

# SUSTAINABLE INVESTMENT OPPORTUNITIES IN AFRICA: PROSPECTS FOR BRICS



**EXPORT-IMPORT BANK OF INDIA**

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**SUSTAINABLE INVESTMENT OPPORTUNITIES IN AFRICA:  
PROSPECTS FOR BRICS**

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<b>CONTENTS</b>	
	<b>Page No.</b>
1 Sustainable Investment in Africa: An Introduction	9
2 Sustainable Investment Opportunities in Africa	11
3 BRICS Investments In Africa: An Overview	49
4 BRICS Investment in Africa: Prospective Areas of Cooperation	66

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LIST OF EXHIBITS		
Exhibit No.	Title	Page No.
1	Trends in GDP Growth of Africa	1
2	Countries with the highest share of Agricultural Land in Africa	11
3	Countries with the highest share of Agricultural Value Added in Africa	12
4	Share of Agricultural Commodities Exported from Africa	20
5	Share of Agricultural Commodities Imported by Africa	21
6	Africa's State of Healthcare: Some Key Metrics	22
7	Regionwise Health Expenditure	24
8	Public Health Expenditure	25
9	Private Expenditure on Health in Africa as Percentage of Total Health Expenditure	26
10	Regionwise Health Expenditure per capita	27
11	Pillars of Africa's Healthcare	28
12	General Government Expenditure on Health	28
13	External Resources for Health as percentage of Total Expenditure on Health	29
14	Share of countries in Bauxite Reserves	31
15	Share of countries in Copper Reserves	31
16	Share of countries in Copper Production	32
17	Regional Coal Reserves and Share in World	33
18	Country-wise Distribution of Proven Oil Reserves	34
19	Country-wise Distribution of Oil Production	35
20	Share of Countries in Uranium Reserves	37
21	Share of Countries in Uranium Production	37
22	Comparison of Rural and Urban Electricity access in 2010 and 2030	39
23	Installed solar PV capacity in Africa	40
24	Share of Top 10 countries in installed Solar Capacity in Africa	40
25	Share of Investments of BRICS economies in Africa	49
26	Top 10 African economies receiving investments from BRICS economies	49
27	Top 10 African industries receiving investments from BRICS economies	50
28	Segmentwise share in Investments by BRICS economies in the Agriculture Sector in Africa	52
29	Investments by BRICS economies in the Agriculture Sector in Africa	52
30	Investments by BRICS economies in the Agri Processing Sector in Africa	54
31	Segmentwise share in Investments by BRICS economies in the Agri Processing Sector in Africa	54
32	Investments by BRICS economies in the Healthcare Sector (excl. pharma) in Africa	59
33	BRICS investments in Oil and Gas Extraction in Africa	61
34	Countrywise share in investments by BRICS countries in Solar in Africa	65



LIST OF TABLES		
Table No.	Title	Page No.
1	Annual Real GDP growth	1
2	Key Agricultural Products of Africa	13
3	Agriculture Investments in Africa	14
4	Agricultural Land Acquisition in African by Foreign Economies	15
5	Total FDI investments in Agriculture in Africa	16
6	Cumulative Investments by Countries in the Agricultural Sector in Africa	16
7	Investments in Agri Processing	17
8	Total FDI Investments in Processed Agricultural and Allied Industries in Africa	18
9	Cumulative Investments by Countries in Agri Processing and Allied Industries in Africa	19
10	Major Agricultural Exporters of Africa and their Destinations	20
11	Major Agricultural Importers of Africa and their Destinations	21
12	Status of Coal in Africa	33
13	Countries with the Highest Oil Reserves in Africa	35
14	Oil Production in Africa	36
15	Foreign Direct Investments received by African Countries in Solar Energy	46
16	Foreign Investors in Solar Power in Africa	46
17	Solar Energy Policy Framework introduced in Select African countries in recent years	48
18	Investments by BRICS economies in Africa	49
19	Investments by BRICS economies in Africa in Key Sectors	51
20	Key Investment Destinations of BRICS economies in Africa	51
21	Select companies from BRICS economies invested in Agriculture in Africa	53
22	Select companies from BRICS economies that have invested in Healthcare in Africa	60
23	Status of Crude Oil in BRICS countries	60
24	Status of Coal in BRICS countries	62
25	Select companies from BRICS economies investing in Minerals in Africa	63
26	Select companies from BRICS economies investing in Solar in Africa	65

LIST OF BOXES		
Box No.	Title	Page No.
1	Azuri Technology introduces Pay-As-You-Go model	44
2	Solar Park, Rwanda	45
3	Lines of Credit Scheme Operated by Exim Bank, India	53
4	Socio-Economic Impact under of Exim Bank's Lines of Credit program in Senegal: A Case Study	58

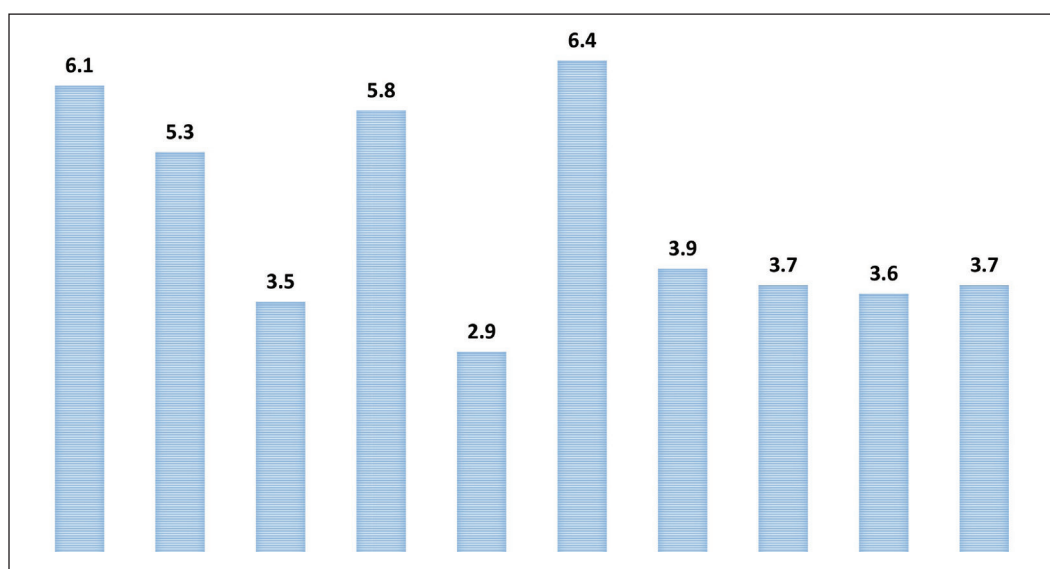


# 1: SUSTAINABLE INVESTMENT IN AFRICA: AN INTRODUCTION

Africa, a continent on the rise, achieved relatively high economic growth during the past 15 years in spite of all the constraints, with its GDP expanding from an average of just above 2% during the 1980-90s to more than 5%

during 2001-14. However, since 2013, the growth has moderated, largely due to the commodity price slump, and subdued external demand.

**Exhibit 1: Trends in GDP Growth of Africa**



p= provisional

Source : Data derived from African Economic Outlook; Exim Bank Research

**Table 1: Annual Real GDP growth (Average)**

Country	2007-2015 (%)
Ethiopia	10.5
South Sudan	9.0
Rwanda	7.5
Mozambique	7.0
Zambia	7.0
Congo, Dem. Rep.	6.9
Equatorial Guinea	6.8
Ghana	6.7
Tanzania	6.7
Uganda	6.5

Source: African Economic Outlook, 2016; African Development Bank

Regionwise, the growth remained the highest in East Africa, followed by West Africa and Central Africa, and was the lowest in Southern Africa and North Africa. Assuming gradual improvement in international and domestic conditions, growth is projected to accelerate across regions during 2016 and 2017.

Exports from Africa have been largely commodity based. This huge dependency on commodity exports has been a boon and a bane at the same time. In times of commodity boom in prices, the African countries stands to benefit and garner a lot of revenues. However, during times of slump in prices, the entire economy suffers drastically. For example, the share of 'Mineral fuels, mineral oils and products of their distillation; bituminous substances' alone in Africa's overall exports

stood at a phenomenal 45% in 2015 and was equivalent to about 20% of world exports of this particular category. Such high concentration of the export basket in overall exports exposes the African economies to the vagaries of commodity price cycles.

This Study, *inter alia*, explores the various opportunities for sustainable investments in Africa, which would not only lead to job creation but also facilitate a sustainable mechanism towards wealth creation in Africa.

In the mining and extractive industries, there have been numerous arguments towards diversifying away from commodity based economy. However, it is felt that such an exercise may not be possible in the immediate future, and hence the need of the hour is having a commodity based industrialization which facilitates value addition. In the crude oil sector, there is a scope of setting up refining capacities keeping the long term in view, while in the nonferrous categories opportunities could be explored in intermediate and mid to low end manufacturing.

Another area of focus which could lead to a significant improvement in African economy is agriculture. The continent has been dependent on the sector largely for its sustenance and livelihood. A good opportunity exists in the African agriculture sector wherein cooperative farming and contract farming could be encouraged. Such initiatives can lead to greater mechanisation, which in turn would facilitate development of regional and global value chains in agro products and food processing. Also required would be introduction of new agri equipment, which would significantly help in increasing productivity.

Besides concentrating on resource endowed product chains, there is an important aspect that requires immediate attention. As Africa gradually flourishes under surging economic and population growth rates, it also faces the challenge of ensuring that everybody benefits optimally from the gains of its progress. Two sectors which are critical in this context are energy security and healthcare. Both these would impact the continent's productivity and translate into greater economic growth.

Access to electricity would help in businesses operating at higher levels of productivity, farmers running

cleaner irrigation systems and processing machines that improve their yields and thus, their income. In rural communities, the farmers benefit from climate controlled storage solutions. At the same time, introduction of solar based electricity would catalyse movement away from fossil fuels as a source of energy of a large part of the population, thereby mitigating the ill-effects of climate change.

Healthcare is another area which requires serious attention. Many pockets of this huge continent do not have access to even basic health amenities. A general well-being of the community helps not only in having better health upkeep, but also improves the overall efficiency of the nation.

This Study envisages identifying areas of sustainable, responsible and impact investments in this remarkably huge African continent. The Study also appreciates the existence of a dual need in Africa. On the one hand, investments are required in an area which are its strengths, namely in minerals and agriculture, but there is a need to establish forward and backward linkages so that there is value addition, and the local community benefits. On the other hand, there is also need for creating a sound power infrastructure which will sustain the growth paradigm of the African continent. This could essentially be facilitated through introduction of solar infrastructure, on grid and off grid, in a zone which is naturally endowed with almost 300 days of sunlight.

While the Study explores the huge opportunity available, innovative partnerships are also required towards creating sustainable investments. In this context, emerging economies which have largely been proponents of South-South cooperation, can lend their hand towards creating the requisite mechanism. BRICS economies (Brazil, Russia, India, China, and South Africa) in particular can act as instruments towards strengthening their investments in these identified sustainable areas. This Study has briefly highlighted the existing investments in Africa by the BRICS economies in areas like mining, agriculture and agro processing, solar, and healthcare. The Study surmises that sustainable and sustained investment in these sectors over a medium to long term horizon would not only induce better infrastructure, but also generate jobs for the young Africa. BRICS economies would also significantly benefit out of such investments.

## 2: SUSTAINABLE INVESTMENT OPPORTUNITIES IN AFRICA

### THE CASE FOR INVESTING IN AGRICULTURE IN AFRICA

The agricultural sector is a key source of livelihood across the African continent. While nearly two-third of Africa's population make a living through agriculture, it contributes less than one-third to the continent's GDP. Although its significance in the economy varies widely across African countries, agriculture remains a vital sector for most countries. Furthermore, an estimated 38% of Africa's working youth are presently employed in agriculture<sup>1</sup>. African soil remains greatly underutilized with the region having 60% of the world's unused arable land. Despite this, the continent still imports a substantial deal of its food requirements, essentially because food production, supply, and consumption systems are not functioning optimally. The share of agricultural imports in total imports of Africa was nearly 9.6% during 2015<sup>2</sup>. (Net food imports are expected to grow from US\$ 35 bn in 2015 to over US\$ 110 bn by 2025, which could be offset by increased African production).

This is coupled with the fact that Africa has the highest incidence of undernourishment (estimated at almost one in four persons) worldwide. (Given the importance of food and nutrition, promoting agricultural value chains and improving market access have the potential to diversify African economies, raise incomes, increase food security and macroeconomic stability, contribute to mitigating conflict and prevent internal and external migration).

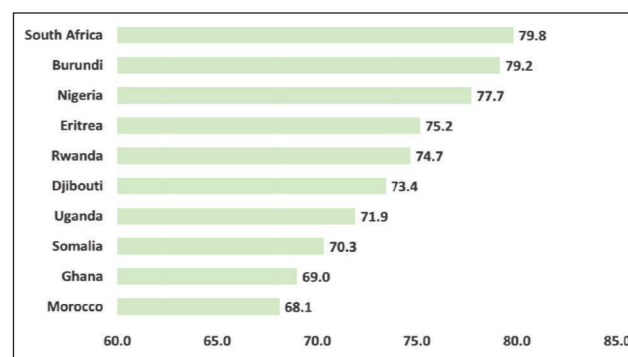
Given Africa's situation, agriculture, especially value added agriculture, is an immediate need. A large part of African population is engaged in subsistence farming and could be brought into the mainstream production through structured interventions like land reforms, mechanization, adopting an integrated value-chain approach that focusses on markets and climate, smart

agriculture etc. This would help in ameliorating poverty levels faster, given that the agricultural sector consists mostly of smallholder farmers, with majority of them being women. With higher agricultural productivity; gender-equal access to land, seed, and fertilizer; and overall better performance in rural economies, growth is expected to reach the most disadvantaged sections of the population.

Some of the African countries that have a high percentage of agricultural land (as a percentage of the total land area) at their disposal include South Africa, Burundi, Nigeria, Eritrea, and Rwanda with 79.8%, 79.2%, 77.7%, 75.2%, and 74.7% share, respectively. Agricultural land essentially refers to the share of land area that is arable, under permanent crops, and under permanent pastures.

While Africa has the highest area of arable uncultivated land (202 million hectares) in the world, most farms occupy less than 2 hectares<sup>3</sup>. The sector is characterized by a high percentage of smallholder farmers

**Exhibit 2: Countries with the highest share of Agricultural Land in Africa: 2013**



Source: Data derived from World Bank Development Indicators; Exim Bank Research

<sup>1</sup>World Bank

<sup>2</sup>World Bank

<sup>3</sup>World Bank Development Indicators



(80 percent) cultivating low-yield staple food crops on small plots with minimal use of inputs. These farms depend on rainwater, thus subjecting production to the vagaries of weather.

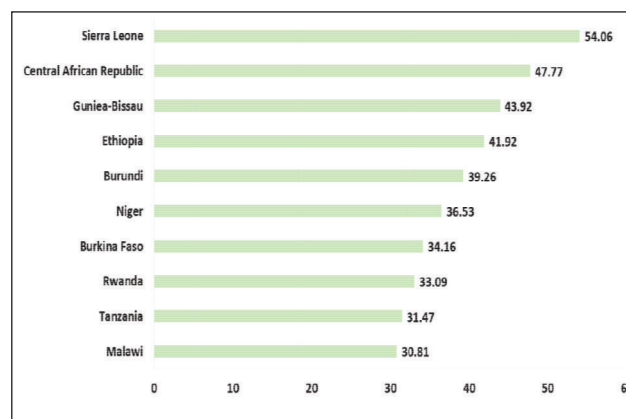
Besides this, farmers at all scales of production need access to the inputs required to produce a high-yielding crop, effective fertilizer and sufficient water. According to the latest data available from FAO, Africa accounted for 3% of world fertilizer consumption in 2013, which is the lowest in the world among regions. Even when these are available, input pricing have been found to be often too high for smallholders, resulting in fertilizer use in Sub-Saharan Africa which is just one-tenth the world average. According to FAO, fertilizer in some African countries can cost up to 10 times more than in other developing nations.

Africa's agriculture is dominated by a variety of staple food crops (maize, rice, sorghum, millet, cassava, yams, sweet potatoes, etc.) and a few traditional cash crops (coffee, cocoa, oil palm, sugar, tea, and tobacco). While land availability is there, productivity remains low, and one of the major reasons for low productivity is low level of mechanization. Mechanization remains a somewhat ignored constituent of agricultural and rural development policies in Africa – only limited improvement has been achieved in terms of usage of number of machines and overall advances in mechanization in the continent.

The slow productivity growth in agriculture is also constraining Africa's structural transformation process and economic diversification.

Value addition to agricultural products is the process of increasing the economic value and consumer appeal of an agricultural commodity. The level of value addition and crop processing of agricultural commodities is low and post-harvest losses in sub-Saharan Africa average at 30% of total production, meaning that the region loses over US\$ 4 billion each year<sup>4</sup>. Amongst the countries

**Exhibit 3: Countries with the highest share of Agricultural Value Added in Africa: 2013 (percentage of GDP)**



Source: Data derived from World Bank Development Indicators; Exim Bank Research

which figure at the top in World Bank Development Indicators, Ethiopia, Rwanda, and Tanzania offer good scope for investments given their current growth and improving economic conditions.

While a host of agricultural products are produced in Africa, some of these products occupy a significant share in the world market. Focusing on augmenting their production for local consumption and as well as for exports therefore offers good prospects for the continent.

Agricultural produce like yams, cocoa beans, cassava, sorghum, pulses, beans, tea and tomatoes had a double digit share in world agricultural production in 2012. Africa has a huge potential to be a global supplier of traditional cash crops (cocoa, sugar, and tea), which account for about 50 percent of Africa's total agricultural exports.

An analysis of the major producers of these agricultural commodities shows that Nigeria, Mozambique, and Cote d'Ivoire are among the main producers of many of these products in which Africa has a potential edge.

<sup>4</sup>AfDB

Table 2: Key Agricultural Products of Africa: 2012

Product	Production (Mn tonnes)		Share in World (%)		African countries with a minimum 1% share in global production (in 2012)
	2003	2012	2003	2012	
Yams	42.6	57.3	96.2	96.2	Nigeria (63%), Ghana (11%), Cote d'Ivoire (9%), Benin (4%), Togo (1%), Ethiopia (1%)
Cocoa beans	2.4	3.3	66.0	65.7	Cote d'Ivoire (32%), Ghana (17%), Nigeria (8%), Cameroon (5%),
Cassava	104.7	149.4	54.5	55.5	Nigeria (20%), DR Congo (6%), Ghana (5%), Angola (4%), Mozambique (4%), Tanzania (2%), Uganda (2%), Malawi (2%), Madagascar (1%), Rwanda (1%)
Sorghum	23.1	23.4	39.1	40.9	Nigeria (12%), Ethiopia (6%), Burkina Faso (3%), Niger (2%), Chad (2%), Mali (2%), Cameroon (2%), Tanzania (2%), Egypt (1%)
Pulses	1.2	1.3	33.7	23.4	Mozambique (4%), Tanzania (2%), DR Congo (1%)
Beans dry	3.0	5.0	14.5	21.1	Tanzania (5%), Kenya (3%), Ethiopia (2%), Rwanda (2%), Uganda (2%), Cameroon (2%), Mozambique (1%)
Tea	0.5	0.6	14.8	12.4	Kenya (8%), Malawi (1%), Uganda (1%)
Tomatoes	14.4	17.9	12.0	11.1	Egypt (5%), Nigeria (1%)
Maize	45.6	70.1	7.1	8.0	South Africa (2%), Nigeria (1%)
Potatoes	15.5	29.3	4.9	8.0	Egypt (1%), Algeria (1%)
Rubber natural	0.5	0.6	5.5	5.2	Cote d'Ivoire (2%), Nigeria (1%)
Sugar cane	89.4	94.6	6.5	5.1	South Africa (1%), Egypt (1%),
Oil, palm	2.0	2.3	6.9	4.3	Nigeria (2%), Cote d'Ivoire (1%)
Rice, paddy	18.5	28.3	3.2	3.8	Nigeria (17%), Madagascar (16%)

Source: Data derived from FAO; Exim Bank Research

There is also a need to add value to African agriculture. The fact remains that a typical African smallholder farming lacks the necessary resources to transform their small farm into a thriving agribusinesses. The situation becomes more acute given the farmer's limited knowledge and information about integrating its produce in the value chain. However, with growing globalization, there is a notable opportunity for African farmers to participate in the agri-value chain. This integration may not necessarily be global, and even has a very good potential to be regional – especially given the fact that participation at a global scale would require abiding by international norms and standards. While cash crops offer a better prospect in

the overseas markets, food crops can be considered for internal consumption as well as for the African region. Nevertheless, due to infrastructural lacunae, it is often cheaper to export outside Africa than within the continent.

The Governments in Africa have also taken some measures to increase their production. In 2009, Mozambique distributed 7,300 oxen as part of a programme to expand the use of animal traction, a measure that should enable families to cultivate at least five hectares each, instead of the average of just one. Also, in 2009 and 2010, Uganda distributed enormous quantities of good-quality high-yielding seeds leading to

one of the best maize harvest witnessed in the country. This has also helped them to produce more than twice the domestic consumption, and even export a part to South Sudan and the Democratic Republic of the Congo. In 2010, in Tanzania, the Government facilitated greater use of hybrid seeds and fertilizers enabling farmers to produce a surplus rice crop. Malawi also had taken some concrete steps - in 2005, it embarked on an innovative solution to provide government subsidies to reduce the retail costs of fertilizers and high-yielding maize seeds for smallholders, leading to having surplus produce, thereby enabling exports.

Besides facilitating enhancement in productivity, many African countries have also undertaken land reform exercises. One of the successful land reforms was implemented in Ethiopia in 1975. Through this reform, the Government nationalized rural land without compensation, abolished tenancy, forbade the hiring of wage labor on private terms, ordered all commercial farms to remain under state control and granted each peasant family the so called 'possessing rights' to a plot of land not to exceed ten hectares. Another successful land reform in Africa was in Malawi. In 2004, with support from the World Bank, the Government of Malawi

instituted a decentralized, voluntary and community-based land reform pilot project that distributed land owned by large corporate estates to groups of poor farmers. The Malawi program was modeled on Brazil's market-based approach to land reform, provided the groups land rights and funds to buy the supplies needed to diversify their farming and increase the production.

### Investments in Agriculture

During the last decade, there have been many investors in the agricultural sector who have been flocking to many parts of the world, including Africa. Cumulative FDI in the African agriculture sector during 2003-2015 aggregated to US\$ 9.6 billion. India has been one of the largest investors in the agriculture sector in Africa (excluding agro based processing). Major investors among the developed countries included UK, USA, Switzerland, France and Canada. Apart from India, amongst the developing countries Malaysia and Kuwait were the other major investors in the African agricultural sector. Almost half the total value of investments were accounted for by two African countries – viz. Cameroon and Mozambique.

**Table 3: Agriculture Investments in Africa**

Share of Countries Investing in Agriculture in Africa during 2003-2015 (Cumulative) Total Investments: US\$ 9.67 bn		Share of African Countries Receiving Investment in Agriculture during 2003-2015 in Africa (Cumulative) Total Investments: US\$ 9.67 bn	
India	21.7%	Cameroon	23.8%
UK	15.5%	Mozambique	20.3%
Kuwait	15.5%	Ghana	11.0%
USA	13.3%	Liberia	6.6%
Malaysia	8.1%	Nigeria	5.8%
Switzerland	4.6%	Ethiopia	5.0%
Spain	2.4%	Morocco	4.0%
Singapore	2.4%	South Africa	3.9%
France	2.3%	Zambia	2.5%
Canada	1.9%	Egypt	2.4%
Others	12.3%	Others	14.7%

Source: Data derived from fDi Markets; Exim Bank Research

Since the turn of the century, there has been a sudden increase in investments in Africa's agricultural land. Three broad trends have triggered such surge in investments.

- First, the potentially food insecure but predominantly rich nations have sought to outsource their domestic production by gaining access and control over agricultural lands in foreign countries.
- Second, with high crude oil costs, the demand for agro fuels has been rising. According to the International Energy Agency, in 2006 an estimated 14 million hectares of land were used for the production of biofuels and by-products, approximately 1% of globally available arable land. At the global level, projected growth in biofuel production to 2030 could require 35 million to 54 million hectares of land (2.5% to 3.8 % of available arable land). Over the next ten years, biofuels are expected to account for about half the increased demand for oilseeds.
- And third, high food prices coupled with low land prices in many parts of the world have made investments in land attractive due to higher financial returns.

In Africa, since large tracts of land still remain unutilized, a mechanized farming approach could help in generating better yields as well. Leasing unused land to foreign governments and companies for large-scale cultivation would boost an underdeveloped sector and create new job opportunities. However, the need is to have a sustainable methodology wherein both local communities and foreign investors benefit. This could be facilitated by ensuring a minimum value addition norm for investors in the continent. Most crops have a forward linkage opportunity which could be harnessed by the local African government so that there is additional employment as well.

According to the Financial Times database, fDi Markets, these investments in Africa have been across segments, with crop production having attracted the maximum focus. The other segments which have received investments in Africa include grains & oilseed, rubber products, agriculture, coffee & tea, and fruits & vegetables including tobacco.

Table 5 shows the major agricultural sectors receiving investment. Crop production received the highest amount of investments cumulatively during 2003 and 2015, to the tune of US\$ 6649.3 million, followed by grains & oilseeds at US\$ 1215.5 million. Coffee & tea, fruits & vegetables & specialist foods, and tobacco received the rest of the investments.

**Table 4: Agricultural Land Acquisition in African by Foreign Economies**

Base of Foreign Investor	Target Country	Area(ha)
South Africa	Democratic Republic of Congo	10,000,000
US	Sudan	40,0000
China	Zambia	2,000,000
Gulf State, Egypt, South Korea	Sudan	1,500,000
Saudi Arabia	Mali, Senegal, Sudan, Uganda	700,000
South Korea	Sudan	690,000
Saudi Arabia	Tanzania	500,000
Sweden	Tanzania	400,000
UAE	Sudan	378,000

Source: Economic Report, Land Grabbing: myth or reality, ODDO securities

**Table 5: Total FDI investments in Agriculture in Africa (2003-2015) (in US\$ million)**

Segment	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	Total
Crop production	939.2	8.8	325.2	-	-	258.85	793.5	11.8	2460.6	173.3	99.2	68.8	1510	6649.3
Grains & oilseed	10	31.2	26.3	58.4	58.4	24.2	158.5	173.1	207.8	90.7	134.9	222.1	19.9	1215.5
Fruits & vegetables	3.2	59.4	50	71	58.4	4.2	53.9	108.2	131.4	58.4	-	36.6	20	654.7
Coffee & tea	-	-	24.2	26.7	53.4	34.7	115.8	142.8	-	58.4	65.6	34.7	45.1	601.4
Tobacco	156.2	-	-	80	-	-	-	-	-	-	-	212.7	103.5	552.4
<b>Grand Total</b>	<b>1108.6</b>	<b>99.4</b>	<b>425.7</b>	<b>236.1</b>	<b>170.2</b>	<b>321.2</b>	<b>1121.7</b>	<b>435.9</b>	<b>2799.7</b>	<b>380.8</b>	<b>299.7</b>	<b>574.9</b>	<b>1698.5</b>	<b>9673.2</b>

Investments includes in activities like, manufacturing, retail, logistics, sales, marketing, research and development, etc.

Source: Data derived from fDi Markets; Exim Bank Research

In the coffee segment, in 2010, Nestle opened a factory in Mozambique and in Angola in 2012 to cater to the rising middle class in the country. Besides, Nestle has also put up manufacturing facilities in Cameroon and South Africa. They have also established distribution centres and sales offices in Kinshasa, Lubumbashi and Goma in 2009 in Congo, and have witnessed remarkable growth since then. Nestle had also invested around

US\$ 16.9 mn in Cote d'Ivoire (which is the largest coffee producer in Africa) for R&D in 2009. On the other hand, Nespresso ventured into Senegal by establishing retail chains in 2015. Nespresso has also expanded into Morocco and Gabon. India also has a presence in coffee through Tata Coffee in Uganda, and in tea through Kanan Devan Hills Plantations in Ethiopia.

