

Oil & Gas (Global)



Rising up

Unlocking the potential of Africa's oil and gas

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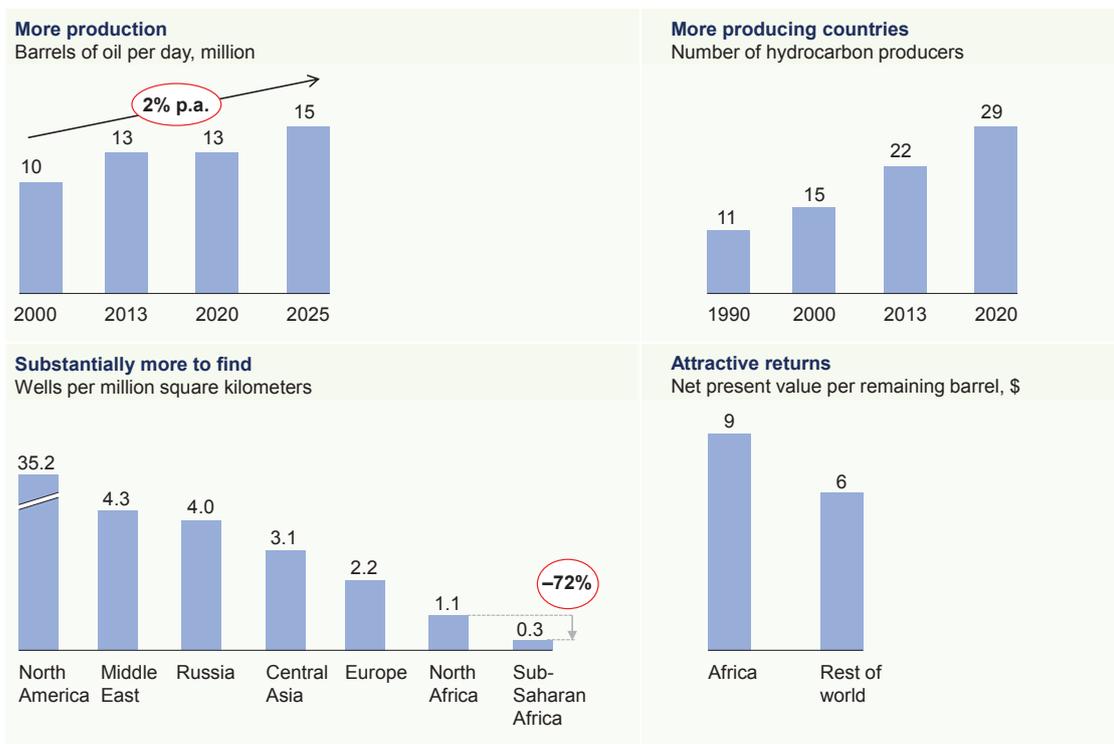
Rising up: Unlocking the potential of Africa's oil and gas

Africa offers some of the world's most exciting hydrocarbon plays and among the greatest opportunities for oil-and-gas operators and investors alike. The diverse continent is rich in unexplored, high-potential regions, has spawned several world-class local companies, and has attracted the attention of many international independent exploration-and-production (E&P) operators. Its deepwater oil and onshore and offshore gas resources have gained particular notice. Despite the recent decline in oil prices, sustaining and restoring production from mature onshore fields has also become a growth opportunity.

African oil and gas is at an inflection point. In 1990, 11 countries produced these resources. Today, there are 22, with 7 more to come in the next six years (Exhibit 1). How should oil-and-gas companies operate in such an environment? The continent's cultural, ethnic, and geographical diversity—more than 50 countries, as many as 3,000 languages, and tremendously varied geological systems—guarantees that a one-size-fits-all approach to E&P will fail (Exhibit 2).

