irrigation projects, local communities, and the mining sector. Within this policy, we will create a framework that identifies the tradeoffs of different uses of water, but ensures that the mining sector receives priority. This framework will apply throughout Afghanistan's five major water basins and associated tributaries.

SOFT INFRASTRUCTURE

- **Rule of Law:** Mining companies want stability in regards to both mining legislation and mining contracts to be able to make long-term investment decisions. Afghanistan unfortunately has a history of unclear rules of the game, manipulation of tendering processes, and widespread corruption. However, we have made great strides in three areas: (1) developing the legal basis of a market economy, (2) ensuring transparent decision-making processes for all economic and procurement decisions, (3) improving contract stability, and (4) accepting international dispute resolution mechanisms.

To develop required legislation for a market economy, we are in the process of enacting various pieces of legislation (*e.g. revising the Corporations Law, passing a new Bankruptcy law*). To ensure implementing transparency in all economic-making and contractual processes, all large contracts are now approved at the National Procurement Council, economic policy is created at the High Economic Council, and any corruption issues are reviewed at the High Council on Governance and Rule of Law).

To improve contract stability, the GoIRA has hired international external counsel to develop and advise on contractual terms and tendering processes. We will over time use standard contracts. Furthermore, we have appointed new leadership at our legal institutions, and have ensured greater autonomy for these legal sector actors (*including a vice-president in charge reviewing legislation, a new Chief Justice of the Supreme Court, and a new AG*).

Finally, there is broad agreement in terms of accepting international dispute resolution and arbitration mechanisms for large contract awards. In sum, we have moved from a situation where contracts were awarded non-transparently based on side deals, to a rule-based and transparent contractual development and awards process. These steps should provide confidence to mining investors that Afghanistan's legal framework, as well as contractual terms and tendering process, will provide stability for investment decisions. This leaves only the identification of relevant risks, appropriate pricing of such risks, and usage of risk-mitigation strategies where available (*e.g. from IDA, OPIC, or MIGA*).

- **Security:** Although we must acknowledge security considerations in Afghanistan, it is worth noting that Afghanistan already has thousands of kilometers of existing transmission lines and fiber optic cables, which are rarely targeted. To further ensure security for economically significant projects, we have embedded security strategies for large economic projects within the national security four-year action plan. For these large projects, the Afghanistan Public Protection Force (*APPF*) is available to provide customized protection. Furthermore, the U.S.'s recently announced South Asian strategy calls for a secure Afghanistan embedded in a secure region, and will ensure continued support for Afghanistan so that we triple the size of our air force, expand the commando core to a division, and implement a generational shift to an active cadre of young commanders. These security changes will complement the motivations of the entire population, which is clearly aligned and supportive of large national economic projects.
- **Procurement:** Afghanistan's reform of procurement has been cited as an example of success in fighting corruption and ensuring transparency. As the National Procurement Office has acquired both the capacity and the culture of efficiency, effectiveness and transparency, procurement of mining and oil & gas contracts will take place through this office. To ensure efficiency, the technical board for evaluation of bids will function under the umbrella of the National Procurement Office, submitting its recommendations to the High Economic Council and, after approval, follow up on the procurement process.
- **Legacy Issues:** The GoIRA is committed to ensuring transparency into the mining sector. The MoMP has already updated the database of all mining contracts, as well as has scanned and uploaded all mining contracts. This sets the standard for transparency in the mining sector. We are now working to resolve, using the legal system, any legal and financial issues with previously signed contracts. These steps will ensure that there is clarity in regards to the existing mining landscape, and so that the MoMP can focus on developing the vision of the mining sector rather than focusing on the past.

- **Community Engagement:** While many mining areas are located in relatively desolate areas, there are significant mineral areas where community engagement becomes critical. The minerals framework stipulates that a portion of mining revenues be spent at the local level. Rather than every mining company having to develop unique projects for each community in which they invest, the GoIRA strategy will be to utilize such funds through the Citizen's Charter program, which provides a nationwide framework for engaging with local communities. The use of this framework will lower uncertainty and program management costs for mining companies, while increasing the effectiveness and benefits for local communities.
- **Environmental Issues:** All mining exploitation contracts require an environmental impact study. We have only one relevant counterpart: Afghanistan's National Environmental Protection Agency (*NEPA*). They are in the process of ensuring that their policies are in line with international environmental standards so that mining companies will not face unique environmental standards in Afghanistan.
- **Knowledge and Information Management Systems:** A whole government approach for information management systems is being prepared, with Ministry of Information and Culture and the Central Statistical Office leading an inter-ministerial task force. This group is also tasked with identifying crucial gaps in the knowledge of our natural capital and MOMP will play an active role in assessing gaps in its area of competence and propose a program for generation of knowledge.
- **Human capital:** High Council on Human Capital, chaired by the President, has been formed and meets regularly to reform the entire educational system of Afghanistan. Identification of the skills necessary for sustainable utilization of our natural capital and investing in the systems and institutions to produce and upgrade the skills is one of the central objectives of the Council.

