



AfDB Pre-TICAD 7 Seminar Energy Sector and Africa Investment Forum -Energy Market in Africa-

Naoshige Kinoshita
Chief Investment Officer, Energy Financial Solutions
Power, Energy, Climate and Green Growth



ENERGY MARKET IN AFRICA

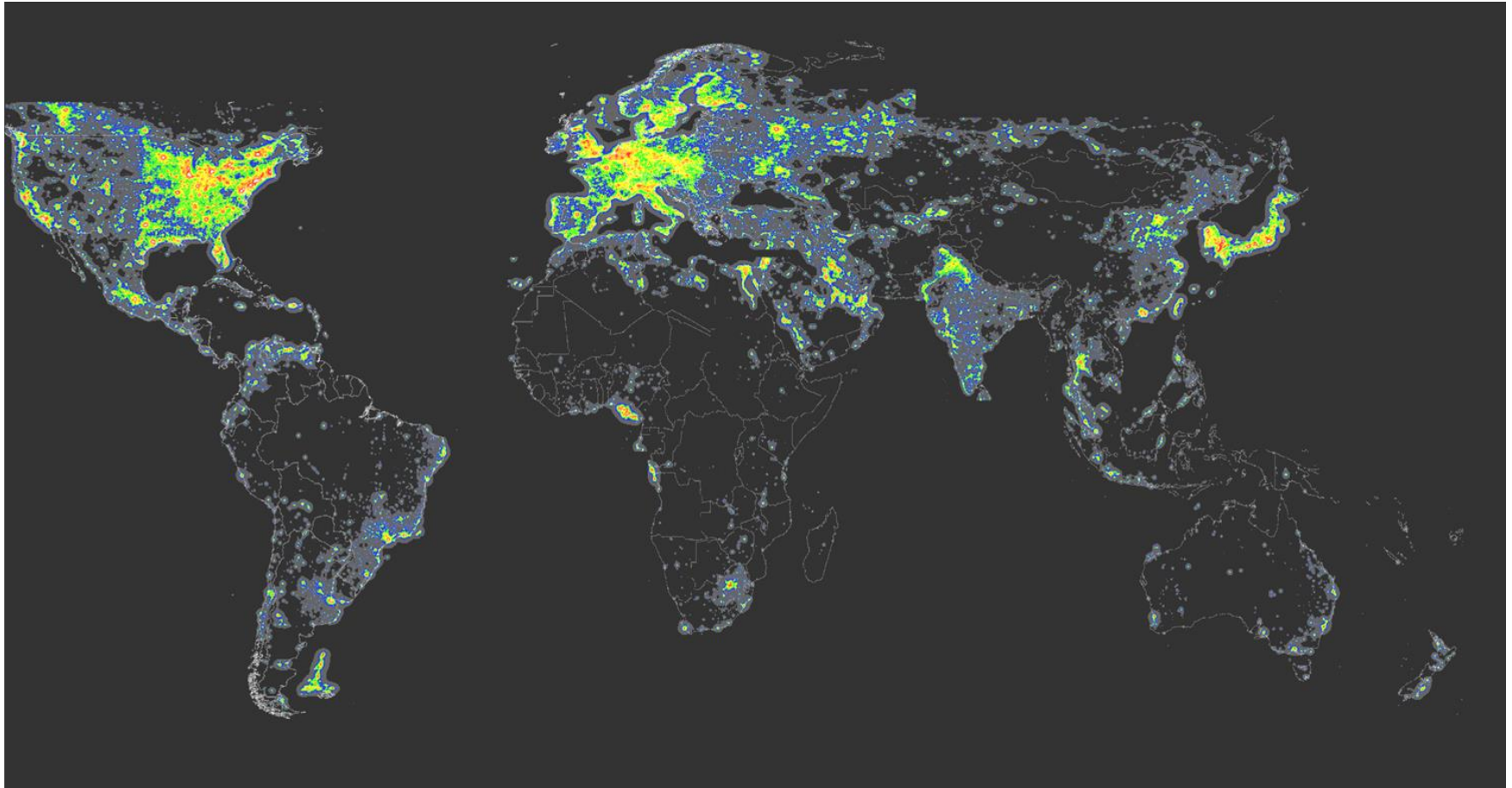
MARKET STATUS

MARKET POTENTIAL AND OPPORTUNITY

RISK PROFILE IN THE MARKET

Global view of power consumption

More than 600 Million African can not access to the power



USA
13,000 Kwh/capita

Sub-Sahara Africa
181 kwh/capita

Europe
6,500Kwh/capita

Power situation in Africa (Nigeria as example)

NIGERIA experienced a major power cut on the first day of its **World Cup**. The power grid problem occur on the same day the national team played against Croatia.



