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Oil and Gas in Eastern Africa: Current Developments and Future Perspectives

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Abstract

The position of oil companies toward East Africa has changed considerably since 2006 when the first reserves in Uganda came to light. However, for many investors interested in the region, it remains difficult to get a clear picture of the scale of developments of this sector. This paper will discuss the locations of reserves, their volumes, when they will be developed, what they will be used for, and possible impediments to their development. In addition to Uganda, Kenya, Tanzania and Mozambique, which already have ample hydrocarbon resources, it will be useful to address the future of certain countries such as Ethiopia, Somalia, Madagascar, and the Comoro Islands, which have largely underestimated potentials.

Contents

Introduction

East Africa began to emerge as a large-scale oil and gas-producing region in 2006, although less than ten years ago, few geologists believed in its potential. Invitations to tender and proposals for exploration zones or blocks[1] organized by ministers of the region's four principal countries (Uganda, Kenya, Tanzania and Mozambique), have very often failed. Since the first discoveries of crude oil and gas in Africa in 1957 and 1958 in Gabon, Nigeria, and Algeria, petrol companies have almost exclusively focused on the Maghreb and the states that comprise the Gulf of Guinea. Explorations in East Africa also started in the 1950s, but the discoveries in the 1970s by Chevron in Sudan (during the civil war), by Amoco and Agip in Tanzania, and by the now defunct Gulf Oil in Mozambique, were not deemed adequate to pursue development. There were two reasons for this. Firstly, the remote, isolated nature of deposits in Sudan, which were over 1000 kilometers from the nearest port (Port Sudan) and secondly, the discoveries in Mozambique and Tanzania were of gas, which requires development of infrastructure which, at the time, could not be justified given the near-total absence of a local or even regional market.

Oil executives' regard for East Africa has changed considerably since 2006, when the Ugandan discoveries were made. It is still difficult, however, for investors who are interested in the region to get a precise understanding of several issues such as the exact location of the reserves, their actual size, the date at which development can begin, and the impediments to any such development. In addition and as part of a forward-looking objective, it is important to investigate the prospect of discovering further resources in the region, as it may be that Uganda, Kenya, Tanzania, and Mozambique are just the first to join the club of producers, a club which could grow to include new members such as Madagascar, the Comoro Islands, and France, through its overseas department of Mayotte and Juan de Nova Island, which is part of the French Southern and Antarctic Islands (TAAF).

[1] This term is most often used to define the zone as determined by the coordinates within which oil companies carry out exploration or produce oil according to the host State's authorization. To avoid repetition, the synonyms 'license' or 'permit' will also be used.

This paper reviews the state of the oil and gas sectors country by country — Uganda, Kenya, Ethiopia, Tanzania, and Mozambique — systematically detailing the political and security issues inherent in each case. The paper also outlines the outcomes of their different projects and any possible collaboration. Finally, the paper looks into the prospects of future development in terms of exploration in the region. Even though Sudan and South Sudan are not central to this study, since Sudan has been producing oil since 1999, it cannot be sidelined completely, and is the subject of the first part of the paper, which highlights the current situation of these two countries, which have been separate since July 2011.

This project was made possible by numerous field studies in East Africa carried out since 2008, notably in Mozambique, Tanzania, Kenya and Uganda, where several hundred interviews were conducted with oil investors, ministers and civil servants within the hydrocarbon sectors of concerned states, members of parliament, lawyers, university professors, journalists, members of non-governmental organizations (NGOs) and, where possible, with people living close to exploration zones.

Oil and Gas in East Africa: Real Eldorado or Flash in the Pan?

Describing the situation of discoveries, reserves and actors in this vast zone in East Africa is an exercise demanding constant revisions and updating given the rapid acceleration of explorations following the first discoveries that were considered commercially profitable. The first onshore discoveries in Uganda in 2006 directed attention to neighboring Kenya and Ethiopia. Similarly, offshore discoveries in Mozambique saw an increase in oil companies' interest in offshore zones of Tanzania, the Comoro Islands, Kenya and South Africa. Oil companies tend to work by imitation; when one of them makes a discovery, the others follow suit, hoping to repeat the initial find on a nearby exploration block. The copycat system dictates that the more profitable explorations bring increased investment and even more exploration. The inverse is also true; if exploration wells are not abundant or are dry, and in a little-known region, it could condemn the zone for several years, with other oil companies believing that nothing will be found there, even if there have only been a few drills on areas covering several hundred thousand square kilometers. Taking risks in new or under-explored zones is now increasingly part of the culture of smaller companies, called junior companies, or medium-sized independent companies. These small and medium-sized companies cannot afford to continue exploring where many dry wells have been discovered and therefore opt out if oil is not found quickly, in order to follow up zones with more positive indications. The major oil companies usually start getting interested once a discovery has already been made.

The Specific and Already Old Case of Sudan

Before the deposits found recently in Uganda, East Africa was not without known oil resources. Sudan was the first country in which significant discoveries were made by Chevron[2] in 1978. At that time, several billion barrels were discovered by the American giant, but it

[2] Chevron Corporation, founded in 1879, is the second largest oil company in the United States, and the sixth largest in the world.

pulled out of the country, not only because of the zone's isolation, but more so because of the political instability in the country since the resurgence of the civil war in 1983. Oil companies can adapt to crisis situations, but only when the scale of the resource requires them to do so. With its isolated deposits, which on the whole were quite modest, and in a period when the global market was largely catered for, Sudan was "sacrificed" by Chevron quite shortly after a second civil war broke out. The impetus for a decision to be made was intensified by the death of three of Chevron's expatriate workers in 1984, when the company was developing oil deposits on a block[3]. After much procrastination, Chevron formally abandoned its assets in Sudan in 1992.