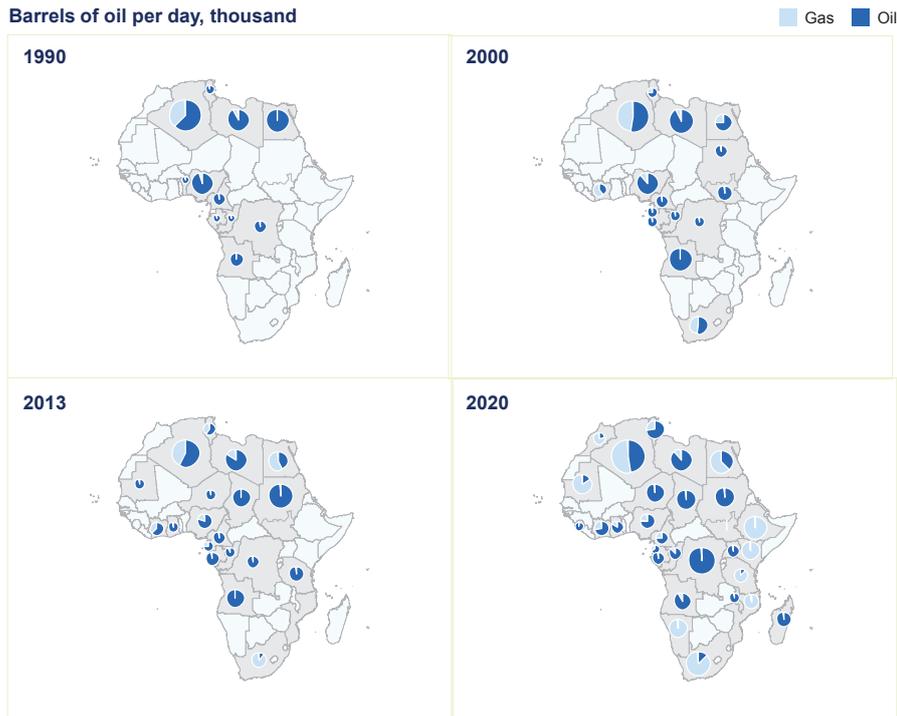
In our extensive work on the continent and in interviews with oil-and-gas leaders across the public and private sectors, we have found that building partnerships with government and other industry players is key to success for operators. Relationships among national oil companies (NOCs), international oil companies (IOCs), independents, and governments are frequently tense and colored by mutual distrust. African countries are relying increasingly on resource revenues to balance budgets, while new finds create ever-higher expectations among citizens about the transformative role of the oil-and-gas sector. As a result, it is more important than ever for companies to rigorously assess and communicate their economic contributions, making sure they match host-government priorities and taking a long-term view that prioritizes balanced returns. They should try to ensure that deals signed today are not seen as unfair by citizens in the future and that they are viewed as indispensable to the country's broader social and economic agenda.

Exhibit 1 Africa has strong potential in oil and gas.



Source: Baker Hughes; Rystad Energy; Spears & Associates; Wood Mackenzie

Exhibit 2 Growth in African oil and gas will come from a more diverse group of nations.



Source: Rystad Energy; McKinsey analysis

We have identified four levels of stakeholder partnership essential for maximizing an operator's opportunity. There's partnership at the local level, with communities and authorities, to increase understanding and trust among the relevant parties. There's partnership within the oil-and-gas industry and across value chains to complete projects, manage risk, build infrastructure, and create markets. There's partnership among industry, national governments, and other stakeholders (including nongovernmental organizations and international bodies such as the Extractive Industries Transparency Initiative) to decrease costs, manage regulatory and administrative risk, increase the size of the economic pie, and train the next generation of African engineers. Finally, there's regional partnership between operators and governments to pool knowledge and resources and create infrastructure so that the oil-and-gas industry can grow and contribute to the continent's economic development.