The first implication of these existing constraints is that it will impact the sequencing the selection of the priority AOI tenders. For example, we will likely have to move forward with bulk metal contracts such as iron ore and copper only after a few years, when power and transport issues are resolved. The lack of acknowledgment of these constraints is one reason why the signed Aynak and Haji-Gak contracts have not moved forward since the signing of these contracts. For this reason, it likely makes greater sense to begin with construction material and aggregate contracts, as these form the bulk of contract awards and do not require extensive transport or power resources.

Second, the security constraints imply that we should either sequence AOI tenders in regions of the country with higher security, or upfront acknowledge that greater security must be provided for mines in less secure areas.

Third, we must decide whether we want to relax these constraints one by one, or if it is possible to resolve these constraints concurrently by region. In other words, it may be difficult to quickly

resolve security, power, or transport issues throughout the country, but it may be possible to resolve a bundle of these constraints in a particular region at the same time. If this is true, then we must align our regional transport, power, security, and other strategies with our mining strategy.

LEGAL FRAMEWORK

A strong legal and regulatory framework can successfully attract and retain investment. Moreover, it can assure contract transparency. The Afghan Cabinet originally adopted the Mineral Law in 2005. It has since been amended three times: in 2009, 2011, and 2012. There are four key issues that must be resolved in the current version: (1) decision rights, (2) tendering process, (3) classification of mining assets, and (4) royalty rates. First, in terms of decision-rights, the law provides for different approval processes and decision-rights for each of the five contract award types. This is provided in detail in the table below.

TYPES OF MINING LICENSES & ASSOCIATED DECISION RIGHTS

License	Process	Decision Rights	Area (maximum)	Term
1. Reconnaissance	Application	MoMP approval	20,000 square km	2 years + no extensions
2. Exploration	Tender	HCI + Cabinet approval	250 square km	3 years + 2 extensions
3. Exploitation	Tender	HCI + Cabinet approval	50 square km	30 years + 15-year extensions
4. Small-Scale Mining	Tender	MoMP approval	1 square km	10 years + 5-year extensions
5. Artisanal	Application	MoMP approval	1 hectare	5 years + 5-year extensions
6. Quarry & Construction Materials	Application	MoMP approval	1 hectare	5 years + continuous 5 year terms

HCI = High Commission for Investment

The decision-rights as outlined in the mining legislation provide a great deal of discretion to the Minister of Mines to approve contracts. In particular, the Minister currently holds decision rights authority for reconnaissance, small-scale, artisanal, and construction material contracts. We therefore will make changes to the legislation such that all contracts should have to be at a minimum taken and approved at the High Economic Council (HEC), with larger contracts approved at Cabinet. This change of decision-rights in the legislation should be made immediately.

Second, the current legislation must clarify the tendering process for all types of contracts. The key principle here is the requirement for transparency. The current mineral legislation allows simple applications for reconnaissance, artisanal, and construction material contracts. We will move to an open tendering process for all type of production licenses. Furthermore, a professional board to evaluate all mining tenders submitted to the ministry will be jointly proposed by the ministry and the National Procurement Office for approval to the President. After this standing board evaluates the mining applications, they will provide an evaluation report and final recommendation to the HEC and, in case of approval, follow up on the procurement process up to the High Council on Procurement. This change of tendering process in the legislation should be made immediately. In

the long-term, this standing advisory board will also act as the board for the independent mining regulatory body.⁸

Third, we must clarify how we classify mineral assets in the minerals legislation. The current classification methodology relies too heavily on the maximum mining area to distinguish license types. This has led to confusion and rent-seeking, as both mining companies and ministry employees simply divide a mining area to smaller blocks, thereby allowing approvals at the ministerial level rather than the council or Cabinet level. Instead, we seek a classification scheme that reduces the types of licenses and focuses classification of licenses on the type of mineral and required investment levels. For example, gemstones and construction materials would be classified as small-scale mining licenses, while copper would be an exploitation licenses, irrespective of the license area. These changes in the law should be made immediately.

Fourth, we must clarify which contractual terms should be stipulated in the Mineral Law versus individual contracts. The consideration of such frameworks must take into account the trade off between certainty for investors and flexibility for the government as conditions potentially improve. In particular, many countries have moved away from a legal framework where royalty rates are negotiated into contracts to a framework where royalty rates are specified in the law (*and are distinguished by the type of mineral*). This change would provide a greater deal of certainty to investors during their exploitation period. Furthermore, such a legal change would allow the state to grant an almost automatic transition from exploration to exploitation licenses, as there would be no financial negotiation necessary if a company finds a mine during its exploratory period (*this would still require negotiations on minor issues*). This legislative change will require some analytical work, but should also be made immediately.