After a long period without significant investment, it was not until 1996 and the signing of a contract between Sudan, the Chinese company China National Petroleum Corp (CNPC), the Indian corporation Oil and Natural Gas Corp (ONGC) and the Malaysian company Petronas, for the oil deposits discovered by Chevron to start being developed again in 1999. Production on Sudanese blocks (1-2-4 and 3-7) peaked in the decade 2000-2010 at 470,000 barrels per day (b/d), making the country the sixth largest producer of African oil behind Nigeria, Angola, Algeria, Libya and Egypt.

Since July 2011 and South Sudan's independence, the situation has become highly complicated because all the exportation infrastructure is controlled by Khartoum whereas three quarters of production areas are located in the newly formed South Sudan. Nevertheless, the separation of the two entities has not changed the high level of mutual distrust between Khartoum and Juba. The situation brought a stop to production in the South for almost all of 2012 before an accord was signed which agreed on transit fees that South Sudan accepted henceforth to pay Khartoum for the use of the two oil export pipelines to Port Sudan. However, since December 2013, a new South-Sudanese civil war has broken out between the supporters of President Salva Kiir (Dinka ethnic group) and his former Vice-President who was dismissed, Riek Machar (Nuer). These two figures have rallied their respective peoples, creating a power struggle for control of the Sudan People's Liberation Movement (SPLM), the party that controls the state and its oil revenue. The decrease in production has been significant for a year now, with oil wells being directly targeted by belligerent groups. South Sudan's production is approximated currently, at the beginning of 2015, at less than 200,000 b/d and Sudan, being unaffected by the South's civil war, to be at 120,000 b/d.

[3] "The Chevron Period: 1974-92", *Human Rights Watch Report*, November 2003, <www.hrw.org/reports/2003/sudan1103/10.htm>.

Uganda, the "Trigger" for East African Exploration

Exploration in East Africa never really stopped after the 1950s, but the programs put in place by oil companies, including some of the biggest such as Conoco or Shell, quickly stopped when the price of oil became so low as to no longer justify costly campaigns in remote zones. The rise in oil prices since 2003, which peaked at 147 dollars per barrel in August 2008, followed by a period of relative stability up to the beginning of 2014, at a yearly average of around 100 dollars per barrel, facilitated the creation of smaller companies and increased the exploration budgets of existing companies in lesser known zones that had previously undergone little "radiograph" assessment. By 2004, Tullow Oil (British junior), Hardman Resources (Australian), and Heritage Oil (Canadian) obtained permits in eastern Uganda, on and around Lake Albert. The first discoveries were made only two years later during a drilling campaign that found four deposits. Following the discoveries in Uganda and Ghana, Tullow Oil bought Hardman Resources, which held blocks in Mauritania, French Guiana, the Falkland Islands, as well as in Uganda in 2007, bringing ample gains (1.1 billion dollars) for its shareholders. In 2010, Tullow Oil acquired Heritage Oil's assets in Uganda for 1.45 billion dollars. While continuing to explore on the three permits, which it controlled from then on at 100%, Tullow Oil (see map n° 1) signed an agreement in 2012 with oil giants Total and China National Offshore Oil Corp (CNOOC) handing over two thirds of the three permits for 2.9 billion dollars. The British company did not have the capital to pursue development in this important zone on its own. Each of the three oil companies now operates one block and owns 33.33% of the three permits.

Map n° 1: Oil Blocks in Uganda

Source: Tullow Oil Plc website: <www.tullowoil.com/index.asp?pageid=282>.

To date, around one hundred wells have been sunk with a success rate of 84% (which is very significant). They represent a total volume over the three blocks of 1.7 billion barrels, or roughly the equivalent of total deposits in Chad or the Democratic Republic of the Congo. The agreement in principle signed in February 2014 between the State of Uganda and the three operators (Tullow Oil, CNOOC and Total) for further development gave the green light for the possible construction of a 30,000 b/d refinery in the Hoima district in the west of the country, as well as an exportation pipeline towards Kenya. The first barrel should leave CNOOC's block (Kingfisher field) in around

2016 but plans for exportation, which is highly complex, will take longer (see: Petrol and Gas, How to Get it Out).

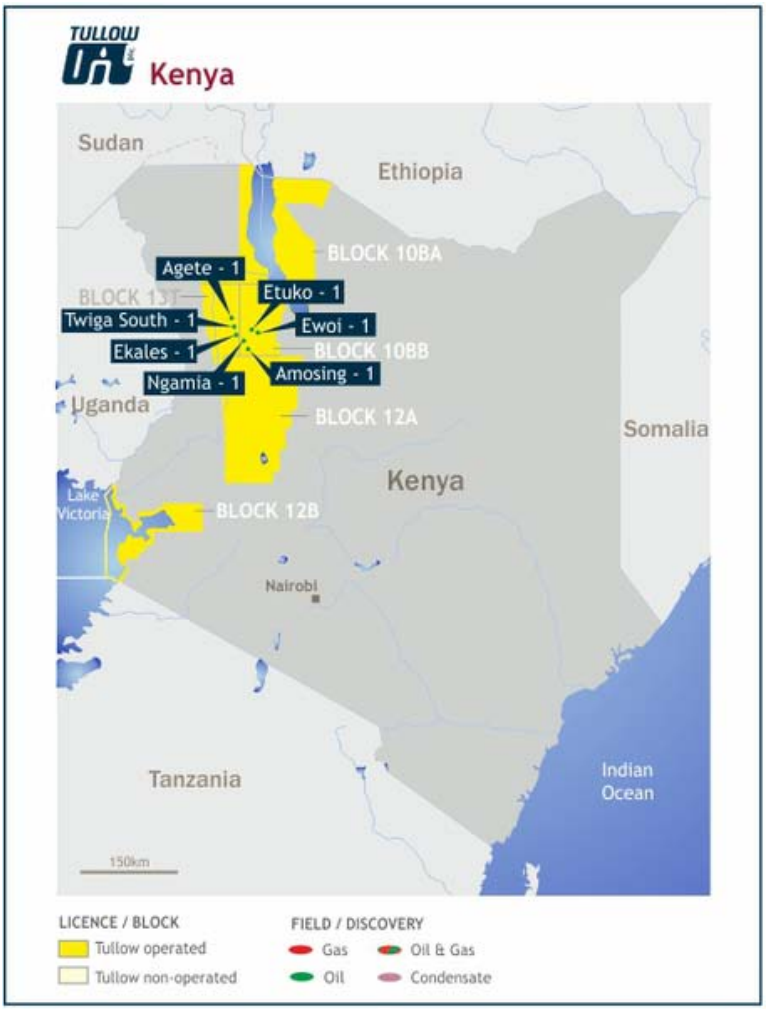
Kenya, Ethiopia and Somalia, Continuing Uganda's Success