Back up generator for super market

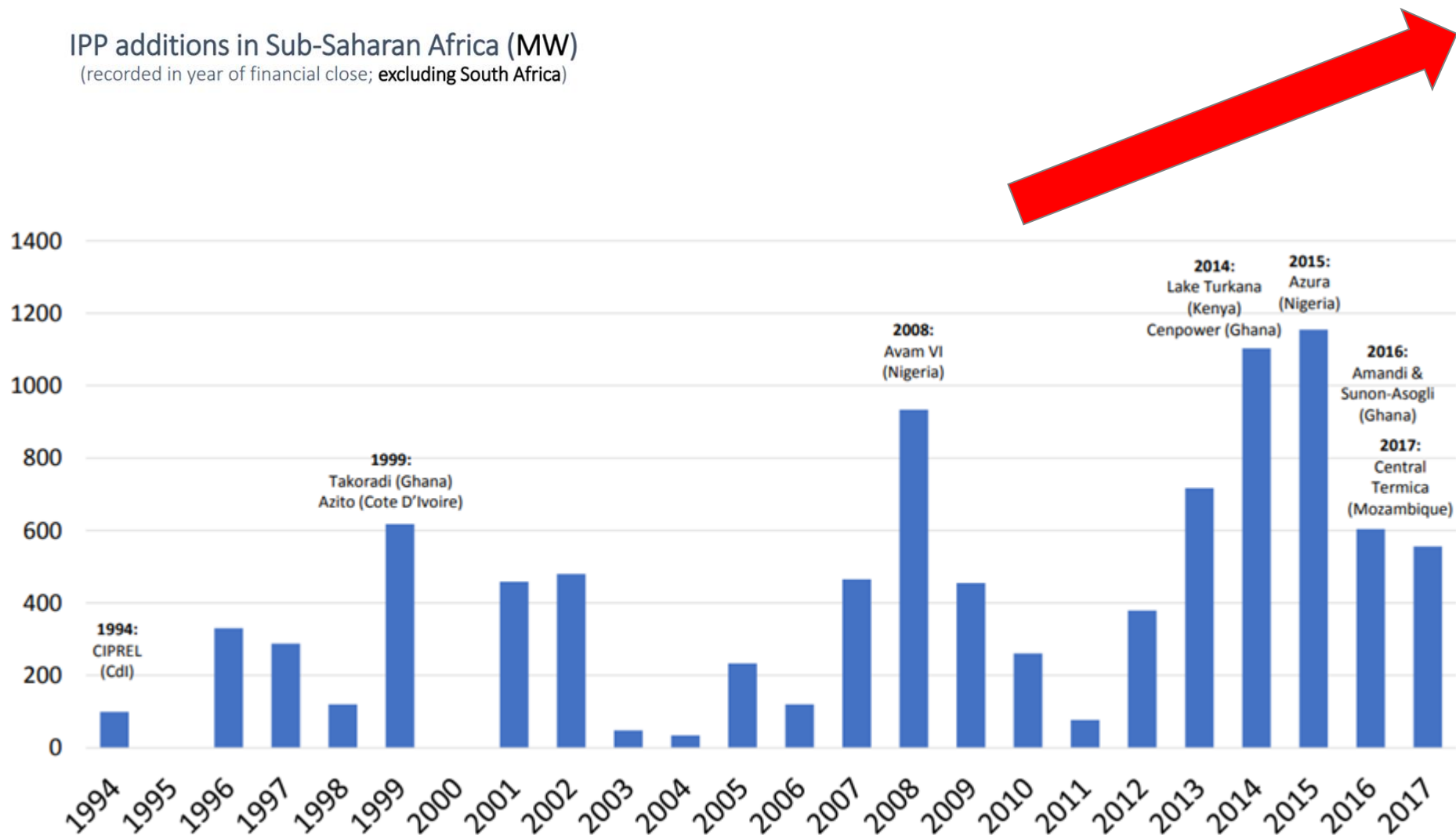


Generator for factory (Gas Engine)
+ Pipeline and CNG back up

IPP historical additions in Sub-Saharan Africa



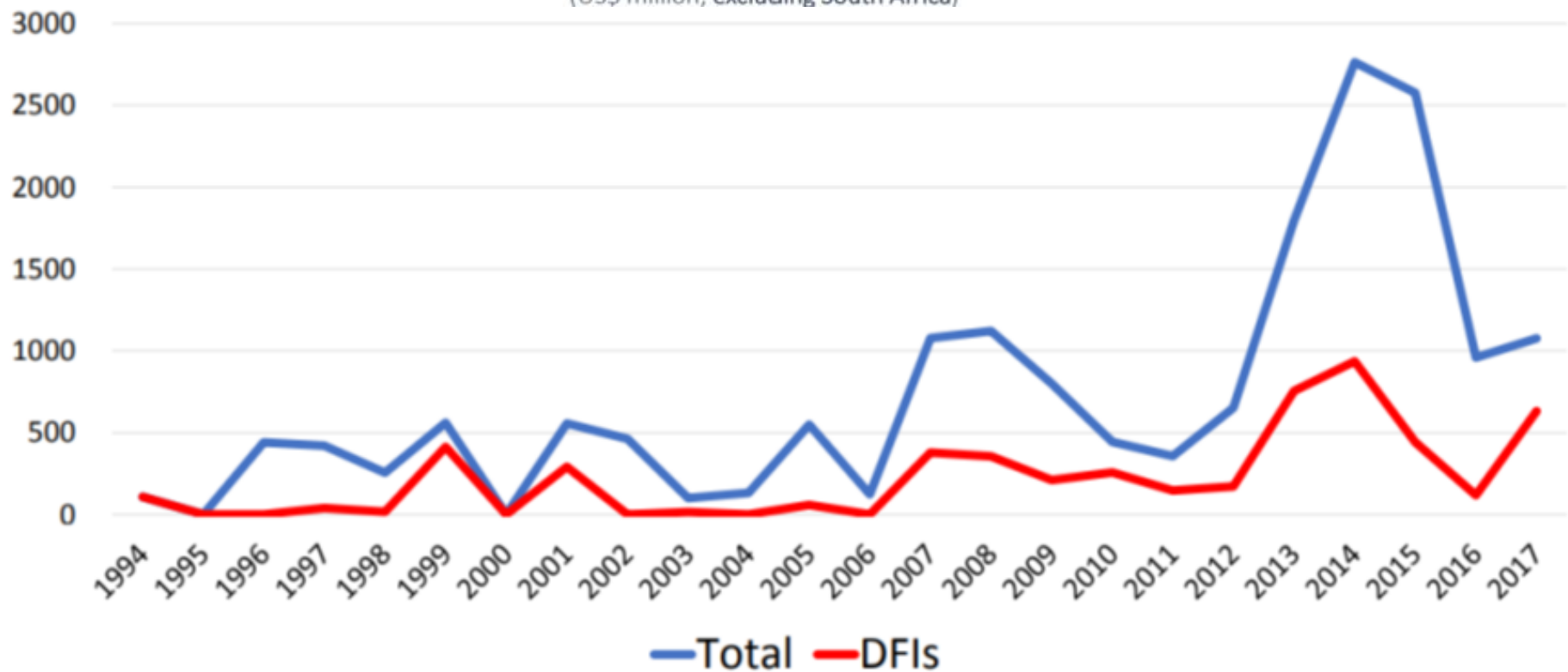
IPP additions in Sub-Saharan Africa (MW)
(recorded in year of financial close; excluding South Africa)



DFIs contribution in IPP in Sub-Saharan Africa



DFIs contributions track IPP investments
and play a key role in de-risking projects in SSA
(US\$ million; excluding South Africa)



Lenders in the market



Development Financial Institutions (DFIs): Strengths in Sub-Saharan Countries



Export Credit Agency (ECAs): Financing linked to exporters/investors of the country



Local Commercial Banks: Strengths in local currency deals in SA and Morocco



Regional Development Bank: Expanding beyond regional focus.