**Table 6: Cumulative Investments by Countries in the Agricultural Sector in Africa – 2003-2015 (US\$ Mn)**

Coffee & tea		Crop production		Fruits & vegetables & specialist foods		Grains & oilseed		Tobacco	
Total	601.4	Total	6649.3	Total	654.7	Total	1215.5	Total	552.36
Switzerland	336.0	India	1907.2	Turkey	116.8	United States	202.1	UK	259.66
India	119.0	Kuwait	1500.0	Canada	105.7	Singapore	126.5	USA	237
USA	60.1	UK	1139.5	Austria	105.2	Spain	107.6	Zimbabwe	55.7
China	34.7	Malaysia	723.4	United States	68.8	Tanzania	99.4		
Libya	24.2	USA	722.8	France	62.6	France	98.5		
Denmark	11.9	Netherlands	110.4	Spain	58.4	UK	92.2		
UK	8.8	Italy	104.7	Italy	53.2	India	75.0		
Germany	6.7	Singapore	102.0	Kenya	24.2	Canada	75.0		
		Spain	70.4	Brazil	20.0	Switzerland	70.9		
		Mexico	64.3	UAE	19.2	Israel	69.8		
		France	59.8	Japan	9.8	Malaysia	58.4		
		Israel	58.4	Switzerland	9.8	Philippines	55.7		
		UAE	49.2	Belgium	1.0	Kenya	34.2		
		Switzerland	25.4			Hong Kong	26.2		
		China	10.0			Saudi Arabia	11.2		
		South Korea	1.7			South Africa	6.2		
						Tunisia	4.3		
						China	2.3		

Investments includes in activities like, manufacturing, retail, logistics, sales, marketing, research and development, etc.

Source: Data derived from fDi Markets; Exim Bank Research

Among crop production companies, Biopalm Energy of India has invested US\$ 1907 mn in Cameroon for 200,000 hectares of land. This was followed by the next highest investment by Kuwait based Al-Bader International Development of US\$ 1500 mn in Mozambique. UK based companies like Guinness Ghana, D1 Africa, D1 Oils, DOS Palm Oil Production, and Lonrho Agriculture have cumulatively invested around US\$ 1139.5 mn for manufacturing of variety of agro products. For example, Lonrho produces and procures large volumes of produce, and then processes, packs and ships the produce to retail chains within Africa and abroad to the Europe, the United States, the Middle East and, increasingly, the Far East. On the other hand, Kuwait based Al-Bader International Development Company plans to invest US\$ 1.5 bn in an agro-industrial project for the production of sugarcane in Mozambique, with a view to producing ethanol.

In the fruits & vegetables segment, Turkey has been the highest investor in Africa, although there have been only a couple of investments from the country, one each in Libya (by Dardanel) and Gabon (by Dimes). Canada had invested in South Africa through McCain Foods with a total investment of around US\$ 105 mn.

Africa has also seen fairly good investments in grains & oilseed between 2003 and 2015. USA based Monsanto has been the key investor, followed by Singapore based Olam International, Olam Nigeria, apart from Wilmar International. Alimentos Naturales and Borges of Spain

have invested in Morocco and Egypt respectively. It may also be noted that Bakhresa, a Tanzania based company, while benefitting from the Eastern African Community customs union, has invested in Rwanda towards establishing a plant to minimize the high cost of imports. Another Tanzanian based company Mount Meru Millers, has also invested in Uganda to take advantage of the abundant oil seeds in the country, and the potential to grow more.

In the tobacco segment, UK based British American Tobacco (BAT) had invested in Kenya and Nigeria in 2003, while Habanos has recently invested in Morocco in 2015. The segment has also witnessed an investment from a Zimbabwean company Savanna Tobacco which has invested US\$ 55.7 mn in Mozambique in 2014.

### Investments in Agri Processing and Allied Industries

Many investors into Africa have also been concentrating on value addition of naturally available products. The top 10 investing countries in Africa constituted 79.5% share of the cumulative investments of US\$ 11.8 bn, with most of the investments coming from European countries like the UK, the Netherlands, Switzerland, and France. Besides the USA, Saudi Arabia and India, two African countries, viz. South Africa and Zimbabwe also figure in the list of top 10 investors in Africa. The countries that received the highest investments (cumulatively during 2003-2015) are Nigeria, South Africa, Cote d'Ivoire, Egypt, Ghana, Zambia, Angola, Ethiopia, Tanzania, and Mozambique.

**Table 7: Investments in Agri Processing**

Share of Countries Investing in Agri Processing & Allied Sectors in Africa between 2003-2015 (Cumulative) Total Investments: US\$ 10.5 bn		Share of Countries Receiving Investment in Agri Processing & Allied Sectors between 2003-2015 in Africa (Cumulative) Total Investments: US\$ 10.5 bn	
UK	22.9%	Nigeria	17.6%
Netherlands	10.3%	South Africa	11.7%
Singapore	10.1%	Cote d'Ivoire	11.0%
Switzerland	9.0%	Egypt	7.6%
United States	5.6%	Ghana	7.1%
Saudi Arabia	4.8%	Zambia	6.7%
Zimbabwe	4.7%	Angola	4.8%
South Africa	4.3%	Ethiopia	4.5%
France	4.3%	Tanzania	4.2%
UAE	3.4%	Mozambique	3.7%
Others	20.5%	Others	21.1%

Source: Data derived from fDi Markets; Exim Bank Research



As has been discussed, Africa has a modest share in production of sugar and as a result the continent has witnessed a significant investment into sugar & confectionary products. The cumulative investments into the sector have been to the tune of US\$ 4.6 bn during the period 2003 to 2015. For example, Savola, a Saudi Arabia based company, has added two sugar plants in Egypt and increasingly relies on locally produced sugar beet, rather than more expensive raw sugar, to meet the rising demand in the Middle East. Singapore based Olam International has invested in Nigeria and Cote d'Ivoire. In 2010, Olam had set its first, large greenfield cocoa processing plant in Cote d'Ivoire given its forward linkages towards manufacturing chocolates. Later in 2011, Olam invested in sugar manufacturing in Nigeria, as it realized that the State's 44% duty on imports of the refined sweetener favoured local output.

Many US based companies like Cargill, Archer Daniels Midland, Cadbury, Mars, Wrigley have invested in a host of countries like Cote d'Ivoire, Egypt, Ghana, Kenya,

Nigeria in the sugar & confectionary products segment. In fact, Starbucks has also invested in education and training in coffee production in a sustainable manner in Kenya.

The beverages and distilleries segment also witnessed fairly good levels of investments, especially from European countries like the UK, the Netherlands, and Portugal apart from Ghana, South Africa, Mauritius, and even the USA. The Netherlands based Heineken invested in Ethiopia in 2013.

Many UK based companies have invested in the African agriculture processing and allied industries - NILE Breweries (NBL) has constructed a brewery in Mbarara in western Uganda; beer giant SAB Miller has invested in four breweries in Angola, apart from having invested in Mozambique, Namibia, Nigeria, and Ghana; Guinness has invested in Nigeria, Ghana, Tanzania; while Diageo has exposure in countries like Ethiopia, and Mozambique.

**Table 8: Total FDI Investments in Processed Agricultural and Allied Industries in Africa (2003-2015) (in US\$ mn)**

	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	Total
Sugar & confectionary products	145.7	54.2	150	158.4	473.7	590.2	123	567.1	457.3	705.6	143.5	750	296.7	4615.4
Breweries & distilleries	474.8	176.3		19	37.7	662.9	443.5	192.9	612.7	206.2	146.8	342.9	228.3	3544
Snack food		9					471.2	55	6.8	423	168.2	56.3	5	1194.5
Seasoning & dressing					75.4		10.4		281.8		131.4		41.3	540.2
Other rubber products							160			183	159			502
Bakeries & tortillas	55.7		58.4						34.7	16.6				165.4
Wineries	0	0	0	1.5	0	0	0	0	0	19	0	0	0	20.5
Total	676.2	239.5	208.4	178.9	586.8	1253.1	1208.1	815	1393.3	1553.4	748.9	1149.2	571.3	10582

Investments includes those in activities like manufacturing, retail, logistics, sales, marketing, research and development, etc.

Source: Data derived from fDi Markets; Exim Bank Research

**Table 9: Cumulative Investments by Countries in Agri Processing and Allied Industries in Africa  
2003-2015 (US\$ Mn)**

<b>Sugar &amp; confectionary products</b>	<b>4615.4</b>		<b>Snack food</b>	<b>1194.5</b>
United States	511.2		Switzerland	546.5
Saudi Arabia	508.3		Singapore	474.2
Zimbabwe	500		Hong Kong	80
UK	454.6		United States	49.6
Singapore	407.8		Brazil	25
France	394.7		Japan	19.2
UAE	358.4		<b>Seasoning &amp; dressing</b>	<b>540.2</b>
Algeria	258.4		Switzerland	260.8
Mauritius	250		UK	122.6
South Africa	224		Spain	80.2
Italy	171.6		Japan	76.6
Spain	140		<b>Wineries</b>	<b>20.5</b>
Switzerland	107		Chile	19
India	100		South Africa	1.5
Canada	58.4		<b>Bakeries &amp; tortillas</b>	<b>165.4</b>
Egypt	58.4		France	58.4
Mozambique	58.4		Greece	55.7
Lebanon	49.2		Switzerland	34.7
Belgium	5		Oman	16.6
<b>Breweries &amp; distilleries</b>	<b>3544</b>		<b>Rubber products</b>	<b>502</b>
UK	1850.6		Singapore	183
Netherlands	1094.5		Malaysia	160
South Africa	232.9		Cote d'Ivoire (Ivory Coast)	159
Portugal	225.2			
Mauritius	55.8			
United States	37			
Bermuda	19			
Kenya	19			
Ghana	10			

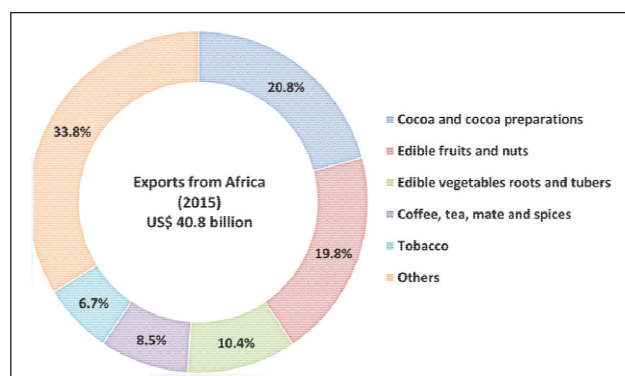
Investments includes those in activities like manufacturing, retail, logistics, sales, marketing, research and development, etc.  
Source: Data derived from fDi Markets; Exim Bank Research



### Africa's Agricultural Exports

Agricultural exports from Africa aggregated to US\$ 40.8 billion in 2015, accounting for 10.9% of the total exports of the continent (Exhibit 4). Among the agricultural items exported, cocoa and its preparations constituted approximately 20.8% of the total exports. The exports of edible fruits and nuts valuing around US\$ 8.1 bn formed 19.8% share of the aggregate agricultural exports by the continent. Other significant agricultural products exported by Africa included edible vegetables (10.4% of the total exports) and small proportions of coffee, tea, and spices and tobacco.

**Exhibit 4: Share of Agricultural Commodities Exported from Africa: 2015**



Source: Data derived ITC Trade Map on August 14, 2016;  
Exim Bank Research

**Table 10: Major Agricultural Exporters of Africa and their Destinations (2015)**

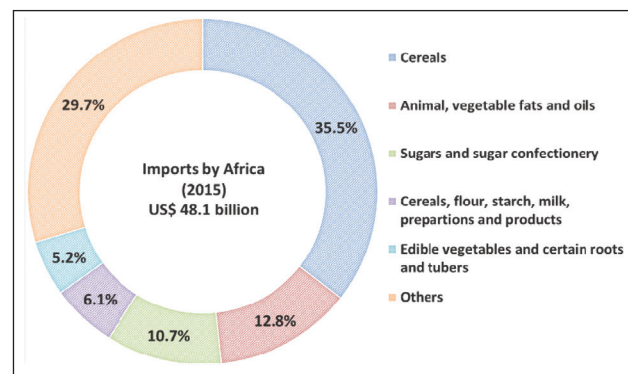
Product	Total Export (in US\$ bn)	Exporting Country (% in African Export)	Destination
Cocoa	8.5	Nigeria (54.0%) Ghana (28.9%) Cote d'Ivoire (6.3%)	The Netherlands, the USA, Germany
Edible fruits and nuts	8.1	South Africa (36.2%) Morocco (15.1%) Egypt (13.3%)	The Netherlands, the UK, France, Russia, Saudi Arabia
Edible Vegetables, certain roots and tubers	4.2	Morocco (31.1%) Egypt (21.7%) Ethiopia (21.1%)	France, Spain, The Netherlands, Italy, Russia, Saudi Arabia
Coffee, tea, mate and spices	3.5	Ethiopia (30.2%) Kenya (19.6%) Uganda (13.8%)	Germany, the USA, Pakistan, Afghanistan, Italy
Tobacco	2.8	Zimbabwe (23.4%) Malawi (18%) Tanzania (15.3%)	South Africa, Mozambique, Belgium, China, Romania

Source: Data derived from ITC, accessed on August 14, 2016; Exim Bank Research

### Africa's Agricultural Imports

The agricultural imports accounted for nearly 9.6% of the total imports by Africa during the year 2015. Cereals were the leading import item and its share in the aggregate agricultural imports was 35.5% (US\$ 17.1 bn) (Exhibit 5). Animal, vegetable fats and oils formed the second largest agricultural product imported, followed by sugar and sugar confectionery. Most of the imports to Africa were from the developed countries in Europe – France, Switzerland, Germany, Denmark, amongst others.

**Exhibit 5: Share of Agricultural Commodities imported by Africa: 2015**



Source: Data derived ITC Trade Map on August 14, 2016;  
Exim Bank Research

**Table 11: Major Agricultural Importers of Africa and their Destinations (2015)**

Product	Total Import (in US\$ bn)	Importing Country (% in African Import)	Source
Cereals	17.1	Algeria (15.9%) Egypt (15.8%) Nigeria (8.2%)	France, Argentina, Canada, Ukraine, the USA, Thailand
Animal, vegetable oil and fat	6.1	Ethiopia (18.3%) Egypt (12.2%) South Africa (9.6%)	Indonesia, Malaysia, the USA, Russian Federation, Ukraine, Indonesia, Argentina
Sugar and sugar confectionery	5.1	Algeria (11.5%) Sudan (North and South) (9.7%) Nigeria (9.4%)	Brazil, France, Germany, the USA, China, India, Thailand
Cereal, flour, starch, milk preparation and products	2.9	Nigeria (12.7%) Algeria (8.1%) Libya (6.4%)	Ireland, Denmark, new Zealand, France, Belgium, Spain, Italy
Edible vegetables and certain roots and tubers	2.5	Somalia (20.5%) Egypt (18.1%) Algeria (11.9%)	The USA, China, the UK, Australia, the Netherlands

Source: Data derived from ITC, accessed on August 14, 2016; Exim Bank Research

### THE CASE FOR INVESTING IN HEALTHCARE IN AFRICA

Africa has been drawing increasing global attention with the region being home to some of the fastest growing economies – three of the world's ten fastest growing economies over the last few years (average GDP growth during 2010-2015) are in Africa. The continent also has

a young and rapidly growing population of over 1 billion people, more than half of which are below 25 years and nearly two-thirds have a mobile phone. At the same time, Africa has been urbanizing rapidly and about two-fifth of its population now live in cities.

**Exhibit 6: Africa's State of Healthcare: Some Key Metrics**

<b>Life expectancy at birth (years)</b> 58.6 (71.5)	<b>Births attended by skilled health staff (% of total)</b> 48 (70)	<b>Number of surgical procedures (per 100,000 population)</b> 1283 (4511)
<b>Incidence of tuberculosis (per 100,000 people)</b> 281 (133)	<b>Cause of death by communicable diseases and maternal conditions (% of total)</b> 62 (23)	<b>Cause of death by non-communicable diseases (% of total)</b> 29 (68)
<b>Prevalence of HIV, total (% of population ages 15-49)</b> 4.6 (0.8)	<b>Out-of-pocket health expenditure (% of private expenditure on health)</b> 60 (46)	<b>Annual Health expenditure per capita (US\$)</b> 97 (1060)

\*data in parenthesis shows World average

Source: Data sourced from World Bank; Exim Bank Research

Despite the huge opportunities in Africa, there are various kinds of challenges, both economic and social. One of the fundamental challenges that the continent has to deal with is that of its grossly inadequate healthcare infrastructure system. Health is one of the largest concerns on the continent. Lack of health education, limited access to basic health supplies, strained government budgets, and insufficient healthcare professionals have made it hard for the continent to improve the health of its people. On most of the health indicators, Africa lags behind the rest of the world not only in terms of absolute figures but also in terms of the rate of progress on these healthcare

metrics. This is further exacerbated by spread of either new strains of existing disease or an outbreak of a completely new disease.

#### *Life Expectancy at Birth*

The life expectancy parameter<sup>5</sup>, which is a crucial indicator of the socioeconomic status of an economy, shows Africa's being 13 years less than the global average<sup>6</sup>. Most African countries rank among the lowest in the world on life expectancy parameters. The average life expectancy at birth in Africa in 1990 (for both sexes) stood at 52.9 years, which declined in 2000 to 52.2,

<sup>5</sup>Indicates the number of years a new-born infant would live if prevailing patterns of mortality at the time of its birth were to stay the same throughout its life

<sup>6</sup>World Bank

and then moved up touching 59.4 years in 2012. The number of countries above the average life expectancy (for both sexes) in 1990 stood at 22, which declined to 18 in 2000 and then increased to touch 21 in 2012. Countries like Swaziland, Guinea-Bissau, Côte d'Ivoire, Mozambique, Democratic Republic of the Congo, Central African Republic, Chad, Angola, Lesotho, and Sierra Leone have life expectancy below 55 years. This is a far cry compared to some countries like Japan which has a life expectancy of 85 years.

However, there is one crucial observation (**refer Annexure 1**). Among the 21 countries which exhibited a higher life expectancy than the average in 2012 (for both the sexes), female life expectancy was higher in all these countries as compared to male life expectancy. In fact, countries like Seychelles, Mauritius, Cape Verde and South Africa show a significant difference between the two genders on this parameter.

#### *Infant mortality rate*

Infant mortality rate is defined as the probability (expressed as a rate per 1000 live births) of a child born in a specific year or period dying before reaching the age of one. A higher infant mortality rate is often considered as detrimental to growth potential. Africa suffers from significantly high numbers of newborn who continue to die at birth. For every 100,000 births, there are approximately 400 deaths in Africa, which is the highest child mortality rate anywhere in the world. Even chances of an African woman dying from pregnancy related causes are 100-times higher than a woman in the developed world.

Despite some progress in many countries, Sub-Saharan Africa remains the most affected (**refer Annexure 2**). Countries like Sierra Leone, Angola, Central African Republic, Chad, Democratic Republic of Congo, Guinea-Bissau, Mali, Nigeria, Lesotho, and Côte d'Ivoire are amongst the countries with the highest infant mortality rates in the continent. Countries like Liberia, Mozambique, South Sudan, Malawi, Guinea, and Niger, which were amongst those with the highest infant mortality rates in 1990, have achieved phenomenal

success in reducing the rate by more than half by 2013. On the other hand, countries like Sierra Leone, Angola, Central African Republic, and Chad continue to remain amongst the highest in infant mortality rate. Countries which have improved their position throughout the period under consideration, even though they were among the lowest in terms of infant mortality rates. even in 1990, include Seychelles, Mauritius, Algeria, Cape Verde, South Africa, Namibia and Botswana.

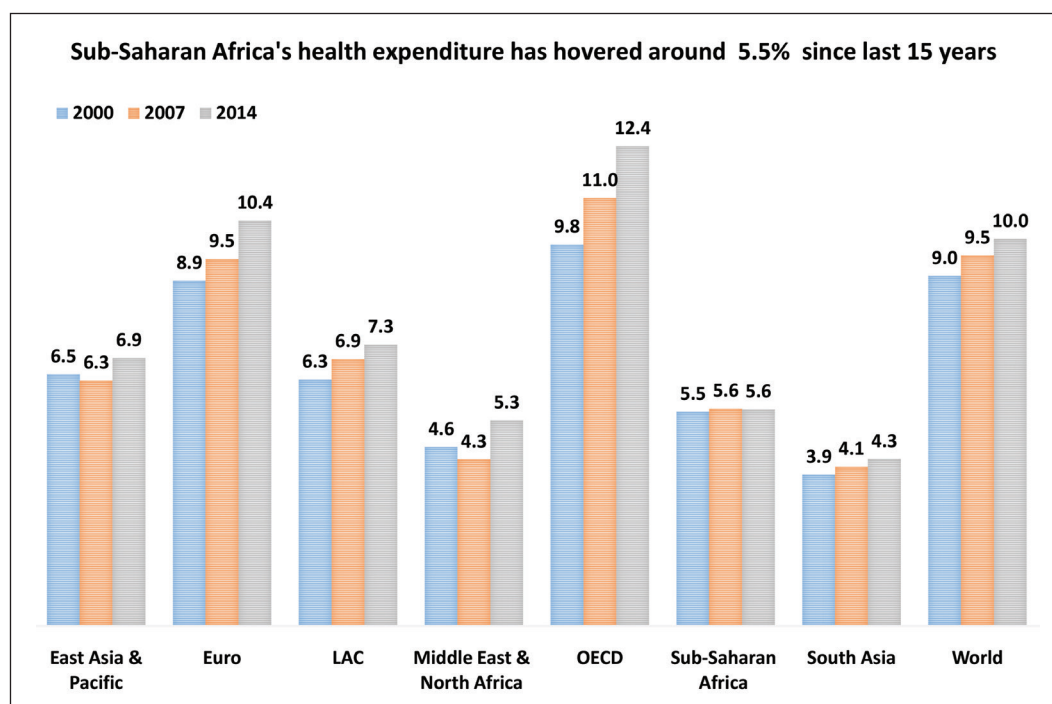
#### *Burden of disease*

Burden of disease essentially depicts the percentage of the years of life lost by major cause groups. Years of life lost (YLLs) take into account the age at which deaths occur by giving greater weight to deaths occurring at younger ages and lower weights to deaths occurring older ages. The YLLs (percentage of total) indicator measures the YLLs due to a particular cause of death as a proportion of the total YLLs lost due to premature mortality in the population. In this category, 3 major cause groups are identified – communicable (including maternal, neonatal and nutritional conditions); non-communicable diseases; and injuries.

From the data (**refer Annexure 3**) it is observed that there exist a high proportion of countries in Africa where the cause of death is largely due to communicable diseases. Amongst the top 10 countries in 2012 with the highest share of their population affected by communicable diseases, 9 figured in the list in 2000 as well (Lesotho was the new addition). Mauritius, Cape Verde, and Algeria had the lowest share of their population affected by communicable diseases. This is largely because of the availability of better preventive health care facilities.

One of the key reasons for communicable diseases accounting for a large share of deaths is the lack of requisite laboratories in Africa. An early detection of the communicable disease is the best way to prevent its spread. Due to inadequate laboratories, both in terms of numbers and in terms of facilities, disease control and prevention programmes cannot be undertaken. Coupled with this is inadequate staffing, equipment and supplies.

Exhibit 7: Regionwise Health Expenditure (as a percentage of GDP)



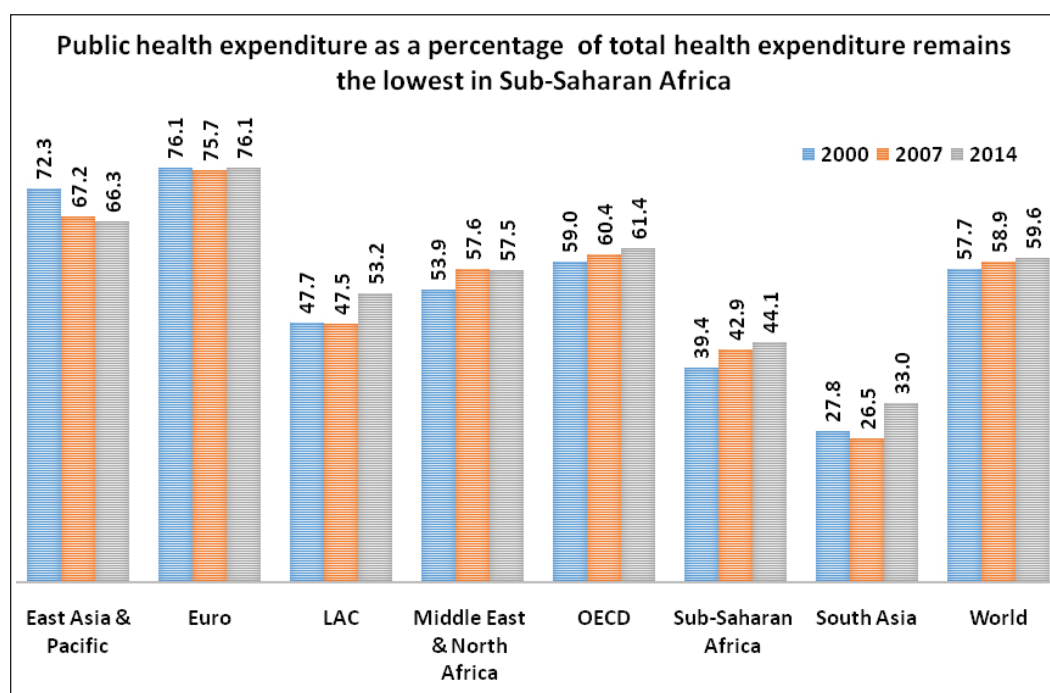
Source: Data derived from World Bank, 2016; Exim Bank Research

The existing laboratories in Africa can be grouped into two broad categories, clinical laboratories and public health laboratories. Public health laboratories are responsible for providing timely and reliable results primarily for the purpose of disease control and prevention. However, clinical laboratories are responsible for providing accurate diagnosis of ongoing, recent or past infections for appropriate case management. The focus of the clinical laboratory is individual patient care. However, data generated from both types of laboratories are essential for disease surveillance, control and prevention activities – which remain largely non-existent in most parts of Africa.

Despite the growing threat from emerging and re-emerging diseases, very few laboratories have been able to build the capabilities for diagnosing highly infectious diseases. Due to lack of facilities, countries often have to ship specimens to other regions for confirmation, resulting in delayed responses to outbreaks. This has also been because laboratories have usually been given low priority and recognition in most national health delivery systems, and hence the challenge remains in developing a comprehensive laboratory policy which addresses the key issues. However, going forward, non-communicable diseases are projected to overtake communicable and nutritional diseases as the most common cause of death in Africa by 2030<sup>7</sup>.

<sup>7</sup>Novartis

Exhibit 8: Public Health Expenditure (percentage of total health expenditure)



Source: Data derived from World Bank, 2016; Exim Bank Research

#### Non-communicable Diseases and Conditions

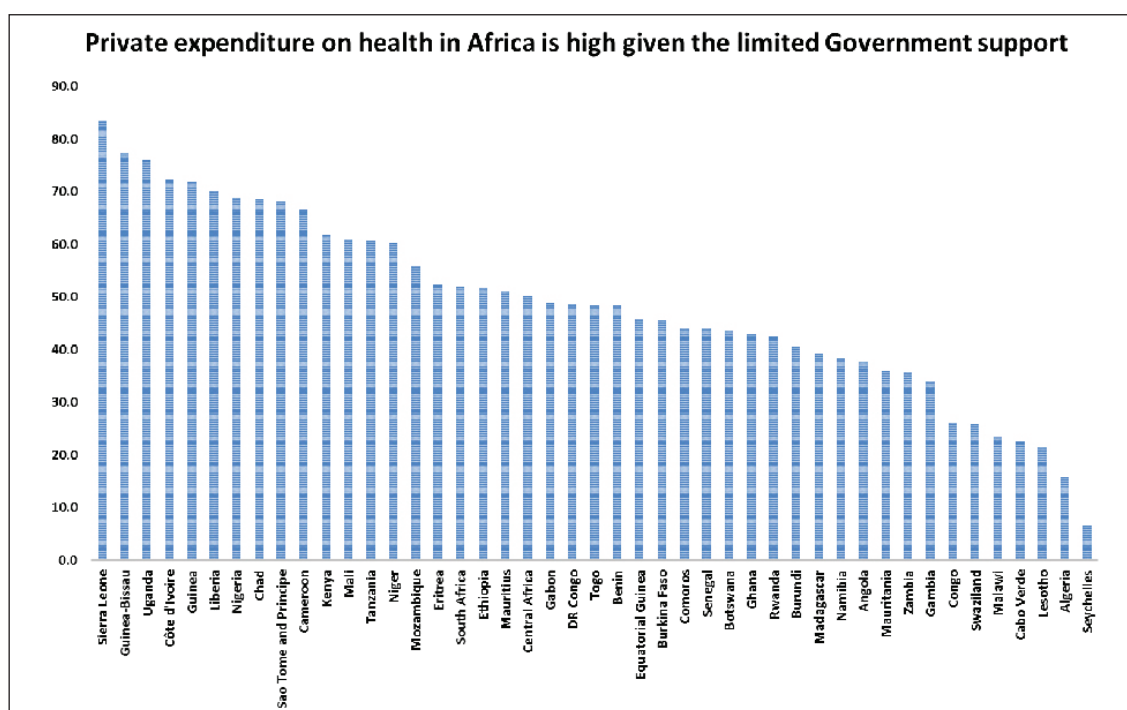
Malaria and other contagious, preventable diseases like HIV, tuberculosis, pneumonia and even leprosy still stand in the way of growth. In fact, 90% of global malaria deaths occur in Africa. Countries like Sierra Leone, Algeria, Mali, Angola, Burkina Faso, Benin, Guinea-Bissau, DR Congo, Equatorial Guinea, and Madagascar have been amongst the top 10 countries having lost sizeable number of their population due to cardiovascular diseases in Africa as in 2012 (**refer Annexure 4**). On the other hand, countries that appear at the bottom of the list are Mozambique, Mauritius, Kenya, Tanzania, Senegal, Zimbabwe, and Ethiopia. With regard to chronic respiratory diseases, Liberia, Mali, Lesotho, Swaziland, Central African Republic, Equatorial Guinea, Angola, Namibia, Democratic Republic of Congo, and Sierra Leone were found high on the list. Countries which were observed to be relatively much better off in terms of deaths caused due to chronic respiratory diseases were Tanzania, Rwanda, Zambia, and Kenya.

