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Synergising and Optimising Mineral Infrastructure in Regional Development Strategies

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ABSTRACT

The mineral "super cycle" of the past decade, as a result of exceptionally high prices of commodities, has encouraged many mining companies to embark on very large mining projects, including in "frontier" countries `once considered too distant or too risky to invest in. Besides weak business environments, institutions, and regulatory frameworks, one of the biggest challenges encountered by mining companies, in particular by "first movers," is the absence of appropriate or existing infrastructures, especially in transport, energy, and logistics, and the limited track record of engagement in effective partnerships with the public sector to construct such infrastructures. It is widely recognised that poor and insufficient infrastructure provisions are major obstacles to factor mobility, productivity, and competitiveness. Several recent studies have highlighted the extent of current gaps (in physical and financial terms) and have quantified their negative impacts on growth and the business environment in several parts of the developing world. In Africa, the challenge is particularly daunting.

To address this, it is estimated that the world will require US$57 trillion in terms of infrastructure investment between 2013 and 2030 to sustain gross domestic product (GDP) growth. This implies that investments will have to increase by almost 60 percent over the next 18 years. In Sub-Saharan Africa (SSA) alone, the World Bank estimates that needs would amount to US$93 billion a year. These figures are probably just an average guess. While they reflect what would be needed to maintain and upgrade existing infrastructures in developed economies and meet the needs of developing countries, they, however, do not take fully into account the broader ambitions and upcoming challenges of emerging economies. Indeed, infrastructure provision is not sufficient in itself. It can only be transformative if it is well connected and integrated into territorial development and if it can contribute to stimulate trade and investment, business development, and maximise the potential of economic sectors. For this reason, infrastructure development that arises from large mining projects provides a unique opportunity for poorly endowed countries to permanently change their state of affairs. To address the general weaknesses in the infrastructure sector and reverse their impact on overall economic development, there is a strong case to be made to leverage, share, and optimise the use of mineral infrastructures for broad-based economic activities. This is not only relevant at the national level, where smart spatial linkages can unlock access to other economic actors and sectors, but also more broadly at the regional level, to better connect markets and improve the movements of goods, services, and people. Countries can derive significant positive externalities from the large economic potential that can be released from wider use of mineral infrastructures. On their side, companies can share their (high) costs and manage capital exposure risks by partnering with governments and other stakeholders to achieve this objective. The purpose of this paper is to explore the potential of mineral infrastructures as "anchors" for economic development and cross-border cooperation. It proposes some policy recommendations to make better use of existing frameworks to foster the utilisation of mineral infrastructures. It also points out that in some cases, rules may not be the most appropriate way to stimulate broader economic development out of resource infrastructures. Sometimes incentives and strategic partnerships are more efficient and effective ways to realise certain objectives. For example, governments need to coordinate their efforts with private sector actors, both from the mining industry and from other economic sectors, to build synergies across economic objectives. Co-locating infrastructures has the potential to create scale economies, address different types of shortages at the same time, and reduce costs.

CONTENTS

LIST OF ABBREVIATIONS

ADB	Asian Development Bank
CAADP	Comprehensive Africa Agriculture Development Programme
EAC	East African Community
EU	European Union
GATS	General Agreement on Trade in Services
GDP	gross domestic product
GMS	Greater Mekong Sub-region
GPA	Government Procurement Agreement
ICT	information and communication technology
IFIs	international financial institutions
MDC	Maputo Development Corridor
NEPAD	New Partnership for Africa's Development
PIDA	Programme for Infrastructure Development in Africa
RECs	regional economic communities
SADC	Southern African Development Community
SDGs	Sustainable Development Goals
SMEs	small and medium-sized enterprises
SSA	Sub-Saharan Africa
TiSA	Trade in Services Agreement
WTO	World Trade Organization

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INTRODUCTION

The mineral "super cycle" of the past decade, as a result of exceptionally high prices of commodities, has encouraged many mining companies to embark on very large mining projects, including in "frontier" countries once considered too distant or too risky to invest in.[1] Besides weak business environments, institutions, and regulatory frameworks, one of the biggest challenges encountered by mining companies, in particular by "first movers," is the absence of appropriate or existing infrastructures, especially in transport, energy, and logistics, and the limited track record of engagement in effective partnerships with the public sector to construct such infrastructures (IFC 2013).

It is widely recognised that poor and insufficient infrastructure provisions are major obstacles to factor mobility, productivity, and competitiveness.[2] Several recent studies (Foster and Briceno-Garmendia 2010; OECD 2012; Banerjee et al. 2015) have highlighted the extent of current gaps (in physical and financial terms) and have quantified their negative impacts on growth and the business environment in several parts of the developing world. In Africa, the challenge is particularly daunting. The continent lags behind all other developing countries in most (hard and soft) infrastructures, both in quality and physical provision.

To address this, it is estimated that the world will require US$57 trillion in terms of infrastructure investment between 2013 and 2030 to sustain gross domestic product (GDP) growth. This implies that investments will have to increase by almost 60 percent over the next 18 years (McKinsey 2013). In Sub-Saharan Africa (SSA) alone, the World Bank estimates that needs would amount to US$93 billion a year (Foster and Briceno-Garmendia 2010).

These figures are probably just an average guess. While they reflect what would be needed to maintain and upgrade existing infrastructures in developed economies and meet the needs of developing countries, they, however, do not take fully into account the broader ambitions and upcoming challenges of emerging economies.[3] Indeed, infrastructure provision is not sufficient in itself. It can only be transformative if it is well connected and integrated into territorial development and if it can contribute to stimulate trade and investment, business development, and maximise the potential of economic sectors. As stated by the Asian Development Bank (ADB), building infrastructure "from nowhere to nowhere through nowhere would never be meaningful" (2011: 3).

For this reason, infrastructure development that arises from large mining projects is of particular importance, and provides a unique opportunity for poorly endowed countries to permanently change their state of affairs. To address the general weaknesses in the infrastructure sector and reverse their impact on overall economic development, there is a strong case to be made to leverage, share, and optimise the use of mineral infrastructures for broad-based economic activities. This is not only relevant at the national level, where smart spatial linkages can unlock access to other economic actors and sectors, but also more broadly at the regional level, to better connect markets and improve the movements of goods, services, and people. Countries can derive significant positive externalities from the large economic potential that can be released from wider use of mineral infrastructures.[4] On their side, companies can share their (high) costs and manage capital exposure risks by partnering with governments and other stakeholders (such as financial institutions and other economic actors) to achieve this objective.

The purpose of this paper is to explore the potential of mineral infrastructures as "anchors" for economic development and cross-border cooperation. It proposes some policy recommendations to make better use of existing frameworks to foster the utilisation of mineral infrastructures.