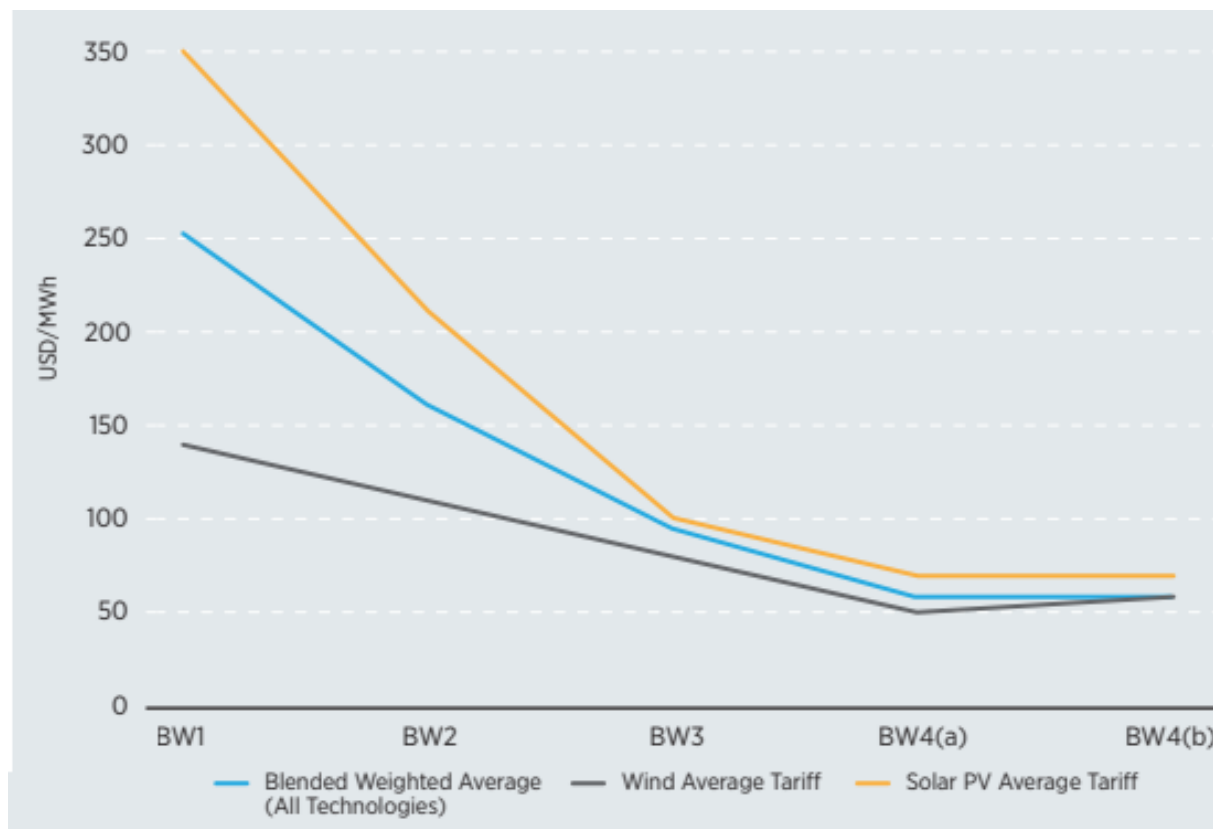


IPP investors and developers in the market



Tariff Revolution (FiT Program to Auction)

Weighted average bid tariff (across all selected projects) per bid window in REIPPP in SA



In **Kenya**, transition to an auction model of solar procurement expected to push down to **\$0.08/kWh** despite signing power purchase agreements for four 40MW solar PV projects in July 2017 at \$0.12/kWh.

Nigeria, where tariffs were reduced from \$0.155/kWh to \$0.115/kWh in 2016 and the projects have yet to close – attempted to reduce to **\$0.075/Kwh**

Getting mode difficult to achieve “high equity IRR”