However, data related to diabetes mellitus reveals some stark results. Countries with significant number of deaths of their population occurring due to diabetes mellitus include Mauritius, South Africa, Swaziland, Lesotho, and Sierra Leone. This is despite the fact that Mauritius and South Africa are considered as having the best medical facilities in the African region. This trend can be largely attributed to the prosperity in these countries, given that diabetes is a lifestyle disease – an increase in the disease could be a symptom of growing prosperity, as people are able to afford more processed foods. It is also a sign of a more sedentary lifestyle as more people spend their working days sitting down. African countries which have experienced least amount of deaths due to diabetes mellitus are Central African Republic, Zimbabwe, Cape Verde, and Madagascar.

Amongst the non-communicable diseases, the cause of cancer is not very well defined. In Africa, countries which have been prone to malignant neoplasms (cancer) are Zimbabwe, Kenya, Burundi, Uganda, Madagascar, and Rwanda.



Exhibit 9: Private Expenditure on Health in Africa as Percentage of Total Health Expenditure: 2014



Source: Data derived from WHO, 2016; Exim Bank Research

### Density of Healthcare Centres

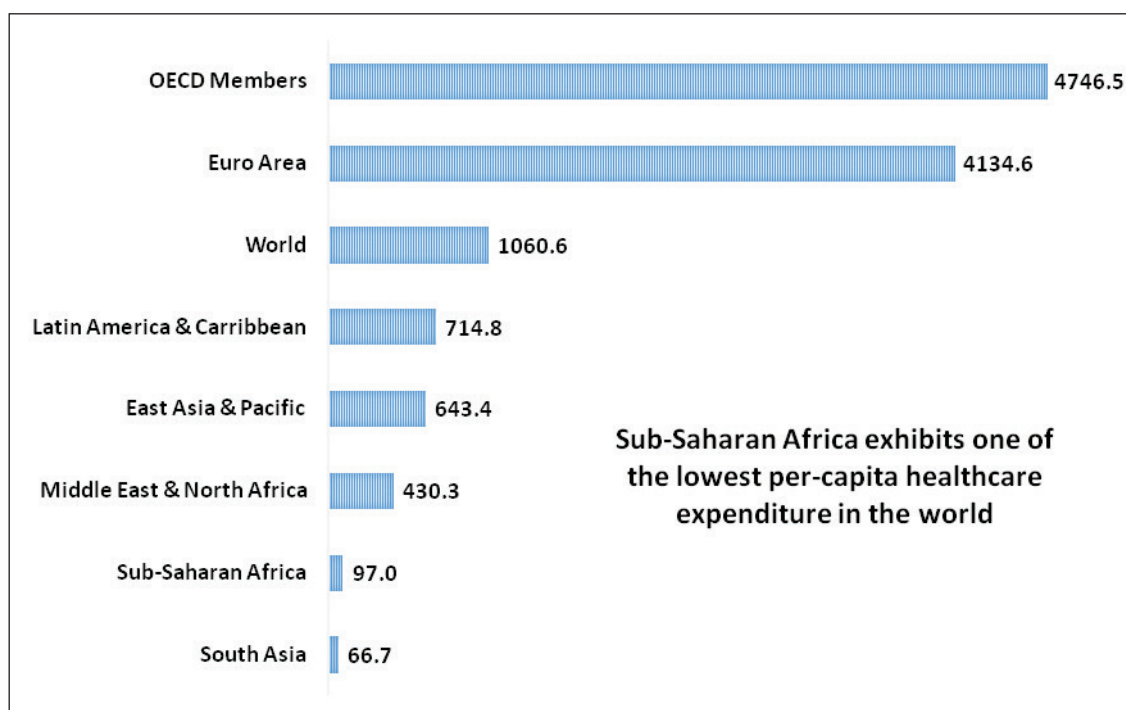
Hospital infrastructure is crucial in the socio economic structure of a country. In fact, the density of hospital can be an indication of the availability of inpatient services. An analysis of the data for total density of hospital per 100,000 population reveals that Guinea-Bissau has the highest numbers at 56.45, far ahead as compared to Gabon, the distant second at 3.53. Countries like Tunisia, Kenya, Ghana, Botswana, Seychelles, Mauritius, South Africa, and Egypt show a ratio of 2.33, 1.47, 1.36, 1.29, 1.08, 0.96, 0.67 and 0.62 hospitals per 100,000 population, respectively (**Annexure 5**).

Some of the other health related facts and figures are also not very encouraging. The number of specialist surgical workforce in Africa at 1.7 per 100,000 people as compared to world average of 30.5<sup>8</sup> also shows the primitive healthcare scenario in Africa. A severe

shortage of nurses and midwives means that over two thirds of women in Africa have no contact with health personnel following childbirth. Therefore, Africa accounts for more than half of the world's maternal and child deaths.

However, as in many parts of the developing and less developed countries, those living in urban areas are more likely to receive better healthcare services than those in rural or remote regions. Many communities in the rural region lack clean water and proper sanitation facilities. This means that illnesses caused by poor hygiene, such as cholera and diarrhoea, are common in some African countries. Knowledge and skill based manpower is largely unavailable. Supplies are another problem as hospitals and clinics in some African countries lack basic equipment and have inadequate supplies of medicines.

<sup>8</sup>World Bank

**Exhibit 10: Regionwise Health Expenditure per capita (figures are in US\$) : 2014**

Source: Data derived from WHO, 2016; Exim Bank Research

Disruption to daily life and damage to facilities caused by conflict, in some countries, have also disrupted the healthcare delivery. In the past, outbreaks of sleeping sickness have been closely associated with civil unrest in Uganda, Angola and the Congo. The movements of population also spread disease. One of the latest diseases to have caught the attention of African population is diabetes. In Africa, the prevalence of diabetes has more than doubled from 3.1% to 7.1% (of population) during 1980 to 2014, as the average world's diabetes share increased from 4.7% to 8.5% during the same time period. In fact, in terms of number of people with diabetes, Africa has witnessed a 6 fold increase from 4 million to 25 million persons during the same period.

The financing system in Africa is as deficient as the healthcare delivery system that it supports. The total health expenditure (sum of public and private health expenditure covering the provision of health services, family planning activities, and nutrition activities, but does not include provision of water and sanitation) as a percentage of GDP in 2014 in Sub-Saharan Africa was 5.6% as compared to the World average of 10%. While

the average health expenditure as a share of GDP for the world has moved up by 1 percentage point during the 15-year period from 2000 to 2014, that of Africa has increased by a just 0.1 percentage during the same period.

What is even more disheartening is the fact that this share in Africa has been declining consistently from 2009. This state of affairs has largely been a factor of inadequate funding of healthcare by the government – public health expenditure (which consists of recurrent and capital spending from government budgets, external borrowings, grants, and social health insurance funds) as a percentage of total health expenditure in 2014 for Sub-Saharan Africa stood at 42.4% as compared to the World average of 60.1%, which is significantly below all other regions in the world. In most of the developed countries, the Governments provide social security under which health services are covered.

As a result, the private expenditure on health in Africa as a percentage of total health expenditure seems apparently higher. With limited Government support, Africans are incurring a significant amount of health expenditure on their own.



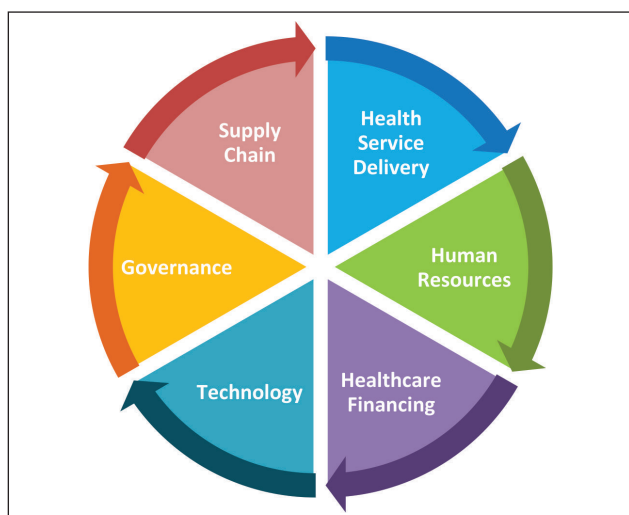
The per capita health expenditure (current US\$) of Sub-Saharan Africa since the turn of the century has increased by three times from US\$ 32.57 in 2000 to US\$ 96.98 in 2014. During the same period, the average

many African countries in terms of absolute values, especially when compared to other regions of the world.

It is but true that Africa is a conglomeration of 54 countries, most of which are landlocked; however, the healthcare solutions to most of the challenges in the continent are similar in nature. The pillars of Africa's healthcare solutions can broadly be classified as improvements in health service delivery, human resource, healthcare financing, technology, governance, and supply chain. Considering the massive challenges facing Africa's healthcare systems, concentrating on developing systems and procedures around these will certainly enable the continent to develop a viable healthcare system.

The need for a robust healthcare delivery system is accentuated given that there has been a slow and steady growth of urban middle class, who are willing to pay for better treatment in Africa. This eventually creates the potential to open the door to the private sector, which is starting to explore opportunities working in partnership with donors and governments to provide better healthcare facilities, and increased access to medicine at an affordable price.

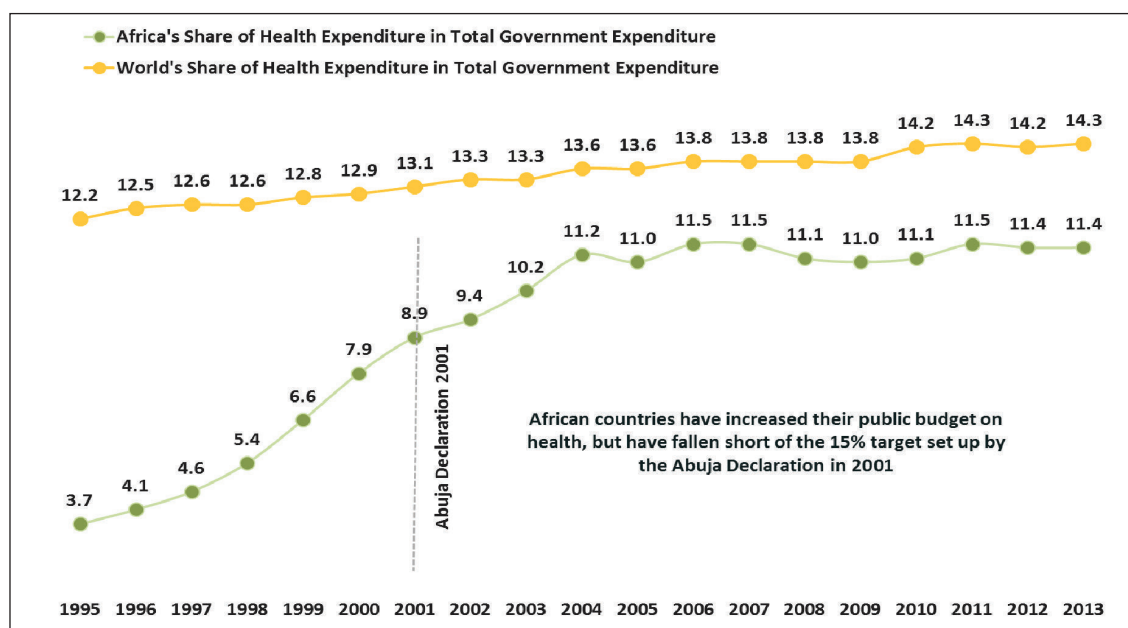
**Exhibit 11: Pillars of Africa's Healthcare**



Source: Exim Bank Research

per capita health expenditure for the world increased almost by two and half times from US\$ 491.11 to US\$ 1060.56. While in terms of growth, this progress may appear appreciable, there is still a long way to go for

**Exhibit 12: General Government Expenditure on Health (as a percentage of total Government Expenditure)**



Source: Data derived from WHO, 2016; Exim Bank Research

Governments in Africa are acknowledging the importance of preventive methods over curative action and becoming more conscious of the healthcare lacunae, and new models of care are being designed. This, in turn, is empowering communities to make their own healthcare decisions. At the same time, some countries are experimenting with different forms of universal health provision.

In some African countries, there are positive frameworks of regulations that are being brought in, although enforcement still remains a major challenge. In order to engage with a new set of investors, African nations must mould the regulatory system towards attracting investments from the private sector, besides encouraging the involvement of civil society organisations.

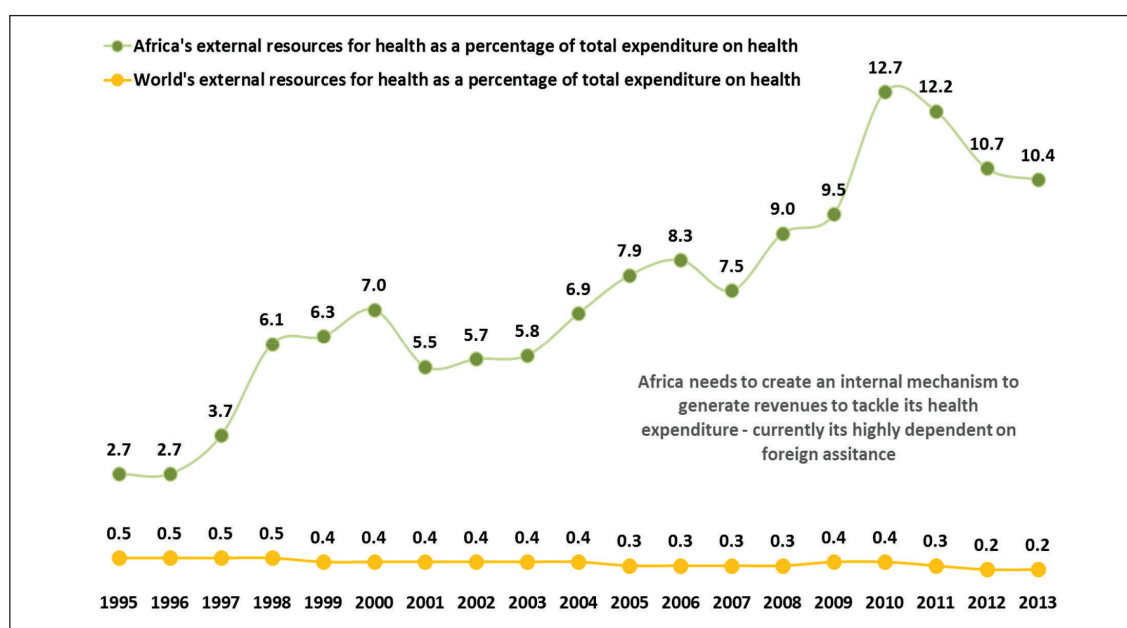
Reforms in the healthcare financing are well under way in the African continent. A number of countries (Burkina Faso, Mali, Niger and Sierra Leone) are opting for subsidized or free healthcare, particularly for pregnant women and children below five. Some countries have introduced health insurance schemes with the objective of reducing out of pocket spending of the population.

Countries such as Ghana, Rwanda and South Africa have introduced universal healthcare coverage. In Ghana, for example, health insurance enrolment has significantly reduced the out of pocket payments and protected the households against exorbitant expenditure.

All African countries have committed, in Abuja Declaration in 2001, to spend at least 15% of their public budget on health. Although only a few countries have succeeded in meeting this commitment, other African countries are exhibiting political will to achieve this commitment.

External resources for health account for 10.4% of total health expenditure in Africa, which is a much higher proportion than anywhere else in the world (world average is just 0.2%). In some countries like Malawi, Mozambique, and DR Congo, external resources accounted for more than 50% of country's health expenditure in 2013. With the global meltdown, international donors are likely to cut down aid for healthcare. The Governments in Africa need to develop equitable and sustainable health financing system to meet their healthcare expenditure, and generate internal resources for their healthcare development agenda.

**Exhibit 13: External Resources for Health as percentage of Total Expenditure on Health**



Source: Data derived from WHO, 2016; Exim Bank Research

The working population in Africa is expected to grow. The growth in young population and likely change in their lifestyle may lead to growth in lifestyle related diseases such as obesity, cancer and cardiovascular illness. According to some estimates, by the year 2050, the aged population will account for nearly 13% of Africa's total population. The fastest growths of old age population will be in North Africa where the proportion of elderly citizens will be double that of Africa as a whole. It is estimated that by 2060, one-third of North Africa population will be above 60 years.

Set against this background, it will not be out of place to assert that Africa's healthcare systems which today is at a nascent stage, provides tremendous opportunity for healthcare investors to create new and innovative business models for different geographies in the continent. The private sector involvement across the healthcare chain in Africa will be extremely crucial for improving the health outcomes in the continent over the next decade and beyond. The private sector has been playing an increasingly important role in health financing in Africa. In Sub-Saharan Africa, about half of spending in all types of income categories, from the

poorest to the richest, comes from the private sector. Of this, about 72% is out of pocket expenditure, with the remainder coming from risk pooled<sup>9</sup> and other sources. In some countries like Angola and Mali, all private expenditure is direct payments from households. A study by the International Finance Corporation (IFC) has estimated the market for healthcare in Sub-Saharan Africa at about USD 35 bn in 2016.

Poor health of the workforce could impact GDP per capita negatively, by reducing both labour productivity and the relative size of the labour force. As Africa is emerging as a growing region, the health of the region becomes a vital component to help achieve and sustain high economic growth. Thus, it is pertinent for the region to provide a strong focus on the sector. One of the means of doing so would be to attract greater investments to this sector. The potential for foreign investors in this sector remains significant. Given that the BRICS countries were in a similar situation not too long ago, their enterprises are likely to understand the market dynamics in Africa better than most others, providing them an edge as investors.

### **THE CASE FOR INVESTING IN STRATEGIC MINERALS IN AFRICA**

Africa is believed to be a continent having significant amount of natural extractive resources like oil, gas and minerals, which if harnessed strategically could accelerate and change the face of the African economy significantly. However, their distribution across the continent is not uniform and transformation of such resources into assets that engender economic empowerment still remains a fundamental challenge. Added to this, at the current juncture, the volatile commodity prices continue to remain a cause of concern.

While Africa has continued to act as a feedstock for the world's demand for minerals, it is important that going forward there is complete consciousness towards sustainable development of such resources.

Investments in Africa's natural resources would call for a drive to increase the benefit obtained by Africans from minerals mined and exported (often by foreign companies). This would require partnering with state-owned enterprises and local communities to ensure that the benefit of mining is transferred to citizens.

The need of the hour is to make extractive industries contribute to the overall development through value addition. Extractive sector projects can be leveraged to improve infrastructure, enabling systemic linkages and economic expansion, as well as affordable access to critical resources like power and water. Combined together, these measures can generate positive impact on job creation, skills development and poverty alleviation.

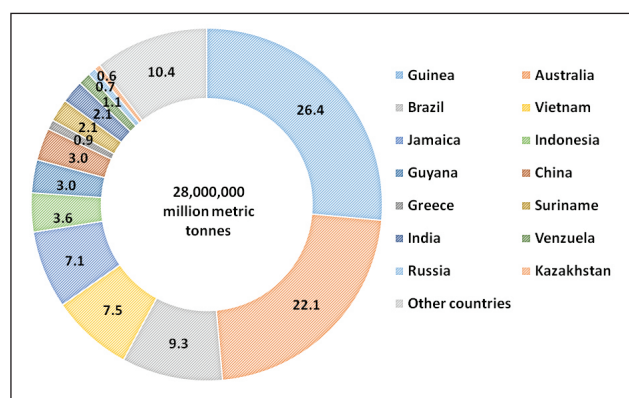
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<sup>9</sup>A risk pool is one of the forms of risk management mostly practiced by insurance companies. Under this system, insurance companies come together to form a pool, which can provide protection to insurance companies

## Bauxite

Bauxite, which is used in cement, chemicals, soda cans, dishwashers, siding for houses, and a host of other aluminum products, is one of the most important industrial minerals.

**Exhibit 14: Share of countries in Bauxite Reserves 2014 (in per cent)**



Source: Data derived from USGS, 2016; Exim Bank Research

Guinea has the world's largest reserves of bauxite in the world, almost one-third of the world reserves of 7,400,000 million metric tonnes. However, in terms of production it is at the fourth position, after Australia, China, and Brazil.

Given the fact that bauxite is the most important ore for producing aluminium and is predominantly used across industries, it calls for a greater integration of mining, refining, smelting and of semi-fabrication centres, thereby helping in creation of a sustainable mechanism for value addition locally.

The domestic agencies involved with mining are the Association pour la recherche et l'Exploitation du Diamant et de l'Or, Friguia Sal, Siguri Gold Property, and Societe AMIG Mining International (SARL).

A major developer in the field of bauxite mining is the Alumina Company of Guinea (ACG-Fria), which is located in Fria, and the Government of Guinea holds a 49% share while the Reynolds Metals Company holds the balance. Another firm in which the Government of Guinea has a stake along with the world's second largest aluminium company RUSAL, is Compagnie Des Bauxites De Kindia (CBK).

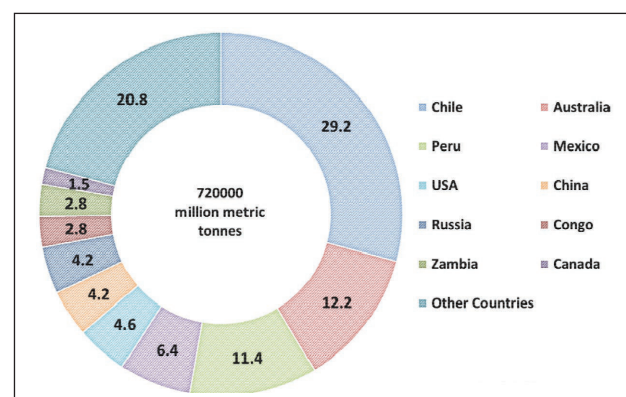
Besides this, there are a number of international companies associated with mining operations in Guinea, one of them being Cie des Bauxites de Guinée's (CBG). It is a joint venture of Alcoa, Rio Tinto, and Dado Mining holding a 51% share, and the Guinean government holding a 49% share. Its exports of bauxite are the largest in the world. CBG has been planning a US\$ 1 billion expansion to increase its production capacity to 23.5 million tonnes per year by 2018 to respond to increased demand.

While the Government is aware of the tremendous potential that Guinea has, and which as yet remains untapped, some infrastructure projects have been lined up which would help in strengthening the bauxite mining sector in Guinea. These include Kamsar Harbour (for evacuation of the bauxite and alumina), and Bofa Harbour project (being developed with Alufer and China power Investment).

## Copper

While Latin America will always be the most important source of copper supply globally, given its sheer size and volume of production and reserves, Africa with its rich reserves in Congo and Zambia is also a significant player. Congo and Zambia are the two countries that had a proven reserve share of 2.8% each in 2014. There is also a belief that the true resource base of copper in Africa is being widely underreported due to limited exploration work as a result of political instability and underdeveloped infrastructure.

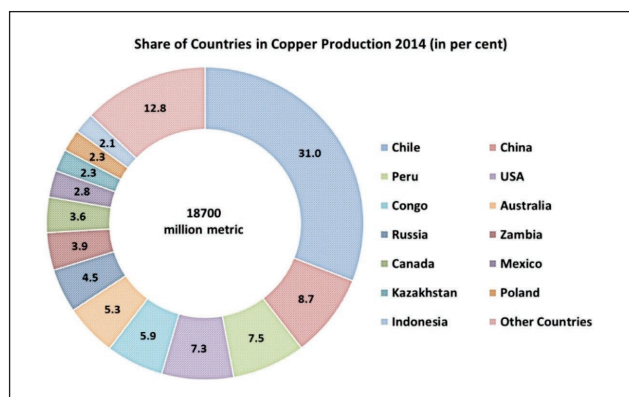
**Exhibit 15: Share of countries in Copper Reserves 2014 (in per cent)**



Source: Data derived from USGS, 2016; Exim Bank Research

In terms of production, both Congo and Zambia are amongst the top 10 in the world, with a share of 5.9% and 3.9%, respectively.

**Exhibit 16: Share of countries in Copper Production 2014 (in per cent)**



Source: Data derived from USGS, 2016; Exim Bank Research

While there exist significant opportunities in both these countries for investment, the region is handicapped by the lack of infrastructure and to some extent due to the occasional political challenges faced by these countries.

If the infrastructure challenges are overcome, Congo and Zambia could take better advantage of the huge wealth of resources they have through sustainable development.

Today, copper is in high demand around the world because of its thermal and electrical conductivity. And, in addition to industrial uses, its aesthetic qualities keep it popular in art and construction. There is a huge scope for value addition in copper through fabrication, cathode/blister copper, besides creating a more competitive domestic manufacturing industry by building local demand for fabricated products. Greater use of copper products in the construction industry (like, copper pipes for plumbing, etc.) in the region would also help to create this demand.

One of the largest investments in copper ore is by the First Quantum Minerals which is currently operating in the Kansanshi and the Guelb Moghrein copper-gold mine in Zambia. The Kansanshi mine in Zambia is the eighth largest copper mine in the world, with two open pits. The mine is 80% owned by First Quantum Minerals through its subsidiary Kansanshi Mining. The remaining 20% is held by a subsidiary of ZCCM Investment Holdings, a state-owned company in Zambia. There are also plans to construct a 290 km long new railway line connecting Chingola to the Kansanshi, Lumwana and Kalumbila mines with an investment of US\$ 489 mn. The mine will be built by Northwest Rail Company (NWR) in cooperation with Grindrod. Zambia has also initiated The Kansanshi Copper Smelter Development Project in 2014 involving setting up of a new smelter, which will be shared by the Kansanshi (33%) and Sentinel (67%) mines. The project is estimated to cost approximately US\$ 690 mn. WorleyParsons will provide engineering services for the project.

The Congo copper belt includes some of the highest grade copper deposits in the world. In some reserves, the grades are above 5%. The ore also has high grades of cobalt and may hold 34% of the world's cobalt reserves.

There are quite a few companies operating in Congo. Gécamines (La Générale des Carrières et des Mines), remains the main state-owned mining company in Congo, with its principal products being copper (accounting for 50% of export earnings), cobalt and zinc. Copper mines in which Gécamines has a major interest include Kambove, Kipushi and Kolwezi.

