VIEWPOINTS

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The Potential for Shared-Use Infrastructure

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Overview

The need among natural resource companies and governments to use capital more efficiently is creating opportunities for commercial shared-use infrastructure in emerging and frontier markets.

Shared-use infrastructure is financed, constructed, owned, and operated independently of its users through a special-purpose vehicle (SPV), and backed by at least one investment-grade anchor client. Infrastructure built to support natural resource extraction often can be shared among industry users operating close to one another.[1] In some circumstances, infrastructure can also be shared with other users to the benefit of local industries and communities.

Historically, natural resource companies operating in emerging and frontier markets have favored vertically-integrated infrastructure solutions for which they provide most of the capital and over which they maintain exclusive control and use.[2] This contrasts with the practice in developed countries, where an "open-access" model dominates. Today, however, the integrated model is becoming less viable in emerging markets. In the future, it is likely that more natural resource infrastructure will be shared.

The shared-use model offers three main benefits. First, compared to integrated infrastructure, shared-use infrastructure spreads capital investment and operating costs among a wider user base. Lower costs make large extraction projects in sub-Saharan Africa and other developing regions more viable.

Second, the shared-use model provides institutional investors with new options for investing in long-term, high-yield assets supported by creditworthy, highly dependent anchor clients.[3] As a result, shared-use entails less risk and more transparency than investors typically associate with emerging markets.

Third, shared-use enables countries to exploit natural resource wealth more efficiently, and may also

[1]We define natural resources industries broadly to include hydrocarbons (oil and gas), metals, minerals, and timber.[2] Hereafter, we will use the term "emerging markets" to refer to both emerging and frontier markets.

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[3] We define institutional investors to include long-term investors such as endowments, insurers, pension funds, and sovereign wealth funds.

serve as a catalyst for broader economic development. As such, shared-use projects may receive enhanced support from host countries, OECD governments, and development finance institutions (DFIs).

I. The Problems Shared-Use Infrastructure Addresses

The Need for New Natural Resource Assets and Supporting Infrastructure

Substantial investment is required to develop new natural resource assets. The McKinsey Global Institute (MGI) estimates that, as demand increases and current productive assets are depleted, $11 trillion to $17 trillion will need to be invested in mining, oil, and gas by 2030, of which $1.2 trillion to $3 trillion will be in developing countries.[4]

Natural resource companies strive to secure long-term logistics, water, and energy solutions that support efficient and reliable operations at competitive and predictable costs. Of that estimated $11 trillion to $17 trillion overall investment, MGI forecasts that nearly $2 trillion is needed for infrastructure development in resource-rich countries.[5] In some cases, the costs of building the infrastructure exceed those of the natural resource project.

There is an acute need for infrastructure investment in emerging markets. Often, these economies depend heavily on natural resource extraction, but lack the infrastructure to support expanded activity. This is increasingly true as companies develop more projects far from coastlines or navigable waterways, where the earliest infrastructure was built. For example, Africa has vast oil, metal, and mineral resources, much of it still unexplored. However, most emerging countries lack the infrastructure needed to bring these resources to market. Deutsche Bank has estimated that more than 4,000 kilometers of greenfield railway will need to be constructed, at a cost of over $50 billion, just to exploit Africa's known iron ore deposits.[6]

The efficient financing of emerging natural resource infrastructure is at a crossroads for two reasons. First, there is a lack of consensus on appropriate models for ownership and operation, especially with respect to rail and ports. Second, there are doubts as to whether developing countries' traditional sources of financing, both public and private, have the capacity to fund needed investments. It is true that, even in sub-Saharan Africa, national governments account for the majority of infrastructure financing—63 percent in 2012.[7] However, many new projects, particularly those in small countries, are many times larger than the national governments' budgets and also exceed their borrowing capacity. DFIs have also been major providers of capital, but they are now limited in their ability to substantially increase funding levels.[8] Banks have historically provided the majority of private project financing, but they are now retrenching, in part due to new Basel III regulations.[9] Institutional investors could become