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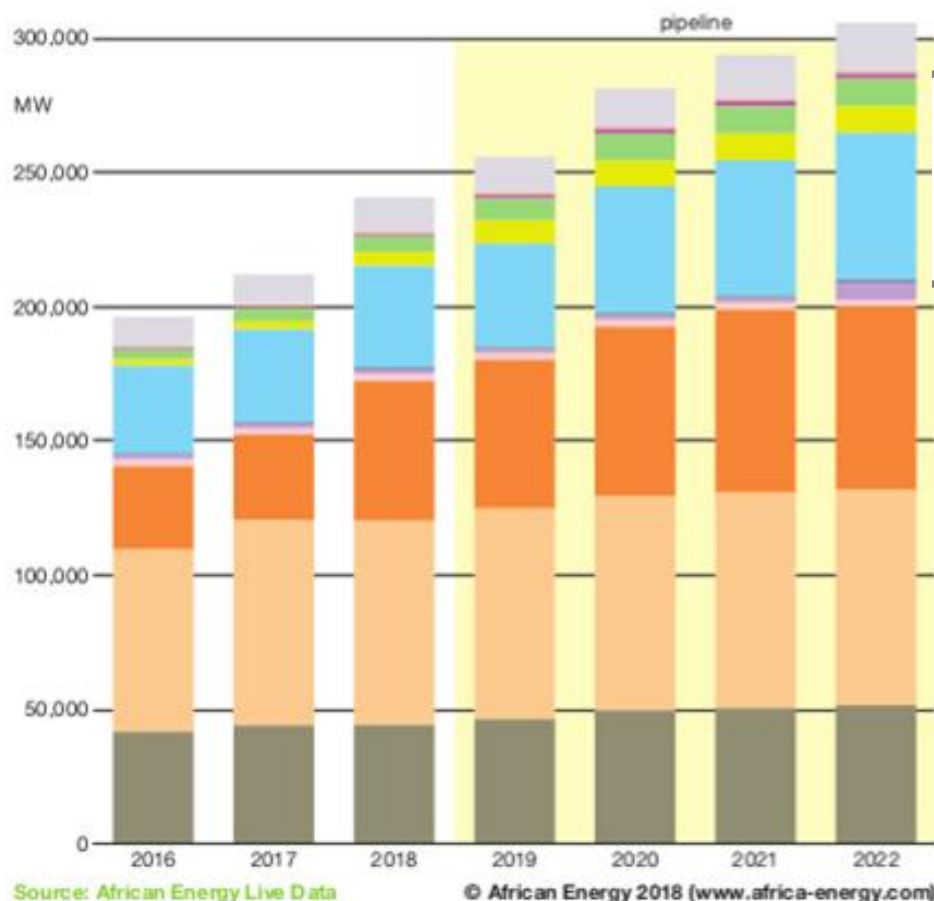
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Generation Capacity growth by technology (2016 to 2022)

Generation capacity will Increase more than 50% from “2016 to 2022”.



