



ECONOMIC CONTRIBUTIONS FROM INDUSTRIAL MINING IN MADAGASCAR

RESEARCH SUMMARY



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The present Research Summary is based on a set of brochures and an economic model prepared by the CSRSM team who conducted the research. A Technical Annex is available separately with the key assumptions and justifications of the model.

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EXECUTIVE SUMMARY

The contribution of mining used to be seen essentially through taxes and royalties; it tends to be viewed now in a more integrated manner. Fiscal revenues continue to remain one of the biggest questions when it comes to assessing the benefits of mining. However, Governments are increasingly exploring ways in which mines can become more closely integrated with local economies via local purchasing and hiring and/or synergies with infrastructure and community development. This shift in policy approach is described in the African Union's "African Mining Vision 2050", which outlines a new resource-based industrialisation and development strategy for Africa. Such policy documents highlight the potential for non-fiscal contributions of mining if sufficient "linkages" - a word used to characterize economic activities and socio-economic impacts catalysed and/or boosted by mining operations - can be developed.

In Madagascar, where two world-class mining operations have recently been launched, there is a need to document and share information about those developments and their potential impacts. Large-scale mining can be a shock both at the national and local levels. In countries where there is limited experience of such industry, many questions are raised about the costs and benefits generated for the country. Madagascar is no exception: high expectations or strong suspicions in some regions have already led to disappointment, grievance and blockades. Despite communication efforts from the Government and private sector, as well as multi-stakeholder initiatives like the Extractive Industry Transparency Initiative (EITI), there is a clear need for more information and understanding of the real and potential contribution of mining to the local and national economy in the near and long run.

This report, the result of a 2-year research project, attempts to improve that information and to structure the debate around the long-term economic impact of industrial mining.

The objectives of this research were to assess the fiscal and non-fiscal contribution of mining to Madagascar economy, and by so doing to reinforce the capacities of main stakeholders to prepare for the related challenges and opportunities. Its scope was deliberately focused on large-scale mining, excluding i) mining exploration; ii) artisanal and small-scale mining; and iii) quarrying. This explains why the reader may notice important differences between historical data and information published by EITI in Madagascar, which also includes petroleum exploration activities. The research focused on economic spillovers as a first step. Admittedly, additional research on the environmental and social impacts of industrial mining over time should complement this work to provide for a more complete picture of the contribution of the sector towards sustainable development.

A lot of assumptions need to be made in order to be able to envisage future mining developments and their fiscal and non-fiscal contributions. The research is based on a review of available information, discussions with stakeholders including private companies who shared information when possible, as well as economic modelling for future potential mines. Important assumptions are made to forecast both the evolution of Madagascar's economy (growth, fiscal receipts, exports etc.), and the mining sector's development (commodity prices, production, new investments etc.). The reader needs to bear in mind that, given the number of assumptions, the results are mostly illustrative when it comes to future mines. Most of the technical details and model assumptions or justifications are listed in the Technical Annex that accompanies the present Research Summary, and which can be found online.

At this point in time, there is no certainty that new large-scale mines will be constructed in the coming five years. It is important to emphasize that the “pipeline” of mining projects in Madagascar needs to be developed before one can really ascertain which of the known deposits will reach the exploitation stage. The research built 3 scenarios for the future of large-scale mining in Madagascar, which may or may not materialise depending on domestic and international factors. For instance, scenarios 2 and 3 rely on the development of another ilmenite mine, as well as a coal mine and an iron-ore mine. This will greatly depend on: i) international markets and commodity prices; and ii) results of (pre)feasibility studies. In any case, the basic scenario based on QMM, Ambatovy and Kroama mines is the most probable for the coming years. Attracting investment in exploration will be a condition for additional mining development.

In the current economical context, industrial mining can have very significant macroeconomic impacts. According to the findings, industrial mining could account between 4 and 14 percent of GDP and dominate Madagascar’s exports by 2025. It should provide a steady fiscal income representing up to 10 percent of the country’s fiscal income. Large investments in mining provided a very timely support to the economy in a time of crisis, but more modest investments in productive operations could result in better macroeconomic effects in the long run. The main recommendations focus on fiscal aspects as the research shows: i) royalty will remain the principal source of revenues generated by mining in the medium term; ii) corporate tax could change the order of magnitude of mining revenues, but only once new projects reach profitability; and iii) state participation is not expected to generate significant dividends. For those reasons, Madagascar needs to consider whether the current mining fiscal regimes are suited to seize

the opportunities of the next generation of mining investment. However, any revision should be based on detailed analysis as well as proper modeling, and respect existing stability clauses to maintain investor confidence.

The non-fiscal effects of large-scale mining will also be significant, especially at the local and regional levels. According to the model, local procurement could increase from around US\$ 200-300 million per year with the existing mines to close to a billion dollars per year under the most favourable scenario. In terms of employment, although mining is not considered a labour intensive sector, more than 12,500 people are directly employed by mining companies in Madagascar (representing 9 percent of the total workforce in industry, and 2 percent of national employment). In the future, the potential final employment effect of mining (direct, indirect and linked) could reach more than 65,000 people under the most optimistic scenario. Mining projects, like QMM and Ambatovy, may also help catalyse the development of various infrastructures: ports, roads, bridges, social services, and water distribution systems. However, optimizing economic linkages and complying with good practice and international standards require engagement by both Government and private sector, in partnership with civil society. For instance large-scale companies in Madagascar have established significant programs to develop local procurement, with promising results on the local economy. They have also provided opportunities for training and skills development and prioritised the employment of Malagasy citizens. However, Government should prioritise such local content and procurement in policies and/or regulations. Rather than adopting highly prescriptive or punitive measures, it should seek to encourage and reward best practice and processes for multi-stakeholder planning and

training (local, regional and national). The Chamber of Mines, Ministry of Mines and Petroleum, Planning, Employment and Education, and regional Government should further dialogue on key areas of local content and procurement and their relationship with human development.

A whole host of benefits can stem from mining investments but Government, companies, as well as communities each have a role in managing the prospective costs. This research focused on the potential benefits but this is not to underestimate the potential costs. Typically,

as demonstrated through initiatives like Wealth Accounting and the Valuation of Ecosystem Services (WAVES), mining decreases the national mineral assets. Mining also has environmental and social impacts that can damage biodiversity and/or affect communities. It is essential to ensure that the right policies and/or practices are promoted to leverage the positive aspects. But it is at least as important that the proper capacities are in place to monitor the operations and manage the sector. The reflection on the institutional framework as well as capacity strengthening strategies is in that sense essential.



MADAGASCAR

Mayotte (France)

Mozambique Channel

15°S

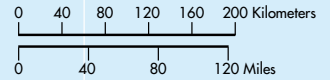
15°S

20°S

20°S

INDIAN OCEAN

This map was produced by the Map Design Unit of The World Bank. The boundaries, colors, denominations and any other information shown on this map do not imply, on the part of The World Bank Group, any judgment on the legal status of any territory, or any endorsement or acceptance of such boundaries.



MADAGASCAR

- SELECTED CITIES AND TOWNS
- ⊙ REGION CAPITALS
- ⊕ NATIONAL CAPITAL
- ~ RIVERS
- MAIN ROADS
- RAILROADS
- REGION BOUNDARIES

INTRODUCTION

COUNTRY BACKGROUND

Madagascar remains one of the world's least developed countries, ranking 155 out of 187 on the Human Development Index¹. It is estimated that, 92.8 percent of the population lives on less than USD 2 PPP per capita per day (2010). Madagascar's development has been hindered by repeated political crises, occurring every decade on average since the country's independence in 1960. The latest crisis occurred following the unconstitutional change of regime in 2009, and lasted close to five years. It left the economy severely crippled and led to a sharp rise in poverty levels. In 2012, income per capita had fallen to its 2003 level (around USD 400). Key business indicators have experienced a downward trend, with the decline for example of the country's ease of doing business ranking from 148 out of 189 countries in 2014, down to 163 in 2015². The return to an elected government in 2014 has raised hopes of an economic rebound and a return to the development path.

Madagascar's GDP is estimated at US\$ 11.8 billion (2013)³. The country's economy is overwhelmingly dominated by informal activities: according to "ILO", persons in informal employment represented 73.6 percent of non-agricultural employment in 2005. The Transparency International index ranks Madagascar at 133 out of 174 countries in 2014⁴.

MINING AT A GLANCE

While Madagascar has a long history of small-scale mining of gold and precious stones, the sector has entered a new era with the launch of two large-scale mining projects in the 2000s. These include Ambatovy, the largest private investment ever witnessed on the island, having invested a total of US\$ 7.2 billion as of 2013. The second project, QMM, indicates having invested US\$ 930 million in Madagascar by 2008. A number of other indicators provide evidence of the magnitude of the mining sector in Madagascar:

- ▶ The contribution of the mining sector to the Madagascar's GDP is estimated in 2013 at 2.12 percent (INSTAT).
- ▶ The growth of extractive industries was far greater than that of the primary, secondary or tertiary sector between 2000 and 2012.
- ▶ In 2013, 30 percent of exports were minerals.

Should this trend be maintained, Madagascar will soon become a resource-rich country as defined by the IMF, i.e. a country in which, over the course of several years, exhaustible natural resources account for either at least 20 percent of total exports, or 20 percent of natural resource revenues⁵. However, mining is a very cyclical sector and both international and domestic factors will affect the future of mining in Madagascar, including the country's capacity to govern and monitor the sector.

¹ United Nations Development Programme (UNDP) 2014, Human Development Report.

² IFC & World Bank 2013 & 2014, Doing Business 2014 & 2015, 11th and 12th editions.

³ IMF 2014, World Economic Outlook database.

⁴ Transparency International 2013, Corruption Perception Index.

⁵ IMF 2014, Macroeconomic Policy Frameworks for resource-rich developing countries.

HOW DO GOVERNANCE ISSUES AFFECT MINING DEVELOPMENT?

Governance of the mining sector will largely determine whether the sector will either bring about sustainable development in Madagascar, or further destabilise an already fragile economy.

The island's underground wealth constitutes a non-renewable asset that requires cautious and effective management by Government. In some countries, like Chile or Botswana, the skillfull management of the mining sector has translated mining into a comparative advantage.

If the mining sector is riddled with vested interests, opacity, non-compliance with rule of law and unregulated environmental and social impacts, it could lead to the degradation of the country's political and economic conditions. Conversely, complete transparency, effective Government and civil society oversight, with a view to use mining wealth to improve the lives of the Malagasy people in the short and long term, will ensure the sector can become a real catalyst for development.

ABOUT THIS RESEARCH

This report is the result of a research project on the economic contributions of industrial mining in Madagascar. This research was an initiative of the World Bank in partnership with the Ministry of Mines and Petroleum (formerly the Ministry of Mines and Ministry of Strategic Resources), the Chamber of Mines, and GIZ. It was financed by the South African Extractive Industry, Energy and Transport Trust Fund (SAFETE), and implemented by the Centre for Social Responsibility in Mining (CSRMin), at the University of Queensland, Australia. The Australian Government's International Mining for Development Centre (IM4DC) also provided support for the last mission and training.