[4] McKinsey Global Institute, "Reversing the Curse: Maximizing the Potential of Resource-Driven Economies," 2013: p. 5
[5] Ibid, p. 10
[6] International Finance Corporation, "Fostering the Development of Greenfield Mining-Related Transport Infrastructure Through Project Financing," 2013: p. 7
[7] This figure excludes DFI contributions to national government budgets. See: Gutman, Sy, and Chattopadhyay, "Financing African Infrastructure," 2015: p. 41
[8] World Bank, "Practical Solutions and Models for Addressing Obstacles to Institutional Investment in Infrastructure in Developing Countries," 2014: p. 2
[9] Ibid

important providers of new capital, but thus far they have only taken tentative steps toward allocating more of their portfolios to infrastructure.

Ownership/Operating Arrangements: Public Access, Integrated, and Shared-Use

Today, there are two basic ownership/operating arrangements for natural resource infrastructure: open-access and integrated.

In developed countries, natural resource companies typically use an open-access model in which infrastructure is developed directly by the government or by a private company working under a government concession. Such infrastructure is open to all users, and usage tariffs are regulated by the government. While there are some notable exceptions to this practice—in parts of Canada and Australia, for instance—in general, open-access is required by law, based on the "essential facilities" doctrine.[10] In developing countries, by contrast, natural resource companies often operate within self-contained enclaves. They usually own their own infrastructure, which they operate and control as part of an integrated operation. This approach is more capital intensive, but natural resource companies also view it as simpler and more efficient. In most developing countries, the essential facilities doctrine is not enshrined in law, and so any sharing of privately owned infrastructure must be negotiated on a case-by-case basis.

Today, the integrated model is being challenged by two developments, one related to host country expectations and the other to headwinds in the mining industry.

First, developing country governments are increasingly requiring that new infrastructure be made available to third parties, including industry competitors, freight services, and, in some cases, civilian use (e.g., passenger services). Governments are developing a preference for such arrangements because they foster greater competition, allow marginal natural resource assets to be developed, and deliver economic benefits (e.g., greater employment levels) by supporting farmers and other domestic constituencies. However, requiring the infrastructure be made available to multiple parties may reduce the incentive for a single natural resource company to fund the infrastructure.

Second, natural resource companies, especially mining companies, are searching for new ways to improve the efficiency with which they deploy their capital. In many cases, they are no longer able or willing to finance the entire cost of infrastructure. The current uncertain outlook for commodity prices, combined with write-downs on investments made when the outlook for commodity prices was much higher, has constrained natural resource companies' ability to invest in greenfield infrastructure, even for promising projects.[11] As mining companies struggle to right themselves, they are jettisoning non-core

[10] The essential facilities doctrine was first developed in the United States, through anti-trust actions brought under Sherman Act. It was subsequently incorporated into law by the United Kingdom, the European Union, and many other countries. The doctrine applies to natural monopolies and requires that "essential" or "bottleneck" facilities provide access to third parties on reasonable, non-discriminatory terms. See: OECD, "The Essential Facilities Concept," 1996: pp. 7 and 87

[11] In the 2000s, many mining companies made capital investments or acquisitions on the basis of the "commodities super-cycle" theory, which held that the industrialization and urbanization of emerging market economies, such as China's, implied steadily rising demand for most commodities, regardless of any downturns in the business cycle. According to PWC ("Mine 2014"), this "had the industry chasing volume at any cost; absolute output was prioritized over productivity considerations" (p. 34). Commodities prices began to fall in 2012. The 40 largest mining companies booked record impairments in 2012 ($40 billion) and again in 2013 ($57 billion), driven mainly by the revaluation of acquisitions and

assets and operations, as well as exploring joint ventures to share infrastructure, to reduce costs.[12] Reduced appetite for the integrated model creates an opportunity for commercial shared-use infrastructure, under which infrastructure facilities are owned and operated independently of natural resource companies (and other users), who each agree to pay a minimum annual usage fee. Industry initiated shared-use arrangements are already employed in developed countries, in circumstances where the open-access regime does not apply, such as the North Sea oil and gas fields, where the undersea pipelines are owned and operated by consortiums of the companies operating in those waters. The combined effect of host governments become more assertive in imposing open access regulations or commitments, and natural resource companies seeking ways to release or more efficiently deploy their capital means that the number and range of shared-use infrastructure arrangements can be expected to proliferate in the coming years.