Some countries have gone even further, and have made an even stronger commitment to potential investors by passing an additional piece of legislation that ensures the stability of contractual terms of twenty or thirty years for mining investment contracts. This is the framework that the country of Chile has implemented with a great deal of success. We will evaluate the potential for similar legislation in Afghanistan. Taken together, the mentioned changes would create a new tender process and decision-rights framework as per the table below.

PROPOSED: TYPES OF MINING LICENSES & ASSOCIATED DECISION RIGHTS

License	Process	Decision Rights*	Area (maximum)	Term
1. Reconnaissance	Application	HEC approval	20,000 square km	2 years + no extensions
2. Exploration	Tender	HEC + Cabinet approval	250 square km	3 years + 1 extension
3. Exploitation	Tender / Application [^]	HEC + Cabinet approval	50 square km	30 years + 15-year extensions
4. Small-Scale Mining	Tender	HEC approval	1 square km	10 years

* All licenses require the review of the Standing Technical Board for all applications before they are presented to HEC and Cabinet

[^] Exploitation licenses go for tender, except for cases where an exploration license leads to a mineral finding, in which case the license will be transferred to an exploitation license

To reiterate, there were four required legal changes that we will move to implement immediately. In terms of decision rights, we have provided a framework where approvals have to be given, at a

⁸ Please see the next section on MoMP required reforms

minimum, by HEC or Cabinet. In terms of tendering processes, we have made all processes to be open bidding processes, except for reconnaissance licenses. In terms of classification, we have suggested that the classification of contracts should be based more on the type of mineral and required investment rather than the area of exploitation. And in terms of royalty rates, these will now be specified into the legislation (*distinguished by the type of mineral*). While these changes will be made immediately, a larger reworking of the legislation will take place over the next year.

Furthermore, we must move towards a system of standardized contracts. Just as with procurement contracts, financial terms should be standardized, leaving only a few minor terms that will be negotiated during the bidding process. This would act as another mechanism to provide greater stability for potential investors, as well as likely reduce the likelihood of corruption during the bidding process.

Finally, Afghanistan has Mining Regulations that were approved on February 14, 2010. These regulations provide greater detail for each type of license, tendering process, royalty fees, and environmental and social protection issues. These regulations should also be reviewed to ensure compliance with any redrafts of the mining law.

MINISTRY OF MINES & PETROLEUM (MOMP): REQUIRED REFORMS

To move Afghanistan's mineral sector forward, we must reform the Ministry of Mines & Petroleum (MoMP) itself. The core functions of the ministry must be clarified and redefined. The ministry currently combines elements of policy-making, regulation, and operations, and employs more than 2,200 employees. Over time, we seek a MoMP will retain and strengthen its policy-making role, while relinquishing its regulatory and operational roles.

The regulatory component of the ministry will initially be given operational autonomy, and over time be spun off as a separate regulatory authority. This regulatory portion will be responsible for tendering processes, similar to the telecoms and hydrocarbons industries. Likewise, the operational portions of the ministry, which include Afghan Gas Enterprise (AGE), Kod-e-Barq (KeB) fertilizer factory, Jabal Saraj cement (JSC), and Coal Enterprise (CE) will each be corporatized. The Ministry will retain a majority ownership stake, but will reduce and eventually eliminate its role in the operations of these enterprises. As a first step, each tasadee should implement financial accounting systems, obtain an external audit, and expand its board members to include independent directors.

MOMP KEY DEPARTMENT SUMMARIES

Department	Summary
Offices	
Afghanistan Geological Survey	The Afghanistan Geological Survey is responsible for developing and maintaining natural resource technical reports. Its archive collection contains a wealth of reports, aerial photographs and maps of the geology and mineral resources of Afghanistan. It is housed in one wing of the AGS building and consists of four rooms containing the collection and another four rooms comprising staff offices, a consultation room and storage rooms
Technical Offices	Most offices under the MoMP DM Technical deputy are key in technical decision-making. A key office is the cadaster department, which is responsible for assessing production