The main objectives were to assess and anticipate the fiscal and non-fiscal contributions of large-scale mining in Madagascar, and to provide recommendations about how Madagascar can maximise the potential benefits, and ultimately leverage the mining sector to improve the quality of life of the Malagasy people.

It is aimed for a wide audience of sector stakeholders or other parties interested in learning more about what to expect with regards to the economic impact of large-scale mining.

The research was conducted by a multidisciplinary group of local and international professionals. The methods included field research within Madagascar, visits to mining sites; analysis of primary and secondary data; economic modelling; case study analyses; semi-structured interviews; and workshops with local stakeholders.

The results are presented in the form of "key findings" and "recommendations" in an attempt to make the reading easy. Most of the technical details and model assumptions or justifications are listed in the Technical Annex that accompanies the present Research Summary and which can be found online.

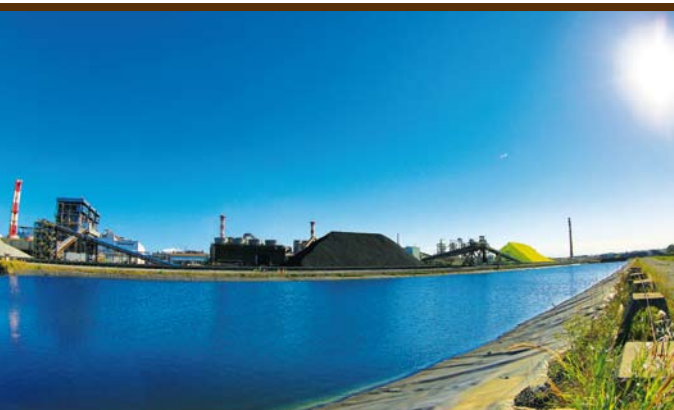




SCOPE

The research focused on economic contributions as a first step. Additional research on environmental and social impacts of industrial mining over time should complement this work to provide for a more complete picture of the contribution of the sector towards sustainable development.

In addition, the research focused on large-scale mining, excluding: i) mining exploration; ii) artisanal and small-scale mining; and iii) quarrying. Petroleum activities (exploration essentially) are also precluded from the research. This would explain why the reader may notice important differences between historical data and information published by the Extractive Industry Transparency Initiative (EITI) in Madagascar.



CAVEAT

The research is based on economic modelling. It is built on possible scenarios for the future of large-scale mining in Madagascar, which may or not materialise depending on domestic and international factors. The reader needs to bear in mind that, given the number of assumptions, the results are mostly illustrative when it comes to future mines.

SECTION 1

MINING DEVELOPMENT IN MADAGASCAR



HISTORY OF MINING

Artisanal and small-scale mining

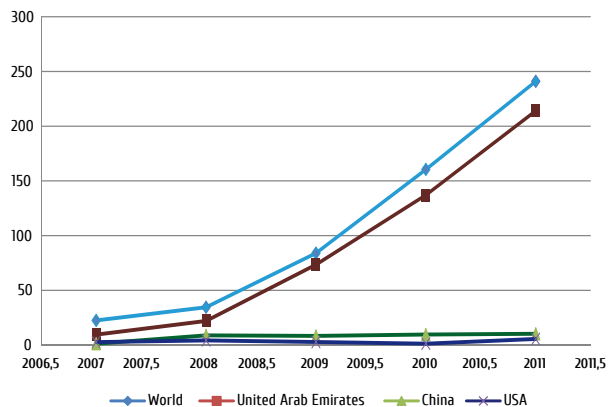
Until recently, mining in Madagascar predominantly amounted to artisanal and small-scale extraction of gold, precious and semi-precious stones such as sapphire, ruby, aquamarine, tourmaline, topaz, amethyst and emerald.

At the end of the 1990s, a rush for sapphire and ruby led to the sudden development of new mining towns at Ilakaka and Sakaraha and turned Madagascar into one of the world's largest producers of these coloured gemstones. The artisanal extraction of alluvial gold is also a livelihood activity in many parts of the country, with - at times - several tons of gold produced per year.

Gold exports dramatically increased since 2008, coinciding with the rise in gold price (see graph 1). 2012 is considered to be one of the peak-years for gold and gemstone production in Madagascar: official gold production was multiplied by 10; and ruby production by an estimated factor of 4.4, compared with 2008. However, only a fraction of the gold produced and exported are reported and such statistics paint an incomplete picture of what remains an essentially informal sector. The significance of small-scale mining is better understood looking at data on imports from Madagascar: in 2011, almost US\$ 250 million worth of gold and stones were imported by foreign countries from Madagascar, mainly the United Arab Emirates (Dubai).

The artisanal mining sector is one of the largest providers of employment in Madagascar, with an estimated 500,000 full-time and seasonal artisanal miners taking part in gold and precious stones' extraction. This is less than the agricultural sector, but more than the textile and clothing industry⁶.

Graph1 : Imports of pearls, precious metals, precious and semi-precious stones from Madagascar (US\$ Million).



Despite significant contributions to the Madagascar's economy and local livelihoods, artisanal mining has also been associated with considerable adverse impacts on health, safety, social harmony, the environment, taxation revenue, as well as corruption and illicit trade.

The present research focuses on large-scale mining, yet also recognises that the development of large-scale mining should not shift attention away from initiatives aimed at formalising the artisanal and small-scale mining sector, as well as the government's capacity to regulate the sector.

Large-scale mining

Until the 2000s, chromite was the only commodity exploited industrially in Madagascar. Chromium is an important commodity for the production of steel. Chromite production commenced in 1968 with the COMINA company, which was nationalised in 1975 and is now known as Kraomita Malagasy or Kraoma SA. With this medium-sized mining company, Madagascar has long been the 10th world producer of chromium, although way behind South Africa, the number one producer.

⁶ United States Geological Service (USGS) 2014, Minerals Yearbook 2012, Madagascar.

Large-scale mining markedly increased in the years 2005-2012 with the development of two large industrial mining projects that are now in their exploitation phase:

- ▶ QIT Madagascar Minerals (QMM) is an ilmenite, rutile and zircon mine in Tolagnaro, in the South East of Madagascar, which was launched in 2009. The entity is 80 percent owned by Anglo-Australian mining giant Rio Tinto and 20 percent by the State. The site includes a mine, a separation floating plant and port facilities. The extracted ilmenite is exported then enriched in the metallurgical complex of Sorel-Tracy of Rio Tinto in Canada. The total investment amounts to US\$ 1.1 billion, including US\$ 930 million in Madagascar as of 2008. The potential full capacity at QMM is 496,000 ton per year of ilmenite and 26,710 ton per year of zirsill.
- ▶ The Ambatovy Project produces nickel, cobalt and sulphate of ammonia (as a refining by-product), from a mine near Moramanga, and a processing plant at Toamasina, in the East of Madagascar. The project was launched at the end of 2012 by a consortium of Sherritt International Corporation of Canada (40 percent), Sumitomo Corp. of Japan (27.5 percent), Korea Resources Corp. of the Republic of Korea (27.5 percent), and SNC-Lavalin Inc. of Canada (5 percent). The ore slurry is conveyed to the processing plant in Toamasina through a 220 km long pipeline. Product is shipped to international markets from the port of Toamasina. With an accumulated investment of \$7.2 billion as of 2013, it has a capacity of 60,000 tons per year of refined nickel, and 5,600 tons per year of cobalt.

Other prospective large-scale mining projects

The international crisis and Madagascar's 2009-2013 political transition have slowed mining exploration and degraded the country's attractiveness as an investment destination. In light of these factors and the history of mining development in Madagascar, it is likely that QMM, Ambatovy and Kraoma will remain the only large-scale mining projects in production in Madagascar within the next 5 to 10 years.

However, some deposits have been significantly explored and could be developed in the medium-term. It is impossible to predict which ones will become economically viable in the years to come, but the following have been the focus of much attention:

- ▶ **Ilmenite extraction on the East Coast and around Toliara.** Madagascar's coastline is rich in mineral sands. The south-western coast near Toliara has been explored by World Titanium Resources Ltd. The deposit could contain around a billion ton at 4.4 percent of ilmenite at Ranobe. Toliara Sands has an Exploitation Licence (EL), and at the end of 2013 an Environmental Impact Study (EIS) was under way (the approval of which is required before construction can begin). Depending on the results of the feasibility study, and according to preliminary studies, the potential mine could produce 407,000 tons per year of ilmenite and 44,000 tons per year of zircon concentrate⁷. The company has declared that an initial investment of US \$216 million would allow the project to reach full production capacity in 2023. On the East Coast, Mainland Mining, a Chinese company, already extracts ilmenite on a small scale around Toamasina.

⁷ World Titanium Resources 2014, Building a Tier One Mineral Sands Company. Presentation to GMP Mining Jamboree.

- ▶ **Coal extraction at Sakoa.** Several companies explore coal deposits in this region: MCM-SA Sakoa, PAM-SAKOA and Lemur Resources. Initial estimates vary between 1,1 and 1,2 billion tons of coal. If the feasibility studies confirm the initial estimations, coal mines could potential be developed in the Greater Sakoa Basin, with 5 to 10 million tons per year capacity⁸.
- ▶ **Iron ore extraction at Soalala.** According to initial estimations, this prospective deposit contains more than 800 million tons of reserves available for exploitation⁹. Wuhan Iron and Steel CO (WISCO), China's third largest steelmaker, started exploration in 2011. Limited information is available about this project and despite the ambitious plans, to date, the project has not advanced beyond exploration.

Other mineral deposits have some potential for development, including:

- ▶ The gold of Betsiaka, Maevatanana, and Dabola-va, where mining permits were issued to several operators in 2008 with a view to transforming artisanal exploitation into industrial production.
- ▶ The bauxite of Manantenina, where several companies, including Rio Tinto-Alcan, hold prospecting permits.
- ▶ The rare earths of Ampasindava and Fotadrevo. Occasional price peaks have renewed interest for rare earths and several projects are already active.

Quarrying

Madagascar produces a range of industrial minerals and other ornamental stones: graphite, gypsum, kaolin, mica, agate, quartz, labradorite, salt, granite, limestone, marble and cement. Holcim Madagascar SA, the cement producing company, was the second largest mining contributor of Government payments in 2011, according to the Extractive Industries Transparency Initiative¹⁰. The company employs 280 people and consists of two production centers: an integrated production capacity of 150,000 tons per year in Antsirabe (Ibity) and a bagging and silo facility with a capacity of 180,000 tons per year located in Toamasina. Another company, Madagascar Long Cimenterie (Maloci) of China also owns a cement plant with 360,000 ton per year capacity.

Remark on Petroleum

Production of oil has started on a pilot basis at the Tsimiroro site but exploration is expected to expand significantly. The company Madagascar Oil is the most advanced on-shore with a pilot of production by vapor injection in Tsimiroro which demonstrated an average of 465 barrels a day (March 2014). The company has also partnered with Total for the exploration of the neighboring field of Bemolanga. Oil potential off-shore is not proven but the proximity to fields in Mozambique gives hope for discoveries in Madagascar.

⁸ United States Geological Service (USGS) 2014, Minerals Yearbook 2012, Madagascar.