MINERAL INFRASTRUCTURES: WHY THEY MATTER

SOME FACTS AND FIGURES

Well-designed infrastructures are the backbone of an economy. They are indispensable to the functioning of businesses and to enable the development of other economic sectors, notably by linking producers to markets,

1 Frontier countries are defined as countries with gross domestic product (GDP) per capita of less than US$1,200 and/or conflict or post-conflict low or middle-income countries, and include Guinea, Sierra Leone, Mongolia, Mozambique, and Afghanistan (IFC 2013).

2 In this paper, infrastructure covers physical infrastructure (rail, roads, ports, bridges, energy, pipelines, and so on) and soft infrastructure (telecommunications, logistics, and the institutions required to maintain physical infrastructures in place, and the like).

3 Such as the construction boom to meet the needs of the growing population, and rapid urbanisation and industrialisation that will add to the pressure on infrastructure.

4 These include enhanced economic growth as a result of improved competitiveness, factor mobility, greater land value, and so on.

smoothing access to goods and services, thinning borders, and lowering transaction and trade costs. It is estimated that poor provision of infrastructures, fragmented borders, and weak networks increase the cost of transport by adding up to 75 percent to the price of goods (AfDB 2014), inflating the cost of doing business, and lowering firms' productivity by approximately 40 percent (Escribano et al. 2008).

Africa, where investment in infrastructure has accounted for more than half the recent improvement in economic growth, continues to suffer from chronic infrastructure deficits and deficiencies, both in quality and in quantity, even compared to other developing countries, as revealed in Table 1. The cost of infrastructure is also much higher in SSA than in other developing countries, as can be seen from Table 2. Together, underdeveloped infrastructures are estimated to skim off at least 2 percent of Africa's growth every year, holding back the capacity of the continent to catch up on development.

While better infrastructure provision is critical for all economic sectors in low-income, resource-rich countries, the (growing) extractive sector is particularly demanding. Investment in infrastructure represents an important share of companies' capital spending on resource projects. It is estimated that almost 40 percent of capital expenditure in bulk mineral projects is spent on transport infrastructure, of which a significant 80 percent accrues to rail and ports (McKinsey 2013). Spending is often even higher in "greenfield" projects (often in remote areas) in low-income countries where convenient infrastructure facilities are non-existent. Energy is the second-most important determinant of a sector's productivity, and soft infrastructure barriers act as significant deterrents to countries' economic performance,

TABLE 1:

Sub-Saharan Africa's Infrastructure Regional Outlook Compared to Other Developing Countries

Note: Road density is measured in km per 100 square km of arable land; telephone density in lines per 1,000 population; generation capacity in megawatt (MW) per million population.
Source: World Bank 2010; Yepes et al. 2008.

	Sub-Saharan Africa								Other developing countries	
	ECOWAS	EAC	SADC	Central Africa	Middle-income	Resource-rich	Low-income (non fragile)	Low-income (fragile)	Low-income	Middle-income
Roads										
Paved roads density	38	29	92	4	284	14	14	55	134	461
Total roads	144	362	193	44	381	66	106	197	29	106
Energy										
Generation capacity	31	16	176	47	293	67	39	40	326	648
Electricity coverage	18	6	24	21	37	26	16	12	41	88
Information and communication technology										
Main line density	28	6	80	13	142	14	7	16	38	252
Mobile density	72	46	133	84	277	105	46	53	55	557
Internet density	2	2	4	1	8.2	1.6	1.2	3.1	29	235

TABLE 2:

Cost of Infrastructure: Sub-Saharan Africa Compared

Note: Ranges reflect rates in different countries and various consumption levels.
Source: World Bank 2010.

Sector tariff	Sub-Saharan Africa (Av.)	Other developing countries (Av.)
Power ($ per kw/hr)	0.02 – 0.46	0.05 – 0.10
Water ($ per cubic meter)	0.86 – 6.56	0.03 – 0.60
Road freight ($ per ton-meter)	0.04 – 0.14	0.01 – 0.04
Mobile phone ($ per basket per month)	2.60 – 21.00	9.90
International dial up service ($ per month)	6.70 – 148.00	11.00

preventing them from building on regional synergies to achieve economies of scale.[5]

While the extractive sector requires significant infrastructure investments at different phases of operations, resource-rich countries have the lowest quality infrastructure, as can be seen in Table 1 (highlighted in red). This poor record has not helped diversification away from the heavy concentration on commodities.

The extractive sector is one of the largest consumers, providers, and contractors of large-scale hard infrastructure. The industry is expected to invest up to US$2 trillion by 2030 to meet its needs and to fill in gaps in countries where sufficient quality infrastructure is not available.[6] Estimates suggest that up to 70 percent of mineral infrastructure could be shared among other extractive operators themselves, hence optimising the use of and improving the productivity of infrastructure, including across countries. The remaining 30 percent (in particular, roads and power generation) can be shared with other non-extractive users (McKinsey 2013). As a result, there is a compelling case to argue for more productive use of their capital stock and for better integration of mineral infrastructure development for broader economic benefits at the national and regional levels, notably by sharing or opening the use of these infrastructures (Toledano et al. 2014).

Given the huge infrastructure deficits in Africa and their high costs, there are significant and untapped opportunities of using the extractive sector as an "anchor customer" to produce and release infrastructure resources to meet the needs of other customers.[7] As shown in Table 1, the two sectors where deficits are more evident are power (Africa has the lowest connectivity in the world)[8] and transport, two priority infrastructure projects for the extractive sector. To bridge this deficit, in 2014, in 257 construction projects in Africa, 40 percent of their value was invested in transport infrastructure, and 39 percent in the energy and power sector (Deloitte 2014).

FROM BENEFIT SHARING TO BENEFIT ENHANCEMENT

To be beneficial for long-term inclusive and sustainable development, the use of mineral infrastructures must be better optimised. Synergies must be enhanced, prioritised, and sequenced with other economic activities, at the national and regional levels. The timing of project development is also of fundamental importance. Linkages to other economic activities must be conceived and designed in the early stages of infrastructure development to maximise the use of existing assets, increase returns on last-mile infrastructure connectivity, and enhance the efficiency of resource utilisation. Proper timing and planning also helps to avoid hiccups that may arise from shifting political agendas (McKinsey 2014).

As visualised in Figure 1, there is scope to "grow" this synergy and catalyse broader economic development, both nationally and regionally, to benefit a larger range of stakeholders. This can be done in several ways. First, where possible, connecting producers that operate along mineral corridors (for transport infrastructure) through last-mile or feeder infrastructure projects can widen the scope of the anchor infrastructure. For instance, in countries or regions with significant agriculture potential, there are significant benefits in connecting last-mile mineral infrastructure to farm-to-market roads, provincial road networks, or in linking agri-business to other food supply chain-supporting infrastructure such as storage or warehousing (Nogales 2014). In Brazil, multi-user infrastructure along the Northern Corridor, initially conceived to serve the extractive sector, has enabled the opening up of new agricultural frontiers, allowing agriculture-rich regions such as Mato Grosso to expand its grain production capacity and lower the cost of transportation to the port.