The high number of discoveries made in Uganda from 2006 stirred up renewed interest in Kenya and Ethiopia. One of the last oil companies to believe in Kenya's potential was the Canadian company, Africa Oil Corp (Swedish group Lundin) which acquired several blocks around Lake Turkana (north-east Kenya) from the small local company Turkana Petroleum. Then, from 2010, Africa Oil Corp managed to start attracting larger companies like Tullow Oil. From 2012, the Africa Oil - Tullow Oil pair made eight discoveries (see map n° 2) and has already surpassed the minimum volume needed to consider production. Here they are looking at a deposit of 600 million barrels just in the Lokichar basin (around Turkana Lake). This is still distinctly less than in Uganda, but Kenya is still in the early stages of exploration. The zone in which the discovery was made has the particular feature of being extremely poor. Thus, the issue of the relationship between the oil companies and the local population will be difficult. Tullow Oil has already had to temporarily suspend its activities because the inhabitants of the area, rallied by local members of parliament[4], were demanding jobs and immediate benefits.

Other onshore permits have been awarded in Kenya, around the Somali border (Mandera and Anza basins) where important junior explorers are working, such as Afren and Taipan (where one of Heritage Oil's geologists is leading the exploration team), as well as offshore permits (Total acquired five permits). However, no discovery has yet been made.

[4] Interviews conducted in Nairobi with Kenyan politicians and oil companies, April 2014.

Map n° 2: Tullow Oil's Permits in Kenya



Source: <www.tullowoil.com>.

Following the continuation of geological finds made in Kenya's Lokichar basin, Africa Oil and Tullow Oil have also taken up permits in southern Ethiopia, in the Omo region (see map n° 3).

Map n° 3: Tullow Oil's Permits in Ethiopia

Source: <www.tullowoil.com>.

So far, drilling in this zone has not revealed the presence of any hydrocarbon deposits. Other territories in Ethiopia, however, offer significant potential, especially in the western region of Ogaden, on the border with Somalia, where the Malaysian group Petronas has found gas, but still in quantities insufficient to consider export programs. The company pulled out the country in 2010, partly due to the incidents sparked by the Ogaden National Liberation Front (ONLF), a separatist movement that in 2007 killed sixty-five Chinese nationals who were carrying out seismic surveys[5] for Petronas[6].

[5] Seismic surveying generates an image of the different geological layers in order to determine which zones are most favorable for drilling. Such images are created by lorries that send waves underground, or with boats for maritime zones. The second stage consists of interpreting the data in order to decide on the next step in the exploration process.

[6] "Separatists on Warpath", *Africa Energy Intelligence*, January 14, 2009 or "Éthiopie: 74 morts dans l'attaque d'un site pétrolier, 7 Chinois enlevés", *Agence France Presse*, April 24, 2007.

Although Shell, Conoco and Marathon stopped oil exploration in Somalia in the 1990s, following Siad Barre's fall from power, the two autonomous territories of Puntland and Somaliland have, since the 2000s, been the focus of intense exploration activity due to their relative stability. Extensive seismic surveying has been carried out in Somaliland thanks, notably, to Ophir Energy (founded by Tokyo Sexwale, a South African politician and ANC heavyweight), Genel Energy (directed by the former CEO of BP, Tony Hayward), the emirate Ras al-Khaimah's Rak Gas, and DNO (a Norwegian junior company), and drilling could start in 2015. In Puntland, two dry drills (no presence of hydrocarbons) were carried out in 2012 by Africa Oil. Since Hassan Sheikh Mohamud came to power in Somalia, as elected by Parliament in 2012, the major oil companies who had frozen activity in their exploration zones for twenty years, have started to negotiate conditions for resuming work. For now, no agreements have been signed, but the situation could start to move forward in 2015, given that Somalia's offshore prospects are far from negligible. Discoveries in Yemen, a significant oil and gas producer, and with similar geology, have attracted a lot of attention from investors such as Total.

Many oil company executives, with whom interviews were conducted, believe that Somalia's new leader has, over the last two years and in contrast to his predecessors, demonstrated credible governance, a development which changes their position and allows them to consider more active involvement in the coming months. He has notably, with the help of the UN and the Ethiopian and Kenyan armies, managed to considerably weaken the Al-Shabaab Islamist group, even though there is still much to be done[7].