Partnering is critical across the value chain. In exploration, one E&P company executive told us that "building long-term relationships means we avoid a feeding frenzy at bid-round time." In development, some operators are working

hard to make sure their resource programs are aligned with the interests of national governments. In operations, better community ties are often essential to reducing oil theft and protecting the physical security of people and facilities.

The opportunity in deepwater oil and gas and onshore gas

Africa is the least explored continent for oil and gas, but discovering new oil sources can be very profitable. In the past, African resources have traded at a discount, about \$7 a barrel less than the global average in 2004 (on a proven-plus-probable basis), a difference resulting from a combination of factors, including a challenging business climate. Recently, the discount had narrowed to about \$2 per barrel, suggesting a better operator understanding of the continent's resource basins, improved ease of doing business, and increased interest from investors, leading to more competition for assets. Also, for IOCs, Africa's current production generally offers higher cash flow per barrel across similar assets than elsewhere. And independents such as Maurel & Prom,

TransGlobe Energy, and Tullow Oil have generated some of the highest shareholder returns in the industry by not only running world-class operations but also establishing and maintaining effective partnerships.

Across the continent, meanwhile, a shift is taking place from onshore to offshore, with gas making up an ever-greater share of production. Behind this trend is maturing production of existing fields, higher prices, and new technologies permitting the economic exploitation of difficult-to-reach assets. Deepwater oil comprises 20 percent of the continent's production and is expected to rise to 27 percent by 2025 (Exhibit 3). This shift represents a big opportunity for IOCs to deploy their capital and technology as well as use experience gleaned from work in other basins.

As for gas, the happy coincidence of huge potential and booming domestic demand presages more jobs, higher economic output, and increased prosperity. We estimate

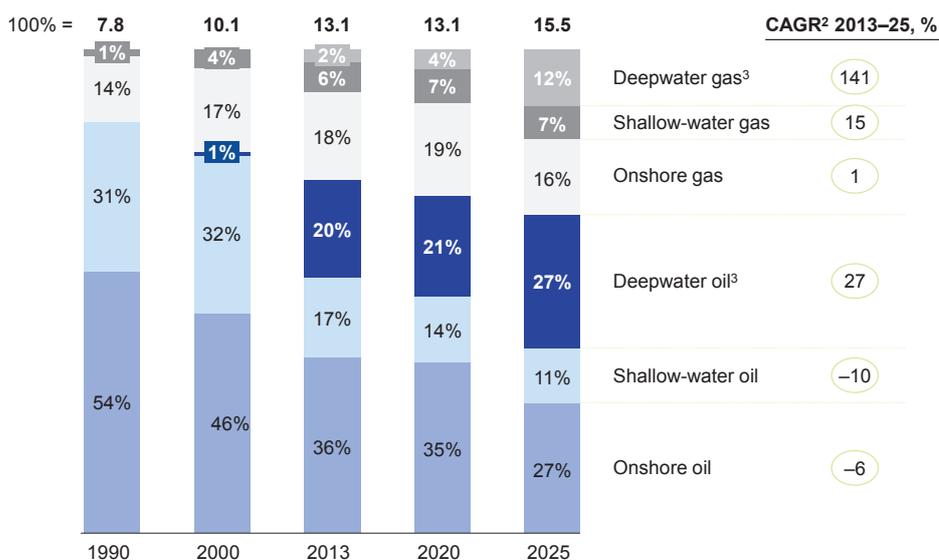
that the domestic gas market in Africa will grow by 9 percent a year, propelled by the demands of power utilities, feedstock-based industries such as fertilizer, and captive generation. We also believe that the deployment of new technologies for compressed natural gas and microliquefied natural gas will permit the expansion of gas-fed, dedicated power units at factories, building on proven business models in China, Latin America, and North America. These "virtual pipelines" can bypass infrastructure bottlenecks and reach customers with a high willingness to pay if whatever equipment investment is necessary is both scalable and movable. These technologies will enable operators to turn stranded gas into cash and lead to creation of new markets, given the competitive advantage of gas compared with gasoline for transport or diesel for generators.