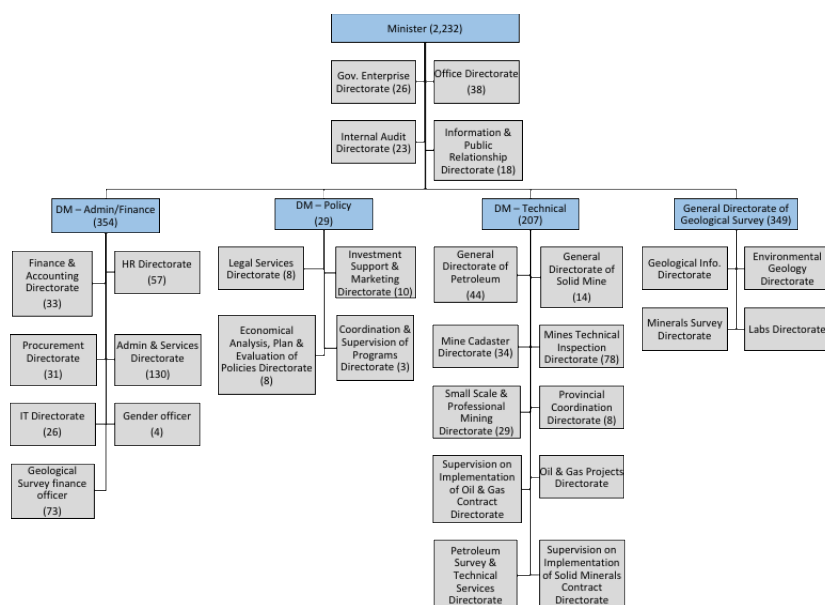
Tasadees	
Afghan Gas Enterprise (<i>AGE</i>)	AGE extracts gas at its four main gas reserves in Sheberghan City of Jawzjan province. Annual production is 147 million cubic meters. The company's main customer is Kod-e-Barq fertilizer company, as well as local businesses and residents of Sheberghan City. Two new contracts for generation of 90 megawatts of power by the private sector have been approved.
Kod-e-Barq Fertilizer Factory (<i>K&B</i>)	This company is located 18km west of Mazar-e-Shareef. It was established in 1964 with an initial investment of \$48 million. During its early period, the factory had the capacity to produce 105,000 MTs of fertilizer and 48MW of electricity per year. Currently only the factory only produces ~35,000 MTs of fertilizer and ~13MWs of power
Northern Coal Enterprise (<i>NCE</i>)	NCE is one of the four state owned enterprises managed by MoMP. In terms of operation, NCE currently owns six mines, of which four are active mines and two are inactive mines. The current daily production of NCE is an average of 4,500 MTs. In addition, NCE operates as a coal trader, sourcing supply from great number of independent miners
Jabal-Saraj Cement (<i>JSC</i>)	A small cement clinker factory that produces minimal amounts of cement for local consumption

Second, to improve employee performance, the MoMP must effectively leverage external assistance. Too often in the past, single individual consultants with only minimal mining experience provided technical support for the ministry. We must accept that some activities should be outsourced, so that the ministry could focus on its key policy-making role. The roles that should be outsourced include the legal and transaction functions.

This means that the ministry will only retain small legal and financial teams, whose job it will be to liaise with external consultants. Ideally, MoMP would retain multiple legal and financial teams, who could then provide multiple legal and financials opinions for each tender or financial transaction. A vital component of this reform is to depoliticize the legal function within the ministry. Currently, legal advisors report directly to the minister. This creates turnover as each new minister brings his own legal advisor. Instead, the ministry should create an office of legal counsel, whose staff builds expertise over time and is appointed by the civil service commission instead of the minister.

Third, MoMP should move away from general technical assistance contracts, and move towards specific support for key tasks. Fourth, the ministry should identify areas where it requires training, and should partner with domestic mining technical institutes and other mining ministries to build capacity.

MINISTRY OF MINES & PETROLEUM ORGANIZATIONAL STRUCTURE



INDUSTRY & REGIONAL MARKET DEVELOPMENT

Afghanistan must leverage the expertise of the private sector to harness the potential of its mining sector. That much is clear. But the Government can support the sector by improving minerals and hydrocarbon legislation, recalibrating the MoMP so that it works in support of the private sector, removing infrastructure impediments, and implementing a transparent tendering process. Although market development will depend on the trajectory of future mineral findings, we offer a few potential examples of industry development across a few mineral/industry sectors:

- Cement Production** (*central + western Afghanistan*): Cement is the most basic of all modern building materials. Hence, the availability of reasonably priced cement to the construction industry in Afghanistan is a high priority. The demand for cement is estimated at greater than 6 million MTs per year, which is currently being met by imports from neighboring countries. The two most promising areas for cement production are in Pul-e-Khumri (*Baghlan*) and Jabal-e-Saraj (*Parwan*). If required, a detailed feasibility study should be commissioned for each, and then both sites should be put out for tender. There is also an opportunity for a cement plant at Herat. The site has extensive limestone, and power needs can be met by either the nearby Sabzak coal area or natural gas once the TAPI pipeline reaches the city
- Hydrocarbon Market Development** (*northern Afghanistan*): Northern Afghanistan's Amu Darya and Afghan-Tajik basins could become the center of oil field drilling, service, and refining industries. In addition, the region could be locus for natural gas production and transmission facilities