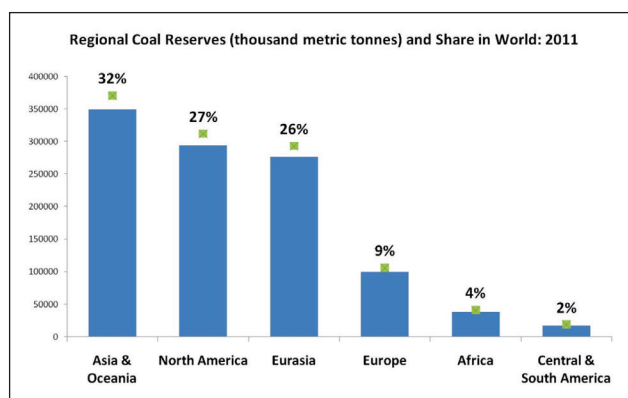
Besides this, there are overseas investors like Canada based Anvil Mining that has been in Congo since 2002, Metorex based out of South Africa operating in Kinsenda and the new Ruashi mines. The UK based, Eurasian Natural Resources Corporation (ENRC) has a significant presence, particularly with the Mukono Mine asset, since its takeover of the Central African Mining and Exploration Company (CAMEX).



## Coal

Coal is the second most important source of primary energy, and is predominantly used for power generation. According to US Energy Information Administration (US-EIA), majority of the proven coal reserves in the world are in the Asia and Oceania region (32%), with Africa constituting around 4% of the total.

**Exhibit 17: Regional Coal Reserves and Share in World: 2011**



Source: Data derived from EIA, 2016; Exim Bank Research

The world coal production is expected to increase by 1.2 billion tons from 2012 to 2040, with 0.7 billion tons (62% of the total increase) coming from India. China however is anticipated to continue to remain as the largest coal producer through 2040. Production in Australia, Africa, and Russia is also forecast to increase substantially,

**Table 12: Status of Coal in Africa: 2012 (values are in thousand metric tonnes)**

	Production	Consumption	Exports
South Africa	314415	226961	90152
Mozambique	4569	88	3753
Zimbabwe	3633	3472	230
Botswana	898	902	0
Swaziland	593	153	593
Niger	288	288	0
Congo	161	477	0
Tanzania	117	117	0
Malawi	66	66	0
Nigeria	39	39	0
Africa	324776	242552	95455

Source: Data derived from US-EIA; Exim Bank Research

with their combined increase representing 24% of the world's total production increase.

As far as coal production in Africa is concerned, it has increased by around 4% during the period 2008 and 2012 from 311101 thousand metric tonnes to 324776 thousand metric tonnes.

Amongst the key producers of coal, South Africa occupies the first position. It is also the key consumer and exporter of coal, in terms of volume. In fact, more than 90% of the coal in Africa is produced and consumed in South Africa. In addition to the extensive use of coal in the domestic economy, about 28.7% of South Africa's production is exported, mainly through the Richards Bay Coal Terminal, making South Africa as amongst the key coal exporting countries in the world. Around 46.5% of the country's coal mining is underground and 53.5% is produced from open-cast mines. By global standards, South Africa's coal deposits are moderately shallow with thick seams, which make them easier and, typically, cheaper to mine.

Mozambique, which is the second largest producer of coal in Africa, has been showing significant potential for additional mineral deposits, off late. Significant reserves of coking coal have been discovered in the Tete province and the Zambezi area of the country, which have attracted a number of prominent mining companies. Vale Mining and Rio Tinto are developing mines in the country and constructing key infrastructure to facilitate export of mining commodities. Vale has been producing coal from the Moatize mine since July 2011, and has invested in developing two railroad projects – the Sena railroad project would connect the Moatize mine to the port of Beira, while the Nacala corridor project for transporting coal from the Moatize mine to the sea port of Nacala for exports. In 2012, Rio Tinto opened the Benga mine, to undertake its large investments in coal interests in Mozambique. Besides this, Nippon Steel, which is one of the largest producers of steel in the world, and one of the largest buyers of iron ore and coal, has shown interests in the Revuboe mine in Mozambique.

The main source of coal in Botswana is the Morupule colliery located in Palapye which has been in operation since 1973. Another source of coal in Botswana is Mmamantswe, which is located just 70 km north of the capital Gaborone. There are other areas as well like – Dutlwe, Foley, and Letlhakeng.

Coal has also been produced in Zimbabwe in Hwange since 1895. The state-owned Hwange Colliery operates at 60% of its nominal capacity, and this is largely due to lack of upgraded infrastructure, inadequate logistics and lack of capital, which prevents any major expansion or drive to increase productivity. Hwange region alone constitutes around 75% of Zimbabwe’s coal production.

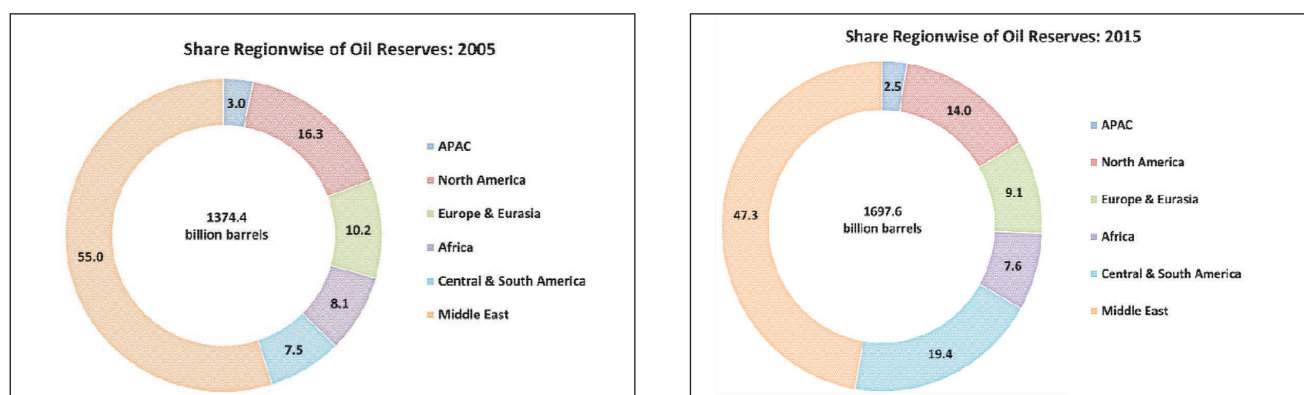
There is also a need for value addition beyond mere coal mining. As has been the practice across the globe, there is forward integration in the form of steel manufacturing process from coal. The largest single use of coal in the steel industry is as a fuel for the blast furnace, either for the production of metallurgical coke or for injection with the hot blast. Other less commonly thought uses of coal are for making steam and electricity, as sources of carbon addition in steel making processes, and in direct smelting of iron processes. Furthermore, electricity purchased from outside sources is largely generated from pulverized coal combustion and therefore has an indirect influence on steelmaking operations. Most coal mining operations has a steel manufacturing plant in the vicinity, and Africa too can explore combining its coal mining operations with steel manufacturing.

## Crude Oil

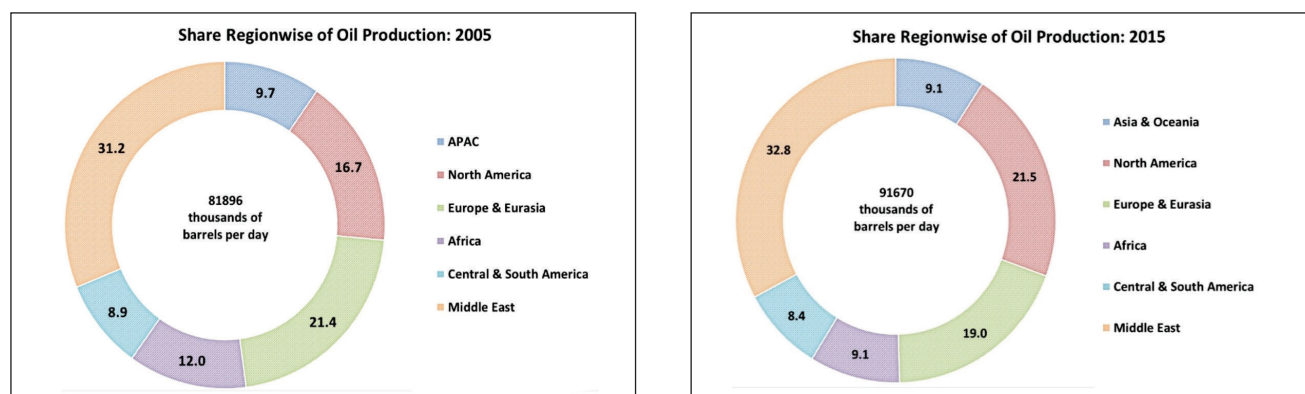
The global proven oil reserves have witnessed a significant increase from 1126.2 billion barrels in 1995, to 1697.6 billion barrels in 2015. Africa, which is home to some of the world’s fastest-growing economies, has been aided in its growth by new oil and gas finds, including those in Mozambique, Tanzania, Kenya, Uganda and Ghana. The share of Africa in global oil reserves has increased from 6.4% in 1995 to 7.6% in 2015, which is higher than the entire Asia Pacific and close to Europe and Eurasia regions. According to EIA estimates, a US based energy body, at least another 100 billion barrels in offshore Africa, is waiting to be discovered.

As far as world crude oil reserves of the Organization of the Petroleum Exporting Countries (OPEC) members are concerned, more than 81% of the world’s proven oil reserves are located in OPEC Member Countries, with the bulk of OPEC oil reserves in the Middle East, accounting for around 66% of the OPEC total. OPEC members include Algeria, Angola, Ecuador, Iran, Iraq, Kuwait, Libya, Nigeria, Qatar, Saudi Arabia, UAE, and Venezuela. During the period 2005-2014, OPEC Member countries added 289.1 billion barrels to their total proven crude oil reserves, a significant addition compared to the 11 billion barrels by non-OPEC members.

**Exhibit 18: Country-wise Distribution of Proven Oil Reserves (in percent)**



Source: BP Statistics 2016; Exim Bank Research

**Exhibit 19: Country-wise Distribution of Oil Production (in percent)**

Source: BP Statistics 2016; Exim Bank Research

A country-wise breakup of Africa in terms of world oil reserves shows Libya having the highest oil reserves with a share of 37.5%, followed by Nigeria (28.7% share), Angola (9.8% share), and Algeria (9.4%). Amongst these only Libya is not a member of the OPEC group of economies.

Oil contributes substantially to Africa's total export receipts; in 2011, 58% of Africa's total export receipts in value terms belonged to the category 'mineral fuels, oils and distillation products'. In some individual countries, hydrocarbon exports account for over 95% of export earnings.

**Table 13: Countries with the Highest Oil Reserves in Africa (million barrels)**

Country	1995	2005	2015	Share in 2015
Libya	29500	41500	48400	37.5%
Nigeria	20800	36200	37100	28.7%
Angola	3100	9000	12700	9.8%
Algeria	10000	12300	12200	9.4%
Egypt	3800	3700	3500	2.7%
South Sudan	NA	NA	3500	2.7%
Gabon	1500	2100	2000	1.5%
Republic of Congo	1300	1500	1600	1.2%
Chad	NA	1500	1500	1.2%
Sudan	300	600	1500	1.2%
Equatorial Guinea	600	1800	1100	0.9%
Tunisia	400	600	400	0.3%
Other Africa	700	500	3700	2.9%
<b>Total Africa Reserves</b>	<b>72000</b>	<b>111300</b>	<b>129200</b>	<b>100.0%</b>

Source: BP Statistical Review of World Energy, June 2016



**Table 14: Oil Production in Africa (in thousands of barrels per day)**

Country	1995	2005	2015	Share in 2015
Nigeria	2527	2535	2352	28.1%
Angola	1282	1863	1826	21.8%
Algeria	1990	1689	1586	18.9%
Egypt	672	725	723	8.6%
Libya	1745	1656	432	5.2%
Equatorial Guinea	358	274	289	3.5%
Republic of Congo	247	314	277	3.3%
Gabon	270	255	233	2.8%
South Sudan	NA	NA	148	1.8%
Sudan	294	462	105	1.3%
Chad	173	122	78	0.9%
Tunisia	80	85	63	0.8%
Other Africa	172	162	264	3.2%
<b>Total Africa Production</b>	<b>9810</b>	<b>10142</b>	<b>8376</b>	<b>100.0%</b>

Source: BP Statistical Review of World Energy, June 2016

Africa's key oil producing countries are expectedly in sync with the reserves. Algeria, Angola, Nigeria, and Egypt together accounted for a share of 77.4% of Africa's total oil production. On the whole, in 2015, Africa's oil production represented 9.1% of the world's total crude oil output.

The North Africa region has been a significant producer of oil in the continent and includes big-league players like Libya, Algeria and Egypt. While Libya is host to the continent's largest reserves of oil, its production has largely been constrained by the internal conflicts and political turmoil it has been going through. On the other hand, Algeria which has the fourth largest reserves of oil in the continent, has been the third largest producer in Africa after Nigeria and Angola.

It has also been observed that a good extension of the coast of West Africa, especially Gulf of Guinea has been a growing source of oil to world markets. Gulf of Guinea nations mostly supply European and American markets, although Angola supplies to China as well. The Gulf of Guinea runs from Guinea on Africa's north-western tip to Angola in the south and includes oil producing countries like Nigeria, Ghana, Ivory Coast, DRC, Congo,

Gabon, Cameroon, Equatorial Guinea and Angola. However, amongst the West African countries, Nigeria is the predominant player with the second largest reserves (after Libya) and the largest producer in Africa.

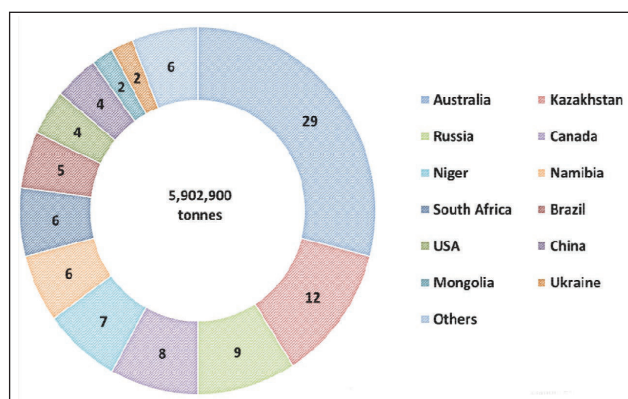
The Eastern part of Africa is witnessing significant developments as well. After being in the shadow of North and West Africa for long, the Eastern African region has off late become the new energy frontier after new discoveries. Efforts to find oil has been underway in East Africa for long, but the extent of the potential has only become evident in the last few years. In 2006, Uganda discovered oil on the country's western border with the Democratic Republic of the Congo in the Albertine Graben region. With greater proven reserves, many well-known companies have already engaged in exploration and production businesses in Uganda. Kenya, another emerging East African country, too has been lucky to find oil onshore in 2012. The US Geological Survey estimates that coastal areas of Mozambique and Tanzania alone could harbour more than 250 trillion cubic feet of gas in addition to a further 14.5 bn barrels of oil. Other than these three countries, Madagascar is also seen to have potential, but no commercial discoveries of oil have been made there to date. Ghana

on the other hand, became a key producer of oil in Africa since December 2010, following discovery of a major offshore oil field in June 2007. This helped the country to register one of the highest economic growth rates in the world in 2011, when Ghana saw its first full year of oil production.

However, while Africa has almost 7.6% of the global reserves and produces around 9.1% of world's crude oil production, the continent lags behind drastically when it comes to oil refineries. The primary reason attributed is the lack of feasibility in keeping a firm's operation over a long term time horizon. Government intervention and support, along with policies to attract private players can make construction and operation of refinery viable.

## Uranium

**Exhibit 20: Share of Countries in Uranium Reserves: 2014 (in per cent)**

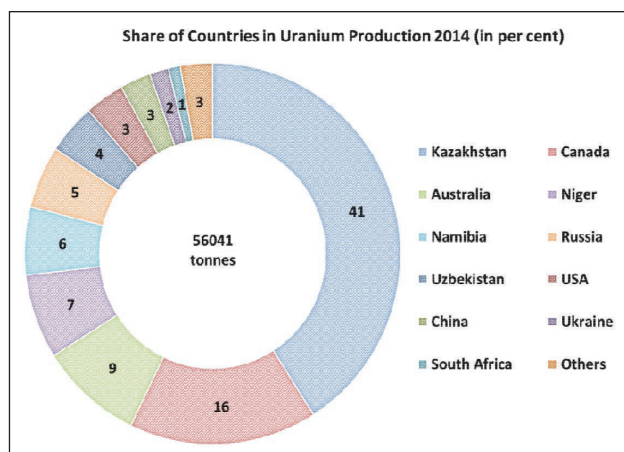


Source: Data derived from World Nuclear Association; Exim Bank Research

One of the foremost usage of uranium is to produce clean energy in the form of nuclear energy. The demand, as and where capabilities exist to produce energy from uranium, remains quite high.

In terms of share, Australia, Kazakhstan, Russia and Canada, hold 58% of the global share in uranium reserves. Amongst the African countries, Niger, Namibia, and South Africa figure in the top 10 list, having a combined share of 19% globally. Though Botswana does not figure amongst the top 10, it has a global share of around 1% in uranium reserves.

**Exhibit 21: Share of Countries in Uranium Production: 2014 (in per cent)**



Source: Data derived from World Nuclear Association; Exim Bank Research

Kazakhstan holds 41% percent of the world's uranium production, followed by Canada (16%), and Australia (11%). The African countries figuring the top 10 producer list are Niger (with 7% share globally), Namibia (6%), and South Africa (1%).

Niger has two significant uranium mines in producing one of Africa's highest-grade uranium ores. It should be noted that there is strong government backing for expanding mining operations; this has led to plans for additional mines and prospects in the future. Of these new mines, GoviEx Uranium's Madaouela project is expected to be a promising addition once it begins production by 2018.

The other key uranium mining companies in Niger are Somair, Cominak, and Imouraren Inc. Somair is 63.6% owned by Areva NC and 36.4% by Office National des Ressources Minières du Niger (ONAREM) through Sopamin, the Niger mining assets company. Cominak is 34% owned by Areva NC, 25% by Japan's Overseas Uranium Resources Development Co. (OURD), 10% by Enusa SA, Spain and 31% by ONAREM through Sopamin; and Imouraren Inc joint venture has 66.65% held by Areva NC Expansion (86.5% Areva, 13.5% Korea Electric Power Co (Kepco/KHNP)) and 33.35% by the State: Niger government (10%) and Sopamin (23.35%).

The commercial uranium mining in Namibia which began in 1976, contributes about 12% of the country's GDP, which has been growing at a rate of about 5% a year for the past four years. The mid-western regions of Namibia have a large number of uranium deposits and prospects, with many of these first discovered in the 1960s. The World Nuclear Association believes Namibia's mines are capable of providing at least 10% of global supply from its proven 5% of global recoverable resources.

There are two major mines, capable of providing 10% of world mining output - Rossing mine (majority owned by the Rio Tinto Group) has been operational since 1976 - and the Langer Heinrich mine (fully owned by Paladin Energy Ltd) having commenced output in 2006 is the world's third largest uranium mine by output.

Recently in May 2013, mining activity began at a third mine, the Husab project which is the world's third-largest uranium-only deposit and has the potential to produce around 6,820 tonnes per year, more than Namibia's entire current uranium output. The Husab mine is expected to be at full capacity by 2017. This world class uranium mine is being built Swakop Uranium near the town of Swakopmund in the Erongo region in western-central Namibia. Once in full production, Husab will be one of the largest uranium mines in the world.

Having secured a 25-year mining licence for Valencia (in Spain), Canadian owners Forsys Metals also intend

to build a consolidated uranium project called Norasa in Namibia.

The French company AREVA group is present in Namibia through its subsidiary AREVA Resources Namibia, which is working in the region of Swakopmund. This subsidiary was in the process of developing the Trekkopje mining project, located 70 km northeast of Swakopmund in the desert region of Erongo, until 2013. However, owing to the downward trend in uranium prices, AREVA postponed the start-up of mining.

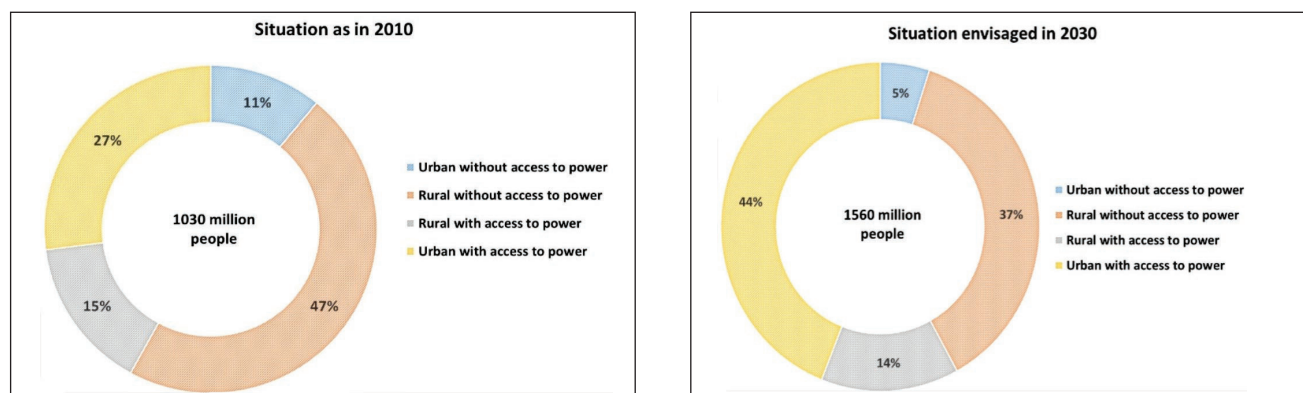
A number of exploration companies, notably Bannerman Resources and Reptile Uranium, are still awaiting governmental approval to proceed with mining. Bannerman Resources applied for a mining license for its Etango Project with an estimated US\$ 870 million capital cost for a mine and heap leach concentrate plant.

As far as South Africa is concerned, the increase in production is mainly attributed to the two mining projects, uranium mining company Areva-owned Ryst Kuil mine in the Karoo, in the Western Cape, and mining company Namakwa Uranium's Henkries deposits, in Namaqualand, in the Northern Cape. South Africa also has a 1800 MW Koeberg nuclear power plant, near Cape Town, which contributes about 6% of total electricity generation in South Africa. The Government of South Africa envisages to increase it to 9600 MW in another 10 years' time.

### **THE CASE FOR INVESTMENT IN SOLAR IN AFRICA**

Africa in the last decade or so has witnessed a significant amount of growth, and in order to sustain this transformation, with a growing population, a massive amount of investment in energy is needed. By 2050, the continent is expected to have around 2 billion people. In 2010, about 590 million African people (58% of the population) had no access to electricity, and 700 million (68% of the population) were living without clean cooking facilities. Assuming that these current

energy access trends continue, in 2030, there is expected to be around 655 million people in Africa (42% of the population) without access to power, and 866 million (56% of the population) without clean cooking facilities. Power consumption per capita in Sub-Saharan Africa is the lowest of all regions, currently estimated at 181 kWh per annum, compared to 6,500 kWh in Europe and 13,000 kWh in the United States.

**Exhibit 22: Comparison of Rural and Urban Electricity access in 2010 and 2030**

Source: IEA: World Energy Outlook; UN-World Population Prospects; Exim Bank Research

Energy-sector bottlenecks and power shortages are estimated to cost Africa some 2% - 4 % of GDP annually, undermining economic growth, employment creation and investment. Companies in Tanzania and Ghana are losing 15% of the value of sales as a result of power outages. South Africa's economic growth also faces threat from frequent 'load-shedding'. An estimated 600,000 Africans (mostly women and children) die annually due to indoor air pollution associated with the use of fuel wood for cooking. Children under-perform for lack of electricity, since over 90% of Africa's primary schools lack electricity. Lives are at risk in African hospitals, as life-saving equipment and services lie unused because of lack of electricity.

Africa's current energy needs are met through a mix of biomass and fossil fuels. Biomass accounts for approximately half of Africa's total primary energy supply. Coal and natural gas account for about 14% each, and oil approximately 22%. Hydropower represents about 1% of the total primary energy supply in Africa<sup>10</sup>.

The irony is Africa, which is one of the few regions of the world that is well endowed with an exceptional amount of sunshine throughout the year, has not been able to harness its resources for its benefit. The desert regions of North Africa and some parts of Southern and East Africa enjoy particularly long sunny days with a high intensity of irradiation. However, the paradox is that during this period, most parts of Africa are bereft

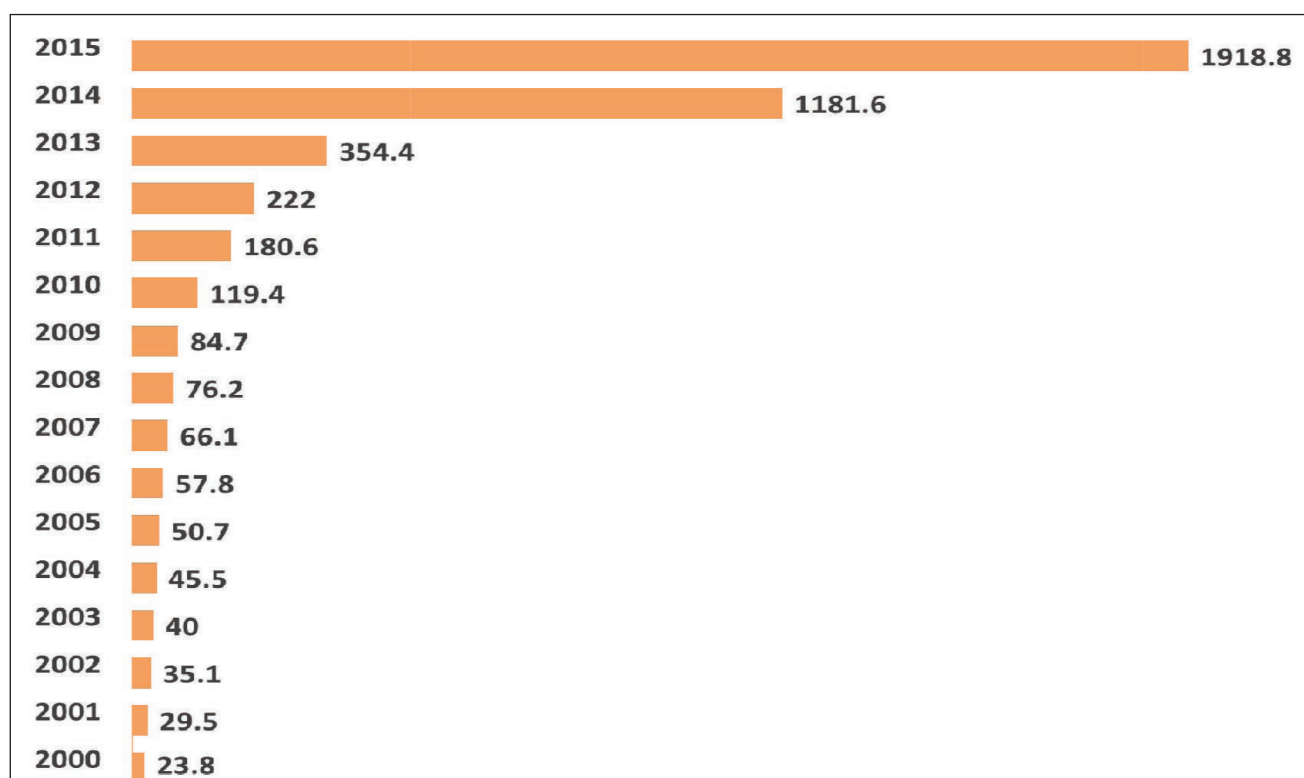
of electricity. The problem is further aggravated by the fact that there is a huge deficit of transmission lines.

In such a situation, it may seem more viable to explore introduction of wide scale solar based electricity across the African countries. Solar energy can be generated at different scales, ranging from the household and community levels to industrial and commercial levels. These could be both through on-grid as well as off-grid. On-grid structures could be in areas where there are existing transmission lines or where setting up such lines are commercially viable. The potential for off-grid solar installations is far greater as its reach is widespread ranging from rooftop solar panels, solar lanterns, solar street lights, amongst others and can be consumed directly at the location where energy is generated.

As far as realizing the solar potential in Africa is concerned – the installed solar capacity (**Annexure 6**) in the continent has witnessed significant movement since the turn of the century from 23.8 MW in 2000 to 1918.8 MW in 2015 – an increase of more than 80 times. While the penetration of Concentrated Solar Power (CSP)<sup>11</sup> has gained momentum in Africa since 2010, the chunk of the contribution has been made primarily by solar Photovoltaic (PV). This sudden boost in the cumulative installed solar PV capacity during 2014 and 2015 (Exhibit 23), is largely due to South Africa's initiative to significantly expand its solar PV capacity.