In Nigeria's case, it costs \$157 per megawatt-hour to generate electricity from diesel, but only \$55 through gas-fired thermal generation, or \$61 in a large-scale factory-generator unit.¹

Exhibit 3 The extraction mix will shift decisively away from onshore and shallow water into gas and deep water.

Barrels of oil per day, thousand

Supply growth outlook, Africa¹



¹ Figures may not sum to 100%, because of rounding.

² Compound annual growth rate.

³ Deepwater depth >450m.

Source: Rystad Energy; McKinsey analysis

¹ Based on *World Energy Outlook 2012* estimates and Nigerian Multi-Year Tariff Order II regulations, assuming rates of \$2.8 per million British thermal units.

Even based on conservative per-capita usage and growth, the continent could use up to 70 percent of its own gas.² But that would require stakeholders to crack the critical combination of market prices, infrastructure development, regulation, and regional integration—all major challenges. We also see big potential in the gas-to-urea fertilizer value chain, given the low nitrate content of soil across West Africa. All told, there is potential for a gas-fired industrial revolution: African countries could move away from the traditional extract-and-export model to one that makes better use of their resources on the continent.

As IOC production shifts to deepwater megaprojects, opportunities are opening both for trailblazing independents and local and regional champions. Whereas Angola and Nigeria were predominantly opened up by IOCs, it has fallen to independents such as Anadarko Petroleum, Heritage Petroleum, Hess, Kosmos Energy, and Tullow Oil to bring new perspective and exploration approaches to frontier markets such as Ghana, Kenya, and Mozambique. Meanwhile, as IOCs divest acreage, especially in Nigeria, local champions such as Afren, Seplat Petroleum Development Company, and Seven Energy have emerged as effective operators with scale ambitions in their own right. We expect the coming years to see ever-more homegrown champions follow Oando and Seplat in raising capital on both local and international stock markets. Also, as domestic gas markets grow, companies that traditionally did business upstream are increasingly being forced to take midstream positions (for example, in gas pipelines) to find profitable routes to market and are finding that these plays can be profitable in themselves.

Identifying and managing the challenges

Africa offers no easy location to do business in oil and gas. This has been the case during periods of high oil prices as well as in today's new lower-price situation. North Africa faces regional instability, mature and declining production, and challenging fiscal terms. In Nigeria, legislative uncertainty related to the proposed Petroleum Industry Bill clouds the picture, as does oil theft and insecurity in the Niger Delta. Angola confronts increasingly challenging deepwater and presalt production environments. The Kenyan Rift Valley could hold up to ten billion barrels of oil,³

but the country's petroleum-sector legislation has not been updated in 30 years. Unleashing the tremendous potential of the offshore Rovuma Basin will require Mozambique and Tanzania to overcome political challenges, manage societal expectations, and address infrastructure shortcomings—for example, the fact that it currently takes three days to cover the almost 3,000 kilometers of rough roads along the EN1 highway between Maputo and Palma, the proposed site for Mozambique's liquefied-natural-gas train.

On top of these issues, producers must account for the disruptive influence of US unconventional hydrocarbons on global oil-and-gas flows. The boom in US light tight oil complicates the position of West African deepwater projects on the cost curve, given their high technical expense and the governments' desired revenue take. The potential of US shale exports also challenges the position of East Africa projects because of uncertainty about cost, demand, and customer willingness to pay (Exhibit 4). What's more, US light tight oil is replacing crude flows from West Africa to the United States by about 20 percent a year. This means West African producers must increasingly find new Asian markets, which is likely to fundamentally affect geopolitical relationships in the coming decades.

Cost and schedule overruns plague oil-and-gas projects globally, and Africa is no exception. Capital-spending overruns and project delays in Africa worsened by 20 percent a year between 2003 and 2010.⁴ We can expect the trend to continue as work moves into the challenging deep waters of East and West Africa and efforts intensify to coax more production from North Africa's aging wells.

