



Enhancing the Performance of African National Oil Companies

2021



AFRICAN DEVELOPMENT BANK GROUP

African Natural Resources Centre

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List of Acronyms and Abbreviations

ADNOC	Abu Dhabi National Oil Company	KPRL	Kenya Petroleum Refineries Limited
AfDB	African Development Bank	LPG	Liquefied Petroleum Gas
AfDB High 5s	African Development Bank's top 5 strategic priorities	NAMCOR	Namibia National Oil Company
ALNAFT	Agence Nationale Algérienne pour la Valorisation des ressources en Hydrocarbures	NDCs	Nationally Determined Contributions
ANRC	African Natural Resources Centre	NNPC	Nigeria National Petroleum Corporation
AU	African Union	NOC	National Oil Company
boe	barrel of oil equivalent	NOCAL	Liberia's National Oil Company
CEO	Chief Executive Officer	NOCK	National Oil Corporation of Kenya
CMMS	Computerized Maintenance Management Systems	OCTP	Offshore Cape Three Points
BOST	Bulk Oil Storage and Transportation	OE	Operational Efficiency
CNG	Compressed Natural Gas	OECD	Organisation for Economic Cooperation and Development
CSI	Corporate Social Investment	OPAC	Operational Performance and Capability
2D	Two Dimension	PETROSEN	Petroleum Company of Senegal
3D	Three Dimension	PIAC	Public Interest and Accountability Committee
EDMS	Electronic Document Management System	PRMA	Petroleum Revenue Management Act, Ghana
EITI	Extractive Industries Transparency Initiative	PURC	Public Utilities Regulatory Commission, Ghana
ENH	Mozambique's National Oil Company	SH2030	Sonatrach's Strategic Transformation by 2030
ERP	Enterprise Resource Planning	SDGs	Sustainable Development Goals
GNPC	Ghana National Petroleum Corporation	SH2030	Sonatrach's Strategic Transformation by 2030
HFO	Heavy Fuel Oil	SOEs	State Owned Enterprises
HR	Human Resource	Sonatrach	Algeria's National Oil Company
HSEQ	Health Safety Environment and Quality	SMHPM	Société Mauritanienne des Hydrocarbures et de Patrimoine Minier
IBRD	International Bank for Reconstruction and Development	SPQR	Systematic, Periodic Quality Reviews
ICV	In-country Value	TEN	Tweneboa, Enyenra, Ntomme fields offshore Ghana
ICT	Information and Communications Technology	TPDC	Tanzania Petroleum Development Corporation
IDA	International Development Association	UN	United Nations
IT	Information Technology	UNOC	Uganda National Oil Company
IDMS	Inspection Data Management System	VRA	Volta River Authority
JV	Joint Venture	VLCCs	Very Large Crude Carriers
KPI	Key Performance Indicators	WAPCo	West Africa Gas Pipeline Company



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THE African Development Bank through the African Natural Resources Centre (ANRC) commissioned the study on African National Oil Companies (NOC) in order to evaluate how African NOCs can create lasting value. It looked at selected NOCs to draw out lessons and grounded experiences which can be shared with both long established NOCs as they continue their development and new companies being initiated. The aim is to provide a useful reference especially to emerging petroleum producers who are seeking efficient models.

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Foreword

REVENUES from oil and gas resources have been the value-creating engines for governments across the globe. For African countries, commercializing oil reserves is a major opportunity to fund the breadth of socio-economic industrialization programmes for which they strive and as a result National Oil Companies (NOCs) have been established by many, whether petroleum producing or still in the process of exploring assets. It is tempting to make the assumption that National Oil Companies must add more value than their international oil competitors but the situation is often more complex. National energy companies usually have multiple roles including revenue generation, local content promotion, providing preferential energy pricing to stimulate the local market and delivering national expertise ranging from geo-data to managing and partnering with international peers. But the window for extracting value from oil is beginning to close as the global energy transition gets underway and NOCs must meet these sometimes diverse objectives while also helping their countries make progress against challenging social development enabling and climate change reduction goals. Countries may no longer have the luxury of multiple decades to develop expertise and iterate progress in oil and gas, in contrast to international companies who may have had the advantage of long histories and a very different socio-political environment.

Several NOCs have been modelled using examples from some of the most successful countries in the world but despite this there have been many

underlying conditions that have hindered these companies from delivering the value to which they aspire.

With these considerations in mind, the African Natural Resources Centre (ANRC) of the African Development Bank (ANCR) has taken a forensic approach to exposing the true issues, costs and opportunities for NOCs with a view to supporting governments to decide on their strategy and to manage NOCs efficiently, as well as taking a practical view to the energy revenue issues for which NOCs are a lightning rod.

This study evaluates how the performance of existing African National Oil Companies can be enhanced and also to set a foundation for any countries considering establishment of such companies in future. The study uses four NOCs in Africa as case studies. The selected NOCs are of different sizes, focus on different parts of the oil and gas value chain and have different experiences in the industry.

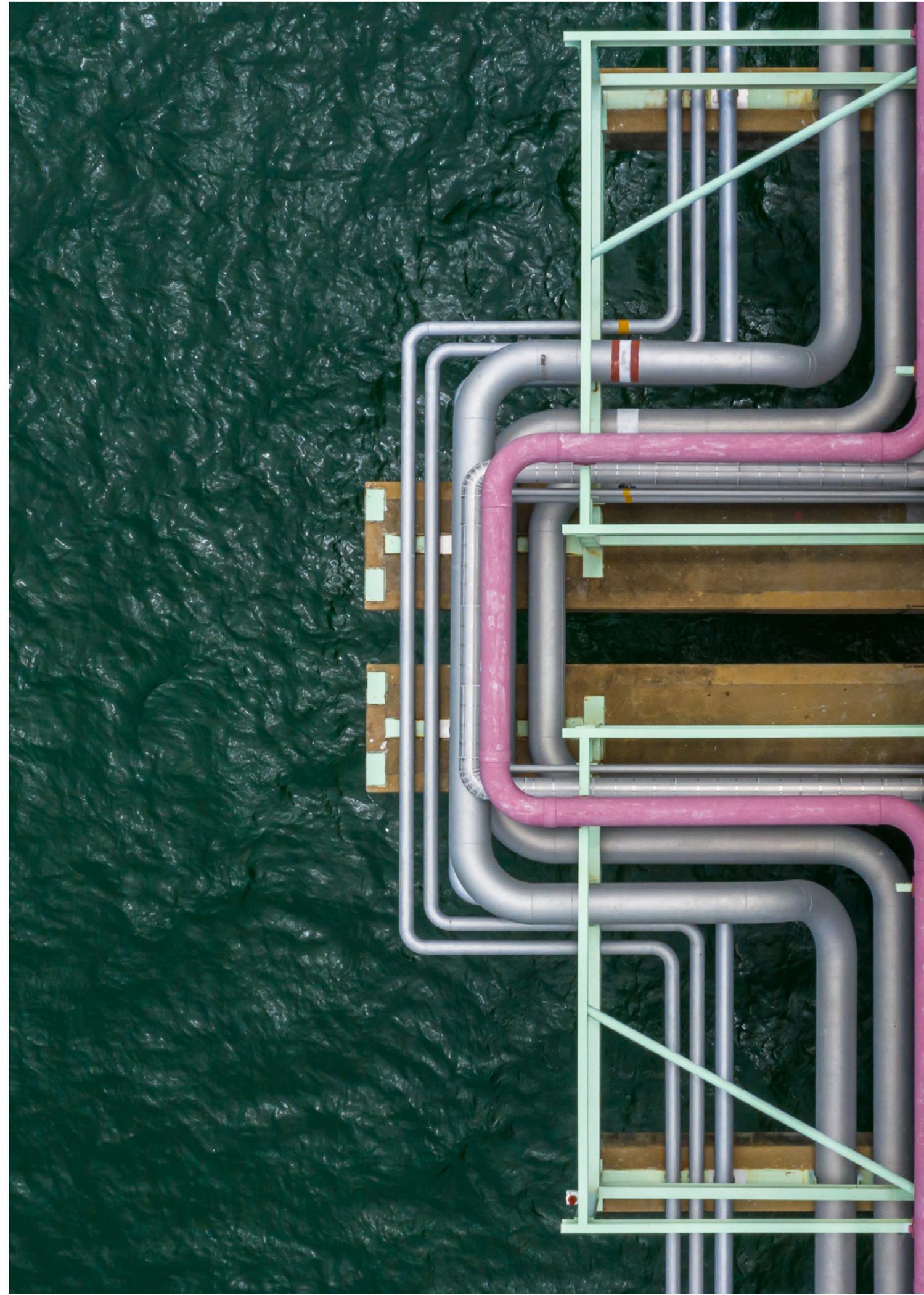
The study offers realistic comparisons with NOCs in similar settings and operating conditions rather than with the world's best companies. A comparison with world-leading may be unhelpful for many companies because of diverse scopes of activities, large differences in business environments and the maturity and experience of the NOCs.



A methodology for evaluating and benchmarking the performance of NOCs has therefore been developed taking into account the regulatory and policy environment in which these companies operate. The study also discusses pathways for enhancing their processes and capabilities. For NOCs, the study underscores the importance of measuring both their socio-economic impact, their financial and operational performance, their environmental stewardship and their contribution to sustainable development by supporting the United Nation's Sustainable Development Goals (SDGs), the African Union's Agenda 2063 and the African Development Bank's High 5 strategic priorities. It highlights common weaknesses broadly attributable to suboptimal internal processes and unclear strategic direction, as well as bureaucratic and hierarchical corporate cultures. If African NOCs are to fulfil their governments' ambitions and demonstrate that they can add more value than foreign oil companies would, they will need to enhance their performance tracking and internal systems.

It is my hope that this report will reach out to all the relevant National Oil Companies, countries planning new NOCs and other decision-makers within governments. It should provide answers to the critical questions of how these entities should improve their performance at the same time as contributing to the fight against climate change and promoting sustainable development. Above all, these improvements should eventually contribute to the maximisation of benefits from petroleum resources for the countries that own them and improve life for their citizens.

Dr. Emmanuel Pinto Moreira,
OIC Director, African Natural Resources Centre





Executive Summary

GLOBALLY, National Oil Companies (NOCs) dominate the oil and gas landscape. By 2019, production by NOCs was estimated at 55% of global total production while they were estimated to hold over 80% of the world’s oil and gas reserves. A significant number of NOCs collect the largest revenue shares for their countries while others carry big debt burdens. The global picture is not very different across Africa. There are about 42 countries in Africa with National Oil Companies (NOCs) in their statutory books. The companies are of different sizes, operational levels and they focus on different areas of business. Where they are operational, some are fully integrated while others focus on only the upstream or the downstream segment.

This study focused on the NOCs of Namibia, Kenya, Ghana, and Algeria. All four NOCs are 100% government owned. Most global analysis of NOC performance and value creation focus on major producers, but investments made by emerging NOCs are vital to their economies and the report examined these with similar care. This is critical because these emerging NOCs dominate the continent. They include UNOC of Uganda, ENH of Mozambique, TPDC of Tanzania, NOCAL of Liberia, SMHPM of Mauritania and Petrosen of Senegal among others. There are also many countries without NOCs which are considering whether and how to establish one. These emerging NOCs operate in a markedly different environment from the NNPCs and Sonatrachs of the continent – most notably with limited upstream income. The study offers specific pathways for analysing improved

performance and potential value creation by NOCs in Africa.

The methodology used in this report for evaluating NOC performance innovatively combines four dimensions of NOC value creation:



The financial comparisons against peer NOCs serve to illustrate the balance to be struck between petroleum rent making and profit-seeking that can optimize financial value for the country. The financial data also enable us to tease out comparative performance by peer sub-group (e.g., by region, production level or mix, geology, experience level and role in the sector). The socio-economic benchmarking highlights programmes delivering value to countries but finds these are too often pursued without strategic direction and their impact rarely monitored or evaluated by the companies. The operational benchmark indicates that the companies broadly have leadership which is aware of best practices, and



some initiatives to implement these practices but only occasionally organisations that are enabled to fully implement best practice.

This study highlights many strengths of these four national oil companies; for instance, National Oil Corporation of Kenya's geoscientific services and facilities, NAMCOR's upstream stakes and data management, GNPC's experienced upstream technical staff and deep understanding of Ghana's geological potential and Sonatrach's financial and technical might, guided by a dynamic new strategy.

The study also identifies common weaknesses broadly attributable to sub-optimal internal processes, unclear strategic direction, as well as bureaucratic and hierarchical corporate cultures. If NOCs are to fulfil their governments' ambitions and demonstrate that they add more value than would foreign oil companies, they will need to enhance their performance tracking and internal systems.

The study proposes benchmarking indicators related to these dimensions of value creation and establishes a baseline assessment (limited in certain functions by data availability) for the four companies. Future benchmarking studies can track how the performance of these NOCs progresses over time and expand the sample to other comparable peers globally which will enrich the data set and potential learnings.

The study includes recommendations for governments and NOCs for maximizing value creation. It also suggests next steps to improve the current benchmarking processes and methodologies.

Recommendations for governments:

- i. Establish clear and prioritized strategic goals to guide NOC investments.
- ii. Provide consistent and predictable direction to the NOC.
- iii. Limit interference in the NOC's operational and managerial decisions. Autonomy is critical to performance.

- iv. Establish professional boards to provide oversight and accountability mechanisms for NOCs.
- v. Develop indicators for evaluating financial value creation, which are adapted to the NOC's circumstances (e.g. whether in pre-production or production phase).
- vi. Determine the 'right' level of NOC fiscal contribution, balancing between higher transfers to (or from) the state today and allowing reinvestment in the company's growth for long-term fiscal returns for the state.
- vii. Assess how well the NOC achieves its reserve-expansion goals (and any associated trade-offs).
- viii. Limit the scale of NOC discretionary programmes on welfare and require the NOC to measure impact and cost.
- ix. Avoid asking the NOC to spend on programmes outside of the scope of its operations, as quasi-fiscal expenditure bypasses normal budgetary avenues and limits the NOC's available capital.
- x. Carefully assess the costs and benefits of requiring the NOC to provide energy below market price. (One of these opportunity costs is the inability of these NOCs to invest in other activities).
- xi. Review civil service rules that apply to the NOC, in particular when it aims for the competitive responsibilities of operatorship, to find a suitable balance between control and enablement mechanisms.
- xii. Benefit from the NOC's ability to oversee operations from the ground up. (Ensuring the NOC has stakes in development licenses can give NOCs better visibility of operators' plans).
- xiii. Release the NOC from regulatory responsibilities so that it can focus on its commercial role enhancing its capacity to self-finance and access financial markets.
- xiv. Ensure sustainable development of the oil and gas industry by making sure that companies including NOCs maintain environmental stewardship and contribute to SDGs, Aspiration of Agenda 2063 and NDCs under the Paris Agreements and thus to the AfDB High 5s.

Recommendations to enhance NOC performance:

- i. Encourage systematic evaluation of value creation (and benchmarking) by establishing baselines of conditions at the beginning of new projects, setting specific targets or KPIs, measuring impact, tracking progress over time and using the results to improve projects on a continuous basis.
- ii. Disclose financial and operational data to shed light on performance and allow for more effective benchmarking against peers.
- iii. Evaluate and improve internal processes, as part of an ongoing progression towards operational excellence.
- iv. Formalize roles, accountabilities, responsibilities and commit resources to allow implementation of best operational practice.
- v. Champion best practice processes at the leadership level.
- vi. Formalize standards and simplify processes and procedures for each business segment to drive costs down.
- vii. Introduce performance management and continuous improvement systems.
- viii. Establish company-wide risk management processes.
- ix. Evaluate investments with socio-economic objectives under similar scrutiny as purely commercial projects.
- x. Ensure investments are guided by long-term strategic objectives, without lags in the strategy process.
- xi. Stress test the company's portfolio and long-term strategic objectives against expected industrial and policy transformations and climate risk.
- xii. Partner with IOCs in a diversification strategy to develop and source new capabilities given budget constraints and diminished talent access.
- xiii. Pursue gas infrastructure partnerships to increase electricity access to households in Sub-Saharan Africa.
- xiv. Allow systematic evaluation of projects' environmental sustainability (and benchmarking) by establishing baselines of conditions, setting specific targets or KPIs, measuring impact, tracking progress over time and using the results to improve projects on a continuous basis.
- xv. Allow systematic evaluation of how well business is aligned with SDGs, Agenda 2063 Paris Agreement and AfDB High 5s by establishing baselines of conditions, setting specific targets or KPIs, measuring impact, tracking progress over time and using the results to improve on a continuous basis.

Recommendations for future benchmarking:

- i. Identify comparable peer-groups with specific metrics (e.g. compare companies with heavy domestic energy supply obligations, similar production levels, production mixes, geologies, experience levels and roles in the sector).
- ii. Gather a dataset of NOC expenditure on wages, to allow for comparisons of labour productivity.
- iii. Gather datasets on socio-economic value creation that indicate to NOCs which programmes create most benefits.
- iv. Gather datasets on profitability of different segments of the value chain.
- v. Gather datasets on environmental stewardship and alignment with SDGs and Agenda 2063 that indicate which projects are not on the sustainable path and highlight areas of misalignment with SDGs, Agenda 2063, Paris Agreement and AfDB High 5s.

01

Introduction: Aims and Objectives

Countries endowed with oil and gas hope these resources will lift their economies. They often create national oil companies (NOCs) to act as vehicles for participation in the oil and gas sector, to capture a greater share of the resource rents and act as catalysts for the implementation of broader development goals. The fulfilment of these aspirations depends on the technical and commercial ability of the NOCs, as well as the operational environment provided by their governments. The ability of NOCs to carry out their mandate should therefore be assessed, as should the inducements offered by their government. This study proposes a methodology to evaluate and benchmark the performance of select African NOCs, taking into consideration the regulatory and policy environment in which they operate. It also offers pathways for enhancing their processes and capabilities.

Fundamentally, this study puts a question to African governments: are investments made by the NOCs creating value for the country? This vital question should be asked regularly, and this study offers a methodology for answering it. The importance of NOCs to the national petroleum sectors across the African continent is plain

to see. From established, historic oil producing countries to emerging petroleum provinces without proven oil and gas reserves, there is a footprint of national oil companies. Governments establish these companies to increase benefits to their country, financial and otherwise; benefits they might not obtain from foreign private oil companies, which are focused on creating value for their shareholders. Governments count on

NOCs to ensure energy security, develop national skills, and support local content, for instance. But rarely do they measure how well they have achieved these goals or consider the cost-benefit analysis of these investments. And thus, rarely do NOCs internalize these broader goals with performance indicators, to allow reporting on progress made and value generated.

The hope is that this study will help governments and citizens make a more informed and nuanced view of how NOCs can create value and the information required to make a systematic assessment of NOC value. For established NOCs, the study should make clear how important it is to measure their socio-economic impact, their financial and operational performance as well as their environmental stewardship and contribution to sustainable development. In addition, the study will form a basis on which countries planning new NOCs can evaluate what needs to be emphasized in establishing a successful NOC.

In the context of the NOC's broader mandate, which encompasses more than maximising profitability, performance has been defined as the economic behaviour by the NOC that is conducive to overall value creation. Value is defined by government (or shareholder) objectives. NOCs can deliver value in different ways. As Paul Stevens explained, NOCs directly create value, either through their role as operators or through their national mission. They can also create value indirectly, as advisors to government or as regulators of the oil and gas sector. The NOC's capacity to fulfil its mission and objectives determines its contribution to value creation.

Section 2 introduces the four NOCs selected to participate in this study, with a presentation of the strategic objectives of each NOC, as well as their distinctive

corporate culture and values. This section will also present a comparative view of the scale of their activities through the oil and gas value chain. This will highlight where the NOCs stand on the pathway to the development of technical upstream capabilities. Section 3 articulates a three-pronged benchmarking methodology developed for making this assessment of value creation by NOCs. Section 4 applies the benchmarking methodology to the selected NOCs with regards to operational excellence and national socio-economic value creation and reflects on how to benchmark them on financial value creation. Section 5 will focus on the role of government in NOC performance. It examines the direction and support given to the NOC by government, as well as any obligations that make it difficult for the NOC to compete with private companies. The concluding section traces the possible future trajectory of the companies in the study. Section 6 also offers some general guidance on which business segments can create value in Africa and the importance of prioritizing NOC objectives. The study concludes with recommendations for governments, NOCs and for future benchmarking.

Silvana Tordo (2011). *National Oil Companies and Value Creation*, World Bank Working Paper No. 218, Available at: <https://siteresources.worldbank.org/INTOGMC/Resources/9780821388310.pdf> (last accessed 11 March 2019)

Stevens, P. (2008). "A Methodology for Assessing the Performance of National Oil Companies." Background Paper for a Study on National Oil Companies and Value Creation, World Bank, Washington, DC. Available at: www.worldbank.org/noc.



02

Profile of selected companies



This section introduces the four national oil companies included in this study. As this report will make clear, they are very different and have historically been active in quite different sectors. Namibia National Oil Company (NAMCOR) has sought to import and store fuel products. The National Oil Corporation of Kenya (or NOCK) is established in retail. The Ghanaian NOC, GNPC, has large ambitions for growth of its upstream business. Sonatrach is a fully integrated oil company and invests in renewable energy. In order to introduce the companies, the profile will begin with a review of their strategic outlook, to understand what objectives guide them, and then provide a brief introduction to their corporate cultures and values, and finally present the range of commercial activities they currently undertake.

Company website, <http://www.nationaloil.co.ke/site/2.php?id=4> (accessed 12 Nov. 2015).
Valerie Marcel (2016). *The Cost of an Emerging National Oil Company*, Chatham House; Available at: <https://www.chathamhouse.org/sites/default/files/publications/research/2016-03-01-cost-emerging-national-oil-company-marcel.pdf>
NOCK, "Strategy Roadmap 2017-2020"; Presentation shared with the consultants.

2.1. Are the strategies clear?

This study does not benchmark the NOCs performance on the basis of future plans, but the quality of their strategy processes is an important indicator of their capabilities. The strategy process should ensure investments are continuously guided by long-term objectives, with risks and opportunities assessed at regular intervals. Some of difficulties with the strategy process are related to delayed or unclear government direction. This will be addressed in greater detail in Section 5.1.1.

In some NOCs, the term of the strategy plan has expired (NAMCOR) or is nearing expiration (GNPC). At NOCK, the strategy expired in 2016, but the company developed a three-year interim strategy, in anticipation of a long-term strategic review that began in 2019. Sonatrach was the only company embarking on the implementation of new strategy – having sailed without one for some years preceding, however.



2.1.1. At NAMCOR and NOCK

At NAMCOR and NOCK, recent strategies have focused on developing upstream capabilities and acquiring stakes. Kenya made 7 oil discoveries in Turkana county between 2012-14, prompting NOCK to redirect its strategy towards the upstream. The majority of its focus and its manpower had hitherto been in retail, while its technical upstream team was only 20–25 people (approximately 10% of the total workforce). The company is in the process of recruiting 34 further technical staff for positions in the upstream and sent them on postgraduate oil and gas courses abroad. NOCK's regulatory role was transferred to the Ministry of Petroleum and Mining – though it retained responsibility for petroleum data management. NOCK's

strategy aimed to act as an adviser to government in the development of national petroleum resources and, according to its 2017/18 – 2019/20 strategic plan, the company planned to become the “go-to authority” on oil and gas matters. Several of its technical staff were seconded to the Ministry of Petroleum. The company would develop its upstream capabilities and its upstream support services (e.g. laboratory, drilling services, seismic processing). While this was not raised in interviews, the strategy presentation refers to company goals of reaching first oil in its operated Block 13T by 2022 and operating at least two blocks by 2027.

From interviews with the various support functions of NOCK, its upstream and downstream operational units, and senior leadership it did not appear that the importance of the upstream goals permeated through the company. That the upstream unit has been without a permanent general manager for the last three years probably contributes to the loss of momentum. Only once did a manager describe plans to acquire two offshore blocks to explore for gas and to establish a drilling services company to capture In-Country Value from Tullow’s planned 300 wells in Kenya using the geothermal industry’s idle rigs. In contrast, the expansion of the retail network was repeatedly cited as the key priority driving the company, with executives pronouncing significantly less certainty in the upstream potential.

At the time of interviews in 2018, the leadership of the company was focused on the retail activities, which it saw as the most promising area, the “flagship” of the company. NOCK set an ambitious target to reach a domestic market share of 10 per cent within the next two-and-a-half years. It wanted to reach 300 stations; primarily through partnerships with Kenyans under a franchising model. However, it was not made clear to the consultants what NOCK’s comparative advantage would be in the retail sector. Another area of focus was scaling up its supply of LPG, lubricants and jet fuel, which the leadership saw as a growth area. It remains to be seen how the departure of the company’s CEO in October 2019 and replacement by a new one will affect the company’s direction.

The Institutional Review study in 2017 had recommended splitting NOCK into upstream and downstream companies, with a third unit to act as a special purpose vehicle for state participation in back-in rights.

This focus on the retail business was attributable to the fact that it has long been the revenue generator and principal activity of the company. As the company engages in a long-term review of its objectives, the upstream is coming back to the fore. The strategy process indeed restarted in March 2019, supported by a firm hired by the World Bank’s Kenya Petroleum Technical Assistance Project (KEPTAP) to help develop and implement a transformation plan. The plan is envisaged to be a 15-year long-term strategic blueprint that is aligned to the country’s development agenda. The transformation plan is taking a whiteboard approach and is not required to build on the previous institutional review commissioned by the World Bank’s KEPTAP programme. The Institutional Review study in 2017 had recommended splitting NOCK into upstream and downstream companies, with a third unit to act as a special purpose vehicle for state participation in back-in rights. The Ministry of Petroleum supported this idea of a special purpose vehicle and initiated discussions with the London Stock Exchange for a public listing (World Bank, 2018). Interviews in the fall of 2019 indicated that discussions around NOCK’s strategy were deadlocked with the Ministry of Petroleum opposing a significant upstream role for NOCK (Government direction is discussed in greater detail in Section 5.1.1). The Energy Regulatory Commission was rebranded as the Petroleum Upstream Regulatory Authority and assigned upstream regulatory functions following legislative changes in 2019. This was with the aim of improving the institutional framework and streamlining



Interviews and World Bank document (2018); Available at <http://documents.worldbank.org/curated/en/439761516440291612/pdf/Disclosable-Version-of-the-ISR-Kenya-Petroleum-Technical-Assistance-Project-KEPTAP-PI45234-Sequence-No-06.pdf> (accessed 8 March 2019)

It was apparent from interviews and the lack of documentation on an interim strategic plan that there is no formalized strategy to communicate throughout the company.

collaboration amongst the institutional bodies. The full impact of the Authority is slow to materialise. It is short of skilled personnel, which are available at the Ministry of Petroleum. Therefore, the ministry still has more influence than it should on regulatory activities.

NAMCOR's previous strategy, which had a focus on acquiring equity stakes in exploration blocks, building a reputable geological database and developing capacity to become an upstream operator, ran through to April 2018. The company has been creating a new strategic plan for the next 5 years and in the meantime was working with an interim plan in 2018 (which was not shared with us). According to one executive, the company's new focus will be on establishing a separate entity for the upstream activities (the company could not clarify whether this entity would aim for operatorship), farming down existing equity stakes, capitalising on data sales and bringing the Kudu gas field to development. A company Health, Safety, Security and Environment (HSSE) report referred to "NAMCOR's vision of becoming a N\$5 billion company by 2020". In interviews, a senior executive said the future strategy would focus on tightening up the company's revenue generation and increasing the prospects of underexplored areas. On the latter objective, there is some hesitation in the company as it does not want to remove opportunities from foreign oil companies that would have both more financial might than NAMCOR and better current ability to explore those blocks. According to one executive, NAMCOR is moving from being a regulator for the upstream to becoming a commercial player.

It was apparent from interviews and the lack of documentation on an interim strategic plan that there is no formalized strategy to communicate throughout the company. Two objectives are clear to management: develop the Kudu field and invest in retail. The company's upstream growth is the area of uncertainty - specifically, whether the company should aim to take on a dominant position in exploration acreage.

2.1.2. At GNPC

GNPC's strategy, developed for the 2012-20 period, was to become a stand-



alone operator by 2019 and a world-class operator by 2027. Following presidential elections in 2016, there was a change in policy direction, management and the organisational structure. Regarding the change in policy direction, the fundamental tenets of GNPC's "accelerated growth strategy" to operatorship remained intact: GNPC would focus on capacity building, reserves replacement, optimized management of capital and

investment as well as catalysing local content development. However, there was a "strategic re-calibration" to pursue the following:

- i. Re-positioning the 5-year onshore Voltaian Basin Project as the strategic vehicle to achieve operatorship. GNPC's goals are to de-risk the basin to attract partners - and build its capacity towards operatorship while doing so. It had previously been focused on its offshore acreage and the company is seeking to be allocated a shallow offshore block to operate;
- ii. Gaining a social license to operate for onshore exploration through what the company calls "Corporate Social Investment" (CSI), a term meant to highlight the long-term returns on investment in the wellbeing of local communities;
- iii. Focus on achieving financial independence (the company's perceived lack of liquidity has been a constant concern) through efficiency and cost reduction measures as well as diversifying revenue sources.

Human resources estimated that the company has developed 70% of the

GNPC, "Our Strategy," http://www.gnpcghana.com/our_strategy.html, (accessed 8 February 2019).

competences required for operatorship from 46% at the outset of the strategy. Those responsible for the strategy process acknowledged that the timeline for achieving the operatorship milestone “may need to be revised” since it was unlikely to achieve operatorship in 2019. They explained that the strategy review process was ongoing.

Interviews indicated that the operatorship strategy is not actively supported throughout the company’s departments. In several interviews with the upstream divisions, the goals of the strategy were not spontaneously raised by managers or were expressly discredited. For instance, while the stated company goal is become an operator and all departments are meant to direct their plans to achieve that goal, several managers characterized the company plans for the onshore acreage in the Voltain basin as “collecting data to promote the acreage and bring in qualified partners.” Their interest was in developing prospects for farm-ins. When asked about the operatorship strategy, managers in the upstream frequently replied that it was unrealistic. The human resource department’s development plan towards operatorship did not appear to guide their thinking.

2.1.3. At Sonatrach

Sonatrach stands out among the NOCs studied as one that was embarking on a new strategy at the time of interviews in 2018, with high levels of alignment with

Under this strategy, Sonatrach plans to invest in solar energy to meet demand at its facilities, domestic consumers and for export.

the strategy across the divisions at a senior level. After years of poor performance and little strategic direction, the company was taking 5 years to rework its fundamentals and driving a push to bring the company from “competence to excellence,” joining the ranks of the five top producing NOCs by 2030.

However, two months after the interviews were conducted, a widespread popular protest movement

erupted, leading to the forced resignation of President Abdelaziz Bouteflika in April 2019. The government’s response to the protests included a wave of indictments of senior government officials and also the dismissal of Sonatrach’s CEO. After

some months without clear signals on the new leadership’s intent with regards to the transformation strategy, the new CEO Rachid Hachichi indicated in October 2019 that the company remained focused on its implementation. Mr. Hachichi was replaced in November by Kamel-Eddine Chikhi, but the fact that his appointment coincided with the passing of the (domestically contested) new hydrocarbons law that underpins the transformation strategy gives some indication of government’s continued support for the strategy.

The 2030 strategy is based on an assessment of vulnerability to price volatility, both historic and future, resulting from the energy transition. Under this strategy, the company is focusing on capturing value rather than on maximizing volumes produced. In the upstream, value creation means a focus on efficiency, reducing operating costs by 30%, and reducing time to first oil. The strategy also takes stock of the depletion of Algeria’s fields, partial reserves replacement and poor performance in exploration and the risks involved, leading to a decision to rely on partnerships with foreign oil companies for exploration and for the development of unconventional and offshore hydrocarbons. But the strategy goes beyond upstream, with a focus on the transformation of hydrocarbons into petrochemicals and electricity. The company is looking to meet the demand of end users with high value products. Its strategy is more focused on petrochemicals than refining.

Under this strategy, Sonatrach plans to invest in solar energy to meet demand at its facilities, domestic consumers and for export. It plans to have 80% of its own electricity needs covered by solar by 2030. In that timeframe it will expand solar generation to 1.3 gigawatt and eventually 4 gigawatts (current domestic demand is 14 gigawatts, which is expected to grow to 22 in 2030). This is ambitious and there seems to be sufficient commitment. Sonatrach has been ramping up investment in new energies since 2017. There was an increase of more than 3500% in 2019 (see Table 1).

TABLE 1. Change in capital expenditure on new energies by Sonatrach, 2017/2018/2019

	2017	2018	2019
Change %		82 %	3 506%

Source: Company Data

In-country value (or local content) creation is a key feature of the new strategy. It aims to retain 55% of spend in-country by 2030. There was less understanding of the current state of progress towards increasing in-country value creation among executives, with some thinking the planning was more advanced than it was. Conversely, there was also doubt about the target among some executives, who saw it as an aspirational ‘vision’ and not an operational target. However, plans are to set Key Performance Indicators (KPIs) for each division, with performance against these affecting managers’ pay.

The company had been without a strategy for some time. The new strategy involves a profound overhaul of management practices, corporate focus and values. While there was no divergence or dissent perceived in interviews, it appears that some executives had opposed the restructuring and transformation even before popular protests erupted. Press reports indicated that eight senior executives were dismissed and replaced by people closer to the leadership and supportive of the plan.

2.2. Corporate culture and values

Corporate culture and company values are important barometers of how employees feel about their company, how performance is rewarded, and whether the strategy guides them.

2.2.1. NAMCOR

Words used to describe the culture at NAMCOR were: ‘vibrant’ and ‘dynamic’. NAMCOR staff is young and motivated to join the company (in spite of salaries capped by the SOE Law). In interviews, executives indicated staff were excited to be part of a moment in history where – they feel sure - discoveries will be made. NAMCOR is seen as a good employer, according to company executives, in

Algérie Part, 19 May 2018; <https://algeriepart.com/2018/05/19/exclusif-sonatrach-dinosaures-saboteurs-allergiques-changement/> (Accessed 24 January 2019)

Algérie Part, 13 August 2018 ; <https://algeriepart.com/2018/08/13/reuters-confirme-informations-dalgerie-part-8-vice-presidents-remplacent-sein-de-sonatrach/> (Accessed 24 January 2018)



part because of its attractive non-financial benefits (skills development and health benefits). For practical reasons, interviews were limited in scope at NAMCOR and the study can only offer a partial assessment of its corporate culture.