<sup>10</sup>IEA

<sup>11</sup>In CSP, mirrors focus the sun's light and heat up a liquid, which, when mixed with water, reaches around 400 degree Celsius. The steam produced from this process drives a turbine and generates electrical power. A cylinder full of salt is melted by the warmth from the mirrors during the day, and stays hot enough at night to provide up to three hours of power

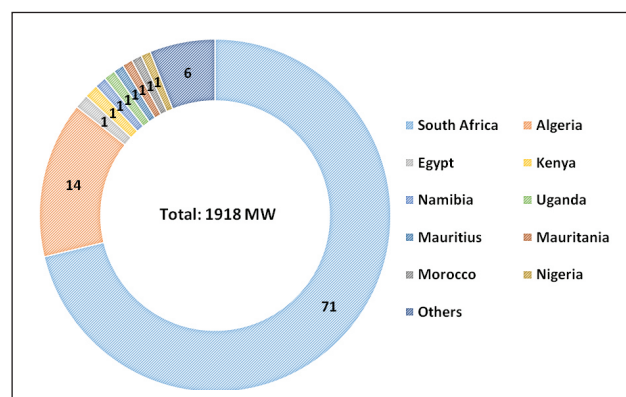
**Exhibit 23: Installed solar PV capacity in Africa (in MW)**

Source : Data derived from IRENA; Exim Bank Research

#### South Africa

South Africa, which contributed about 33% of Africa's installed solar capacity during the turn of the century, has been successful in increasing its share phenomenally to 71% in 2015. The country's solar capacity increased from 7.8 MW in 2000 to 23.2 MW in 2010, and then sky rocketed to touch 1361 MW in 2015. South Africa has committed to achieve 9600 MW of solar power capacity by 2030.

Several solar PV projects have been commissioned in recent times in South Africa, including the 96 MW Jasper Solar Energy Project, which is one of the largest photovoltaic power stations in Africa. The project aims at providing enough solar power for 30,000 homes. Besides this, a consortium led by ACWA Power International (Saudi Arabia) commissioned a 50 MW CSP project in South Africa's Northern Cape in December 2015.

**Exhibit 24: Share of Top 10 countries in installed Solar Capacity in Africa in 2015 (in per cent)**

Source: Data derived from IRENA; Exim Bank Research

Under the South African Government's Renewable Energy Independent Power Producer Procurement Programme (REIPPPP), the Redstone Solar Thermal



Power project<sup>12</sup>, with a 100 MW capacity has been set up. The 100 MW project with 12 hours of energy storage will be able to deliver electricity to more than 200,000 South African homes during peak demand periods, even well after the sun has set. The project is scheduled to commence operations in early 2018. This solar power plant would complement other large solar installations in South Africa, including the Kalkbult Solar Park, Lesedi Solar Park, Kathu Solar Park, and Letsatsi Solar Park under the REIPPPP.

### *Algeria*

Algeria, which is a key oil producing country, is increasingly focussing on solar energy. With oil and gas production on a decline, renewable energy is being considered as an essential substitute for fulfilling domestic energy demand. Algeria installed roughly 270 MW of solar PV capacity in 2015 – the largest ever by crossing single digit additions witnessed previously. SKTM, a subsidiary of state-owned utility Societe Nationale de l'Electricite et du Gaz (Sonelgaz), was mainly responsible for the strong progress in PV deployment in 2015. The target of the national renewable energy programme is to install 13.57 GW of solar capacity by 2030.

Algeria has been a relatively late entrant in the field of solar power generation. The first solar project was built only in 2011 at the Hassi R'Mel power station in the northern part of the Sahara, next to Algeria's major natural gas industry hub with a capacity of 150 MW. Siemens Energy had been awarded the contract to provide long-term maintenance services at this solar-combined cycle hybrid power plant.

In 2016, six new solar power plants with a total capacity of 48 MW have been commissioned in the province of Adrar (1543-km south of Algiers). These facilities comprise a central power plant in the city of Adrar (20 MW), three power plants south of the province in Zaouiet Kounta (6 MW), Reggane and Aoulef (5 MW each), and

two others north of the province in Timimoune (9 MW) and Tsabit (3 MW). These power plants, which have been connected to the national electricity network, will contribute to improving electricity supply, especially in remote regions. They will also give a boost to various sectors like agriculture and tourism, and will generate many jobs.

Algeria has also introduced feed-in tariff (FiT) for large-scale PV power plants to support its goal of building 800 MW of solar capacity by 2020. The programme offers solar power generators about US\$ 0.17 per kilowatt-hour (kWh) and has contributed about 350 MW worth of solar PV projects. The FiTs will be available under 20-year power purchase agreements, although different rates will be paid for the final 15 years of the agreement. A limit has been set on the number of generating hours eligible for FiT payments. For plants of 1-5 MW, the FiT has been set at reference rate of US\$0.20/kWh for up to 1,500-1,574kWh per year for the first five years. Over the following 15 years, payments will vary depending on plant outputs, with those generating above the reference quota receiving less and those generating less receiving higher rates. For plants over 5 MW, a similar system will apply: a reference rate of US\$0.16/kWh will be paid to plants generating 1,500-1,574kWh per year for the first five years; thereafter that rate will fall or increase for plants producing respectively more or less than the reference output.

Algeria has a national programme targeting 22 GW of renewable energy capacity from 2030, and has a stated aim of becoming leading player in solar power.

### *Morocco*

On the other hand, Morocco which was close second in 2000 with a share of 28% of Africa's installed solar capacity, has not been able to keep pace and currently accounts for 1% of Africa's installed solar capacity. However, with Morocco being one of the

<sup>12</sup>Redstone Solar Thermal Power (RSTP) is a planned solar power tower solar thermal power plant, located in Postmasburg, near Kimberley, in the Northern Cape Region of South Africa. Redstone Solar Thermal Power is 100 (MW), and will be the first solar tower plant with molten salt energy storage in Africa. The project is based on the technology used in Solar Reserve's Crescent Dunes project in the US

most developed countries in the continent, there is a significant potential to increase this share. Morocco has already announced to source 52% of its electricity consumption from solar by 2030. Towards this endeavour, Morocco in early 2016, officially turned on a massive solar power plant located near the town of Ouarzazate, on the edge of the Sahara Desert. The first phase of this project which cost an estimated US\$ 894 mn, would provide renewable energy to more than a million Moroccans by 2018 while reducing carbon emissions by an estimated 760,000 tons per year. The plant would have the capability to generate 160 MW of power. After the completion of the next two phases, the plant will be the single largest solar power production facility in the world.

Apart from the project in Ouarzazate, Morocco has also planned electricity production driven from solar energy from four other major sites like - Ain Bni Mathar, Fom Al Oued, Boujdour and Sebkhah Tah, with a combination of two technologies CSP and PV. The project is being developed and operated by a consortium led by Saudi Arabian Acwa Power, Spanish Sener, Acciona, and TSK Electronica y Electricidad. Under a build, own, operate and transfer (BOOT) scheme, a special purpose vehicle has been set up under the name of Acwa Power Ouarzazate, which is 75% owned by Acwa Power and 25% controlled by Moroccan agency for solar power MASEN.

The project is part funded through a public-private partnership arrangement that brings together MASEN, the African Development Bank, the World Bank, the Clean Technology Fund (part of Climate Investment Funds), the European Investment Bank, the KfW Development Bank, the French Development Agency, and private operators. There is also a significant grant from the European Union.

Besides this, Moroccan Government initiated a national program called PROMASOL in 2002 to promote the market of Solar Water-Heaters (SWHs) in Morocco. Apart from the Government, many international agencies like the UNDP, the French Global Environment

Facility (FGEF), the Autonomous Government of Andalusia, and the Italian Ministry of Environment, provided support to this initiative. At the environmental level, PROMASOL is expected to reduce about 920,000 tons of CO<sub>2</sub> per year until 2020. According to an UNDP assessment, with regard to its socio-economic impacts of this program, PROMASOL has increased the number of SWHs, while contributing to the creation of hundreds of jobs directly through the training and certification of installers, and indirectly through the creation and/or expansion of specialized companies. It is also expected to create about 13,000 new jobs by 2020. In addition to job creation, PROMASOL has had a positive impact on helping the poor through lending support to charity organizations.

### Opportunities

The gradual decline in the cost of solar PV power plants (80% reduction since 2008) has improved solar PV's competitiveness, allowing solar to compete with other power generation sources in some markets. While the majority of operating solar projects are in developed economies, the drop in prices coupled with unreliable grid power and the high cost of fossil fuels could help African countries to adopt solar PV technology in a viable and sustainable manner. At the same time, solar installations can be built relatively quickly, often in 6–12 months, compared to hydro and fossil fuel projects that require more than 4–5 years to complete. This presents a major opportunity for the BRICS countries in rapidly-growing, emerging African markets with a high unmet demand and urgent need for power. The opportunity can be tapped both via utility scale solar PV and distributed solar PV.

#### Utility Scale – Solar PV

Most of the solar PV projects have production capacity ranging between 10 MW and 100 MW, with capacity factors<sup>13</sup> from as low as 11% to as high as 33%. This range corresponds to utility-scale solar PV applications, though in some countries much smaller systems, in the range of 1 MW to 10 MW, are also used at a utility scale.

<sup>13</sup>The capacity factor of a power plant is the ratio of its actual output over a period of time, to its potential output if it were possible for it to operate at full nameplate capacity continuously over the same period of time.



Mirroring the rapid reduction of PV module costs worldwide, which fell by 75% from 2009 to 2015, the levelised costs of electricity (LCOE)<sup>14</sup> for the best utilities in Africa has also fallen rapidly. According to IRENA's Costing Alliance Database, LCOE for African solar PV utility projects in 2013 and 2014 ranged between US\$ 0.13 and US\$ 0.26 per kilowatt-hour (kWh). The lowest cost for utility-scale PV in South Africa is below US\$ 0.075 per kWh, which is among the most competitive PV projects worldwide. This gap between the best practice and cost range in Africa suggests further cost reduction potential.

#### *Distributed Solar PV*

Smaller scale PV systems can be used with or without connection to a power grid. Given the lack of grid connectivity, off-grid PV markets provide significant opportunity for development across African countries. Extending a national or regional grid to remote villages has often been an expensive solution to rural electrification. In the African context, where many villages are scattered and large tracts of the population live in clusters, off grid solar connectivity would help penetration of electricity to a greater number of people. In such a situation, small-scale distributed solar PV systems can provide power to houses and buildings for essential services such as lighting and charging electric appliances. Even where a connection to the existing network is available, if an uninterrupted supply is required, such as in health-care settings, solar PV systems with battery storage can be an economic solution.

In recent years, many of the East African countries have exhibited successes in solar PV system installations. These solar PV systems are estimated at around 4 MW and 6-8 MW respectively. This may appear modest, but with solar PV home systems often sized as low as 20 W<sup>15</sup>, these gains represent tens or even hundreds of thousands of individual systems installed annually. Investment costs for these systems in Africa ranges between USD 2.2/W and USD 17/W. This is largely because system size has been influencing the cost. For example, the best practice investment cost for solar home systems below 1 kW in size (around USD 4/W) is almost twice as high as for systems above 1 kW<sup>16</sup>. Wide cost differentials between average and best-practice investment point to significant potential for cost reductions.

Small-scale stand-alone PV systems could also be widely used for mini-grid service in rural communities as well as for other community services, such as street lighting, solar kiosks, mobile-phone charging stations, telecom towers and pumping water. Water pumping is well suited for solar PV, as the operation can be adjusted to the availability of solar electricity. Telecom towers are also considered a provider of steady demand, on the back of which investment cases can be made for mini-grid systems at the community level. In 2013, Africa had around eight million solar systems installed to power public lighting<sup>17</sup>. These energy services have historically been using diesel fuel, but solar PV systems offer a cost-effective and eco-friendly alternative.

<sup>14</sup>The levelized cost of electricity (LCOE), is the net present value of the unit-cost of electricity over the lifetime of a generating asset. It is often taken as a proxy for the average price that the generating asset must receive in a market to break even over its lifetime.

<sup>15</sup>IRENA

<sup>16</sup>IRENA

<sup>17</sup>IRENA

**Box 1: Azuri Technology introduces Pay-As-You-Go model**

Azuri is transforming the prohibitive upfront cost of renewable energy into a pay-as-you-go model by combining mobile and solar technology. They call it Indigo technology. After paying a small one-time installation fee for the solar home system, the user then purchases a scratch card, or uses an integrated mobile money service to top-up their unit. This top-up costs up to 50% less than their current weekly budget on kerosene and phone charging. Users are able to avoid the normally large up-front costs of solar systems and instead pay for them over one-week or four-week activation. Customers can charge their mobile phone and have 8 hours of lighting per day typically at US\$ 1.50 a week.

The smallest system starts at three watts, and a single payment is enough to get energy to charge a mobile phone and light two rooms for eight hours a day for one week. Some of the scratch card fee goes to paying off the system. Once the system is paid off, the customer can upgrade to a larger system, eventually purchasing the largest 80-watt system, which can run four lights and multiple appliances. The dealers are responsible for installing the systems, selling scratch cards, and providing after-sales service in their local area, working to Azuri specifications. Online records are kept for all sales and scratch card activations, so that both Azuri and the local dealer can track the progress.

Dealers sell scratch cards directly to customers, but also work through local resellers so that all customers have easy access to top-up facilities. After 80 payments, users can pay a fee of about US\$ 5 to have their system permanently unlocked, and can use renewable energy at no further cost.

According to UNFCC, while 85% of Azuri customers used kerosene lamps prior to installing the solar home system, only 17% still use kerosene now. Across its operations, Azuri calculates that its systems have provided 28.5 million hours of clean light and 9.5 million hours of emission-free mobile phone charging. This equates to 3,504 metric tons of CO<sub>2</sub> emissions avoided as on 2013.

This technology has benefitted tens of thousands of units in 11 countries across Sub-Saharan Africa, in Tanzania, Kenya, Ethiopia, Uganda, Sierra Leone, Malawi, Zimbabwe, South Africa, Rwanda, Togo, and Ghana. The scratch card payment system works well, and payments are lower than the cost of the kerosene and phone charging that the Indigo unit replaces. Reducing the use of kerosene lamps cuts the damage to health from air pollution. Mobile phones are widespread in Sub-Saharan countries like Kenya, and off-grid households spend both money and time to keep their phones charged. Phone charging with an Indigo system at home is useful, and avoids the cost and time of taking a phone or phone battery to a charging shop. The Azuri distribution chain contributes to the local economy through income and employment, not just for dealers and installation technicians, but also for scratch card sellers.

### Box 2: Solar Park, Rwanda

The Agahozo solar park in Rwanda set up in 2014 produces up to 8.5 MW of electricity, which is nearly 7% of the electricity produced. The government has signed a power purchase agreement to pay for that electricity for the next 25 years. The Agahozo solar park has more than 28,000 solar panels and was built at a cost of US\$ 23.7 mn. In its first year it produced an estimated 15 million kilowatt hours, sending power to a substation 9 km away.

The project brought together an international consortium of financing partners. Debt was provided by FMO (Netherlands Development Finance Company) and the London-based EAIF (Emerging Africa Infrastructure Fund); mezzanine debt provided by Norfund (The Norwegian Investment Fund for Developing Countries); equity from Scatec Solar ASA (who also served as EPC contractor and serves as O&M provider), Norfund and KLP Norfund Investments (a vehicle jointly owned by KLP, the largest pension fund in Norway, and Norfund). Grants were received from the United States Government via OPIC's ACEF (Africa Clean Energy Finance) grant and from Finland's EEP (Energy and Environment Partnership).

The solar power plant is having a strong positive social impact on the Rwandan people. The supply of clean electricity generated is sufficient to power approximately 15,000-18,000 additional households. Further, the number of households provided with electricity could multiply significantly if the country's electrification rate were to increase due to improvements and expansions over time in the transmission and distribution grid.

The project significantly reduces the amount of time and money that women and children must spend trying to gather fuels, allowing for more time to be spent on capacity building activities such as education, work or vocational training. It is estimated that the total time savings could range from US\$ 10.95 - 13.29 million hours per year, and that there could be between US\$ 834,000 - US\$ 1.79 million of additional income or equivalent economic value per year due to the reallocation of time.

The project also increases economic empowerment of women and other disadvantaged or disenfranchised groups through the participation in and implementation of the project. Local engineers and technicians continue to benefit from training programs being implemented to teach them how to properly manage the solar field. Children benefit considerably from additional and enhanced reliability of electricity, allowing them to allocate more time to studious activities. It is estimated that there could be increased school performance for 35,550-43,100 school students. Furthermore, the orphanages in the Agahozo-Shalom Youth Village (ASYV)<sup>18</sup> benefits from the increased access to renewable energy services, and receives a steady flow of rental income from the land lease that contributes to the long-term sustainability of the orphan village and benefits its health and education programs.

<sup>18</sup>The Agahozo-Shalom Youth Village (ASYV) is a residential community in rural Rwanda. Its 144 acres are home to youth who were orphaned during and after the genocide in 1994. The Village is designed to care for, protect and nurture these young people. It is a place of hope, where "tears are dried" (signified by the Kinyarwanda word agahozo). Within Agahozo-Shalom's supportive and structured community, the rhythm of life is being restored, with the ultimate goal of equipping young people who have lived through great trauma to become healthy, self-sufficient, and engaged in the rebuilding of their nation. Having a solar field built into its farm has created a steady flow of rental income for the ASYV, increasing its sustainability and benefiting its health and education programs. Additionally, the 500 students at ASYV will have access to education in engineering and solar PV technology.

### FDI in Solar Power in Africa

The cumulative FDI into Africa in the solar energy sector during 2007 to 2015 amounted to US\$ 14.7

billion, although the distribution has been erratic across years and has largely concentrated in Nigeria, Egypt, Morocco, and South Africa. All the investments have been towards generation of power.

**Table 15: Foreign Direct Investments received by African Countries in Solar Energy (in US\$ Mn)**

	2007	2008	2009	2010	2011	2012	2013	2014	2015
Nigeria							5000.0	100.0	5100.0
Egypt								3700.0	3700.0
Morocco	641.0		0.0			0.0	2000.0		2641.0
South Africa			0.0	263.8	250.0	511.7	0.0	1200.0	2225.5
Djibouti							132.0	429.0	561.0
Zimbabwe							250.0		250.0
Mali								56.8	56.8
Burkina Faso							50.0		50.0
Uganda							32.5		32.5
Rwanda						23.7			23.7
Libya	15.0								15.0
	656.0	0.0	0.0	263.8	250.0	535.4	7464.5	5485.8	14655.5

Source: Data derived from fDi Markets; Exim Bank Research

The investments received from various countries are sporadic in nature, and have largely been from countries like Canada, China, Bahrain and Saudi Arabia. Canada's SkyPower has invested in Nigeria in the Delta State in 2014, and recently in Djibouti. While Bahrain based Terra Solar has invested in Egypt, Saudi Arabian firm ACWA Power International has invested in South Africa and Morocco. The investment in Morocco is one of the largest investments for a solar park in Africa. With regard to China, a number of companies have invested

in the continent - Beijing Fuxing Xiaocheng Electronic Technology Stock and Yingli Green Energy Holding Company Limited (Yingli) have invested in Ghana; Shanghai Electric in Morocco, and Zhenfa New Energy Science and Technology in Zimbabwe. Some of the USA based companies which have invested in solar sector in Africa, albeit in small amounts, include New Generation Power, Astonfield, General Electric (GE), SunEdison Inc (MEMC Electronic Materials), and SolarReserve.

**Table 16: Foreign Investors in Solar Power in Africa (US\$ Mn)**

	2007	2008	2009	2010	2011	2012	2013	2014	2015	Total
Canada	-	-	-	-	-	-	-	5050	429	5479.0
Bahrain	-	-	-	-	-	-	-	-	3500	3500.0
China	-	-	-	-	-	-	-	2250	-	2250.0
Saudi Arabia	-	-	-	-	-	-	311.7	-	1200	1511.7
Spain	641	-	-	-	-	-	-	-	-	641.0
United States	-	-	-	-		250	-	132	-	382.0
Norway	-	-	-	-	263.83		23.7	-	56.75	344.3
Italy	15							15.5	200	230.5
France	-	-	-	-	-	-	200	-	-	200.0
UAE	-	-	-	-	-	-	-	17	100	117.0
Grand Total	656	0	0	0	263.83	250	535.377	7464.5	5485.75	14655.5

Source: Data derived from fDi Markets; Exim Bank Research

## **Solar Policies**

Policy initiatives are the backbone to the success of new renewable energies, including solar. As the sector requires huge amount of capital, a conducive policy oriented ambience is necessary to encourage greater investments into the sector. Africa, which is home to a large number of LDCs, is unlikely to get support from its population for paying premiums for goods/services tagged “clean”. In such a scenario, solar energy projects cannot sustain without government support primarily in the form of capital infusion. This could be done in a number of ways, from sanctioning grants (reduces initial investments costs), introducing tax credits (to reduce capital or operating costs), including low interest loans and grants (lowers capital recovery requirements), to introducing green purchasing targets (which may help to create a market pull by committing to buy green power for their operations) in the country.

While the fact remains that despite huge demand for reliable electricity, the tremendous opportunity for solar in most of the African countries has largely remained untapped. Notwithstanding this, over the last few years, there has been some affirmative actions

including introduction of solar energy (apart from other forms of renewables) policies which would incentivize private sector to participate in creating a solar infrastructure in the region. Most of these policies are in the form of economic instruments, fiscal/financial incentives, grants and subsidies, policy support, strategic planning, regulatory instruments, and other mandatory requirements (Table 17).

These policies also set aside solar energy targets – for example Algeria through its Renewable Energy and Energy Efficiency Development Plan 2011-2030, has plans to increase solar production up to 37% of total national electricity production by 2030. Similar has been the case for Egypt, whose Egyptian Solar Plan of 2012 envisages to install around 3,500 MW of solar power plants (2,800 MW CSP + 700 MW PV) by 2027. The Nigeria Renewable Energy Master Plan 2011 on the other hand plans to install solar PV to the extent of 500 MW by 2025 – while the Nigeria Feed-in Tariff for Renewable Energy Sourced Electricity Policy introduced in 2016 has set a target of 2GW generated through renewables like biomass, small hydro, wind and solar<sup>19</sup>.

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<sup>19</sup>IEA – Policy & Measures

**Table 17: Solar Energy Policy Framework introduced in Select African countries in recent years**

Country	Policy	Year	Policy Type
Algeria	Renewable Energy and Energy Efficiency Development Plan 2011-2030	2011	Policy Support; Strategic planning
	Feed-in tariff for solar PV installations	2014	Economic Instruments; Fiscal/financial incentives; Feed-in tariffs/premiums
Burkina Faso	Law of finance 2013 relative to the deletion of customs charges on equipment and material of solar energy	2013	Economic Instruments; Fiscal/financial incentives; Tax relief
Egypt	Egyptian Solar Plan	2012	Economic Instruments; Fiscal/financial incentives; Grants and subsidies, Policy Support; Strategic planning, Regulatory Instruments; Other mandatory requirements
	Feed-in tariff for wind and solar PV projects	2014	Economic Instruments; Fiscal/financial incentives; Feed-in tariffs/premiums
Ghana	Ghana National Energy Policy	2010	Policy Support; Strategic planning, Policy Support
	Feed-in tariff for electricity generated from renewable energy sources	2013	Economic Instruments; Fiscal/financial incentives; Feed-in tariffs/premiums
Kenya	Solar water heating regulations	2012	Regulatory Instruments; Other mandatory requirements, Regulatory Instruments
	Tax incentives for renewable energy	2015	Economic Instruments; Fiscal/financial incentives; Tax relief
Madagascar	Tax incentives for renewable energy	2015	Economic Instruments; Fiscal/financial incentives; Tax relief
Mauritius	Small Scale Distributed Generation (SSDG) (Feed-in tariff/Net metering scheme)	2010	Economic Instruments; Fiscal/financial incentives; Feed-in tariffs/premiums
Morocco	Moroccan Agency for Solar Energy (MASEN)	2010	Economic Instruments; Market-based instruments, Regulatory Instruments
	National Integrated Project for Solar Electricity Production and Moroccan Agency for Solar Energy (MASEN)	2010	Research, Development and Deployment (RD&D); Research programme ; Technology deployment and diffusion, Policy Support; Institutional creation, Policy Support, Economic Instruments; Direct investment; Infrastructure investments
Nigeria	Nigeria Renewable Energy Master Plan	2011	Economic Instruments; Direct investment; Infrastructure investments, Economic Instruments; Fiscal/financial incentives; Tax relief, Policy Support; Strategic planning
South Africa	Renewable Energy Independent Power Producer Programme (REIPPP)	2011	Policy Support, Economic Instruments; Fiscal/financial incentives; Feed-in tariffs/premiums, Economic Instruments
Tunisia	The Decree on connection and access of renewable electricity to the national grid	2011	Policy Support, Regulatory Instruments; Codes and standards
Uganda	Renewable Energy feed-in tariff	2011	Economic Instruments; Fiscal/financial incentives; Feed-in tariffs/premiums
	Uganda Energy Credit Capitalisation Company (UECCC)	2011	Economic Instruments; Fiscal/financial incentives; Loans, Policy Support; Institutional creation, Economic Instruments; Fiscal/financial incentives; Grants and subsidies, Information and Education; Advice/Aid in Implementation
	Global Energy Transfer Feed-in Tariff (GET FIT) Programme Uganda	2013	Economic Instruments; Fiscal/financial incentives; Feed-in tariffs/premiums, Economic Instruments; Fiscal/financial incentives; Loans

### 3: BRICS INVESTMENTS IN AFRICA: AN OVERVIEW

There was a point of time when investing in African countries was perceived as highly risky and without proportionate returns. But things have been changing during the last 10-15 years. More and more global investments are pouring into the region. BRICS economies alone have invested US\$ 138.74 bn across

sectors between 2003 and 2015 (Table 18). Remarkably, all the five BRICS economies have individually invested in at least one African country consistently every year during this 12 year period (2003 to 2015), although the value of investments has fluctuated.

**Table 18: Investments by BRICS economies in Africa (2003-2015) – Value in US\$ Mn**

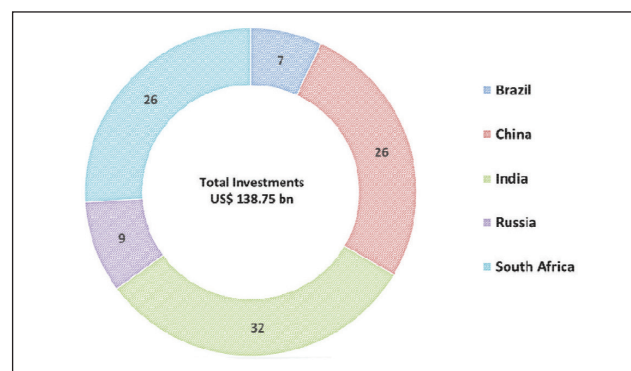
	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	Grand Total
Brazil	2943	17	31	7	1781	2207	282	800	1159	8	36	70	336	9676
China	5997	230	932	2411	1774	9050	2948	834	1791	1762	621	6036	2313	36698
India	859	4047	1069	1548	1494	4306	2824	4563	7871	7827	5220	1122	981	43731
Russia	622	756	98	91	635	2613	1130	93	708	50	1678	82	4028	12584
South Africa	1813	1755	315	1031	927	1728	6774	3420	4668	1252	5556	4800	2019	36058
<b>Grand Total</b>	<b>12233</b>	<b>6804</b>	<b>2445</b>	<b>5088</b>	<b>6613</b>	<b>19904</b>	<b>13958</b>	<b>9710</b>	<b>16196</b>	<b>10899</b>	<b>13111</b>	<b>12110</b>	<b>9677</b>	<b>138747</b>

Source: Data derived from fDi Markets; Exim Bank Research

India led the pack with a share of 32% in the cumulative investments made by BRICS economies in Africa between 2003 and 2015, followed by China (26%).

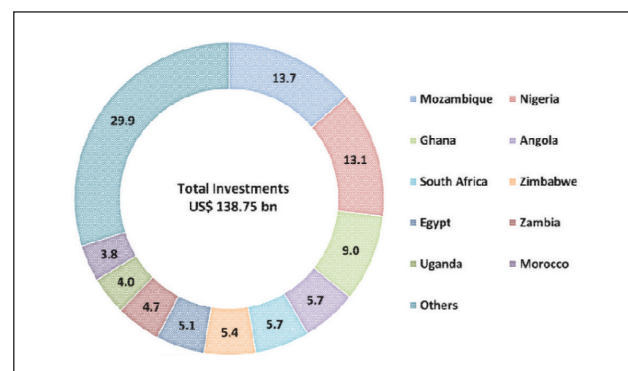
Both these countries together constituted 58%, while South Africa's share during the same period stood at marginally below 26%.