Second, sharing the use of infrastructure with other economic actors has enormous network effects and can be important to fostering innovation, stimulating trade and investment, enhancing competitiveness, and facilitating the development of other economic activities essential for long-term economic diversification. This can contribute to reversing the present situation where profitability of production in most economic sectors is held back by the current state of infrastructure.

Third, where feasible, mineral infrastructures should have inclusive, multi-modal, multi-purpose, multi-client, and multi-functional usages to trigger investment opportunities in other economic sectors. In the areas surrounding extractive operations, they can be an important driver to "dis-enclave" mining communities, improve their quality of life, and facilitate linkages that support different types of local economic activities. For many governments, it is also an opportunity to build long-term strategic partnerships with mining companies, make better use of private sector capital, and benefit from the spillover effects of linking other economic actors to mineral infrastructure.

5 These include poor logistics, weak institutions, unclear policies, and inadequate regulatory frameworks, and lack of capacity to implement reforms, thick borders, and cumbersome customs procedures.

6 These include rail, road, port, power, pipelines, and water facilities constructed by extractive industries for specific projects.

7 Anchor customers are high-volume customers that provide a captive source or demand and a consistent source of revenues (World Bank 2015).

8 It consumes about 3 percent of global commercial energy for about 13 percent of the world's population. Some 30 countries face regular power shortages, hence paying (too) high premiums for emergency power. SSA largely falls short in energy provisions, behind all other regions. It has an installed generating capacity of only 80 gigawatt (GW) (equivalent to that of Spain) and slightly more than 50 percent (45 GW) is generated by South Africa alone, followed at a distance by Nigeria (6 GW). Development and productivity of the industrial sector have suffered from power shortages. The extractive sector is very energy intensive.

There are very few examples of successful greenfield, multi-client, multi-user, mining-related infrastructure private-public partnerships in the world and only one in SSA—the port of Ehoala in Fort Dauphin in Madagascar, which is designed for multi-purpose use, but does not have any in place yet. Brownfield projects have been relatively more successful, as is the case in Sierra Leone (Merampa-Pepel) and South Africa (Richards Bay), where the shared use of infrastructure is realised (IFC 2013).

However, for this to happen, a certain number of conditions must be met. These include, among others, (i) dealing with the politics of infrastructure; (ii) having a stable and predictable regulatory framework, functioning institutions, and a well-defined policy focus at the national and regional levels to facilitate mineral infrastructure investments and to enhance benefits beyond the mining sector; (iii) addressing a myriad of challenges linked to the financing of mineral infrastructure (IFC 2013); and (iv) facilitating linkages among various economic sectors so that businesses can tap into opportunities.

The potential to leverage the use of mineral infrastructures also depends on the type of mining operations, proximity to settlements, and commodity types. Indeed, for the sharing of such infrastructures to be sustainable, it must be technically feasible (for example, transporting minerals, goods, or passengers has different requirements); financially sustainable (financial constructs may become more complex as all parties need returns on their investments); and commercially viable (that is, closely linked to solid anchor production networks with scale economies and profitable for extractive companies). If these do not exist, the nodes that are expected to be linked to such infrastructure and high-density centres of activities must be substantive or have sufficiently large potential (and a critical mass of actors) to amplify economic spillovers.

Connecting other economic actors to such infrastructures, in particular when they are privately financed, is a complex issue because unless extractive industries have incentives to share their infrastructure, there is a natural tendency to tailor these to fit their exclusive use. While this paper does not discuss the complexities of financing infrastructure or negotiating sharing arrangements, it is acknowledged that these questions define, to a large degree, the extent to which infrastructure may be available for broader economic use (see IFC 2013).

Finally, in many developing countries, the exiguity of domestic markets calls for a coherent and coordinated regional approach to develop cost-effective transnational projects.[9] This is a critical factor in the success of regional integration. Improved infrastructure networks and regional integration are mutually reinforcing. It helps to link markets, create nodal centres, and facilitate the movement of goods and people across borders. For instance, several corridor initiatives have been promoted in the sub-Saharan African region (see Mtegha et al. 2012), and they are a common feature in Asia and Latin America (see ADB 2012; Nogales 2014). An interesting case, although not extractives related, is the Nacala Road Corridor Development Project that runs through Malawi, Zambia, and Mozambique. The objective is to improve connectivity within and across countries and to stimulate economic activities in agriculture, agro-forestry, fisheries, and tourism. Last-mile infrastructures such as feeder roads are expected to be connected to the main corridors to supply roadside markets (AfDB 2013).

9 For example, in Africa, countries are too small to develop cost-effective national infrastructure systems. The lack of scale economies and capacity to pay for services undermine investments in efficient energy plants.

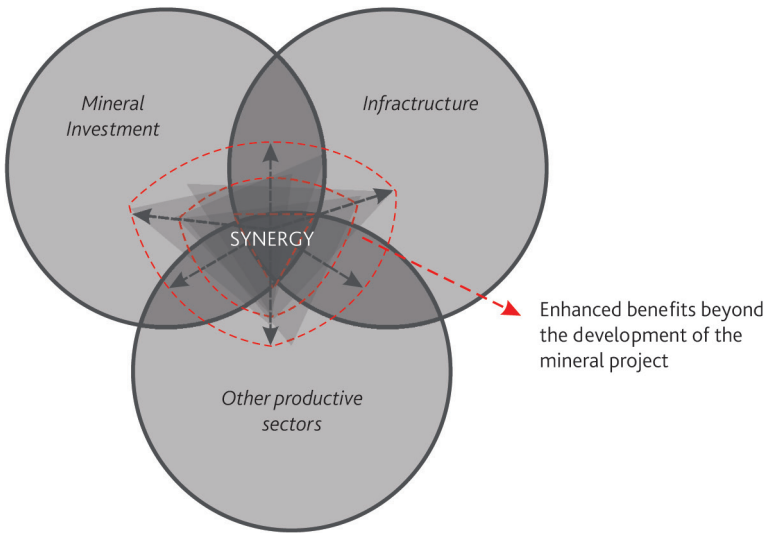

FIGURE 1:

Potential to 'Grow' Synergy among Investment, Infrastructure, and Countries' Needs

Source: Adapted from Benke (2015).

Similarly, regional energy power pools have been developed to address common needs and fix common shortfalls. While their importance to deepening the cooperation agenda is uncontested, their performance has been mixed so far.