In the background, 2018 unfolded with serious internal difficulties: NAMCOR’s managing director was under investigation regarding alleged corruption and malpractice, during which period he was on leave. The ensuing battle with the company’s chairman ended with the chairman resigning and managing director being reinstated. This was not mentioned in discussions with the company, though decision-making and morale are likely to have been affected by the fact that the managing director was on extended leave and clashing with the chairman.

2.2.2. NOCK

At National Oil Corporation of Kenya, the culture is predominantly one of a commercial entity in which staff is expected to perform and deliver results. Interestingly, on the website Glassdoor, through which former and current employees can provide anonymous corporate reviews, a reviewer who had worked at the company for over 5 years commented that it should “Rediscover the old organization culture”. This comment, which echoes some of those made in interviews, seems to point to the period of upstream growth that followed

the Tullow discoveries. Since then upstream technical staff fell from a high of 54-59 in 2015 to 22 in 2018. It appears some of the younger trained staff were laid off. Otherwise, the attrition could have been caused by the financial woes of the company, the removal of previous CEOs, and the accusations of fraud – though this was not discussed in interviews. Comments made on Glassdoor also pointed to slow, bureaucratic decision-making processes.

2.2.3. GNPC

When asked to describe GNPC in one word, interviewees offered many instead: bureaucratic, slow, centralized... This opened discussions on how they would like to see the company: one with a defined corporate culture that guides employees towards more personal accountability, more delegation and cascading authority, enabling decisions to be taken at the operational level, more continuity and less politics, and more openness.

With regards to the description of the company as bureaucratic, there are some constraints on decision-making that stem from government rules of state-owned enterprises (e.g., procurement, as discussed in section 5.2.4). But the company has also favoured centralized, hierarchical decision-making and approval systems. Several operational decisions require CEO approval e.g. training. Together with a reluctance to take decisions at a lower level, the approval process is described as “slow, slow,” even where specific threats to the business were identified at the managerial level.

Yet, GNPC’s attrition rate is negligible, which indicates a good level of work satisfaction. Executives could name the individuals who had left the company. Thanks to benefits and perks, compensation was described as ‘competitive’. Some managers had noted that the flexibility of work at GNPC enabled managers to

Windhoek Observer, 17 August 2019; <https://www.observer.com.na/index.php/national/item/10220-mulunga-faces-criminal-charges> (Accessed 26 February 2019)

The Namibian, 10 October 2018; <https://www.namibian.com.na/182177/archive-read/Kauta-resigns-from-NAMCOR> (accessed 26 February 2019)

The review was posted on 12 February 2019. <https://www.glassdoor.co.uk/Reviews/National-Oil-Corporation-of-Kenya-Reviews-E885336.htm>

work outside the company in their own or family businesses. Against this light, the lack of turnover can be an indicator of some level of complacency.

However, interviews also revealed human resources as a strength in GNPC, with very competent managers who clearly care about the company and creating benefits for Ghana. Female managers have strong voices too, a clear asset for this NOC.

2.2.4. Sonatrach

Sonatrach recently revamped its corporate values. They embody many of the aspirations that were articulated by their Ghanaian counterparts as well as those in other NOCs. The new corporate values at the core of the transformation plan are simplicity, action, delegation, initiative, communication and cooperation. These values are aspirational within Sonatrach too and are the polar opposite to the values used by managers and employees to describe Sonatrach until now. At Sonatrach and in many other NOCs, hierarchical decision-making, respect for seniority, reluctance to delegate, attachment to symbols of power and authority (e.g. a closed, corner office), and hoarding of information are more characteristic values. But the cultural transformation of this plan points to a ‘model’ NOC. To make this happen the company is promoting awareness of the values and the senior executives are expected to model them. One executive explained he uses a desk in the new open plan office, to be with his team. Another said that senior management is teaching subordinates that mistakes won’t be sanctioned, and they should be encouraged to take initiatives. Another highlighted that the office door of the CEO, who was the architect of the transformation strategy, was always open.

Interviews with HR indicated that new recruits were largely young graduates. They are said to be supportive of the transformation plan although that was not confirmed by our own research. Performance and digitalization are a part of their language, thanks to contemporary movies and other cultural references. However the success of the transformation will depend on how well the new values trickle down to lower echelons of the company. Almost all of the 32 reviews by full-time

staff recorded on Glassdoor in 2018-19 indicate that low salaries were a major disincentive; many also complained about corruption, bureaucratic processes and lack of competence development.

Each division at Sonatrach has its own distinct culture and way of operating. For instance, refining was shaped by its partnership with Bechtel and is more American, while midstream is more influenced by French corporate culture. Until now, managers and staff did not move across divisions as they would in international oil companies, which reinforced these differences. But this, a manager explained, would change with the new competence development and professional development programmes.

2.3. Comparative review of the scale of their activities

As mentioned, the four companies are very different (see Table 2), both in terms of the scale of their operations and where their countries stand in the development of their resource base. The scale of Sonatrach's operations far outweighs its peers in this study, as it is an established exporter of crude oil, natural gas and condensates; it operates major fields, an extensive pipeline network and also a refiner. Sonatrach holds majority rights in most licenses and dominates the petroleum sector in Algeria. In 2016 it was producing 1.2mn b/d of crude oil and 2.5mn boe/d of natural gas (company data, 2016). The upstream accounts for 87% of the company's capital expenditure (CAPEX), while the downstream (including refining, petrochemicals and liquefaction) amounts to 3% of its investment and midstream 9%. Sonatrach is the only NOC in this group which is actively investing in renewable energy. Sonatrach's spend on solar represented 2% of total investment in 2019.

Next in size is GNPC, which is primarily an upstream company aiming to operate a field in the coming years. It holds minority stakes in producing fields and therefore retains earnings from crude oil and gas sales. GNPC's share of oil from production sharing agreements in Ghana stands at 13,218 b/d of crude oil (PIAC data, 2016). It

has historically been active in some non-petroleum sectors, such as cocoa, and is still active in gold mining through a subsidiary. It is responsible for aggregating gas for domestic use and sells some heavy fuel oil but is not involved in other segments of the petroleum value chain unless it is necessary to relieve bottlenecks.

National Oil Corporation of Kenya is primarily a retail NOC, which is the company's only source of revenue, according to data provided by the company, though closer examination revealed it also received revenues from data sales and transfers from government. It also owns storage tanks. It has the option to take minority stakes in all the exploration licenses. It currently has 12% of its staff in technical upstream roles. Yet the upstream accounts for 96% of the company's expenditure.

NAMCOR holds minority stakes in all exploration licenses and a significant stake in the offshore Kudu Gas Field (with proven and possible recoverable reserves estimated at more than 2.3 trillion cubic feet). It is active in the sourcing and selling, as well as the distribution of petroleum products. Sales of petroleum products represent 74% of NAMCOR's revenues (86% of total income with the fuel levy). According to company reports, 44% of its capital expenditure budget for 2018 was earmarked for the retail roll out (\$4.6mn).

Upstream

The four NOCs in our study share upstream mandates to explore, develop and produce hydrocarbons, but they are not at the same level of technical maturity in the upstream. Our benchmarking analysis will benefit from a clear understanding of where each company stands on the spectrum of independent upstream operation (and associated responsibility).

a. Operated upstream production

Sonatrach is the only company in this group of NOCs that is an operator. In

<https://www.bwoffshore.com/lir/corporate-news/imported-press-releases3/2017/bw-offshore-farm-in-to-kudu-field-in-namibia/>

The WAPCo western interconnection and gas management project provides an outlet for the gas produced in the Western enclave.

Refer to Valerie Marcel (2006). *op. cit.*

<https://www.glassdoor.co.uk/Reviews/Sonatrach-Reviews>

The company conducted a feasibility study with foreign oil companies for the solarization of its industrial sites generating 1.3 GW from solar and together with partners was in the process of defining KPIs.

practice this requires the company to have the capability to propose a development plan, raise money and manage a large project, including supervising international partners and contractors (Marcel: 2016). Sixty-nine percent of its exploration and production is sole-operated and 31% is in partnerships.

TABLE 2. Summary of NOC activities in the energy sector (Refer to Appendix I for further details on these activities)

ACTIVITY	NAMCOR	NOCK	GNPC	SONATRACH
Operated upstream production				√
Non-operated upstream production			√ Minority stakes in producing fields	
Operated upstream exploration	√ Pre-exploration	√ Pre-exploration	√ Pre-exploration	√
Non-operated exploration	√	√	√	√
Gas production			√ Non operated	√ Operated
Logistics, services, R&D		√ Geochemical and geophysics laboratory, Data centre, Seismic processing centre	√ Patrol vessels, R&D centre and geochemical and geophysical laboratory in development	√ Drilling, transport, construction, engineering, maintenance and R&D centre
Midstream	√ 3 depots	√2 depots	√WAPco ¹⁷	√ Extensive pipelines
Trading and marketing	√	√	√	√ New trading JV
Retail	√ 1 station	√ 153 stations		√ Franchises
Downstream				√ Refining, liquefaction & petrochemicals
Renewables/clean energy	(LPG in development)	√ LPG		√ Solar, LPG, butane for transport

Source: Data provided by the companies.

b. Operated exploration

As is typical for emerging NOCs seeking to increase their upstream capacity, NOCK, NAMCOR and GNPC hold majority rights to some exploration acreage, in which they carry out mostly pre-exploration activities – that is to say, data acquisition, processing and interpretation, and drilling supervision. Sonatrach’s exploration budget dwarfs the above with approximately \$1.5-1.8bn spent per year. According to information obtained from the company, it made 33 discoveries in 2017 (sole operated); and yet, this exploration drive has not been sufficient to meet its targets of reserves replacement and growth.

c. Non-operated upstream stakes

NOCs in Africa – and in particular emerging NOCs – commonly have minority stakes in upstream licenses. The NOC’s share of costs is often carried by foreign oil company partners until the development or production phase. These non-operated stakes in exploration blocks or producing fields are in many cases the main upstream activity of these companies and can be an important vehicle for building upstream competences.

NAMCOR holds many minority stakes, but of greater importance to the company is its 44% interest in the Kudu petroleum production licence. Kudu discoveries date back to 1974 and successive development plans have faltered. Its proposed gas to power project would have taken gas from the offshore Kudu Field to a new-build power station (to be designed, built and operated by the state-owned enterprise (SOE) NamPower and its partners). After several setbacks, the project was reconfigured in 2017 to cater for only the Namibian domestic market. The project was waiting on a sovereign guarantee allowing NAMCOR to finance its share of the project, but the government ruled in November 2019 against the project.

New rules in Ghana give GNPC a minimum 15% stake in all exploration agreements and enable it to request from the Minister of Energy an open block without having to bid. As for NOCK, according to data sent by the company, it carries a 10% -

20% interest in all exploration acreage in Kenya. However, interviews outside the company indicated that NOCK had not exercised most of its back in rights.

Sonatrach has not been a minority stakeholder historically as the hydrocarbons law gave it a guaranteed stake of at least 51% through license agreements. However, it is negotiating minority stakes in licenses to develop shale and offshore resources, thanks to the law granted by the Ministry of Energy.

d. Upstream manager/Concessionaire

None of the NOCs under study is a concessionaire for the upstream, but GNPC, National Oil Corporation of Kenya and NAMCOR promote open blocks and the blocks in which they have majority rights, in order to attract companies to farm-in.

NOCK and NAMCOR also both act as custodians of the countries' geological data. NOCK earns approximately \$280,000 per year from data sales and viewing fees and while NAMCOR earned \$1.65mn in 2016-17, which was its main revenue source in the upstream. GNPC and Sonatrach are no longer custodians of the national geological data, but retain copies of all data, which gives the companies

a notable information advantage in their partnerships with foreign oil companies. Indeed, they have a visibility of all acreages, whereas the oil companies only see what they pay to see and the work plans for the fields they are working in.

This analysis suggests that the four companies have different interests and levels of focus in the upstream, midstream and downstream segments. While GNPC, NAMCOR and NOCK are smaller companies very active in one segment along the value chain, Sonatrach is an integrated giant compared to them and very active in all the segments. Table 3 shows the different sizes of the four companies. With a distributed share of Sonatrach employees in each segment of the value chain, Table 3 also demonstrates the integrated nature of its activities. In contrast, GNPC's staff distribution shows the importance of the upstream to the company. This review makes it clear there is no 'model' or standard NOC. These companies have expanded into various segments of the petroleum or energy value chain in response to national opportunities and government instructions.

TABLE 3. Distribution of staff in the four selected NOCs in 2018

NOC	Total employees 2018	Number and share of technical staff in upstream	Number and share of technical staff in upstream	Number and share in support functions ²¹
NAMCOR	105 ²²	19 17%	19 17%	67 61%
NOCK	218	26 12%	-	-
GNPC	504	222 44%	Marketing 12 2% Sustainability 57 11%	213 42%
Sonatrach	51,332	19,309 38%	Midstream 5,373 10% Downstream 7,921 15% Marketing, retail: 236 0.5%	18,493 36%

Source: Data shared by the companies.

²¹ The project suffered a set-back in 2014 when Tullow and Itochu exited before reaching Final Investment Decision (FID). NAMCOR has since diluted its equity share from 56% to the current 44% and brought in BW Kudu (an affiliate of BW Offshore Ltd.) as the majority shareholder. NAMCOR finalized the technical and engineering studies of the scaled down project and determined the project was economically viable.

²² With this rule it secured in 2018 a shallow-water block, where it will seek an experienced partner to lead the exploration programme.

Sales for end of 2016; Annual Business Plan 2016/17.

03

Methods used in Evaluating NOC performance

Case selection

The study focuses on the NOCs of Namibia, Kenya, Ghana, and Algeria - varied cases which serve to test our methodology for assessing performance. Indeed, these companies are so different in the scale and focus of their business that they can barely be benchmarked against each other. Rather, the range of their commercial profiles serves to trial our performance assessment in different contexts.

NOCs are defined as oil and gas companies fully or majority owned by government. All four NOCs under study here are 100% government owned. This selection includes NOCs in countries with active exploration programmes and in the development phase post-discovery (National Oil Corporation of Kenya and NAMCOR of Namibia), a country with eight years of production experience (Ghana National Petroleum Corporation, even though Ghana's experience with petroleum exploration and production can be traced back to 1970), and finally a major exporting country, Algeria (Sonatrach). Most analysis of NOC performance and value creation has focused on major producers, but investments made by emerging NOCs should be examined with similar care. These emerging NOCs

dominate the continent (e.g. UNOC of Uganda, ENH of Mozambique, TPDC of Tanzania, NOCAL of Liberia, SMHP of Mauritania, Petrosen of Senegal) and many countries without NOCs are considering whether and how to establish one. These emerging NOCs operate in a markedly different environment from the NNPCs and Sonatrachs of the continent – most notably with limited upstream income - and the study will offer specific pathways for analysing their performance and potential value creation.

In contrast to the Middle East and Latin America, few NOCs across the African continent are operators - companies responsible for the exploration, development, and production of an oil or gas well or lease. Sonatrach and National Oil Company of Libya are major operators. Sonangol is a minor operator, having taken over responsibility for some already-producing fields. But elsewhere ambitious NOCs strive to develop the technical and financial capabilities required for operatorship. Our performance assessment will distinguish between NOCs that are operators (Sonatrach), those which aim to become operators within a specific timeframe (GNPC) and those with no specific goals for operatorship (NOCK and NAMCOR). Operatorship involves a significant step up in terms of risk and liability from holding minority stakes in licenses and requires demonstrated capacity to make appropriate technical decisions and manage inherent risk.

The oil and gas sector can broadly be divided into three components: the upstream sector, which involves exploring for and extracting crude oil or raw natural gas, the midstream sector, involving the transportation, storage, and wholesale marketing of crude or refined petroleum products, and the downstream sector, relating to the refining of crude oil and processing of natural gas, as well as marketing and distribution of petroleum products (including retail). Many emerging NOCs do not have upstream production revenues and have therefore invested in other

Tordo (2011). Op. cit.; David G. Victor, David R. Hufts and Mark C. Thurber (2012). Oil and Governance; State-Owned Enterprises and the World Energy Supply, Cambridge University Press; James A. Baker III Institute for Public Policy (2007). "The Changing Role of National Oil Companies in International Energy Markets." Baker Institute Policy Report, no. 35.

They are 'rents' because the selling price for oil and gas is usually much higher than their production costs. Also, "Natural resource revenues differ from other government revenues both in their time profile, and in their political and legal status: they are volatile and exhaustible and belong to all citizens of the country in which they are located." In Paul Segal (2012). "How to spend it: Resource wealth and the distribution of resource rents", Energy Policy, Vol. 51, December. Refer also to Paul Stevens, Glada Lahn, Jaakko Kooroshy (2015). "The Resource Curse Revisited",



sectors, such as retail or refining, to generate most – if not all - income. Despite this variance in the scope of their activities, the companies under study all have a mandate to represent the state in the upstream. Conducting an evaluation of value creation is equally important for NOCs operating only in refining

or retail (e.g. Petromoc, Kenya Petroleum Refineries Ltd.), but our focus on the upstream is justified by its potential to generate resource rents. It is through minority and majority equity stakes in upstream acreage that NOCs can generate income not derived from productive labour within the country but from high profit commodity margins. The high profit margins can lead to wasteful spending by the NOC. The rents generated from exhaustible resources should be invested to create long-term value, which this study aims to assess.

Benchmarking methodology

This study employs performance assessment as a conceptual framework for understanding the value created by national oil companies in Africa. Benchmarking is a valuable tool in assessing performance and NOCs regularly express interest in being benchmarked against their peers. However, developing a valid benchmarking methodology for NOCs is uniquely challenging because of the wide variance in the strategic mandate, legal, regulatory policy, and fiscal regimes, and asset characteristics (e.g. geology, operating environment) for each NOC, as well as variances in the scope of operations - i.e. their ‘national context’.

In the most fundamental performance benchmarking area – financial benchmarking – significant challenges are presented due to the unique national context of each

NOC. Each has inherent resource development complexity, risk, capital intensity, cost, recovery, and economic realisation profiles for their asset base. Additional strategic mandates regarding their scope of operations, local content expectations and objectives, and regulatory policy, in areas such as domestic energy pricing and transfer pricing have major impacts on financial performance. Compounding these difficulties is the lack of comparative financial data due to insufficient disclosure and different accounting standards. Section 3 will review our methodology for comparing the NOCs on financial and production metrics.

Acknowledging the challenges in making valid financial comparisons between such different companies, it seems appropriate to consider what can be compared. All companies successfully competing in high risk, capital-intensive, technology-intensive extractive industries, like the global oil and gas industry, need to work at high standards of operational performance (i.e. profitability, efficiency, asset integrity and reliability, operational integrity and sustainability) a cluster of management capabilities often referred to as “operational excellence”. These operational practices and capabilities (specifically, their degree of adoption and sustainable implementation) and their associated performance measures provide a valuable second dimension and area for qualitative and quantitative benchmarking to complement financial metrics of efficiency and shareholder returns.

A third dimension and area of analysis for benchmarking relates to how well NOCs achieve, or contribute to, their national mission i.e. “national benefit” or “national contribution”. NOCs are expected to help generate and manage fiscal revenues that come from oil and gas. But their missions do not end there, and most NOCs are called upon to provide more than economic rents. In line with Tordo (2011), this study proposes to assess the value creation of other NOC contributions, specifically: meeting domestic energy demand, providing clean, sustainable energy to domestic users, improving oversight of foreign oil companies, investment in infrastructure, support of supply chain creation, skills development and job creation.

Chatham House Research Paper, Available at: <https://www.chathamhouse.org/sites/default/files/publications/research/20150804ResourceCurseRevisitedStevensLahnKooroshyFinal.pdf> (accessed 11 March 2019)

For an introduction to the concept of national mission, refer to Valerie Marcel (2006). *Oil Titans; National Oil Companies in the Middle East*, Chatham House/Brookings Institution, chapter 6; and Stevens (2008). *Op. cit.*

This benchmarking study proposes to combine four types, or dimensions, of benchmarking analysis outlined above, specifically:



While no individual dimension can be perfectly normalized, in combination they provide many useful indications of relative performance and capabilities in each area and point to the improvement and developmental “roadmap” of each NOC.

The methodology proposes a benchmarking analysis of applicable value chain segments (i.e. exploration, production, midstream, refining, marketing, distribution and retail). While there is no expectation that each NOC should be active in all segments, structuring the analysis in this way sheds light on which segments contribute most or least in each dimension (i.e. financial, operational, and national benefit). Initial conclusions are put forward on value creation through the energy chain in section 6.2.1.

This study applies the benchmarking methodology in four cases and examines the efficiency, capabilities, processes and assets of these national oil companies to assess the value they are generating today. In other words, it measures historical performance. But the preparedness of these companies to take up the challenge of industrial transformations also needs to figure in any thorough assessment. To acknowledge and address the strategic importance of the shift to stricter, global climate mitigation policies and the necessary evolution of the petroleum industry to cleaner, more diversified and sustainable portfolios, the methodology also includes an investigation of the performance of NOCs in renewables, cleaner energy production and energy efficiency investments, as applicable.

In order to fairly assess and compare the capabilities and performance of NOCs operating in different national contexts, the study accounts for the potential impact of the policy and regulatory context, which determines the rules by which the NOC must operate. Section 5 reviews the regulatory and political operating environment for each NOC. This environment often provides both comparative advantages and disadvantages for

NOCs in relation to private companies. For instance, some NOCs in Africa have profitable product import and retail operations because they benefit from fees per volume sold or an import mandate. Others are required to service rural areas at a loss. The analysis of the legal and regulatory context will provide the backdrop for interpreting a fairer benchmarking score and is important for



ongoing discussions between the NOCs and their government about increasing their efficiency and competitiveness.

Benchmarking NOCs’ performance is not an exact science because NOCs vary so much in their activities, cost structures, accounting standards, and national contexts and, as a result, truly comparable numbers are not available. Nevertheless, the real contribution of this benchmarking exercise is to demonstrate to NOCs and their governments which metrics are useful indicators of performance, to emphasize the importance of tracking performance and value creation, and to lay out practices and processes they could adopt to reach the performance levels of industry leaders.

3.1. Benchmarking financial value creation

The first benchmark is the most quantitative with financial data collected from the participating companies covering 2015-2018. This period is particularly interesting because it comprises a price cycle from a low in 2015-2016 with a partial recovery to moderate price levels in 2017. Whatever measures are captured on the performance of NOCs through these price swings can be good indicators of the companies' strategic focus, aptitude for organisational change, cost discipline and resilience to price volatility. Companies that grow too fast when prices rise are subject to expenditure contractions in the downturn that can erode the value of assets.

Company financial performance metrics were based on published data from company and other national sources (like the Extractive Industries Transparency Initiative (EITI), the Public Interest and Accountability Committee, financial

NOC public reporting on some items – most notably on the disaggregation of expenditure and investment, and on the composition of staff – is significantly inconsistent across companies.

disclosures collected by Natural Resource Governance Institute (NRGI)'s National Oil Company Database and complemented by data provided by the companies for this study. NRGI's database of 71 NOCs is focused on upstream financial and operational data and compares NOC production, revenue, expenditures, cash

flows, tax payments and simple measures of operational performance. The available data was fairly extensive for Sonatrach from 2011-17, satisfactory for the Ghana National Petroleum Corporation (GNPC) from 2015-17 (drawing also on PIAC reports) and for the National Petroleum Corporation of Namibia (NAMCOR) in 2015 only (the company provided the consultants with additional data for 2016). National Oil Corporation of Kenya (NOCK) disclosed almost no financial and

The dataset includes 21 NOCs in Africa, though some of them (such as Equatorial Guinea's GEPetrol) publish little or no data. <https://nationaloilcompanydata.org>

The Public Interest and Accountability Committee is a Ghanaian, watchdog body created by the Petroleum Revenue Management Act that reports to Parliament and issues extensive public reports on petroleum revenues in Ghana.

operational data publicly in this period but provided the consultants with financial data for the period 2015-17.

NOC public reporting on some items – most notably on the disaggregation of expenditure and investment, and on the composition of staff – is significantly inconsistent across companies. The NOC database does not therefore attempt to disaggregate these items in detail. This means that it is difficult to do cross-company comparison on value creation at each stage of the company value chain. Reporting on downstream activities is particularly inconsistent. The performance indicators in the NOC database thus focus more heavily on company-wide financial metrics, and on upstream performance, where company reporting facilitates more ready comparison and analysis. In order to facilitate greater segment-by-segment quantitative analysis in the future, it would be valuable for NOCs to use this methodology to offer a disaggregated view of the financial value creation of each segment of the value chain.

3.2. Operational Performance and Capability Assessment

National oil companies are entrusted with their country's finite resources. Their operations must be at the highest industry standard to ensure optimal use of these resources, assure the safety of staff and surrounding communities, together with the protection of the environment. Operational excellence (OE) programs that help oil and gas companies recalibrate their operations have now become an essential part of running a business.

Operational excellence is defined as “a workplace philosophy and methodology focused on identifying and eliminating defects or inefficiencies in a process”. It promotes a set of principles and practices that, if effectively implemented, will continuously improve a business and will identify opportunities, processes and tools that can deliver sustainable results. OE combines technical, social and human factors, and is based on operational management and engineering processes, as well as taking account of employees and their impact on any implementation process. In this context environmental sustainability is also considered to be included in OE

and align with the United Nations Sustainable Development Goals 2030, African Union's Agenda 2063, the Paris Agreement and the AfDB High 5 priorities.

OE is critical to both NOCs and IOCs. It enables them to achieve the following:

- i. Aligned business purpose, strategy and behaviours: a unified framework and a globally consistent set of principles help companies define best practices across operations and business activities, including integrated planning, supply chain management, organization.
- ii. Optimization of the supply chain and operational cost reductions: depending on whether they have activities within the upstream, midstream or downstream businesses, operators can reduce costs and monetize opportunities by constantly forecasting demand, developing and monitoring exploration and production capabilities, looking into crude oil selection economics and refinery margin economics, crude oil assay, product slate decisions, logistics and distribution options etc.
- iii. Portfolio optimization—aligning goals, assets, and expectations for the market: upstream, midstream and downstream operators need to set aside inherent biases, and undertake an objective strategic review of their assets, deploy an asset management Information Technology (IT) platform and identify those that can perform in all potential future scenarios - changes in crude pricing, higher demand for energy transition, stricter carbon regulations etc.
- iv. Management of various risks: companies can better anticipate and minimize their exposure by implementing formalised risk registers consisting of appropriate strategic, operational and compliance measures, controls to mitigate identified risks, by formalizing and documenting responsibilities, authority limits and decision workflows, etc.

In late 2019, Kenya's Office of the Auditor General published financial statements for NOC Kenya covering the fiscal years ending 30 June 2015 and 30 June 2016. The publication of these statements came after this paper had been finalized for editing. The statements can be found in the Natural Resource Governance Institute's National Oil Company Database Library, at <https://www.resourcedata.org/dataset/nock-financialstatements-2016>.

Daniel Callahan, Steven Jablon (2016). "Operational Excellence: A Safety Diagnostic Event", American Society of Safety Engineers

European Foundation for Quality Management (2017). Available at: <http://www.efqm.org/efqm-model/what-is-excellence>

A. M. Carvalho, P. Sampaio, E. Rebentisch, J. □. Carvalho & P. Saraiva (2017). "Operational excellence, organisational culture and agility: the missing link?", Total Quality Management & Business Excellence, 1–20.

- v. Appropriate and, where applicable, compliant health, safety and environmental (HSE) performance: studies have observed major improvements in performance by reducing the time taken to implement adapted solutions, thus improving safety while increasing efficiency – there was a 10%-15% increase in the productivity of workers when mitigation measures in relation to the risks of each activity were implemented.
- vi. A high-performance focused culture that is continuously supported by highly skilled and motivated employees: The Society of Petroleum Engineers estimates that up to 50% of skilled workers worldwide could retire from the oil and gas industry within the next 5-7 years, leading to a shortage of talent in the industry. It is important for companies to ensure proper onboarding processes, retention incentives and adequate training and create a dynamic culture with inspired and motivated employees under strong and committed leadership.
- vii. Good reputation, based on efficient operations, sustainable business practices, environmental stewardship and dedicated employees.

Specialists consider health, safety and environment (HSE) to be the foundation of OE, as operational risks are assessed and addressed, potentially eliminating incidents for employees and damages to the environment. Consequently, better HSE performance has many advantages in its own right. HSE measures can lead to:

Reduced costs;	Fewer accidents;
Reduced risks;	Lower employee absence and turnover rates;
Improved standing among suppliers and partners;	Reduced threat of legal action;
Better reputation for corporate responsibility among investors, customers and communities;	Increased productivity, because employees are healthier, happier and better motivated;
	Better safeguarded environment.

Bjoern Ewers (2018). "A new era for operations excellence in E&P". Pipeline Oil and Gas Magazine
Georgina Enzer (2014). "Oil & gas is facing a severe talent shortage". Oil and Gas Middle East; Available at: <https://www.oilandgasmiddleeast.com/article-12091-oil-gas-is-facing-a-severe-talent-shortage>
Ernst & Young (2015). Driving operational performance in oil and gas

Thus, there are many benefits for oil companies to conduct an Operational Performance and Capability (OPAC) Assessment and implement an OE Programme that also incorporates frameworks to improve health, safety and environment-related performance. This study adopts the Hartree Consulting methodology for the OPAC Assessment. The process and results of the assessment help companies identify operational performance gaps. Crucially, the path to operational excellence is an ongoing process of improvement. The operational assessment traces the way forward for the NOCs, with an “improvement ‘pathway’ or ‘roadmap’” indicating what specific practice and capability changes and improvements should be made.

The Operational Performance and Capability Assessment framework provides a 1-5 rating for activities pertaining to the assessed functions of the NOCs. The scale, which is explained in detail in table 1, represents the extent to which the NOC management and leadership are aware of and committed to implementing industry best practices. The scoring is based on the consultants’ review of the functional operations and capability demonstrated by the NOC, against international industry best practices adopted by the world’s leading private and national oil companies. No oil company scores a perfect 5 across the board, but the industry leaders achieve those scores for several functions.

NOCs in this study are evaluated according to their current roles and mandates, with specific evaluation criteria for operators, for instance. But it is worth noting that in the case of the upstream segment, it is an international best practice for both non-operators and operator to have exploration field development planning standards and processes in place. Even non-operators should adopt such standards to oversee their assets. Thus, we assess those functions in all the NOCs in the study.

Table 4 presents the indicators for the operational assessment.

TABLE 4: Indicators for operational assessment

Assessment Criteria	Performance score	
Accountabilities, responsibilities, and authorities designated, and capacity committed to support implementation of the process and its associated best practices Active, visible leadership and champion promotion of the process with its associated best practices Leadership champions awareness of the performance-critical process and its associated best practices and performance objectives	1	Leadership awareness
Allocation and commitment of adequate resources (esp. people and budgets) to fully support implementation of the process and associated best practices Formalized, appropriate formalized policies, processes, and/or procedures are in place which incorporate/codify and reflect the associated best practices Formalized leadership implementation and performance expectations associated with the process and its associated best practices	2	Leadership sponsorship
Adequate organisational competency to support the best practice (specific level of skill, expertise, and experience) Efficient methods, tools, and technologies, to support and sustain adherence to the process and associated best practices Formalized implementation training/capability-building programme supporting the process and associated best practices Formalized, efficient operating model addressing the critical processes, roles, and accountabilities re the best practice	3	Organizational enablement
Formalized performance management contracts, monitoring, feedback, recognition, rewards, and consequences supporting the process and associated best practices Formalized performance tracking system, based on reliable, accurate, high-quality data, objective, relevant, cascading, KPIs and targets, aligned to strategic objectives Cross-functional leadership, stakeholders’ alignment, implementation and support of the process and associated best practices Adequate organisational capacity to support the process and associated best practices (specified numbers of competent people)	4	Technology enablement
Continuous performance improvement is being driven by formalized, fully-enabled, cross-functional, multi-disciplinary high-performance teams Process and best practice-related performance targets regularly updated based on challenging internal and/or external industry benchmarks Active, systematic knowledge and best practice capture, codification, and sharing enabled by efficient knowledge, collaboration, and data management systems Aligned front-line organisational behaviours critical to sustaining the process and associated best practices and performance	5	Performance management and continuous improvement

The operational capabilities part of the benchmark is an important metric that cuts across all companies and segments of the value chain. It represents their performance as a relatively qualitative assessment that sets each NOC against industry peers. The qualitative assessment is subjective but rigorous and based on clear criteria that plot companies on a scale of growing capability maturity. Quantitative metrics, such as capacity utilization, are also collected, to validate and enrich the qualitative assessment.

The period under examination is primarily 2016-2018. It is therefore a snapshot of recent operational capabilities. Data on NOC operational performance was collected through interviews in the participating NOCs and supplemented by data requests made to the companies. The study reviews and analyses only existing data maintained and utilized by the NOCs. Operational performance and socio-economic impact are assessed through an assessment of capability maturity, which covers strategy, processes, systems and organisation. In some cases, NOCs are not able to provide information on their performance indicators. Any such gaps in the visibility of performance metrics should inform the consultants' assessment. A company with strong processes should know how well it is doing on various performance metrics.

The following are the key functions assessed throughout the oil and gas value chain – although they are not all relevant for all the companies studied.



Upstream	Exploration and field development planning Technology management Reservoir management Rigs and wells design and planning Field and facilities operations
Midstream:	Pipelines, storage etc. planning and scheduling Operations Maintenance management New facilities development
Downstream:	Refineries planning and scheduling Refineries management Supply chain management Production blending and storage HSE management New facilities development
Retail:	Marketing and retail strategy Site operations and IT enablement
Support Functions	<i>(structures differ for reviewed NOCs, however, at a high level, the following functions are common across them):</i> Enterprise IT HR Supply chain and sourcing Finance, accounting, risk Audit and insurance Legal Governance HSEQ

3.3. Benchmarking national socio-economic benefits

In benchmarking socio-economic benefits to the country, this study is concerned with the specific programmes or interventions of the NOC that have a measurable impact on the country. It does not consider socio-economic benefits resulting from the rent generated by the NOC, as any benefits resulting from public spending would be attributable to government.

The data collected for this aspect of the benchmark primarily came from interviews, complemented by data provided by the companies. Interviews were conducted jointly for the socio-economic analysis and operational benchmarking in each of the four NOCs between October and December 2018 with managers of each business unit, as well as the human resource, HSSE and finance functions. In Kenya, interviews were held with the Ministry of Petroleum and Mining, and some further discussions in the fall of 2019. Conversations were under the Chatham House Rule of non-attribution. Data collected from NAMCOR was more limited than other NOCs in the study due to a more limited range of interviews and less information being sent by the company. This limits the validity of the benchmark for NAMCOR.