**Exhibit 25: Share of Investments of BRICS economies in Africa [2003-2015]**



Source: Data derived from fDi Markets; Exim Bank Research

**Exhibit 26: Top 10 African economies receiving investments from BRICS economies [2003-2015]**



Source: Data derived from fDi Markets; Exim Bank Research

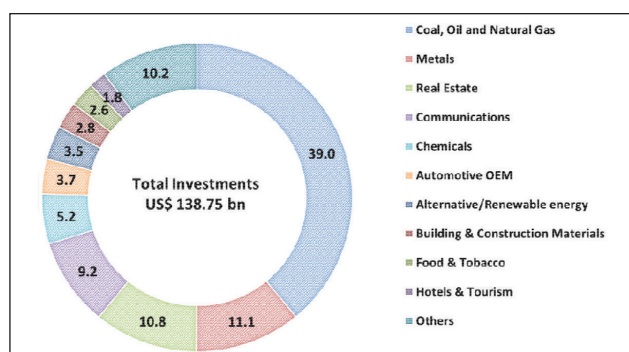


Africa is a geography of 54 different countries, where each one provides unique opportunity for investments. Among these 54 countries, Mozambique received the highest amount of investments during the analyzed period, accounting for a share of 13.7% in the total investments from BRICS, followed by Nigeria (13.1%), Ghana (9%), Angola and South Africa (5.7% each), Zimbabwe (5.4%), Egypt (5.1%), Zambia (4.7%), Uganda (4%), and Uganda (3.8%) (Exhibit 25).

Africa has been known as a continent with rich natural resources. The investment portfolio of BRICS economies in Africa clearly attests to this fact - coal, oil and natural gas were the sectors that witnessed the highest investments from all BRICS members put together, accounting for a share of 39%; metals (includes mining of ores of copper, gold, alumina, etc.) followed second with a share of 11% (US\$ 15.3 bn) (Exhibit 27).

There has also been a fair bit of value addition in the metals category. It may be noted that, of the US\$ 15.3 bn investments in the metals category, around US\$ 9.7 bn has been in iron & steel mills & ferro alloy, foundries, non-ferrous metal production and processing, steel products, and other fabricated metal products.

**Exhibit 27: Top 10 African industries receiving investments from BRICS economies [2003-2015]**



Source: Data derived from fDi Markets; Exim Bank Research

While Brazil's and Russia's investments have been largely oriented towards extractive industries, investments from India, China, and South Africa have been across diversified sectors. Coal, oil and natural gas, along with metals have been the favoured sectors for investment from Brazil and Russia accounting for as much as 82.6% and 75.3% shares (in their total investments in Africa),

respectively, while China (46.7%), India (44.5%), and South Africa (42.4%) had relatively lesser shares in these sectors (Table 19).

There have been significant investments in the field of communications from India, China and South Africa. Given the huge population and the significant headroom for enhancing the penetration in connectivity – telecommunications, and ICT - this area offers good scope for investments. Amongst the communication firms, investments have been from global networks like MTN, Airtel, Vodafone, Huawei Technologies, CNBC, etc. and largely concentrated on wired telecommunications carriers, communications equipment, data processing, hosting, & related services, and radio & TV broadcasting.

Another sector in which India and China have been the only investors among the BRICS nations is the renewable energy sector. These investments have been in segments like solar, wind, hydro, biomass and geothermal. Chinese companies involved in the solar segment include Shanghai Electric, Yingli Green Energy, Zhenfa New Energy Science and Technology, while Indian firm includes Shapoorji Pallonji Infrastructure Capital which has a presence in Egypt.

The automotive segment also finds presence of Indian and Chinese firms. The irony is that most vehicles in Africa are imported from across the world, especially from Europe. The number of manufacturing facilities in Africa is very limited - Morocco, Egypt, South Africa are amongst the few African countries having such facilities. In the motor vehicle gasoline engines & engine parts segment, India based Tata Motors has a manufacturing facility in Zambia; apart from having another assembly facility in South Africa for semi knocked-down (SKD) kits, light, medium and heavy commercial vehicles ranging from 7 tonnes to 75 tonnes, with an annualised capacity of around 3650 vehicles. Tata Motors also has a significant marketing network in South Africa, Angola, Algeria, Democratic Republic of Congo, Ghana, Kenya, Morocco, Mozambique, Nigeria, Seychelles, Sudan, Tanzania, Tunisia, Uganda, Zambia and Zimbabwe. At the same time, India based commercial vehicles major Ashok Leyland has recently in 2016, expressed

interest to boost its presence in the African market, by establishing its first assembly plant in the continent in Kenya. Apart from these, other motor vehicle parts are being manufactured by Steel Strip Wheels, India

in Morocco, and Mothersen Sumi Group which has a manufacturing set up in South Africa. Besides this, motor vehicle body & trailers are being manufactured by Brazilian company Marcopolo in Egypt.

**Table 19: Investments by BRICS economies in Africa in Key Sectors – 2003-2015**

Brazil	Share (%)	US\$ mn	Russia	Share (%)	US\$ mn	India	Share (%)	US\$ mn	China	Share (%)	US\$ mn	South Africa	Share (%)	US\$ mn
Coal, Oil and Natural Gas	75.6	7318	Coal, Oil and Natural Gas	46.4	5836	Coal, Oil and Natural Gas	39.0	17050	Coal, Oil and Natural Gas	32.4	11905	Coal, Oil and Natural Gas	33.4	12050
Metals	7.0	678	Metals	28.9	3637	Chemicals	11.9	5219	Real Estate	15.7	5750	Real Estate	19.0	6841
Building & Construction Materials	6.9	670	Real Estate	11.6	1457	Communications	9.9	4325	Metals	14.3	5245	Communications	15.9	5750
Alternative/ Renewable energy	4.7	450	Hotels & Tourism	4.9	618	Metals	5.5	2405	Communications	7.4	2720	Metals	9.4	3379
Hotels & Tourism	1.4	132	Automotive OEM	3.6	448	Food & Tobacco	5.4	2354	Alternative/ Renewable energy	7.3	2681	Financial Services	3.3	1185
Automotive OEM	1.2	117	Financial Services	1.2	153	Automotive OEM	4.4	1922	Automotive OEM	7.1	2606	Building & Construction Materials	3.1	1110
Food & Tobacco	1.1	110	Transportation	1.0	126	Alternative/ Renewable energy	4.1	1776	Building & Construction Materials	4.9	1791	Food & Tobacco	2.9	1051
Automotive Components	0.8	77	Minerals	0.9	119	Textiles	2.8	1230	Chemicals	3.1	1119	Chemicals	2.5	892
Business Machines & Equipment	0.7	69	Non-Automotive Transport OEM	0.5	61	Plastics	2.8	1222	Ceramics & Glass	1.9	697	Hotels & Tourism	2.3	812
Financial Services	0.2	23	Software & IT services	0.4	47	Real Estate	2.1	937	Textiles	1.7	630	Consumer Products	1.7	602
Others	0.4	32	Others	0.6	82	Others	12.1	5291	Others	4.2	1554	Others	6.5	2385
<b>Total</b>		<b>9676</b>			<b>12584</b>			<b>43731</b>			<b>36698</b>			<b>36058</b>

Source: Data derived from fDi Markets; Exim Bank Research

**Table 20: Key Investment Destinations of BRICS economies in Africa – 2003-2015**

Brazil	Share (%)	US\$ mn	Russia	Share (%)	US\$ mn	India	Share (%)	US\$ mn	China	Share (%)	US\$ mn	South Africa	Share (%)	US\$ mn
Angola	32.9	3188	Uganda	31.9	4011	Mozambique	15.1	6587	Nigeria	13.0	4771	Mozambique	26.6	9589
Mozambique	27.6	2670	Morocco	16.5	2081	Nigeria	14.9	6526	Angola	10.7	3928	Ghana	24.4	8800
Nigeria	21.6	2089	Zimbabwe	12.9	1625	South Africa	12.0	5267	Niger	8.9	3282	Nigeria	12.3	4449
Algeria	4.6	443	Namibia	8.3	1040	Egypt	10.8	4734	Zambia	7.9	2885	Zimbabwe	4.8	1719
Zambia	4.1	400	Egypt	5.4	677	Zimbabwe	7.1	3096	Algeria	7.3	2661	Zambia	4.7	1709
Guinea	2.8	270	Libya	5.0	624	Kenya	6.2	2730	Ethiopia	6.9	2515	Congo (DRC)	4.3	1547
Malawi	1.6	154	South Africa	3.5	440	Ghana	5.1	2222	Morocco	6.0	2204	Mauritius	2.8	993
Morocco	1.4	131	Tanzania	3.2	400	Cameroon	4.4	1907	South Africa	5.8	2123	Namibia	2.7	974
Ghana	1.2	120	Guinea	2.8	350	Ethiopia	4.2	1839	Sudan	4.9	1789	Angola	2.0	710
Egypt	0.7	70	Nigeria	2.3	292	Zambia	3.4	1481	Ghana	3.8	1404	Tanzania	1.8	667
<b>Total</b>	<b>100</b>	<b>9675.95</b>		<b>100</b>	<b>12584</b>		<b>100</b>	<b>43731</b>		<b>100</b>	<b>36697.95</b>		<b>100</b>	<b>36058</b>

Source: Data derived from fDi Markets; Exim Bank Research

## INVESTMENTS BY BRICS ECONOMIES IN AGRICULTURE & VALUE ADDED AGRICULTURE IN AFRICA

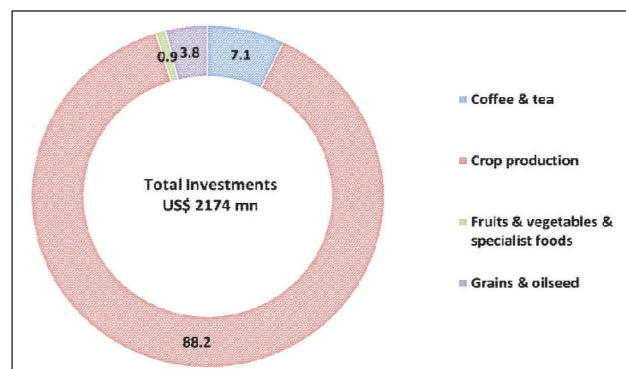
Agriculture Investments by BRICS economies in Africa's agriculture sector (including value added), is a win-win situation for both the entities. Africa has a huge import bill arising out of agricultural imports although the continent itself has the capability to not only feed its own population but also export to other regions of the world.

BRICS economies, which have a burgeoning population to feed, have not been able to secure food from domestic production – i.e. the demand has been exceeding the supply. While India is self-sufficient in most of the agricultural products, it has to import edible oil which is the single largest agricultural product imported into the country. Apart from this, there are some cereals and pulses which India has been importing. China too has been importing cotton, and cereals in significant volume. In fact, cereal import also ranks as the primary agricultural import of Brazil and South Africa. Russia however, has primarily been importing coffee and tea.

### Agriculture

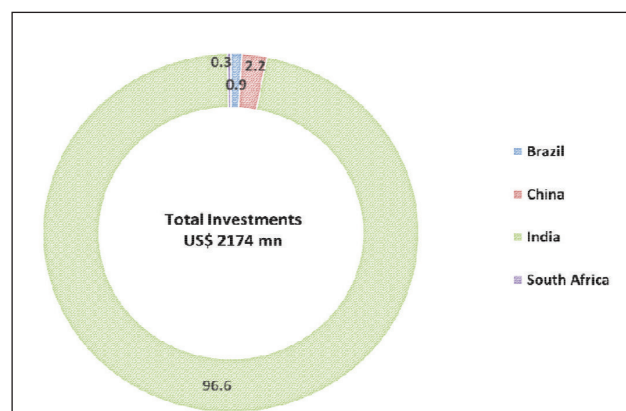
Crop production, by far, was the single largest category of investments made by BRICS economies in African agriculture sector between 2003 and 2015, accounting for 88.2% of the total investments (Exhibit 28). While there have been investments by all the BRICS economies in the African agricultural sector, India stands out owing to the fact that 96.6% of all investments made by BRICS nations between 2003 and 2015 in this sector – aggregating to US\$ 2174 mn – were from India (Exhibit 29). The cumulative investments between 2003 and 2015 by Indian enterprises were to the tune of US\$ 2101.24 mn. These included investments by Biopalm Energy (Siva Group) in crop production in Cameroon, Ruchi Soya Industries in Grains & oilseeds in Ethiopia, Kanan Devan Hills Plantations in tea plantations in Ethiopia, and Tata Coffee in coffee plantations in Uganda. Besides these, there is Karuturi Global which expanded its base in Africa by acquiring Kenya-based Sher Agencies (now Sher Karuturi) in September 2007 from Dutch horticulturists Gerrit & Peter Barnhoorn. The acquisition brought into Karuturi's fold a 188-hectare farmland in the rich Naivasha region of Kenya. Of this,

**Exhibit 28: Segmentwise share in Investments by BRICS economies in the Agriculture Sector in Africa: 2003-15**



Source: Data derived from fDi Markets; Exim Bank Research

**Exhibit 29: Investments by BRICS economies in the Agriculture Sector in Africa: 2003-15**



Source: Data derived from fDi Markets; Exim Bank Research

about 135 hectares are under greenhouse cultivation and 42 hectares in open cultivation and has an average daily output of about 1.5 million stems that are exported from Kenya to Europe. The company has also acquired 311,000 hectares on a lease-hold basis from the Ethiopian government in the Baka and the Gambela region to cultivate short, medium and long-gestation crops.

On the other hand, China had a cumulative investment of US\$ 47 mn between 2003 and 2015. Companies like Hainan Zhongchen Biologic Engineering, Bright Food, Guangzhou Pharmaceutical Holdings have invested in various segments and countries like crop production (Tanzania), grains & oilseed (Kenya), coffee & tea (South Africa), respectively.

Brazilian company Odebrecht invested US\$ 20 mn in Mozambique in 2015, while South Africa's Promasidor put in US\$ 6.2 mn in Kenya's grain and oils seeds segment.

In terms of value of investments received, Cameroon received the highest share of investments from BRICS countries, 87.7%. This was followed by Ethiopia (8%), South Africa (1.6%), Mozambique and Uganda (0.9% each), Tanzania (0.5%), and Kenya (0.4%).

**Table 21: Select companies from BRICS economies invested in Agriculture in Africa**

Brazil	China	India	South Africa
Odebrecht	Guangzhou Pharmaceuticals	Biopalm Energy	Nutro Manufacturing EPZ
	Hainan Zhongchen Biologic Engineering	Kanan Devan Hills Plantations	
	Weetabix Food Company	Ruchi Soya Industries	

Source: Data derived from fDi Markets; Exim Bank Research

### Box 3: Lines of Credit Scheme Operated by Exim Bank, India

Government of India had launched the Indian Development and Economic Assistance Scheme (IDEAS) for providing developmental/financial assistance to other developing countries. The scheme was formulated in 2003-04, with the objective of sharing India's development experience through (i) capacity building and skills transfer, (ii) trade, and (iii) infrastructure development by extending Lines of Credit (LOCs) on concessional terms to other developing countries. These LOCs are extended by Exim Bank of India, at the behest of, and with the support of the Government of India to :-

- Foreign Governments or their nominated agencies such as central banks, state owned commercial banks and para-statal organizations;
- National or regional development banks;
- Overseas financial institutions;
- Commercial banks abroad;
- Other suitable overseas entities.

The above mentioned recipients of LOCs act as intermediaries and on-lend to overseas buyers for import of Indian equipment, goods and services. LOC is a financing mechanism that provides long-term capital to the borrowers to import cost-effective technologies and services that are adaptable, appropriate and affordable in a developing country context.

Bilateral or multilateral assistance, through lines of credit, typically follows a sequence of standard procedures, vis-à-vis:

- project identification and preparation;
- review and approval of the project proposal;
- offer of the loan, acceptance and execution of loan agreement;
- project implementation, monitoring and supervision; and
- socio-economic impact assessment after project completion.

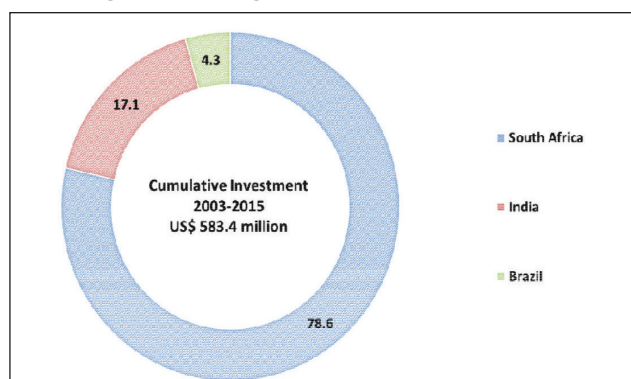
Exim Bank has in place 203 Lines of Credit, covering over 63 countries in Africa, Asia, Latin America, Europe and the CIS, with credit commitments of over USD 14.26 billion (as on end-March 2016). Exim Bank's LOCs help demonstrate Indian expertise and project execution capabilities in emerging markets. These LOCs enable the recipient developing countries to set up developmental and institutional projects and create capacities and skills.

Source: Exim Bank Research

### Value added agriculture

The total investments by BRICS countries in the agro processing sector in Africa was around US\$ 852 mn between 2003 and 2015. According to fDi Markets, South Africa was the largest investor within BRICS, followed by India and Brazil (Exhibit 30).

**Exhibit 30: Investments by BRICS economies in the Agri Processing Sector in Africa: 2003-15**



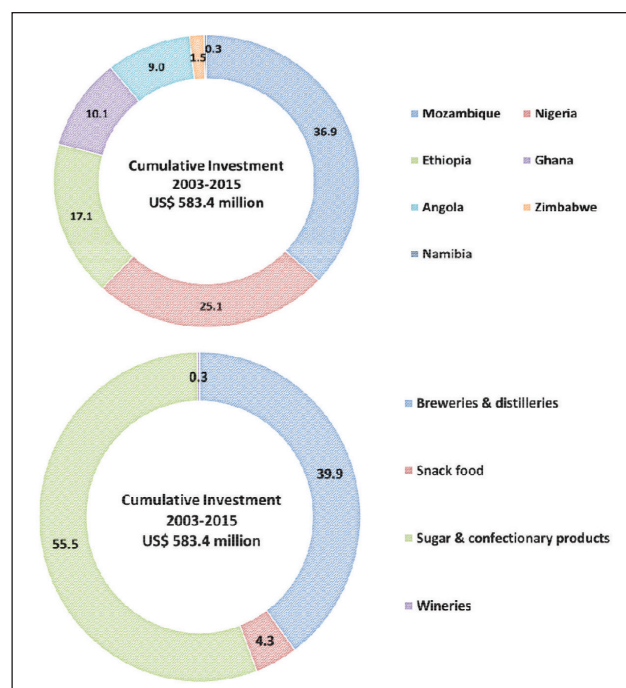
Source: Data derived from fDi Markets; Exim Bank Research

The segment-wise analysis shows that the sugar and confectionaries attracted the largest volume of investment (55.5% share), followed by breweries & distilleries (39.9%) (Exhibit 30). In terms of recipients of these investments in the agro processing sector, the largest was Mozambique for sugar & confectionary products, Nigeria for breweries & distilleries, Ethiopia for sugar & confectionary products, Zimbabwe for sugar & confectionary products, Ghana for breweries & distilleries and snack food, Angola for breweries & distilleries, and Namibia for wineries.

Amongst the BRICS companies that have invested, the only Brazilian firm has been Usibra which has invested US\$ 25 mn in snack food in Ghana. There has been a host of South African companies which have invested in other African countries. These includes - Tongaat Hulett (invested US\$ 223 mn in Mozambique and Zimbabwe in sugar & confectionary products), Remgro (US\$ 232.9 mn in breweries & distilleries in Nigeria, Angola, Ghana), and Distell Group in wineries in Namibia.

Besides this India based Surface Investments Pvt. Ltd. has also been engaged in Chitungwiza, Zimbabwe in the manufacturing of cooking oil, soybean meal, high

**Exhibit 31: Segmentwise share in Investments by BRICS economies in the Agri Processing Sector in Africa: 2003-15**



Source: Data derived from fDi Markets; Exim Bank Research

protein cottonseed meal, cottonseed cake, and hull pallets in Zimbabwe. It offers cottonseed refined oil, soybean refined oil, blend of vegetable salad oil, cotton hulls, acid oil, soy lecithin, and linters. The company sells its products through a network of distributors in Zimbabwe and internationally. Surface Investments Pvt. Ltd. operates as a subsidiary of Midex Group B.V.

However, it has been observed that apart from direct investments in the agriculture or value added agricultural sector, BRICS economies have also facilitated the growth and improvement of crop production, research and technology infusion for better yields in Africa. Some of these are a replication of the successful measures that have been undertaken in their home economies.

### Interventions of Brazil in Africa's Agriculture

Brazil's agricultural cooperation in the continent has been characterized by technical assistance involving the delivery of short training courses and peer-to-peer sharing of tropical agriculture science and technology activities that were conducted mainly by the Brazilian



Agricultural Research Corporation (Empresa Brasileira de Pesquisa Agropecuária: EMBRAPA)<sup>19</sup>. Another one is the ProSAVANA program in Mozambique which draws mainly on Brazil's experience in large-scale agribusiness development in the cerrado, an area portrayed as similar to the African savannah. The aim is to increase production in the Nacala corridor, a 14.5 m-hectare area in central and northern Mozambique. A Triangular partnership was created between Brazil, Japan and Mozambique mainly aimed at developing improved seeds of soybean and rice; improving soil health; and, funding roads and other infrastructure. It also contributes to poverty-reduction, food security and employment generation. ProSAVANA is backed by co-operation agencies of Brazil (ABC) and Japan (JICA). The Brazilian government's agricultural research agency, EMBRAPA, has been training extension workers and staff at Mozambique's Institute for Agricultural Research (IIAM), in ProSavana's first project, which ran from 2011 to 2016. Japan had already provided US\$ 38 million to fund research. The Ministry of Agrarian Development (MDA) of Brazil developed More Food International (MFI) in Africa as its main cooperation instrument in 2010<sup>20</sup>. In Africa, MFI was established in which a concessional loan was tied to the purchase of agricultural equipment manufactured in Brazil. The loan targets a group of small and medium African farmers' who are like the counterpart to Brazil's family farmers living in sub-Saharan Africa. In addition to hardware financing, MFI includes government-to-government exchange centered on Brazil's experience with public policy aimed at family farmers, and specific activities designed to strengthen technical assistance. The programme is a result of the Brazil-Zimbabwe cooperation agreement which put in place a US\$ 98 million loan facility for the procurement of irrigation equipment, tractors and implements. Implementation of the first phase of the programme was launched in

2015. There has been installation of 176 irrigation projects throughout the country. The loan interest is low at 2% per annum. Cotton 4 Togo is another program developed by Brazil jointly with Benin, Burkina Faso, Chad, Mali, and Togo for enhancing the agricultural practices of cotton. The initiative aims to help the five African countries to develop the cotton sector, increase productivity, generate genetic diversity and improve the quality of the product grown. It was the first initiative of the Brazilian Cooperation Agency (ABC) in partnership with the Brazil's Ministry of Agriculture. One of the outcomes of its initial phase was the establishment of an office complex; an entomology lab to raise natural enemies of major cotton plant resources; a shed to process samples, and space for a power generator in Mali. Furthermore, soil and biotechnology laboratories were revitalized.

#### *Interventions of India in Africa's Agriculture*

As far as India is concerned, it has encouraged green revolution in Africa whereby with the use of application sensors, satellites, genetic engineering, green house cultivation, precision irrigation, soil analysis, robotic science, increased application of organic fertilizers and pesticides, it can be known which crop is suitable to each agro climatic conditions. India also focuses on building capacity and sharing experience, particularly in research and knowledge. Teams of farm experts from the Indian Council of Agricultural Research (ICAR) have gone to Africa to acquire first-hand knowledge of how African countries explore ways of improving their agricultural practices. The capacity building programme provides an annual scholarship to 75 students from African countries in agricultural universities in India. Moreover, Government of India proposes to establish new institutions in agriculture and rural development

<sup>19</sup>EMBRAPA, has been largely responsible for the successful development of the cerrado (Brazil's savannah). The cerrado, which was once considered unfit for farming, and was an under-developed and poverty-stricken part of the country, currently, produces 70% of the country's farm output, helping to feed Brazil, and provide exports. The Brazilian development cooperation is increasingly focused on agriculture in Africa as the Brazilian government and EMBRAPA believes that it can use the transformation of the cerrado as a success template to make it a leader on tropical science.

<sup>20</sup>MFI draws on Brazil's domestic 'More Food Program', which offer subsidized credit to family farmers in order to support modernization through the acquisition of agricultural machinery and implements aimed at boosting productivity. Such assistance is part of a policy package that targets family farming under the framework of the National Program for the Strengthening of Family Farming (Programa Nacional de Fortalecimento da Agricultura Familiar: PRONAF), which has been in place for 20 years.

sector, and on mutual grounds, it has been agreed upon to exchange scientists, scholars, technologies and literature and to collaborate on research projects. Furthering cooperation, both India and Africa has prioritized agricultural cooperation, which according to leaders on both sides offers great potential, given the strong complementarities between them. Indian companies have invested in African agriculture by setting up food-processing clusters in Africa. In 2013, there was a new collaboration focused on agriculture between India and USA in Liberia, Malawi and Kenya to enhance food security. This partnership is aimed to improve agricultural productivity and support market institutions in Kenya, Liberia and Malawi. The programme trained 180 agriculture professionals from the three African countries by providing marketing and extension of management training.

Taking cognizance of the crucial impact agricultural growth has on the African economy in terms of its forward and backward linkages, demand and employment linkages, Exim Bank has been engaged with Africa through a number of Lines of Credit program. These credit lines have been successful in creating a difference at the bottom of the pyramid to the overall socio-economic development of the recipient countries. As on March 31, 2016, Africa's share in the total value of Exim Bank's LOC program stood at US\$ 7.13 bn, which constituted 51.3% of the total LOC portfolio – of which more than US\$ 1.7 bn (around 24% Africa's share) has been to the agricultural sector alone. These have been provided to as many as 25 African nations for projects as varied as acquisition of tractors, harvesters, agricultural processing equipment; farm mechanization; setting up plantation projects and processing plants; development of sugar industry; procurement of design, supply, installation and commissioning of fuel storage facilities, irrigation network, commissioning of sugar processing facility; rice self-sufficiency programme; including setting up of the agri related institutions like the Mahatma Gandhi IT and Biotechnology Park in Cote d'Ivoire.