II. Assessing the Benefits of Shared-Use Infrastructure

As an alternative to integrated infrastructure, shared-use arrangements offer certain benefits to companies, host countries, and institutional investors.

To natural resource companies and their shareholders, shared-use enables better economies of scale, which translates into direct cost savings, as the financing costs are spread out among multiple users. Under the integrated approach, both the natural resource project and the supporting infrastructure must exceed the company's required rate of return, based on its own cost of capital. When owned by an SPV, which operates like a utility and is not directly exposed to commodity price fluctuations, the infrastructure's cost of capital can be lower than that of the natural resource company.

In addition to savings, natural resource companies consider two other factors when considering whether to share infrastructure: the infrastructure's strategic value to the company, and its development value to the local community.[13] All else being equal, the less strategic the infrastructure, the easier it is for natural resource companies to share it.[14] Telecommunications are therefore the most amenable to sharing, followed by water and power. Port and railways are usually considered the most difficult to share.[15] However, mining companies are more willing to share when they perceive it will dramatically improve their relations with the local community.[16] Therefore, the greater the infrastructure's development potential, the more likely natural resource companies are to share it.

In developing countries, shared-use can help governments maximize revenue from natural resources by facilitating the development of smaller deposits, thus avoiding the problem of "stranded" deposits. This is especially important when a country's geography is still under exploration. Companies typically do not

PP&E investments made in the mid-2000s (p. 22. In addition, industry net profits have fallen 72 percent and free cash flow has recently turned negative (pp. 23 and 28). Having been hit by "a perfect storm," the mining industry is now suffering from "one of the toughest years in memory" (p. 7 and 12).

[12] PWC, "Mine 2014," pp. 35-37.

[13] Columbia Center on Sustainable Investment, "A Framework to Approach Shared Use of Mining-Related Infrastructure," 2014, p. 7

[14] Ibid

[15] Ibid

[16] Ibid

coordinate the development of natural resource projects. If the first-mover builds infrastructure to support its operations, but then denies its competitors access, the value of mineral rights for these nearby smaller deposits will fall. As a result, the government may have no choice but to sell them to the first-mover at a less-than-competitive price.[17] Further, by lowering natural resource companies' costs, and thereby improving their profit margins, shared-use infrastructure may lead to higher tax revenues for the host government.[18]

Shared-use infrastructure can also lower the cost of economic development. Historically, the construction of natural resource infrastructure has not been coordinated with host countries' national infrastructure plans.[19] If it were, natural resource infrastructure could, in some cases, form the backbone of a country's infrastructure, opening up the interior to development and making it possible to bring goods such as agricultural products to international markets. This is possible when infrastructure is to be located in regions that are either fertile or populous. In the former case, the infrastructure may be used to support local agricultural development; in the latter case, it may be used to improve living standards and mobility. Leveraging such infrastructure projects to diversify and grow the economy can mitigate the "resource curse" that often plagues resource-rich economies.

Host countries seeking shared infrastructure solutions may be willing to make concessions to companies and infrastructure investors in other areas, particularly with regard to taxes and revenue-sharing.[20]
To institutional investors, shared-use infrastructure offers opportunities in emerging market infrastructure, but with the reduced risk that comes with having one or more creditworthy, global "offtake" partners. Infrastructure's primary benefit to institutional investors is that it is a long-term asset with stable, inflation-adjusted cash flows. This could be especially attractive as some institutional investors, such as corporate pension funds, return to an asset-liability matching funding structure, whereby the cash inflows from assets are structured to match the cash outflows on liabilities. Other potential benefits include low correlation to other portfolio assets, as well as a liquidity premium. Shared-use natural resource infrastructure offers at least three additional benefits to investors.