Information requested of the companies in writing and in interviews included the company-directed and government-mandated policies for investment in or contributions to:

- i. Welfare support, whether through initiatives aimed at improving education, health and livelihoods;
- ii. Infrastructure development outside the scope of what is necessary for their operations;

At Sonatrach, the consultants met in December 2019 with the CEO, vice-presidents and managers overseeing exploration and production, pipelines, refining, petrochemicals, gas liquefaction and processing, marketing, strategy, planning and economics, finance, audit, HSE, new energy, human resources, procurement and logistics. In GNPC, the consultant met in October-November 2018 with managers overseeing corporate strategy, geoscience, geology and geophysics, exploration, development and production, projects, marketing, finance, procurement, human resources, ICT, internal audit, risk and insurance and sustainability. In National Oil Corporation of Kenya the consultants met in October with the CEO and managers overseeing corporate planning and strategy, geology, geoscience and contracting, supply planning, downstream, finance, procurement, SHEQ, human resources, ICT, and internal audit and risk management. In NAMCOR, the consultants conducted interviews by phone in November with managers overseeing exploration and production, the Kudu gas field, the commercial business unit, HSEQ, and corporate governance.

- iii. Skills development nationally or locally where they operate;
- iv. Creation or support of domestic supply chains around the petroleum sector;
- v. Access to energy, whether this entails interventions to ensure national energy security or the provision of energy to domestic industry, underserved areas or poor citizens;
- vi. Provision of clean energy or investments in energy efficiency, interventions which enhance the quality of life of citizens and curb national emissions;
- vii. A contribution to the operational oversight of the sector; an important contribution to the national good made by NOCs through their oversight of foreign oil company operations in the joint ventures on behalf of the government.

The data collected for this aspect of the benchmark primarily came from interviews, complemented by data provided by the companies.

Interviews sought to ascertain whether the companies invested in achieving any of the above socio-economic benefits for the country and at what scale. Several of the above roles have both a commercial and socio-economic component. The assessment considers what aspects of these contributions are driven by company commercial interest versus their national mission (or concern for contributing to

national benefits). It also clarifies whether that focus was at the initiative of the company or directed by government. When directed by government, it can be assumed that the government sees value in this intervention though it might not be economical. When directed by the company itself, the question of whether the intervention is an effective use of resources is even more salient. In any case, the NOCs should measure the cost of these programmes and evaluate their impact.

Most NOCs do not measure the impact of such interventions rigorously. It would be beyond the scope of this study to measure socio-economic impacts of such a range of interventions in place of the NOCs, but it is possible to put forward an assessment of whether these investments are strategically directed (versus ad hoc), whether impacts are measured, and to extent to which the value of these

activities is discussed and debated. In other words, one can benchmark NOCs on how rigorously they plan these interventions and track their value creation. The study adopted a simple rating system on a scale of 1-3 to make this assessment:

- i. Engaged in activity or spend on ad HOC basis
- ii. Activity or spend is directed by company strategy
- iii. Company measures impact and value creation

3.4. Benchmarking environmental stewardship and contribution to sustainable development

NOCs can be important contributors to the pursuance of the UN Sustainable Development Goals 2030 (SDGs) and the African Union Agenda 2063 (A2063). To this end, they would ensure the sustainability of their own operations and those of other companies with which they partner. They henceforth have to also ensure that they contribute to the achievement of their countries' Nationally Determined Contributions (NDCs) under the Paris Agreement. This comes with a new set of performance criteria, which more than ever determine the health of their business and that of the industry as a whole, as the world is combatting climate change and driving towards a greener future that requires less CO₂ intensive fuels and operations, fewer energy intensive operations, longer lifecycles of materials through circularity and increased share of renewables in the energy mix. In this light, benchmarking environmental stewardship and sustainability performance would imply measuring how much and how well the NOCs are able to map their operations to the SDGs and the Agenda 2063 and therefore to the top 5 strategic priorities of the African Development Bank (AfDB High 5s).

It is concerned with specific policies that integrate the SDGs and aspirations to support Agenda 2063 in the companies' business process. It considers specific programs or interventions that drive these goals and requires NOCs to map their company's objectives to the SDGs and A2063. Mapping objectives to the SDGs and A2063 is an emerging strategic orientation for many industries due to the recency of these goals. As such, this work did not specifically consider it during interviews and data collection. Some objectives of the SDGs and Agenda 2063

were however considered in the financial and operational performance, as well as in the contribution of the NOCs to socio-economic development. The relevance of the contribution of these objectives to energy transition and a low carbon pathway, which are more than ever important criteria for the industry's sustainability, imposes the pursuance of the SDGs and A2063 as new key indicators of the NOCs' performance. In this regard, a methodology is proposed in this work to evaluate the performance of the NOCs against the pursuance of the SDGs and A2063. The methodology follows the works of UNDP (2017) and Anifowose et al. Figure 1, Figure 2 and Figure 3 summarise the SDGs, the aspirations of Agenda 2063 and the AfDB High 5s respectively. Although this methodology proposed is not tested in the benchmarking exercise in section 4, its adoption and implementation form prominent recommendations of the work.

The UNDP, IFC and IPIECA discussed how oil and gas companies can help

FIGURE 1: Summary of UN Sustainable Development Goals 2017 (adapted from (UNDP, IFC & IPIECA, 2017).



operationalize the SDGs in practice by incorporating them in their corporate systems, policies and processes, including: (i) company policies, standards and management systems; (ii) project due diligence reviews; (iii) risk and opportunity assessments and planning processes; and (iv) dialogue and engagement with communities, governments and other stakeholders. Targets can be set, and progress monitored on how well they support the achievement of the SDGs. A score on a scale of 1 indicating very weak support to 5 indicating very strong support can be assigned. Table 5 and Table 6 show how NOCs can map their business processes and operations to the SDGs and Agenda 2063 and AfDB High 5s.

Project due diligence and risk and opportunities assessment may follow and independent Systematic Periodic Quality Reviews (SPQR) of an environmental impact statement and risks or hazards and operability assessment statements every 3 to 5 years would also be recommended to ensure they align with best practices and any changing operational and environmental requirements (following Anifowose et al).

FIGURE 2: Summary of Aspirations of the AU Agenda 2063

Aspiration 1:		A prosperous Africa based on inclusive growth on sustainable development
Aspiration 2:		An integrated continent, politically united and based on the ideals of panafrikanisms and the vision of Africa's renaissance
Aspiration 3:		An Africa of good governance, democracy, respect of human rights, justice and rules of law
Aspiration 4:		A peaceful and secure Africa
Aspiration 5:		An Africa with a strong cultural identity, common heritage, shared values and ethics
Aspiration 6:		An Africa whose development is people-driven, relying on potential of African people, especially its women and youth and caring for children
Aspiration 7:		Africa as a strong, united, resilient and influential global player and partner

Anifowose, B., Lawler, D., Van der Horst, D. & Chapman, L., 2016. A systematic quality assessment of environment impacts statements in Oil & Gas industry. *Science of the total environment*, Volume 572, pp. 570-585.
 UNDP, IFC & IPIECA, 2017. *Mapping Oil and Gas industry to the sustainable development goals: An Atlas*, New York: UNDP.

FIGURE 3: The African Development Bank High five priorities

Hi 1		Light up and power Africa
Hi 2		Feed Africa
Hi 3		Industrialise Africa
Hi 4		Integrate Africa
Hi 5		Improve the quality of life of the people of Africa



TABLE 5: Mapping of business processes to UN SDGs and AU Agenda 2063

Programme	What to measure	SDGs	A 2063	High 5s	Method
Company policies, standards and management systems	How company governance and management systems, standards and strategies address areas such as environment, health and safety, anti-bribery, gender, and supply and procurement.	SDG1, 2,13,1 6,5,118,15	Aspiration 1,3 and 6	Hi 2, Hi 5 and Hi 4	Compare with identified best practices and score on a scale of 1 to 5 to reflect how aligned it is to best practices where 1 represents poor alignment and 5 very good alignment
Project due diligence	How fit are the processes and standards to identify social, economic and environmental baselines of the local area and the potential impacts of operations to inform engagement, contribution and mitigation measures. Other baseline assessments will include human rights, health, lifecycle assessments and landscape scale plans. Are goals set, and is progress monitored on how these support achievement of SDGs and A2063 and High 5s?	SDG13,15, 14,11,	Aspiration 1,3 and 6	Hi 5,	Compare with identified best practices and score on a scale of 1 to 5 to reflect how aligned it is to best practices where 1 represents poor alignment and 5 very good alignment. Use of SPRQ method by Anifowose et al. (2016)
Risk and opportunity assessments and planning processes	Risk assessments are crucial to identifying and predicting potential risks and implementing preventative measures	SDG3,13,15, 14,11	Aspiration 1,3 and 6	Hi 5	Compare with identified best practices and score on a scale of 1 to 5 to reflect how aligned it is to best practices where 1 represents poor alignment and 5 very good alignment. Use of SPRQ method by Anifowose et al. (2016)
Proactive engagement and consultation with stakeholders	Proactive engagement and consultation with stakeholders, including local communities, indigenous peoples, local and national governments, and civil society are vital to establishing and maintaining trust, understanding concerns and perspectives, and securing and maintaining a company's social licence to operate (p.7) .	SDG17, 9,8 and 16	Aspiration 1,2, 3 and 6	Hi 5	Compare with identified best practices and score on a scale of 1 to 5 to reflect how aligned it is to best practices where 1 represents poor alignment and 5 very good alignment Use of SPRQ method by Anifowose et al. (2016)

TABLE 6: Mapping of operations to SDGs, Agenda 2063 and NDCs

Programme	What to measure	SDGs	A 2063	NDC	High 5s	Baseline	Method
Support to energy transition	Share of renewables in own energy mix % of RE projects in project portfolio	SDG 7, 3,11,13, 15	Aspiration 1 and 3	yes	Hi 1 Hi 1 and Hi 5	To assess	To set e.g. 30% To set e.g. 20%
Gas flaring in their operations	Reduction/ elimination in new and old equipment	SDG 3, 11, 13	Aspiration 1 and 6	yes	Hi 1, Hi 3 and Hi 5	To assess	0%
Energy efficient building and equipment/ energy consumption	Improvement in energy consumption/ energy bills	SDG 12,13	Aspiration 1 and 3	yes	Hi 5	To assess	To set % reduction in energy bill
Gas utilisation for power	Number of power plant supported/ project initiate	SDG 7, 11, 3,13	Aspiration 1 and 3	yes	Hi 1 and Hi 3	To assess	To set
Gas utilisation for fertilisers	% of gas used for fertilisers	SDG 2, 3,13	Aspiration 1	yes	Hi 2 and Hi 5	To assess	To set
LPG for clean cooking	Number of projects supported or initiated	SDG 3,7,11	Aspiration 1 and 3		Hi 5	To assess	To set
Recycling and reuse of equipment.	Percentage of recycled waste or materials	SDG 12,13,14	Aspiration 1	Yes	Hi 5	To assess	To set
Waste disposal	Volume of waste generated and disposed unsafely	SDG13, 14,6,15	Aspiration 1 and 3		Hi 5	To assess	To set
Electrification of production sites, refineries and other facilities	Number of sited electrified or supported for electrification	SDG 7,3, 13,15	Aspiration 1 and 3	yes	Hi 5	To assess	To set
CO ₂ use and sequestration	Number of project initiated or supported	SDG 3, 13, 15	Aspiration 1 and 3	yes	Hi 5	To assess	To set
Nature Based solutions projects in communities	Number of projects initiated or supported	SDG 3, SDG 6, 1, 6 2, 15	Aspiration 1, 3,7	yes	Hi 2 and Hi 5	To assess	To set
Gender equality/ positions/ salary	% of women in staff and in decisions positions	SDG 5, SDG 8, SDG 10,16	Aspiration 1, 3,5,6		Hi 5	To assess	To set

TABLE 6: Mapping of operations to SDGs, Agenda 2063 and NDCs (cont.)

Programme	What to measure	SDGs	A 2063	NDC	High 5s	Baseline	Method
Youth empowerment	Number of youth programs initiated and number of youth supported	SDG 8, 10,16	Aspiration 1, 3,5,6		Hi 5	To assess	To set
Support to education	Projects/ programs including scholarships	SDG 4, SDG8	Aspiration 1,6		Hi 5	To assess	To set
Research & Development	Number own projects and with local universities and other companies	SDG 9, 17	Aspiration 1,6	yes	Hi 5	To assess	To set
	R&D budget	SDG 9			Hi 5		
Job creation	Number of jobs created	SDG 8	Aspiration 1,6	NA	Hi 5	To assess	To set
Empowerment of suppliers and regional suppliers	Number of suppliers developed	SDG 4, SDG 10	Aspiration 1,6,7	NA	Hi 5	To assess	To set
	% of local and regional contracts in all contracts value in US\$				Hi 5, and Hi 3		
Partnership with local and regional E&P companies and NOCs	Number of projects or licenses PSA with local operators and regional operators and NOCs	SDG 9	Aspiration 1,2,6,7		Hi 4	To assess	To set
Contribution to state revenue	% of revenue rendered to the state	SDG 17	Aspiration 1,3	yes	Hi 1, Hi 2, Hi 3, Hi 4, Hi 5	To assess	To set
Support to local farmers, fishermen and craftsmen	Number of projects supported	SDG 1, SDG 2, SDG 8, SDG 10	Aspiration 1,3	yes	Hi 2, Hi 5	To assess	To set
	Amount spent for the support as % of CSR budget				Hi 2, Hi 5		



04

Are the NOCs creating value for their countries?

This section presents the three dimensions of performance assessment: financial, operational and socio-economic benefits for the nation.

4.1. Benchmarking financial value creation

African NOCs have an opportunity to enhance their financial contributions to shareholders by more consistent performance assessment and benchmarking. Financial benchmarking of NOCs has traditionally been complicated by several factors, including the multiplicity of roles that NOCs are called upon to play, the under-development of accounting systems in many companies and a lack of publicly-available comparators against which to assess progress. Recent advances on several of these fronts can provide new opportunities for African NOCs to increase the sophistication and rigor of their benchmarking of strategic priorities.

In this section, there is a discussion of the core principles for benchmarking upstream financial value creation and it provides a list of indicators that can be useful for future benchmarking and assessing the value creation of various NOCs.

This discussion can be valuable for the four case-study countries but also for a larger group of African NOCs seeking to enhance their financial benchmarking. The section also dives in more deeply to the case study countries on a few indicators, assessing performance in comparison to indicators of peer NOCs identified via the NREGI National Oil Company Database, which assembles publicly-available information from more than 70 NOCs worldwide.

A strong commitment to rigorous quantitative measurements of financial value creation can enable NOCs to track progress against various kinds of benchmarks:

- i. Stated goals for the company. If governments and their NOCs establish clear goals for financial performance on a range of metrics, then consistent tracking against those goals can help guide priorities and inform management.
- ii. The company's past performance. Tracking progress over time on defined metrics can help a NOC evaluate its evolution in line with strategic goals.
- iii. Peer NOCs. Comparing a company against other, similarly-situated companies can provide meaningful information about how well a company and its government are succeeding at various missions. Choosing which NOCs represent "similarly-situated" peers suitable for comparisons can be challenging, and this section provides some advice on approaches.
- iv. IOCs. Comparing NOC value creation to the performance of an IOC is complicated by various factors. IOCs have different value-drivers than many NOCs, in many cases focusing exclusively on upstream commercial metrics rather than a broader set of upstream, downstream and public service priorities. IOCs also benefit from long experience and a diverse portfolio of assets that would be the envy of most NOCs. Thus, direct comparisons are usually insufficient to say whether a NOC is doing "better" or "worse" than an IOC. Looking at the comparison in a more nuanced way, however, can deliver insight to goal-tracking, especially where a NOC aspires to world-class commercial performance.

Even if the analysis in this section is focused on the upstream, NOCs can still deliver financial value to their citizens in myriad ways. For the purposes of this analysis, the financial metrics have been divided into two categories, treating each one in turn:

- i. Commercial efficiency and growth, which connects to a NOC's mandate to develop as effective commercial players and expand their portfolios. This is particularly important in countries where developing a profitable and sophisticated NOC is a long-term priority.
- ii. Fiscal contribution to the state, which emphasizes the NOC's responsibility to convert oil and gas resources to fiscal revenue, and to deliver a sizable share of that revenue to the state in order to finance government programs. This is particularly important for NOCs in countries with governments that are highly dependent on revenues coming via the NOC for the financing of public expenditure.

These goals are often complementary, but sometimes may contradict one another. In particular, a NOC prioritizing commercial efficiency and growth may seek to minimize its transfers to the state in the short term in order to invest in expansion with an eye to the future. On the flip side, a government that depends on NOC revenues for fiscal space may wish to reduce NOC investment in risk-taking activities – even ones with the potential to generate long-term return – and may prioritize taxation over company investment.

As part of the process of establishing financial benchmarks, it is critical for a government and its NOC to prioritize goals and engage in strategic reflection about the most important objectives for the company, in line with the country's geological endowments and non-financial goals. It is difficult for any NOC to simultaneously emphasize every financial goal noted above, especially when the country also has high expectations for the NOC to be creating value via the other mechanisms discussed elsewhere in this paper. This can be particularly challenging for NOCs working from an uncertain or relatively small base of proven oil and gas reserves, as is the case with several of the case-study companies.

4.1.1. Indicators for consideration

The following discussion establishes some indicators that NOCs can use in order to track their financial value creation in each of the three categories. Not every NOC will use each of these indicators; rather, they should be tailored to the goals and priorities of the company and its government. The value of some indicators also varies depending upon whether the NOC is in a country that is already producing oil and gas (in which case various measures of how efficiently the NOC is extracting and the level of its contributions to the state are important) or in a pre-production country. This section presents a range of comparative financial and operational indicators, which a future benchmarking study could draw from to compare companies of similar profiles and mandates.

a. Commercial efficiency and growth

Many African NOCs and governments have the ambition for the company to grow into an efficient commercial entity that can lead the development of national resources and even to expand activities abroad to generate revenue from oil and gas in other jurisdictions. Among the case-study countries, for example, GNPC's strategy calls for the company to become a "world-class" operator by 2027.

This kind of ambition has the potential to deliver financial value to the state via several local content pathways:

- i. The efficient production of national barrels can increase the amount of profit that is available to share between the NOC and the state;
- ii. By developing its own operational skills over time, the NOC can



reduce the country's dependence on private and foreign contractors and increase the share of the pie that stays with the country;

- iii. Becoming an efficient commercial player can deliver various positive spill-overs to the economy, including the development of a cadre of skilled professionals and managers who can ultimately help develop other businesses and industries.

These kinds of commercial goals are seen by many to be among the most important reasons that a government may wish to develop a NOC instead of vesting state power exclusively in ministries and administrative bodies. Several NOCs worldwide have indeed succeeded in developing into world-class companies and delivering substantial benefits to their countries.

Pursuing this goal of commercial efficiency and growth comes with costs and risks, however. Developing the company's commercial skills and expanding its activities into specialized business areas requires significant investment. This investment is usually financed either by a share of the country's oil revenues or via debt or "carried interests" with private partners that will be repaid via future oil earnings. If the NOC succeeds in developing strategic commercial capabilities, these investments can pay off. If the NOC does not develop into an effective commercial player, then these expenditures do not pay off, and result in wasted money that could have been used for other things. There have been several high-profile cases – including long-time oil producers such as Mexico and Kazakhstan – where despite years of heavy spending, the NOC has proven unable to meet its costs and has required costly bailouts from the state.

This complexity makes it critical to establish clear goals for how a company and government will determine "commercial efficiency" or "commercial success", and to consistently track evolving performance. Table 7 shows indicators that can represent important components of such an effort.

The Natural Resource Charter, for example, holds that "an objective of commercial efficiency" should be the most important goal for a state-owned enterprise in the extractive sector. Natural Resource Governance Institute, Natural Resource Charter – Second Edition, 2014, page 22, https://resourcegovernance.org/sites/default/files/NRC1193_natural_resource_charter_19.6.14.pdf.

TABLE 7: Indicators of commercial efficiency and growth for companies in the production phase

Indicator	Mode of calculation	Rationale/notes
<i>Financial Efficiency and Growth</i>		
Return on Capital Employed (ROCE)	EBIT (Earnings before Interest and Taxation) divided by total capital employed (total assets – current liabilities)	Long-term measure of the degree to which a NOC has been able to convert assets invested in it into profits. Needs to be tracked over time to be meaningful. The ROCE will be much higher for the upstream and for a company such as Sonatrach which is operating in both the upstream and the downstream space, this indicator should be measured for each sector and compared to peers, to highlight the degree to which upstream revenues may be subsidizing downstream costs.
Net profit margin	Net operating income divided by total revenue	Measures how much money a NOC earns after covering operating expenses. As with previous indicator, can also be useful for assessing impact of downstream on financial bottom line.
Operational expenditures (upstream only) per barrel produced	Operational spending on upstream projects divided by total boe produced	Measures how efficiently the company is getting oil out of the ground. When doing benchmarking, it is important to take geology into account. Useful to separate the NOC's operated vs. non-operated production.
Operational expenditures (company-wide) per barrel produced	Total spending divided by total boe produced	Measures how much the company is spending overall across its activities as a function of its production. A proxy for how efficient a company's overall spending vis-à-vis the oil and gas is it is producing. Can help identify situations in which non-commercial activities are using up resources generated in the upstream.
Capital expenditures (upstream only) per barrel produced	Upstream CAPEX divided by total boe produced	Measurement of how much the company is investing, how much it is leveraging current fields to invest in future upstream growth. When doing benchmarking, it is important to take geology into account. Useful to separate the NOC's operated vs. non-operated production.
Capital expenditures (company-wide) per barrel produced	Total CAPEX divided by total boe produced	Measurement of how much the company is investing in its overall portfolio as a function of current production.
Revenue (oil and gas sales only) per barrel produced	Oil and gas sales revenue divided by total boe produced	Measures what kind of financial return the company is getting on its oil sales. Can help identify situations in which ineffective oil sales contracts or obligations to sell under market value may hurt company bottom line.

TABLE 7: Indicators of commercial efficiency and growth for companies in the production phase (cont.)

Indicator	Mode of calculation	Rationale/notes
<i>Financial Efficiency and Growth</i>		
NOC liabilities as a multiple of annual revenues	Total NOC liabilities divided by average annual revenue	Measures the debt risks associated with the NOC, specifically how many years of revenues it would need to devote to repaying liabilities.
NOC liabilities as a % of assets	Total NOC liabilities divided by total NOC assets	Measures the debt risks associated with the NOC.
Energy intensity and GHG emissions per barrel	Total energy consumed and total GHG emissions per barrel of oil equivalent (boe) produced	Measures the cost and competitiveness that are (or will be) associated with energy efficiency and emissions, which have a significant impact on the future financial health of the company.
<i>Operational Efficiency and Growth</i>		
Revenue (all revenue) per barrel produced	Total revenue divided by total boe produced	Measures overall revenue generation as a function of production.
Production per employee	Total oil and gas production divided by total number of employees	Measures the productivity of the company's labour force. Purely commercial companies tend to want to maximize this figure, while NOCs with a broader public mandate may tolerate (or prefer) a lower figure.
Revenue per employee	Total revenue divided by total number of employees	Measures the productivity of the company's labour force. Purely commercial companies tend to want to maximize this figure, while NOCs with a broader public mandate may tolerate (or prefer) a lower figure.

Indicators for pre-production NOCs:

Because pre-production NOCs are investing in the potential future revenues that have not yet come to fruition, measuring their commercial success in the upstream is inherently more challenging. Nonetheless, rigorous measurement of several indicators shown in Table 8 can help NOCs and their governments track progress towards future growth. Comparing figures with other pre-production NOCs (where data is available) can offer a useful frame of reference. Before production revenues are available, many emerging NOCs are active in other segments of the value chain, such as retail, services or refining.

TABLE 8: Indicators of commercial efficiency and growth for companies in the pre-production phase

Indicator	Mode of calculation	Rationale/notes
Total operational expenditure	Total expenditure	Important to track costs so as to keep them manageable in the pre-production phase. Where possible, it can be valuable to compare upstream costs incurred against other similarly situated NOCs (including equity, training, data acquisition, for instance). NOC expenditure before production can contribute to debts and/or tax losses that may reduce the public benefits derived from any production. While expenditure is necessary for many NOCs, setting and enforcing benchmarks can be an important way to constrain spending.
Operational expenditure by business unit	Expenditure by business unit within the company	Important to track costs so as to keep them manageable in the pre-production phase
Profitability	Either Earnings Before Interest and Taxation or net operating income	It may be inevitable for a NOC to incur losses in the upstream segment during a pre-production phase, but tracking those losses is nonetheless critical. It is equally important to track profitability of other activity segments, to understand whether they create financial value.
Net profit margin	Net operating income divided by total revenue	Measures how much money a NOC earns after covering operating expenses. While upstream losses may be necessary pre-production, tracking those losses is nonetheless critical.
Total debts	Total company debts	Important to track company debt levels
Total debts as a % of expected future revenues	Total company debts divided by revenue projections under a variety of scenarios	If a company does detailed modelling of revenues under a range of scenarios, it is useful to examine debts as a function of those revenues. Can help illustrate what kind of success would be necessary in order to repay debts.
Employees	Total number of employees and employees per business unit	Comparing against other pre-production NOCs can help the company assess whether or not the workforce is right-sized. The 'right' number of employees depends on what segment of the value chain they are active in, with larger staff numbers for companies in active in the downstream.

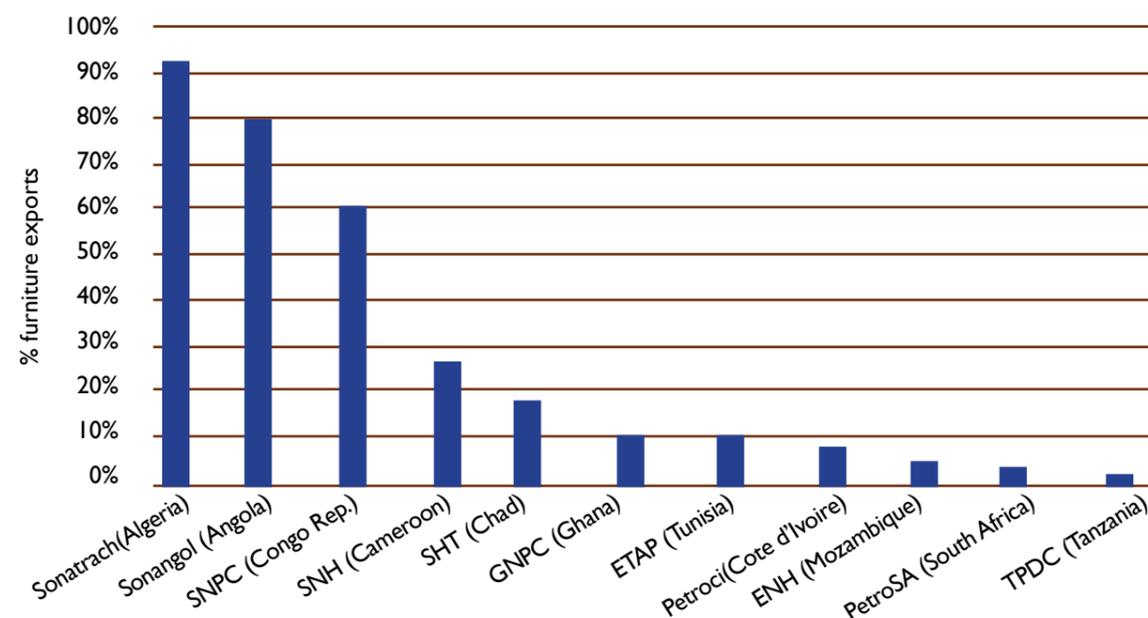
b. Indicators on fiscal contributions to government

Revenues from the oil and gas sector are critical to the functioning of many governments all across the world, including in Africa. In some countries, a large share of the oil and gas money collected by public entities goes to NOCs first before making it to the treasury (in other words, those NOCs can retain earnings from sales before tax obligations). That means that the fiscal influence of NOCs can be

very large, although there is significant variation across countries. Figure I provides an illustration derived from public reporting by NOCs and their governments. It shows NOC gross revenues as a percentage of total government revenue as reported by the IMF, for 2014, among the African NOCs in producing countries that published the necessary data.

Figure 4 shows the contribution of NOCs to government revenues in some countries. It illustrates considerable variance. In established producers such as Algeria, Angola and Republic of Congo, NOC revenues are huge when viewed in the context of total public revenues, equivalent to upward of 60%. In new and smaller producing countries such as South Africa, Mozambique and Ghana the figures are significantly smaller, although still meaningful. They are almost insignificant for Namibia and Kenya who even receive transfers from the state.

FIGURE I I: Proportion of furniture exports from Benin to importing African countries (%)



For a discussion of the expected range of employee numbers depending on the type of NOC activity, see Valerie Marcel (2016). *The Cost of An Emerging National Oil Company*, Chatham House; Available at <https://www.chathamhouse.org/sites/default/files/publications/research/2016-03-01-cost-emerging-national-oil-company-marcel.pdf> (accessed 28 February 2019)

Figure derived from NRCI National Oil Company Database, www.nationaloilcompanydata.org, 2019. The database collects revenue from reports published by NOCs and their governments and assembles it according to a consistent methodology.

Tracking the flows of funds between the NOC and the state is critical, but also complex. The size of NOC revenues in relation to the total public sector underscores the importance of policy for NOC transfers to their governments. Rules on the share of their revenues that the NOC must transfer to government, as well as the NOC's own performance in helping limit cost, play a determinative role for the amount of NOC revenues that ultimately go to government.

NOCs and governments interested in tracking their fiscal contributions to the state over time can rely on several indicators. As in the preceding sub-section, interpretation of several of these indicators depends in part on both NOC and government priorities. They may wish to maximize fiscal transfers to the state in the immediate term, in order to finance public priorities and reduce the risks of loss-making commercial ventures. Alternatively, if a government or NOC is executing a growth strategy, it may be willing to tolerate smaller transfers in the short term. Regardless of which of these approaches is being taken, close tracking of fiscal transfers can provide a stronger basis for analysis of financial value creation.

Determining the 'right' level of fiscal contribution over the value retained by the NOC requires a wide perspective. It is critical to look at how much the companies are contributing to the state together with their performance against operational and commercial goals. A NOC and its government may, for example, be willing to sacrifice short-term revenue transfers to the state in the pursuit of spending on a robust exploration programme designed to increase the company's reserves. In assessing performance against this strategy, it is important to look both at how much the company transferred to the state in fiscal flows and how well it achieved its reserve-expansion goals. As such, the government and the company can analyse whether any short-term trade-off in revenue transfer actually generated the desired outcomes.

NOCs collect revenues both in the form of fiscal payments from partner companies (bonuses, income taxes, royalties, etc.) and from the results of their commercial activities (oil sales, return on equity, etc.). In this paper terms used such "fiscal contributions to the state" and "fiscal transfers to government" are used to refer to the mechanisms by which the NOC transfers money to the treasury or other government entities, including through income taxes, automatic transfers of the proceeds from sales of state profit/equity oil, royalties, dividend payments, etc.

An effective NOC can deliver major financial value to the state. By increasing proved reserves, developing fields effectively, overseeing the work programmes and costs of private oil operators or promoting national acreage effectively, a NOC can increase the revenue that is generated and can be used to finance national development.

For pre-production NOCs such as NOCK and NAMCOR, fiscal flows between the government and the company play out in a different direction, with the government covering some of the NOC's costs in the absence of significant revenue flows from the upstream. Here too, measuring costs against results is important. In Namibia, for example, NAMCOR has needed significant government backing for the Kudu gas to power project. As Namibia tracks the success of this investment, it should set clear benchmarks on operational success and revenue generation (as well as access to energy for Namibians) for that project, as a mechanism for tracking cost-benefit of the investment made.

TABLE 9: Indicators on fiscal contributions to government for NOCs in the production phase

Indicator	Mode of calculation	Rationale/notes
Total transfers to the state	Adding all transfers made by the NOC to the state	Shows the bottom line – how much money is ultimately making it to the treasury (or special petroleum funds) from the NOC. Tracking over time in line with goals is important.
Transfers to the state via specific kinds of payments	Tracking how much money the NOC is transferring via income taxes, dividends, royalties and a range of other mechanisms, in accordance with national legislation	Shows how effective different fiscal streams are in their objectives of generating fiscal revenue (in the case of income tax and dividends, these can also be proxies for commercial profitability).
Transfers to the state in \$ per boe	Total transfers to the treasury divided by total production	Puts transfer figures in context by showing how much makes it to the state for every boe produced. In doing comparative benchmarking, geology and quality of oil must be taken into account.
Transfers to the state as % of gross revenues	Total transfers to the treasury divided by NOC gross revenues	Puts transfer figures in context by showing how much makes it to the state as a share of revenues. In doing comparative benchmarking, geology and quality of oil must be taken into account.
Transfers to the state a % of profits	Total transfers to the treasury divided by NOC profits (EBIT or net operating income)	Puts transfer figures in context by showing how much makes it to the state as a share of profits. Does not automatically account for NOC efficiency which will impact profits.

TABLE 10: Indicators on fiscal contributions to government for NOCs in the pre-production phase

Indicator	Mode of calculation	Rationale/notes
Net flow of funds between the NOC and the state	Total transfers from the NOC to the state minus transfers from the state to the NOC	Shows whether the NOC, in its pre-production stage, is contributing fiscal revenues to the state or is a (temporary) drain on public coffers.
Cash flows from operations	NOC cash flows from operating activities	Another manner of showing whether the NOC is already earning positive revenues before production has begun.

Table 9 and Table 10 summarise indicators of the contribution of NOCs to government revenues and the methods for their calculation – at the production and pre-production phases respectively.

4.1.2. Selecting peers for comparison

To the extent that a NOC or its government opts to compare a company's performance on certain indicators against figures produced by other NOCs, it is important that the company establishes appropriate companies against which to benchmark. Comparing the operational efficiency of GNPC against global giants such as Equinor or Petronas would be unlikely to yield meaningful conclusions on how well the company is doing. To the degree that available data exists, the following peer groups may be valuable to examine in constructing comparisons:

- i. **Regional.** Comparing a NOC against other companies from the same region may be politically resonant and may serve to approximate companies that are called upon to play similar roles.
- ii. **Production level.** Viewing NOC data in light of the performance of other NOCs producing at similar levels can provide one useful way to sort by company size.
- iii. **Production mix.** Where possible, companies primarily working with oil may prefer to benchmark themselves against other oil producers, likewise for gas producers.