⁹ Madagascar Ministry of Strategic Resources (formerly Ministry of Mines) 2014. Fiche relative au projet de la société MADAGASCAR WISCO GUANGXIN KAM WAH RESSOURCES S.A.U. (unpublished).

¹⁰ Ernst and Young, 2013. EITI Madagascar: Rapport de réconciliation (version préliminaire), Exercice 2011. September.

MODELLING THE FUTURE CONTRIBUTION OF MINING

Mining scenarios in Madagascar

Three possible scenarios for the future of large-scale mining in Madagascar were developed to forecast the potential impacts of the sector for the 2014-2035 period. Scenarios were constructed based on the history of mining in Madagascar, a prospective analysis of operational and planned mining projects in various stages of development, and consultation with key stakeholders.

Scenario 1: This scenario considers only the existing large-scale mining projects: Ambatovy, QMM and Kraoma.

Scenario 2: Scenario two consists of scenario one projects, and the development of two additional mining ventures: 1) another ilmenite mine based on the Toliara Sands project, and 2) one coal mine based on a combination of projects in the Sakoa Region.

Scenario 3: Scenario three comprises scenario two plus the development of an iron mine based on the Soalala Project (WISCO).

A simplified cash-flow model was developed for individual mining projects based on empirical data, estimations and assumptions of the project cost structure; actual and forecasted production; market conditions and prices; and an analysis of Madagascar's mining fiscal regime. The cash-flow models for each individual project were then aggregated to estimate the monetary effect of the large-scale mining sector in Madagascar, including national costs, salaries, taxation and royalties. Royalties are included in the analysis acknowledging that these are payments for inputs owned by the state. The final component of the model uses an analysis of the projected macroeconomic conditions in Madagascar to determine the impact of large-scale mining development on key economic variables, including exports, GDP, employment, fiscal revenues, GDP per capita and fiscal revenue per capita.

A sensitivity analysis was undertaken to model the impact of variations in production and commodity price.

Phases of mining development

The scenario analysis has considered an estimation of the duration (in years) of key planning and construction phases before projects operate at full capacity. These phases include:

1. Feasibility studies
2. Financial planning
3. Legal approval and permits
4. Engineering and procurement
5. Construction
6. Start up

Factors that can accelerate or reduce the speed of mining development in Madagascar

Several interrelated factors could accelerate or reduce the speed of mining development in Madagascar and the likelihood of new projects materialising. These are:

- ▶ 1) Technical aspects. Including: resource estimation; geological analysis; quality of resources; technology of extraction; mining and processing; and local capacity to provide goods, services and labour.
- ▶ 2) Capacity to develop complementary infrastructure. Including: roads; ports; industrial facilities; or energy infrastructure.
- ▶ 3) International market conditions. Including: commodity prices; cost of production; and cost of energy.
- ▶ 4) Financial structure. Including: capacity of the companies to raise capital; credit structure; financial covenants; and financial risk analysis.

- ▶ 5) Management of environmental and social impacts. Including: proximity to sensitive environments; engagement with civil society and local communities; and the level of public support or concern about the project.
- ▶ 6) Political and legal context. Including: the role of the state of Madagascar; level of political support for development; the presence of, and ability to enforce, regulation; and political stability.
- ▶ 7) Technical capacity of the mining authority. Including: the knowledge and resources to facilitate, regulate and oversee mining development.

PRODUCTION FORECASTS FOR MINING SCENARIOS IN MADAGASCAR

Analysis of the three mining development scenarios in Madagascar indicates that the projects included under scenario two and three are not likely to reach construction phase before 2019-2020 (see table 1 below). Full capacity is anticipated by 2023-24 under scenario two, and full production under scenario three is not anticipated before 2025.

Project transition from one stage of development to another is not an automatic process. It will take a significant effort on the part of government and other relevant actors.

Table 1: MINING SCENARIOS IN MADAGASCAR
Production based on Phases of Mining Development (*000 tonnes)

Commodity	Projects	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	
Scenario 1																													
Chromium	Kraoma	141	253	256	183	201	130	150	150	150	150	150	150	150	150	150	150	0	0	0									
Nickel	Ambatovy				5.7	25	37	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60
Cobalt	Ambatovy				0.5	2	2.7	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6	
Ilmenite	QMM	160	287	470	562	562	562	475	396	480	496	496	496	496	496	496	496	496	496	496	496	496	496	496	496	496	496	496	
Zirsill	QMM	5.3	12.6	17	30	30	30	24	23	24	26	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	
Scenario 2 (additional projects)																													
Coal	Sakoa																	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	
Ilmenite	Toliara																	407	407	407	407	407	407	407	407	407	407	407	
Zircon	Toliara																	44	44	44	44	44	44	44	44	44	44	44	
Scenario 3 (additional projects)																													
Iron Ore	WISCO																												
																		14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000	

Notes

Feasibility Studies	Technical, economic and financial evaluation
Financial Structure, Legal Approval and Engineering and Procurement	Capital structure, lenders, shareholder structure, Environmental Impact Assessment, permits, agreements planning, programming, estimation, design, purchasing
Construction	Including construction of mine facilities, pre-stripping, complementary infrastructure
Start up	First period of production phase
Production at full capacity	Two years after start up

SECTION 2

MACROECONOMIC IMPACT



Large scale mining is projected to have a growing macroeconomic impact in Madagascar, with increased monetary flows (salaries, domestic expenditure and fiscal income), and a rising contribution to GDP and exports.

KEY FINDINGS

1 - Monetary flows are dominated by domestic expenditure

The large scale mining projects under analysis have contributed and will continue to contribute significant monetary flows to the economy through domestic expenditure, salaries and fiscal contribution. Monetary flows are expected to increase as the three main mining projects reach full capacity and new ones enter into production. The table below illustrates those monetary flows based on the assumptions listed in the Technical Annex. It shows domestic expenditure dominating this flow, and fiscal contributions increasing in terms of percentage of total contributions

in the last seven years of the analysed time period (2028 to 2035). The fiscal contribution is discussed further in section three of this report.

The final impact in terms of monetary flows will depend on the number of companies operating in Madagascar (scenarios 1, 2 or 3), the level of production, and commodity prices. International evolution of commodity prices could impact fiscal contributions (potentially reducing net profit and consequently the level of corporate tax) and reduce salaries and national procurement (due to the relatively fixed cost structure of mining).

Table 2: TOTAL MONETARY FLOWS OF LARGE SCALE MINING AT FULL CAPACITY
(US\$ Million)

	2012		2015		2025				2035			
	Scenario	%	Scenario	%	Scenarios			%	Scenarios			%
					S1	S2	S3		S1	S2	S3	
Salaries	24	19%	99	22%	96	128	198	16.4%	96	128	198	13%
Domestic Expenditure (1)	84	67%	318	69%	310	469	924	76.4%	310	469	924	62%
Fiscal contribution (2)	18	14%	43	9%	40	52	88	7.2%	38	89	378	25%
Total monetary flows	126	100%	460	100%	446	649	1,210	100%	444	686	1,500	100%

Note:

The scenarios include the following mining activities:

Scenario 1: QMM, Ambatovy and Kroama

Scenario 2: S1 + Toliara Sands and Sakoa Region

Scenario 3: S2 + WISCO

Domestic procurement includes the potential expenditure at local or national level during operational phases.

Fiscal contribution includes: royalties, corporate taxes, withholding taxes on dividends, customs duties and import taxes, professional taxes, non-refundable VAT, foreign transfer taxes, and minimum corporate taxes. This fiscal contribution does not include indirect effects of taxes and personal taxes

2 – Mining could account for 4 to 14 percent of GDP by 2025.

Large scale mining development in Madagascar is expected to have a significant impact on the national gross domestic product (GDP) - i.e. the country's capacity to generate added value, and on future opportunities for development.

Mining accounted for only 1 percent of total GDP in 2012. But by 2025, mining could amount to 4 percent of GDP under scenario 1 and 14 percent under scenario 3. This contribution is evidently susceptible to key factors like nickel price: as shown in the graph 2, a 10 percent increase in Ni price results in the model in one more percent of contribution to GDP.

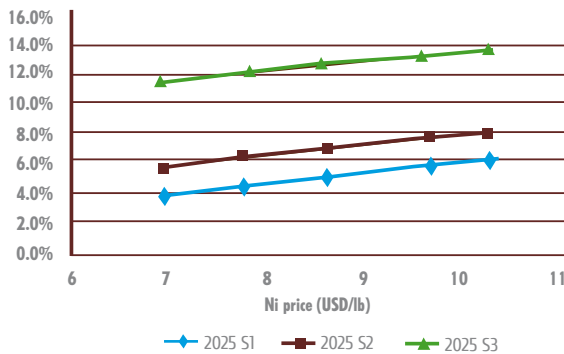
The model assumes Madagascar maintains the economic trend of the last five years, and increases its GDP - excluding mining - from US\$ 10 billion in 2012 to US\$ 11.8 billion in 2015 and US\$ 16.5 billion in 2025. It calculates that mining development could generate a direct mining GDP of US\$ 554 million in 2015 and US\$ 1,89 billion each year from 2025 to 2035. The model estimates that indirect GDP - the added value generated in other sectors from mining

salaries and local procurement - could amount to US\$ 159 million in 2015 and US\$ 462 million each year from 2025 to 2035. This means that for each GDP dollar directly generated by mining, mining related activities would indirectly generate US\$ 0.29 in 2015 and US\$ 0.24 each year from 2025 to 2035.

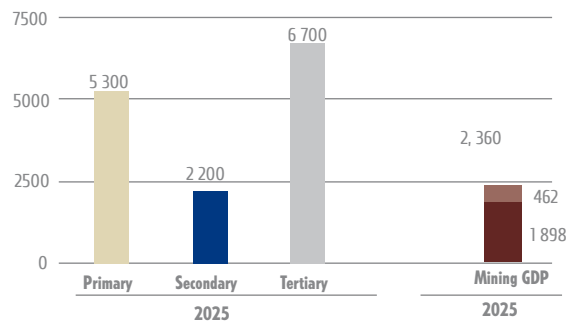
Comparison with other sectors offers some perspective of large scale mining's significant contribution to GDP in Madagascar: by 2015, total mining GDP is expected to match the rest of industry GDP, half of agriculture GDP and a third of services GDP. (see graph 3 and 4).

Mining contribution to GDP consists of large scale mining investments' added value and productivity in Madagascar over the study period. While this contribution is relatively stable given the execution of planned investments and productivity, it does not automatically result in economic development and improved livelihoods. It should rather be perceived as an opportunity, which could be translated into human development given the right mechanisms for the generation, management and distribution of benefits at the local level.