While availability and reliability of infrastructures are critical to unlock economic opportunities across countries, efficient integration efforts that engage strongly with the political leadership; institutional effectiveness; strategic policy orientations; and regulatory and legal harmonisation will largely facilitate countries' attempts to fully harness the advantages of connecting markets.

WHERE SHARING OF INFRASTRUCTURE HAS MADE (OR CAN MAKE) A DIFFERENCE AND WHY

The importance of transnational mineral infrastructure connectivity has often been overlooked, and when it has not, its potential has been largely underexplored in the regional cooperation and integration processes of developing countries. Given the current deficits, and rising demands for infrastructure in general, enhanced regional responses have the potential to leapfrog national responses, which have proved to be costly and ineffective. Moreover, incentives to interconnect infrastructures across borders are strong. They can lead to improved reliability and accessibility, and reduced costs due to economies of scale and scope, all potentially unlocking broader economic benefits.

Yet, looking at various regional integration processes, there is (too) little evidence of where this potential has been fully tapped. The success stories show that proper timing, sequenced and integrated planning and strategic thinking are critical. This must be substantiated by effective coordination and well-targeted policy instruments, all supported by strong political will, mutual trust, and the capacity to pool significant financial resources.

Most evidence of successful integrated infrastructure projects is not always directly related to the extractive sector. However, they provide interesting insights from which lessons can be drawn for resource-related infrastructure.

The European Union (EU) is by far the region that has best managed to successfully connect its markets in the last 50 years, thanks to its effective infrastructure networks. For instance, it has put in place core network corridors through an integrated infrastructure instrument—the Connecting Europe Facility—common to transport, energy, and information and communication technology (ICT), with a strong emphasis on innovative financing and systematic exploitation of synergies. The main purpose has been to maintain the competitive edge of EU firms by removing bottlenecks, building missing border connections, and promoting modal integration and interpolarity.

Europe also successfully integrated Eastern European countries after the fall of the Berlin wall. It designed a cohesion programme to support the latter's growth and integration with the Western block.[10] Learning from experiences of countries where development of transport networks widened regional disparities instead of bridging them (Roberts et al. 2012), the EU did not want to support early infrastructure and connectivity investment programmes without developing the capacities of these regions to access larger networks and production chains at the same time (Brunner 2013). The joint cohesion policy was reinforced by a transport infrastructure investment programme that supported regional growth hubs, improving labour productivity and employment, especially for small and medium-sized enterprises (SMEs). This was particularly successful in the Baltic countries (Latvia, Estonia, and Lithuania). In less than 15 years, the integration of these economies was spectacular.

Similar experiences (though with varying degrees of success) exist in South Asia. The case of the ADB-funded Greater Mekong Sub-region (GMS) provides interesting insights on ways to create regional market linkages, notably through transport, energy, and telecommunications, especially in landlocked developing countries.[11] Again, although not triggered by mineral resource development, the region evolved progressively from being a narrow transport corridor to a multi-modal economic corridor that managed to attract investments and widen economic activities for lesser-developed areas (Nogales 2014; Brunner 2013). Despite existing challenges in trade facilitation across countries or cooperation in certain sectors such as energy, the GMS-

10 The cohesion funding is the second-largest portion of the EU budget. It was felt that if those countries were left alone to market mechanisms, growth would remain partial, incomplete, and too slow to bridge the development and technology gaps. These gaps would then create intolerable economic disparities within the EU (and with established EU members) and consequent migration and labor market upheavals that would become unmanageable.

11 The GMS corridor development effort has so far concentrated on three main corridors—(i) the East-West Economic Corridor (EWEC), running from Da Nang in Viet Nam through the Lao People's Democratic Republic (Lao PDR) and Thailand to Myanmar; (ii) the North-South Economic Corridor (NSEC), which covers the major routes running from Kunming in Yunnan, (the People's Republic of) China through the Lao PDR and Myanmar, and to Bangkok in Thailand (it has another arm that runs from Nanning in Guanxi, [the People's Republic of] China to Ha Noi and Hai Phong in Viet Nam); and (iii) the Southern Economic Corridor (SEC), which runs through the southern part of Thailand, Cambodia, and Viet Nam (ADB 2012).

integrated infrastructures helped to develop high-priority regional projects and attract significant investments along the corridors. This was supported by the implementation of a Cross Border Transport Agreement that helped simplify procedures, among others, and by the critical role played by the private sector in developing business networks along the corridor (Nogales 2014). This corridor was an important milestone in the establishment of the ASEAN Economic Community (Shrestha and Chongvilaivan 2013).

Evidence is much less prominent in resource-rich countries. One case to be highlighted is the Maputo Development Corridor (MDC) in Africa.[12] This worked well because it placed much emphasis on designing and upgrading infrastructure projects (road, rail, ports, power transmission, gas pipelines, and harbours) that connected highly productive regions (notably industrial areas around Gauteng and Limpopo provinces in South Africa) to a port (Maputo in Mozambique) with extensive private and public investments and effective logistical mechanisms to ensure implementation.[13] Key milestones included significant private sector investments and greater market opportunities in the region in various economic activities,[14] job creation, and well-functioning industrial and regional infrastructure that facilitated trade among regions. However, the success of the MDC is said to relate to its narrow scope (Byiers and Vanheukelom 2014), which makes the interests of the stakeholders involved more manageable.[15] Other resource corridors in Africa have been more disappointing due to a lack of political leadership, institutional frameworks, and sequenced planning between infrastructure development and other economic activities (see Mtegha et al. 2012).

Similar potential can be leveraged through better cooperation in the energy sector.[16] In Central America, for instance (although not resource-triggered), countries created a regional electricity market through a complex integration process of interconnections.[17] Political leadership and remarkable coordination were instrumental and supported by adequate legal and institutional frameworks (IDeAL 2014). A big project in the pipeline is the great Inga Dam in the Democratic Republic of Congo (DRC),[18] which can, in theory, have significant impact in the region. This is so far the world's largest hydropower project (a capacity of 40,000 MW),[19] with the capacity to power 40 percent of Africa (Guardian 2013); in particular, mining companies along the copper belt and in South Africa. Due to its ambitious size, the project has suffered from numerous political and financial setbacks, which have significantly delayed its development.

CHALLENGES

There are very few cases where large mineral infrastructures have been successfully integrated, shared, and optimised nationally and/or regionally. One of the challenges of doing so with brownfield infrastructures lies in their design, which were initially meant to carry resources from extracting sites

12 The Maputo Development Corridor was revitalised in 1996 and is the shortest route to an export harbour for South Africa's most industrial zones (Gauteng and Limpopo provinces). The project had the highest political support from the South African and Mozambican government, with high involvement of both the presidents of the time (Nelson Mandela and Joaquim Chisano) and extensive follow up by the ministers of transport of both countries (Mtegha et al 2012).