One area of potential value for future studies may involve looking at historical data from the early days of companies that have evolved significantly today, where it is available.

- iv. **Geology.** Where data is available, it can be useful to track performance against other companies facing similar costs and resource quality.
- v. **Experience level.** A NOC may wish to track its performance against that of other companies with roughly similar levels of experience.
- vi. **Role(s) in the sector.** It may be valuable to benchmark performance against other companies that carry similar roles in the downstream or social service provision.

In addition to comparing against peer NOCs, it can also be informative to benchmark against NOCs that have achieved significant success and are seen as models in various operational areas. This can help NOCs analyse major differences in their experiences and inform their thinking on how to overcome obstacles and aspire to high performance.

Benchmarking the case study companies – some examples

It is beyond the scope of this study to engage in comprehensive benchmarking of all elements of upstream financial value creation for the four case study companies. A lack of comprehensive data – both from the companies themselves and from some peer companies – also impedes comprehensive benchmarking. Nonetheless, it is useful to discuss some benchmarks where possible, both to illustrate the value and potential of a more rigorous approach to benchmarking and to provide inputs into the evolution of these companies’ strategies.

Of the case study companies, Sonatrach provides by far the most comprehensive data in its public reporting. As such, it is not possible to offer several illustrations of comparative benchmarking for the company, and to use them to raise questions for the consideration of company officials.

In the interviews, it was learnt that Sonatrach’s new strategic transformation focuses on operating expenditure. “This is completely new for the company”, commented one executive. Keeping costs low is the new focus. While the finance division could see all expenditure and revenue in real time, it had no control over

the expenditure of other divisions. Consistent benchmarking can help the company track its progress against this goal.

Table II looks at this data in comparison to some of Sonatrach’s peer NOCs. It provides a benchmark on where the company stood in terms of company-wide operational expenditure (OPEX) on a per boe basis in the high price years and then as oil and gas prices fell precipitously. This measure shows how much the company is spending in operating expenses across all its activities (not just the upstream), as a function of the amount of oil and gas that the company produced. It shows that Sonatrach’s total spending per boe produced was very competitive compared with production profile and production mix peers. Its spending was lower than almost all of the other NOCs in these categories for which data was available during these years.

TABLE II: Total operational expenditures (company-wide) divided by production in barrel of oil equivalent, USD, Sonatrach and peer NOCs

NOC	2012	2013	2014	2015	2016	2017
<i>Production profile (NOCs producing more than 500,000 boe/day, primarily in their home countries)</i>						
Ecopetrol (Colombia) {Company Reporting}	76	80	90	56	36	
KazMunayGas (Kazakhstan) {Company Reporting}	96	92	87	24	22	
KPC (Kuwait) {Company Reporting}	43	..	40	35	22	
Pemex (Mexico) {Company Reporting}	53	57	59	70	33	
Sonatrach (Algeria) {Company Reporting}	16	17	15	(data incomplete)	14	16
Sonangol (Angola) {Company Reporting}	..	43	51	47	41	..
<i>Production mix (companies that primarily produce gas)</i>						
Gazprom (Russia) {Company Reporting}	26	28	26	20	18	..
Naftogaz (Ukraine) {Company Reporting}	..	81	70	39	37	..
Sonatrach (Algeria) {Company Reporting}	16	17	15	(data incomplete)	12	..
YPFB (Bolivia) {Company Reporting}	54	53	49	35	..	..

It is worth noting that Table II only provides a partial picture. Each company's OPEX requirements are shaped by its mission – a company with extensive downstream activities or social contributions will necessarily have higher operating costs than a similarly-situated company that is exclusively focused on the upstream. Geology also plays a major role, so the mere fact that Sonatrach's spending per barrel was lower than that of peer companies does not on its own demonstrate that the company has achieved its goals. More important would be tracking how OPEX per barrel changes over time in response to the company's cost-cutting marching orders. NOCs and IOCs all over the world dramatically reduced their OPEX in the wake of the 2014 price drop, deriving from a mix of falling industry costs and directives from shareholders. In order to track progress effectively, Sonatrach leadership can see how these figures change, and compare any decline in the company's expenditure against the declines achieved by other NOCs.

The data suggests that the Sonatrach's spending as a function of production remained relatively flat when prices fell, in comparison to other NOCs which were able to reduce per-barrel costs dramatically. This interpretation is subject to important caveats. First, because Sonatrach's per-barrel OPEX was so much lower than that of its peer companies during the high price years, it is possible that there was less "fat to trim" for the company than for its peers.

Second, there is an important data distinction about the sourced information between 2014 and 2016, which at the margins may impact the per-barrel figures on Table 9. The study used production data for 2016 and 2017 from the figures provided to the consultants by Sonatrach. The production data for the other years, and the calculation of OPEX for all years, were derived from the company's published annual and financial reports. The comparison of production figures from

Data from NRG National Oil Company Database, forthcoming 2019, Production data for 2016 taken from documents supplied to consultants by Sonatrach. Operational expenditure data taken from published 2016 Financial Report. If production data from published Sonatrach Abstract 2016 had been taken instead, OPEX per boe figure for Sonatrach would be \$12.
Production data for 2017 taken from documents supplied to consultants by Sonatrach. Operational expenditure data taken from published 2017 Financial Report.
For a discussion of operating cost reductions among IOCs, see Toews, Gerhard, and Alexander Naumov. The Relationship Between Oil Price and Costs in the Oil and Gas Industry, (Oxford, UK: Oxford Centre for the Analysis of Resource Rich Economies, 2015), <https://www.economics.ox.ac.uk/materials/papers/13819/paper152.pdf>.

the published 2016 Sonatrach Abstract and those provided to the consultants suggests that there may be slight differences in methods of calculation as between the published and internal reports. As such, since table 9 uses figures from the published reports for 2011 - 2014, there is a possibility that these differences in calculation methods may slightly impact the interpretation of the figures between 2014 and 2016.

TABLE 12: Average labour productivity, 2011 - 2017, production (boe) per employee, Sonatrach and peer companies

Regional peers (Middle East, North Africa and sub-Saharan Africa)	Average annual production per employee (boe)
Basra Oil Company (Iraq) {Company Reporting}	40,271
ENOC (United Arab Emirates) {Company Reporting}	3,271
Saudi Aramco (Saudi Arabia) {Company Reporting}	70,921
Sonangol (Angola) {Company Reporting}	30,875
Sonatrach (Algeria) {Company Reporting}	27,799
Production profile (other NOCs producing more than 500,000 boe/day, overwhelmingly in their home countries)	Average annual production per employee (boe)
Ecopetrol (Colombia) {Company Reporting}	31,796
KazMunayGas (Kazakhstan) {Company Reporting}	2,879
PDVSA (Venezuela) {Company Reporting}	9,998
Pemex (Mexico) {Company Reporting}	8,104
Pertamina (Indonesia) {Company Reporting}	7,121
Saudi Aramco (Saudi Arabia) {Company Reporting}	70,921
Sonangol (Angola) {Company Reporting}	30,875
Sonatrach (Algeria) {Company Reporting}	27,799
Production mix (Companies that primarily produce gas)	Average annual production per employee (boe)
Gazprom (Russia) {Company Reporting}	7,215
Naftogaz (Ukraine) {Company Reporting}	1,502
Sonatrach (Algeria) {Company Reporting}	27,799

discussion of operating cost reductions among NOCs, see Patrick Heller and David Mihalyi, National Oil Company Database: Key Findings (New York: Natural Resource Governance Institute, forthcoming).

Sonatrach also shared with the consultant's additional data on expenditures covering recent years. It was not completely clear to us from the data provided what year the expenditure data came from. The categories of expenditures covered in the data provided to us differed in various respects from the categories included in the company's published annual reports, making a time series comparison difficult.

Data from NRG National Oil Company Database, 2019. Data on Sonatrach derives from all years in which company public reports made sufficient information available to complete the indicator: 2012, 2013, 2014.

Another way to measure Sonatrach's commercial efficiency is via labour productivity, as illustrated in Table 10. Sonatrach exhibits competitive performance in terms of this measure of productivity of labour (production per employee) compared to the most relevant peer group: other NOCs producing at a roughly similar level of daily production and operating largely within their country's national borders. Sonatrach's per-boe labour productivity exceeds those of the other two predominantly gas producers for which data was available for this year, but the lack of a large pool of comparators limits the conclusions that could be drawn from this. Sonatrach's production per employee ranks around the middle of the Middle East/North Africa NOCs for which data is available. Interviews revealed that the company had in fact lost a large contingent of experienced technical staff to early retirement after 2008 (c.f. Section 5.2.4). Declining labour costs do not, therefore, necessarily indicate a strengthened technical or organisational foundation for a company.

As Sonatrach continues to try to raise its commercial efficiency, updating and tracking this measure of labour productivity, as well as other similar measures including revenue per employee and sub-divisions of the revenue and staffing of different business units, can be beneficial. These measures are compared in Table 12 with those of regional peers and other companies with similar production profiles.

The company's 2017 Financial Report indicates a reduction in the wage bill of 7% from 2016 to 2017, which suggests some progress toward its goal of increased labour efficiency. That said, providing competitive salaries would contribute to the retention of high-functioning staff and a reduction of labour costs should aim to target those areas which are not as productive.

GNPC can be used to illustrate a measure of fiscal revenue generation. The company ranks roughly in the middle of the pack compared to both other African NOCs and a broader group of non-operating NOCs producing at a similar level when it comes to how much the company remits to the state per barrel produced. Table 11 provides insight into GNPC's fiscal contributions to the Ghana Petroleum Holding Fund – in comparison with peers, including NOCs that have been producing for longer. GNPC has converted the barrels it sells into state revenues at a higher level

than some companies (such as Nigeria's NNPC) and a lower level than others (such as Chad's SHT). Like all measures, this indicator cannot be taken on its own to mean GNPC is "succeeding" or "failing," but can help put Ghana's decisions about the fiscal rules applying to the company and GNPC's evolving growth strategy in context.

Like oil companies worldwide, GNPC saw its per-barrel fiscal contributions to government decline as oil prices dropped. As the company scales up its commercial ambitions, it will be useful to track the evolution of its fiscal contributions to the state. They may decline if GNPC's spending and investment increase as the company raised its capacity. Such a decline may be appropriate considering GNPC's commercial ambitions. As noted above, the analysis of fiscal contributions to the state should be conducted in parallel with a review of progress against the commercial strategy and the returns it generates, in order to assess the trade-off between short-term fiscal contributions and longer-term commercial development. This assessment will need to guide the government's thinking about whether to extend the PRMA transfers to GNPC past the natural expiration of the programme in 2026.

Reserves growth through an acquisition programme can also support long-term growth. NOC equity represents the value of the corporation to government. GNPC's equity has grown substantially, from approximately GH¢87 million in 2010 to over GH¢2 billion in 2015, while its total assets increased from a little of over GH¢1 billion to nearly GH¢3 billion during the same period.

Table 13 shows a comparison with regional peers and companies with similar production profiles.

TABLE 13: Transfers to the treasury (or to special petroleum funds), USD per barrel of oil equivalent, GNPC and peer NOCs, 2011 - 2017

Regional peers (Sub-Saharan Africa)							
	2011	2012	2013	2014	2015	2016	2017
ENH (Mozambique) {EITI}			5	5	2	3	
GNPC (Ghana) {PIAC}	59	63	68	79	23	15	20
NNPC (Nigeria) {EITI}		53	49	48	22		
Petroci (Cote d'Ivoire) {EITI}	27	32	27	20	22		
PetroSA (South Africa) {Company Reporting}	-	0	0	1	0	0	0
SHT (Chad) {EITI}		96	98	51	38	33	
SNH (Cameroon) {EITI}	80	71	73	63	41		
SNPC (Congo (Rep.)) {EITI}	94	109	98	69			
Sonangol (Angola) {Company Reporting}			85	68	35	26	
NOC Production profile (NOCs producing 100,000 boe per day or less)							
	2011	2012	2013	2014	2015	2016	2017
ENH (Mozambique) {EITI}			5	5	2	3	
ETAP (Tunisia) {Company Reporting}	17	21	20	21	9	5	7
GNPC (Ghana) {PIAC}	59	63	68	79	23	15	20
MOGE (Myanmar) {EITI}				55	36		
Petroci (Cote d'Ivoire) {EITI}	27	32	27	20	22		
PetroSA (South Africa) {Company Reporting}	-	0	0	1	0	0	0
SHT (Chad) {EITI}		96	98	51	38	33	
SNH (Cameroon) {EITI}	80	71	73	63	41		
SNPC (Congo (Rep.)) {EITI}	94	109	98	69			
Staatsolie (Suriname) {Company Reporting}	50	47	47	43	4	1	

Company financial statements, reported in: Kojo Asante, Abdul-Gafaru Abdulai, Giles Mohan, "Ghana: Researching the Politics of Natural Resource Governance", forthcoming.

Data from NREGI National Oil Company Database, 2019. Underlying data on GNPC production and transfers derives from reports of the Ghana Public Interest and Accountability Committee. GNPC production is defined as production sold by the company. Definition of GNPC "transfers" is determined based on the Ghana Petroleum Revenue Management Act. A transfer in this case for GNPC is defined as the revenues from GNPC oil sales that remain in the Ghana Petroleum Holding Fund net of GNPC spending and investment.

As is noted, benchmarking of indicators for pre-production NOCs is inherently more difficult, given the lack of large upstream revenue sources and the goal that risky upfront investment in developing a strong NOC may pay off in the event of a discovery. Still, systematic tracking of spending and efficiency by pre-production NOCs can be an important part of an effort to develop into a lean and effective company. NOCs and their governments may want to avoid the situation encountered by some pre-production NOCs – Liberia's NOCAL being one prominent example – which ended up with bloated staffs and large budgets that drain public finances without creating strong performance incentives.

The data shared by NAMCOR provides a window into the company's approach to personnel. Through the first 11 months of 2018, the NOC spent the equivalent of 37 % of its total operating expenses on salaries and wages (6% of total expenditures including cost of sales). This wage bill is equivalent to 96% of the company's gross profit after selling fuel. On the basis of limited interviews in NAMCOR, it is difficult to conclude whether this represents a right-sized approach to staffing. Moreover, the fact that most companies do not provide detailed reports on salaries and wages makes systematic benchmarking difficult. Given that many companies are concerned about striking this balance effectively, the African Development Bank could play a valuable role by gathering data from NOCs from interested member countries to develop a set of data on these and similar indicators that could help inform company policies.

The materials shared by NOCK in the preparation of this report suggest that the company is working to implement stronger procedures to track the company's efficiency and spending. The Auditor General's report for the 2015/2016 financial year, for instance, indicated that huge losses incurred by the corporation were a threat to its sustainability. The company's then CEO, her successor and the new board appointed in 2016 worked to turn the company around.

In 2015, the Liberian government sacked the entire 200 person staff of NOCAL, with President Ellen Johnson Sirleaf expressing serious concern that "despite the obvious decline in revenue that began in late 2013, NOCAL continued hiring staff at an alarming rate with exorbitant benefits resulting the current wage bill of over \$7 million (US) per annum." James Butty, "Liberia's National Oil Company Sacks Entire Staff," Voice of America, August 26, 2015, <https://www.voanews.com/alliberias-national-oil-company-sacks-entire-staff-of-200/2932682.html>.

First cutting a loss of Sh808 million reported in 2015/2016 to Sh67 million by close of the 2016/2017 financial year, and then making a pre-tax profit of nearly Sh400 million midway through the 2017/2018 financial year. Company website; <https://nationaloil.co.ke/2018/05/14/national-oil-is-now-in-a-healthy-cash-flow-position-ceo-maryjane-mwangil/>; accessed 10 January 2019.

The Business Plan FY 2016/17 shared with the consultant to this study showed specific targets for the company's gross margin, profits and seismic drilling program, among other upstream initiatives. The plan included timetables for tracking performance. These appear to be positive steps in enhancing corporate culture and a commitment to efficiency. As the company continues to develop its plans for the upstream, supplementing these benchmarks with some of the additional metrics discussed above may contribute to the further development of the company's strategy and consequent performance.

Examining company liabilities is another way to view some of the risks facing the NOCs and their governments. Table 14 looks at the liabilities of NOCK and NAMCOR in comparison with those of two other NOCs that are not yet producing their own oil or gas from the upstream (Jamaica's PCJ, which has extensive activities in importing and fuel sales and Timor Leste's Timor GAP, which is expanding its business in the upstream, downstream and services), as well as two other NOCs producing gas in very small quantities while anticipating major offshore projects which could come online in the coming years (Mozambique's ENH and Tanzania's TPDC).

TABLE 14: Total Liabilities, USD million, pre-production and early production NOCs

NOC (country)	2011	2012	2013	2014	2015	2016	2017
ENH (Mozambique)	288	276	333	365	..	..	..
NAMCOR (Namibia)	23	18	..	..	..	..	..
NOCK (Kenya)	..	..	..	..	..	88	91
PCJ (Jamaica)	..	242	262	..	..	..	..
Timor GAP (Timor Leste)	..	4	5	4	2	2	3
TPDC (Tanzania)	..	52	319	86	112	..	..

The data provides an incomplete picture, given the variance in the roles among companies and the gaps in data. The data suggest that, from a comparative perspective NAMCOR has relatively low total liabilities while NOCK is roughly in the middle of the pack. Further analysis would be necessary in order to more

thoroughly unpack the debt risks facing these companies. In fact, this kind of comparative analysis is most useful as a starting point for analysis, to identify areas for more in-depth, country-specific assessment.

Table 15 provides further perspective, showing the liabilities of NAMCOR and NOCK as a percentage of total government revenue. This figure can be valuable because it shows the share of total government revenue that would need to be sacrificed if the NOC could not meet its liabilities and needed to be bailed out by the government. Here, the figures show that these two companies rank on the low end of the scale compared to the other companies. This fits their status as pre-production NOCs. Though not an immediate red flag, it may be worth NAMCOR's leadership tracking this figure going forward, as its percentage is as high as that of NOCK, and higher than that of Timor GAP, even though the country has not yet had a discovery.

TABLE 15: NOC liabilities as a % of total government revenue, pre-production and early production NOCs

NOC (country)	2011	2012	2013	2014	2015	2016	2017
ENH (Mozambique)	8.0%	6.7%	6.6%	6.8%	..	..	..
NAMCOR (Namibia)	0.6%	0.4%	..	0.7%	0.6%	0.7%	0.7%
NOCK (Kenya)	..	..	..	..	..	0.7%	0.6%
PCJ (Jamaica)	..	6.2%	6.6%	7.2%	6.4%	..	..
Timor GAP (Timor Leste)	..	0.1%	0.1%	0.2%	0.1%	0.2%	0.3%
TPDC (Tanzania)	..	0.8%	4.6%	1.2%	1.7%	..	..

4.2. Benchmarking operational progress, capabilities and management processes

Governments and companies can track NOC success in developing operational capabilities against objective quantitative measures connected to national priorities. They can also benchmark the evolution of internal company processes and the

maturity of the company’s approach to a wide range of operational issues. In this section, the study briefly highlights some examples of quantitative indicators related to national geological development, then proceeds to a detailed discussion of the operational performance and capability assessment methodology.

a. Quantitative metrics for measuring operational progress:
indicators on geological development

As is true for the financial performance indicators discussed above, governments and NOCs can track a range of quantitative metrics as an element of a comprehensive approach to benchmarking operational performance across a range of NOC roles. One area where such an approach can be beneficial is in measuring a NOC’s performance in helping contribute to the national reserve and production base. NOCs also seek in many cases to increase their own reserves bases as core assets.

Many African NOCs are called upon to play a role in helping the country develop its resources sustainably by promoting or participating in exploration of the resource base. This can happen via a NOC’s role as a quasi-regulatory body responsible for organizing licensing rounds, conducting road shows or overseeing the execution of contractor companies’ exploration obligations (Liberia’s NOCAL is an example of an African NOC that has played these roles at various points in its history). It can also happen via NOC participation as a commercial operator or equity holder in projects designed to discover and produce (Sonatrach and the Nigerian National Petroleum Corporation are examples). To the extent NAMCOR, GNPC and NOCK are active in pre-exploration (data acquisition) and seek farm-ins to the fields for which they hold majority rights, they too are developing national resources. Some NOCs play both of these roles simultaneously, such as Angola’s Sonangol. Table 16 provides a summary of some key indicators.

TABLE 16: Some key indicators on geological development to measure operational progress

Indicator	Mode of calculation	Rationale/notes
Reserves addition (NOC operated)	Change over time in proved and probable reserves of the NOC	Measure of the growth in the amount of oil and gas that the NOC has booked.
Reserves-to-production ratio (NOC only)	Total proved/probable reserves divided by average annual production of the NOC	Amount of oil and gas that can be produced at current production rates.
Reserves addition (national)	Change over time in proved and probable reserves	Measure of the growth in the amount of oil and gas that the country has discovered.
Reserves/production ratio (national)	Total proved/probable reserves divided by average annual production	Amount of oil and gas that can be produced at current production rates. Indicator only relevant for countries that are already producing.
Seismic surveys (national)	Kilometres of seismic surveys conducted (2-D and 3-D)	Measure of the level of ongoing activity that may result in reserves addition and future production.
Wells drilled (national)	Number of explorations, delineation and development wells drilled	Measure of the level of ongoing activity that may result in reserves addition and future production.
Rig count (national)	Number of rigs operated on and offshore in national territory	Measure of the level of ongoing activity that may result in reserves addition and future production.
Investment in exploration (national)	Spending on exploration and development by companies with licenses in the national territory	Measure of the amount of money being invested in exploring for oil and gas. Proxy for the seriousness of partners and the incentives created by the NOC and the regulatory system.

Progress on these indicators depends in part on factors outside the NOC’s control. In many places, the NOC’s role in promoting exploration and investment is limited, with rules, systems and other public entities being the biggest determinant of success. Geology is perhaps the most important factor in many places determining interest and investment by oil and gas companies. But to the extent that the NOC is expected to support the further development of the national upstream sector in order to generate future financial returns to the state, these measures offer valuable ways to track progress.

b. Benchmarking management systems and processes

As was outlined in Section 3.2, formalized Operations Management Systems (OMSs) and Operational Excellence (OE) programmes - supporting sustained, safe, reliable, efficient and profitable and environment-friendly operations - have become

a competitive requirement in the oil and gas industry. This applies to NOCs as well because their safety, reliability, and efficiency are critical to the quality of their operations and major factors in attracting and retaining IOC partners to develop the country's hydrocarbon resources in an increasingly competitive global market.

There is a wide range of legal, fiscal, regulatory, market, and infrastructure circumstances that affect performance. Keeping this variety of circumstances in mind, comparisons can be made to established international best practices and capabilities for key functions. It can be observed whether the key implementation conditions are in place for sustained industry-leading performance and continuous improvement.

Specifically, the Operational Performance and Capability (OPAC) Assessment methodology employed in this study consists of identifying the state (or "maturity" level) of implementation of a specified, catalogued set of best practices and capabilities (i.e. "targeted best practices and capabilities") that characterize leading international industry performers. Implementation "maturity" for these targeted best practices is measured and scored using a progressive "capability maturity model (CMM)/framework", based on observable, verifiable conditions known to be required for sustained first quartile performance and continuous improvement. The CMM framework is outlined in Section 3.2. In addition, environmental sustainability is assessed following the SPQR procedure proposed by Anifowose et.al (2016) and embedded in the SGDs and African Union Agenda 2063 and thus also the AfDB High 5s.

The data and information gathering process for the OPAC Assessment includes a combination of data requests and interviews with key participant executives, managers, and subject matter experts most closely involved in the various key segments, functions and processes that are relevant for the benchmarking study. Data requested typically include existing and readily available performance reports, audit and compliance reports, and formalized policies, processes, and procedures for the assessed segment, function and/or process. Reports that help monitor and track performance for the different segments, functions and activities are essential to improve performance, manage inefficiencies and risk, and their

existence and availability can indicate strong management focus. The information received from interviews, data and exhibits form the basis for determining the state of implementation of the various targeted best practices (i.e. determining which conditions in the CMM framework exist). Objective CMM ratings can only be made based on observable conditions. In cases where substantiation is not provided by the companies in any form (verbal description, on screen or on paper), the CMM assessment ratings will be low compared to industry leaders.

The following section covers the OPAC Assessment high-level comparative analysis, as well as observations and results for each NOC by function (for the detailed assessment, refer to Appendix 2). These results point to the various operational performance and capability improvement opportunities that the NOC's could focus on in the context of their individual mandates. The section also provides a progressive roadmap and recommendations for near-term, sustainable performance and capability improvement.

OPAC MATURITY RESULTS BY FUNCTION FOR EACH NOC

Table 17 shows the results of OPAC maturity. They include average OPAC assessment and maturity ratings for all activities within the functions and segments assessed. The activities have been rated on a scale from 1 to 5, as detailed in section 2.2. To see the individual scores for each NOC by segment, function and activity, please refer to Appendix 2.



TABLE 17: OPAC maturity assessment results

	NOCK	NAMCOR	GNPC	SONA-TRACH
UPSTREAM				
Exploration	1.5	1.5	2.0	3.0
Technology Management	1.0		2.0	3.0
Reservoir Management			1.5	2.5
Rig Planning, Scheduling and Utilization			1.0	1.0
Well Delivery			1.5	2.0
Field Operations			1.0	1.5
Facilities Capacity Planning, Capital Projects and Operations			1.0	
Environmental sustainability				
MIDSTREAM				
Capacity Planning, Scheduling and Utilisation				2.0
New Facilities Development				1.0
Midstream Operations				1.0
Maintenance Management				1.5
Environmental sustainability				
DOWNSTREAM				
Refinery Capacity Planning and Scheduling				2.0
Direct Supply Chain				2.0
Refinery Energy Management and Energy Efficiency				1.5
Strategic Asset Management				1.5
New Facilities Development				1.5
Refinery Performance Management				2.0
Refinery Reliability Management				3.0
Refinery Maintenance Management				1.5
Product Blending and Storage				1.0
HSE Management and Procedures				1.0
Environmental sustainability				
RETAIL				
Marketing and Retail Strategy and Planning	1.5			
Retail Systems and IT Enablement	1.5			
Site Operations	1.5			
Environmental sustainability				
SUPPORT FUNCTIONS				
Enterprise IT	2.0	1.0	2.0	2.0
Enterprise HR	2.0	1.0	2.0	2.0
Enterprise Finance, Accounting and Risk Management	2.0	2.0	1.0	2.0
Indirect Procurement and Sourcing	1.0		1.0	2.0
Audit and Insurance	2.0		1.0	
Direct Supply Chain Integration and Optimization		1.0		
Legal			2.0	
Governance		2.0		
Inventory and Logistics Management				1.0
SHEQ		2.0		1.0
Environmental sustainability				

Not measured or monitored

The following subsection provides a short introductory summary of key takeaways and observations against international industry best practices, and near-term recommendations for each of the assessed NOCs.

NOCK

NOCK is primarily a petroleum retail company. In the upstream segment, NOCK has a 22.5% stake in Block 13T and a 20% stake in 10BB, where Tullow is expected to proceed with its development. NOCK also operates its own exploration acreage in Block 14T, for which a farm-down process was initiated to sell a significant part of their shares. Based on interviews, data and exhibits provided, it was apparent that NOCK's short to mid-term strategic initiatives focus on growing the retail business unit, strengthening its operatorship capabilities and completing the transition of interim responsibilities to a fully operational regulatory body.

The interviews with key stakeholders and functional leaders were focused on the following functions for the upstream segment (specifically in the role of operator of exploration Block 14T):

- i. Exploration
- ii. Technology Management

For the retail segment, the following functions were assessed:

- i. Marketing and Retail Strategy and Planning
- ii. Retail Systems and IT Enablement
- iii. Site Operations

The overall OPAC maturity scores, by segment for NOCK are provided below:

- i. Upstream: 1.5 out of 5
- ii. Retail: 1.5 out of 5
- iii. Support Functions: 2.0 out of 5

<https://oilkenya.wordpress.com/2019/02/26/national-oil-corporation-of-kenya-nock-seeks-partner-in-its-block-14t/>

High level summary of observations

Based on interviews with key executives, managers and subject matter experts, as well as data and exhibits provided, the study makes the following observations on general operations and performance capability. These relate to the segments and functions (i.e. upstream, retail and support functions) and activities assessed during the study (please refer to Appendix 2 for details):

Overall, NOCK:

- i. Has formalized and designated roles, accountabilities, responsibilities, and commits capacity to support its business segments and functions, to ensure reliable and sustainable implementation of the associated best practices and capabilities;
- ii. Management (across multiple functional interviews) demonstrated awareness of industry best practices and is looking to implement them across the business;
- iii. Has relatively few formalized standards, processes and/or procedures across all its business segments;
- iv. Has limited enterprise, finance, accounting and risk management capability and risk management tools (e.g. a formalized, systematically maintained risk register);
- v. Has potential to improve performance management and continuous improvement systems.

Specifically, in its retail segment, NOCK:

- i. Has insufficient competitor analysis reports, market intelligence programs, detailed site-level and regional demographics analysis, or market data acquisition strategies. Such data can enable a downstream retail company to be more competitive and make insight-led strategic decisions;
- ii. Has room to improve its continuous risk-based equipment monitoring and inspection programs for its depots and retail stations. Such programs can help NOCs reduce operating costs, manage risks, and ensure the optimal use of assets.

Specifically, in its upstream segment, NOCK:

- i. Leadership is supportive of best practices around exploration and planning, developing a seismic processing centre and strategic partnerships with international companies.

TABLE 18: Recommendations for NOCK's performance improvement

Functional Areas Please refer to Appendix 2 for detailed functional activities and related illustrative best practices	Expected performance impacts (illustrative)
Upstream	
Exploration Planning	Higher exploration success rates. Higher discovery rates.
Field Development Planning	Reduce time to first oil. Increased recovery. Increased return on investment. Minimise environmental impacts and ensure sustainability.
Retail	
Market Research and Intelligence	Increased market share. Increased strategic sales (e.g. LPG).
Site Profitability and Performance Management	Improved site-level performance monitoring. Increased site-level profitability and financial performance.
Site Selection and Development	Optimised site selection and planning. Increase sales and revenue.
Franchise Programme Strategy and Operations	Improved franchisee retention rates. Aligned strategies, plans and initiatives across retail stations.
Quality and Quantity Assurance	Increased brand image and value. Minimise fraud risk.
Support Functions	
HSEQ (Health, Safety, Environment and Quality)	Increased personnel safety and security. Reduced HSEQ incidents and ensure sustainability.
Indirect Procurement and Sourcing	Increased alignment between procurement and supply chain organisation with the wider technical functions. Minimise procurement lead times. Optimal working capital utilisation.
Enterprise Finance, Accounting and Risk Management	Maximised organisational financial performance. Optimal control in the organisation. Adequately controlled strategic risk management.
Audit & Assurance	Increased audit finding resolution. Higher recommendation implementation rate.

Recommendations for near-term, sustainable performance and capability improvement

NOCK to improve its performance and achieve business sustainability, the company should consider building formalized, continuously improving and best-practice based

procedures and operation management systems to increase its functional maturity on the OPAC assessment scale, for the following activities by segment, as a priority. Table 18 provides recommendations to improve the performance of NOCK.

NAMCOR

As outlined in Section 3.3, NAMCOR is primarily an upstream company, with a 10% interest in 39 blocks, four 100% operated blocks, and 54% interest in the Kudu field. NAMCOR also built two depots for products and is planning on entering the retail market (one station was opened in 2019).

As stated in Section 3.1, NAMCOR's previous strategy, which focused on moving from being a regulator for the upstream to becoming a commercial player, acquiring equity stakes in exploration blocks, developing capacity to become an upstream operator, and entering the retail fuel market, ran through to April 2018. The company is in the process of developing a new strategic plan for the next 5 years and is working in the meantime with an interim plan (which was not shared). During the interviews, discussions were focused on non-operated upstream operations (for the Kudu asset primarily, as well as exploration licenses). Therefore, the assessment focuses on Exploration and Field Development Planning.

The overall OPAC maturity scores, by segment for NAMCOR are provided below:

- i. Upstream: 1.5 out of 5
- ii. Support Functions: 1.5 out of 5

High level summary of observations

The data collected from NAMCOR was more limited than other NOCs in the study due to a narrower range of interviews and limited information being provided by the company.

The following general, operations and performance capability related observations, were noted for NAMCOR. These relate to the segments, i.e. Upstream and Support Functions and activities assessed during the study (Please refer to Appendix 2 for details):

Overall, NAMCOR:

- i. Has limited formalized performance management systems and performance measures, and, given that the company needed significant government backing for the Kudu gas to power project, clear benchmarks on operational success and revenue generation are needed;
- ii. Has a formalized risk register, alignment between strategic business areas and business risks, but lacks documentation on an interim strategic plan, indicating that management is not aligned around a clear and up-to-date strategic direction;
- iii. Currently does not have an enterprise resource planning technology enablement, but is currently implementing an ICT strategic plan;
- iv. Has the potential to formalize and document responsibilities, authority limits and decision workflows for all segments which are required to support the implementation of the key processes and their associated best practices, and to ultimately drive performance, efficiency and appropriately manage risks;
- v. Lacks formalized systems for strategic sourcing, procurement and indirect supply chain management;
- vi. Has a formalized field development planning process in place. This was designed for the Kudu field by Tullow Oil, which has since exited the project and was replaced by BWK;
- vii. Has a formalized exploratory seismic acquisition programme, along with advanced reservoir data, 2D and 3D seismic surveys;
- viii. Has the potential to implement a formalized exploratory drilling programme which complements the seismic programme.

Recommendations for near-term performance and capability improvement

For NAMCOR to improve its performance and achieve business sustainability, the company should consider building formalized, continuously improving and best-practice based procedures and operation management systems. This will increase its functional maturity on the OPAC assessment scale, for the following activities by segment, which should be done as a priority. Table 19 provides recommendations to improve the performance of NAMCOR.