AFRICA: INSTALLED CAPACITY BY TECHNOLOGY TYPE, 2016–22



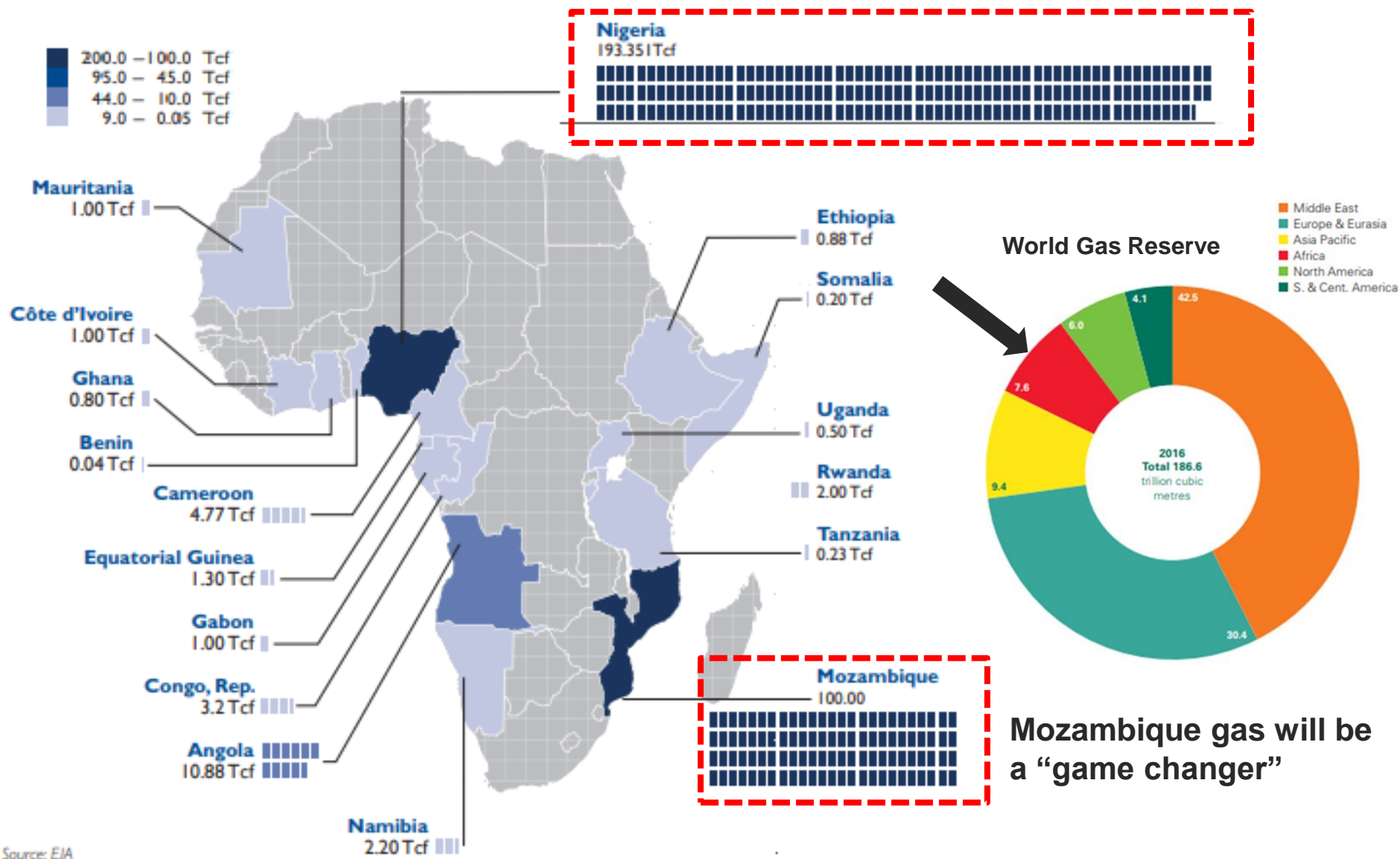
The share of **renewables** in the energy mix across Africa should grow from 21% by end 2018 to 25% in 2022.

Gas (CCGT, OCGT) also remains strong resource for generation option in the continent.

No increase is expected for **coal**.

Africa possesses rich natural resources

(Proven gas reserves in Sub-Saharan Africa)