13 The Maputo Corridor Logistics Initiative is a private-public partnership that operates in both South Africa and Mozambique. It plays an important role in co-ordinating activities and helps to address outstanding issues that act as constraints. The initiative has assisted in facilitating co-operation, allowed for networking, and enabled the resolution of logistical and operational issues by offering a platform through which all stakeholders can engage.

14 MOZAL, the world's third largest aluminium plant was the anchor project of the MDC, natural gas pipelines were developed by South Africa's SASOL and Mozambique's ENH, and an industrial park was developed around the MOZAL area for local investors

15 Despite its success, compared to others in the African context, a number of challenges remain to be addressed. For instance, the border post does not operate (yet) on a 24-hours basis. This limits the expansion of trade volume, creates traffic, and increases transit time. Moreover, the MDC has largely benefited South African exporters—the flow of trade is unequal (with South African exports being 120 times more than Mozambican imports), and containers rarely go back full from the Mozambican side. This doubles the costs of users (Bowland and Otto 2012).

16 The energy sector has immense potential for regional cooperation given its significance in the operations strategy of extractive industries, in particular for those that involve significant processing activities. It is estimated that energy costs can represent up to 15 percent of the total cost of production of mining companies (Accenture 2012).

17 The six countries are Panama, Costa Rica, Honduras, Nicaragua, El Salvador, and Guatemala.

18 Decades of civil war, corruption, and the DRC's reputation as a failed state have limited the hydropower developments of the country's Inga Falls to two relatively small dams, built in 1972 and 1982. These, known as Inga 1 and 2, have a theoretical capacity of 1,400 MW but produce only about half their capacity.

19 Construction is planned to commence in 2017 and proponents have put forward arguments that it will provide cheaper and readily available energy to allow several African countries' industrial and manufacturing industries to take off. Yet critics say that expectations are that the project will only serve the interests of (large) mining companies at the expense of the local population (only 6 percent of the DRC is electrified) and environmental considerations. If this dam is to contribute to larger economic benefits in SSA, it has to do better that its previous sister projects. However, the track record of the Inga dams 1 and 2 is very poor in terms of contributing to economic development to even providing energy to the local population (judged cost-ineffective due to remoteness and sparse population distribution). Numerous financial partners are involved in the project and South Africa has already announced it will purchase 2,500 MW and Congolese mines will buy 1,300 MW.

to their port of departure, to be exported in raw forms (pit-to-port infrastructure). While road infrastructures can in principle be connected to other networks, provided they are close to commercially viable markets, rail infrastructure, unless conceived to accommodate passenger tracks, may be more difficult to adapt.

Transport infrastructures (and, in particular, railways) share some characteristic features of network industries—their operations are interconnected, they have significant externalities, and can provide significant economies of scale if used in an effective manner. However, the challenge is that these have very high fixed (sunk) costs, which often means that companies have no incentives to share their use. Railways are therefore run as single entities (Collier 2011) and access to the use of road infrastructure remains limited, in part to avoid free-riding.

Another challenge is linked to the ownership and financial structure of infrastructure development. In effect, the task of constructing, sharing, and funding the monumental gap in infrastructure development requires massive coordinated efforts among a range of stakeholders. In frontier countries, this is more complicated, as companies must embark on multi-billion dollar infrastructure investment projects to be able to develop their projects as host governments may not be creditworthy enough to raise finance on the capital market to provide wholly public infrastructure (IFC 2013). The options remaining are therefore entirely mining company-led, or third-party, investments. Shared use arrangements, in particular across borders, increase the complexity, risks, and costs associated with the project and hence tend to reduce its financial viability (that is, they become less bankable). This risk is higher if at the time of submitting the financing proposal of the infrastructure project, the other "users" or "clients" are not known (IFC 2013).

Some models of infrastructure sharing, if not well designed, might lead to "hold up" problems. This may be the case for existing brownfield investments, where providers may lose their bargaining power as they negotiate the terms of a sharing agreement. Similarly, once a government has entered into a contract for a new project, there is a risk that other parties to the agreement may extract rents from it.

Further, political buy-in at the regional level may sometimes be challenging. Engaging in large, cross-country projects such as infrastructure, where costs, risks, and benefits will have to be shared (not always equitably), requires a certain amount of trust among countries. It also requires making trade-offs to leave the neighbour the provision of infrastructure (which may not be politically easy to sell at home [for example, in power and water] or when a significant provision will be supplied by "fragile" states such as the DRC or Guinea).

The regional integration agenda is often still in the making or not very advanced. In these cases, it is difficult to design and implement compensation mechanisms that will ensure all participating countries and populations benefit from the projects. In particular, infrastructure development is not coordinated across countries and priorities are not always aligned in regional development plans.

A number of initiatives are in place to support the realisation of the broader economic development objectives. In Africa, the African Union, together with the UN Economic Commission for Africa, the African Development Bank, and the New Partnership for Africa's Development (NEPAD) agenda have formulated a Programme for Infrastructure Development in Africa (PIDA). The objective is to provide a coherent, coordinated, and long-term strategic vision for cost-effective infrastructure development across the African continent. It includes energy, transport (pipelines, rail, roads, and ports), water, and telecommunications connectivity. The plan has identified 51 priority projects to be initiated by 2020 (WEF 2013). These projects are very large and complex and often contain various infrastructure components (road, rail, ports), which need specific types of intervention mechanisms. These will necessitate enormous resources—human, legal, financial, coordination, and so on—to deliver on their promises. Effective and pragmatic implementation will necessitate unbundling the projects into smaller ones that could be delivered in the short term and the creation of proper regulatory frameworks to guide cross-border infrastructure.

While connections certainly exist, the PIDA does not seem to be developed jointly with the African Union industrialisation strategy (although all of them are an integral part of Agenda 2063). This would be necessary to address other challenges linked to the development of regional markets and the lack of economies of scale and scope to create linkages efficiently.

POLICY OPTIONS

This section proposes some policy options to optimise the use of minerals-related infrastructures for broader national and regional economic development. It must however be emphasised that different types of infrastructures, linked to particular types of minerals may require context-specific policy instruments and mechanisms depending on the economic objectives of the countries and regions involved.

STRENGTHENING THE THREE PILLARS OF THE MULTILATERAL TRADE AND INVESTMENT SYSTEM

The use and sharing of resource-based infrastructure will be optimised efficiently only if it operates within the framework of a well-functioning multilateral system. Transparency is critical in the governance of the global trading system. It is not only important to providers, financiers, and users of mineral infrastructures to be aware of each other's actions and intentions, it is also a key element of trust building. National and regional policy decisions (or changes thereof) must be clearly notified, and explained, for example, by publishing policy changes on ministries' websites (and making sure they are up to date), so that all economic actors, whatever their role and wherever they operate, can access them freely.