TABLE 19: Recommendations for NAMCOR's near-term performance improvement

Functional Areas Please refer to Appendix 2 for detailed functional activities and related illustrative best practices	Expected performance impacts (illustrative)
Upstream	
Exploration Planning	Higher exploration success rates. Higher discovery rates.
Field Development Planning	Minimise time to first oil. Maximise recovery. Maximise return on investment. Minimise environmental impact and ensure sustainability.
Support Functions	
Enterprise IT	Increased productivity, efficiency, lower costs for general administration and management activities. Mitigating risks by implementing appropriate controls across functions and activities. Increased cybersecurity.
Procurement and Supply Chain	Maximise alignment between procurement and supply chain organisation with the wider technical functions. Minimise procurement lead times. Optimise working capital utilisation.
Finance & Accounts	More efficient cash flow management. Maximise organisational financial performance. Appropriate compliance to regulatory requirements.
HR (including Learning & Development)	Increased workforce competency. Higher workforce engagement. Lower attrition rates.
Governance	Optimal control in the organisation. Optimised strategic risk management. Increased audit finding resolution.

GNPC

As outlined in Section 3.3, GNPC is an upstream company, aiming to operate a field in the short-term. It holds minority stakes in producing fields and therefore retains earnings from crude oil and gas sales. It has conducted pre-exploration activities offshore, owns marine vessels, and sees research and collaborations as major enablers to developing operator capabilities.

Based on interviews, it was apparent that GNPC's strategic focus is to become a stand-alone operator in the short-term, with both commercial and developmental roles in the exploration and production business. However, they are currently reviewing their strategic objectives.

The company's plan to achieve operatorship is based on four strategic pillars, 1) building capacity and expanding activities, 2) replacing and growing reserves, 3) achieving efficient capitalisation, optimum participation and financial independence and, 4) enhancing sustainability through local content development and corporate social investment (CSI). The interviews with key stakeholders and functional leaders focused on the following functions for the Upstream segment (for operated and non-operated blocks):

- i. Exploration
- ii. Reservoir Management
- iii. Rig Planning, Scheduling and Utilization
- iv. Well Delivery
- v. Field Operations
- vi. Facilities Capacity Planning, Capital Projects and Operations
- vii. Technology Management

The overall OPAC maturity scores, by segment for GNPC are provided below:

- i. Upstream: 1.5 out of 5
- ii. Support Functions: 1.5 out of 5

High level summary of observations

It is worth noting that substantial amounts of requested data and exhibits were not provided by GNPC for this assessment, especially data and exhibits related to upstream operations, due to confidentiality agreements with external, joint venture partners. In such instances, interviews and email responses were used to provide the OPAC assessment ratings. Given the company's plan to become an operator in the short-term, the study aims at assessing GNPC's operational readiness as an operator, and covers capabilities and functions that, even though

at first glance do not seem to apply to GNPC, are essential to achieving the goal of operatorship.

The following general, operations and performance capability related observations were noted for GNPC. These relate to the upstream segment and support functions and activities assessed during the study (please refer to Appendix 2 for the detailed assessment):

Overall, GNPC:

- i. Has designated accountabilities, responsibilities, and authorities, and resource commitments for all segments to support the implementation of the key processes and their associated best practices, and to ultimately drive performance, efficiency and manage risks;
- ii. Has high level of collaboration with Joint Venture partners and departments and teams which enables knowledge-sharing and can provide a unified and integrated set of processes across different functions and activities;
- iii. Has potential to implement efficient methods, tools and processes that would make possible organisational and technology enablement, and the continuous improvement of the organisation and its business functions;
- iv. Has limited enterprise, finance, accounting and risk management capability and basic risk management tools (e.g. a formalized, systematically maintained risk register).

Specifically, in its upstream segment, GNPC:

- i. Lacks approved upstream policies and procedures which are needed for stand-alone operatorship, such as formalized field development planning standards and procedures or integrated reservoir model development and maintenance frameworks;
- ii. Currently does not have formalized rig inspection and certification standards and processes which are essential to the company's goal of achieving operatorship;

- iii. Has the potential to formalize systems for strategic sourcing, procurement and indirect supply chain management, elements that should be in place, given GNPC's multiple partnerships.

Recommendations for near-term performance and capability improvement

For GNPC to improve its performance, achieve business sustainability and the strategic objective of operatorship in the near future, the company should consider building formalized, continuously improving and best-practice based procedures and operation management systems to increase its functional maturity on the OPAC assessment scale, for the following activities as a priority. Table 20 provides some recommendations to improve the performance of GNPC.

TABLE 20: Recommendations for GNPC's near-term performance improvement

Functional Areas Please refer to Appendix 2 for detailed functional activities and related illustrative best practices	Expected performance impacts (illustrative)
Upstream	
Exploration	<ul style="list-style-type: none"> • Higher exploration success • Higher discovery rates
Field Development Planning	<ul style="list-style-type: none"> • Minimise time to first oil • Maximise recovery • Maximise Return on Investment • Minimise environmental impacts and ensure sustainability
Asset Management	<ul style="list-style-type: none"> • Increased asset integrity, reliability and efficiency • Increase revenue and reduced OPEX
Rig Requirements and Capacity Planning (including exploration, development, workover)	<ul style="list-style-type: none"> • Minimise costs • Maximise rig capacity utilisation • Minimise environmental impacts
Support Functions	
Procurement and Supply Chain	<ul style="list-style-type: none"> • Maximise alignment between procurement, supply chain organisation with the wider organisation • Minimise procurement lead times • Optimise working capital utilisation • Minimise environmental impacts and ensure sustainability
Finance and Accounts	<ul style="list-style-type: none"> • Optimise organisational financial performance • Optimal control in the organisation
HR (Learning and development)	<ul style="list-style-type: none"> • Higher workforce engagement • Maximise efficiency • Maximise employee satisfaction
Audit, Risk Management and Insurance	<ul style="list-style-type: none"> • Optimised strategic risk management • Increased audit finding resolution • Higher recommendation implementation rate

SONATRACH

As outlined in Section 3.3, Sonatrach is the only company in this group of NOCs that is an operator. It is an established exporter of crude oil, natural gas and condensates, it operates major fields, an extensive pipeline network and is also a refiner. Sonatrach holds majority rights in almost all licenses in Algeria. Its operations far outweigh the other national oil companies analysed in this study.

The company is currently undergoing a strategic transformation. The plan, 'SH2030' is aimed at transforming the company and turning it into one of the highest-performing and most profitable NOCs in the industry. SH2030's four key strategic objectives focus on: 1) the improvement of exploration and production; 2) the development of new resources; 3) the optimization and commercialisation of the downstream segment; and on 4) international growth. This assessment is made less than a year into the transformation process and provides a baseline against which to track progress in revamping operational processes and capabilities.

Interviews with key stakeholders and functional leaders were focused on the following functions for the Upstream segment:

- i. Exploration
- ii. Reservoir Management
- iii. Rig Planning, Scheduling and Utilization
- iv. Well Delivery
- v. Field Operations
- vi. Technology Management

For the Midstream segment, the following functions were assessed:

- i. Capacity Planning Scheduling and Utilization
- ii. New Facilities Development
- iii. Midstream Operations
- iv. Maintenance Management

For the Downstream segment, the following functions were assessed:

- i. Refinery Capacity Planning and Scheduling

- ii. Direct Supply Chain
- iii. Refinery Energy Management and Energy Efficiency
- iv. Strategic Asset Management
- v. New Facilities Development
- vi. Refinery Performance Management
- vii. Refinery Reliability Management
- viii. Refinery Maintenance Management
- ix. Product Blending & Storage
- x. HSE Management

The overall OPAC maturity scores, by segment for Sonatrach are:

- i. Upstream: 2.0 out of 5
- ii. Midstream: 1.5 out of 5
- iii. Downstream: 1.5 out of 5
- iv. Support Functions: 1.5 out of 5

High level summary of observations

The following section provides a detailed overview of Sonatrach segments and functions, i.e. upstream, midstream, downstream and support functions, alongside associated scores on the OPAC maturity curve. Based on interviews with key executives, managers and subject matter experts, and data and exhibits provided, the following general observations were noted for Sonatrach. These relate to the Upstream, Midstream, Downstream, Retail and Support Functions and activities assessed during the study (please refer to Appendix 2 for details):

Overall, Sonatrach:

- i. Is undergoing a major strategic transformation across the company. This includes 34 initiatives focused on commercial and operational transformations;
- ii. Is currently implementing SAP in its organisation and ERP technology system;
- iii. Has limited formalized performance management systems or performance measures, which are essential to achieving the SH2030 performance related goals;
- iv. Has initiatives around formalizing a new risk management plan and activities.

Specifically, in its upstream segment, Sonatrach:

- i. Has formalized guidelines delegating roles, responsibilities, authority or formalized decision processes and field development planning, standards and procedures;
- ii. Has standardized onshore specifications for wells, rigs, downhole technologies, oilfield equipment and facilities;
- iii. Lacks real-time performance monitoring and tracking, and predictive analytics data and tools across multiple activities in Upstream (please refer to Appendix 2 for details).

Specifically, in its midstream segment, Sonatrach:

- i. Has integrated facilities and infrastructure capacity planning and utilization reviews;
- ii. Has industry standard quality monitoring and reporting services;
- iii. Currently does not have IT enabled maintenance management system to support management and tracking of maintenance activities.

Specifically, in its downstream segment, Sonatrach:

- i. Has optimised short, medium and long-term production and operational refining plans;
- ii. Has the potential to document processes related to refinery capacity planning and scheduling, refinery energy management and energy efficiency.

Recommendations for near-term performance and capability improvement

For Sonatrach to improve its performance, achieve business sustainability, and implement its SH 2030 strategy, the company should consider building formalized, continuously improving and best-practice based procedures and operation management systems to increase its functional maturity on the OPAC assessment scale, for the following activities by segment (not exhaustive), as a priority. Table 21 provides recommendations to improve the performance of Sonatrach.

Digitalisation is an important feature of Sonatrach’s transformation, but as the systems were only in the development and testing phases.

TABLE 21: Recommendations for SONATRACH’s near-term performance improvement

Functional Areas Please refer to Appendix 2 for detailed functional activities and related illustrative best practices	Expected performance impacts (illustrative)
Upstream	
Exploration Planning	Higher exploration success. Higher discovery rates.
Field Development Planning	Minimise time to first oil. Maximise recovery.
Reservoir Performance Monitoring	Maximise recovery factor. Maximise return on investment.
Rig Requirements and Capacity Planning	Maximise margins and profitability. Maximising rig capacity utilisation.
Well Delivery Performance Improvement	Lower well delivery times. Optimised production cost.
Facilities and Equipment Integrity and Reliability Management	Maximise facilities and equipment utilisation. Minimise equipment and facilities failure.
Midstream	
New Facilities Design, Fabrication/ Build, Commissioning	Increased efficiency in operations. Increased design reliability.
Maintenance Management and Integrated Systems	Maximise facilities and equipment reliability. Minimise maintenance costs. Minimise facilities and equipment down-time.
Downstream	
Refinery Planning	Optimise and minimise refinery down-time. Maximise revenue and profitability. Enhanced crude selection.
Energy Management	Maximise energy efficiency. Minimise refinery operating costs.
New Facilities Design, Fabrication/ Build, Commissioning	Increased efficiency in operations. Increased design reliability.
Refinery Maintenance Management and Integrated Systems	Maximise facilities and equipment reliability. Minimise maintenance costs. Minimise facilities and equipment down-time.
HSE management and execution	Maximise personnel safety and security . Minimise HSEQ incidents and ensure sustainability.
Support Functions	
Enterprise IT	Increased productivity, efficiency, lower costs for general administration and management activities. Mitigating risks by implementing appropriate controls across functions and activities. Increased cybersecurity.
Indirect Procurement and Sourcing	Maximise alignment between Procurement, supply chain organisation with the wider technical functions. Minimise procurement lead times. Optimise working capital utilisation.
Finance & Accounts	More efficient cash-flow management. Maximise organisational financial performance. Appropriate compliance to regulatory requirements.
Enterprise HR (including Learning & Development)	Increased workforce competency. Higher workforce engagement. Lower attrition rates.
Governance	Optimal control in the organisation. Optimised strategic risk management. Increased audit finding resolution.

4.3. Benchmarking national socio-economic benefits

Through either their core operations or through investments made outside the strict scope of petroleum projects NOCs may improve the country's infrastructure, ensure reliable energy supply to domestic consumers, develop national supply chains around petroleum projects or build national skills.

The operations of all four companies in the study aim to achieve some forms of socio-economic benefits to their countries. But only Sonatrach and GNPC explicitly articulate these objectives as part of their business strategies, with targets that enable companies to proceed to the next step of defining key performance indicators. This more strategic approach may be attributable to the fact that Algeria and Ghana are producing oil and gas, which brings increased public and government expectations regarding socio-economic impacts. At the National Oil Corporation of Kenya, objectives related to socio-economic contributions appear in a stand-alone policy proposal, which appears to have guided company expenditure in welfare. NAMCOR did not share any company material outlining its strategy for achieving national benefits, but briefly reports on welfare activities in its annual report. These were articulated around the Sustainable Development Goals (SDGs). The ambitions of NAMCOR and NOCK are more modest – as is right considering the absence of production revenues.

In 2017 GNPC created a new sustainability department. Its mandate was to develop a “corporate social investment” (CSI) programme that gives GNPC a social license to operate in Ghana, with investments primarily in the areas of welfare, training and local content, as well as education under STEM. Its budget for 2018 was \$28mn, rising to \$43mn in 2019, which indicates a high company commitment to the programme. Several interviews in GNPC indicated managerial pride in the programme.

Sonatrach puts socio-economic and environmental benefits to Algeria at the centre of its new strategy. It wanted to develop opportunities that would increase domestic economic development and position the country in value creating avenues emerging with the energy transition. It also wanted to be a “role-model company

for the Algerian economy, stimulating excellence and talent development”.

Like any NOC investment, socio-economic programmes should be evaluated for their performance and good corporate practice. There is an opportunity cost to be considered with these programmes: are the NOC investments in broader socio-economic areas creating value and could another entity do it more effectively?

Our assessment will examine the strategic approach to programmes aiming to increase socio-economic benefits to the countries and whether there are any plans for or ongoing measurements of impact and efficiency among the NOCs in our study. Impact assessment will require more than classic financial tools. But NOCs can draw on established methodologies for doing so, which this section will highlight where relevant. Such analysis will be more effective in coordination with the relevant government agencies that compile statistics. A critical feature of all such measurements is the necessity of having a baseline assessment made, against which to measure any progress made. The cost effectiveness of the programmes



can be measured in comparison to similar programmes delivered by government agencies or international government organisations. When programme costs and impacts are measured it will also be possible to benchmark these socio-economic programmes with those of other NOCs. It is worthy of note that the costs would include non-tangible costs to which monetary value can be assigned and that can affect the value of investments. These include but are not limited to tranquillity and peace. They would support smooth operations and therefore will influence the impact of the programmes.

4.3.1. Welfare

Programmes aimed at increasing the welfare of communities near NOC operations or nationally are similar to international oil company (IOC) social investment programmes or corporate social responsibility programmes (CSR). These are discretionary programmes to the extent they are guided by NOC interests – most notably because they aim to obtain a social license to operate. However, they are not truly discretionary in the sense that, unlike IOC CSR programmes for which the costs are not recovered, those of NOCs are accepted as part of their operational costs. For this reason, the scale of investment and value created should be reviewed by government. When expressed in relation to operational expenditure, the scale of CSR investments can be compared to other companies. Table 22 shows the value of expenditure on social welfare by the NOCs. It highlights the larger expenditure by GNPC. Note the costs of externalities (such as tranquillity and peace) may be subtracted from the figures in table 22 to derive the true costs of social welfare.

4.3.2. Job creation

At a minimum, most governments expect their NOCs to nationalise their workforce to the largest extent possible (or reasonable). This effort is important for national pride and valuable in developing a national cadre of people who understand the industry. All the NOCs in the study have a nationalised workforce.

National Oil Corporation; “Corporate Social Investment Proposal”. Goal 1, no poverty, Goal 3, good health, Goal 4, quality education, Goal 9, industry, innovation and infrastructure and Goal 11, sustainable cities and communities. Science and Technology, Engineering and Mathematics.

TABLE 22: NOCs spend on welfare, selected years

Company	Programme
NAMCOR	\$36,700 in 2016-17 (0.3% of operating expenditure). Contributions to an entrepreneurship programme, clinics, schools, community clean up.
NOCK	\$660,000 in 2018 (3% of operating expenditure). School facilities, health initiatives, sponsorship of sports, and empowerment. In 2019, it will also include a programme to redirect the livelihood of communities living near its upstream operations in Block 14T.
GNPC	\$6mn in 2018 (7% of operating expenditure). 176 projects in areas such as sanitation, sport facilities, education infrastructure, and water pumps. The outcome thus far, from the company’s perspective, is that it now has a social licence to operate onshore Ghana.
Sonatrach	Budget not provided. Focused on sponsoring sports, culture and arts. Foundation SONATRACH-Tassili supports environment and welfare of Tassili region where company operates.

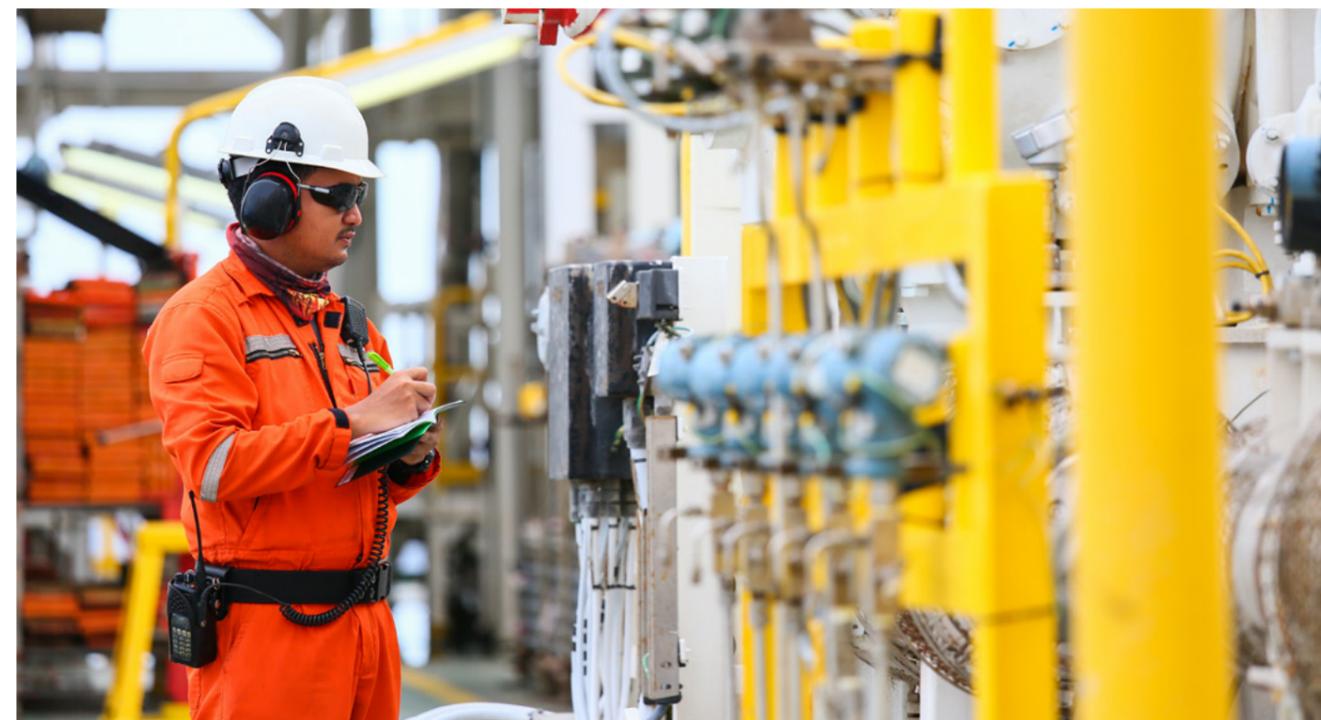
Some governments push their NOCs to hire more nationals than strictly required by operations. In Ghana, for instance, GNPC faces periodic review of its progress on job creation by the Ministry of Employment and the Parliamentary Committee on Employment. However, in none of the four cases is the pressure to hire more nationals similar to that brought to bear on CNPC, PetroChina, Pemex (historically) or Saudi Aramco, for instance. This may be seen by those governments as creating value for the country by alleviating unemployment, but overstaffing can be very detrimental over time to company moral and effectiveness (refer to Section 4.1 for a discussion of financial efficiency). In any case, the NOC’s ability to significantly impact unemployment is limited, even as an operator. NOCs can use such data points to demonstrate to government the negative effect that overemployment has on various NOCs (or itself).

*Company data
Valerie Marcel, Roger Tissot, Ekpen Omonbude, Anthony Paul (2016). A Local Content Decision Tree for Emerging Producers, Chatham House. Available at <https://www.chathamhouse.org/publication/local-content-decision-tree-emerging-producers> (Accessed 5 March 2019)*

4.3.3. Skills development

NOCs can support the national development of skills needed by the petroleum sector. Petronas stands out among NOCs for its successful, decades-long support of education in Malaysia. Petronas aside, there has been a tendency to focus on the development of specialised petroleum skills, but in emerging oil and gas producers, job opportunities are greatest in the development phase and mostly for tradespeople such as welders or electricians and unskilled workers. For countries with unproven to small reserve bases, it is important to manage expectations about specialist jobs in the petroleum sector. This was a lesson learned in Ghana and Kenya, where many young nationals entered specialised degrees after oil discoveries were made and struggled to find jobs after graduation.

In the past, GNPC provided scholarships to Ghanaians to get degrees in oil and gas at foreign universities. According to interviews with GNPC's sustainability department, the company reviewed these programmes and found that, too often, the graduates returned to Ghana finding no jobs were available. This assessment prompted GNPC to change its training programme by working with oil company partners to identify what skills would be required (and when) and by increasing



the capacity of Ghanaian universities to train young Ghanaians in petroleum related fields through upgrading laboratories or through partnerships with foreign universities. It also helped local communities upskill to boost productivity. This example illustrates the value of evaluating programmes to allow continuous improvement.

GNPC's spend on capacity development was \$12.32mn in 2018, amounting to 15% of that year's operating expenditure. The strategic refocusing of its training programme to support skills development outside the petroleum sector and better university programmes for petroleum skills in-country is valuable. Sustained public communication efforts by GNPC could help guide Ghanaians towards upskilling in the most promising and value creating areas. Moreover, it appears from interviews and data sent by the company that there is currently no impact assessment for

GNPC's procurement is largely indirect (procurement is handled by the foreign oil company operators), except for its seismic operations onshore.

the current training programme. This is necessary in order to allow continuous programme improvement and to demonstrate value creation. The impact of NOC training can be measured by the certification of skills acquired and the proportion of professionals employed post training in relevant fields.

In a similar, but smaller-scale programme, NAMCOR must contribute 1% of its labour costs to fund the Namibian Training Authority. The government also expects NAMCOR to invest in the training of nationals for the petroleum sector. NAMCOR's budget for all capacity development is approximately \$350,000 per year, which amounts to 2% of its OPEX.

Another aspect of skills development relates to secondment of NOC technical staff to government agencies. NOCK has approximately 5-6 technical and commercial staff on secondment at the Ministry of Petroleum. GNPC also sends its top people on secondment to the Ministry of Energy and the Petroleum Commission (and in 2018 it had 4 staff at the Ministry and 1 at the Commission). GNPC also helped

the regulatory agency establish and operate its new data centre, notably with the transcription and copying of the GNPC's data.

There is clear value for governments in secondments of technical staff to agencies that are building capacity to oversee the sector (as long as the NOC is able to retain enough of its core competencies.) Indeed, it would be valuable for GNPC and NOCK to measure the impact of these government capacity-building initiatives - which can be done through formalized reporting by secondees of skills transferred and surveys of host agencies. In the case of NOCK, which is sending staff to help oversee the development phase of the Tullow discoveries, there is great potential for the secondees to return to NOCK to transfer the skills they acquired in the process. However, it would need formalised processes and plans to ensure these skills are retained (recorded) and applied in the NOC.

There is scope for NOCK to better align its training and development pipeline with the needs of its upstream programme and those of the ministry. As mentioned in Section 3.1 on Strategy, following some discoveries NOCK benefitted from Ministry funds to train 34 recruits in specialised degrees that were intended to help both organisations manage the new discoveries. However, an interview in the Ministry indicated that these recruits returned from their training to find they did not have specific duties or responsibilities. Finding them idle, NOCK laid half of them off.

NOCs also share their research facilities with national institutions. GNPC's new research centre, offering the country's only geophysical and geochemical labs, will be open to the Petroleum Commission and also to four Ghanaian university chairs. NAMCOR and NOCK also allow national universities to access their data centres and laboratories. This practice is formalised in Namibia through NAMCOR's 2016 Data Policy, which stipulates how Namibian universities can access the data centre to conduct research. Sonatrach has invested in research and training for several decades already. It established its own specialised petroleum training centres and research labs. It also has collaboration agreements in place with Algerian research and training institutions.



There is certainly value for these countries in having their NOCs open their labs to national universities, a practice which should be formalised through agreements (as it is for all the NOCs in the study). NOCs should collect data on the frequency and type of use of the facilities and conduct surveys of national institutions using them which would support a process of assessment and improvement of the programme.

4.3.4. Supply chains

NOCs can be important levers for domestic supply chain creation around oil and gas projects – especially when they are operators and are responsible for procurement decisions (direct procurement). Outside of direct procurement, NOCs can also support domestic supply chain creation through supplier development programmes.

GNPC's procurement is largely indirect (procurement is handled by the foreign oil company operators), except for its seismic operations onshore. GNPC measures its national procurement and the Sustainability Department estimates that for pre-exploration work onshore, the level of local good and services procured is above 90% and only seismic data acquisition is procured abroad. Other procurement

Through its empowerment programme, GNPC wanted to redirect the interest of communities in Ghana away from the limited prospects in the oil industry. GNPC is working with the German development agency GIZ to increase the skills of Ghanaians working in agriculture, fishing, and artisanal professions in order to boost their productivity and livelihood.

Data provided by the Sustainability Department, inclusive of 4 professorial chairs, 101 foreign scholarships and 1010 local scholarships.

(for the offshore fields) is the responsibility of the foreign oil company operators, which must comply with Ghanaian local content regulations.

GNPC does not participate in supplier development. From interviews, it was gathered that, if the required skills were not available in Ghana, it procured them abroad. The Ghanaian Petroleum Commission has primary responsibility for local content and supplier development. However, in anticipation of GNPC becoming a stand-alone operator, GNPC's new Local Content Department was created in July 2018 to enhance local participation along Ghana's upstream petroleum value chain. The company therefore has plans to increase its support of local content, but these plans are not yet based on specific targets.

Sonatrach has made significant commitments to creating In-Country Value (ICV) or 'local content' through procurement and supplier development. Interviews indicated that the company had set targets related to ICV, with specific KPIs assigned to managers of operational divisions, and that performance on these metrics would impact executive pay. However, it also appeared from interviews that the specifics of these KPIs were not known to the heads of operational divisions.

Key aims of the programme are to increase the domestic industrial base, national capabilities, and get local suppliers into the petroleum supply chain. The baseline for local content at the time of interviews in late 2018 was estimated by the relevant executives at 20-25%. The assessment from interviews was that the company did

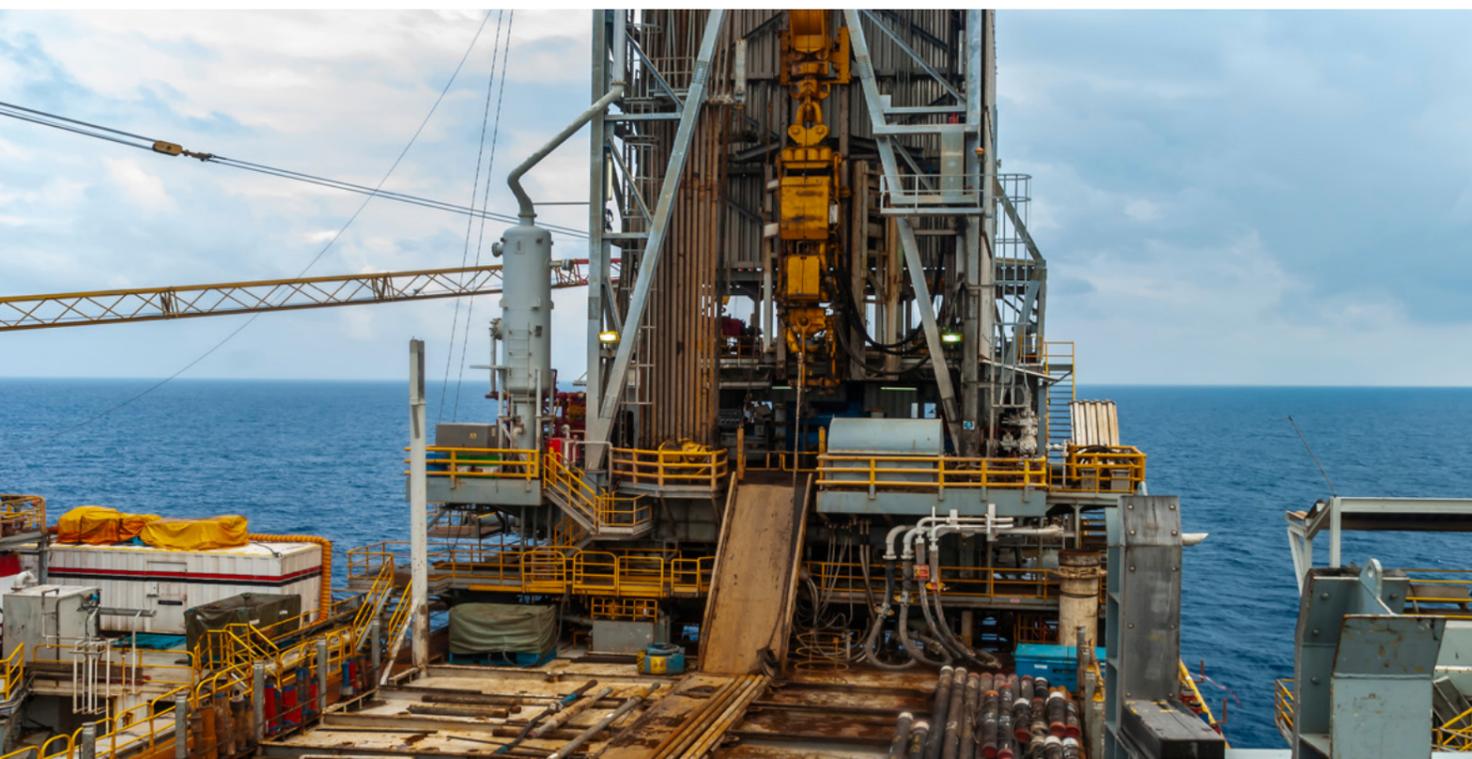
not yet have reporting mechanisms for ICV that would allow it to measure the current baseline or future progress. Clear and systematic reporting guidelines for ICV will be a necessary requirement of the programme. Sonatrach can draw from the experience gained by ADNOC, Petroleum Development Oman and Saudi Aramco, which have successful ICV programmes and developed tools for measuring and certifying ICV.

The industrial baseline survey, another key step in a successful ICV programme, is also at an early stage. Sonatrach hired a firm to conduct a diagnostic of its spend (the demand) but does not have a granular view of potential supply in Algeria e.g. skills, manufacturing and services. Sonatrach is beginning the process of constructing an inventory of domestic firms and developing a platform to give them visibility of contracts in the petroleum sector. The government and Sonatrach will collaborate to support the competence development of the local firms.

This focus is new for the company and has the potential to create significant, long-term benefits for the Algerian economy. Algeria has sufficient oil and gas reserves to produce for several decades. Demand for gas is expected to outlive oil demand and this creates longer-term prospects for Algeria's gas exports. This justifies the focus on supply chains that are more dependent on demand from the petroleum industry than in primarily oil producing countries and indeed in smaller reserve holder countries, such as Ghana and Kenya. For Ghana, Kenya and Namibia, it will be prudent to establish a domestic supply base of goods and services that can also supply other sectors once the market for their oil declines or their gas supply dries up.

Notably with the Centre de Développement des Énergies Renouvelables (CDER, a national centre for research on renewables).

Saudi Aramco's IKTVA programme measures the percentage of ICV as $[(A+B+C+D+r)/E]+X$, where A = Localized goods and services; B = Salaries paid to Saudis; C = Training and development of Saudis; D = Supplier development spending; r = Research & Development; X = Export Revenue Factor (%); and E = Company revenue. Refer to <http://iktva.sa>. ADNOC and Petroleum Development Oman have similar programmes and offer templates for companies to calculate their ICV contribution, which can be certified by an international accounting firm. Details of the ICV programmes and templates can be found here: <http://www.incountryvalueoman.net/getattachment/201de0ad-a3a8-4c06-bfbb-82209858a056/Standardisation-of-ICV-Requirements-in-C-P&> <https://www.adnoc.ae/en/in-country-value/>; Certification programme examples are: <https://www.pwc.com/Im1/en/services/assurance/adnoc-in-country-value-program.html>; <https://home.kpmg/ae/en/home/services/audit/adnoc-icv-certification.html> (Accessed 18 February 2019).





4.3.5. Infrastructure

National oil companies can create significant value for countries by developing a dual purpose infrastructure – one that benefits their operations and also meets local or regional needs. The design of roads or other infrastructure can be guided by an alignment of project and national needs. This is the approach adopted by Saudi Aramco in the design of its operated projects. It is, however, a delicate balancing act between NOC investments that create value for the country and quasi-fiscal expenditure that helps the government bypass the appropriate, regular avenues for public spending.

Among the NOCs in this study there was little mention of infrastructure development. NOCK was envisaging joint infrastructure with the Kenya Pipeline Company that was purely guided by their own operational needs. The infrastructure involved in NAMCOR's Kudu projects was also driven by the needs of the project and there was no mention of its design being modified to meet local or regional needs.

In interviews, Sonatrach managers mentioned the company's investments in desalination. Through a public-private partnership, Sonatrach constructed and operates a desalination plant through an affiliate. Sonatrach interviews did not otherwise touch on infrastructure, though the company has in the past been asked to invest in large scale infrastructure projects.

In the same vein, GNPC advanced \$50mn in funds to the Ministry of Finance and the Ghana Gas Company (GNGC) for the Western Corridor Roads project. This involved road works enabling GNGC to transport natural gas liquids extracted from Jubilee Gas to power plants. The loan, dating back to 2014, has not been repaid and the spending is termed by the Ghanaian Public Interest and Accountability Committee as quasi-fiscal.