First, unlike many other emerging market investments, shared-use infrastructure can be financed in hard currency, given that the natural resource clients are producing commodities denominated in U.S. dollars, so there is minimal foreign exchange risk.

Second, unlike many public infrastructure projects, which routinely suffer from serious demand risk, natural resource infrastructure benefits from having at least one, and potentially more, long-term, highly-dependent clients.

Third, shared-use infrastructure may reduce political risk by creating constituencies for the investment within the host country and among international actors. Political risk may be reduced when several

[17] Ibid, p. 15
[18] Norton Rose Fulbright, "Sharing Mining Infrastructure," 2014, p. 6
[19] Columbia Center on Sustainable Investment, "A Framework to Approach Shared Use of Mining-Related Infrastructure," 2014, p. 5
[20] Norton Rose Fulbright, "Sharing Mining Infrastructure," 2014, p. 11

natural resource companies rely on the infrastructure. This is because host governments are less likely to disrupt an entire sector than the operations of a single company. Infrastructure that is used by local freight, such as agriculture, will also benefit from an expanded domestic constituency.

III. The Characteristics of Shared-Use Infrastructure

Because shared-use arrangements can be applied to different industries and different types of infrastructure, they have many permutations. The two most important dimensions to consider are the degree to which the infrastructure is shared and the trade-offs that may exist between capital efficiency and operational efficiency.

The Degree of Sharing: Single-Purpose and Multipurpose

Shared-use does not necessarily imply that the infrastructure can be used by any entity. Access and usage arrangements vary widely.

With single-purpose multiuser arrangements, infrastructure is shared only among like entities. For example, in Norway, the Norpipe undersea oil and gas pipelines are owned and operated by Norpipe Oil AS and Gassled, two consortiums that comprise the companies operating in the North Sea's Ekofisk oil field. Likewise, the Richards Bay Coal Terminal (RBCT) in South Africa is jointly owned by the mining companies Anglo American, BHP Billiton, and Glencore, among others, and is operated by an independent contractor.[21]

With multi-purpose multiuser arrangements, infrastructure is shared not only among natural resource companies, but also with non-industry users. One example of this is Vale SA's Carajás Railroad, which connects the Carajás mine (the world's largest iron ore mine) in the Brazilian state of Pará to the Ponta da Madeira Port in São Luís. The railroad transports 120 million tons of ore per year, along with 350,000 passengers.[22] A prospective example is the Simandou project in Guinea, which is being developed by Rio Tinto, Chinalco, and the International Finance Corporation (IFC). If constructed, the project will link an iron ore mine deep in the interior to a new deep-water port in Moribaya. The proposed rail line and port will be funded, built, and owned by InfraCo, a third-party infrastructure company, and will be operated on an open-access basis.[23]

The Trade-Off between Capital and Operational Efficiencies

A second important characteristic that differentiates shared-use arrangements has to do with the type of infrastructure in question, and what implications sharing may have on capital and operational efficiency. For some types of infrastructure—electricity, water, and wastewater treatment—sharing among multiple users poses few coordination issues. However, expanding capacity entails relatively high marginal costs, so the potential economic and financial efficiency gains are not as large. This is true whether or not the

[21] Norton Rose Fulbright, "Sharing Mining Infrastructure," 2014, p. 8

[22] Vale, "Carajás Railroad: The Path Our Wealth Runs On": www.vale.com/en/initiatives/innovation/carajas-railway

[23] Aplin and Ireland, "Will Simandou Deliver on its Promise of Shared-Use Mining Infrastructure in Sub-Saharan Africa?," 2014: www.infra-share.org/publications/will-simandou-deliver-on-the-promise-of-shared-use-mining-infrastructure-in-sub-saharan-africa/

users are all natural resource companies. Doubling the capacity of a power generating station requires roughly doubling the number of generating units and doubling fuel expenditures. For these reasons, natural resource companies have typically engaged in shared-use water, wastewater, and electricity projects on the basis of sustainability and community engagement, not capital cost-sharing. However, given that sharing still has the potential to reduce overall fixed capital expenditures, options for scaling up shared-use in these areas are now being explored by the World Bank and others.[24]