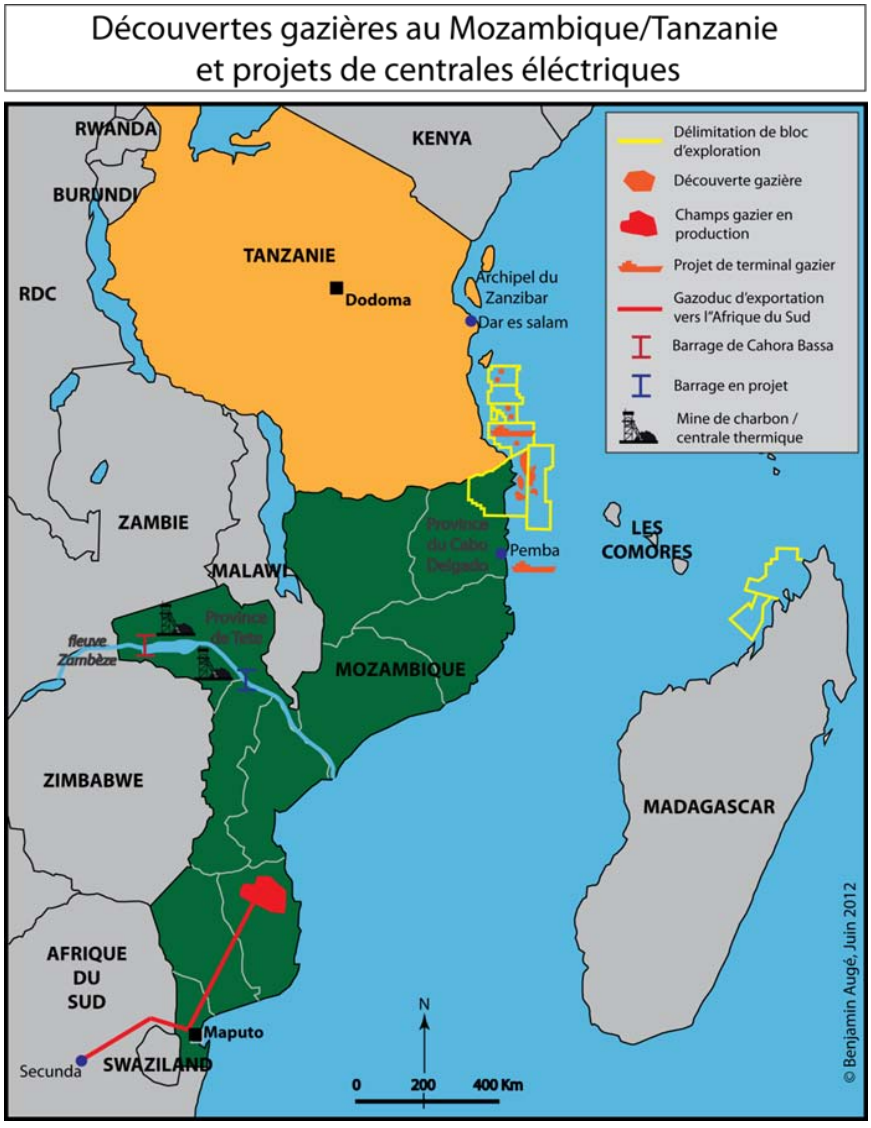
Tanzania and Mozambique, Two Future Gas Giants

Apart from in Ethiopia's western region of Ogaden, it is principally oil that has been discovered in Uganda and Kenya. Only a few volumes of gas, known as "associated gas" in oil deposits have been found and will be used in these two countries to produce electricity. In Tanzania and Mozambique, it is the opposite: nearly all of the reserves found are made up of gas. The presence of gas has been known in these two countries since the 1970s: they are the Songo Songo reserve in Tanzania and the Temane and Pande reserves in Mozambique. However, at the time, oil companies only wanted oil. It was not until 2004 that both countries started to develop their existing

[7] A. Bruzzone, "Somalie, la renaissance manquée", *Politique africaine*, n° 132, 4/2013, p. 161-174.

gas deposits. In Tanzania's case, they are used to produce electricity for the economic capital Dar es Salaam; in Mozambique, the gas goes to the Sasol coal liquefaction[8] plant in Secunda in South Africa (see map n° 4).

Map n° 4: Exploration Blocks and Gas Discoveries in Tanzania and Mozambique.



Source: B. Augé, *Produire du pétrole en zone de conflit*, Doctoral Thesis, Université Paris-8, 2012.

[8] The *Coal to liquid* process, is better known by the name Fischer-Tropsch who were the German inventors who developed it during the Second World War.

A new era began around the middle of the 2000s for both countries with the arrival of major oil companies that had obtained offshore blocks (in northern Mozambique and southern Tanzania). The independent American company Anadarko (the biggest foreign producer of crude oil in Algeria and an important player in the Gulf of Mexico) acquired block 1 in 2007 in Mozambique's Rovuma basin while the major Italian company ENI obtained block 4 located to the east of block 1 (see map n° 4, yellow blocks in the far north of Mozambique's offshore territory). At the same time, other companies acquired other exploration licenses further to the south: this was the case for Petronas on blocks 3 and 6 and Artumas and Statoil on blocks 2 and 5. By 2014, none of the four licenses had revealed exploitable quantities of hydrocarbons. Indeed, Statoil chose to quit operations and return its zone to the state.

In contrast, on Anadarko and ENI's blocks, discoveries to the order of 140 to 180 trillion cubic feet (tcf[9]) were brought to light. This volume is equivalent to Nigeria's entire current reserve, Nigeria being home to the greatest reserves in the African continent. If these figures remain the same, not all of the 180 tcf will be extractable, but around 60 to 70% will be, which is equivalent to 100 tcf, a considerable volume in itself.