It would therefore appear that GNPC and Sonatrach's infrastructure investments were driven by government requests rather than their commercial needs and do not qualify as "dual-use".

4.3.6. Access to energy

An important facet of NOC mandates is the provision of reliable and affordable energy to domestic consumers and industries. This has historically been one of the principal reasons for establishing NOCs, especially on the African continent. In countries without oil and gas production, NOCs in Africa have historically been called on to import a share of the country's petroleum needs. But this is less common than it was, especially in deregulated markets, where the private sector ensures domestic demand is met through imports, distribution and retail. However, remote areas might be underserved, and some segments of the population might be unable to afford market prices. NOCs in these cases are expected by their governments to meet these needs.

NAMCOR, for instance, entered the retail business and opened its first retail station in November 2019. The government has long signalled it expects NAMCOR to also serve remote areas that are underserved by the private retailers but accepts that the NOC should first develop a profitable network in urban centres to finance the unprofitable remote market. As for the company, it expects the government to provide financial compensation for any additional cost incurred. It is

The water is purchased by Sonatrach which sells it below cost, with a financial compensation from the ministry of finance. Government statements in the press indicated that only Sonatrach had the cash flow to carry the cost of the subsidies for the water on its books.

unclear whether NAMCOR would receive any compensation beyond the fuel levy it currently receives on national product sales.

There are other state-owned enterprises in Ghana mandated to meet the country's energy needs (Ghana National Gas Company, Tema Oil Refinery, Bulk Oil Storage and Transportation Co. Ltd, as well as power companies). GNPC's mandate is to be an upstream company. That said, it is tasked by government as the national gas aggregator, collecting associated and non-associated gas from Ghana's producing fields (negotiating the price of gas) and selling it on to Ghana Gas. GNPC's ability to reduce the cost of the non-associated gas from ENI's field was of significant value to the country. However, GNPC is not being paid by Ghana Gas, and not financially compensated by government, which makes this role financially unsustainable in the long run and will eventually require government intervention (see section 5.2.5).

Energy security is a core aspect of Sonatrach's mandate. It is expected to supply the domestic market first with natural gas and fuel at an "internal price" (see section 5.2.5). National consumption by industry, transport and households of petroleum liquids and gases combined in 2017 amounted to 31.3 M Tep (million tons of oil equivalent) while 107.8 M Tep was exported (crude, condensates, products, natural gas). When the value of crude exports declined from 2013 to 2016 (see Table 23 below), the burden of supplying 22% of its total production to the domestic market at cost was more acutely felt by the company.

TABLE 23: Sonatrach domestic and external sales of oil, gas and products, 2011-2017, million USD

	2011	2012	2013	2014	2015	2016	2017
Domestic sales	3,684	3,865	3,329	3,449	2,451	2,324	2,306
External sales	71,654	71,339	63,751	58,400	33,200	27,900	33,230

Source: NRGi. <https://nationaloilcompanydata.org/>

Namibia Economist, 22 November 2019. <https://economist.com.na/49236/retail/namcor-opens-first-ever-filling-station-in-windhoek/>

Since its first discovery in 1973, attempts to commercialise the gas resources of the Kudu field in Namibia have been frustrated by a number of technical, commercial and political factors. It is an economically challenging development, and success depends on volumes and price. However, given the rapid growth in demand for electricity and the Namibian government's strategic objective to become self-sufficient in power generation, the partners expected the government to sanction the current (third) development plan submitted to it. With its partners, NAMCOR evaluated the potential national impact of the project in terms of access to energy, as well as job creation and economic growth.

The NOCs under study all measure whatever financial shortfall they incur by supplying domestic users. They also track volumes sold nationally. They could, additionally, measure against baselines any growth in energy access for specific regions or income brackets resulting from their programmes. NOCs could also provide estimates of costs and benefits of alternative domestic energy supply programmes (e.g. raising the price of fuel products, increasing LPG penetration in remote areas). This is important data for government, allowing it to supplement its own data points and make a more informed cost-benefit analysis of programmes to supply energy below market prices to specific consumers.

4.3.7. Cleaner energy/improved energy efficiency

Because NOCs seek to produce and sell fossil fuels, their potential contribution in the area of renewables, cleaner energy and energy efficiency standards is often underappreciated. NOCs can be key levers of government policy with regards to investment in clean energy or energy efficiency. Their efforts in this area can also be – and often is – at the company's initiative. NOCs often have project management capabilities, access to finance and a self-interested appreciation for the need to limit domestic petroleum consumption that can make them investors in cleaner and more efficient energy systems and help their countries prepare for the energy transition.

For instance, it funds the Agence Nationale de la Promotion et la Rationalisation de l'Utilisation de l'Energie (a national agency for the promotion and rationalization of energy use), which organises local energy efficiency programmes.

The Moving Energy Initiative awarded NOCK with a prize for its proposal to supply LPG to refugees in the Kakuma and Kalobeyi camps and serve the neighbouring communities as well. More information available at: <https://mei.chathamhouse.org/cooking-with-clean-fuels> (accessed 18 March 2019)

Sonatrach endorsed the "Zero Routine Flaring by 2030" (ZRF) Initiative in 2018.

Through its corporate social responsibility programme, Sonatrach supports energy efficiency programmes and education. Sonatrach and NOCK also both track their energy efficiency gains with energy audits (resulting from conservation and efficiency improvements). NOCs could promote the value of this practice to the national private sector and civil service agencies, articulating the savings made through measuring energy use and improving systems and upgrading facilities.

As indicated in Section 2.3 (and further detail can be found in Appendix I), NAMCOR, NOCK and Sonatrach are active in supplying LPG to domestic users. Sonatrach is also supplying natural gas to the trucking industry. This focus on LPG is largely in response to government instructions, though NOCK and NAMCOR see it as a source of revenue and a niche market to develop. This is in contrast to most IOCs which have largely avoided becoming involved in what they see as difficult local LPG or compressed natural gas (CNG) markets to displace wood and charcoal in cooking and more polluting diesel in transport.

Sonatrach has ambitious plans to generate first 1.3 GW and later 4GW from solar energy (refer to the strategy discussion in Section 2.1 and Appendix I). Renewable energy investments have increased 82% from 2017 to 2019 already, but much larger investments will be required in the coming years. Sonatrach also plans to create a research facility focused on renewable applications. Should solar ambitions be realised, the benefits to Algeria will include cheaper energy (allowing government to further reform fuel and electricity prices), a reduction in carbon emissions that can contribute to the country's climate commitments, cleaner air, restrained growth in domestic fossil fuel consumption, and revenues generated from solar energy exports.

However, implementation of the plans is still at early stage and financial value creation will depend on how efficiently Sonatrach can deliver these solar projects. The company will need to monitor its costs per unit of energy generated, allowing a value-based comparison with private sector players and existing state utilities. Where market readiness is not assured, Sonatrach could play an important role in research and development and in leading the first investments to grow experience and reduce risk for future investors.

Sonatrach has also developed clear internal policy guidance on environment and sustainable development, which puts the protection of the environment as a prerequisite for value creation for the country. Flaring the gas associated with oil production is wasteful and harmful to the environment but not flaring usually requires investment in largescale infrastructure to utilize the gas. Sonatrach and its partners continue to flare, though they incur penalties, imposed since 2005 when the government-imposed regulations on flaring. Sonatrach does track the flaring. It has been reduced from 6 billion m³ to 2.5bn m³ (according to interviews). The strategy to eliminate routine flaring has received senior leadership support and interviews indicated that specific targets have been set to which performance is linked, impacting executive pay. Ghana also has a zero routine flaring policy. Oversight of operator practices is driven by government agencies more than GNPC.

Renewable energy investments have increased 82% from 2017 to 2019 already, but much larger investments will be required in the coming years. Sonatrach also plans to create a research facility focused on renewable applications.

4.3.8. Operational oversight of the sector

An often-overlooked benefit to countries comes from NOC oversight of operators and the advice they give to the ministry of energy and the regulator. NOCs are the state's eyes and ears in joint venture partner meetings,

in which operators present their work programmes. They can also support the implementation of regulations and policies in the joint ventures.

NAMCOR has been an active promoter of the Namibian upstream. It manages the data centre and handles promotion for Namibia but the negotiation of agreements is the prerogative of the Ministry of Energy and Mines.

NAMCOR also holds full rights to some licences, which it then promotes for farm ins, as a commercial player. This activity, common to GNPC and NOCK, presents a potential conflict of interest. NOCs with rights to licences stand to gain from an

influx of capital when bringing in partners and this may make them less interested in weeding out companies that are less qualified or likely to 'sit on acreage'. For this reason, governments should put in place safeguards, such as strict pre-qualification requirements. That said, NAMCOR has diligently pushed forward the Kudu gas to power project, convinced that it is beneficial to the country and has overseen the various designs of the development plans, to ensure they reflect government objectives.

As Section 2.3 explains, NOCK is the custodian of the country's geological data. It is no longer responsible for the promotion of open acreage but operates the data centre and geoscience laboratory. It has also historically been the centre of national petroleum geology expertise. However, NOCK does not oversee operators on behalf of government through its joint venture shareholding. Its potential contribution to national interests is, in this respect, under-utilized by government.

GNPC has diligently played the role of overseer of the government's interests in licences. As a minority partner in all agreements, GNPC takes an active role in reviewing operational decisions made by the lead operator. By working closely with partners through the project lifecycle, GNPC adds a valuable layer of oversight that the government could not get through classic ex-ante review of plans and ex-post review of performance. While only a minority partner, GNPC in effect has significant power over decisions taken by operators. Should there be a disagreement with the operator, GNPC could escalate the issue to the Minister of Energy. However, the technical review is made collegially and GNPC emphasizes to the foreign oil companies that it is not a regulator but a partner, working with them. There are benefits for the foreign partners too because GNPC has access to all the country's data and is a partner in all licences, which gives it a broader perspective.

GNPC also physically oversees operations, with staff present on seismic vessels, drilling rigs and at the data processing centre. This oversight allows the company to learn from operations, as it participates through the workflow, and also to track expenditure. But it is also likely un-necessary to sit on a seismic vessel for 3 months

watching very little happen. GNPC would benefit from an ongoing assessment of the cost of and value gained from each oversight activity.

In interviews, managers explained they oversaw the operators' costs very carefully. Lower costs mean lower cost recovery, of course. But costs also determine the rate of return, on which the 'additional oil entitlement' is based. With this provision, the Ghanaian state becomes entitled to an additional percentage of the operators' share of crude oil on each separate field (ranging between 10-25% of petroleum revenue minus royalties and the GNPC interest, depending on the rate of return of the project) once profitability passes certain agreed rate of return thresholds. This responsibility should normally fall on the tax authorities, but they have not yet developed the relevant expertise to do so. The issue only arose in 2016 when the Jubilee partners finished amortizing the exploration and development costs of the Jubilee field. GNPC plans to transfer that responsibility to the authorities when their capacity is established.



Since the 2005 reform of the petroleum sector, Sonatrach transferred regulatory responsibilities to the regulators, Al Naft and ARH. It is meant to focus on its commercial role as operator, rather than embody a regulatory role. In fact, Sonatrach has increasingly taken on the role of representing oil company interests to the regulatory agencies and the ministry of energy, articulating the difficulties caused by various regulatory and approval bottlenecks. It also was the driving force of efforts to revamp the existing petroleum law, pushing to make investment more attractive to foreign companies. Sonatrach also collaborates with the Ministry of Environment, the Ministry of Energy and the ARH to draft regulations for the sector.

4.3.9. Overall assessment

As discussed earlier, this study cannot comprehensively assess the value creation of the various NOC programmes meant to benefit their countries. To do so would require:

- i. A baseline analysis (of energy access, skills or infrastructure, for instance) at the outset of the programme or year against which to measure impact;
- ii. Specific targets or KPIs;
- iii. Measures for impact (statistics, surveys, reports, for instance).

The above should, in fact, be produced by the NOCs, as a component of monitoring and evaluation of programmes. An initial assessment of the value of these programmes has been made in the above discussion under each type of socio-economic contribution and in the below conclusion, based on a general appreciation of cost, risk and potential benefits.

To offer a more systematic assessment of the progress these companies have made towards developing a rigorous approach to defining the goals and measuring the impact of such contributions, the range of interventions has been rated as ad hoc or directed by company strategy (or by government instructions). The study also highlights any company efforts, garnered through interviews and written material sent by the companies, to evaluate the impacts of these programmes.

Articulating the cost and impact of these investments is a particularly useful tool for NOCs in their discussions with government, as they can inform decisions about where it is valuable for NOCs to invest and which organisations can do so most effectively going forward.

Table 24 summarises the programmes with a rating indicating the companies' strategic approach to the design of programmes and their evaluation on a scale of 1 to 3:

TABLE 24: Summary of socio-economic programmes and their rating indicators

Socio-economic benefit	Company	Rating			Comments
		Engaged	Strategic	Measured	
Welfare programmes	NAMCOR				0.3% of OPEX, briefly reported in the Annual Report
	NOCK				3% of OPEX, guided by a company policy document, briefly reported internally
	GNPC				6% of OPEX, guided by company strategy, spending tracked, plans to measure impact
	Sonatrach				National CSR and programmes for local communities, directed by company policy.
Job creation or nationalisation of workforce	NAMCOR				Nationalized workforce
	NOCK				Nationalized workforce
	GNPC				Nationalized workforce
	Sonatrach				Nationalized workforce
Skills development	NAMCOR				2% of OPEX, formalized training and university collaboration, directed by government
	NOCK				Secondments and training, but lacks planning and strategy; Formalized university collaboration
	GNPC				15% of OPEX, training, secondments; Formalized university collaboration; Strategy in place, but no plans to measure impact

G. Lahn et al (2007). *Good Governance of the National Petroleum Sector, The Chatham House Document*, Chatham House; Available at <https://www.chathamhouse.org/publications/papers/view/108469> (last accessed 20 February 2019)

TABLE 24: Summary of socio-economic programmes and their rating indicators (continued)

Socio-economic benefit	Company	Rating			Comments
		Engaged	Strategic	Measured	
	Sonatrach				Formalized university collaboration and training programmes. No demonstrated impact assessment.
Support for supply chain creation	NAMCOR				
	NOCK				
	GNPC				Planning supplier development ahead of operatorship; planning to measure impact
	Sonatrach				55% ICV planned to 2030, setting targets and planning to measure baseline and impact
Infrastructure development	NAMCOR				
	NOCK				
	GNPC				Western Corridor Roads, not company directed
	Sonatrach				Desalination plant, not company directed
Access to energy (remote or underserved areas, domestic energy needs)	NAMCOR				Plans for gas to power project directed by company, measured baseline and targets. Retail in remote areas directed by government, plans to measure cost-volumes
	NOCK				Plans for retail in remote areas, plans to measure cost-volumes (not benefits)
	GNPC				Government directed to supply gas, company measures cost-volumes (not benefits)
	Sonatrach				Government directed to supply gas and fuels, company measures cost-volumes (not benefits)
Cleaner energy/energy efficiency	NAMCOR				LPG (no strategy document)
	NOCK				LPG, directed by government. Energy audit
	GNPC				Flaring targets set by government
	Sonatrach				Solar energy, directed by company strategy, baseline measured, targets set. Flaring reduction, government-directed, targets set with KPIs, progress reported. Energy audit with ongoing tracking.
Operational oversight of the sector	NAMCOR				Gas to power project design and upstream promotion
	NOCK				Withdrawing from role
	GNPC				Company directed oversight of operator costs and work programmes
	Sonatrach				Commercial operator but drove the reform of the petroleum law

- i. Engaged in activity or spend on ad hoc basis
- ii. Activity or spend is directed by company strategy
- iii. Company measures impact and value creation

General assessment of the value of socio-economic interventions:

- i. Discretionary programmes on welfare: If the NOC observes that the relevant government agencies are not able or willing to provide for the welfare of communities near the NOC operations, NOCs are justified in requesting government approval for programmes that aim to do so. However, these programmes should not grow too large. NOCs that deliver public services to the population substitute themselves for government agencies, which, over time, lose administrative capacity and legitimacy in the eyes of the public. Companies also need to measure impact and value for money, so government can assess the ‘opportunity cost’ and whether it can deliver a similar programme nationally or regionally more effectively. As the Chatham House project “Good Governance of the National Petroleum Sector” recommended, there should be “an exit strategy to enable the NOC to transfer any non-commercial, social and/or national development functions to the government or other agencies when they are ready and able to take over.”
- ii. In a similar vein, government attempts to use NOC spending power as a substitute for normal fiscal processes is not advisable. This practice leads to unclear responsibilities for evaluating project impact and unclear accountability processes. It also causes the NOC to be distracted from its core business and draws on its available capital.
- iii. The review of socio-economic programmes indicates that government direction is more prevalent with regard to ensuring access to energy and infrastructure spending, and to a lesser extent, in supplying cleaner energy, reducing flaring, job creation, and skills development. There were no demonstrated government instructions regarding welfare programmes or support of supply chain creation.
- iv. There can be great value in NOCs overseeing operators, as demonstrated by GNPC. In NOCK’s case there is a missed opportunity in the fact

that it is not called upon to be the eyes and ears of government in joint venture operations with partners.

- v. Table 24 shows how the assessment of programmes and activities intended to benefit the country is rarely carried out – or even considered. This is an important gap, for the reasons discussed above. It is also necessary to undertake baseline studies so they value creation generated by programmes can be tracked. This is especially important in the case of Sonatrach and GNPC, which are investing substantial amounts in new programmes.

4.4. Benchmarking environmental stewardship and contribution to sustainable development

As discussed in section 3, it is becoming more than ever critical for oil and gas companies in general and NOCs in particular to assess their performance against the high standards of environmental stewardship and increasingly sustainable development of the countries in which they operate. Such an assessment would consist of mapping business processes and operations with the UN SDGs, AU Agenda 2063 and NDCs under the Paris Agreements, and will translate to how the NOCs' operations effectively support the High 5s of the African Development Bank.

The methodology developed in section 3 has not been used in the benchmarking exercise in this section. This is because of the newness of the concepts of mapping sustainable development indicators to oil and gas operations. In addition, data and information gathered during interviews, although indirectly relating in some cases to environmental stewardship and contribution to sustainable development, are not sufficiently detailed to be used in the benchmarking exercise.

In this respect, the purpose of the methodology to benchmark environment stewardship and contribution to sustainable development is more to provide guidelines and recommendations for governments and NOCs to ensure that the oil and gas industry is developed in line with the UN SDGs, Agenda 2063 and the Paris Agreement. This will help the industry to remain attractive by: aligning with the international agenda and commitments; satisfying civil society organisations; attracting investors; and minimising risks of oil and gas assets stranding during transition to greener economies.



05

Regulatory and political operating environment

NOCs are subject to diverse national operating environments. The analysis of their relative performance in this report must be read and balanced against the following factors that affect performance: the clarity and consistency of shareholder (government) direction and the legal and regulatory frameworks that dictate the rules by which the NOC must play. Broadly speaking, this section deals with the external factors which NOCs are, generally, unable to change. That said, NOCs can (and should) seek to shape government expectations regarding their mandate and ensure that government understands the negative effects of managerial interference and ineffective civil service rules. As the benchmark expands to include other NOCs in future, participating companies (and their governments) can draw lessons from top performing NOCs on what regulatory and policy environment helps or stalls the advancement of their business and socio-economic objectives.

5.1. Shareholder direction

5.1.1. NOC mandate and strategy

The Chatham House project on “Good Governance in the National Petroleum Sector” established 40 benchmarks for good governance. Many of these relate to how governments and national oil companies should interact and their respective responsibilities. Chief among the benchmarks related to NOCs: “Where there is an NOC, its purpose and mission are well defined, and its objectives are transparent and aligned with national development goals.” National oil companies need support from government to implement their strategies. This is often lacking, with changes in political leadership that leave the existing strategy without a political champion.

This study has relied more heavily on the voices of NOCs than governments and this undeniably influences the analysis in this section. That said, where NOCs have indicated there is a lack of clarity from government on their mandates or objectives, our assessment can create an opportunity for a discussion with government on these issues.

NAMCOR

It is clear to NAMCOR that its primary mandate is to ensure the energy security of the country. It follows that the Namibian government has been supportive of NAMCOR’s investments in retail, with an understanding that remote areas would be better served. Indeed, in interviews it was gathered that the government wants NAMCOR to supply rural areas that have been underserved since the supermajors exited the retail business some 10 years ago. Retail operations are “real” in the government’s eyes, according to a NAMCOR executive.

But NAMCOR was uncertain of the level of support it has from government regarding its upstream focus. The uncertainty relates primarily to government intent regarding the Kudu gas field. Over the last 10-15 years, NAMCOR has invested significant efforts and resources in delivering a development plan that

G. Lahn et al (2007). Op.cit.



meets the expectations of government. NAMCOR has lobbied government for its support of Kudu gas-to-power, emphasizing its strategic value to Namibia. It presented the project as a catalyst for the Namibian oil and gas sector, catapulting the skills of NAMCOR; as a secure supply of gas for domestic needs (currently Namibia imports 50-60% of its electricity); as a source of employment for Namibians (the project would employ 1000 people); as a driver of economic growth for the country (with what the company estimated would be an increase of 2% to GDP).

Development plans have gone back and forth between larger scale to small scale, between designs including exporting electricity to meeting domestic needs only, in response to both changing government objectives and the willingness of investment and trade partners to commit. With the Kudu field on the fourth iteration of the development plan, it appeared during interviews in 2018 that NAMCOR lacked the necessary support from government. Interviews indicated a great deal of

Petroleum (Exploration, Production & Development) Act, 2019, first introduced as a bill in 2013. The law indeed includes a provision for the creation of the Upstream Petroleum Regulatory Authority. The existing Energy Regulatory Commission will be responsible for regulatory functions until the new authority is established.

Le Matin d'Algérie, 18 June 2018; <http://www.lematindalgerie.com/sonatrach-cest-faux-letat-na-donne-aucune-carte-blanche-au-pdg> (last accessed 15 February 2019)

uncertainty within management about whether the government would approve the current scaled-down plan for gas to power. The perception conveyed was that government was not sufficiently clear or consistent about its objectives and the financial or regulatory support it is willing to offer the project. These concerns about the lack of support were, in the end, founded, as the government shelved the project in November 2019. The operator for the Kudu field is investigating other commercialisation options.

NOCK

In Kenya, the Ministry of Petroleum and Mining, the shareholder ministry, has been busy reviewing the development of the Tullow discoveries and its regulatory role for the upstream, following the passing of the Petroleum Bill. NOCK has not figured prominently in the plans of the Ministry. From discussions held there in 2018, it appeared that the Ministry's interest was in establishing a new fit-for-purpose vehicle, which would be granted licences and list part of its shares on the London Stock Exchange and in Kenya. Indeed, the Petroleum Act, passed in March 2019, makes scant mention of NOCK, granting (an unnamed) "national oil company" a possible state participation in licences. Interviews in NOCK indicated that its managers wanted the Petroleum Bill to grant their company the right to exercise back-in rights on behalf of the state, giving it assets that would enable it to raise finance through listing. However, discussions at the Ministry indicated its preference was to approach investors with a new company that did not carry any "baggage". NOCK also wanted the bill to grant it the right to be the marketer of the state's share of crude oil but was "ignored".

In a welcome development, NOCK has embarked in a complete review with government of its strategy (refer to Section 3.1). The broad consultative process could focus the management on long-term growth and galvanize NOCK interest in its upstream programme. This process has the potential to rally political support

for a meaningful role for NOCK in the upstream or in other sectors. However, initial proposals made on strategy were said to have been blocked by the Ministry of Petroleum, which was not supportive of giving NOCK an upstream mandate as the entity holding the state equity interests in the upstream.

GNPC

GNPC's strategy to become an upstream operator has been broadly supported by successive governments. However, there is uncertainty around the pace of and path to operatorship. The current government reversed course on using Explorco as a vehicle for operatorship in the offshore, preferring the development of onshore acreage through the GNPC parent company. Some executives thought the new administration did not support the idea of Explorco or GNPC handling exploration alone because of the risk involved. GNPC's strategic direction has undergone dramatic shifts with successive periods of political transition, and many of those interviewed lacked confidence in the ability of the company to retain a consistent strategy in the event of future political transitions. This impedes the company's ability to confidently act on the current strategic direction. While sometimes necessary, strategic reassessments may cause companies to abandon plans, resulting in lost investments (whether Explorco, the Voltain exploration programme or the CSI programme).

GNPC's strategy to become an upstream operator has been broadly supported by successive governments.

Sonatrach

Sonatrach presented its new strategy to government, to the legislature and the public and obtained broad support. Critically, support from the Bouteflika administration

David G. Victor, David R. Hufts and Mark C. Thurber (2012). *Op.cit*, Chapter 20. *The Arab Weekly*, 22 July 2018; <https://theArabweekly.com/algerias-sonatrach-chief-receives-expanded-powers-weather-attacks-opponents> (Accessed 25 January 2019) Numéro 18-152 du 4 juin 2018

had been secured, with some Algerian commentators characterizing that support at the time as a *carte blanche* to implement the new strategy. It is true the then-CEO enjoyed extensive powers, according to discussions with executives, though he also regularly had to explain and justify decisions to the parliament. With the popular protests and political upheaval that gripped Algeria in 2019 there was initially broad decision-making paralysis in government and at Sonatrach. But the passing of the new, investor-friendly Hydrocarbons Bill in November 2019 removed a degree of uncertainty regarding the direction of the sector and signalled the government's intent to support the new Sonatrach strategy, which relies on partnerships with foreign oil companies.

By comparing the performance and governance of 15 NOCs, they concluded that countries in which the NOCs enjoy consistent, predictable direction from government about their mandate are also those with the best performance.

Consistency is of critical importance to NOC performance, as demonstrated by the analysis of David Victor, David Hufts and Mark Thurber. By comparing the performance and governance of 15 NOCs, they concluded that countries in which the NOCs enjoy consistent, predictable direction from government about their mandate are also those with the best performance. For the NOCs in this study, this means that strategies should be endorsed for a period longer than one electoral cycle. Broad consultations with government and non-government stakeholders on the shape and form of the strategy can create more enduring consensus around the NOC's strategy.

5.1.2. Interference

Government interference in NOC commercial or operational decisions is common and negatively affects performance. As the Victor et al analysis demonstrated, having a "unified system of control" over the NOC was more important in explaining performance differences than any particular form of administration, regulation or corporate governance (2012: 907). Cohesive and predictable rules under a centralised system allow for longer planning horizons for NOCs and this increases

their performance. In other words, when the NOC receives directives or requests from multiple actors in the system without predictability this negatively affects its performance.

Sonatrach was among the NOCs studied in the above Victor et al research. They found Sonatrach to have neither very fragmented nor very centralised governance of the NOC and its performance at the time was judged to be 'lower-middle'. In the interviews in late 2018, Sonatrach executives did not complain of government interference, but rather pointed to an increased support from outside the company. They explained that the company had been building confidence with parliamentarians, investing considerable time in engaging with them and informing them of the company's plans under the new strategy. This allowed the company to obtain support for the purchase of the Augusta refinery in 2018. While it was not mentioned in interviews, Sonatrach's then CEO was criticised by some nationalists, who accused him of being close to US corporate interests. But his position was bolstered by former president Bouteflika's executive order, which increased the CEO's independence from political interference by giving him the power to select the members of the executive committee, with the exemption of the deputy-presidents. The decree also doubled the number of Sonatrach's executive committee members from four to eight and expanded the scope of their responsibilities from overseeing operational activities to include financing, business development and strategy. That said, since 2010, Sonatrach has seen a revolving door at its CEO office, with the government offering only short-lived support to the CEOs.

Government interference was a problem commonly cited in GNPC. Recruitment and promotion, in particular, were raised as key issues hampering the company's development. When governments change, the senior staff changes too (usually the top two levels of management), and this prevents continuity of planning. Some executives also commented that contracts were awarded to friends of the party in power. Should GNPC become an operator, it will be handling procurement on a much greater scale and this expectation that the ruling party's allies should be rewarded will become a serious governance risk.

Under the previous administration, GNPC had devised Explorco as a mechanism to insulate its upstream business from government interference. The company was established as a home for the development of operator competences. GNPC had wanted it to have a new, different business culture that was more commercial. With its 8 licences, it could access capital markets for finance and eventually could list, to ensure its continued independence from government. However, as explained previously, the current administration is not in favour of Explorco as the vehicle for GNPC's future strategy and the company is dormant.

NOC boards are frequently not as good as they could be and become the channels for government interference. Nominations tend to be political: some members represent shareholder ministries and others are purportedly independent but are in fact closely associated with or actually, the ruling party. In Ghana, the Chairman of the company's board is also the chairman of the ruling party (and several other board members are also from the party). As a result of these political nominations,



Matthew Tyce, forthcoming.
MOLLER, L. (2013). *Evolution of the legal framework for oil and gas exploration and production in Namibia*. Available at: <http://openair.rgu.ac.uk>
Zarara Oil & Gas Ltd was awarded a license in 2017 for offshore exploration. *The East African*, 12 October 2017, Available at <https://www.theeastafrican.co.ke/business/Kenya-awards-firms-licence-to-drill-for-natural-gas/2560-4136206-7pctjc/index.html> (last accessed 21 February 2019)
The East African. (2012). Kenya's oil hunt turns into multibillion cash cow for Canadian speculators, <https://www.theeastafrican.co.ke/news/ea/Wildcat-prospectors-make-billions-out-of-Kenya-oil-blocks/4552908-1358716-format-xhtml-dcf7nn/index.html> (Accessed 5 February 2019); cited in: Matthew Tyce (forthcoming)
Luke Patey (2014). "Kenya: An African oil upstart in transition", Oxford Institute for Energy Studies, Available at <https://www.oxfordenergy.org/wpcms/wp-content/uploads/2014/10/WPM-53.pdf> (last accessed 21 February 2019)

board members frequently do not have the necessary industry expertise to assess and guide plans, and may enable patronage, nepotism and corruption. In Kenya, the board of NOCK has seen more political appointments since 2006. The size of the board has increased, and members have interfered in operational decisions, pushing the interests of particular industry players or demanding that their clients be employed as low and medium-grade employees. Formalized board rules on nominations and governance (specifically on the scope of their role vis-à-vis management) would be very beneficial.

5.2. Legal and regulatory context

The legal and regulatory context refers broadly to the rules by which the NOC must play on the national territory – or the cards the NOC is dealt by government. This includes the legislative framework for investment by foreign oil companies, the means by which the NOC can access finance, any competitive advantages given to the NOC over foreign oil companies, unfavourable rules that come with its state-owned status and obligations to meet domestic energy needs below international market prices.

5.2.1. Legal framework for investment

The legal framework for investment dictates the level of activity in the petroleum sector – together with the attractiveness of the geology of course. It determines how incentivized foreign oil companies are to invest. As such, it is a factor that affects the performance of the sector overall. Most NOCs need to partner with foreign oil companies, which provide a mix of capital, technology and experience that complements what they have.

Namibia presents an effective licensing system and legal and regulatory framework. It has successfully established the framework for investment, notably the “setting up

Valerie Marcel (2016). The Cost of an Emerging National Oil Company, op cit. Standard Digital, 18 February 2019, <https://www.standardmedia.co.ke/article/2001313450/police-to-probe-sh100m-oil-theft-at-nock> (accessed 27 February 2019)



of an effective legal and regulatory framework, the management and administration of the policy and law, the licensing system, the regulation of offshore health, safety and environmental issues, including decommissioning, etc.”

In Kenya, despite Tullow’s discoveries in the Lochikar Basin, the exploration drive of the country has stalled, with almost no new licences awarded since 2013 and speculators sitting on some of the country’s best acreage, using political connections to win extensions. But policy and regulatory changes are underway to kickstart exploration. The Ministry of Petroleum has created an extra 17 new oil exploration blocks and indicated it will introduce bidding rounds in the future to replace direct negotiations and the open-door policy. The licensing rounds were delayed because the new petroleum bill had not passed. The law was passed in March 2019. In order to further incentivise exploration and discourage speculators, Kenya announced new rules that will sharply increase licensing fees, require commitment to training fees for Kenyan civil servants and introduce tough penalties for failure to respect exploration schedules (Patey, 2014).

Ghana had attracted a great deal of interest after the Jubilee discovery. But exploration almost came to halt during the oil price slump, as it did in most of Africa. In order to boost exploration, Ghana launched its first licensing round in

2018. It reserved ultra-deep blocks for direct negotiation. Activity in the sector is set to increase also as a result of the ruling of the international tribunal for the law of the sea in favour of Ghana in its dispute with Côte d'Ivoire.

Judging by the poor results of recent bids and comments made by Sonatrach and foreign oil company executives, oil companies did not find the Algerian legislation sufficiently attractive between 2005-2019. Comments made in interviews indicate that Law 14 of 1986 had encouraged foreign investment but the 2005 law that replaced it had not. Sonatrach took the lead in shaping the new law overseeing upstream hydrocarbons. The company invested efforts in changing the investment framework because, as indicated in interviews, the implementation of its strategy depends on its ability to partner with international oil companies in exploration to shore up its capabilities.

The slow regulatory process was often cited by oil companies as a significant hurdle to investment (and this was acknowledged in interviews with Sonatrach). The government has supported Sonatrach's push to make the process less bureaucratic. Negotiations with oil companies are now handled in tripartite discussions comprising investors, Al Naft and Sonatrach.

5.2.2. Access to finance

Source of finance

Access to finance is an important enabler for NOCs. Oil and gas life cycles are long, and NOCs must be able to commit capital to long-term plans. Two types of financial constraints commonly arise: first, NOCs with stakes in producing fields may not be able to retain earnings from crude or gas sales, which requires them to request funds from the government budget; and second, NOCs without producing fields do not have access to the associated, high-profit revenue streams.

PIAC (2017). *Simplified Guide to Petroleum Revenue Management in Ghana*, June; http://www.piacghana.org/portal/files/downloads/simplified_guide_to_ghana%27s_petroleum.pdf (last accessed 18 January 2019)

PIAC (2018). *Report on the Management of Petroleum Revenue for January - June 2018*. Available at: http://www.piacghana.org/portal/files/downloads/piac_reports/2018_piac_semi-annual_report.pdf (accessed 22 March 2019)

PIAC (2018). *Report on the Management of Petroleum Revenue for January - June 2018*.