Linked to the above, the policy and regulatory frameworks must be predictable. This is another cornerstone of a functioning system. Too many and too frequent changes in legal or regulatory frameworks make investors "nervous." Large, cross-border infrastructures will only trigger interest from other economic actors if they are assured of a stable macroeconomic, fiscal, and regulatory environment. Likewise, mining companies would be more inclined to invest and partner in infrastructure projects if they are confident in the stability of the legal framework.

Given the evolving nature of economic development, such policy frameworks would need to be flexible and adaptable, while ensuring the stability of the system in place. Flexibility is particularly important because all countries do not necessarily have the same levels of development in a regional context, the same priorities, and the same needs, and will not derive the same level of benefits from the optimisation of mineral infrastructures. In the case of energy power pools, for example, it may be the case that one country will be the main supplier of energy while others will have to depend on it. This may require a major (political) trade-off, as some countries may have to cede some "sovereignty" over power supply to their neighbours. For this system to work, national governments and regional bodies involved in such complex cross-border projects need to put in place a mechanism to ensure a proper balance of rights and benefits across countries, avoiding situations where lack of agreements or disputes among users hinder the optimisation of infrastructure use.

ADDRESSING GOVERNANCE CHALLENGES

It is acknowledged that infrastructure development is not just a technical and financial question. It is guided by (often strong) political considerations, which must be well understood as various stakeholders are driven by different types of incentives and interests, which, in the end have a significant impact on the final outcome of projects. So, it is necessary to address the political leadership question. In all cases where regions have been successful in making the best linkages between infrastructure and broader economic development (for example, in the EU, in Central America for energy, or in the case of the MDC), high-level political buy-in was a key condition to driving the successful implementation of projects. It is therefore necessary to ensure the systematic involvement of political leaders (or champions) in guiding strategic mining investment projects that have significant potential spillovers.

To support political engagement, it is necessary to ensure regular follow up, notably through the proper engagement of various line ministers to whom technical operating bodies are accountable. Stakeholders (in particular, mining companies and other economic operators) must engage in regular dialogue to coordinate their projects.

In addition, functional authorities (such as regulators) and institutions must be set up and capacitated so they can address any bottlenecks that operators may face in an effective manner.[20] This is critical to ensure that providers do not have exclusive rights on infrastructure concessions, which may potentially hide undiscovered mineral assets.[21]

For transnational infrastructures, effective cross-border institutional and administrative arrangements (such as border posts that work, efficient customs management, alignment of transport regulations, pricing mechanisms, and so on) must also be put in place.

POLICY COORDINATION, COHERENCE, AND STRATEGIC PLANNING

Governments and investors must ensure that large mineral infrastructures do not remain isolated and are inscribed within the overall infrastructure and economic development plans of their respective countries and regions. In this respect, policy coordination, alignment of priorities, and strategic planning are essential to the success of constructing and financing such complex infrastructure projects in resource-rich countries. Policy coherence is also critical—this may require some political trade-offs, such as agreeing on lower tax revenues in the short term to incentivise infrastructure sharing by mining companies.

20 See, for example, the case of the MDC in Byiers and Rampa (2013); Byiers and Vanheukelom (2014).

21 In Africa, it is estimated that four-fifths of the mineral assets are yet to be discovered.

At the national level, infrastructure development pursued in the context of mining projects must take into account the needs of other economic sectors within the broader sustainable development objectives of countries (UNCTAD 2015). The roles and responsibilities of various stakeholders must be well defined to avoid hold-up problems and there must also be a clear understanding among all parties on the sharing of costs, risks, and benefits for such infrastructure, as well as putting efficient mechanisms in place to address potential disputes.

To address the high fixed costs linked to large mineral infrastructures, it is necessary to have an efficient pricing policy that does not create unnecessary market distortions. Governments are often tempted to provide subsidies. But subsidies are not always the most effective policy measures. A system of price differentiation might be a better alternative (Collier 2011).

The potential that can be derived from the optimisation of mining infrastructure with broader economic development should go beyond rhetoric and must be clearly spelt out in national development programmes. Planning must be done in the early stages of infrastructure development. For example, when large mineral infrastructures are being planned, governments should maximise the connection with high-density economic nodes and priority economic sectors, and ensure that they put in place last-mile infrastructure legs by investing in connections to feeder roads, power networks, and so on to optimise accessibility to rural or remote areas.

Governments must also facilitate and incentivise companies to develop extra capacity to provide open access of mineral infrastructure for third parties (that is, other mining companies or other economic operators). For this to be efficient, some concerns on cost efficiency or risks must be addressed and sufficient guarantees, in particular regarding access rights, operational control, competitive and first-mover advantage, must be given to companies.

At the regional level, it is equally important to have a coherent and coordinated approach to corridor development. For instance, regional economic communities (RECs) must develop integrated regional investment compacts (see UNCTAD 2015) that conjoin the need to have an efficient mineral infrastructure and the objectives of agricultural and industrial development. For example, the current regional investment compacts that are being developed in the context of the Comprehensive Africa Agriculture Development Programme (CAADP) has no explicit policy to benefit from the large mineral infrastructures that are being developed in resource-rich African countries. This is a missed opportunity, and it should be addressed.

Legal frameworks or specific regional agreements on cross-border infrastructure sharing and use that clearly define responsibilities need to be put in place and implemented. In the electricity sector in Central America, for example, there is a framework agreement among countries for the regulation of regional electricity exchanges. The objective is to foster interconnectivity across national markets through regulatory harmonisation in view of creating a regionally competitive electricity market (WEC 2008). Along this line, RECs should establish the necessary conditions to ensure the functioning of regional projects and their links to regional economic development priorities, while providing a conducive business climate for the private sector to invest along regional corridors. This will necessitate the creation of specific regional institutions that have the legal capacity and operational functions to coordinate, implement, and monitor progress, and address challenges as these arise.

International financial institutions (IFIs) and development partners also have an important role to play. IFIs need to ensure that the projects they finance are aligned with national and regional priorities, that key stakeholders are involved at crucial stages of financial negotiations, and that any project ultimately supports economic development. Where IFIs are involved in financing multiple infrastructure projects (such as rail, roads, ports, and so on) in given countries or regions, and where possible, they should ensure that there is proper coordination and coherence across those different projects. Development partners should support countries and regions in preparing and implementing their national and regional strategies and should ensure that their priorities are aligned to those of their partners. Where possible they could also support countries in negotiating open access with first-mover companies or facilitate negotiations of specific regional agreements to lower the risk of disputes or non-implementation of commitments.