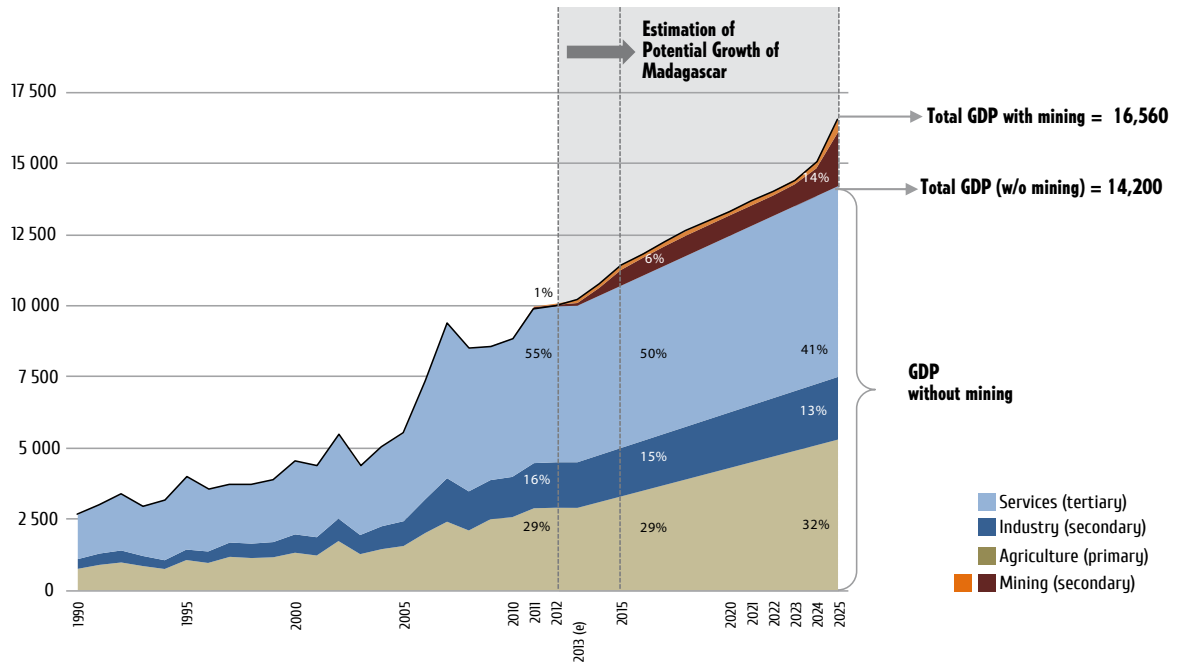
Graph 2 : Contribution of large-scale mining to GDP sensitivity to nickel price



Graph 3 : Gross Domestic Product by sector in Madagascar and forecast contribution of mining in 2025 (US\$ Million)



Graph 4 : Gross Domestic Product by sector in Madagascar and the contribution of mining (US\$ million; Scenario 3)



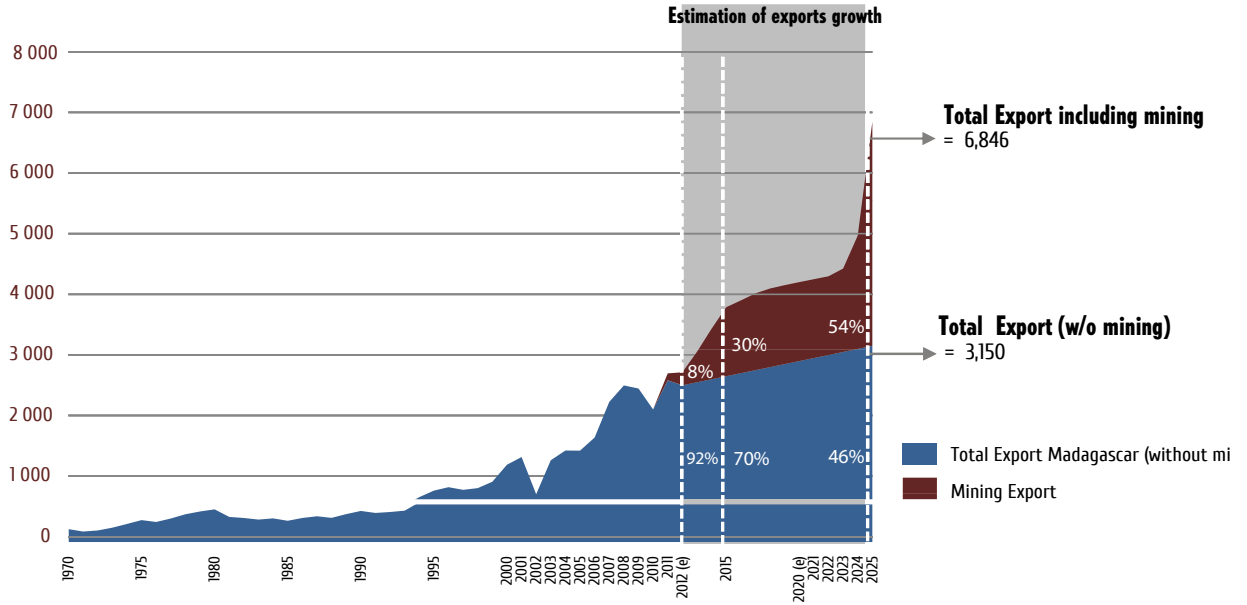
3 – Mining could dominate Madagascar exports by 2025

The large scale mining projects under analysis operating at full capacity could export US\$ 1,14 billion in 2015, and US\$ 3,69 billion each year from 2025 to 2035. As shown in the table 3 and graph 5 below, mining exports are expected to account for 54 percent of total exports by 2025, a significant increase from 30 percent in 2015 and 8 percent in 2012. However,

the increase in exports will make a much smaller contribution to improving Madagascar’s balance of payments, as they will coincide with corresponding financial outflows: large mining investors will retain most of the export earnings abroad (outside Madagascar) inter alia to repay their investors and creditors. The export earnings will be brought back to Madagascar essentially to fund operational costs.

	2012	2015	2025		
	Scenario	Scenario	Scenarios		
	S1	S1	S1	S2	S3
Export	214	1,139	1,270	1,876	3,696

Graph 5 : Total exports and mining exports in Madagascar (US\$ million – current – FOB)



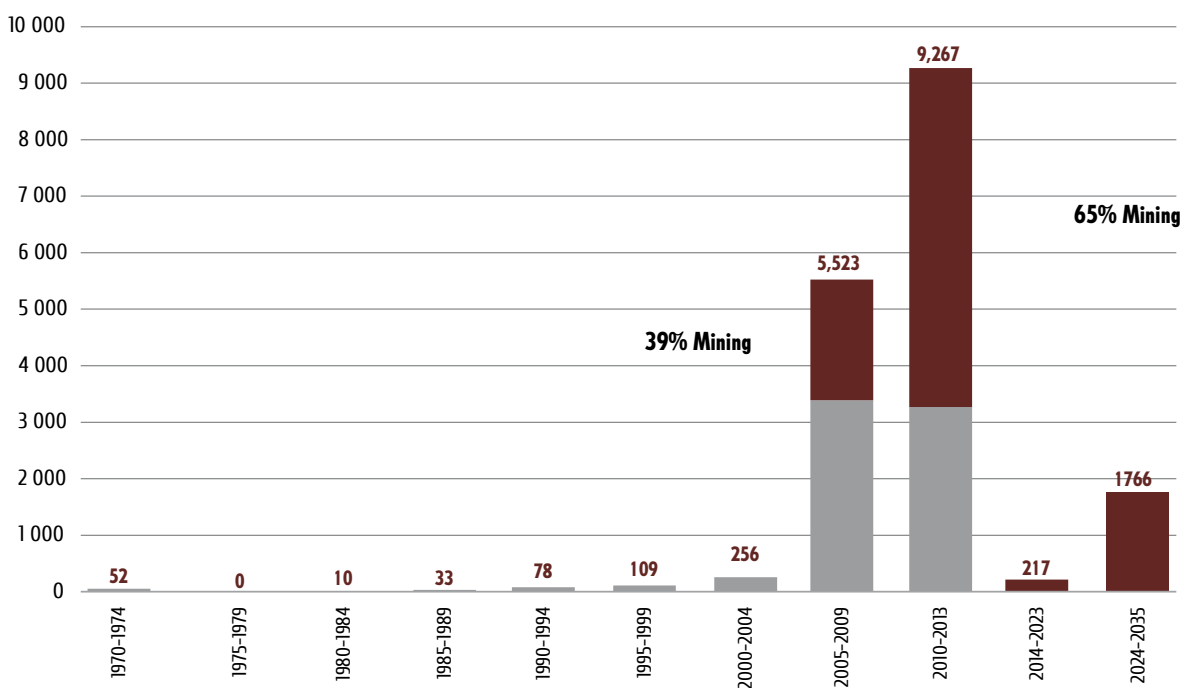
4 – Large investments in mining provided critical support to the economy in a time of crisis, but more modest investments could result in better macroeconomic effects in the long run.

Large scale mining companies, mainly Ambatovy and QMM, have invested around US\$ 8.13 billion between 2005 and 2013. This is a historical inflection point for Madagascar's economy: in previous periods, foreign investment across sectors had not exceeded US\$ 256 million for every five years between 1970 and 2004 (see graph 6 below). Ambatovy and QMM accounted for 39 percent of total investment in-country between 2005 and 2009. Ambatovy's significant contribution extends to 2013, representing 65 percent of total investment between 2010 and 2013.

This rare investment peak may have led to shocks for local stakeholders, especially in rural areas, but also provided a strong and timely boost to the national economy at a time of economic and political crisis.

However, given the existing fiscal regime, high investments could also result in reduced fiscal revenues because they are deducted from income tax (depreciation in loss-making years can be carried forward indefinitely). By assuming lower levels of capital investment for future mines under scenarios 2 and 3, the research indicates a more significant contribution can be achieved through good production levels and limited investment. Needless to say, investment requirements for projects such as Tulear Sand and Wisco are based on early estimates, which are subject to a high level of uncertainty and will most likely be revised.

Grappe 6 : Foreign Investment in Madagascar (US\$ million)



RECOMMENDATIONS

Enhance access to public information

As mining becomes an even more important sector from a macroeconomic perspective, the Government of Madagascar, in particular the Ministry of Mines and Petroleum, should ensure that all data that is key to understanding the impacts of mining are disclosed and available in one single location (website). Data collection mechanisms need to be established, particularly in remote regions and for companies that do not rigorously report information to Government, the public and the market. Key areas of information and responsibilities include: production and exports; investment; taxes collected; employment; environmental impact studies, audited financial statements, policies, legislation.

Ensure transparent governance and management of monetary flows

A lack of transparency, poor governance and mismanagement of monetary flows could fuel corruption, lead to the decline of state institutions, and result in a missed development opportunity. EITI, which has recently expanded its mandate from revenue-focused information to more contextual information, is a critical tool to counter such risks, and should be promoted and streamlined. The central and local governments should seek support from, and partner with, development organisations, but also continue to strengthen national leadership. This would ensure that development priorities are identified and monetary benefits from mining are effectively directed into focused social and economic development programs.

Monitor key macroeconomic factors related to mining

Seeing as the economy is increasingly dependent on mining, the Ministry of Mines and Petroleum and the Ministry of Finance should closely monitor macroeconomic factors of influence to the sector. At the international level, monitoring commodity prices (like nickel, which is very volatile) is undoubtedly key. For minerals without a publicly available reference price (like ilmenite), it is essential to develop a deeper knowledge of the market. At the national level, the Central Bank should closely monitor not only exports but also export earnings. Investments in mining exploration are a key indication of sector vigour, and reflect the likelihood of new mines being developed. Mining investments in construction and production can be proportionally very high compared with the rest of the economy. They should be monitored closely as they can have a great and timely contribution but can also reduce long term benefits.