- **Gold Market Development** (*northern + southern Afghanistan*): Afghanistan's gold belt runs from Badakhshan southwest to Takhar. Given the concentration of the gold belt, a domestic processing industry could be developed in northeast Afghanistan. A second gold belt running from Ghazni to Zabul could be centered in Ghazni. Both markets could be connected via air corridor to the largest gold market in the world in India
- **Gemstone Market Development** (*eastern Afghanistan*): Extensive gemstone assets are located in Panshir, Nuristan, Kapisa, and Laghman. Kabul could therefore become a key gemstone processing area. MoMP must develop a clear licensing and validation process, so that gemstones are processed in Kabul, and could be exported via air corridor to international markets in India, China, and beyond
- **Rare-Earth Minerals** (*southern Afghanistan*): REMs assets in Afghanistan provide a unique opportunity. These assets will need to be tendered and evaluated under commercial terms, but under the parameters laid out in a national security REMs strategy. One such area of interest is the lithium deposits located in southern Helmand province. Such assets could be transported to international markets via our extensive airport infrastructure and air corridor program
- **Bulk Minerals** (*central Afghanistan*): Both the Aynak copper and the Haji-Gak iron ore mines, as well as other large bulk mineral assets, are located near Kabul. These mineral resources require extensive power and rail infrastructure. To ensure the development of our world-class bulk mines, investment in the required infrastructure, such as the rail and power networks, will be a national priority. Meanwhile, we will focus on development of medium-size iron and copper deposits. Current market demand and future infrastructure investments serve as a good guide to the private sector. Investment in steel mills in the last three years, for instance, has boosted domestic production to 220,000 tons, allowing it to meet about 33% of the current demand. Construction of the national railway and power systems will boost and sustain the demand for at least two decades, allowing for a medium-term horizon.
- **Talc**: preliminary analysis shows that Afghanistan can join the rank of 10 largest producers. Eastern Afghanistan, particularly, is endowed with high quality deposits that are harvested from the surface. Despite the fact that talc was classified for artisanal mining, the private sector has already invested around \$35 million in the value chain and an industrial part in Nangarhar has emerged as a hub of processing. Examining the prospects, the Economic High Council has changed the classification into large-scale, instructing the ministry to create the conditions for award of competitive tenders for large-scale development of the value-chain of this mineral and export of its processed products.
- **Chromite**: exploitation of chromite through crude inefficient technology and its smuggling has become a contributing driver of conflict in the central, southeastern and eastern regions of the country. Creating the conditions for investment in processing facilities and the

development of an efficient and profitable value chain, is, therefore, a priority for the country.

- **Marble:** Our deposits of 1.3 billion MTs gave us the quantity to be a long-term player. Additionally, we are blessed with a range of colors, around 40, and quality, including Carrara quality white. An analysis by Chinese experts estimate that an annual export of \$500 million to China alone is feasible. Concentration on the development of the value chain for marble, therefore, will be among our top priorities.
- **Coal:** Initial estimates of coal deposits were in the range of 1 billion MMTs. Subsequent estimations, however, have varied widely. MOMP, however, estimates 2017 production around 2 MMTs, of which around 500 MMTs have been exported. Production is inefficient, dangerous and, at times, illegal. As our coal is high quality, we will focus on its utilization for generation of power through clean coal technology, develop its value chain, and seek agreements for export to new markets.

These product/region mix strategies are summarized in the table below.

AFGHANISTAN MINERAL PRODUCT / REGION MIX

Region	Primary	Industrial	Bulk	Building Materials	Hydrocarbons
Eastern	--	Gemstones + Talc	Copper + Iron	Marble	--
North	Gold	Gemstones	Copper	Marble + Limestone	Amu Darya + Afghan Tajik
West	--	--	Copper	Marble + Limestone	--
South	REMs + Gold	Flourite	Copper	--	--
Central	REMs	--	Lead + zinc	--	--

CONCLUSIONS / RECOMMENDATIONS

This roadmap provides a strategy for the key decisions on how to improve the performance of Afghanistan's minerals and hydrocarbons sector. We now provide recommendations across five key areas: (1) prioritizing mineral and AOI interventions, (2) implementing institutional reform at MoMP, (3) reforming the tendering process, (4) ensuring service delivery for communities, and (5) ensuring that mining revenues contribute to macro-fiscal sustainability.

- **Mineral/AOI Prioritization Framework:** In terms of mineral interventions, we will begin by prioritizing interventions first in construction materials, second in industrial metals, third in precious metals, and lastly move with tenders for bulk minerals. This sequencing has a number of advantages. First, it acknowledges the current constraints in the sector, particularly in regards to a lack of transport and power infrastructure required for bulk material extraction. Second, it allows MoMP to build expertise and a track record with

smaller contracts before signing a long-term contract without sufficient legal, financial, and technical experience. Third, it can be approved for mines throughout the country.