Across the continent, almost all regions score poorly operationally. Access to talent, infrastructure, and security, as well as ease of doing business, are among the big issues oil-and-gas companies face. Talent is a particular concern. Local educational systems fall short of producing the number and quality of staff across technical and functional disciplines to meet industry needs.⁵ The most successful NOCs will be those that address this talent deficit. And while IOC educational and rotational programs are praiseworthy and often effective, they are unlikely to deliver the scale of talent required, especially given the imminent retirement of so many in the workforce (the so-called big crew change).

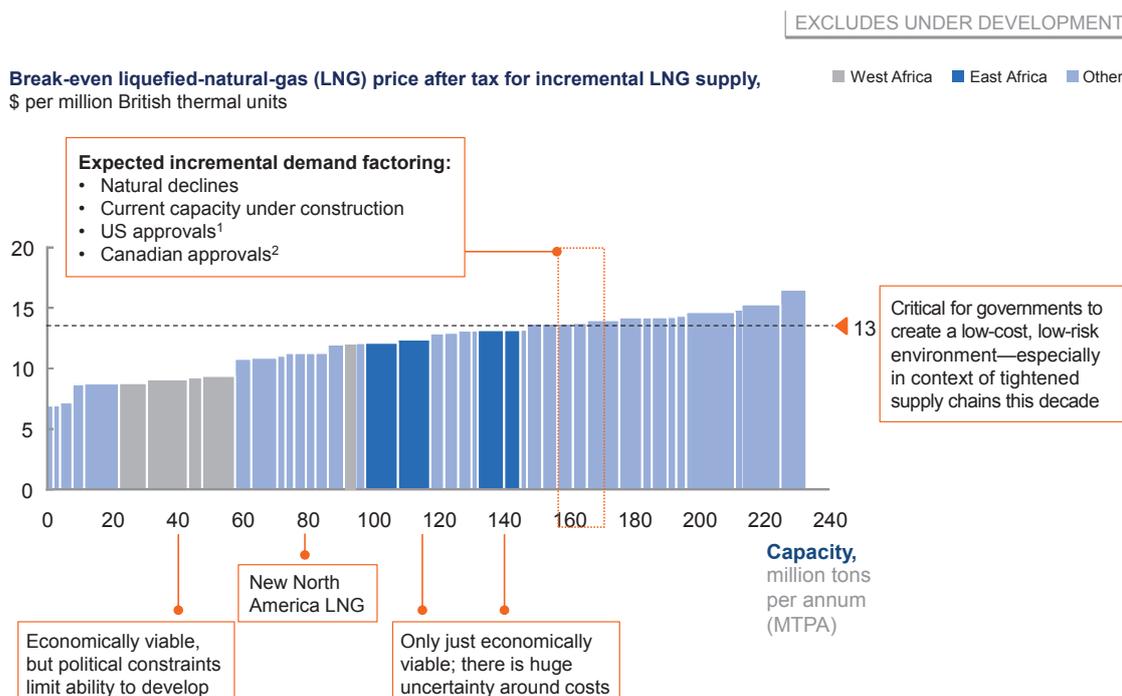
² Rystad Energy and Wood Mackenzie.

³ Eduard Gismatullin, "In Kenya, the next big oil patch," *Bloomberg Businessweek*, March 14, 2013, businessweek.com.

⁴ HIS Hearold.

⁵ EIU; HDRO calculations; Human Security Index; World Bank Group; and World Economic Forum.

Exhibit 4 US shale-gas production threatens the economics of some East African LNG projects.



1 Cove Point, Freeport, Lake Charles, and Sabine Pass (total 57 MTPA capacity and 52 MTPA supply).
 2 Kitimat and Douglas Channel (total 6 MTPA capacity and 5 MTPA supply).