SECTION 3

FISCAL CONTRIBUTION



MODELLING OF FISCAL INCOME

The analysis presented in this section is modelled using estimations of the cost structure of large-scale mining companies; average realised ore prices for the companies currently in operation up until 2014; price forecasts for the 2015-2035 period based on different forecasting methods, including World Bank forecasts; and the final or net effects of royalties and income taxes, indirect taxes and direct payments (including corporate tax, minimum corporate tax, withholding tax, professional tax, non-refundable VAT, foreign transfer tax, customs duties, import tax, and direct payments associated with state participation).

The model is based on the tax regime and legal framework for mining in force in 2014, as well as available information on corporate policies (accounting and investment policies such as depreciation, fiscal discounts, and dividends), commodity prices, production levels and cost structure.

The model was benchmarked against payment data disclosed by the 2011 EITI report for Madagascar¹¹. The benchmark analysis found that the model accounted for the tax and royalty payments considered as fiscal contributions. EITI data represents both tax and royalty contributions, as well as payments (and taxes) which are not considered fiscal contributions in this study. Penalties, administration fees, employee personal income, employee pension fund contributions, environmental impact assessment evaluation fees, visa and identity card fees, and other one-off payments are not included in the present modelling but represent a substantial component of the payments to Government in EITI data. Many of these payments are for services provided by Government or for contributions by employees, which should not be considered as mining sector fiscal contributions. However, the magnitude of these payments indicates an indirect value in providing resources for services delivered by Government or resulting from the employee labour.

It should be noted that while royalties are included under the term “fiscal income” in this study, as previously mentioned they are in effect a payment for the State’s ownership of mineral resources.

The model does not include all mining and mineral exploration companies operating in Madagascar (see section one). A number of small companies excluded from analysis (Mainland, PAM etc.) do make fiscal contributions. The magnitude of their combined contributions was calculated at around US\$ 2 million in 2011.

The Technical Annex that supplements this research summary provides details on the economic approach applied to the study.

KEY FINDINGS

Large scale mining in Madagascar has the potential to provide a steady fiscal income (tax and royalty payments) to the country because of the sector’s capacity to generate long-term resources through royalties, corporate taxes and other payments. Modelling has revealed that royalties will provide the majority of fiscal contributions up until 2028. Corporate taxes only become significant in the later years of the analysis due to fiscal incentives to encourage large-scale investment.

1 – Large scale mining in Madagascar should provide a steady fiscal income and could reach 11 percent of the country’s fiscal income.

Fiscal revenues from existing mines could increase from an average US\$ 10 million per year today to around US\$ 40 million per year under the model price assumptions.

¹¹ Ernst and Young, 2013. EITI Madagascar: Rapport de réconciliation, Exercice 2011. September.

The large-scale mining projects currently in production (scenario 1) contributed to a total fiscal income of US\$ 11.4 million in 2012 and in US\$ 15.9 million in 2013 (see table 4). As explained in the introduction, these figures differ from the EITI results because they do not cover the same monetary flows. When both QMM and Ambatovy will operate at full capacity, those revenues could amount to US\$ 40 million. Royalty, non-refundable VAT, minimum corporate tax and professional tax are the largest contributors to fiscal income from currently operating mines during the period of analysis. Nickel price fluctuations will directly impact sales that are not subject to long term offtake contracts at Ambatovy. Although QMM is part of an integrated company, ilmenite price variations are likely to affect production levels, either positively or negatively, and would therefore affect QMM royalties in the same proportions.

New mining projects could increase the contribution of mining from 1 to 11 percent of national fiscal income.

Based on the average fiscal revenue as a percentage of GDP for 2008-2010, the fiscal revenue of Madagascar is estimated at 14 percent of GDP each year for the 2011-2035 period. This assumption is influenced by how fiscal revenues other than mining change over time.

The increase will depend on additional companies in Scenario 2 and 3 and in particular their payments in terms of royalties, corporate taxes and withholding taxes on dividends. Under the model assumptions, overall government fiscal revenues would amount to US\$ 3,4 billion in 2035, with mining accounting for 11 percent of the total.

2 – Royalty will remain the principal source of revenues generated by mining in the medium term.

Whereas royalties will represent between 30 to 40 percent of mining fiscal revenues in the short run, this could exceed 70 percent once new mines develop.

Royalty is the most emblematic "fiscal" instrument associated with mining: it is designed to compensate the exploitation of national mineral resources and it is paid once production starts. The research shows royalties as the predominant fiscal income between 2014 and 2027 for all scenarios.

At the local level, royalties will be even more critical.

According to the mining code, an important share of total royalties (70 percent) is managed by local entities, with the remaining 30 percent managed by the central Government (see graph 7 below). The 70 percent are further apportioned to autonomous provinces (10 percent), regions (30 percent), and communes (60 percent). For example, local entities received US\$ 2.4 million in royalties from currently operating projects in 2012 (Scenario 1), of which US\$ 1.4 million is allocated to communes (see figure below). When Scenario 1 projects are expected to operate at full capacity in 2015, they are forecast to generate US\$ 10 million of royalties for local entities. Communes would receive a US\$ 6 million share of this total.

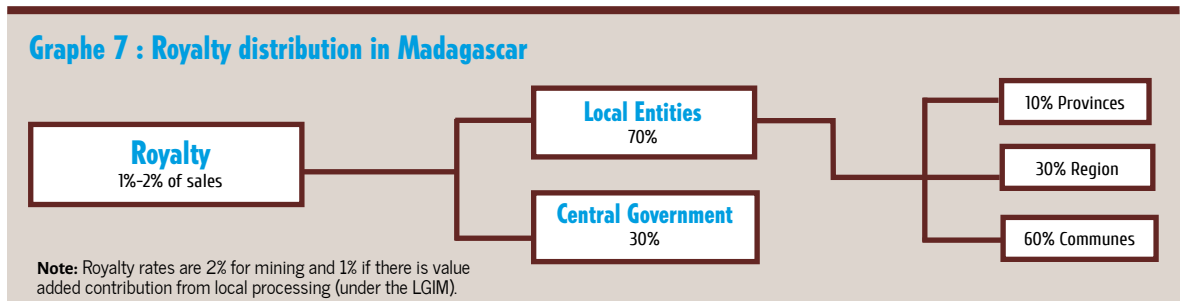


Table 4: TOTAL FISCAL INCOME FROM LARGE SCALE MINING
(US\$ million)

	2012			2015			2025			2035		
	S1	S2	S3	S1	S2	S3	S1	S2	S3	S1	S2	S3
Royalties	3,44	3,44	3,44	14,38	14,38	14,38	15,68	27,81	64,21	15,68	27,81	64,21
Corporate Taxes (less ITC)	2,90	2,90	2,90	2,22	2,22	2,22	0,00	0,00	0,00	0,00	18,31	212,04
Minimum Corporate Taxes	0,00	0,00	0,00	0,00	0,00	0,00	2,45	2,45	2,45	2,84	2,84	2,84
Withholding Taxes on Dividends	0,73	0,73	0,73	0,00	0,00	0,00	0,00	0,00	0,00	0,00	20,81	78,92
Non-refundable VAT (food and mobile fuels)	0,00	0,00	0,00	10,20	10,20	10,20	9,20	9,20	9,20	8,20	8,20	8,20
Professional Taxes	2,4	2,4	2,4	3,4	3,4	3,4	8,00	8,00	8,00	8,00	8,00	8,00
Customs Duties and Import Taxes	0,0	0,0	0,0	1,8	1,8	1,8	1,8	1,80	1,80	1,00	1,00	1,00
Foreign Transfer Taxes	2,00	2,00	2,00	2,40	2,40	2,40	2,40	2,40	2,40	2,40	2,40	2,40
Total Fiscal Income	11,48	11,48	11,48	34,40	34,40	34,40	39,53	51,66	88,06	38,12	89,37	377,61

Note:

The scenarios include the following mining activities:

Scenario 1: QMM, Ambatovy and Kroama

Scenario 2: S1 + Toliara Sands and Sakoa Region

Scenario 3: S2 + WISCO

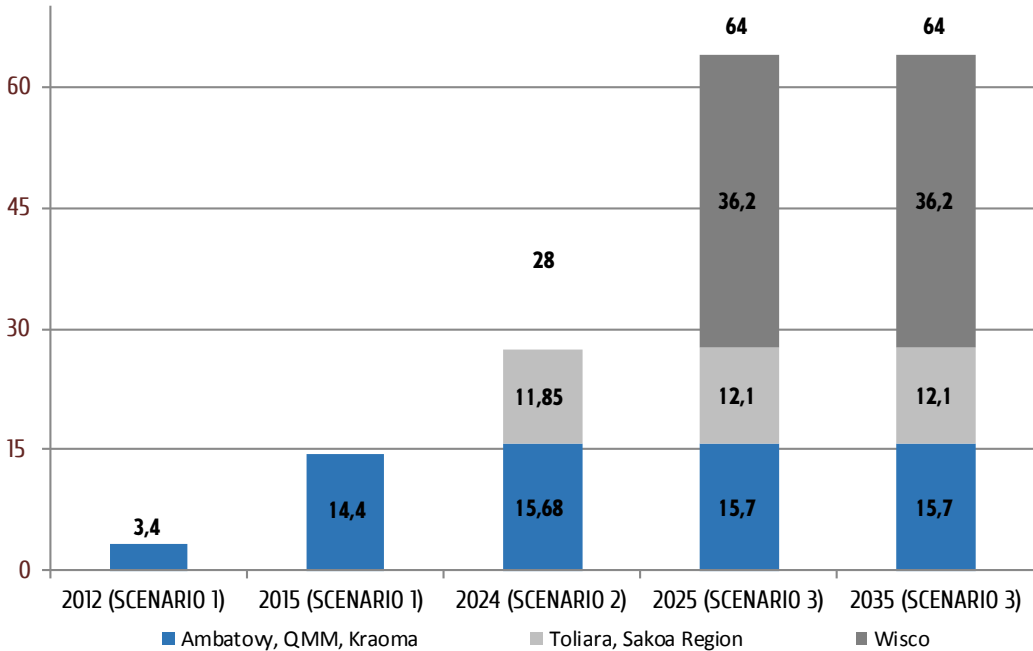
Given the challenging fiscal situation in Madagascar, capacity to develop new and tailored social programs has been significantly reduced at the local level. Royalties managed by all the relevant entities could therefore have a significant impact on local public policies (especially in the provinces of Toamasina, Toliara and Mahajanga).

3 – Corporate tax could change the order of magnitude of mining revenues once new projects reach profitability.

Existing mining projects are not expected to generate a lot of corporate income tax.

Ambatovy and QMM are not forecast to pay corporate tax above the threshold of minimum corporate tax (0.5 percent of income) during the period under analysis (2016-2035). This is largely due to the high level of investments of those two projects, as well as the

Graph 8: Total royalties from large scale mining (US\$ million)



fiscal incentives associated with investments such as depreciation, carry forward of accumulated losses, and investment tax credits. The mines are expected to generate a greater degree of fiscal income after the period of analysis when fiscal incentives decline. In the meantime, the benefits of these investments are derived from other payments (mainly royalty) but also the provision of employment, procurement, and infrastructure, as well as the strengthening of the investment climate for future growth of the large-scale mining sector.