Sonatrach can retain earnings from sales and pays royalties, tax and dividends to the treasury. This is a sound financial model, as it ensures the government is paid first, through royalties, and the focus on profits encourages the NOC to keep costs low. Accordingly, comments by executives indicate that the company is financially enabled to execute its strategy. The 'state take' in Algeria amounts to 72% of profits, according to an executive. In contrast, NOCK and NAMCOR do not transfer dividends to the state, and instead mechanisms are devised to provide capital inflows. NOCK receives transfers from government (\$7.93mn in 2018, according to company data) and in NAMCOR's case the state funding has come in the form of a fuel levy, which has been a significant source of income (\$6.5mn in 2017, covering approximately 36% of expenditure).

Emerging NOCs commonly struggle to finance their growth. NAMCOR executives explained that finance was a key hurdle in the rollout of its retail network and the Kudu gas to power project. Without capital, NOCK has not been able to secure stakes in promising acreage in Kenya. The company also lacks liquidity for its current retail operations. The then-CEO told the National Assembly Energy Committee in February 2019 that the corporation was under-capitalised and was relying heavily on financing through borrowing to sustain its operations. In light of the relative inactivity of upstream licensing in Kenya, NOCK does not generate significant revenues from data sales, in contrast to NAMCOR.

Two types of financial constraints commonly arise: first, NOCs with stakes in producing fields may not be able to retain earnings from crude or gas sales, which requires them to request funds from the government budget;

As discussed in Marcel (2016), recommendations for financing an emerging NOC (without production revenues) are:

- i. Governments need a clear understanding of what different roles cost (e.g. upstream operator, non-operated minority shareholder, advisor to government, retail);
- ii. Governments and NOCs should set a role for the NOC that it can

- realistically play, and which can be funded;
- iii. Governments must approve an explicit financing model for NOCs, to ensure they can fulfil their mandate and do not seek funding outside the agreed parameters;
- iv. NOCs should focus on keeping costs low, contain their ambition, and implement strong accounting and reporting standards.

GNPC's fiscal model is rather unique. The Petroleum Revenue Management Act dictates that petroleum payments go to the Petroleum Holding Fund (PHF), which disburses the funds by set rules: first to GNPC to finance its operations (up to 30%) and then to support the national budget and the Petroleum Funds. Parliament approves GNPC's programme of activities of every year. The provisions for funding of GNPC through the PRMA are set to expire in 2026. GNPC will need to ensure that its strategy can continue to be financed from upstream revenues. While in interviews GNPC managers mentioned the expiration of PRMA transfers as a concern, they did not highlight any potential alternative revenue streams.

Though GNPC has stakes in producing assets, it also faces financial constraints and lacks liquidity, according to an executive of the company. The non-governmental watchdog, PIAC, noted that GNPC had not secured sufficient petroleum receipts from the PRMA to meet its share of expenditure incurred in its exploration activities and its equity financing for the Jubilee and TEN fields. For instance, in 2016 GNPC was allocated US\$88 million from the PRMA, while its upstream costs amounted to US\$92.8 million, forcing the company to draw on debt and its cash reserves, which had been earmarked for other expenses. PIAC has advised that GNPC should proactively budget for cash calls to avoid having equity payments outstanding for its participations in licences. The company may also need to prioritize spending amidst constraints, reducing its operational expenditure and quasi-fiscal expenditure.

In the case of the Kudu gas to power project, executives felt the amount of capital required was too large to be considered by the capital markets without a sovereign guarantee (\$1 bn for the upstream segment and \$700mn for the downstream segment). According to company reports, the company's strategy is to dilute its interest to a minimum of 10-15%. Its approach is to relax the terms to be more attractive to loan markets, at least until partners can be secured for a farm down.

World Bank, July 2015; <http://www.worldbank.org/en/news/press-release/2015/07/30/world-bank-approves-largest-ever-guarantees-for-ghanas-energy-transformation> (accessed 21 January 2019)

Since oil production began, GNPC has engaged in quasi-fiscal expenditures, often upon request of the Ministry of Finance, which have eroded available capital. In 2013, for instance, it used a share of its oil revenues to repay a loan facility incurred by the government of Ghana and in 2016 it provided a \$100mn guarantee for the Karpower Emergency Project. In a forthcoming article, Kojo Asante, Abdul-Gafaru Abdulai and Giles Mohan explain that in 2015 GNPC overspent its allocation of oil revenues by 49%, with about 70% of this budget overrun spent on items that were outside of its core mandate in the petroleum sector, namely financing the government's 'Western Corridor Roads Project', as well as the petroleum products owed by Bulk Oil Storage and Transportation (BOST) to Trafigura. In 2018, PIAC estimated outstanding advances and guarantees by GNPC to the government of Ghana, Ministry of Finance, TOR, GNGC and BOST amount to over US\$253mn in financing of quasi-fiscal expenditure. In 2019, the Ministry of Energy asked GNPC to borrow \$250mn on behalf of the Ministry to finance the energy sector debt. This clearly poses a significant challenge to the capitalization of the company and would cripple its ability to become an operator – as this role requires capital investments on a much higher scale.

http://www.namcor.com.na/media/plg_downloads/procurement/legislation/public-procurement-act.pdf
<https://nationaloil.co.ke/public-procurement-laws>



Ability to borrow

For emerging NOCs, access to loan or equity markets is often a critical path to funding their upstream plans. NOCs ask their governments for sovereign guarantees, which they are understandingly reluctant to grant, considering the risk involved.

NAMCOR and GNPC executives commented that they struggled to access finance without sovereign guarantees, and this had created hurdles for project delivery. However, both companies have benefitted from government support to obtain loans. NAMCOR received a \$8.66mn loan from government for the funding of the Kudu project and a low interest loan of \$3.67mn for downstream activities

NAMCOR and GNPC executives commented that they struggled to access finance without sovereign guarantees, and this had created hurdles for project delivery.

(company report, 2016-17). While it was not mentioned in interviews, GNPC received the support of the World Bank for the Sankofa Gas Project, which offered two guarantees in 2015 – an IDA (International Development Association) Payment guarantee of \$500 million that supports timely payments for gas purchases by Ghana National Petroleum Corporation and an IBRD (International

Bank for Reconstruction and Development) Enclave Loan guarantee of \$200 million that enables the project to secure financing from its private sponsors. GNPC has also relied on oil-backed loans for capital to complement the transfers from the PRMA.

Sonatrach is not allowed to borrow with a sovereign guarantee. It relies on project finance, cash from retained earnings and capital from project partners to finance its projects. It is broadly able to self-finance. However, the petroleum law requires Sonatrach to hold 51% equity in licences, which creates a large financial burden on the company. The funding for petrochemical projects will rely on capital from foreign partners, Algerian bank loans (BNA) and other development banks.

5.2.3. Competitive advantage given to the NOC

NOC performance is often supported by the competitive advantages the company obtains over foreign oil companies or domestic private sector companies.

The most significant comparative advantage given to NOCs is the right to acreage. Section 3.3 reviewed the rights to acreage of the four companies. Sonatrach benefits most among these NOCs with a guaranteed 51% stake in licences, though the associated responsibility is also a burden on the company. GNPC, NOCK and NAMCOR hold multiple stakes that are carried to production and rights to increase their equity post-discovery.

Responsibility for data management is a key advantage that can be bestowed on NOCs as, beyond the revenue generation, it gives them privileged access to the geological data and therefore an opportunity to develop an enhanced and holistic understanding of the country's geological potential. All four companies have full access to the national geological data.

Where NOCs enjoy free or privileged access to infrastructure, they have a comparative advantage over foreign or private oil companies and retailers. The NOCs in the study have only minor infrastructure privileges: NOCK benefits from privileged access to 30% of Kenya Pipeline Company's infrastructure and free LPG cylinders.

5.2.4. Unfavourable civil service rules

NOCs are often subject to civil service rules that dictate how they can recruit and pay staff and how they should procure goods and services. These rules are primarily designed to keep NOCs (and other SOEs) in check, by preventing discretionary or abusive practices. However, they can make it difficult for NOCs to compete with

PAIC (2018). *Report on the Management of Petroleum Revenues for January – June 2018*

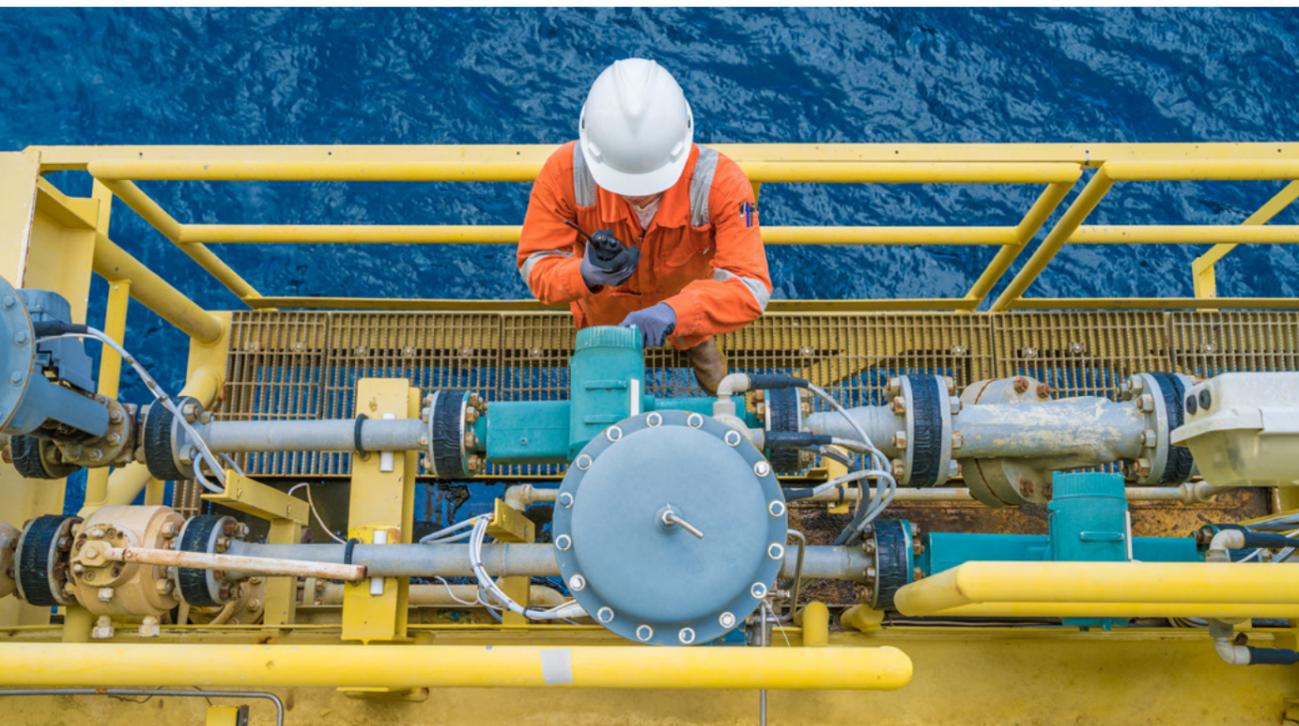
Reduced from the estimated headline price of US\$9.8/MMBtu thanks to cost savings. According to Vitol, estimated net cost of gas to Ghana would be less than \$4.5/MMBtu. <https://www.vitol.com/first-sankofa-gas-deliveries-to-ghanas-power-producers/>

private companies, which might be able to poach their human resources or, at the very least, attract the best talent. Cumbersome procurement processes can slow operations significantly, making it difficult for NOCs to deliver projects in a timely fashion.

Restrictions on recruitment and pay

Salaries at SOEs in Namibia are capped by the State-Owned Enterprises Law of 2005, but executives did not cite this as an obstacle to the company's growth. Salaries and benefits at National Oil of Kenya and GNPC are considered good by staff and competitive compared to other parastatals, according to interviews with staff (and reviews of NOCK on the website Glassdoor).

GNPC's recruitment process is affected by incoming political administrations. As one manager explained, "As a political entity, we are not fully in control of recruitment." Several appointments at the senior level are political, but it is less common at the lower echelons. This practice was cited several times in interviews as a highly disruptive factor, causing the revisiting of strategies and plans and confusion within the company.



They were placed at the Banque Extérieure d'Algérie, which invested them outside Algeria to avoid an inflationary effect. The more recent tranche was placed at the Bank of Algeria.

Sonatrach lost 23,000 employees since 2008 and 16,000 employees since 2013, of which many were mid-level managers and 50-year old engineers and specialised technicians who were entitled by law to early retirement. Sonatrach has recently been able to have the early retirement provision removed. Recruitment and human resources development are critical to achieving its strategic goals. The Agence nationale de l'emploi (ANEM, the national employment bureau) is responsible for civil service recruitment and had created significant bottlenecks for Sonatrach. It required Sonatrach plants and affiliates to recruit locally even for very specialised positions. Sonatrach had no control of the recruitment process – indeed Sonatrach could not even screen or interview candidates. However, following discussions in 2018 Sonatrach and ANEM came to an agreement to recruit jointly. Sonatrach is now working to resolve another un-commercial civil service rule that prevents it from hiring interns at the end of their internship. The company has recruited 8,000 young Algerians since 2014. They are assigned to operations, rather than support functions (where the career paths are uncertain as a result of increasing digitalization).

Rules on procurement

NAMCOR and NOCK's procurement is subject to civil service rules. However, as these companies are not operators in the upstream, they have limited procurement spend and the impact of such rules is limited.

In GNPC's case, the rules are a more obvious hurdle in its path to operatorship. GNPC must procure through the Public Procurement Authority (which oversees all SOE procurement). According to the Public Procurement Act any expenditure on goods under \$20k can be approved by the CEO, but larger amounts go through the Internal Tender Committee and the Central Tender Committee. This approval process has delayed GNPC's processes and there is concern within the company that it would create problems when it is an operator. Procurement is certainly an area where governments and NOCs must undertake special precautions to avoid corruption. While keeping that goal at the forefront, GNPC could also engage government on how best to manage the chain of approval when GNPC becomes an operator and the scale and pace of procurement increase.

Interviews in Sonatrach revealed that the company's bureaucratic procurement and spending rules were company-instigated and not imposed by government regulations. Sonatrach benefits from special status and can spend without going to the government committee for approval. But its spending was slowed by bureaucratic and hierarchical decision chains. Now the company has introduced greater delegation of authority into its procurement and spending decisions and the CEO delegates these decisions to his directors. The company is transitioning to a system of ex-post controls and audits. Similarly, Algerian rules on procurement simply require equality of treatment, transparency and preclude short-listing so all pre-qualified companies can bid. The Algerian government allows SOEs to establish their own procurement standards. However, Sonatrach's policy was previously to take the lowest bidder - a result of the 2010 corruption scandal. This policy has now changed, and the company is attaching more value to quality and competence.

Sonatrach does face significant financial hurdles related to currency conversion. It only has Dinar accounts. The Bank of Algeria gives Sonatrach foreign currency on demand, but it has limited capacity. Equally uncommercial are rules restricting hedging. Sonatrach will register its new trading joint venture abroad in order to escape this control.

5.2.5. Obligation to supply the national market below international market price

Several NOCs must direct some of their production to domestic sales at a price that covers costs plus a small profit margin (and sometimes with no margin), with an obvious opportunity cost compared to exporting crude oil, condensates and natural gas sales.

While GNPC's mandate to market its and the country's shares of crude oil is commercial – indeed GNPC has no obligation to sell to a refinery and could sell on the spot market, for instance - its mandate to sell the gas produced has not been on a fully commercial basis because the market is regulated. GNPC provides gas to the Ghana National Gas Company (Ghana Gas Company), whose mandate is to build, own and operate infrastructure required for the gathering, processing, transporting and marketing of natural gas resources in Ghana. Ghana Gas Company, in turn,

sells the gas to the VRA, which generates electricity. GNPC pays the foreign oil operators for the gas (except in the case of the Jubilee Field, which associated gas is free for Ghana to take) but has not received any payment from Ghana Gas Company since September 2014. Ghana Gas has itself received only partial payments from VRA.

As the Public Interest and Accountability Committee (PIAC) explains, there were no payments from GNPC into the Petroleum Holding Fund in respect of gas revenue during the first half of 2018, even though large amounts of gas were supplied to the National Gas Company from the Jubilee and TEN Fields. During that period, as an example, GNGC received a total of 14,637.25 MMScf valued at approximately US\$45mn. GNGC processed the raw gas and sold it with an invoice value of US\$160mn, but only received US\$46mn (29 percent). GNPC is currently owed \$86.4mn. As discussed in interviews, the debt is set to become a much heavier burden on GNPC's books now that ENI started selling volumes of more expensive non-associated gas from the Sankofa field in August. The debt is covered by the \$500mn loan guarantee given by the World Bank, but GNPC will need to be paid to pay back the loan.

Another difficulty for GNPC relates to gas pricing. GNPC as gas aggregator employs a weighted average cost for the commodity price. The associated service costs, like transmission, processing and gathering, are also determined on a weighted average basis by PURC. GNPC, working with the Ministry of Energy, has made submissions to the PURC on a suite of interventions aimed at achieving a reduced blended price.

- i. GNPC worked with OCTP partners to reduce the development costs for the gas field and its associated effect on the gas price. This has already achieved significant results, which GNPC expects will be reflected in the final delivered price to be determined by PURC this year.
- ii. GNPC has proposed a discount on the state take (GNPC share + state

While GNPC's mandate to market its and the country's shares of crude oil is commercial – indeed GNPC has no obligation to sell to a refinery and could sell on the spot market

royalty) portion of that commodity price on associated and non-associated gas.

- iii. GNPC is also encouraging rationalizing of the service costs (transmission, gathering and processing) on account of increased throughput.

Ultimately, GNPC wants to achieve a lower gas price to incentivize the utilization of gas and develop a viable domestic gas market.

In Namibia's case, the government wants gas to meet domestic needs and had identified the Kudu gas project as a strategic project. However, it did not agree to a gas sales agreement with NAMCOR. Because the power market is regulated in Namibia, the agreement would not have been based on a market price. The government (via Nampower) would need to pay for the cost of the gas plus a margin for NAMCOR. Without a buyer for the gas, NAMCOR cannot progress the Kudu field to proved reserves.

Product prices are also regulated in Namibia. Gasoline prices are set by the government, which also sets the profit margin NAMCOR can take.

Product prices are also regulated in Namibia. Gasoline prices are set by the government, which also sets the profit margin NAMCOR can take. Supplying petroleum products in remote rural areas is more costly and the company is likely to ask the government to support this activity with a capital injection.

Sonatrach has an obligation to supply the domestic market, including remote areas.

According to interviews in Sonatrach, Sonelgaz takes gas "almost free" to meet domestic demand. The price actually reflects the internal cost of production. Because product prices are regulated, demand growth is not contained and Sonatrach has had to import products to meet demand (mostly from industry). Sonatrach requested a government subsidy to offset the losses. In response the government paid the company in treasury bonds for the supply of products between 2012-14. The bonds amount to a staggering \$8bn. However, this practice has been a drain on the company's liquidity because of restrictions on cashing in the bonds.

The CFO indicated his intent to meet with government to request permission to cash them in to pay for capital investment programmes.

Some Sonatrach executives hoped the government would raise the price of products and water to contain demand. Domestic demand for petroleum products increases annually at a rate of 4-6%, according to discussions in Sonatrach. While the company feels confident it will produce enough crude to supply all its projects, it acknowledges that this subsidization of products is affecting its business. The price of gasoline in Algeria is €0.40/l versus some €1.50 in Europe. The company sells products without a profit margin, at "equilibrium cashflow".

Failure to capture the full market value of volumes sold inevitably has an impact on the financial performance indicators for these companies. The impact is greater for companies with a higher proportion of volumes sold domestically at cost (or cost plus margin). This is the case for Sonatrach, which exports 632,600 b/d crude oil and must meet a domestic demand for oil of 421,500 b/d (OPEC Statistical Bulletin 2018). The value of domestic sales is only a tenth of the value of exports. Such domestic obligations create a significant burden on the company. For these reasons and in the broader national interest, governments should all be aiming to raise prices to commercial levels over time, in order to support competitive, functioning energy and power markets.

06

Conclusions

6.1. Enhancing performance

6.1.1. Benchmarking conclusions

The illustrative financial comparisons against peer NOCs and the socio-economic benchmarking did not highlight huge deviations for any of the NOCs in the study from the broader NOC peer groups. However, limited financial and operational disclosures by NAMCOR and NOCK – and the lack of comparable data across the companies - did limit the scope of financial value creation comparisons among these four companies. The four companies are indeed at different stages of their lifecycles. As for the socio-economic benchmarking, it highlighted various programmes delivering value to countries, but revealed the near absence of impact assessment by the companies. The lack of evaluation and monitoring is likely to be the case among NOCs generally.

In contrast, the operational benchmark was measured against best international industry practice. Results indicated that the companies broadly have leadership

awareness of best practices, some leadership sponsored initiatives to implement these practices, and only occasionally organisations that are enabled to implement best practice. In order for the NOCs to continuously improve their operational performance and capability and evolve according to their long- and short-term strategies, companies should consider applying the recommendations listed in the operational benchmark (Section 4.2 and Appendix 2) and aim to implement the international industry best practices listed in the Appendix. The continual enhancement of performance and business processes is supported by taking the following steps:

- i. Leadership awareness-raising
- ii. Leadership sponsorship
- iii. Organisational enablement and the allocation of adequate methods, tools and technologies
- iv. Technology enablement and adequate organisational capacity
- v. Systems that drive and enable continuous performance improvement and knowledge capture
- vi. Mapping of business to SDGs, AU Agenda 2063 and Paris Agreement.

This benchmarking exercise took a snapshot of the four companies at one point in time. Most are implementing new programmes to improve their performance (e.g. ERP systems, financial oversight, risk registers, strategy reviews) and one can expect them to rank differently on the above metrics over time.

6.1.2. Risk management

Risk management is a facet of operational excellence that merits highlighting. Risk identification should become a key part of NOC strategy processes - especially in companies that have failed in the past to grow parts of their business, but also considering climate-related risks. Risk mitigation should also be embedded in operational decision-making. But, in fact, procedures for risk identification and management were not robust in any of the companies studied.

For instance, GNPC has insurance against loss of production income (at a cost of

\$13mn p.a.) but does not carry out an enterprise risk management review. As it progresses towards operatorship and commits to capital investment on a larger scale taking responsibility for operational decisions, risk management needs to be at the centre of the business - an independent, challenging function.

At Sonatrach, repeated questions about risks to the implementation of the company's strategy led to very limited discussion. At the senior level, the risks identified were obstacles to the hydrocarbon law and shortfalls in human resources. When pressed in interviews, some executives pointed to the risk that the transformation plan would not obtain sufficient buy-in throughout the company. There was a reluctance to discuss external risks related to markets and demand (e.g. demand for petrochemicals, the expected decline in demand for oil). The company's audit and risk division will be introducing a pilot programme in 4 divisions that maps risks on a matrix of likelihood and impact (with a view to company-wide roll-out in 2021-22). However, from interviews with senior management it appears that risk identification and management is not currently a major part of the company's culture.

Another aspect of risk management is to introduce a strong safety culture. Most NOCs acknowledge this is an area where they could do better – and indeed this was raised in interviews with HSE and Audit managers in all companies. At Sonatrach, an executive commented that the safety culture was much improved over the past 10 years, as a result of multiple company-wide training sessions but required deepening – for instance with respect to systematically investigating 'near-misses'.

6.1.3. Expected NOC trajectories

The study's three-pronged benchmarking highlights the value of the systematic tracking of spending and performance. National oil companies no longer have time on their side. The energy transition changes the time horizon for sub-surface resources to be transformed into wealth and in this context, each investment must have a credible chance of bringing value to the country in a sustainable manner. NOCs should assess what they can do to a high standard and what time would be

required to acquire industry standards in other areas, in order to shape strategic ambitions that can be delivered in time and in form.

NAMCOR

NAMCOR has invested in its upstream skills and, together with the knowledge it is acquiring through the Kudu development and data management and processing, is poised to develop strong capabilities for a non-operated minority shareholding role in the upstream.

The study's three-pronged benchmarking highlights the value of the systematic tracking of spending and performance.

Its planned expansion into retail presents some financial risks. Retail is a challenging business, with tight margins. Other risks for the company stem from corporate governance and leadership. The dispute between the board and management, while not discussed in interviews, certainly must create some uncertainty regarding the direction of the company. It is unclear how the dispute or the investigation into

the senior management's dealings were resolved. The level of company disclosure could be increased, especially with regards to the corporate investigations, company financial flows and performance (indeed, annual reports are released with some delay). The company also needs clear long-term objectives to guide its investments and should avoid lags in its strategy process and ensure alignment of its businesses to SDGs, AU Agenda 2063 and Paris Agreement.

NOCK

NOCK is at a crossroads. The company has looked to the retail sector for its growth. But it is questionable whether a retail expansion will create significant added value to the country where a vibrant private sector already meets domestic needs. In the upstream the company could create value for Kenya, provided the right conditions are in place.

It is our assessment that the company will stagnate without a focus on and means to develop its upstream assets. It has multiple stakes in licences (and could exercise

back-in rights to further licences) that present a potential for discoveries and revenue generation; it acquires, processes and manages geological data; and it manages the geological data centre and laboratories. However, it has lost some of its core technical competences in the upstream as a result of attrition, a leadership gap in its upstream programme and secondments of experienced upstream professionals to the Ministry of Petroleum. It also appears that the company's executive leadership and board have not encouraged the upstream. NOCK could rebuild its upstream programme, with a leadership sponsored commitment to a long-term strategic vision and the best practice operational processes outlined in Section 4.2, and driven by an experienced upstream professional in a permanent role at the head of the programme.

More generally, NOCK would benefit from an overhaul of its corporate governance, notably taking the following measures:

- i. Increase transparency: While NOCK was open to this study and provided financial and operational data to support the analysis, its public disclosure of financial and operational data is limited (its accounts are published by the Office of the Auditor General but the last report published online was for 2014-2015). Higher standards of transparency are in fact required, in light of previous and recent investigations into corruption and fraud at the company.
- ii. Strengthen its performance tracking: Measure value creation – through financial returns, operational excellence benchmarked against industry peers and socio-economic value to Kenya and environmental sustainability. Enhance systems for assessing performance and improve systems and programmes to increase value creation over time. In light of recent company audits revealing fuel theft, it is particularly important to enhance systems for real time tracking of volumes, transactions and financial accounts in real time.

As for the Ministry of Petroleum and government more broadly, it should take a keen interest in its shareholder role. Specifically, it should require higher (and indeed best practice) levels of company disclosure, hold it accountable and clarify what it expects from the company. The Ministry has already signalled its interest in determining the future trajectory of NOCK with its active participation in the

NOCK transformation process. It will need to give NOCK a clear mandate.

GNPC

Among its assets, GNPC has a geological view of all the acreage in Ghana, upstream stakes in prospective licences, and a talented technical staff. In order to capitalise on the value of its staff, GNPC should revamp its corporate values and processes, with a view to increasing delegation of authority to managers and increasing accountability at all levels.

A company-wide engagement around the strategy to operatorship would be beneficial, to align the technical and support functions around a common, agreed path. Interviews suggested that there is a lack of clarity within the company and between the company and its government shareholders as to how much to prioritize the path to operatorship. Given the technical complexity and cost associated with this ambition, it is critical for the strategy to be clear for the company to make



Standard Digital, 18 February 2019, <https://www.standardmedia.co.ke/article/2001313450/police-to-probe-sh100m-oil-theft-at-nock> (accessed 27 February 2019)

decisions going forward.

To this end, GNPC should analyse its progress against the commercial strategy and the returns it is generating and those it expects to generate over time, in order to assess the value of its investments. As discussed in the financial benchmarking section 4.1, longer-term NOC commercial development comes at the expense of fiscal contributions. In addition, the energy transition means the time in which to reap the returns of NOC investments is now limited. Therefore, GNPC should be able to make a clear case on the return on investment of developing operator capabilities (and other GNPC programmes).

This assessment will need to guide the government's thinking about whether to extend the PRMA transfers to GNPC past the natural expiration of the programme in 2026. Similarly, GNPC should engage the government in a discussion around the risks and costs of its propensity to tap into GNPC's capital to finance projects that are not required by operations.

Professionalising the board would help to insulate the company against government interference. The company cannot take this initiative alone and the government would need to demonstrate its commitment to protect the company from interference. The government should be represented on the board, but all nominations should be made through well-structured, merit-based and transparent processes that contribute to board diversity and the nomination of qualified, experienced members. Board members' roles on other boards should be disclosed, as well as any commercial interests that could jeopardize their independence. This guidance is also applicable to the boards of NOCK and NAMCOR.

GNPC should consider engaging government in a public review of the viability of the current model for gas aggregation and the costs and risks of a regulated gas market. The financial burden created by the non-payment of non-associated gas by the VRA and GNGC is not sustainable and restricts the company's capital

Refer to the OECD Guidelines on Corporate Governance of State-Owned Enterprises for detailed recommendations. Available at : https://www.oecd-ilibrary.org/governance/oecd-guidelines-on-corporate-governance-of-state-owned-enterprises-2015_9789264244160-en (accessed 13 March 2019)

allocation. PIAC is a potential ally in this review of gas transfers and quasi-fiscal expenditures.

GNPC's current strategy emphasizes creating long-term benefits for all Ghanaians. This inclusive concern is an important driver for a NOC that is expanding its footprint onshore in Ghana. However, GNPC is investing significant sums in its corporate social investment programme. It is of critical importance that it introduces clear KPIs and systems for assessing the socio-economic impacts of the investment. This feedback loop should guide its future design of projects. The evaluation of cost

and impact of the programmes should allow the government to determine whether development programmes are best handled through the NOC or the relevant government agency.

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Sonatrach

After years of languishing, especially following the corruption scandals that rocked the company in 2010, Sonatrach is emerging from the ashes

as an ambitious, dynamic company. The leadership must act quickly to show results in the first phase of its strategic plan. It currently benefits from moderately high oil prices, still growing demand for oil, and strong gas assets.

The company has demonstrated strong strategic vision through its identification of long-term risks related to the energy transition and hence focused on generating solar energy and developing its gas assets. However, under this strategy the company continues to expend substantial resources towards meeting domestic energy needs (adding solar to the mix) without a plan for containing this growing demand. Similarly, the company has integrated energy efficiency into its values and

Beth Mitchell (2018). "Climate Change, All Change?", KPMG, Available at: <https://home.kpmg/uk/en/home/insights/2018/08/climate-change-oil-and-gas-companies-in-the-transition-low-carbon.html>

plans to integrate it into its operational systems. This is laudable, but only scratches the surface of the problem, which resides at the national scale. Sonatrach could initiate a public debate around the environmental and financial costs of a regulated domestic gas and products market. The better it measures these costs, the better it can articulate the importance of this policy issue. The evolving political context in Algeria is not conducive to increasing the cost of energy to domestic consumers, but it is ripe for informed debate around policy goals and priorities.

6.2. Avenues for value creation

6.2.1. Value creation through the energy value chain

This study reviewed the investments made by NOCs throughout the petroleum value chain and in cleaner energy. In determining where and how much to invest, NOCs and governments should consider the associated risks and whether other companies might be able to make those investments more efficiently. But beyond efficiency, they must also take stock of how resilient their business model is to climate risk. At a time when financial investors are rethinking how they value assets and international oil companies are having to fundamentally rethink their business model, national oil companies must also take stock. Below, some initial considerations are presented.

Upstream

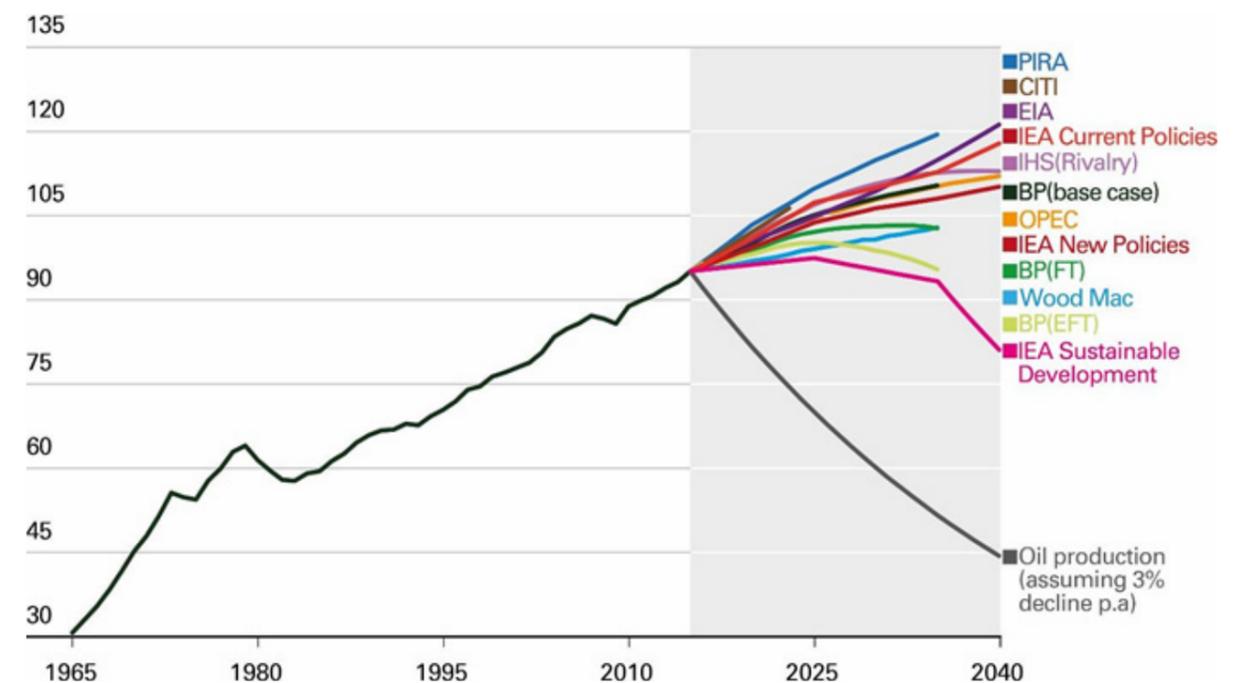
Most national oil companies are primarily designed with the upstream in mind. It is the most promising revenue generating business; it is a rent producing sector in which revenues can vastly outweigh expenditure. One potentially valuable mechanism for increasing the state share of rent is to give NOCs guaranteed minority stakes in licences that are carried to development or production. Governments should be

As a basic rule of thumb, a refinery needs to have a processing capacity of at least 100,000 barrels a day to be economic in a liberalized market; ESMAP (2010). Petroleum Markets in Sub-Saharan Africa, Extractive Industries for Development Series #15; available at: http://siteresources.worldbank.org/INTOGMC/Resources/336099-1158588096604/eifd15_ssa_oil_markets.pdf.

aware that a too-high guaranteed stake will create a disincentive to foreign oil companies, especially at the exploration stage where there is no assurance that a discovery will be made, and costs recovered.