For larger mines, and for reasons of regional equity, we will move forward with a larger mining tender in each of the five regions of the country, based on the identified 24 areas of interest (*AOIs*). Given the world-class deposits in the fifth (*central*) region of the country, we are implanting a series of measures to create the enabling conditions for award of tenders in the short term. These ideas will be validated and confirmed.

Region	AOI / Mine	Summary
West	Limestone	This large limestone deposit could be used to jumpstart cement sector in Western Afghanistan
South	Khanneshin	Contains large reserves of rare earth minerals and uranium reserves. Could be given by restricted tender given, national security implications
Central	Nalbandon	A large lead and zinc deposit in western Ghor province that may be connected to western transport and power infrastructure. However, mines in this region will be difficult to move forward quickly
East	Ghunday Achin / Panjshir	This talc deposit is already being mined, and we will move forward to formalize these talc mines and increase investment in the region. The formalization of the gemstone industry should also be a priority
North	Baghlan /	Baghlan is ideally located to move forward with a tender for a limestone contract that will be able to provide raw materials for cement production

- MoMP Reforms:** In terms of institutional reform at MoMP, the long-term vision has now been clarified. We seek a ministry that is pared back in terms of size, and that focuses solely on policy-making. Over time, the regulatory functions and operational components of the ministry will be spun off as separate entities. The hydrocarbon regulatory functions will be spun off to form an independent hydrocarbons regulatory authority. Next, the mineral technical departments will form the nucleus of an independent mining regulatory agency. This independent regulator will be in charge of tendering processes and contract enforcement. As a first step towards this goal, MoMP will form a technical advisory board that will provide guidance for the MoMP Technical Deputy Minister.

The AGS will be spun off as an independent technical agency whose sole purpose will be to develop and maintain natural resources data or it will be merged with the Arazi, an organization with proven leadership and vision. Where data is unavailable, AGS will be tasked with acquiring the required data via either internal resources or contracting mechanisms. This includes development of geospatial infrastructure, assessment of mineral resources, assessment of coal resources, and assessment of earthquake hazards. Priority assessments for immediate implementation include those in the coal, cement, and natural gas sectors.

All state-owned companies will be spun off as independent state corporations. MoMP will retain a significant ownership stake and board seats, but the ministry will no longer be involved in operational issues. As a first step, robust financial systems will be implemented at each *tasadee*. During 2018, independent directors will be added to the board of each *tasadee*. By year-end 2018, an independent financial audit will have been completed.

- **Improving Mineral Tendering Process:** In terms of tendering processes, given a clear prioritization framework, ready-to-issue EOI packets for each AOI, and clear decision-making framework, the MoMP is theoretically ready to issue a number of tenders. The remaining issue is the evaluation and selection process. Revisions will be made to the minerals legislation such that, at a minimum, the High Economic Council (*HEC*) will approve of all mining evaluation teams (*with larger contracts approved at Cabinet*). In the long-term, a larger redraft of the minerals legislation will take place

- **Ensuring Community Service Delivery:** All service delivery functions, such as community engagement and local community support, should be managed by the Citizen's Charter program. This has the benefit of consolidating all community engagement functions into one program rather than spreading the function tasks throughout multiple ministries. Likewise, all resettlement activities will be tasked to an independent resettlement agency. These actions will allow MoMP to focus its energy on mining policy-making activities

- **Ensuring Mining Revenues Contribute to Macro-Fiscal Sustainability:** Many countries have experienced a 'resource curse,' a large component of which is the effect of large natural resource inflows during a short period of time. Such large inflows tend to overwhelm small domestic economies, cause a non-sustainable overvaluation of a country's exchange rate, and create boom-and-bust cycles that coincide with commodity price fluctuations. To resolve these issues, some countries have created commodity surplus funds to smooth economic cycles. Although Afghanistan is currently far from creating such a fund, we must plan for the future. If and when large mineral deposits do begin production, our Ministry of Finance should prioritize creating legislation that outlines formulaic fiscal rules that outline how resource revenues are spent and saved.

In Chile, for example, the Economic and Social Stabilization Fund (*ESSF*) allows financing of fiscal deficits and amortization of public debt. As defined in their Fiscal Responsibility Law, when copper prices are above their long-term average (*using a clear formula*), excess revenues are deposited into the ESSF. When copper prices are below their long-term average, ESSF funds are used in the national budget. Thus, the ESSF is able to provide fiscal spending stabilization since it reduces its dependency on global business cycles and revenue's volatility derived from fluctuations of copper price and other sources.