Once new large projects become profitable and corporate tax becomes significant, annual revenues generated by mining could reach a new level.

Although corporate income taxes do not - at any time - account for more than half of mining fiscal income

under Scenario 1, they are forecast to generate more than 50 percent of fiscal income for Scenario 2 by 2035 and for Scenario 3 by 2028. By 2035 the sector could generate a total of US\$ 378 million under Scenario 3. This is a four-fold increase compared with contributions forecasted for 2025.

One needs to note that in this model, the effect of a project like Soalala tends to be over-emphasised. This is mainly due to the assumptions of high production levels combined with a relatively modest investment. In turn, it illustrates the effects of these parameters on the overall contribution of an operation.

4 – State participation is not expected to generate significant dividends.

The State currently has participations in both Kraoma and QMM, however neither of them is expected to generate high levels of dividends. Kraoma's payments to the State may have been significant in the past (although they don't appear in EITI reports), but beyond 2022 State withdrawal is modelled to cease with the mine reaching the end of its life. QMM is not projected to result in State withdrawal for the period of analysis due to carry forward of forecast losses.

However withholding tax on dividends could be significant and achieve the same fiscal effect as state direct participation in the long run. A project like Wisco reaching profitability with a relatively limited investment (scenario 3) would mean a substantial increase in fiscal contribution. In 2035, the sector could generate US\$ 378 million. Corporate taxes make up a large portion of the total fiscal income contributing US\$ 212 million (56 percent of the total) but the next significant income would come from withholding taxes on dividends, ahead of royalties (21 percent and 17 percent of total, respectively).

RECOMMENDATIONS

Assess the merit of revising the mining fiscal regime

A country's fiscal regime for mining should be simple, predictable, and transparent. It should ensure a fair distribution between mining companies and Government of the economic benefits derived from mineral resources, with fiscal rules that are complemented by an efficient and transparent tax administration.

Madagascar's fiscal regime has achieved its aim of attracting mining investments, if one considers the early stage of the mining industry, the recent political

context, political risk, quality of infrastructure, and type and quality of mineral resources. The legal framework, tax and royalty regime for mining development in Madagascar (mining code-general regime; LGIM regime; and QMM convention) is a composite model based on different norms and rules according to different needs and State objectives in different time-periods. However, in the context of the recent political instability in Madagascar, the legal and tax framework for mining development has proved to be a competitive tool from the perspective of foreign mining investment in the country. The regime has allowed the materialization of significant mining investment amounting to US\$ 8.1 billion in a relatively short period (2005-2013). The magnitude of this investment can be compared to 'initial foreign mining investments' in other mining countries in the 1990s (e.g. Botswana, Peru or Chile).

Madagascar now needs to consider whether the current mining policy regime and fiscal settings are suited to seize the opportunities of the next generation of mining investment. For example, research fiscal forecasts revealed that royalties are the predominant means of securing revenue in the early stages of investment as rapid cost recovery and low rates of income tax limit fiscal revenues. Compared to other countries in the region, Madagascar's royalty rate is very competitive and in fact one of the lowest. Government should carefully assess if an increase of the royalty rates can increase revenues while maintaining competitiveness at an appropriate level. As the royalty rate directly impacts cut-off grade, level of reserves and mine life, it should be modelled for future mines on the basis of available information as well as for theoretical "standard" mines for the purpose of benchmarking. Similarly, Government should explore whether incentives such as income tax discount for in-country beneficiation are still needed or relevant. Proposals to restrict the export of unprocessed commodities and require downstream value addition could limit fiscal income by deterring mining investment and generating large tax incentives from downstream capital investments that delay income

tax payments for long periods. Capturing upstream value addition can be an equally important source of development potential.

Any revision should be based on detailed analysis as well as proper modeling. For example, the strength of the current LGIM regime is that it is legislated and not negotiated project by project. However it includes incentives that may no longer be appropriate. The costs and benefits of investment tax credits (ITCs) should typically be reviewed. Under the LGIM, ITCs can be realised at any time, with the effect of further delaying income tax payments. Consideration could be given to removing this incentive or limiting the timing of realisation of ITCs to year 6-10 of operations (as is the case with QMM).

Finally, any revisions of the fiscal regime should respect existing stability clauses to maintain investor confidence. An important driver of growth in the sector will be the identification of world class ore bodies. While commodity markets and exploration spending internationally are in a period of decline, support and incentives for exploration will be crucial. Measures that encourage political stability will also have an impact on investor decision-making.

Support the EITI and enhance public information on mining fiscal revenues

The EITI in Madagascar represents a unique opportunity to promote transparency in the sector but it also requires continued support. The EITI has performed as a platform to promote transparency in the extractive industry even during the difficult days of the transition. However, despite communication efforts from the Government, mining companies and civil society organizations, there is a clear need for more information and understanding of the real contribution of mining to the local and national economies. The new EITI standard, which now goes beyond the reconciliation process, is a great opportunity to extend the dialogue on other dimensions of transparency

in the sector, like management of mining titles or distribution of mining royalties. It should now include contextual information, such as production, employment, etc. It should receive continuous support both from Government and development partners / donors.

Given the strategic importance and political sensitivities, clear information about public institutions and state owned companies should be made public. EITI reports, typically, should disclose and justify payments related to State participation (dividends).

Set structural rules for allocation of mining fiscal revenue

As mining revenues grow, and in consideration of the cyclical nature of commodity prices, the Government should consider adopting revenue management mechanisms, especially at the local level. In particular, establishing a consensus formula for royalty distribution at the commune level has been an ongoing challenge. Royalties have been distributed to the communes where mine areas are located. However, there are arguments for extending this distribution to other communes: i) mining activities make use of different industrial facilities and associated infrastructure beyond the communes where the mine is located; and ii) the socioeconomic effects of mining activity also extend beyond these communes. The Ministry of Mines and Petroleum should publicise the February 2014 decree to reform the local distribution of royalties as it tries to address this challenge. Also, in line with the ongoing debate on the optimal way to share and manage royalties around the Ambatovy project, the government should consider whether the existing rule is viable in other circumstances, and whether specific mechanisms should be set up at the local/regional level. These could include trust funds or foundations for strategic long-term investments, and would help avoid over-reliance on cyclical mining revenues for recurrent spending. Governance of such mechanisms would have to be transparent, efficient and inclusive.

Enhance capacity to administer and manage revenues at the national and local levels

It is imperative that the Ministry of Mines and Petroleum and the Ministry of Finance have a complete and in-depth understanding of the mining tax regime in Madagascar, and develop internal capacities to collect, control, monitor and evaluate mining taxes and royalties. Opportunities should be sought for public officials to gain experience from regulators in other countries with a history of mining development. Skills will need to be developed to facilitate and regulate development across the ‘financial mining cycle’ (investment; construction; capital import; pre-stripping;

production; processing; inventory; and exports, among others).

Local capacities, resources and policies also need to be enhanced to improve the collection, management and investment of royalties by communes, regions and provinces. Learning from the participatory budgeting pilot projects, the training could be developed for local governments, such as basic financial literacy and business administration and setting up administrative infrastructure (including bank accounts). Development programs require skills in project management, communication, inclusivity, governance, and the design of trusts and funds for equitable and sustained social development.



SECTION 4

LOCAL PROCUREMENT AND ECONOMIC LINKAGES



The mining industry's demand for goods and services presents an opportunity for the growth of local businesses in Madagascar. If well planned, the mining sector can create positive links with a range of economic sectors and suppliers with different operational, administrative and technological capacities. Both Ambatovy and QMM have supported local procurement and set an encouraging standard to guide future mining development. Partnerships for the provision of complementary public and private infrastructure can enhance regional development and should be a key feature of the next generation of mining projects.

KEY FINDINGS

1 – There are no explicit legal provisions requiring or incentivizing companies to develop local procurement in Madagascar, a notion that is poorly defined in-country.

In Madagascar, laws and regulations do not precisely define 'local procurement'. The term 'local' is used in different contexts as a reference to different levels, either the national level ('local'), or at the regional level (known as 'local local'). There is no consensus on the criteria used to identify local procurement. Experts have suggested that a series of criteria, including the percentage of local staff, management, and ownership, would be appropriate to adequately capture truly local entities.[†] Large-scale mining companies often refer to "local suppliers" as any enterprise registered in Madagascar, and understand "local purchases" to mean any goods and services purchased from a "local supplier. Statistics on local procurement have been provided by mining companies on this basis. Such data may obscure international suppliers registered locally in Madagascar.

2 – In compliance with international standards or voluntary initiatives, large-scale companies in Madagascar have developed significant programs to develop local procurement, with promising results on the local economy.

Although Malagasy law does not require companies to procure their goods and services locally, both QMM and

Ambatovy have their own policies to enhance business ties with the local economy. These policies include:

- ▶ Local preference for purchases and procurement.
- ▶ Training of small size local suppliers to strengthen their administrative and management capacities.
- ▶ Specialised payment arrangements for small size local suppliers.

These corporate efforts, sometimes with the collaboration of international organizations (such as GIZ in the case of QMM), aim to establish long term relationships with local suppliers and enhance inclusive development beyond the direct economic benefits on the economy at the national and regional level.

CARA (Anosy Regional Affairs Centre of QMM) and ALBI (Ambatovy Local Business Initiative) are two specific corporate initiatives to develop and support local suppliers. In 2012, QMM spent around US\$ 12 million in direct purchases linked to local suppliers and organized training programs for 335 local suppliers. Ambatovy used more than 700 small and medium-sized enterprises across 40 sectors in 2013. The company's database references 3,500 businesses, including more than 2,700 local companies used by Ambatovy and its subcontractors.¹² A report for the Chamber of Mines found that QMM has a database of 900 suppliers with 300 active suppliers in the past 3 years¹³.

¹² Ambatovy, 2014. Local suppliers. Online resource: <http://www.ambatovy.com/docs/?p=439>. Accessed: 3 November 2014.

¹³ Ramanoara, Georges. 2013. Appui au Groupe de Travail sur le Contenu Local (GTCL) de la Chambre des Mines de Madagascar

The sectors with the most potential for linkages with mining include:

- ▶ vehicle rentals and transportation
- ▶ food services
- ▶ miscellaneous services (such as cleaning)
- ▶ technical assistance
- ▶ insurance
- ▶ auditing

3 – According to the model, local procurement could increase from around US\$ 200-300 million per year with the existing mines to close to a billion dollar per year under the most favourable scenario.

The model estimates that the cumulated cost of operating Ambatovy, QMM and Kraoma mines should increase from around US\$ 160 million in 2012 to US\$ 590 million in 2015. In scenario 2 and 3, this could gradually increase to US\$ 900 million and US\$ 1,8 billion respectively.