### *Interventions of China in Africa's Agriculture*

China's partnership in African agriculture was focused on technical assistance and capacity building. It has encouraged public-private partnerships and provided incentives for its agribusiness corporations to invest in African agriculture. In the 1960s and 1970s, China built more than 80 demonstration farms, covering a total of 45,000 hectares. The focus then was on technology transfer and training. From 2003 to 2008, many Africans travelled to China for short term agriculture-related courses. By 2009, China had carried out 200 agricultural projects, established 23 fisheries, stationed 1,100 Chinese agricultural experts in various parts of Africa, established 11 agricultural research stations and initiated 60 agricultural investment projects. Most of the investment projects were initiated by large to medium-sized state-owned Chinese farming groups. But smaller Chinese private firms and individuals have also secured new opportunities in Africa.<sup>21</sup> China has invested in Ghana's rice sector especially in the irrigational section as well as the agrochemical section (particularly herbicides, which form the most widely used input in smallholder agriculture, widely adopted by both farmers and labourers for land clearance and weeding). Investment in the development of commercial rice originated in the 1970s when China developed smallholder demonstration rice projects and the government of Ghana pursued a policy of promoting large scale commercial rice production and smallholder contract farming on irrigation projects, tied to inputs suppliers and food marketers and processors. This has primarily taken the form of infrastructure development and has included such projects as the 'Ghana National Theatre', an agricultural cooperation project; the construction of a rice-grinding mill the 'Afeji Irrigation Project'; and grain depot the 'Nobewam Farmland Irrigation Project'. In Guinea-Bissau, Chinese experts established 11 rice production demonstration areas covering a total of 2,000 hectares. Moamba in Maputo Province and Matama in Niassa are two farms in Mozambique which received soft loans from China's EXIM Bank in

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<sup>21</sup>International Centre for Trade Sustainable Development



2000. The Bank has provided credit to rehabilitate and develop important agricultural infrastructure in regions considered critical to boosting the agriculture sector. The most significant development was a US\$ 50 million concessional loan, approved in 2010, to build three agro-processing factories (cotton, rice, and maize). In 2006, the state farm of China's Shanxi Province established a 5,000-hectare rice and cassava plantation in Cameroon. The project was financed by FOCAC (Forum on China-Africa Cooperation) funds through China Exim Bank at a cost of US\$ 62 million.<sup>22</sup> In 2009, Chinese companies invested in a 60-hectare experimental plot to cultivate crops including wheat, corn and sorghum. Chinese firms have also signed contracts with the Malian government to establish a joint venture in sugar production. They plan to process 6,000 tonnes of sugar cane daily, and to produce 100,000 tonnes of white sugar yearly by 2016.<sup>23</sup> Chinese companies are working on the design and construction of 12 major grain storage facilities in Zambia. Covering a total area of some 30,000 square metres, the completed grain barns will have a storage capacity of 100,000 tonnes, thereby greatly enhancing the country's storage capacity and food security. Chinese enterprises have built numerous agricultural infrastructure facilities and irrigation facilities in Africa. The MCC (Metallurgy Corporation of China)

has reached agreements with 35 African countries in supporting large-scale infrastructure, of which 70% of investments are in Nigeria, Angola, Sudan and Ethiopia. There are also other investments in Congo, Mali, Mozambique and Tanzania, such as contracts for infrastructure in bulk commodities worth US\$ 8 billion in Congo. Similarly, the Chinese Agriculture Technology Demonstration Centre (ATDC) in Ethiopia is an aid project on agricultural technology cooperation between China and Ethiopia. The ATDC was established to transfer agricultural technology from China to Ethiopia via the demonstration of Chinese farming approaches to local Ethiopians. From 2007–2009, China sent 104 senior agricultural technology experts to 33 African countries to assist in the creation of agricultural development plans. China also organised extensive training on topics including the cultivation of rice and vegetables, fishery management, meat processing, and the use of agricultural machinery. In 2009, China provided training to 568 African agricultural officials and technicians. Subject areas included rural economic reform and development, food production, soil and water conservation and dry cultivation techniques, the development of new cotton varieties, the use of agricultural machinery and continuing education for agricultural teachers.<sup>24</sup>

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<sup>22</sup>South African Institute of International Affairs

<sup>23</sup>*ibid*

<sup>24</sup>*ibid*

**Box 4:****Socio-Economic Impact under of Exim Bank's Lines of Credit program in Senegal: A Case Study****(a) Irrigation System Project:**

- The LOC was extended for design, manufacture, supply and install diesel engine pumpsets in rice producing zones of North Senegal to increase production of rice in the region through enhancement of its irrigation facility.

**Socio-economic impact of the funding**

- The project helped the Government of Senegal to distribute pumpsets (to rice farmers) and drip irrigation systems (to horticulture farmers like mango, cashew and pineapple) in North Senegal.
- The Indian supplying company (Kirloskar) had trained local farmers, extension workers and government staff in order to fulfil future servicing requirements of these equipments.
- With the implementation of the irrigation system:
  - The coverage area under irrigation increased substantially
  - Rice production witnessed a more than 200% increase
  - Irrigation project had reduced the import bill - 50% of the rice demand in North Senegal as in 2012 is being met by local production as compared to 19% in 2006-07
  - Irrigation project generated employment
  - The new system was found to be economical as their running and maintenance costs are lower than the earlier available pumps as these can be operated for 24 hrs non-stop

**(b) Development of Rural SMEs and Acquisition of Agricultural Machinery and Equipment:**

- Contracts was executed for supply of tractors, agricultural implements (like pumps, seeders, ploughs, cultivators, rice dehuskers with polishers, honey making plants and peanut crushing machines, etc., Mahindra vehicles and its spare parts, Bajaj motorcycles and auto rickshaws)

**Socio-economic Impact of the funding**

- Tractors and implements supplied by Indian company were distributed at affordable price
  - Tractors are being used for cultivation of peanuts, corn, banana and sorghum
  - Running cost of Indian tractors (consumed 64 litres of diesel for a full day operation) lower than European tractors (which consumed 90 litres)
  - Mechanization of farming activities by Senegalese farmers with Indian tractors has considerably reduced tillage time, cost of tillage, and thus increased productivity of crops.
    - a farmer can now produce more than 100 tonnes of corn per season, as compared to 49 tonnes of corn per season
  - Since the arrival of the Indian tractors, the farmers who supply cotton to SODEFITEX, have been able to cultivate larger tracts of land in a short span of time, leading the Govt of Senegal to sanction additional 6000 hectares of land for cotton cultivation.
  - This has led to a jump in cotton production from the region from 8000 tons to 17000 tons.
- As rural areas of Senegal do not have electricity, hand pumps supplied in the region have also been very useful as farmers are now able to draw groundwater for regular usage and for irrigation of farms without the use of electricity.

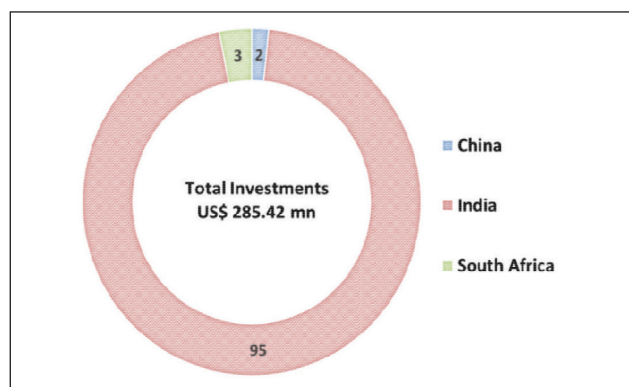
Source: Exim Bank Research

## INVESTMENTS BY BRICS ECONOMIES IN HEALTHCARE IN AFRICA

The healthcare sector in Africa is largely at a nascent stage in most parts of the continent. Limited opportunities in health education, limited access to basic health supplies, constrained government budgets, and insufficient healthcare professionals, remain the prime concerns of African nations.

As compared to Africa, BRICS economies have created a reasonably sound healthcare system and can play a key role in partnering with the African economies by replicating their healthcare development model. This gains even more significance given that most of the BRICS countries have undertaken similar approaches towards taking care of their large population base. On the one hand, there has been direct interventions to secure healthcare expenditure as much as possible by the Government, and on the other hand, there has been a critical role played by the government in encouraging healthcare delivery under the public-private partnership mechanism.

**Exhibit 32: Investments by BRICS economies in the Healthcare Sector (excl. pharma) in Africa: 2003-15**



Source: Data derived from fDi Markets; Exim Bank Research

In terms of investments from BRICS economies, only three countries, namely China, India and South Africa have invested in the healthcare sector of Africa. The cumulative investments by these countries between 2003 and 2015 stood at US\$ 285.42 mn (Exhibit 32).

China's Shandong University of Traditional Chinese Medicine invested US\$ 4.6 mn in education and training facility in Egypt, while South Africa based Lancet Laboratories invested US\$ 8.8 mn in a design,

development and testing facility in Rwanda for outpatient care centres and medical & diagnostic laboratories.

India, on the contrary, has a relatively large investment portfolio in the continent aggregating US\$ 272.02 mn. Apollo Group (Mauritius, Tanzania, and Uganda) and Madras Institute of Orthopaedics and Traumatology (Rwanda) are among the major Indian healthcare service providers present in Africa. Besides this, there are numerous institutions providing healthcare services in Africa. Apollo Hospitals Group has been providing a variety of facilities in different countries - nursing & residential care facilities in Ethiopia, Ghana, Nigeria and Zambia besides outpatient care centres and medical & diagnostic laboratories in Mauritius. Healthcare Global Enterprises (HCG) on the other hand has been providing outpatient care centres & medical & diagnostic laboratories in countries like Burundi, Ghana, Nigeria, Tanzania, and Uganda.

Under the Pan African e-Network Project, India has set up a fibre-optic network to provide satellite connectivity, tele-medicine and tele-education to countries of Africa. The project aims to create significant linkages for tele-education and telemedicine, internet, video-conferencing and VoIP services, making available the facilities and expertise of some of the best universities and super-specialty hospitals in India to the people of Africa. The receiving centres are fully equipped by Government of India and local staff there is trained by Indian experts. Within the telemedicine component, patient end locations have already been set up in the 12 Indian Super Specialty Hospitals, namely, All India Institute of Medical Sciences (AIIMS), New Delhi; Amrita Institute of Medical Sciences, Kochi; Apollo Hospitals, Chennai; CARE Hospital, Hyderabad; Escorts Heart Institute and Research Centre, New Delhi; Fortis Hospital, Noida; Narayana Hrudayalya, Bangalore; Sri Ramchandra Medical Centre, Chennai; Moolchand Hospital, New Delhi; HCG, Bangalore; Dr Bala Bhai Nanavati Hospital, Mumbai; and Sanjay Gandhi Institute of Medical Sciences, Lucknow. These 12 Indian Super Specialty Hospitals have been connected to 48 Patient

**Table 22: Select companies from BRICS economies that have invested in Healthcare in Africa**

Shandong University of Traditional Chinese Medicine	China
Apollo Hospitals Group	India
Healthcare Global Enterprises (HCG)	India
Lifecare	India
Madras Institute of Orthopaedics and Traumatology (MIOT Hospitals)	India
Nova Medical Centers Middle East	India
Fortis Healthcare	India
Shalby Hospitals	India
Dr Agarwal's Eye Clinic	India
Lancet Laboratories	South Africa

Source: Data derived from fDi Markets; Exim Bank Research

End Locations/Hospitals in African countries. Tele-education teaching centres have already been set-up in the five Indian Universities, namely, Amity University, Noida; IGNOU New Delhi; BITS, Pilani; University of Delhi

and University of Madras. 47 Learning Centers (LCs) have been set up in African countries. Tele-education learning centres have also been set-up in the 5 Regional University Centres in Africa, namely, Kwame Nkrumah University of Science and Technology, Ghana; Makerere University, Uganda; Yaounde University, Cameroon; Alexandria Faculty of Commerce, Egypt and Chancellor College, Zomba, Malawi.

There are also other Indian healthcare service providers who have undertaken an exposure in Africa – for example, Dr. Agarwal's Eye Hospital is operate in 9 countries in Africa; Fortis healthcare has set up a modern hospital in Mauritius, besides operating and managing 4 other hospitals in Uganda, Nigeria, and DR Congo; while Shalby Hospitals has put up OPD Centres and consulting camps across countries like Kenya, Tanzania, Malawi and Ethiopia, covering major cities like Addis Ababa, Nakuru, Nairobi, Eldoret, Kisumu, Mwanza, Mombasa, Arusha, Zanzibar, Dar-Es-Salaam, Blantyre.

### INVESTMENTS BY BRICS ECONOMIES IN SELECT MINERALS IN AFRICA

The African continent provides ample opportunities towards securing the future of BRICS economies while undertaking a sustainable investment in the continent through value addition which would result in host country development.

#### Oil and Gas Extraction

All the BRICS economies (except Russia which is

well endowed with oil reserves to take care of its domestic demand) have scarce oil resources and rely on significant oil imports to serve their domestic consumption (Table 23). There has been a need felt by the BRICS countries to undertake oil exploration activities overseas, particularly in a region like Africa which has not received as much investment as it should have.

**Table 23: Status of Crude Oil in BRICS countries**

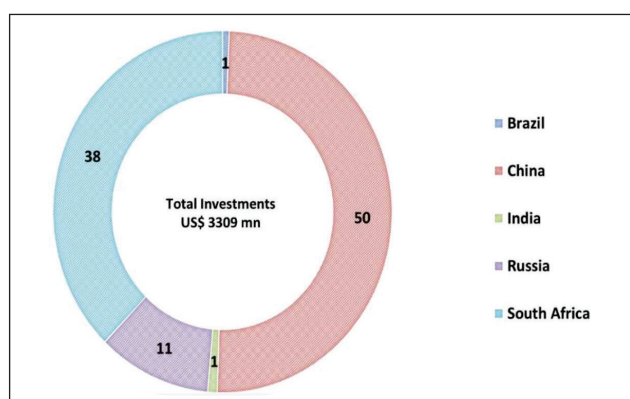
Country	Reserves of crude oil (million tonnes)		Production of Crude oil (million tonnes)		Consumption of crude oil (million tonnes)		R/P ratio*
	2005	2015	2005	2015	2005	2015	
Brazil	1652	1820	89.1	131.8	95.2	137.3	14.1
Russia	14616	14336	474.8	540.7	125	143	25.5
India	826	798	34.9	41.2	121.9	195.5	18.0
China	2184	2590	181.4	214.6	328.6	559.7	11.7
South Africa	-	-	-	-	24.8	31.1	-

\* The Reserves-to-production ratio (RPR or R/P) is the remaining amount of a non-renewable resource, expressed in time. While applicable to all natural resources, the RPR is most commonly applied to fossil fuels, particularly petroleum and natural gas.

Source: US-EIA; Exim Bank Research

Chinese oil companies have been in Africa since long. In extraction, China, through its state owned company China National Petroleum Corporation (CNPC), invested US\$ 350 mn in Algeria in 2003. Following this, in 2005, China Petroleum and Chemical (Sinopec) invested in Egypt as well. In 2014, Sinopec invested US\$ 1300 mn in Nigeria's extraction industry. Simultaneously, China National Offshore Oil Corporation (CNOOC) and China Poly have engaged in Uganda and Ethiopia respectively for sales, and marketing support.

**Exhibit 33: BRICS investments in Oil and Gas Extraction in Africa (2003-2015)**



Source: Data derived from fDi Markets; Exim Bank Research

The second largest investor amongst BRICS nations in oil and gas extraction in Africa is South Africa. SASOL, PetroSA, Nucol, SacOil have taken exposures in Mozambique, Equatorial Guinea, Zimbabwe, and Egypt respectively. SASOL in fact has invested around US\$ 1200 million in Mozambique's oil and gas extraction segment.

Russia, which has a cumulative investment of US\$ 358 mn in Africa in the oil and gas extraction segment, has not witnessed any significant investments for quite sometime. During 2003 and 2004, Lukoil and Rosneft had invested US\$ 340 mn and US\$ 18 mn in Egypt and Algeria, respectively. However, Russian companies, Lukoil, Sinterneftegaz, and Sintez have invested in sales and marketing channels in countries like Sierra Leone, Libya, and Namibia.

Investment by Brazil has largely been through two of its major oil companies Petrobras and Vale. While

the former had exposure in countries like Nigeria, Libya, Algeria, and Angola – Vale has invested only in Mozambique to the tune of US\$ 1450 million.

Oil and gas extraction by India has been confined to the exposure ONGC had taken in Egypt and Libya, almost a decade back.

#### Petroleum refineries

The paradox is that while Africa, which is an important oil exporter to the world, is at the same time a major importer of refined petroleum products due to growing demand for fuel and a limited refining capacity. As such, countries like Angola and Nigeria export crude oil, only to import refined oil at an additional cost. This is an opportunity which BRICS member countries should increasingly explore in the continent. All the BRICS countries have the capability to establish refining capacities. While oil and gas extraction is an area which has tremendous potential to be explored by the BRICS economies, it is very important to have a set of forward linkages, and petroleum refineries is the most appropriate means towards creating the value chain in the oil extraction sector.

One of the highest investments in petroleum refinery amongst the BRICS nations has been made by South Africa's New Alpha Refinery Ghana in the Greater Accra region at a cost of US\$ 6 bn in 2009. Another big investment to the tune of US\$ 4 bn has been done by Russia's RT Global Resources in Uganda in 2015. Government of India owned Indian Oil Corporation had also invested US\$ 3.5 bn in Nigeria way back in 2004. China, apart from having invested US\$ 758 mn through China National Petroleum Corporation (CNPC) in Chad, has also invested in Sudan and Niger.

Although, in the current circumstances, when the crude oil prices are relatively low, setting up a refining capacity may not appear to be a viable proposition for many businesses. However in the long term, getting engaged in downstream activities would be a win-win situation for both Africa and the investor-countries. Africa will reduce its import bill on petroleum products, and the investor will be able to access the huge unmet demand in the continent.

## Coal

Although coal reserves are available in certain pockets of Africa, countries like South Africa, Mozambique and Zimbabwe offer good opportunities for investment in the sector. These coal rich countries have been slow to utilise their coal as local demand has been limited and the means to export coal has been inadequate.

Coal is an essential input for producing power, and BRICS countries are at different stages in terms of their capacities. Brazil, India, and South Africa have to rely on imports given that the domestic consumption is significantly higher than domestic production. India, which despite being one of the largest coal producing countries in the world, has been relying on imports, largely due to the poor quality of coal available domestically.

In the area of coal mining, Brazil's significant coal major, Vale (Companhia Vale do Rio Doce) had invested as early as 2007 in Moatize, Tete in Mozambique to the tune of US\$ 1200 mn. In Moatize, Vale has been engaged in building one of the world's largest coal handling preparation plants in an operational site, with a capacity to process 26 million metric tons of coal per year. It has a proven and probable reserves of 838 million metric tons of coal, which makes it one of the world's largest unexploited coal reserves.

Amongst the Indian entities, JSPL had invested US\$ 50 million in South Africa, and Nava Bharat ventures have invested US\$ 108 million in Zambia. In August 2016, Indian Government owned Coal India has signed a memorandum of understanding (MoU) with the South Africa government-controlled African Exploration Mining and Finance Corporation (AEMFC) for collaborating in areas like identification, acquisition, exploration, development and operation of coal assets in South Africa. This is not the first time Coal India is venturing into overseas acquisitions. In 2010, Coal Videsh floated a subsidiary Coal India Africana Ltd (CIAL) to acquire coal blocks in Mozambique.

BRICS countries have huge potential to not only satisfy their ever-growing need for extractive resources but also simultaneously help in the development prospects of Africa by adding value domestically and capturing the wider socioeconomic benefits derived from such investments.

## Non-ferrous

The importance of non-ferrous ores cannot be overstated in an era when more and more goods are being made with its help. Non-ferrous metals are used because of their desirable properties such as low weight (e.g. aluminium), higher conductivity (e.g. copper), non-magnetic property or resistance to corrosion (e.g. zinc).

**Table 24: Status of Coal in BRICS countries**

	Recoverable Coal <sup>25</sup> (Mn Metric Tonnes)	Production (thousand metric tonnes)		Consumption (thousand metric tonnes)	
Country	2011	2005	2012	2005	2012
Brazil	8053	7598	7657	26179	30090
Russia	190728	343629	429948	257308	302168
India	73614	521539	715908	556409	820460
China	139089	2852097	4427748	2737485	4283765

Source: US-EIA; Exim Bank Research

<sup>25</sup>Includes only the coal that can be mined with today's mining technology, after considering accessibility constraints and recovery factors.



Many non-ferrous materials are used in the iron and steel industries as well – for example, bauxite is used as flux for blast furnaces while others such as wolframite, pyrolusite and chromite are used in making ferrous alloys.

As the BRICS economies expand, their appetite for consumption of commodities, would be increasing significantly, entailing even higher amounts of non-ferrous metals for production purposes.

#### Copper, nickel, lead, & zinc mining

In terms of investments, China has put in a lot of money in this segment - copper, nickel, lead, and zinc mining. Since 2003 till 2015, Chinese companies have taken an exposure of US\$ 1808 mn in the Copperbelt Province in Zambia alone. Besides Zambia, two of Chinese reported investments have been in South Africa. Other BRICS members which have invested in the segment include Brazil's Vale in Zambia to the tune of US\$ 400 mn;

Russia's Norilsk Nickel in South Africa (US\$ 270 mn) and Botswana (US\$ 320 mn); and South Africa's Metorex Group which has invested in Congo (US\$ 406.7 mn) and Zambia (US\$ 246.7 mn). India based, Vedanta has also invested in the Konkola Copper Mines (KCM) unit in Zambia.

#### Alumina & aluminium production and processing

In alumina & aluminium production and processing, Russia had the highest amount of investments among BRICS in Africa. Russia cumulatively invested US\$ 736.5 mn between 2003 and 2015 through Russian Aluminium (RusAl) in three countries – Nigeria, Libya, and Guinea. South Africa based Nampark has invested US\$ 265.78 mn in Angola. On the other hand, China's investment through Bosai Minerals has been in Ghana for US\$ 62 mn. Amongst the Indian companies, ABG International (US\$ 150 mn) and Manaksia (US\$ 2.8 mn) have invested in Sierra Leone and Mauritius, for extraction and sales and marketing purposes, respectively.

**Table 25: Select companies from BRICS economies investing in Minerals in Africa**

Copper, nickel, lead, & zinc mining		Alumina & aluminium production and processing	
Vale (Companhia Vale do Rio Doce)	Brazil	Bosai Minerals	China
China Nonferrous Metals Mining	China	ABG International	India
Macrolink Group	China	Manaksia	India
Zhejiang Huayou Cobalt Nickel Materials	China	Russian Aluminium (RusAl)	Russia
Jinchuan	China	Nampark	South Africa
Vedanta	India		
Norilsk Nickel	Russia		
Metorex Group	South Africa		

Source: Data derived from fDi Markets; Exim Bank Research



## INVESTMENTS BY BRICS ECONOMIES IN SOLAR IN AFRICA

Solar power technology unlike fossil fuels, which tend to become harder and more expensive to extract over time, has been evolving rapidly - each incremental advance in solar technology makes the power generation cost cheaper. Solar installations have increased phenomenally in the last couple of years. World solar PV installations have shot up from a mere 3.4 GW in 2004, to touch 227 GW as in 2015.

Investments in solar PV installations worldwide has increased from US\$ 11.9 bn in 2004 to US\$ 161 bn in 2015. Year 2015 alone has witnessed a 12% increase over the previous year.<sup>26</sup> This meteoric rise of solar installations is a testimony to the determination of countries across continents, including the emerging and developing countries, to transform this need to have energy from solar to an opportunity for green investment.

In the African continent, where there is high irradiation and unreliable and expensive grid power, solar energy (which has reached grid parity in many developed and emerging markets), is well equipped to serve the energy needs of a large section of the population. However, most parts of Africa do not have the financial wherewithal to bear the upfront costs to implement large scale solar projects.

Appropriate mechanisms need to be created to overcome this barrier at the early stage of solar project development in Africa, while simultaneously creating enhanced deal flow for later stage private and foreign institutional investors. BRICS countries in this regard are well placed to play a significant role in 'lighting' most parts of Africa.

The cumulative solar PV installed across the BRICS countries stood at 49717 MW (49.7 GW). While the existing solar PV capacity amongst these countries are varying, they all are moving significantly in the solar value chain as the prices of solar PV reduces.

Africa has a total installed solar capacity of 2094 MW only, which includes 218.2 MW of CSP as well<sup>27</sup>. For investors, this represents a huge opportunity.

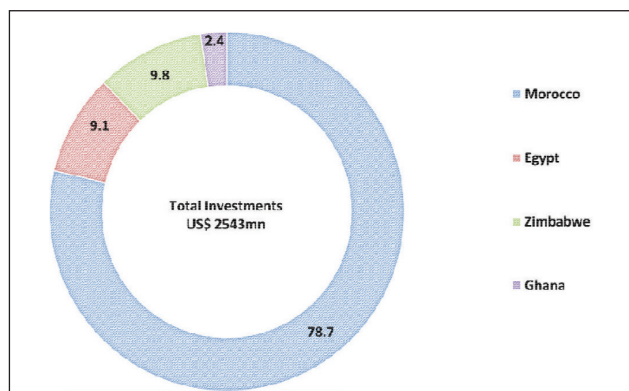
Africa which has a large part not illuminated due to lack of transmission facilities, standalone – off grid solar facilities will be a huge boon for the continent. These off-grid solar can find applications in both domestic and industrial sector with solar PV for outdoor lighting, solar water pumping systems, and solar PV power plants, amongst others. These solar PV systems in Africa can find applications in diverse areas such as households, agriculture, telecommunications, defence, and in manufacturing sector for generation of power.

It may also be noted that amongst the BRICS countries, China is the largest exporter of PV products in the world. The products considered to be related to PV trade are primarily multiple use items with the exception of photosensitive semiconductor devices, including photovoltaic cells whether or not assembled in modules or made up into panels and light-emitting diodes. The key single-use item identified for solar energy is Static converters (PV panels/ modules HS-850440), whose exports amounted to US\$ 54 bn as in 2015. The major exporters included China, including HK (US\$ 22 bn), Germany (US\$ 4.8 bn), USA (US\$ 4.2 bn), and Japan (US\$ 1.7 bn).

Cumulative BRICS investments in African solar energy sector between 2003 and 2015 (Exhibit 34) amounted to US\$ 2543 mn. There is a huge opportunity for BRICS countries to take part in the Africa's solar story. This may happen through either supply of solar panels and other necessary equipment required for installations or going a step ahead as an EPC contractor to execute the whole project. The BRICS economies, particularly India and China have embraced solar in a big way and are poised to take huge steps towards bringing solar energy in the mainstream of electricity consumption.

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<sup>27</sup>CSP in Africa: South Africa: 150.2 MW; Algeria: 25 MW; Morocco: 23 MW; Egypt: 20 MW

**Exhibit 34: Countrywise share in investments by BRICS countries in Solar in Africa [2003-2015]**

Source: Data derived from fDi Markets; Exim Bank Research

Indian investments accounted for 9.1% of total BRICS investment made in the solar energy sector in Africa cumulatively between 2003 and 2015. Shapoorji Pallonji Infrastructure Capital has invested US\$ 231.7 mn in Egypt. China, on the other hand, has invested around US\$ 2311 mn during the same period. A significant part of this, i.e. US\$ 2000 mn, has gone to Morocco in 2015. The rest has been to countries like Ghana and Zimbabwe. Chinese solar companies which have taken exposure in Africa include BXC Ghana, Yingli Green Energy Europe, Shanghai Electric, Zhenfa New Energy Science and Technology.

Energy production and energy security form the kernel of the good relations. In the solar sector, there can be a possibility of a win-win situation between the BRICS economies and the African countries. Climate change presents humanity with a significant challenge. At the same time, investments in clean energy and low carbon alternatives, presents business and capital with an opportunity, which may become one of the largest commercial opportunities of the current era.

**Table 26: Select companies from BRICS economies investing in Solar in Africa**

India	China
Shapoorji Pallonji Infrastructure Capital	Shanghai Electric
	BXC Ghana
	Yingli Green Energy Europe
	Zhenfa New Energy Science and Technology

Source: Data derived from fDi Markets; Exim Bank Research

## SUM UP

The overall BRICS investments in Africa has been significant. Though the predominant share has been from countries like China, India and South Africa, the other two BRICS nations, Russia and Brazil have a huge scope to further augment their investments into this fast growing region which offers tremendous potential.

This chapter has focused on sectors like agriculture, healthcare, mining, and solar, and stressed upon a sustainable model of investment in Africa through engagement in value addition in almost each of these primary businesses in the form of agro-processing, mineral processing, creating healthcare infrastructure, solar supplies and installations, etc. A collaboration by BRICS economies would not only offer good opportunities for investments but will also foster closer engagement with Africa and facilitate the overall progress and socio-economic development of the region.

Given the fact that the long term benefits to be accrued from investments in Africa are on the higher side, going forward BRICS economies should increasingly explore investment opportunities that would cater to the African market.

## 4: BRICS INVESTMENT IN AFRICA: PROSPECTIVE AREAS OF COOPERATION

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BRICS as a forum has come a long way since its formal inception in 2009. Its strengths lie in the unified objective of becoming a more constructive and progressive union within the developing and emerging countries landscape, despite the heterogeneity in their socio-political-legal frameworks. With their economies predicted to surpass the G7 economies in size by 2032, the influence BRICS imparts in the global platform over the rules governing international commerce and economic policy is extremely significant. This provides the grouping a strong leeway in shaping the global rules for the betterment of the countries of the South.

In this context, and subsequent to the discussions in the previous sections of this Study, it may be meaningful for the BRICS economies to take a distinctive interest to enhance their engagements with Africa, which is home to 1.1 billion people of which an estimated 300 million belong to the middle class population.

Select illustrative means and broad areas of collaboration that could be considered by the BRICS economies have been briefly discussed in this chapter.

### **Co-Financing by BRICS economies**

Co-financing is a very well-established way of working for development. BRICS economies can come together to assist the African countries in a variety of sectors to improve the economy. Each of these economies can jointly, or bilaterally finance a program or a project, and share the best practices in terms of financial capability and technical expertise to monitor execution. A co-financing amongst the financial institutions in the BRICS economies can leverage resources - funding, knowledge, and expertise - of all partners involved, for the greater benefit of Africa.