In Tanzania, a call to tender was organized at almost the same time as in Mozambique in 2005, resulting in two companies being awarded the most interesting blocks: the South African junior company, Ophir (block 1) and the Norwegian major, Statoil (block 2). Ophir later entered into direct negotiations with the government and was granted blocks 3 and 4 (all blocks are in yellow on map n° 4 above). After several 2D (two dimensional) and 3D (three dimensional) seismic surveys were made, numerous drills were carried out from 2010 on blocks 1,2,3 and 4 with some 40 trillion cubic feet being found. After these first discoveries, other companies with more means started investing in permits. This was the case for BG (ex British Gas), which started operating blocks 1,3 and 4 from 2010, relegating Ophir to the role of secondary partner. Similarly, Exxon took up a 35% shareholding of Statoil's block 2 in 2010, but left the Norwegians to operate the block.

[9] Unit of measurement in the oil sector, a trillion is equivalent to one thousand million. "Tcf" stands for trillion cubic feet.

Oil and Gas, Getting it Out

Ugandan and Kenyan Oil

Uganda, Kenya and South Sudan's oil reserves are isolated and far from the coast, yet a way to sell it outside of their local regions has to be found. The local oil market is quite limited: Uganda's consumption is estimated at 30,000 b/d, Kenya's at 80,000 b/d and South Sudan's at 13,500 b/d[10]. There are no longer any refineries in the region since the closure of the Mombasa refinery in 2014 and its temporary transformation into a fuel depot (that comes principally from India and the Persian Gulf region). The departure of the Indian company Essar, which controlled 50% of the plant, at the end of 2014, will probably mean the definitive closure of the plant, apart from in the unlikely event of other foreign investors getting involved. The question now is whether there is a regional market that could lead to consider the construction of a refinery in East Africa, with the knowledge that crude oil will be extracted in a few years. If only costs are considered, the response is not necessarily an obvious one. Crude oil from Saudi Arabia and Kuwait, refined in India in enormous structures such as the Reliance plants in Jamnagar (1.24 million barrels per day) could still be very competitive compared with that from local refineries, even by the time it reaches the East African coast at the ports of Mombasa or Dar es Salaam. Yet, for landlocked countries like Uganda, which is often subject to stoppages in supply due to transportation issues over thousands of kilometers of road, the idea of a local refinery could make economic and even political sense. Ugandan President Yoweri Museveni quickly positioned himself in favor of investing in a refinery in the country after the discoveries of 2006, in order to make Uganda self-sufficient in petrol and other oil-based products. The President is highly aware that frequent holdups in supply can have serious consequences (taxi driver protests, suspension of factory work, a decrease in petrol or diesel-based electricity production). In February 2014 three oil companies (Tullow Oil, Total and CNOOC), signed an agreement in principle to supply a refinery (with an initial capacity of

[10] Extrapolation of figures given by the *CIA Factbook*, <www.cia.gov/library/publications/the-world-factbook/geos/ke.html>. For comparison, a country such as France uses 1.7 million b/d and the United States 19 millions b/d according to the *BP Statiscial Review of World Energy*, 2014.

30,000 b/d with the ability to increase to 60,000 b/d), which will be built near the town of Hoima in the Kabale district, close to Lake Albert and its deposits. The process of selecting the company to build the factory is underway, and a provisional date of 2017-2018 has been put forward for operations to begin. Uganda will then be in a position to provide for its national energy demands, the first step in its oil development.

The refinery will only use part of what is expected to be generated on the three permits. It is currently estimated that producing between 200,000 and 250,000 b/d will be possible at a steady level when it reaches its maximum volume. This volume will only be possible after several years of production. Uganda will therefore have to find a way of exporting its crude oil via a pipeline. Since the first three discoveries, three options have been researched by the oil companies: Dar es Salaam in Tanzania, and Mombasa and Lamu in Kenya. However, the success of exploration in the Turkana region in Kenya (which should be able to produce 100,000 to 150,000 b/d) has changed the playing field. The construction of a single pipeline to transport Ugandan and Kenyan crude oil now makes more sense, and sidelines the Tanzania solution.

The Ugandan and Kenyan governments (in partnership with Rwanda) launched a call for expressions of interest in August 2014 to recruit a consultant to carry out feasibility and engineering studies for a project that would start in the Hoima district in Uganda, pass through Lokichar where Kenya's crude is located, and join up with the Kenyan coast at Lamu where a deep water port would be constructed[11]. For the time being Mombasa is therefore out of the discussion, with Lamu being chosen partly with the aspect of land planning in mind. Oil companies are anxious about this decision because attacks and kidnappings in this touristic area of Kenya have been on the rise since the death of the French national Marie Dedieu[12], kidnapped on September 30, 2011 by a division of the Al-Shabaab Islamist movement. In July 2014, 48 people were killed in the town of Mpeketoni, near the island of Lamu. In retaliation for Kenya's military activities in Somalia, militants directly targeted police stations, as symbols of the state[13]. Repression of the Somali community and of Muslims in general can lead to violence since

[11] "Crude to be exported via Lamu", *Africa Energy Intelligence*, n° 726, July 2014.
[12] "Marie Dedieu, la Française otage en Somalie, est morte en captivité", *Le Monde*, October 21, 2011.
[13] "'Islamists' Attack Kenyan Town near Lamu Killing 48", *BBC News Africa*, June 16, 2014, <www.bbc.com/news/world-africa-27865677>.

some Somalis who are arrested, who have no prior link to Al-Shabab, are driven to join their ranks in order to get revenge[14].