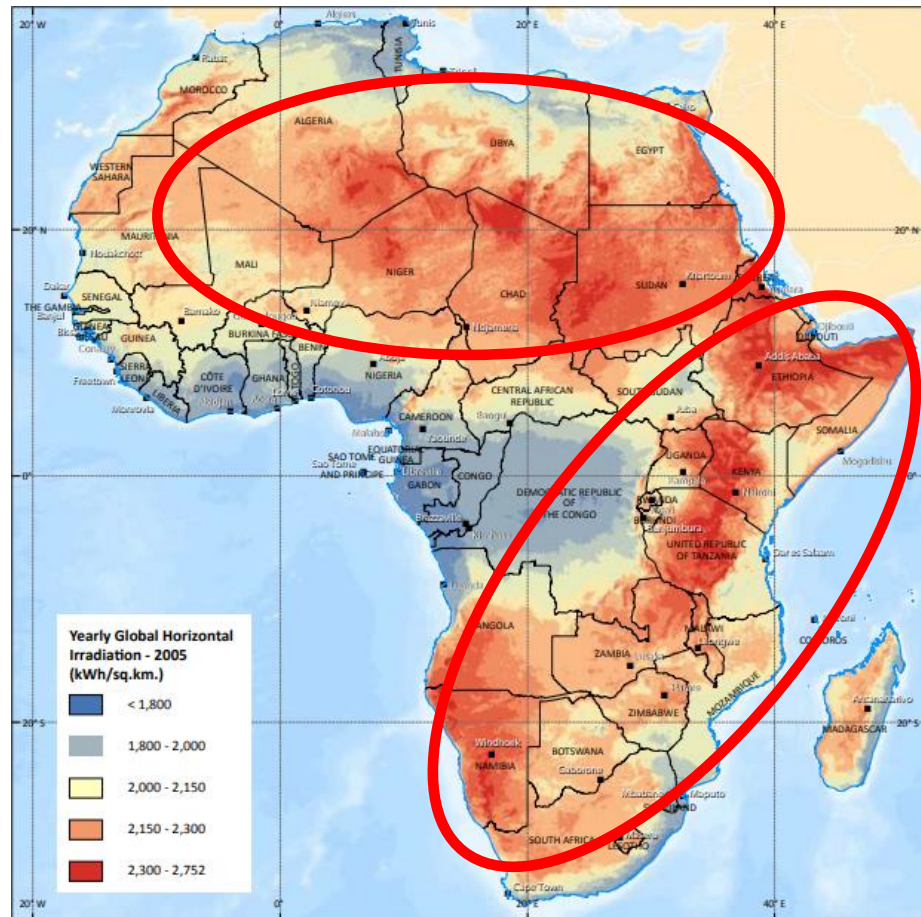
Gas to Power Market

Due to the recent gas market changes triggered by US, for many African countries that do not have indigenous gas reserves, gas-to-power projects can still become a reality by developing the associated LNG-to-power infrastructure, such as offshore floating storage and regasification units (FSRUs) or onshore LNG terminals and related infrastructure.

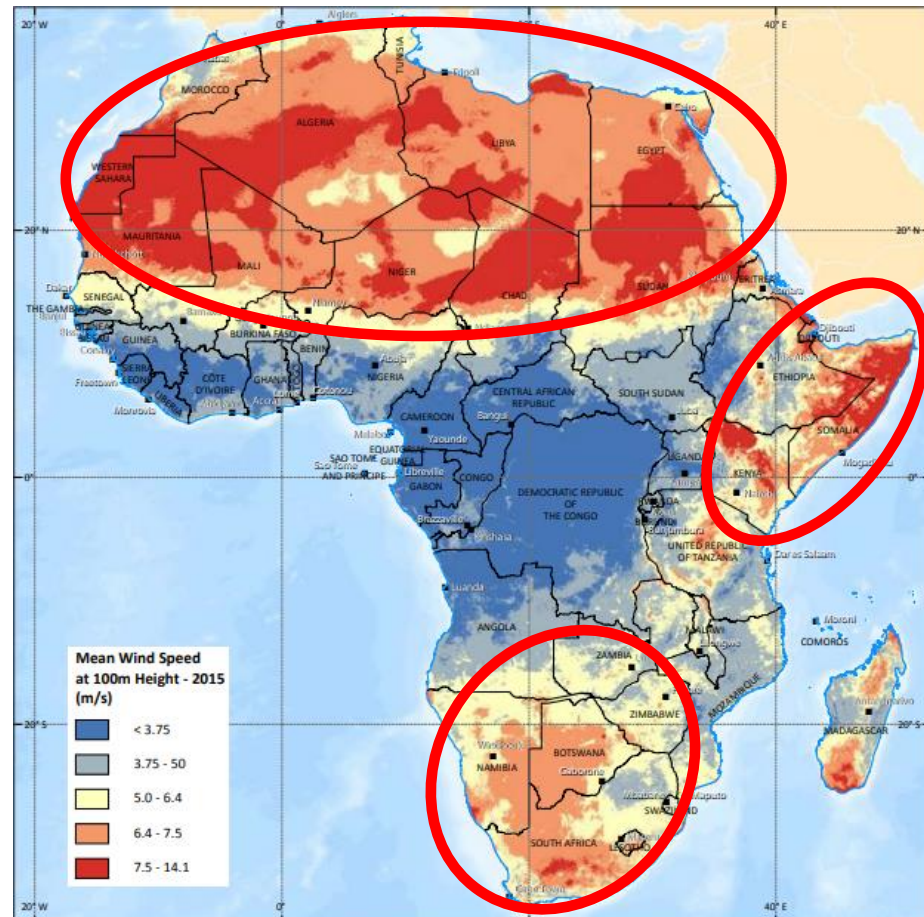
PROPOSED GAS-FIRED GENERATION PROJECTS IN FOCUS COUNTRIES

ESTIMATES OF CURRENT AND POTENTIAL GAS PROJECTS UNDER ASSESSMENT		PERCENTAGE OF PROPOSED GENERATION INCREASE BY GAS SUPPLY SOURCE	
	PROPOSED MW OF GAS-FIRED GENERATION	INDIGENOUS PRODUCTION	LNG IMPORTS
West Africa			
Côte d'Ivoire	1,100	75%	25%
Ghana	3,000	50%	50%
Nigeria	8,000	100%	Some possible
Senegal	TBD portion of HFO Capacity	100%	Some possible
East Africa & Southern Africa			
Angola	2,000	100%	-
Kenya	750	Unclear at present	Unclear at present
Tanzania	3,000	100%	-
Mozambique	1,100	100%	Some possible
South Africa	5,200	10%	90%