For other types of infrastructure—especially railways and ports—sharing poses more coordination issues, but the marginal costs to expand capacity are lower, and thus the potential economic and financial efficiency gains are greater. It might cost a mining company about $10 billion to build a single rail line, but just $10 million more to double that line's capacity. This can be done by adding siding, passing loops, and better tracking and control systems, which allow the line to service freight trains operating at different speeds (accommodating passenger rail is a more expensive proposition). Likewise, dredging a channel is the main cost of building a port; the cost of building additional berths is minor by comparison.

A few types of infrastructure do not fall into either of these categories. For example, the marginal cost of expanding access to roads depends on whether they will be single-purpose or multipurpose. Roads can be shared among like users at relatively low cost, but accommodating different types of users is more expensive. For example, it is unsafe for passenger vehicles to share the road with heavy mining machinery, so separate lanes must be built.

Regions and Industries Suitable for Shared-Use Arrangements

Worldwide, MGI estimates that, of the $2 trillion needed to develop natural resource infrastructure in resource-rich countries by 2030, nearly 30 percent is amenable to multipurpose sharing arrangements. The other 70 percent could be shared among like users.[25]

Shared-use arrangements are potentially applicable to virtually all resource-rich countries, including developing Asia—shared-use is being considered for a coal mine in Mongolia—and Latin America, as demonstrated by the Vale project in Brazil. The greatest number of opportunities for single-purpose and multipurpose shared-use infrastructure are in Africa.

These opportunities exist in both mining and oil and gas projects. Agribusiness, timber, and biofuel companies are less viable as anchor customers because, in most cases, they lack the capital to build rails and ports on their own; however, such companies are likely to become significant beneficiaries of shared-use agreements in the mining and hydrocarbon sectors because access to the new infrastructure can dramatically lower their freight costs.

Much of the infrastructure used by oil and gas companies—including pipelines, terminals, and LNG

[24] World Bank, "The Power of the Mine," 2015

[25] McKinsey Global Institute, "Reversing the Curse: Maximizing the Potential of Resource-Driven Economies," 2013: p. 10

plants—usually lends itself to single-purpose sharing arrangements.[26] Over the past three decades, oil and gas companies have become accustomed to working with each other and with national companies to syndicate risk in gas fields, oil fields and LNG plants. Potential projects for shared-use include the undersea pipelines that will bring onshore the recent enormous gas finds off the coasts of Mozambique and Tanzania.

The infrastructure used by mining companies lends itself to both single-purpose and multi-purpose sharing arrangements. Electricity is needed to ventilate the mines and pump out water. Transportation infrastructure—mainly, rail and ports—is especially important to the extraction of bulk minerals.[27] The task of bringing them to market is fundamentally a logistical one.[28] Rail represents economical transportation for moving non-perishable bulk goods over long distances.[29] Mining companies have less experience sharing infrastructure, however, and so the institutional challenges may be greater.

IV. Shared-Use Ownership, Financing, and Operational Considerations

Ownership and Financing Structure

Like other types of project-financed infrastructure, shared-use projects are financed and owned by a special purpose vehicle. The SPV raises debt and equity financing from users and "disinterested" parties, with the proportions varying considerably from project to project. Well-structured projects can achieve debt-to-equity ratios of 65 percent to 75 percent. The debt may include bank loans and project bonds and is repaid with income from usage tariffs.

Typically, the equity portion is held substantially by users, but can also be held by disinterested investors. Some shared-use projects are jointly owned by a consortium of the companies that will use the infrastructure. The host government usually exercises a minority stake or maintains a "golden share"—a nominal share that endows the government with voting rights.[30] Other shared-use projects have substantial outside investment from banks, DFIs, governments, and other market participants.

For the project to be viable, the SPV's cash flows must be guaranteed under a robust take-or-pay (TOP) agreement with an investment-grade anchor client such as a multinational mining company. The quality of the first-mover anchor client is essential to the bankability of the project and, where necessary, credit enhancement tools can be used (including bank or parent guarantees).