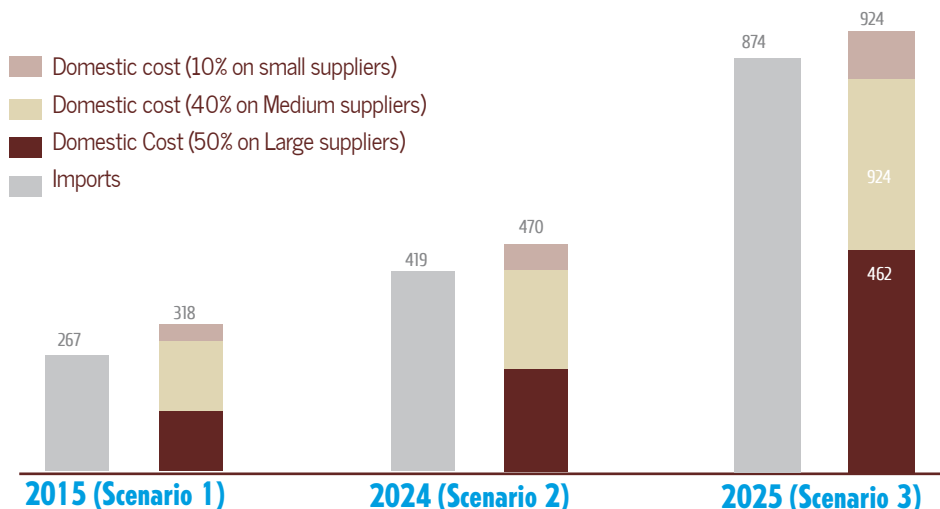
As with other mining activities worldwide, the project cost structure is a composite of different factors such as: geology and mineral resources; availability and

quality of local suppliers; skills, productivity and cost of labour; mining and processing technology; financial and investment structure; and management capacities of the mining companies.

Detailed disaggregation of costs was not made available by the companies, but Ambatovy shared that 55 percent was spent nationally. As shown in the Technical Annex, the portion of national expenditures has thus been estimated at 50 percent for the other companies. Benchmarking of national expenditure in established mining economies reveals up to 90 percent of expenditure is possible. But in developing economies that are new to mining, national procurement typically ranges between 30 to 60 percent.

This represents a demand for national goods and services that will generate business opportunities for large, middle and small sized suppliers in the country. If we assume that 50 percent of the direct local cost could be spent procuring from large sized suppliers, 40 percent from medium sized suppliers, and 10 percent from small sized suppliers (see graph 9), this equates to around US\$ 160 million (large), US\$ 130 million (medium), and US\$ 30 million (small), respectively.

Graph 9 : Estimated Total Operating Cost, by Import and Direct Domestic Operating Cost (US\$ Million)



EXPERIENCES OF THE PIONEERS IN LOCAL PROCUREMENT

'BUY LOCALLY, HIRE LOCALLY': AMBATOVY

In 2012, more than half of Ambatovy's suppliers were from Madagascar. This is the result of a corporate policy to 'Maximize business opportunities for local suppliers and local entrepreneurs' and the Ambatovy Local Business Initiative (ALBI)¹⁴.

The ALBI database lists 3,500 suppliers, 75 percent of which are national companies, who can provide goods and services to the Ambatovy. Since 2011, the database has grown by 26 percent¹⁵.

Ambatovy does not require providers to be ISO 90001 or meet other types of standards but audits them once they are registered in the company's database. Its local procurement arm, ALBI, publishes all necessary information on its website, explaining the need to better understand the activities of potential providers, check their status with respect to laws and regulations applicable in Madagascar, define their ability to meet Ambatovy's requirements, and monitor and support their progression. They have been able to audit 25 to 30 companies per month and publish some interesting statistics which show that most of the "candidates" are micro or small enterprises (with 1 to 99 employees). 75 percent of them have been found compliant in the general audit (legal status, accounting, and administrative principles) but only 46 percent and 41 percent have been so in the quality and HSE (Health, Safety and Environment) audits, respectively

Some achievements of the 'buy locally, hire locally' policy are:

- ▶ In 2012, Ambatovy purchased approximately one million kilograms of fruits and vegetables from its three purchasing centres in Toamasina and Moramanga. These centres purchase directly from local producers, thus enhancing the value of their products.
- ▶ Ambatovy bought over 12,000 uniforms from two sewing cooperatives in Toamasina - more than double what the company purchased in 2011. 99 percent of the staff from the two cooperatives is female.
- ▶ In 2012, Ambatovy received over 10,000 wooden pallets from its suppliers certified by the Forest Stewardship Council. Suppliers in Moramanga produce pallet parts which are assembled by a supplier in Toamasina. Ambatovy has the potential to purchase approximately 50,000 pallets per year to transport its refined nickel and cobalt.

¹⁴ Ambatovy. 2013. SCM/ALBI Monthly Report of 30/9/2013.

¹⁵ Ambatovy. 2014. Local suppliers. Online resource: <http://www.ambatovy.com/docs/?p=439>. Accessed: 3 November 2014

4 – Careful planning is required to design complementary public and private infrastructure

Large scale mining development in Madagascar presents an opportunity for the complementary development of public and private infrastructure. The QMM and Ambatovy projects are linked to the development of infrastructure, including: a port, roads, bridges, facilities for social service provision, a thermal power station, powerlines, and a water distribution system (see tables 5 and 6 below).

Key characteristics of infrastructure linked to mining development in Madagascar are:

1. Operational capacity of developed mining infrastructure exceeds the demand of the mining sector. This means that the assessment model cost structure for new infrastructure includes a social price.
2. Infrastructure planning and assessment includes a range of actors: State, local communities, international development agencies, and NGOs.

3. New infrastructure is part of a larger ‘socioeconomic development plan’ for the region that takes into account social needs and includes initiatives for the development of other sectors, such as tourism or agriculture.
4. Mining sector operators and the State have adopted complimentary roles to manage and operate new infrastructure. The mining sector has played a key role in the operation of new infrastructure due to limited state capacity.
5. The development of complementary infrastructure represents new opportunities for employment and local development and tangible economic benefits at the local level.

Development of public-private interest infrastructure is seen as an important socioeconomic contribution for the local communities, and helps to better ‘visualize’ the contribution of mining development at the local level.

Table 5: EXAMPLES OF COMPLEMENTARY INFRASTRUCTURE: AMBATOVY

Infrastructure	Description and public-interest goal pursued
Roads	Built and/or enhanced 100 km of roads and bridges. Objective: enhance safety, security and access for local populations to transportation corridors and markets linking plant to port.
Port	Upgrades to the Port of Toamasina, Madagascar’s largest seaport – over \$70 million invested. Objective: ensure a safer, cleaner transfer of energy products from tankers and bulk primary materials from cargo ships.
Railway	A 12 km railway line built in parallel to the existing line between the plant site and the port. Objective: create the capacity needed to move commodities efficiently between the port and the plant site.
Water Pumps	Drilling of water wells and installation of water pumps along the pipeline.

Table 6: **EXAMPLES OF COMPLEMENTARY INFRASTRUCTURE: QMM**

Infrastructure	Description and public-interest goal pursued
Port Ehoala	Construction designed to support mining development and economic development of other sectors
Tolagnaro Port	Rehabilitation to provide continuity for traffic during construction of the new port
Roads, including main RN 13	Rehabilitation to provide access to a landlocked region (90 km rehabilitated between 2005 and 2012)
Drinking Water Treatment Plant	Rehabilitation of water treatment plant, installation of new sewage system, construction of new plant to provide access to drinking water (urban population needs met)
Electricity	Purchase and installation of generator for the city to have a reliable source of electricity

RECOMMENDATIONS

Both QMM and Ambatovy have a good track record of local procurement and economic linkage. The companies have made these achievements by adhering to international standards, and training and employing local staff. Significant infrastructure has been built. Company spending through their local suppliers and its multiplier effect have been significant. However, this is not widely acknowledged in the community. Better communication and more transparent processes are needed to build public confidence in this area.

While less people are employed in the post construction phase, opportunities for employment and local procurement are likely to be ongoing and prove more sustainable. They will draw on and train people in skills that are transferable to other areas such as administration, production, occupational health and safety, services such as cleaning and maintenance and the rehabilitation of mined land (transferable skills in forestry, land maintenance and agricultural business).

Two main issues have emerged:

- ▶ Firstly, as QMM and Ambatovy move toward full production, the challenge is how further economic opportunities for local people and businesses can be leveraged from both the mining activity and new infrastructure, such as roads, the Port of Ehoala and its free trade zone, the market in Moramanga and capital works in the Port of Toamasina.
- ▶ Secondly, how can lessons learnt from QMM and Ambatovy's experience of local procurement and economic linkages inform, and form the basis of, standards, policy and regulations to encourage best practice in local procurement for the next generation of mining projects?

These issues are addressed in the following recommendations. Specific recommendations for Government, Chamber of Mines, industry or civil society are made where appropriate.

Government should encourage local procurement, local content and infrastructure linkages

The Government of Madagascar should take action to prioritise local content and procurement either in policies or regulations. Rather than adopting highly prescriptive or punitive measures, they should seek to encourage and reward best practice and processes for multi-stakeholder planning and training (local, regional and national). This could include:

- ▶ Definitions of local, as well as “local” vs. “local local” (referring to an even narrower area of influence), procurement using criteria such as number of local staff and ownership.
- ▶ Incentives for companies to use local procurement such as concessions on VAT for local procurement and allowable cost recovery against good performance in employing and training local people.
- ▶ Specific requirements in the Terms of Reference for Environmental Impact Assessment to assess economic impacts and linkages, and use of local procurement of goods and services and local content throughout the life of the mine.

Beyond defining targets, processes should be established to support knowledge transfer and skill development. For example, training for workplace readiness, diversification of skills and enabling local firms to adhere to ISO and other international standards.

Industry should promote best practice in local procurement, local content and fostering economic linkages

The Chamber of Mines can be a forum for industry leadership and the promotion of best practice. Knowledge and experience developed by members can be shared to influence practice across the sector. The

Chamber of Mines could enhance knowledge exchange and improve practice by:

- ▶ Establishing a Charter of Best Practice that asks member companies to demonstrate and report on local procurement and regional development.
- ▶ Take the lead in fostering public private partnerships for example with chambers of commerce to enhance local procurement strategies.
- ▶ Facilitate opportunities for continuing professional development, training and exchange between companies about best practice in local content.
- ▶ Coordinate public engagement especially in areas of mining and infrastructure development. Topics for dissemination include: tendering procedures; SME financial management and access to micro finance; quality control; ISO standards; occupational health and safety standards; workplace culture; transitioning from the informal to the formal sector.

Civil society, business organisations and development donors can support and partner with industry to advance practice. Examples include: local business associations; chambers of commerce in both the capital and the mining regions; women’s business associations; civil society platforms and donors.

Create a multi-stakeholder reference group for local procurement and local content

The Chamber of Mines, Ministries of Mines and Petroleum, Planning, Employment and Education, and Regional Government should further dialogue on key areas of local content and procurement and their relationship with human development. This multi-stakeholder reference group could work toward the creation of a strategic plan including:

- ▶ An in-depth supply and demand analysis of products that can feasibly be supplied locally, and what capacity and financial support would be needed to do so.