The political and security context in this region have brought some private criticism to the choice of Lamu as the port of export from oil companies present in Uganda and Kenya. With the security problems in Somalia looking to be far from under control, it will be extremely difficult to protect a project in the Lamu region. Further, according to the proposition made by the Kenyan and Ugandan Ministers for Energy, several zones through which the pipeline would pass, are far from secure. This is the case in Karamoja in Uganda (a region to the east, on the Kenyan border, and whose regional minister is Janet Museveni, the wife of the President) as well as Turkana County in Kenya. There are regular skirmishes in these two poor regions amongst armed farmers. They are sometimes extremely violent, and have led to high human casualties (between the Turkana and Pokot tribes, for example[15]). In order to get the attention of national authorities that have always marginalized these remote regions, far from the big urban centers, and in order to channel some revenue and infrastructure, there's nothing to stop the inhabitants of these areas (with a strong sense of self-identity like the Turkana people) from blowing up a pipeline running several hundred kilometers. Choosing the port of Mombasa would certainly have avoided the problems inherent at Lamu, but would not constant revisions and updating have avoided Karamoja and Turkana's geopolitical issues. Lamu may be risky, but it could be profitable for businessmen of the Kikuyu ethnic majority, which is the group that the current President Uhuru Kenyatta, his predecessor Mwai Kibaki, as well as the country's first Prime Minister, Jomo Kenyatta, come from. Since Kenya's independence in 1964, the Kikuyu have bought up large swathes of land in this region to develop tourism and agriculture, although they have not historically been present here[16]. This has led to clashes with "locals". Investment in Lamu for the construction of the port and the export pipeline could aggravate these existing tensions[17]. Political opposition to the current government is

[14] A. Botha, "Radicalisation in Kenya, Recruitment to al-Shabaab and the Mombasa Republican Council", Institute for Security Studies, *ISS Paper*, n° 265, <www.issafrica.org/uploads/Paper265.pdf>.
[15] "Kenya: Conflict Management between Turkana and Pokot Populations in Northern Kenya", *ACTED*, <www.acted.org/en/kenya-conflict-management-between-turkana-and-pokot-populations-northern-kenya>.
[16] G. Prunier, "Au Kenya, les habitants de la côte exclus du banquet démocratique", *Le Monde diplomatique*, October 2014.
[17] "What TJRC Report Said about Lamu Land Grabbing and Violence", *Kenya Today*, July 31, 2014, <www.kenya-today.com/news/tjrc-report-said-lamu-land-grabbing-violence>.

led notably by ex-Prime Minister Raila Odinga, who regularly raises the issue of land ownership to explain ethnic tensions in the region[18].

In this particularly tense security context, it is difficult to predict when oil exportation from Uganda and Kenya will start. The construction of a pipeline could take up to 24 months after a contractor is selected, and the issue of population displacement, as in Karamoja or Turkana, will not be a simple one.

The Long and Complex Process of Developing Tanzania's and Mozambique's Gas

Reserves in Tanzania and Mozambique are not on the same scale (one has 40 trillion cubic feet and the other, 180 trillion according to government figures and 140 trillion if you go by company estimates), but both have to find a balance between local consumption (gas-powered electricity centers, chemical plants producing fertilizer, etc.) and, since the local and regional markets are too small, exporting the greater proportion of its gas. No decision has been made by either government as to the share of gas that should stay within the country. There is still a way to go: in Tanzania, companies will make decisions about investment in 2016 and 2017 and from 2015 in Mozambique, with projects at this stage still vague[19].

Although oil companies (whose objective is to sell as much as possible on the more lucrative international market) will have to get involved in many local projects, the volumes for export will be enormous. Within a decade in Mozambique alone, production will potentially be at 50 million tons of liquefied gas, or 12 liquefaction trains, enabling the transformation of gas into liquid gas for transportation. This would make the country one of the biggest producers of liquid gas in the world, with the market's world leader, Qatar, selling around 77 million tons per year on the market over recent years. In Tanzania, projects are more modest, with a current objective of two or three liquefaction trains or 10.4 to 15.6 million tons per year.

Tanzania and Mozambique do not pose the same security issues as Uganda and Kenya, with territories of local populations

[18] B. Otieno, "Land Grabs behind Lamu Violence Says Raila", *The Star*, July 16, 2014, <www.the-star.co.ke/news/article-177270/land-grabs-behind-lamu-violence-says-raila>.
[19] B. Augé, "Gas in Mozambique, a High-risk economic Evolution", *Note de l'Ifri*, April 2014, <www.ifri.org/fr/publications/enotes/notes-de-lifri/gaz-mozambique-une-evolution-economique-risque>.

being affected by oil exploitation or transportation (they have many of their own issues besides, such as the scarce supply of skilled labor). They will have to confront the need to secure big clients to justify colossal investment sums (50 billion dollars in Mozambique, and at least 20 billion dollars in Tanzania).

The advantage of Mozambique is that as the two operators ENI and Anadarko have made new discoveries, they have brought in new shareholders on their licenses that are particularly interesting from a strategic point of view. Anadarko has sold shares to Thailand's PTT Exploration and Production, to Japan's Mitsui, and to India's Bharat Petroresources, Oil India Limited and ONGC. ENI has sold off shares to the Chinese company CNPC, the Korean group Korea Gas Corporation (KOGAS) and the Portuguese company GALP Energia. Note that Thailand's national company, as well as the Japanese, Korean, and Indian companies, are going to be the future buyers of Mozambique's gas. They are therefore going to be directly involved in indispensable resource development for their economies, which are currently largely dependent (China, India, Thailand) or almost entirely dependent (Japan, Korea) on imported energy.