Financial institutions and development banks of BRICS economies can also partner with multilateral institutions

and regional development banks in the Africa region to co-finance projects. This would diversify risk sharing for the project while at the same time offer attractive credit terms, efficient processing, and transparency.

While BRICS countries need to collaborate to co-finance projects in Africa, either amongst themselves or with others, African countries, on their part, must also make a concerted effort towards facilitating such endeavours, inter alia, through good governance and improving the ease of doing business.

There are existing examples, wherein some of the BRICS institutions have undertaken co-financing activities. For example, in 2014 the Africa Growing Together Fund (AGTF) is being jointly backed by the People's Bank of China (PBOC) and AfDB to support sovereign and non-sovereign guaranteed development projects totaling US\$ 2 bn over 10 years.

In 2010, the African Financing Partnership (AFP) was formed under the aegis of AfDB, which is a collaborative, co-financing platform amongst eight development finance institutions (DFIs) active in private sector project financing in Africa. These include AfDB, Deutsche Investitions UND Entwicklungsgesellschaft MBH (DEG), Development Bank of Southern Africa Ltd. (DBSA), European Investment Bank (EIB), Industrial Development Corporation of South Africa Ltd. (IDC), International Finance Corporation (IFC), Nederlandse Financierings Maatschappij Voor Ontwikkelingslanden N.V. (FMO), and Société de Promotion et de Participation pour la Coopération Economique S. A. (PROPARCO). The AFP models would range from pure co-financing structures to the potential establishment of AFP as a special purpose vehicle.

Besides these models, there are numerous such co-financing approaches that have been undertaken to invest in Africa, along with local partner institutions.

There is an evident need for partnerships amongst development finance institutions, for efficient utilization of Africa's human and natural resources to meet vast financing needs of private sector projects in the continent.

BRICS economies can also explore such opportunities to partner with the New Development Bank (NDB) within the areas of infrastructure and sustainable development while exploring investments in Africa. All the entities, individual BRICS economies and the NDB, can also explore cooperation in mobilizing resources for participating in such ventures. Any such initiative would benefit Africa as it will assist the continent in meeting its enormous infrastructure requirements.

### **Facilitating Sustainable Development & Innovations**

Africa is a region which is beset with some of the strongest challenges hindering sustainable development. The region, which has been endowed with rich natural resources, has largely found itself being exploited rather than being able to create a sustainable ecosystem of development which enables job creation and setting up of value added industries.

It is therefore important to put in place suitable strategies for designing the future course of development, while using appropriate technologies for viable long term growth. Suitable sustainable mechanisms need to be adopted which could offer Africa an opportunity to move from carbon-concentrated development, characterized by uneconomical and unsustainable technologies and systems, to moving to an eco-system that is cleaner and is focused on renewable energy.

At the same time, the region faces food security challenges, which gets further aggravated due to issues like poverty, poor basic healthcare facilities, and lack of access to electricity, education, water supply, amongst a host of others. Africa is not very well equipped to respond to such issues. The answer to improve such a situation would lie in investing in interventions that hit multiple targets (like solar energy), across different sectors, at once. In such a situation, the emerging

economies of BRICS could endeavor to increase their participation in areas of sustainable development through innovations in policy and tools. Possible areas of such interventions could be:

- Utilizing the latent agricultural potential of Africa towards meeting its own needs and even catering to the global demand;
- Harnessing the naturally endowed solar energy in Africa;
- Building healthcare facilities towards making a healthy Africa; and
- Facilitate in creating value added linkages in both mining and agriculture.

Since the turn of the century, there has been a tremendous consciousness amongst the global community towards sustainable development. BRICS countries, amongst many others, have undertaken several steps towards sustainability, and have not only covered a significant path, but have also kept ambitious targets towards achieving them.

A number of BRICS countries are transforming their sustainable agenda using innovations and introducing sustainability into their core business practices. BRICS economies therefore could consider replicating their successes in the African context. They can consider taking into account environmental and social concerns in development, facilitating human capacity development, encouraging better trade practices in agriculture, and most importantly through mass scale introduction of sustainable technologies, like solar.

Fostering agriculture in Africa will be a major development tool to eradicate poverty and hunger over the long term. Deutsche Bank, for example has set up the Africa Agriculture and Trade Investment Fund (AATIF), which aims to sustainably support incomes of people working in agriculture, ensure food security and increase the competitiveness of local businesses. AATIF's mission is to unlock the potential of the African agricultural sector at all levels – production, processing, services and trade – for the benefit of the poor. The Fund aims to provide additional employment and income for farmers, entrepreneurs and laborers alike. Its focus is

on increasing productivity, production and local value creation through knowledge transfer and investment in efficient structures. Deutsche Bank works closely with the International Labour Organization (ILO) and the United Nations Environment Programme (UNEP), which advises the fund on social and environmental issues. BRICS countries could consider jointly floating a similar Fund to not only augment agriculture production in Africa but also promote exports from the region.

Going ahead in the near future, the NDB may also explore the possibility of setting up a dedicated fund for catering to sustainable investment needs of the Africa region. This could be set up in partnership with likeminded institutions like AfDB, development financial institutions of BRICS economies, FMO (Netherlands), DEG (Germany), KfW (Germany), European Investment Bank, amongst others.

### **Enabling Infrastructure Development in Africa**

Infrastructure is the key to unlocking Africa's true economic potential. Africa has seen a moderate economic growth over recent years and is expected to continue growing at around 4% and 4.7% during 2016 and 2017<sup>28</sup>. One aspect that hinders Africa's growth prospects is its lack of infrastructure, both physical and social. Inadequate infrastructure is said to cost Africa approximately 2 percentage points off GDP growth per year<sup>29</sup>.

Given this huge infrastructure lacunae, the entire continent is found to trade more with the outside world than amongst itself. The intra-African trade is the lowest globally, approximately 15% compared to 54% in the North America Free Trade Area, 70% within the European Union and 60% in Asia<sup>30</sup>. This inhibits regional integration of markets for infrastructure services, particularly in power, energy, water and sanitation.

A modest infrastructure would have certainly enabled increased trade, industrialization and the movement

of people across the continent. Roads, ports, railways, electricity and information communications technology are all vital enablers of economic growth. In an increasingly globalized market, linking to regional and global value chains is proving more and more critical to completely achieve economies of scale. This, in turn, is essential to stand a chance to compete globally, foster innovation, and penetrate new markets. In this perspective, connecting to regional and global value chains can prove to be of paramount importance in order to advance Africa.

The Governments of the BRICS economies have ably supported the private sector in improving the infrastructure conditions in their respective countries, and have encouraged the public-private partnership mode. It may be noted that private sector participation is usually critical especially for undertaking complex infrastructure development projects.

BRICS economies could share their experiences wherein the Government entities identify the projects, and run a bid for private companies to participate to execute the project. The capacity and conduct of government sponsors can have a major impact on the initiation and delivery of infrastructure development projects. The Governments in Africa need to be able to efficiently and competently identify, and execute deals with private partners, and manage projects over the course of their lifecycles with greater amount of transparency.

While hard infrastructure is one side of the development that is required, the softer aspect is developing a sound financial system in the continent. These may include having specialized financial institutions catering to trade, housing, infrastructure, agriculture, etc; credit ratings for industries and companies, and payment and settlement systems, etc., all of which are necessary to foster financial stability and the successful operation of modern integrated financial markets.

BRICS countries have developed a fairly robust financial architecture within their domestic economies. These

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<sup>28</sup>IMF Projections

<sup>29</sup>WEF

<sup>30</sup>AfDB



include a mechanism to devise a sound monetary policy, regulatory mechanisms to oversee the functioning of banking, insurance, capital markets, etc., and significant penetration of technology in the banking business. Such experience of an evolving financial architecture in a developing country context, which has now graduated to become fairly robust, needs to be shared with African counterparts for any meaningful partnership.

## **SUM UP**

BRICS nations, under a uniform platform, have been collaborating for some time now. They have held many important decisions at the highest levels, and have even seen the birth of the New Development Bank, set up with an initial authorized capital of US\$ 50 billion, equally divided amongst all the members.

More so, the intent to work together towards a common agenda has been very well demonstrated through a number of agreements that have been successfully concluded during the BRICS Summits that have been held over the years.

Towards fostering institutional linkages, the Development Banks in BRICS nations have signed various multilateral financial cooperation agreements under the BRICS Interbank Cooperation Mechanism. The nominated member development banks are - Banco Nacional de

Desenvolvimento Economico e Social (BNDES), Brazil; State Corporation Bank for Development and Foreign Economic Affairs – Vnesheconombank (VEB), Russia; Export-Import Bank of India (Exim Bank), India; China Development Bank (CDB), China; and Development Bank of Southern Africa (DBSA), South Africa.

These agreements however are not binding upon the five nations together and have to be pursued bilaterally. They are expected to enhance cooperation among BRICS development banks and to significantly promote trade and investments.

In the current context of the Study, four such agreements appear extremely useful which could help in elevating the BRICS partnership with Africa to a higher pedestal. These include BRICS Multilateral Infrastructure Co-financing for Africa, BRICS Multilateral Cooperation and Co-financing Agreement for Sustainable Development; and the Cooperation with the New Development Bank.

The nominated member development banks under the BRICS Interbank Cooperation Mechanism have a tremendous opportunity to capitalize upon this platform, and work alongside each other or joining hands with other multilaterals and regional banks, and undertake sustainable investments in the African continent.



## Annexure 1

## Life Expectancy at Birth in African Countries (number of years)

	1990	1990	1990	2000	2000	2000	2012	2012	2012
	Both sexes	Female	Male	Both sexes	Female	Male	Both sexes	Female	Male
Africa Average	52.9	54.8	51.1	52.2	53.7	51.0	59.4	60.9	57.8
Mauritius	70	74	66	72	75	68	74	78	70
Seychelles	69	75	64	72	77	67	74	78	69
Cabo Verde	66	68	63	70	73	66	74	78	71
Algeria	68	69	66	70	71	68	72	73	70
Sao Tome and Principe	61	63	59	63	65	61	67	69	65
Namibia	63	64	62	57	57	57	67	69	64
Rwanda	48	50	46	46	47	46	65	66	63
Madagascar	51	53	50	58	59	57	64	65	62
Senegal	57	59	56	57	59	56	64	66	63
Ethiopia	45	48	42	51	53	50	64	65	62
Mauritania	58	60	57	60	62	59	63	65	61
Gabon	61	63	60	59	60	59	63	64	62
Eritrea	48	50	46	45	54	39	63	66	61
Comoros	56	58	54	59	60	57	62	63	60
Ghana	57	58	55	58	59	57	62	64	61
Liberia	42	46	39	51	52	50	62	63	60
Botswana	65	66	65	47	47	48	62	63	61
Gambia	52	53	50	56	58	55	61	63	59
Kenya	60	62	58	52	53	51	61	62	59
United Republic of Tanzania	51	52	49	50	51	50	61	63	59
South Africa	62	66	59	59	62	55	59	62	56
Benin	53	56	51	54	56	53	59	60	57

Congo	56	58	55	52	53	52	59	60	57
Niger	43	43	43	50	50	50	59	59	59
Malawi	45	46	43	44	44	45	59	60	58
Togo	55	57	54	55	56	54	58	59	57
Guinea	47	48	46	51	52	50	58	59	57
Burkina Faso	50	51	48	49	50	49	58	59	57
Zimbabwe	62	64	60	42	42	42	58	60	56
Mali	46	46	46	48	48	48	57	57	57
Uganda	47	49	44	45	46	44	57	58	56
Zambia	43	47	40	41	43	40	57	58	55
Cameroon	54	56	53	51	52	50	56	57	55
Burundi	49	51	48	48	50	46	56	57	54
Equatorial Guinea	48	49	46	50	52	49	55	57	54
South Sudan	42	44	41	49	50	47	55	56	54
Guinea-Bissau	49	52	47	52	53	51	54	56	53
Swaziland	61	61	62	48	49	48	54	55	52
Nigeria	46	47	45	47	48	47	54	55	53
Côte d'Ivoire	51	54	50	48	49	47	53	54	52
Mozambique	43	45	41	47	49	46	53	54	52
Democratic Republic of the Congo	49	51	48	48	50	47	52	53	50
Chad	45	47	43	46	47	45	51	52	50
Angola	43	45	41	46	47	44	51	52	50
Central African Republic	48	50	46	45	46	44	51	52	50
Lesotho	61	62	59	48	49	47	50	52	49
Sierra Leone	38	38	38	39	39	38	46	46	45

\* coloured boxes indicate the top 10 countries in the respective category in the respective year

\*\* Data is available for 47 countries out of 54 in Africa; all are latest available

Source: Data derived from WHO database; Exim Bank Research

## Annexure 2

## Infant Mortality Rate in African Countries (per 1000)

Country Name	1990	2000	2010	2013
Sierra Leone	158	141	114	107
Angola	133	128	110	102
Central African Republic	115	113	103	96
Chad	116	106	94	89
Democratic Republic of the Congo	115	115	92	86
Guinea-Bissau	133	109	85	78
Mali	131	116	83	78
Nigeria	126	113	82	74
Lesotho	70	81	77	73
Côte d'Ivoire	104	100	77	71
Equatorial Guinea	124	99	76	69
Mauritania	78	76	70	67
Guinea	140	103	71	65
South Sudan	150	110	71	64
Burkina Faso	103	96	70	64
Mozambique	158	114	72	62
Cameroon	85	93	66	61
Niger	138	101	66	60
Comoros	88	73	63	58
Zambia	115	100	64	56
Benin	108	90	62	56
Togo	90	77	61	56
Swaziland	55	80	63	56
Burundi	103	92	61	55
Zimbabwe	50	61	59	55

Liberia	165	119	60	54
Ghana	80	65	55	52
Gambia	80	63	52	49
Kenya	64	69	52	48
Malawi	143	103	53	44
Ethiopia	122	90	51	44
Uganda	107	89	51	44
Senegal	71	69	47	44
Madagascar	98	71	44	40
Gabon	60	56	43	39
Rwanda	93	108	44	37
Sao Tome and Principe	70	58	40	37
United Republic of Tanzania	101	80	41	36
Eritrea	93	58	39	36
Congo	60	77	42	36
Botswana	39	54	40	36
Namibia	50	49	38	35
South Africa	47	52	35	33
Cape Verde	48	29	23	22
Algeria	40	34	24	22
Mauritius	20	16	13	13
Seychelles	14	12	12	12

\* red coloured boxes indicate the top 10 countries with the highest infant mortality rates; and the green coloured boxes indicate the 10 countries with the lowest mortality rates during the year

\*\* Data is available for 47 countries out of 54 in Africa; all are latest available

Source: Data derived from WHO database; Exim Bank Research

## Annexure 3

## Percentage of Population losing life by major cause groups

	2000	2000	2000	2012	2012	2012
	Communicable	Injuries	Non-communicable diseases	Communicable	Injuries	Non-communicable diseases
Central African Republic	85	5	9	80	8	12
Chad	82	7	11	80	7	13
Niger	85	5	10	77	8	15
Malawi	87	4	9	76	7	17
Zambia	83	8	10	75	11	14
DR Congo	81	8	11	75	10	15
Lesotho	78	8	14	74	10	15
Angola	82	7	10	74	10	17
Zimbabwe	86	5	9	74	9	17
Guinea-Bissau	80	6	14	74	8	18
Mozambique	78	9	13	73	11	16
Nigeria	80	7	12	73	10	16
Sierra Leone	78	7	15	73	8	19
South Sudan	79	8	13	72	11	17
Swaziland	77	8	15	72	10	17
Kenya	82	7	11	72	10	18
Congo	79	8	14	72	9	19
Mali	80	6	14	72	9	19
Togo	78	7	15	71	9	20
Guinea	80	6	13	71	9	20
Mauritania	76	8	16	70	9	21
Burundi	76	12	12	69	12	19
Ethiopia	79	10	12	69	11	20

Burkina Faso	82	6	12	69	10	21
Cameroon	78	7	15	69	9	22
Côte d'Ivoire	79	7	14	69	9	22
Liberia	81	6	13	69	9	22
Uganda	82	8	10	68	13	18
Tanzania	79	8	13	68	12	20
Equatorial Guinea	74	8	17	68	11	21
Gabon	73	8	18	68	9	23
Gambia	74	8	18	67	10	23
Benin	78	7	16	67	9	24
Senegal	78	6	15	67	9	24
Botswana	86	5	9	66	11	23
Comoros	69	10	21	63	12	25
Madagascar	73	9	18	63	12	26
Ghana	75	6	19	63	9	28
Rwanda	80	8	12	62	14	24
Eritrea	44	45	11	62	12	26
South Africa	64	11	25	62	10	28
Namibia	75	8	17	60	13	27
Cabo Verde	48	10	41	33	12	55
Algeria	32	16	52	24	12	63
Mauritius	11	11	77	11	11	78

coloured boxes indicate the top 10 countries in the respective category during the year

\*\* Data is available for 45 countries out of 54 in Africa; all are latest available

Source: Data derived from WHO database; Exim Bank Research



## Annexure 4

## Mortality rate for Non-Communicable Diseases (per 100 000 population): 2012

Country Name	Cardiovascular diseases	Chronic Respiratory diseases	Diabetes mellitus	Malignant neoplasms (cancer)
Algeria	396.6	28.4	67.1	80.6
Angola	374.6	74.4	42.2	89.6
Benin	372.5	42.6	48.1	89.6
Botswana	323.7	30.7	60.3	86.5
Burkina Faso	373.7	48.3	59.9	91.7
Burundi	311.6	45	38.9	134.1
Cabo Verde	249.9	49.3	22.9	63.1
Cameroon	285.7	37.5	52.3	73.4
Central African Republic	244.4	79.5	23.5	81.5
Chad	306.6	50.9	44.8	88
Comoros	329.6	44.9	45.2	100.7
Congo	334.5	54.7	33.9	70.5
Côte d'Ivoire	336.1	46.5	53.9	111.3
DR of the Congo	359.6	61.4	33.3	108.1
Equatorial Guinea	357.6	76.3	39.8	73.4
Eritrea	327.3	42.5	44.4	88.4
Ethiopia	161.6	54.8	24.5	86.1
Gabon	241.7	51.1	29.9	54
Gambia	299.6	38.6	48.6	64.8
Ghana	340.6	32.3	39.5	79.3
Guinea	313.4	42.7	43.5	93
Guinea-Bissau	370.5	48	51.3	87.4
Kenya	205	19.5	34.9	140.9
Lesotho	306.7	91.9	74.1	73.1
Liberia	248.4	125.5	36.9	91

Madagascar	352.3	43.2	22.6	127
Malawi	336.5	40	30.1	103.5
Mali	395.7	102.5	54.6	97.1
Mauritania	262.6	32.1	40	66.1
Mauritius	207.3	36.9	171	82.3
Mozambique	213.5	44.5	33.5	97.1
Namibia	302.9	63.1	58.2	61.9
Niger	317.7	44.3	41.7	55.9
Nigeria	266.5	36.8	47	106.7
Rwanda	261.7	25.6	34.6	124.3
Senegal	198.6	44.9	56.5	73.6
Sierra Leone	436	61.1	69	86.2
South Africa	298.3	52.3	94.3	108.7
South Sudan	249.9	44.3	37.6	113.1
Swaziland	295.8	89.5	74.8	84.9
Togo	307.4	37.2	43.2	99.8
Uganda	263.8	38	43.1	133.6
Tanzania	202.9	27.5	49.7	94.9
Zambia	271.7	23.8	39.3	105
Zimbabwe	197.1	53.8	23.1	223

\* red coloured boxes indicate the top 10 countries; and the green coloured boxes indicate the least 10 in the respective category in the respective year

\*\* Data is available for 45 countries out of 54 in Africa; all are latest available

Source: Data derived from WHO database; Exim Bank Research

## Annexure 5

## Hospital Infrastructure: 2013

Country	Total density per 100 000 population: Hospitals	Total density per 100 000 population: Health centres	Total density per 100 000 population: District/rural hospitals	Total density per 100 000 population: Provincial hospitals	Total density per 100 000 population: Specialized hospitals
Benin	0.41	5.45	0.25	0.05	0.11
Botswana	1.29		0.79	0.35	0.15
Burkina Faso	0.31	11.89	0.25	0.00	0.05
Burundi	0.50	5.01	0.32	0.15	0.03
Cote d'Ivoire	1.71	11.83	1.16	0.45	0.10
Cabo Verde	1.00	3.81	0.60	0.00	0.40
Central African Republic	0.48	1.99	0.28	0.11	0.09
Chad	0.65	0.00	0.50	0.15	0.01
Comoros	0.68	1.63	0.27	0.27	0.14
DR Congo	0.45		0.43	0.02	
Egypt	0.62	0.25	0.50		0.12
Eritrea	0.36	0.88	0.25	0.09	0.02
Ethiopia	0.22	0.00	0.19		0.03
Gabon	3.53	2.21	2.45	0.72	0.36
Gambia	0.70	1.68	0.38	0.22	0.11
Ghana	1.36	9.13	1.30	0.03	0.03
Guinea	0.37	3.52	0.26	0.09	0.03
Guinea-Bissau	56.45	32.98	25.64	0.00	30.81

Kenya	1.47	5.99	1.41	0.04	0.02
Liberia	0.37	1.05	0.35		0.02
Libya	2.64	1.68	1.60	0.55	0.50
Madagascar	0.47	0.27	0.33	0.11	0.03
Malawi	0.40	2.30	0.23	0.14	0.03
Mali	0.46	5.71	0.39	0.05	0.03
Mauritius	0.96	0.16	0.16	0.40	0.40
Namibia	1.91	2.30	1.30	0.17	0.43
Niger	0.55	4.97	0.43	0.06	0.06
Senegal	0.16	0.54	0.16		
Seychelles	1.08	5.39			1.08
Sierra Leone		1.21			
South Africa	0.67	0.55	0.53	0.12	0.03
Sudan	1.35	3.68	0.64	0.67	0.03
Swaziland	0.80	0.64	0.16	0.48	0.16
Togo	0.60	10.94	0.51	0.00	0.09
Tunisia	2.33		1.19	0.86	0.27
Uganda	0.40	3.92	0.36	0.04	0.01
Zambia	0.45	8.33	0.30	0.12	0.03
Zimbabwe	0.52	9.41	0.37	0.08	0.08

\*\* Data is available for 38 countries out of 54 in Africa; all are latest available

Source: Data derived from WHO database; Exim Bank Research

## Annexure 6

## Installed Solar PV in Africa (in MW)

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
South Africa	7.8	9.1	10.4	11.7	13.0	14.3	15.6	16.9	18.2	19.6	23.2	67.4	72.2	147.2	922.0	1361.0
Algeria	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	3.0	273.6
Egypt	0.1	0.5	0.6	0.6	0.6	0.6	0.6	0.7	0.9	1.3	14.9	15.0	15.0	15.0	15.0	25.0
Kenya	3.9	6.2	8.4	8.5	8.6	8.7	8.8	8.9	9.0	9.0	11.3	13.6	16.0	20.0	22.0	24.0
Namibia	1.0	1.2	1.5	1.6	1.6	1.6	1.9	2.4	3.0	3.6	4.2	7.4	10.7	13.4	16.0	20.5
Uganda	0.2	0.8	1.1	1.7	2.3	3.0	5.4	7.7	11.7	14.2	14.9	16.2	17.3	18.5	20.0	20.0
Mauritius													1.4	2.5	18.2	18.2
Mauritania														15.0	15.0	18.0
Morocco	6.7	7.0	7.7	8.4	9.1	10.0	10.8	11.9	12.8	13.4	13.5	14.0	15.0	16.0	17.0	17.8
Nigeria													15.2	15.4	15.6	17.0
Tunisia	0.1	0.3	0.4	0.5	0.7	0.8	1.0	1.1	1.2	1.4	2.0	2.7	3.6	4.8	15.0	15.0
Tanzania				1.2	1.5	1.8	2.1	2.5	3.0	3.5	4.0	4.5	5.0	8.0	11.0	14.0
Mayotte														13.1	13.1	13.1
Cape Verde											7.5	7.5	8.0	9.0	9.0	10.0
Rwanda								0.3	0.3	0.3	0.3	0.3	0.3	0.3	8.8	8.8
Senegal	1.0	1.1	1.3	1.4	1.6	1.7	1.8	2.0	2.3	2.6	3.3	4.8	5.9	7.0	8.0	8.0
Burkina Faso	0.5	0.5	0.5	0.7	1.1	1.2	1.2	1.6	2.3	3.0	3.6	5.8	5.8	6.3	7.0	7.0
Mozambique												0.5	1.5	4.9	7.0	7.0
Niger	0.5	0.6	0.6	0.7	0.8	1.0	1.1	1.1	1.2	1.2	2.1	3.0	4.0	5.0	6.0	6.0
Mali		0.1	0.2	0.3	0.5	0.7	1.0	1.3	1.5	1.6	1.8	2.2	4.1	6.0	6.0	6.0

Libya				0.2	0.7	1.2	1.7	2.2	2.7	3.2	3.7	4.2	4.8	5.0	5.0	5.0
Madagascar					0.1	0.1	0.3	0.4	0.8	1.1	1.8	2.5	3.4	3.4	3.4	5.0
Zimbabwe		0.0	0.1	0.1	0.6	0.8	0.8	1.0	1.0	1.1	1.8	2.2	2.8	3.9	4.4	4.4
Burundi						0.1	0.2	0.3	0.4	0.4	0.6	0.8	1.2	2.2	2.2	2.2
Zambia		0.1	0.2	0.2	0.3	0.6	1.0	1.1	1.2	1.2	1.2	1.4	1.4	1.6	2.0	2.0
Ghana														2.0	2.0	2.0
Botswana													1.7	1.7	1.7	1.7
Cameroon				0.1	0.1	0.1	0.1	0.2	0.2	0.5	1.0	1.1	1.5	1.5	1.5	1.5
Benin	0.1	0.1	0.1	0.1	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.5	0.5	1.0	1.3	1.3
Malawi								0.1	0.1	0.1	0.2	0.4	0.4	0.9	0.9	0.9
Togo			0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.4	0.5	0.6	0.6	0.6
Somalia															0.6	0.6
Congo												0.1	0.1	0.2	0.2	0.5
Central African Republic						0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.3	0.3	0.3	0.3
Djibouti													0.3	0.3	0.3	0.3
South Sudan													0.2	0.2	0.2	0.2
Lesotho														0.2	0.2	0.2
Seychelles														0.1	0.1	0.1
Grand Total	23.8	29.5	35.1	40	45.5	50.7	57.8	66.1	76.2	84.7	119.4	180.6	222	354.4	1181.6	1918.8



## Annexure 7

## Countrywise Access to Electricity

	Country	Access to Electricity (percent of population)	
		2010	2012
1	Algeria	98	100
2	Egypt	97.7	100
3	Libya	99.8	100
4	Mauritius	99.4	100
5	Seychelles	99.4	100
6	Gabon	73.6	89.3
7	South Africa	66.1	85.4
8	Ghana	45	64.06
9	Guinea-Bissau	53.5	60.61
10	Senegal	36.8	56.5
11	Cote d'Ivoire	51.4	55.8
12	Nigeria	44.9	55.6
13	Cameroon	46.2	53.7
14	Djibouti	46.16	53.26
15	Botswana	39.56	53.24
16	Namibia	36.5	47.26
17	Congo	20.9	41.6
18	Zimbabwe	34.2	40.46
19	Benin	25.4	38.4
20	Angola	31.06	37
21	Gambia	34.3	34.53
22	Somalia	25.91	32.71
23	Sudan	25.46	32.56
24	Ethiopia	12.7	26.56
25	Guinea	16.4	26.2
26	Mali	16.7	25.6
27	Kenya	14.5	23
28	Zambia	17.4	22.06

29	Mauritania	14.66	21.76
30	Mozambique	7.1	20.2
31	Uganda	8.6	18.16
32	Rwanda	6.2	18
33	Congo DR	6.7	16.4
34	Madagascar	11.4	15.4
35	Tanzania	8.8	15.3
36	Niger	6.7	14.4
37	Sierra Leone	8.56	14.2
38	Burkina Faso	6.9	13.1
39	CAR	6	10.8
40	Liberia	0.56	9.8
41	Malawi	4.8	9.8
42	Burundi	3.9	6.5
43	Chad	2.3	6.4
44	South Sudan	0	5.06

Source: Data derived from World Development Indicators, World Bank; Exim Bank Research

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