At the global level, world leaders have recognised the importance of investing in resilient and sustainable infrastructures. They have committed in the Addis Ababa Action Plan of the Third International Conference on Financing for Development in July 2015 to establish a new forum to bridge the infrastructure gap (paragraph 14 of the declaration),[22] building on existing multilateral initiatives. They have also endorsed a comprehensive and ambitious agenda for a sustainable development by 2030 by adopting 17 Sustainable Development Goals (SDGs) in September 2015. Expansion of infrastructure and its importance in promoting inclusive and sustainable industrialisation has been explicitly identified (Goal 9) as critical to meet the SDGs. Implementation of the Addis commitment and the universal SDG agenda are therefore tremendous opportunities to act collectively to bring the question of benefit enhancement to the fore of the global agenda. Global leadership and new forms of partnerships are critical to address issues such as alternative and innovative financing mechanisms for complex and integrated infrastructure projects, and to find the risk-sharing solutions necessary to incentivise private-public ventures in such forms of investments.

22 See the action plan at http://www.un.org/esa/ffd/ffd3/wp-content/uploads/sites/2/2015/07/Addis-Ababa-Action-Agenda-Draft-Outcome-Document-7-July-2015.pdf.

STRENGTHENING THE INTERNATIONAL TRADE REGULATORY SYSTEM

First, where they exist, rules must be used and enforced and progress must be monitored regularly. RECs have a series of regulatory and legal frameworks in place (such as trade protocols or investment codes), but there are often major deficiencies in implementation and follow up. Moreover, regional trade policies have focused essentially on removing tariff barriers, but insufficiently on addressing non-tariff barriers and in particular cross-border issues that are considered to be the major hurdles on the path of using cross-border mineral infrastructures. While in theory the free flow of goods and services are allowed, border posts and road blocks across many African countries remain serious and persistent obstacles. At the international level, commitments made within the framework of the General Agreement on Trade in Services (GATS) as well as those taken under the Trade Facilitation Agreement should be enforced.

Second, where rules exist but are not sufficiently robust, these must be strengthened. For example, most countries, in their national legislations, have their own regulations regarding transport or energy infrastructure. However, when it comes to the regional level, there are wide disparities across countries, which limit the capacity of cross-border cooperation. In this case, regulatory frameworks, technical regulations, and administrative procedures must be coordinated, or, at best, harmonised across countries. For example, the Yamoussoukro decision to open skies for air transport in Africa has led to greater freedom in negotiations of bilateral agreements and to improved connectivity across countries, although more needs to be done. The GATS provides another framework for countries to facilitate certain types of infrastructure services (such as transport, energy, logistics, road freight, and so on) if they wish to open market access in those areas. Flexibilities exist for developing countries, which can qualify to the terms under which they would grant market access and national treatment for different modes of supply. Simultaneously, the Trade in Services Agreement (TiSA) currently being negotiated by 25 World Trade Organization (WTO) members (that account for 70 percent of trade in services) offers additional opportunities to facilitate trade in services and deepen commitments on infrastructure-related services. With regard to infrastructure procurement, the Government Procurement Agreement (GPA), which is a plurilateral agreement, offers scope for its member countries to access procurement markets in an open and non-discriminatory manner. No developing countries are, however, party to the GPA at present.

Third, sometimes rules needs to be adapted to fit the exigencies of new projects and new economic ambitions. In many developing countries, effective market connectivity requires fine-tuning of general policy frameworks to fit the evolving ambitions of countries as they move to different levels of development. For example, most regions in Africa have recently adopted regional industrial policies with a clear focus on the development of resource-based industrialisation and regional value chains. However, implementation of those policies still remains within the jurisdiction of national governments. What is now needed is to put in place sound regional investment policies (such as regional investment codes) that will attract economic operators, and design support to the development of regional clusters based around regional infrastructure projects that will facilitate the movement of goods across borders, as illustrated in the case of the Baltics at the time they joined the EU.

Finally, sometimes new rules have to be put in place as countries and regions deepen their levels of cooperation. For instance, in many African RECs, regional competition policies need to be put in place.[23] Yet, large regional infrastructures that are expected to better connect markets and require a large number of stakeholders from various sectors require certain premises that will lay down a stable and predictable environment in which to operate. Efficient regional competition policies are necessary to preserve well-functioning markets and guarantee anti-competitive behaviours for the benefit of consumers. Similarly, in the energy sector, putting in place predictable frameworks (such as interconnection contracts, rules covering operations and commercial aspects of power system integration) are essential to ensure a functional regional market. Likewise, putting in place smart pricing policies to ensure affordable energy tariffs to different stakeholders are necessary to create incentives for the viable use of mineral infrastructures.

ALTERNATIVE TO RULES: STRATEGIC PARTNERSHIPS

In some cases, rules may not be the most appropriate way to stimulate broader economic development out of resource infrastructures. Sometimes incentives and strategic partnerships are more efficient and effective ways to realise certain objectives. For example, governments need to coordinate their efforts with private sector actors, both from the mining industry and from other economic sectors, to build synergies across economic objectives. Co-locating infrastructures (for example, setting up energy projects close to major trunk infrastructure) has the potential to create scale economies, address different types of shortages at the same time, and reduce costs.

23 The Common Market for Eastern and Southern Africa (COMESA) is the only REC that has a Competition Commission, while in the Southern African Development Community (SADC), despite a declaration on regional cooperation and consumer policies signed in 2009, not all countries have enacted domestic legislations on competition policies. The East African Community (EAC) launched a competition policy in 2013, but it still needs to be enforced by some member states.

Moreover, strategic joint planning and sequencing of economic activities along infrastructure corridors to broaden the use of the physical infrastructure is necessary. Governments need to provide complementary incentives up front as projects are being designed. This is critical to guide investments (including mining, infrastructure, or other types of investments) along and around such corridors. On their side, companies need to be proactive to engage governments in defining when and where sharing or opening the use of infrastructure is realistic or not. This will allow governments to decide whether they want to step in to provide logistical support or complementary infrastructure to allow other stakeholders to benefit from the mineral infrastructure. One example is railroad infrastructure—deciding to open rail infrastructure to passenger rail links will require additional safety measures, new stations for regular stops, and multiple tracks with different rolling stocks for fast trains and cargo trains (McCann and Berry 2015).

Finally, it is important to establish functioning platforms for collaborative partnerships with private economic operators through regular private-public dialogue to allow for policy re-engineering as economic activities evolve.

REFERENCES

Accenture. 2012. *Sustainable Energy for All: Opportunities for the Metals and Mining Industry*. UN Global Compact and Accenture.

African Development Bank. 2014. *Tracking Africa's Progress in Figures*. Tunis.

African Development Bank. 2013. *Developing Economic Corridors in Africa: Rationale for the Participation of the African Development Bank*. Tunis.

African Development Bank. 2012. *State of Infrastructure in East Africa.* Tunis.

Aplin, M. 2014. "Can Simandou Infrastructure Deal Deliver?." Insight: Infrastructure, mining-journal.com, 12 Sep.