Tanzania's project similarly received investment in 2013 from Singapore's Pavilion Energy, which bought up 20% of Ophir's BG-operated blocks. It is still principally major western companies that are the most active here since reserves are less abundant and uncertainty is higher. It is very likely that as the final investment decision (FID) draws nearer and in light of the political clarification the October 2015[20] presidential elections will bring, that new Asian investors will position themselves for involvement on the four largest blocks.

Political uncertainty in Mozambique is less of an issue as the President has been known since the beginning of 2014. He was chosen as leader of the party in power since independence, Frelimo, and was elected on the October, 15 2014. Given the party's strength and the relative weakness of the two main opposition parties, Renamo and the Democratic Movement of Mozambique (MDM), it is very likely that the new President, Filipe Nyusi, will remain in power for ten years, sufficient time for oil investors to develop their projects without fear of their contracts being challenged. Tanzania is much more complicated to "read" politically since it is difficult for the President to name his successor and the various decision making mechanisms within the Chama cha Mapinduza (CCM) are not easy to control. The favorites are sometimes excluded from running in order to facilitate the rise of a candidate who does not upset any camp.

[20] The incumbent party Chama cha Mapinduzi (CCM)'s presidential candidate is currently impossible to identify due to multiple conflicting currents within the party.

East Africa's Oil and Gas Sectors – A Difficult Forecast

Aside from the four countries mentioned specifically (Uganda, Kenya, Tanzania and Mozambique), as well as South Sudan, Ethiopia and Somalia, which we also touched upon, oil and gas exploration in East Africa appears to be boundless. Discoveries in Mozambique and Tanzania have brought about a considerable increase in interest in the offshore zones of the Comoro Islands, which remains largely under-explored. The first exploration permits were awarded on March 17, 2014 to junior groups, Safari Petroleum and Western Energy Production as well as to Bahari Resources Limited and Discover Exploration[21], all of which will be working close to ENI's permit 4 in Mozambique[22]. Seismic surveys are currently underway to identify the best drilling sites. However, since the seabed is very deep (between 2000 and 3000 meters), these junior groups will not be able to carry out drilling without the support of major companies. It will be incumbent upon these junior companies to prove that the Comoro Islands' geological environment is favorable to gas and oil deposits. We are still a long way off the first drills which, depending on the seismic surveys, could take place in three or four years and consequently longer still for further development. However, Mozambique has added to the attractiveness of the Comoro Islands' offshore zone, possibly making it one of the most interesting in East Africa.

A little farther south in Madagascar, a lot of time was lost following the departure of former President Marc Ravalomanana, which was the start of a long, politically difficult transitional period from 2009 to January 2014 during which time an un-elected President Andry Rajoelina led the country[23]. However, Madagascar has attracted new investors since Hery Rajaonarimampianina's election in the beginning of 2014. Undoubtedly the most favorable zone is in the north of the large island (see map n° 4) where Exxon has several blocks, notably Majunga where the sinking of a well that was initially planned for 2009 has now been rescheduled for 2015. The major American company has an ambitious project for Madagascar: one well alone costs around 160 million dollars, and Exxon could be

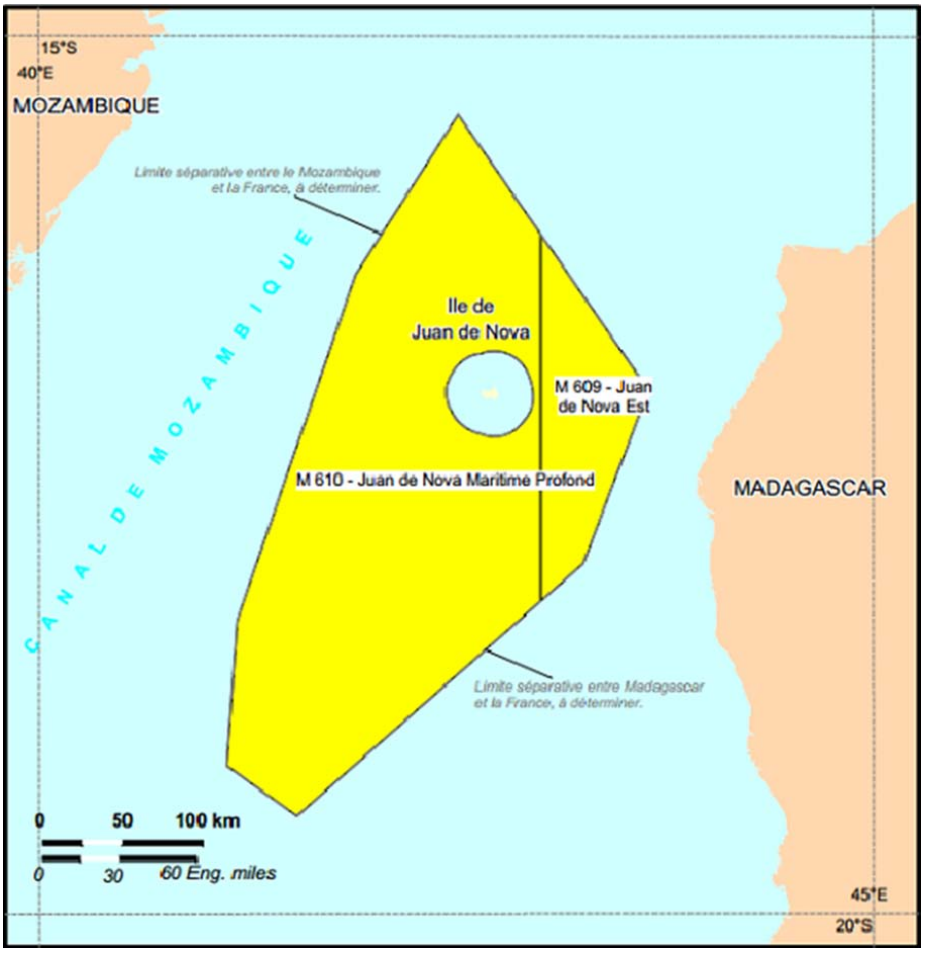
[21] Discover Exploration owned by ex-Shell executive, Michael Blaha, who with his former company Cove Energy owns 8.5% of block 1 in Mozambique, where almost 70 trillion cubic feet have been discovered. He sold to PTTEP in 2012, as detailed in this paper.