- ▶ Tailored approaches for micro, small and mid-size business development and import substitution.
- ▶ Coordinated planning, prior to the construction of projects and building, to enable local populations to gain employment, through training on best practice, such as QMM's intensive professional training (High Intensity Labour Force). Professional aptitude testing can help select the best candidates for training.
- ▶ Consideration of broader development objectives and local economic linkages, and preparing local communities for sustainable development that is independent from mining.
- ▶ Strategies to encourage foreign companies working in critical areas - such as heavy machinery franchise - to set up in Madagascar (especially in regional areas). Even if not locally owned their presence develops the business culture and experience at the regional level.

National planning on infrastructure development

The Government of Madagascar should coordinate with all relevant government agencies, local and regional government, to maximise the opportunities associated with future mining development.

Infrastructure development not only serves mines but also provides development corridors within the regions, opening up areas for product and people movements, and the creation of parallel economies that do not depend on extractive industries. Potential complementary infrastructure associated with prospective mining development includes: a paved highway between Toliara and Tolagnaro; upgrade of the Toliara port; and a new port or port upgrade on the West Coast. Collaborative planning is needed with the mining industry and technical specialists as projects are designed.

SECTION 5

EMPLOYMENT



KEY FINDINGS

1 – While mining is not a labour intensive sector in relative terms, more than 12,500 people are directly employed by mining companies in Madagascar.

According to the national survey on formal employment, 12,500 individuals were directly hired in the mining industry in 2012, which represented 9 percent of the total workforce in the industry and 2 percent of national employment. Such figures include companies that are not covered in the study: quarrying of industrial stones and minerals, including cement, small formal exploitation of precious and semi-precious stones as well as exploration companies. Of course, a much larger number of people is informally involved in full-time or seasonal artisanal mining of gold and stones and is impossible to account for with certainty. Some estimates even reach as much as 500,000 people throughout the country.

The research includes only a small portion of that labour force but one which may represent higher salaries and qualifications. Current large-scale mining projects in Madagascar (Scenario 1) operating at full capacity provide direct employment for 4,200 people (see table 7). Employment in those operations is forecast to remain steady unless production decreases.

Direct employment associated with Scenario 2 is forecast to increase to around 5,000 by 2025, largely due to the potential for the Sakoa Region projects to start operating at full capacity. Scenario 1 projects, however, are still expected to dominate employment during this period. Scenario 3 is forecast to double direct employment potential to more than 10,000 jobs after 2025 (and possibly much more during the construction phase, when a higher number of people is usually employed).

TABLE 7 : DIRECT EMPLOYMENT BY SCENARIO

(At full capacity)

	2015		2023			2024			2025-2035			
	Scenario	Total	Scenarios		Total	Scenarios		Total	Scenarios			Total
	S1		S1	S2 less S1		S1	S2 less S1		S1	S2 less S1	S3 less S2	
Direct employment	4,200	4,200	3,700	200	3,900	3,700	1,250	4,950	3,700	1,250	6,000	10,950
Percent of total	100%	100%	95%	5%	100%	75%	25%	100%	34%	11%	55%	100%

Notes:

The scenarios include the following mining activities:

Scenario 1: QMM, Ambatovy and Kroama

Scenario 2: S1 + Toliara Sands and Sakoa Region

Scenario 3: S2 + WISCO

Construction jobs not included.

2 – Large scale mining generates a large number of indirect employments and higher average salaries

Large scale mining is supported by a wide range of businesses in Madagascar. Modelling of indirect employment in this study has assumed that three rounds of suppliers could benefit from the total domestic cost of large scale mining. Each round of supplier is expected to create its own jobs. To estimate jobs created by the mining sector and linked suppliers, the study has used the salaries generated by mining in relation to base salaries in Madagascar.

On the one hand, higher salaries associated with mining sector activities provide greater opportunities for mining suppliers and local spending. On the other hand, unusually high salary levels can cause inflation, inequality, social tensions and economic disruptions, primarily affecting the poorest populations.

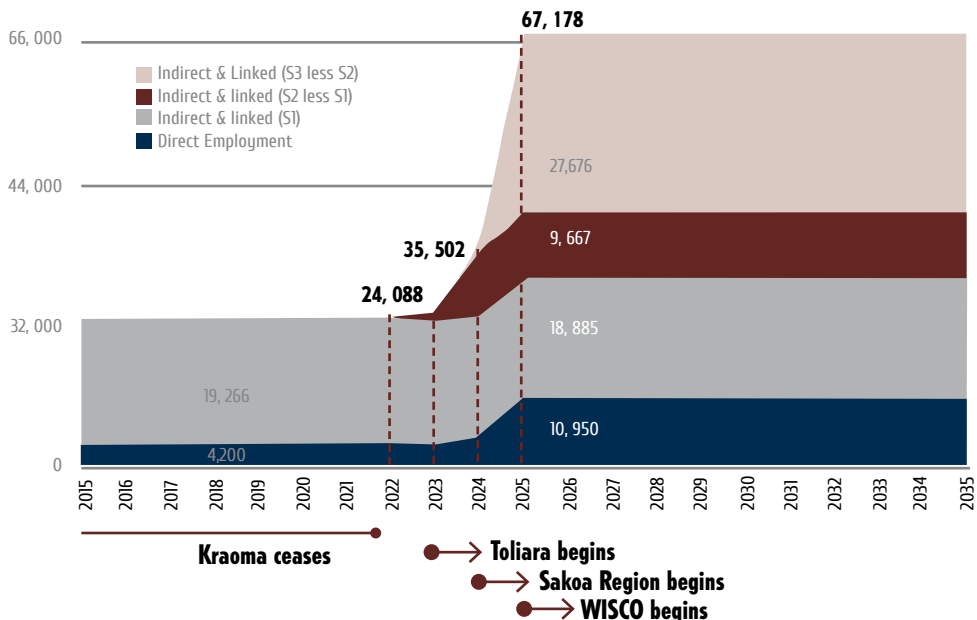
Under the assumptions detailed in the Technical Annex, it is estimated that current projects operating at full

capacity can create up to 20,000 indirect and linked jobs in 2015, in addition to direct mining employment. This brings the total of direct, indirect and linked employees to around 24,000.

As with direct employment, it is expected that indirect and linked employment associated with the additional Scenario 2 projects (Toliara Sands and Sakoa Region) will be generated over different time periods depending on the start of their full capacity production. In addition to the direct jobs created, mining is therefore forecast to provide more than 30,000 direct, indirect and linked jobs under Scenario 2.

During the period 2025- 2035, the potential full employment effect of all the large scale mining projects studied (Scenario 3) is forecast to be realised. Therefore as with direct employment, the indirect and linked employment created is forecast to almost double. Based on the most optimistic scenario, mining has the potential to lead to the creation of 65,000 direct, indirect and linked employments (see graph 10).

Grphe 10 : Total direct, indirect and linked employment by year mining activities at full capacity



QMM

QMM is supporting accessibility and quality of education through programs including scholarships, literacy (in 2012, 178 young people participated), civil education, technical training and leadership.

In 2012, the company completed 33,518 hours of training in technical health, safety, environmental language, leadership and other skills.

QMM implements the Integrated Talent Management System (SIGT) to support the management of employee performance, as well as development of local skills to create a pool of local expertise. The company also has a scholarship program, Rio Tinto for Education (RISE) in partnership with Pact Madagascar which is expected to deliver about 1,300 scholarships in primary, secondary, and university levels.

QMM is also currently supporting entrepreneurship training for local suppliers under the CARA program, which trained 278 people in 2011 and 335 people in 2012.

AMBATOVY

Ambatovy has reported training enrolments in 2009-2011 in areas such as health and safety, language, office and administration software, area and vender specific training, operators training, and skilled maintenance training in trades including electricians, instrument technicians, millwrights, welders and pipefitters.

The company also launched the Ambatovy Leadership Development Program (ALDP) and a Mentorship Program to support the transfer of knowledge and experience as well as career advancement.

With respect to preparing the local workforce for mining employment, Ambatovy has a Technical Excellence Program (PEXT) which offers 18 months of training and a two-month internship for recent high-school graduates in the Atsinanana Region. Under this program, the company reported its first wave of 43 students in 2011 which more than doubled to 98 students in 2012.



3 – The large scale mines currently operating have provided opportunities for training and skills development and prioritised the employment of Malagasy citizens.

In a context where 75 to 85 percent of the Malagasy population is located in rural areas, and only 15 percent and 3 percent of the labour force hold secondary and tertiary education qualifications, respectively, training and skills development is an important contribution to local development. For some people, the training initiatives offered by the mining industry are the only opportunity for advanced professional training.

The Government expects the mining sector to prioritise employment and training of Malagasy citizens. Chapter 4 of the LGIM states that mining companies must give priority to Malagasy nationals (Article 103) and put in place a training plan that equips and enables Malagasies to take up employment at various levels of company activities (Article 104).

To meet this expectation, over 84 percent of Ambatovy's direct employees and contract workers, and 94 percent of QMM's direct employees (excluding Antananarivo office staff) are nationals.



RECOMMENDATIONS

While the mining sector is not considered labour intensive compared with other sectors of the economy, it provides an opportunity to maximise development outcomes. Partnerships between the mining industry and Government offer the best opportunity to simultaneously train a professional workforce with the skills for employment in mining and to strengthen the education sector for broader development outcomes.

Strengthen the secondary and tertiary education systems

Madagascar has recently demonstrated a decline in education scores according to human development reports. Strengthening access to, and the quality of, secondary and tertiary education is important for the success of the mining industry. Literacy skills are a key driver of development and UNESCO has recently illustrated the powerful impact of using resource wealth to improve education across a range of resource rich countries, turning the resource curse into a blessing for education (Education for All Global Monitoring Report, Policy Paper 08, UNESCO, 2013). The Ministry of Education and the Chamber of Mines should identify synergies for further development of basic educational outcomes that can meet the future demand of the mining workforce.

Continue to develop the vocational skills of local labour force

The Chamber of Mines and individual mining companies should continue working with government agencies at multiple levels, as well as development partners, to support the establishment of technical trade schools, and targeted vocational programs (especially in areas of skills shortage) within existing institutions. The mining industry is best placed to provide start-up support and continued enrolments but there is an important role for the public sector to strengthen independent management of the education system. Due to the short lived nature of

the construction phase and associated workforce, pre-employment training programs for future mines should begin local training early and focus on the skills needed for the permanent workforce.

Encourage industry leadership and industry standards to promote best practice in local employment

The Chamber of Mines can be a forum for industry leadership and the promotion of best practice. Knowledge and experience developed by members can be shared to influence practice across the sector. The Chamber of Mines could enhance knowledge exchange and improve the future practice of the next generation of mines by establishing a Charter of Best Practice, that asks member companies to demonstrate and report on local employment and training efforts. Key elements of leading practice in local employment include: local recruitment priority; pre-employment programs; contracting and wages; long term and multi-skills training and development programs; diversity and equal opportunity; and health and safety.

Support local business incubation to maximize the linked employment benefit of mining

Innovative programs for the incubation of mining service businesses can enhance the potential employment outcomes of mining and foster 'local local' procurement. Programs using enterprise facilitation, micro-financing, savings and investment forums, and coaching on financial management and business development could be supported by local government in mining regions with the assistance of development partners and the mining industry. Cooperatives have also proven successful in other African countries such as Rwanda and Ethiopia.



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