Implementing these changes will be challenging - but if done correctly - has the capacity to change the course of Afghanistan's trajectory from a low-income country to a middle-income country over the course of the next few decades. This report provided a roadmap for how we aim to ensure that Afghanistan's natural resources will benefit its entire citizenry. We have highlighted the extensive mineral resources of the country, described the GoIRA's strategy of methodically removing legal, operational, and transport constraints facing the sector so that the minerals sector will act as the growth engine of Afghanistan for decades to come. Upon approval of this roadmap by the High Economic Council, the roadmap will be turned into a time-bound action plan.

AFGHANISTAN: SUMMARY TABLE OF COMMODITIES

Commodity	Resource Estimates	Provinces	Type
(1) Building Materials			
<i>Afghanistan has abundant sand and gavel resources, as well as for building and dimension stone. Limestone deposits suitable for cement production are widespread in Afghanistan. Granite, marble, limestone, travertine, and sandstone occur in abundance</i>			
Sand/Gravel	136,000,000 (sqm)	Badakhshan	Aggregate
Marble	1,300,000,000	Various	Building stone
Limestone	>500,000,000	Badakhshan, Heart, Baghlan	Cement & flux
	3,500,000	Bamyan	Building stone
Dolomite	1,040,000	Bamyan	Building stone
Glass Sand	10,900,000	Balkh	Sand (sandstone)
	110,000	Balkh	Sand (siliceous)
Aragonite	770,000	Helmand	Dimension stone
Sandstone	650,000	Bamyan	Building stone (siliceous)
(2) Metals			
<i>Afghanistan has extensive availability of most bulk and precious metals, including iron, aluminum, copper, gold, silver, and molybdenum</i>			
Iron	2,261,200,000	Bamyan, Baghlan	Sediment-hosted iron
Aluminum	178,000,000	Badakhshan, Kandahar	Igneous-related iron
	4,535,000	Zabul, Baghlan	Bauxite (50.5% alumina, 12% silica)
Copper	12,340,600	Kabul, Logar	Sediment-hosted (probable: +16,880,000 MTs)
	68,500	Kandahar, Zabul, Heart	Igneous-related (probable: +28,469,200 MTs, +724,010 MTs molybdenum, 682 MTs gold, 9,067 MTs silver)
Gold	1,780 (kg)	Badakhshan, Ghazni, Zabul	Lode gold
	918 (kg)	Takhar, Ghazni	Placer gold
Lead & Zinc	90,000	Kandahar, Heart, Paktia	Igneous-related lead & zinc
	153,900	Ghor	Sediment-hosted lead & zinc
Tin & Tungsten	Unknown	Heart, Farah, Uruzgan	Sn veins, SN & W skarns & greisen
Mercury	32,234	Farah, Ghor	Hot-spring mercury (probable)
(3) Industrial Minerals			
<i>Afghanistan has extensive amounts of gemstones, rare-earth minerals, uranium, sulfur, chromite, and talc, among other industrial metals</i>			
Brick Clay	2,200,000 (sqm)	Kabul	Clay
Rare-earth elements	1,405,179	Helmand	Carbonatite (probable, +3,480,159MTs niobium, phosphorous, uranium, & thorium)
Chromite	200,000	Logar, Paktia	Chromium oxide (43% weight, probable: +979,484 MTs)

Barite	151,500,000	Parwan, Heart	Bedded & vein barite
Celestite	>1,000,000	Baghlan, Kunduz	Celestite (75% weight)
Potash	27,513,690	Balkh, Samangan, Kunduz	Evaporite (probable)
Flourite	8,791,000	Uruzgan	Fooourspar (46.69% weight)
Talc, asbestos, & magnesite	1,250,000	Nangarhar	Metasomatic/metamorphic replacement magnesite (+31,200 MTs magnesite)
	50,000	Nangahar	Talc-magnesite (probable: +13,365,563 MTs asbestos)
Sulfur	450,000	Balkh, Badakhshan	Bedded & fumarolic (probable: 6,000,000 MTs)
Kaolin	385,000	Baghlan	Sedimentary kaolin
	150,000	Baghlan	Residual kaolin
Graphite	5,000	Badakhshan	Disseminated flake graphite (probable: +1,050,223 MTs)
Lazurite	1,300	Badakhshan	Skarn lazurite
Halite	Unknown	North Afghanistan	Evaporite

All figures in MTs except where noted otherwise

AFGHANISTAN: SUMMARY TABLE OF AREAS OF INTEREST (AOI)