[22] "Bahari and Safari in breakthrough", *Africa Energy Intelligence,* n° 719, March 25, 2014.

[23] M. Pellerin, "Madagascar, gérer l'héritage de la transition", *Note de l'Ifri,* November 2014, <www.ifri.org/fr/publications/enotes/notes-de-lifri/madagascar-gerer-lheritage-de-transition>.

drilling several. Aside from the island's offshore areas in the north-west, there are good on-land prospects for heavy oil (higher density), as demonstrated by the Tsimiroro deposit operated by Madagascar Oil. Of a reserve totaling 1.7 billion barrels, some 20% could be extracted to provide fuel for the country's electricity plants; it could even provide petrol for the region if a refinery is built (a project that is currently highly unlikely). Tests are now being carried out and a development program was submitted in the beginning of November 2014. However, the heavy oil will be costly and difficult to extract due to the isolation of the deposit, which has no road access. If the price of oil falls below 80 dollars a barrel (in November it hardly reached 70 dollars), the Tsimiroro project would be likely to be abandoned. Total, which held the Bemolanga heavy oil permit near Tsimiroro, abandoned the project in order to pursue deep exploration on the same zone. The other interesting zone under Madagascan control is in the Mozambique Channel farther to the south of the island, in the Morondava offshore basin, shared by the French island of Juan de Nova. Several years ago Madagascar and France were already awarding several blocks for exploration. The Nigerian company Sapetro operates both the Belo Profond (Madagascar) permit and Juan de Nova Maritime Profond (France) permit, (see map° 5) where it has carried out an extensive 3D seismic survey. Drilling could start towards 2016 if the results of the seismic data attract larger companies, given the necessary capital for this type of costly work. We are still far from any kind of exploitation in this zone, but oil companies' interest in this area is on the rise.

Map n° 5: Oil Exploration Blocks on Juan de Nova



Source: France's Ministry for Ecology, Sustainable Development and Energy

Conclusion

This study has demonstrated the highly varied nature of East African countries in terms of hydrocarbons. For some there is near absolute certainty that they will produce oil or gas (Uganda, Kenya, Tanzania and Mozambique). The real question is when the first barrels of oil and cubic meters of gas will reach the market. The issue of timing is key to the hydrocarbon industry yet it is difficult to reliably predict anything in these cases given the complexity of the projects (isolation, politicization, management of local issues) and their high costs, which is why ranges have been given in this paper. Other countries have proven resources, but still probably in volumes that are insufficient to guarantee large-scale development (Ethiopia and Madagascar). Finally, certain countries are still in a state of uncertainty (Comoro Islands and France). The majority of these East African countries are still totally under-explored. This paper addresses only explorations that are currently underway, yet there is a very high number of basins still to undergo radiographic testing, and we are still only in the early stages of efforts to discover these zones' prospects. Hardly a few hundred wells have been drilled (compared with 15,000 in West Africa and the Maghreb) over millions of square kilometers of sedimentary basins.

The question of governance of this sector has only been briefly touched upon. Each country has its own very particular political regime. There is no consistency in their histories, even though some of them, such as Uganda, Kenya and Tanzania, came under the same colonial power of Great Britain. The political cultures in Kenya and Tanzania are nothing alike, since the father of Tanzania, Julius Nyerere, brought with him a powerful socialist influence from the 1960s to the 1980s, which is still seen in the country's strong distrust of the private sector and of foreign investment in particular. In contrast, Kenya operates a fully-fledged liberal market economy with an established and "globalized" management sector, which has advantages for the oil sector. Inversely however, the issue of ethnic conflicts is at the fore in Kenya whereas it is more secondary in Tanzania, as a direct consequence of the country's socialist political history in which the one-party state made efforts to eliminate such

ethnic differences (a similar trajectory can be seen in Mozambique[24]). It remains difficult, however, to form an opinion of current management practices in a sector that is still in its nascent stages of development. This paper has avoided adopting a deterministic approach, while raising points for consideration and basing analysis on decisions that have already been made in other sectors.

It is also very difficult to reliably predict how the future financial windfall will be distributed (according to the World Bank, Mozambique will be looking at close to ten billion dollars in revenue at peak production[25]). Aside from Kenya where several powerful parties share the Parliament and make up the political class (but where the Kikuyu have been dominant since independence), Uganda, Tanzania, Mozambique and Ethiopia operate single-party states that have nearly total control over their country's political and economic functions. The absence of counterweights to these powers can often be dangerous for this kind of industry; regimes can become inflexible, use public funds to prop themselves up and misuse revenue since there are no checks and balances, especially through Parliament. The scale of oil and gas revenue, compared with these countries' current GNPs, will bring about great upheaval. The exact nature of such changes is impossible to predict at this point, but in some cases, it is reasonable to assume that the regimes themselves will not change significantly.

[24] B. Augé, "Gas in Mozambique, a High-risk Economic Revolution", *op. cit.*
[25] Figures are from World Bank reports, <www.worldbank.org/projects/P129847/mining-gas-technical-assistance-project?lang=en>.