Arvis, J. F., Carruthers, R., Smith, G. and Willoughby, C. 2011. *Connecting Landlocked Developing Countries to Markets. Trade Corridors in the 21st Century*. World Bank, Washington, DC.

Asian Development Bank. 2014. *Economic Corridor Development for Inclusive Asian Regional Integration. Modelling Approach to Economic Corridors*. Manila.

Asian Development Bank. 2011. "Regional Corridors Development in Regional Cooperation." By P. Srivastava, ADB Economic Working Paper Series 258, Mandaluyong City, the Philippines.

Banerjee, S., Romo, Z., McMahon, G., Toledano, P., Robinson, P. and Arroyo, I. P. 2014. *The Power of the Mine: A Transformative Opportunity for Sub-Saharan Africa.* World Bank, Washington, DC.

Benke, R. 2015. "Introductory Remarks on Mineral Infrastructure in Regional Integration." Second Expert Group Workshop on Extractive Industries, 11–12 June, Geneva.

Brunner. H. P. 2013. "What is Economic Corridor Development and What Can It Achieve in Asia's Sub-Regions?". Asian Development Bank Working Paper Series on Regional Economic Integration.

Bowland, C and Otto, L. 2012. "Implementing Development Corridors. Lessons from the Maputo Corridor." SAIIA Policy Briefing 54, Johannesburg.

Byiers, B. and Rampa, F. 2013. "Corridors of Power of Plenty? Lessons from Tanzania and Mozambique and Implications for CAADP." ECDPM Discussion Paper 138, Maastricht.

Byiers, B. and Vanheukelom, J. 2014. "Political Drivers of Africa's Regional Economic Integration: Lessons from the Maputo and North-South Corridors." In A. du Pisani, G. Erasmus, T. Hartzenberg and C. McCarthy (eds.), *Monitoring Regional Integration in Southern Africa: Yearbook 2013/2014,* Stellenbosch: TRALAC, pp. 164–200.

Collier, P. 2011. "Building an African Infrastructure." *Finance and Development*, Vol. 48, No. 4, Dec.

Deloitte 2014. "Deloitte on Africa." *Africa Construction Trends Report* 2014, Johannesburg.

ECLAC and UNASUR. 2012. *Infrastructure for Regional Integration.* Santiago. Chile.

Ernst and Young (2014). *Mining: the Growing Role of Renewable Energy.* Global Cleantech Centre .

Escribano A., Guasch, J. L. and Pena, J. 2008. "Assessing the Impact of Infrastructure Quality on Firm Productivity in Africa: Cross Country Comparisons Based on Investment Climate Surveys from 1999 to 2005." Policy Research Working Paper 5191, World Bank, Washington, DC.

Foster, V. and Briceno-Garmendia, C. 2010. *Africa's Infrastructure: A Time for Transformation.* World Bank, Washington, DC.

IDeAL. 2011. *Infrastructure in the Comprehensive Development of Latin America: Strategic Diagnosis and Proposals for a Priority Agenda.* Development Bank of Latin America.

Infrastructure Consortium for Africa (ICA). 2011. *Regional Power Status in African Power Pools Report*. African Development Bank, Tunis.

IFC. 2013. "Fostering the Development of Greenfield Mining-related Transport Infrastructure Through Project Financing." Report written with the support of Taylor Dejongh and PPIAF, Washington, DC.

Kigombe, C. 2014. *Hard and Soft Infrastructure Development in Africa: Implementing the WTO Trade Facilitation Agreement in Africa.* The role of the African Development Bank. Tunis.

KPMG. 2013. "Insights: Mega Projects with a Special Feature on Africa's Infrastructure Market." *Global Infrastructure,* Issue No. 4. U.K.

Latham and Watkins. 2013. "Mining Infra – Case for a New Approach." Project Finance International, Middle East and Africa Special Report, Sep.

McKinsey Global Institute. 2014. *Connecting Brazil to the World. A Path to Inclusive Growth*. London. May.

McKinsey Global Institute. 2013a. *Reverse the Curse: Maximizing the Potential Benefit of Resource-driven Economies.* London.

McKinsey Global Institute. 2013b. *Infrastructure Productivity: How to Save $1 Trillion a Year*. London.

Michaelson, J., Toth, G. and Espiau, R. 2008. *Great Corridors, Great Communities: The Quiet Revolution on Transportation Planning*. Project for Public Spaces, New York.

Mtegha, H., Leeuw, P., Naicker, S. and Molepo, M. 2012. *Resource Corridors: Experiences, Economic and Engagement. A Typology of Sub-Saharan African Corridors.* EI Resource Book.

Nogales, E. G. 2014. *Making Economic Corridors Work for the Agricultural Sector.* Agribusiness and Food Industries Series, Food and Agriculture Organization. Rome.

McCann, M. and Berry, M. 2015. "Nexus. A Global Infrastructure Resource." Norton Rose Fulbright, London, May.

OECD. 2012. *Mapping Support for Africa's Infrastructure Investment*, Paris.

OECD 2013. "OECD Policy Guidance for Investment in Clean Energy Infrastructure: Expanding Access to Clean Energy for Green Growth and Development." An OECD Report to the G20, with contributions from the World Bank and UNDP, Paris.

OECD. 2015. *African Economic Outlook* 2015. Paris.

Shrestha, O. L. and Chongvilaivan, A. (eds.) 2013. *Greater Mekong Sub-region: From Geographical to Socio-economic Integration*. Institute of Southeast Asian Studies, Singapore.

Toledano, P., Thomashausen, S., Maennling, N. and Shah, A. 2014. *A Framework to Approach Shared Use of Mining-related Infrastructure.* CCSI, Columbia.

Toledano, P. 2012. "Leveraging the Mining Industry's Energy Demand to Improve Host Countries' Power Infrastructure." Columbia Centre on Sustainable Investment Policy Paper.

Toledano, P. 2012. "Leveraging Extractive Industry Infrastructure Investments for Broad Economic Development: Regulatory, Commercial and Operational Models for Railways and Ports." CCSI Policy Paper, Columbia.

World Energy Council. 2008. *Regional Energy Integration in Latin America and the Caribbean*. London.

World Economic Forum. 2014a. "Scoping Paper: New Models for Infrastructure Investment in the Mining and Metals Sector." Geneva.

World Economic Forum. 2014b. *Infrastructure Investment Policy Blueprint.* Geneva.

World Economic Forum. 2014c. *African Strategic Infrastructure Initiative. Managing Transnational Infrastructure Programmes in Africa – Challenges and Best Practices.* Prepared in collaboration with Boston Consulting Group. Geneva.

World Economic Forum. 2013. *Strategic Infrastructure in Africa: A Business Approach to Project Acceleration.* Prepared in collaboration with Boston Consulting Group. Geneva.

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