AOI	Main	Minor	Deposit Model	Comments	Prioritization
Central Afghanistan					
<i>Central Afghanistan has extensive tin, mercury, and lead. However, the region is currently located far from required transport and power infrastructure</i>					
Daykundi	Sn, W, Li	Cu, Pb-Zn	Greisen tin-tungsten, tin-tungsten-skarn, lithium pegmatite	Taghawlor lithium pegmatite field	2
Karnak-Khanjar	Hg	Sb, As, Au, Ag	Epithermal mercury, base-metal skarn	Mercury belt	3
Nalbandon	Pb, Zn	Ag	Sediment-hosted lead-zinc	Extensive mineral field	1
Southern Provinces					
<i>Southern Afghanistan has the largest amount of rare-earth minerals and onyx, as well as copper, gold, and the country's main fluorite deposit. These deposits could be relatively easily connected to southern neighbor transport infrastructure</i>					
Khanneshin	REMs, U, P	Th, Ba, Sr, limestone	Carbonatite	Significant REMs and uranium resources	1
South Helmand	Travertine (onyx)	Cu, Au, Mo	Travertine, porphyry copper-gold	Travertine production, porphyry copper-gold deposits in adjacent Pakistan	2
Kundalan	Cu, Au, Mo	Ag, Ph	Porphyry copper-gold and skarn	Copper and gold resource; multiple occurrences	6
Bakhud	Fluorite	Zn, Pb, Ag, Sb, Ba	Sediment-hosted fluorite, fluorite vein, polymetallic skarn	Main fluorite district in Afghanistan	3
Katawas	Ag,	Hg, W	Epithermal gold-silver	ASTER anomaly	4
Zarkashan	Cu, Au	Ag, Pb	Porphyry copper-gold and skarn	Copper and gold resource, multiple occurrences, gold placer	5
Western Provinces					
<i>Western Afghanistan has sufficient limestone for a cement factory, copper deposits, and tin. Mining infrastructure could easily be connected to Iranian ports for export</i>					
North Herat	Ba, limestone, marble, clay, Fe	NA	Bedded barite, vein barite, chemical limestone, marble, clay, iron skarn	Major barite field, marble factory, industrial center	1
Dusar-Shaida	Cu, Sn	Pb, Zn, W	Porphyry copper, volcanogenic massive sulfide, tin-copper skarn	Shaida porphyry copper prospect	3
Tourmaline	Sn	Cu	Tin-tungsten vein, placer tin	Previous mining for placer tin	2

Eastern Provinces					
<i>Many of the largest mines (including Haji-Gak and Aynak) are located in Central Afghanistan, far from transport infrastructure. Also includes Emeralds (Panjshir), talc (Nangahar), and REMs (Nuristan) are located in Eastern Afghanistan. Larger deposits will need to be integrated with southern railway networks</i>					
Haji-Gak	Fe	Ba, marble, sandstone, U, Cu	Volcanogenic iron	1.7 billion MTs plus iron ore	--
Aynak	Cu, Co, Ag	Chromite, asbestos, talc	Sediment-hosted copper, podiform chromite	Reserves at Aynak, Jawhar, & Darband deposits	--
Panjshir	Emerald, Fe, Ag	NA	Emerald, sedimentary iron, silver	Major emerald mining area	2
Ghunday-Achin	Magnesite, talc, asbestos	Graphic, coal, marble	Metasomatic magnesite-talc, ultramafic-hosted asbestos	Achin and Ghunday magnesite-talc deposits near Tora Bora	1
Nuristan	REMs, Li, Sn	Ta, Nb	Pegmatites	Paron (Jumanak-Pasgushta) and Pachigram pegmatite fields, lithium	3
Northern Provinces					
<i>The north part of the country has the most diverse set of mineral resources, including gold, copper, limestone, bauxite, and celestite. Regional infrastructure could be relatively easily connected with northern neighboring countries</i>					
Badakhshan	Au, Fe	Ag, Cu, U	Gold-quartz veins, gold and iron skarn	Weka Dur deposit contains 958kg of gold	6
North Takhar	Au	NA	Gold placer	Past production, gold resources	5
Takhar	Salt, clay silica	Coal, oil & gas	Salt dome, clay, sandstone	Rock salt deposit at Namakab. Porcelain and pottery clay	2
Kunduz	Celestite	Oil & Gas	Bedded celestite, oil & gas, bedded phosphate deposits	About 1M MTs of celestite in speculative resource and Katar Oil occurrence	4
Baghlan	Bauxite, clay (kaolin), gypsum	NA	Bauxite, clay, gypsum	Tala Barfak bauxite deposit contains resources, Clay deposits are extensive	1
Balkhab	Cu	Pb, Zn, coal	Volcanogenic massive sulfide	Balkhab copper prospect	7
Dudkash	Limestone	Coal, gypsum	Limestone cement, dolomite, bedded celestite, gypsum clay	Pul-e-Khumri area and Tangi-Murch celestite deposit	3
Industrial Minerals	dolomite, celestite				

Source: AGS/USGS