Shared-use projects may follow a "build-operate-transfer" (BOT) model. This means ownership of the asset may be transferred to the government after a 20- to 30-year payback period.[31] For this reason, debt may be structured to amortize over the period of the loan, with the usage tariffs tailored to reflect this.

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[26] One general exception to this is electricity. Also, hydraulic fracturing requires water and wastewater treatment plants, as well as rail lines to transport fracking sand.
[27] Bulk minerals include iron ore, coal, potash, bauxite (aluminum ore), phosphates, and copper and zinc concentrate.
[28] This is less true of precious minerals, such as gold, which may be processed onsite and airlifted out.
[29] Columbia Center on Sustainable Investment, "A Framework to Approach Shared Use of Mining-Related Infrastructure," 2014, p. 13
[30] Ibid, pp. 26-27
[31] Ibid, p. 8

Operational Control and Access/Usage Rights

Shared-use infrastructure can be operated by the anchor client or by an independent third-party. Operation by the anchor client may assuage the client's concerns about operational inefficiencies, as it will maintain day-to-day control. This is particularly important with rail infrastructure, where sharing may result in efficiency losses of 10 percent to 20 percent,[32] much higher than the typical loss rates for ports and other types of infrastructure. An independent operator, on the other hand, will be financially motivated to maximize usage, and so may be more appealing to outside equity investors.

A package of founder's rights is needed to compensate the anchor client for the risks it assumes (including risks assumed through an offtake commitment), to avoid or compensate for operational efficiencies, and to prevent future users from unfairly "free riding." Founder's rights can include priority access rights, an upside-sharing mechanism, and input on scheduling.

Conclusion

Despite shared-use infrastructure's many advantages, additional work is needed to make it the standard model for natural resource projects in emerging markets. This is especially true in the realm of market development. Globally, there are many institutional investors and specialized infrastructure funds looking for opportunities to invest capital in projects that can provide stable, long-term returns. There has been an unexpected shortage of such projects in OECD countries, as governments have tried to hold down fiscal deficits in the wake of the Global Financial Crisis.

Based on the roundtable discussion at the 2015 Milken Institute Global Conference, it is clear that a variety of actors will need to coordinate if the shared-use infrastructure model is to be more widely adopted. First, political economy and capacity issues remain front and center. Multinational natural-resource companies and host governments often mistrust each other; further, host governments sometimes lack sufficient human capital to negotiate terms or regulate complex projects as effectively as they could. For these reasons, DFIs such as the World Bank, the IFC, and the African Development Bank (AfDB) will continue to play an important role in bridging trust gaps, as well as in providing technical assistance to host governments. Second, natural resource companies and national governments must continue to deepen their engagement with local communities, to ensure these communities' needs and concerns are properly accounted for in the planning and design stages. This is important for all natural resource and infrastructure projects, but especially so for multipurpose shared-use projects. Third, wherever possible, local institutional investors should be involved in order to provide foreign investors with local expertise as well as some measure of protection against political risk. Finally, capital markets development remains critical to broadening the local investor base for such projects, and to more effectively mobilizing the host country's resources for the long-term financing of its own development.

[32] Ibid, p. 19

About the Authors

Glen Ireland is a founding partner of InfraShare Partners, which develops and implements sustainable and bankable shared-use mining infrastructure solutions. He has written and spoken extensively on the subject of mining infrastructure, advocating for win-win solutions that address the requirements of the mining sector as well as the needs of the host countries to achieve broad-based economic development.

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Suggested Reading

- Columbia Center on Sustainable Investment, "A Framework to Approach Shared Use of Mining Related Infrastructure," 2014
- International Finance Corporation, "Fostering the Development of Greenfield Mining-Related Transport Infrastructure Through Project Financing," 2013
- McKinsey Global Institute, "Reverse the Curse: Maximizing the Potential of Resource-Driven Economies," 2013
- Norton Rose Fulbright, "Sharing Mining Infrastructure," *Mining Journal*, 2014
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