A local way forward for winning operators

The most successful operators on the continent respond to these challenges by both following global best practices and focusing intensely on the local and national context of projects. As in most markets, project operators in Africa have their hands full: they must manage risks, select the right concepts and designs, standardize and use offsite fabrication of modular units, run supply chains effectively, supervise contractors, and train staff in world-class operating systems and standards.

Today, however, this is not enough. For example, the high proportion of construction executed outside Angola to develop the offshore Kizomba projects—often cited as great examples of standardization—would not be possible now given local-content requirements. Operators must explore novel approaches to manage country-specific challenges such as local-content regulation, shallow supplier markets, poor infrastructure, security, and scarce talent. A key to overcoming these hurdles is partnership in four categories of relationships.

All business is local

Partnership at the most local level is critical for success. Failure to manage relations in local communities can hinder or even shut down operations, through oil theft, vandalism, and kidnapping of employees. In Nigeria, for example, it is becoming more important to engage everyone in a certain village or clan, not just to make deals with the traditional or hereditary leader, as a way to manage these potential problems. During due diligence in one Nigerian case, an operator considering an acquisition closely reviewed an existing memorandum of understanding with three major clans and tribes covering roads, schools, scholarship opportunities, and employment opportunities. The acquiring company met with the tribes to assure them that the memorandum would be respected, and even refreshed it.

Operators are increasingly savvy about community engagement, making sure to collaborate with local governments so that their projects fit into the area's broader economic-development plans. For example, Seplat's engagement efforts in Nigeria included encouraging local employment, placing its field office in the heart of the area, listening closely to

communities in defining a memorandum of understanding, and paying attention to traditional hierarchies to make sure it approached the right people in the right order. One benefit of this cultural sensitivity is reduced theft of crude oil.⁶

Hands across the industry

Pan-industry partnerships are often effective ways of tackling common challenges. In one country, operators responded to new local-content regulation by coming together through their trade group and sponsoring a study of the industry's long-term need for goods and services in that location. Their analysis generated a clearer picture of which goods and services were most likely to support the development of a competitive, stable local-supplier market in the future. Several operators we spoke to say the key to increasing local content as a proportion of total hours worked lies also in good partnership with the supply chain—planning ahead and both developing and prequalifying suppliers for projects well ahead of the final investment decision. Where this works, the impact can be high. In Nigeria, Total has increased local-content hours on its deepwater projects, by 28 percent on Akpo, 59 percent on Usan, and a planned 75 percent on Egina.

In another case, operators worked together to manage regulatory risk by developing a cross-industry view of the impact of a new fiscal regime on their portfolios. They used a neutral third party to aggregate and analyze data, eventually leading to the conclusion that harsher regulation would likely decrease investment, jobs, and growth. The study enabled a constructive dialogue with regulators.

In recent years, many operators have financed and built power plants to create a monetization route for their gas and to demonstrate local relevance and acceptability. Major oil-and-gas companies can use their expertise in project management, engineering, and finance as well as their ability to negotiate long-term, off-taker contracts to try to make other parties across the value chain successful in developing power. As one West African independent operator told us, “We don’t want to put our capital into power, but we can make a huge difference simply by guiding our partners to make projects bankable.”

Partnership becomes even more critical when we look beyond power. Broader usage of gas—as a feedstock for products such as fertilizer or plastics, for example—will be a major monetization route but is well beyond the core business of oil-and-gas companies. Nonetheless, they can offer these

partners expertise in capital-project management and knowledge of the local business systems and requirements.

Working at the national level

Effective regulation at the national level is key to a stable, successful oil-and-gas sector. A McKinsey survey of stakeholders found that local-content regulation in Africa, however, is frequently ill adapted to the needs of the industry.⁷ Local content regulation should encourage the growth of domestic support industries that have a realistic chance of success with a parallel objective of keeping production costs competitive. Efficient, capably staffed regulatory agencies are vital to delivering on the economic promise of local content.