Deciding how much the NOC should invest in developing its upstream capabilities should be guided by potential risks and rewards. Where existing NOC technical skills are not yet near the level required to take on operatorships, it may not be a good use of financial resources to invest heavily in building that capacity and capabilities (and it is expensive to develop). The burden of proof for the value of such an investment is heavier too in the context of the global energy transition and the looming risk of assets' stranding. There is disagreement on when oil demand will peak, as illustrated in the chart below. If policy measures to mitigate climate change are ambitious enough, demand may peak earlier and fall faster than any of the companies or commentators are predicting. Natural decline rates create a need for new investment, but only for projects low on the cost curve. There is also a risk that large NOCs in oil revenue dependent countries could maximise production whatever the price to secure some export revenues (see Figure 5 for an illustration of demand forecast scenarios).

FIGURE 5: Oil demand forecast scenarios



Source: Spencer Dale, Bassem Fattouh, Oxford Institute for Energy Studies, *Energy Insight* 25, January 2018

Against this backdrop, emerging national oil companies will undoubtedly have less time to reap the rewards of investment in operatorship (less time with operated production, as demand declines and assets are eventually stranded). Where reserves are conventional (and thus easier to develop) the time to operator capacity will likely be shorter; and where they are low cost, their vulnerability to market pressures (declining oil price) will be less.

Emerging NOCs in countries with unconventional, higher cost reserves may create more value by increasing the state share via production-sharing agreements or by multiplying and maximizing their minority stakes in licences (carried to development or to production), thus transferring exploration and development risk to IOCs, rather than building NOC exploration capabilities.

Rest of the value chain

This study has reviewed NOC activities throughout the energy value chain (with further detail provided in Annex I), their operational standards and related socio-economic contributions. In terms of understanding the commercial benefits of NOCs investing in various segments of the value chain, it is important to consider whether these investments could be (or already are) taken on by the domestic private sector or could more efficiently be managed by the international private sector. Revenue generation is clearly also an important consideration when determining what activities create value. Due to data limitations, the financial section of this study has not delved into the non-upstream segments, but in this section, some initial conclusions will be drawn on value creation and encouragement given to future studies to develop this financial assessment further.

Revenue generation is clearly also an important consideration when determining what activities create value.

In Kenya (and to a lesser extent in Namibia), where there exists a vibrant and



competitive private sector in retail, it is unlikely the NOC adds value for the country by investing in retail stations in densely populated areas - unless it provides different services or goods, such as LPG or CNG. By offering cleaner energy services in retail stations, NOCs offer a service that private companies have been reluctant to meet and also support the country's transition to cleaner, safer fuels in households. Demand in isolated, rural areas is also not met by the private sector. NOCs can create significant economic value by meeting the energy needs in these areas but would incur higher costs. Mechanisms for covering those losses are needed, as are policies for constraining the growth in domestic demand for petroleum products.

In order to maximise local content in the petroleum value chain, NOCs globally have shown interest in providing oilfield services. However, services and logistics could also attract the interest of domestic private sector companies. More value could be created with a joint venture model in which the NOC partners with a domestic private sector company to provide services for the petroleum sector – with a view to selling its share in the company once established (a practice Saudi Aramco pioneered). Sonatrach is in a position to develop a greater range of services to cater to the petroleum sector, especially as the upstream is set to open

Valerie Marcel (2006). *Op. cit.*, p. 207.

Christof Ruhl, "The war on plastic will dent oil demand more than anticipated", *Financial Times*, 17 February 2019, Available at: <https://www.ft.com/content/281addec-2ed9-11e9-80d2-7b637a9e1ba1> (last accessed 22 February 2019)

up to significantly higher levels of foreign investment. But this is an avenue that even non-operator NOCs could take to support supply chain creation.

In refining, the trend globally over the past four decades has been to phase out numerous small, simple refineries in favour of fewer, larger, and more complex ones. This highlights how difficult it would be for smaller NOCs to create value in refining. KPRL in Kenya was uneconomical and required protection from competition before it was closed. Tanzania and Madagascar too closed their refineries, which could not compete with imported products and were expensive to protect financially. Sonatrach's purchase of the Augusta refinery in Italy had a unique rationale: it wanted to avoid expensive imports of gasoline products to meet Algerian demand; by producing competitive products for export in Italy, it could swap those for similar-priced imports to Algeria, which the company would then sell near the internal price of production in Italy.

A World Bank study estimated that pipelines could reduce the cost of supplying petroleum products in several sub-Saharan countries. They are cost-effective but require large upfront capital investments, regular maintenance and a reliable supply of electricity –which remains a major challenge across the continent (ESMAP, 2010). In Kenya and Ghana, pipelines are handled by other parastatals, but not in Namibia.



Storage capacity is another valuable activity NOCs can invest in to protect the national market against unanticipated supply shortages – especially so in landlocked countries. Storage is also valuable in protecting countries against short-term oil price volatility. Storage was lacking in Namibia and NAMCOR built 2 depots in the past decade. Depots are expensive to build and holding stocks also incurs substantial costs. Companies need to manage contingency stocks through careful risk management and use just-in-time inventory management (ESMAP, 2010).

Trading is a new business area for NOCs. They have in the past been reluctant to hedge. The largest NOCs saw it as gambling with the possible returns for the state: if the market price ends up exceeding the futures' price expectations, the lost returns are hard to explain. The trading JV model with an experienced trader, which Sonatrach is adopting, reduces this risk and allows exporters to capture more value on the barrel. With this model particular care must be made to create incentives for the trading company to act in the country's interest.

The energy transition will undoubtedly affect the long-term (and probably also the medium-term) prospects for these NOCs. In broad terms, natural gas is expected to have a longer future as the cleaner fossil fuel, a 'transition fuel'. Petrochemicals are also seen as a transition industry by many established NOCs in the Middle East and Africa, offering an outlet for crude oil and natural gas even as the power and transport sector's demand for oil decline. Indeed, it is a key element of Sonatrach's 2030 strategy, and it hopes to find growth markets in Turkey and on the African continent. However, plastics will also be under threat on environmental grounds. This challenge to plastics will likely emerge in the West first, leaving some time for demand to grow in India and other emerging markets. But emerging markets could also leapfrog the antiquated, Western use of plastics in packaging, significantly reducing the market for petrochemicals.

There is no doubt NOCs will be creating value for their countries by reducing flaring or increasing energy efficiency in their operations. NOCs may also do so by stepping in to generate cleaner sources of energy for domestic consumption (or export), such as renewables. While a NOC may perceive the energy transition as

a threat to its long-term business, giving it a stake in the transition by allowing it to invest in renewables and/or energy efficiency may support the country's transition to cleaner fuels and make the NOC more resilient to the transformations to come in the 21st century.

However, governments should consider the following before letting the NOC commit its financial resources to generating renewable energy:

- i. Can it do so effectively? Does the NOC have a track record of delivering multiple projects efficiently? Does it have good project management capabilities? Does the NOC's staff possess skills and experience that could be transferrable to the renewable sector?
- ii. Is it a better track record than the existing utility? Could it be beneficial for the utility and the NOC to compete?

To determine what effective role a NOC should play in this area, a conversation would be warranted with the power utility, the finance ministry, climate planners and national planners.

6.2.2. Prioritizing among value drivers

Drawing from and modifying the NOC typology developed by Patrick Heller and David Mihalyi (NRGI, 2019), it is proposed that governments must make strategic decisions that prioritize various drivers for value creation and environmental and socio-economic sustainability:

- i. Rent -making: minimizing costs in order to transfer more revenue to the state
- ii. Profit -seeking: reinvesting as much as it can into its operations and capacity in order to grow its business long-term
- iii. Social investing: spending a significant share of its earnings on producing socio-economic benefits and supporting SDGs and AU Agenda 2063 for the country or having the concern for these benefits shape its investment decisions.
- iv. Environmental stewardship: investing to ensure projects are environment friendly and support NDCs under the Paris Agreement.

Figure 6 illustrates the different conflicting poles where a NOC could stand for value creation. The prioritization is necessary because except for very large NOCs there are usually not enough revenues from oil and gas production for the company to afford to excel at all three roles simultaneously. This said, environmental sustainability should not be compromised. A NOC that focuses exclusively on rent making will be less able to invest in long-term growth in its portfolio and capacity. Employees are less likely to be stimulated and challenged to grow in a purely rent making company, which can lead to attrition and impact morale over time. In addition, neglecting environmental sustainability and contribution to SDGs and AU Agenda 2063 will generate environmental cost, reputational risks and operational disruptions. These will generate legal issues that will also lead to attrition and increase the risk of asset losses and stranding.

By contrast, a NOC exclusively focused on profit seeking is more likely to invest heavy shares of its revenues, hoping to expand its activities and increase commercial capacity to be efficient in the long-term.

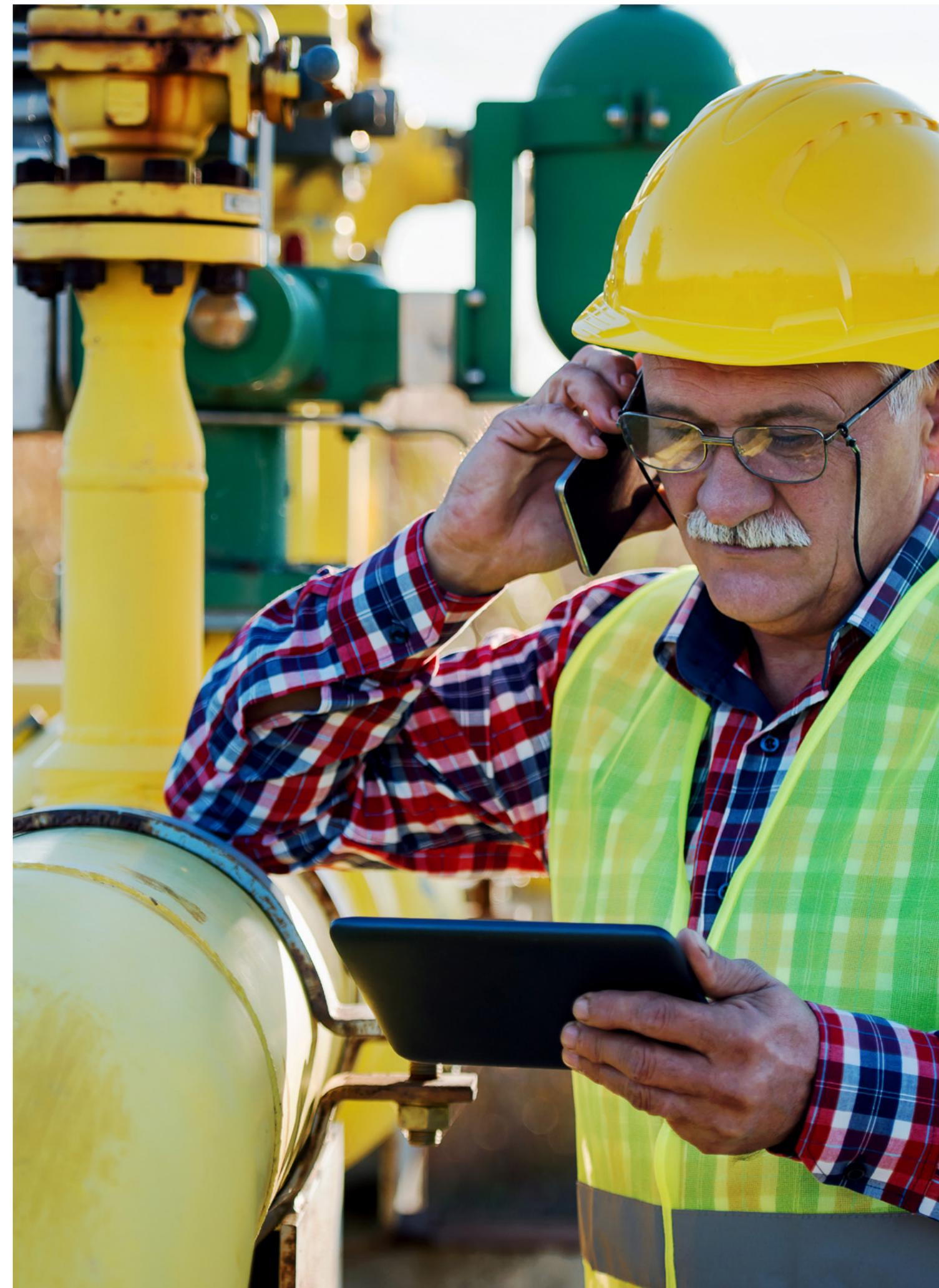
By contrast, a NOC exclusively focused on profit seeking is more likely to invest heavy shares of its revenues, hoping to expand its activities and increase commercial capacity to be efficient in the long-term. This pursuit of longer term gains often requires short-term sacrifices of revenue to the state and also requires a risk tolerance on the part of the state. Spending on becoming a significant commercial player involves commercial

risks; if the NOC does not succeed in becoming an effective commercial company, the foregone fiscal revenues will not have generated a good return. As such, a decision to prioritize profit-seeking should be accompanied by a particularly strong commitment to benchmarking commercial efficiency over time.

Similarly, a focus on rent making or profit seeking may limit the company's ability to prioritize social investing, and vice-versa. If a government and NOC overwhelmingly prioritize the delivery of fiscal revenues to the state, or investment in the company's own capacity, the NOC will have fewer resources available to devote to community-

based projects or public service provision. The flip side of this is that if the state charges the NOC with delivering major provision of services to citizens, it will likely have to tolerate fewer revenues being available for the treasury or for NOC investment.

None of the above suggests that governments cannot aspire to more than one goal for their NOC. But prioritization is critical lest the NOC be pulled in too many directions and stretch its resources too thin. This balance is elusive even for NOC leaders. Petronas, for example, has contributed much to the socio-economic benefits of Malaysia through its investments in education, but its available capital for growth is eroded by the government's dividend policy, which makes the Petronas model lean towards rent-making.



Recommendations

Based on the above findings, this study can offer several recommendations for governments and NOCs to maximise value creation and ensure sustainable development of the oil and gas sector, as well as suggested next steps for improved, ongoing benchmarking.

Specific recommendations for government:

- i. Establish clear goals to guide NOC investments, along with a prioritization among these goals.
- ii. Provide consistent and predictable direction to the NOC.
- iii. Limit interference in the NOC's operational and managerial decisions. Autonomy is critical to performance.
- iv. Establish professional boards to provide oversight and accountability mechanisms to NOCs.
- v. Develop indicators for evaluating financial value creation which are adapted to the NOC's circumstances (e.g. pre-production or production phase).
- vi. Determine the 'right' level of NOC fiscal contribution, balancing between higher transfers to (or from) the state today and reinvestment in the company's growth for long-term returns for the state.
- vii. Assess how well the NOC achieved its reserve-expansion goals (and any associated trade-offs).

- viii. Limit the scale of NOC discretionary programmes on welfare and require the NOC to measure impact and cost.
- ix. Avoid asking the NOC to spend on programmes outside of the scope of its operations, as quasi-fiscal expenditure bypasses normal budgetary avenues and limits the NOC's available capital.
- x. Carefully assess the costs and benefits of requiring the NOC to provide energy below market price. (One of these opportunity costs is the inability of these NOCs to invest in other activities).
- xi. Review civil service rules that apply to the NOC, in particular when it aims for the competitive responsibilities of operatorship, to find a suitable balance between control and enablement mechanisms.
- xii. Benefit from the NOC's ability to oversee operations from the ground up. (Ensuring the NOC has stakes in development licences can give NOCs visibility of operators' plans). Release the NOC from regulatory responsibilities so that it can focus on its commercial role and enhance its capacity to self-finance and access financial markets.
- xiii. Ensure sustainable development of the oil and gas industry by making sure that oil and gas companies including NOCs maintain environmental stewardship and contribute to the SDGs, the aspiration of Agenda 2063 and the NDCs under the Paris Agreements.

This study has highlighted many strengths of these four national oil companies; for instance, National Oil Corporation of Kenya's geoscientific services and facilities, NAMCOR's upstream stakes and data management, GNPC's experienced upstream technical staff and understanding of Ghana's geological potential and Sonatrach's financial and technical might, guided by a dynamic new strategy.

The study identifies common weaknesses broadly attributable to sub-optimal internal processes, unclear strategic direction, as well as bureaucratic and hierarchical corporate cultures. If NOCs are to fulfil the ambitions of their governments and make the case that they add more value for the country than would foreign oil companies, they will need to enhance their performance tracking and internal systems.

Following are key recommendations for the enhancement of NOC performance:

- i. Allow systematic evaluation of value creation (and benchmarking) by establishing baselines of conditions at the beginning of new projects, setting specific targets or KPIs, measuring impact, tracking progress over time and using the results to improve on a continuous basis.
- ii. Disclose financial and operational data to shed light on performance and allow for more effective benchmarking against peers.
- iii. Evaluate and improve internal processes, as part of an ongoing progression towards operational excellence.
- iv. Formalize roles, accountabilities and responsibilities and commit resources to allow implementation of best operational practice.
- v. Champion best practice processes at the leadership level.
- vi. Formalize and simplify standards, processes and procedures for each business segment to drive costs down
- vii. Introduce performance management and continuous improvement systems.
- viii. Establish company-wide risk management processes.
- ix. Evaluate investments with socio-economic objectives under similar scrutiny as purely commercial projects.
- x. Ensure investments are guided by long-term strategic objectives, without lags in the strategy process.
- xi. Stress test the company's portfolio and long-term strategic objectives against expected industrial and policy transformations and climate risk.
- xii. Partner with IOCs in a diversification strategy to develop and source new capabilities given budget constraints and diminished talent access
- xiii. Pursue gas infrastructure partnerships to increase sub-Saharan African household access to electricity using gas. Allow systematic evaluation of projects' environmental sustainability (and benchmarking) by establishing baselines of conditions, setting specific targets or KPIs, measuring impact, tracking progress over time and using the results to improve projects on a continuous basis.
- xiv. Allow systematic evaluation of how well the business is aligned with the SDGs, Agenda 2063 and Paris Agreement by establishing baselines of conditions,

setting specific targets or KPIs, measuring impact, tracking progress over time and using the results to improve on a continuous basis.

Each of the companies was poised for significant transformation that would warrant another assessment in the future. This study has established a baseline assessment (limited in certain functions by data availability) for all four companies and proposed relevant benchmarking indicators. Future benchmarking studies can track how well the NOCs progressed over time in terms of financial and operational performance and the value created by their environmental and socio-economic sustainability.

Recommendations for future benchmarking:

- i. Identify comparable peer groups on specific metrics (e.g. compare companies with heavy domestic energy supply obligations, similar production levels, production mixes, geologies, experience levels and roles in the sector, environmental stewardship, alignment with the SDGs, Agenda 2063 and Paris Agreement, etc.)
- ii. Gather a dataset of NOC expenditure on wages, to allow for comparisons of labour productivity.
- iii. Gather datasets on socio-economic value creation that indicate to NOCs which programmes create most benefits.
- iv. Gather datasets on the profitability of different segments of the value chain.
- v. Gather datasets on environmental stewardship and alignment with the SDGs and Agenda 2063 that indicate which projects are not on the sustainable path and highlight areas of misalignment with the SDGs, Agenda 2063 and Paris Agreement.

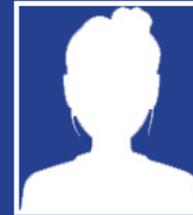
In order to maximize the rent generation of the oil and gas sector, it has always been important to have efficient oil company operators that control costs. In light of the potential environmental and safety hazards related to the oil and gas sector, it is crucial also to have an oil company operator that adopts the highest industry standards in HSSE and, more broadly, that implements operational excellence programmes that support sustained safe, reliable and efficient operations. The

expectation at the boards of NOCs should be that the same standards apply equally to national and private oil companies.

In deciding whether NOCs should aim for operatorship or should take the lead in developing all the country's acreage, as the case may be, governments and NOC boards should take into account the new time pressure operating in the background. The energy transition will cause a decline of the oil sector and later, the gas sector. The time available to NOCs to develop the competences and systems to monetize national petroleum resources is now time-bound. Decision-makers need realistic assessments of baseline NOC capabilities and of the time needed to secure the required capabilities to take on a role with greater responsibility for monetizing the resources. Thus equipped, they can provide NOC managements with clear strategic direction.

More broadly, NOCs will remain relevant in the coming decades if they create value for their countries and ensure sustainable development of the oil and gas industry. The future will not look like the past and the metrics by which 'value' is defined by each country will evolve. 'Value' changes with national development objectives, climate change mitigation and adaptation commitments and broader national aspirations – whether industrial growth or increasingly leading towards inclusive, sustainable development, a cleaner environment and higher governance standards and transparency. NOCs should respond to – and, where necessary for the national interest, demonstrate leadership to guide – these national expectations. But ultimately, value is also measured externally, with international markets dictating the financial value of what NOCs produce and the international community influencing commitments to climate change mitigation. It has been outside the scope of this study to appraise the future value of these NOCs' assets and their stranding risks, but it is necessary to scrutinize the resilience of these portfolios and strategies to industrial and policy transformations and mitigation of assets' stranding risk.

About the Consultants



Dr Valérie Marcel

Dr Valérie Marcel is an Associate Fellow at Chatham House and project lead for the New Producers Group, a South-South knowledge-sharing network of 31 emerging oil and gas producer countries. She is an established expert on national oil companies and petroleum-sector governance. She is the author of *Oil Titans: National Oil Companies in the Middle East* (Chatham House/Brookings, 2006), a ground-breaking book on NOCs that was based on 120 interviews inside the largest NOCs of the world, and a number of publications on emerging national oil companies. She has advised NOCs around the world and sits on the Governing Board of the Renewable Energy and Energy Efficiency Partnership (REEEP) and the advisory boards of the Colorado School of Mines Payne Institute and the Lebanese Oil and Gas Initiative. She previously led energy research at Chatham House and taught international relations at the Institut d'études politiques (Sciences Po), Paris, and at Cairo University.



Don Painter

Don Painter is EMEA Regional Director for Hartree Partners Consulting. He leads the firm's Operations Center of Excellence and is a well-established international expert on Operations Performance and Capability Assessment, and Operations Management Systems in the energy sector. He's led methodology, intellectual property and practice development in these areas for major consulting firms, including Accenture and McKinsey, and architected, designed and implemented major operations transformation programs and operations management systems for more than 20 of the world's leading IOCs and NOCs. His unique breadth and depth of energy sector, strategy, and operations expertise comes from an international career spanning more than 37 years, including 17 years as an industry insider with ExxonMobil and Schlumberger.



Patrick Heller

Patrick Heller is an advisor at the Natural Resource Governance Institute and a senior visiting fellow at the Center on Law, Energy and Environment (CLEE) at the University of California – Berkeley.

He has worked on legal reform and governance initiatives in the developing world for more than 15 years for organizations including USAID, the U.S. State Department, the Asian Development Bank, Creative Associates International and The International Center for Transitional Justice. Patrick's work on the governance of state-owned oil and mining companies includes publications with Cambridge University Press, Oxford University Press and UNU-WIDER. He is the principal designer of a database of operational, financial and performance data on more than 70 National Oil Companies across the world. Patrick has facilitated courses on oil, gas and mining legal frameworks with partner institutions across the world.



Shiva Dhingra

Shiva Dhingra is an Engagement and Practice Development Manager with Hartree Partners, focusing on operations transformation, energy transition strategy and internal controls. Shiva has close to

10 years consulting experience, executing and managing advisory projects across strategy, operational excellence, risk and controls, and governance in the energy sector. He has had the opportunity to work across the value chain with a variety of IOCs, NOCs and power and utilities providers.

APPENDIX

Appendix I – Company activities in the energy sector (except upstream)

Logistics, oil field services, research & development

The emerging NOCs in this study have limited activities in supplying services or logistics to operators. NOCK currently has a geochemical and geophysics laboratory (in a partnership with Weatherford) which provides services for the downstream and upstream. It also has a seismic processing, though this is not a commercial venture.

GNPC sees research as having a major role in the development of operator capabilities and has begun the construction of a data management and research centre (costing an estimated \$30mn). This centre will include a lab with facilities for geochemical and geophysical testing.

Sonatrach offers a significantly more extensive range of services. It has affiliates offering construction, engineering and maintenance services, drilling, air and shipping transport, trading, training, as well as desalination and fertilizer plants (Annual Report 2017). Sonatrach launched an innovation centre in 2018 which will be the home for its digitization development and the processing and analytics of well data.

Midstream

Activities in midstream and storage are naturally limited for the emerging NOCs of the study, since production volumes do not justify significant investments. However, NAMCOR and National Oil have some storage facilities which are necessary for security of supply. Ghana has state owned enterprises already active in the midstream and GNPC engages in midstream (and downstream) activities only to the extent they are needed to relieve bottlenecks for the upstream. This justified its investment with ENI in the WAPCo western interconnection and gas management project to provide an outlet for the gas produced in the Western enclave.

Sonatrach has the monopoly of Algeria's midstream. And indeed, the company was first created through the nationalisation of pipelines. Sonatrach has an extensive network of 21,000 km of pipelines for natural gas, condensates, crude and products running through Algeria and for export. It has installed fibre optic through 14,000 km of its pipeline network, allowing the company to track and measure operational performance. It has 84 pumping stations, 320 turning machines, 3 ports with 5 single point moorings for VLCCs, and employs 13,000 people (of which approximately half are security). It also has a 21% stake in the Camisa pipeline in Peru, which runs through the Amazon forest.

Marketing/trading and retail

Import and marketing of petroleum products has historically been an important aspect of NOC mandates in Africa. This role was formalised in several African countries, with NOCs given import mandates by governments, in order to ensure reliable supply and contain product prices. These mandates gave them the right to import a share of the country's gasoline imports (usually 25–50 per cent), which they could sell to domestic retailers for a commission. But NAMCOR and NOCK both lost their mandates - NOCK as a result of deregulation and NAMCOR lost it in 2010 as a result of an unfavourable import agreement with Glencore, which required the government to bail out the company. The company explained it had taken the necessary measures to avoid associated risks and is in discussions with government to retrieve its mandate.

Even without the mandate, NOCK and NAMCOR continue to source products and sell them to domestic consumers. In Kenya, NOCK competes with other marketers to win the right to import products and crude oil through the Open Tender System. Sales of petroleum products are a major part of these companies' revenues, amounting to 74% of NAMCOR's revenues (86% of total income with the fuel levy) and 100% of NOCK's in 2017. Most of that revenue in Kenya is generated from its retail stations. NOCK has a 5% stake of the national retail market. It currently has 153 service stations - half of which are franchises. NAMCOR is just entering the fuel retail market. According to company reports, 44% of its capital expenditure budget for 2018 was earmarked for the retail roll out (\$4.6mn). It has acquired land in densely populated areas and in the East of the country from where NAMCOR can access land-locked markets.

GNPC is not present in retail, except for sales of heavy fuel oil (HFO) to the 225-megawatt power barge, Karpowership. GNPC is more active in marketing. As the national gas aggregator GNPC markets the associated gas from Ghana's oil fields and the non-associated gas from the ENI field to the Volta River Authority (VRA) and Ghana Gas Company for electricity generation. GNPC also markets Ghana's share of crude oil and sells on spot.

Sonatrach markets Algeria's share of liquids produced. It sells on spot and term contracts. But the company wants to develop trading capabilities and is partnering with an oil trading company to trade a share of its production. Initially (2020) 10% of Sonatrach volumes will be traded through the JV, growing over time to a greater share.

Downstream

Sonatrach has 5 refineries in Algeria and purchased ExxonMobil's Augusta refinery in Italy for \$700 million in 2018. One of the Algerian refineries is designed for condensates, another is a complex refinery (as is the Augusta refinery). Sonatrach has two petrochemical units in Algeria, of which one produces ethanol. But the company considers its new joint venture with Total to build a new complex petrochemical plant as Sonatrach's first real foray into petrochemicals.

New energies and energy efficiency

LPG is seen by several NOCs and their governments as an important source of cleaner energy for domestic users and NAMCOR, NOCK and Sonatrach are all encouraged to meet this demand. The Kenyan government is subsidizing LPG and mandated NOCK to distribute the cylinders. To increase its ability to import LPG, NOCK wants to partner with the Kenya Pipeline Company (KPC) to build an LPG supply platform.

Sonatrach is the only NOC in this group which is actively investing in renewable energy. Sonatrach's current spend on solar represents 2% of total investment in 2019 (up from 1% in 2018), which is on par with international oil companies currently. The company has conducted the feasibility study with foreign oil companies for the solarization of its industrial sites generating 1.3 GW from solar and together with partners are in the process of defining KPIs.

APPENDIX 2 - Detailed Company Operational Benchmarking Reports NATIONAL OIL CORPORATION OF KENYA (NOCK) NOC REPORT Segment – Upstream

Function	Activity	Illustrative best practices	OPAC rating					Current capability
			1	2	3	4	5	
Exploration	Exploration Planning	<p>Formalized Exploratory Drilling Programme with continuous improvement</p> <p>Formalized Exploratory Seismic Acquisition Programme with continuous improvement</p>						<p>Interviews, data and exhibits provided indicated or substantiated that leadership is aware of industry practices and is currently allocating adequate resources for the following:</p> <p>Initiatives to conduct exploration resource and risk assessment studies</p> <p>Initiatives to conduct multi-client surveys and improving development project planning and execution, however, key milestones missed, no indications or evidence of programmatic management of multi-client survey or risk assessment initiatives</p>
Exploration	Field Development Planning	<p>Formalized front-end-loaded strategies and standards for application of key field development technologies</p> <p>Advanced reservoir data aggregation, integration, and visualization technologies, “shared earth models”, etc., for reservoir visualization, 3D and 4D performance simulations, hazard and target identification, etc.</p> <p>Drilling, completion and stimulation technologies used to enhance reservoir contact, well productivity and ultimate recovery.</p> <p>Lift and flow assurance technologies to ensure high well deliverability</p>						<p>Interviews, data and exhibits provided indicated or substantiated that leadership is aware of the industry practices and is committed to the implementation of the following:</p> <p>On-going training on Field Development Plan for Field engineers and other relevant technical stakeholders in partnership with 3rd party company</p> <p>No evidence was provided to indicate the existence of the following:</p> <p>Formalized field development planning, standards and procedures or enabling technologies</p> <p>Advanced analytics used to optimize the Field Development Plan</p> <p>Formalized front-end-loaded strategies and standards for application of key field development technologies</p>

Function	Activity	Illustrative best practices	OPAC rating					Current capability
			1	2	3	4	5	
		<ul style="list-style-type: none"> Implementation of digital oilfield technologies to optimize surface and subsurface assets and enhance production Full-lifecycle EOR strategies and plans, including infrastructure provisions Formalized field development planning standards and procedures Advanced analytics used to optimize the Field Development Plan 	5	5	5	5	5	Drilling, completion and stimulation technologies used to enhance reservoir contact, well productivity and ultimate recovery
Technology Management	Upstream Technology Strategy	<ul style="list-style-type: none"> Systematic, regular upstream data and technology scans and benchmarking Standardized design specs and designs for wells, rigs, downhole technologies, oilfield equipment and facilities Coordinated, integrated and optimized well design, rig, oilfield and facilities technology R&D strategy and plan 	5	5	5	5	5	<p><i>Interviews, data and exhibits provided indicated or substantiated that leadership is aware of the industry practices and is committed to the implementation of the following:</i></p> <ul style="list-style-type: none"> Initiatives to implement system for storing and processing oil and gas exploration data No evidence was provided to indicate the existence of the following: Systemic data and technology scans and benchmarking Standardized design specs for wells, rigs or other equipment or facilities technologies

Segment – Retail

Function	Activity	Illustrative best practices	OPAC rating					Current capability
			1	2	3	4	5	
Marketing and Retail Strategy and Planning	Market Research and Management	<ul style="list-style-type: none"> Detailed site-level and regional demographics analysis Competitor market intelligence and analysis Distributed, mobile, retail market data acquisition Formalized brand development and growth strategy Formalized brand management standards Franchisee recruiting and retention programs Franchise Programme standards Franchise training program Franchise standards compliance program Franchisee survey and feedback system 	5	5	5	5	5	<p>Interviews, data and exhibits provided indicated or substantiated that leadership is aware of the industry practices and is committed to the implementation of the following:</p> <ul style="list-style-type: none"> Competitor performance measurement No evidence was provided to indicate the existence of the following: Detailed site-level and regional demographics analysis Distributed, mobile, retail market data acquisition Interviews, data and exhibits provided indicated or substantiated that leadership is aware of industry practices and is currently allocating adequate resources for the following: Formalized brand management standards and brand development and growth strategy in-place, but no indications or evidence of programmatic management of brand development strategy Initiatives aimed at service delivery enhancement - key milestones missed, no indications of programmatic management of service delivery enhancement Interviews and documents provided do not confirm the implementation of best practices for this activity. Interviews, data and exhibits provided indicated or substantiated that leadership is aware of industry practices and is currently allocating adequate resources for the following: Initiatives around standardized retail site design No evidence was provided to indicate the existence of the following:
Marketing and Retail Strategy and Planning	Brand Development and Franchise Programme Operations	<ul style="list-style-type: none"> Standardised, lean based design program, with design standards document Engineering design focused on: <ul style="list-style-type: none"> Contextual compatibility & response Functional performance Functionality, efficiency, ergonomics, Safety, health, environmental, cost, schedule, quality, reliability, maintainability, and environmental performance Integration of design with supply chain Competitor proximity Traffic patterns 	5	5	5	5	5	
Marketing and Retail Strategy and Planning	Site Selection and Development		5	5	5	5	5	
Marketing and Retail Strategy and Planning	Value-added/ Ancillary Materials and Services Strategy and Planning		5	5	5	5	5	
Marketing and Retail Strategy and Planning	Market Intelligence		5	5	5	5	5	
Marketing and Retail Strategy and Planning	Point of Sale Technology and Systems		5	5	5	5	5	
Marketing and Retail Strategy and Planning	Operator Recruiting, Selection, Training, and Certification		5	5	5	5	5	
Marketing and Retail Strategy and Planning	Site Security		5	5	5	5	5	
Marketing and Retail Strategy and Planning	Site Security		5	5	5	5	5	
Marketing and Retail Strategy and Planning	Site Security		5	5	5	5	5	



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