Governments should also consider the opportunity costs of regulation. For example, national processes are frequently too long and complex, and they impose higher costs on operators than necessary. We have seen 20-year contract-approval cycles for major deepwater projects, from license award to actual oil production. Governments could benchmark their contract cycle times and processes with what’s happening in the rest of the industry globally. The industry should work actively with governments, for example, to explain why a minor stipulation in regulation could actually take a long time to fulfill.

There is considerable potential for NOCs, IOCs, and national governments to cooperate more effectively to increase the productivity of capital and talent and to reduce risk across the industry. What’s more, relentlessly focusing on true partnerships with national governments and NOCs—specifically, understanding and supporting the government’s agenda and building relationships—pays dividends time after time. For example, Eni undertook the construction and rehabilitation of 350 megawatts in generation capacity and an associated transmission grid in Congo, permitting the use of associated gas from the M’Boundi field and allowing the development of off-taker markets. This project, which dramatically reduced flaring, strengthened Eni’s acceptability to the people and government of Congo and increased its long-term importance to the country. A similar dynamic is at work for Eni and the Okpai project, Exxon Mobil and Qua Iboe, and Shell and Afam.

Creating availability of technically qualified graduates is a challenge that might be addressed in part by partnerships between national governments and operators. For example, the industry in Angola will generate up to 70,000 new

⁶ Eduard Gismatullin, “Seplat sees no oil theft in Nigeria, where Shell lost \$1 billion,” Bloomberg, March 14, 2014, bloomberg.com.

⁷ McKinsey Global Institute local-content database.

positions in the coming years. However, each year the country produces only 12,500 technical graduates and 130,000 high-school graduates. Today, expatriates frequently fill the gap. National governments should consider creating technical colleges and petroleum-industry educational institutions to provide the graduates their countries and regions require. Addressing these capability gaps will define which countries succeed longer term and indeed could create a pool of skilled workers that could be used around the world to fill the gap left by an aging Western industry workforce.

NOCs play a critical role in the development of the sector, frequently through joint ventures with IOCs. While there is no one model of success—nor a mandate for a country to have a state-controlled operating company—three core features of successful NOCs have emerged. First, they focus relentlessly on operational effectiveness in combination with national development. They also have the mechanisms in place to ensure sustained adequate funding of operational and capital-expenditure requirements. Finally, they demonstrate best practices in corporate governance including full transparency, with balanced, professional boards. African NOCs should view development of these competencies as part of a long-term transformation effort.

Understanding the merits of regional cooperation

Operators and countries should also consider tighter regional partnerships, particularly on infrastructure development. For example, Uganda would like its partners in the East African Community—Burundi, Kenya, Rwanda, and Tanzania—to take shares in its proposed Lake Albert refinery. From ports to gas pipelines, from roads to railways, Africa's

infrastructure deficit imposes giant costs and restraints on the industry. The emerging basins of East Africa, including the Rift Valley, and the Southern Africa gas corridor will require major infrastructure investment, particularly in pipeline systems.

Overall, we see a big role for regional bodies such as the East African Community and the Economic Community of West African States to facilitate the growth of the continent's maturing energy markets and infrastructure. For example, they could define an overall infrastructure blueprint and engage international organizations such as the World Bank to create financing structures, or create interoperability standards and commercial terms to enable integrated regional gas and power networks.



Africa's diverse, emerging oil-and-gas regions need to compete for a finite pool of capital in an environment where IOCs are under continual pressure to increase returns, particularly given recent oil-price declines. NOCs will have to transform themselves into commercially focused operators or risk irrelevance. The dual forces of rising project costs and pressure on national budgets in the face of growing populations and citizens' expectations of rising living standards further complicate the situation. So, it's in the interest of operators and governments to work together more closely to develop the continent's oil-and-gas sector. Our experience in Africa suggests that focusing on building partnerships will help overcome the obstacles facing stakeholders, leading to a stronger industry and robust economic development.

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