Africa possesses rich natural resources (Solar PV and Wind)

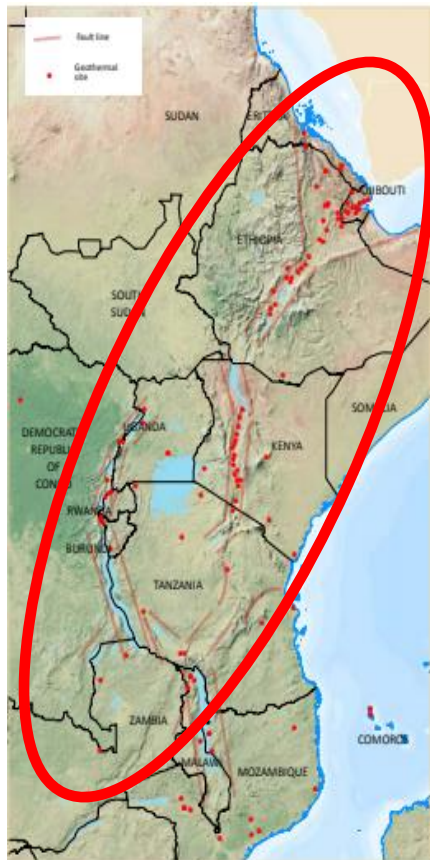


Solar PV (Irradiation) (10 TW)



Wind (Wind speed) (110GW)

Africa possesses rich natural resources (Geothermal and Hydro)



Geothermal (15 GW)



Hydro (350 GW)

Inga III (4.8 to 12GW) Hydroelectric Project in DRC



- Inga 1 (351 MW) and Inga 2 (1,424 MW) were commissioned in 1972 and 1982, are being refurbished as they currently operate at around 50% capacity.
- There are advanced plans to construct Inga 3. A treaty was signed in May 2013 by the South African and DRC governments for cooperation. The treaty was ratified in 2014 by DRC
- The Inga 3 project will provide 4.8 GW and to increase 12 GW to DRC, South Africa and other countries.
- The feasibility study has been updated and the project is at the tendering stage for the developers.
- Grand Inga could produce up to 40 GW of electricity.

- With a total cost of USD 14 bn based on 4.8GW

Preliminary financial structure of Inga III (USD)

11 bn	80% senior debt tranche with up to 22 years tenor to be provided by a mix of IFIs (AfDB), ECA backed financing and Commercial banks (covered)
3 bn	20% tranche of equity from DRC and RSA, developers, and other financial partners
1 bn	Transmission lines to evacuate power to the Katanga and Southern Africa

Corbetti 500 MW Geothermal Power Project



- The project consists of 500 MW generation plant in five phases including exploration of the steam and power supply.
- The first project will consist of phase (exploration + 10 to 20 MW generation) and 2nd phase and beyond will consist in (+ 50MW generation for each project).
- The PPA and IA based on 500MW capacity is signed among Corbetti, GoE and EEP on Dec 9th, 2017.
- The PPA and IA have to be executed based on milestone schedule in next 4 to 5 years (e.g. 50MW X 10). The concession period for each project will be 28 Years+.

- it is expected co-financing opportunities could be either (i) in the exploration phase (equity) and (ii) generation phase (equity and or debt).

Preliminary financial structure of Phase I (USD)

100
mn

100 % tranche of equity, Reikjavic, AREF and others for preliminary, exploration + 10 to 20 MW of generation

Preliminary financial structure of Phase II and beyond (USD)

1.5
bn

75% **senior debt** tranche mix of IFIs (AfDB), ECA backed financing and Commercial banks (covered and uncovered)

400
mn

25% **tranche of equity** from different investors

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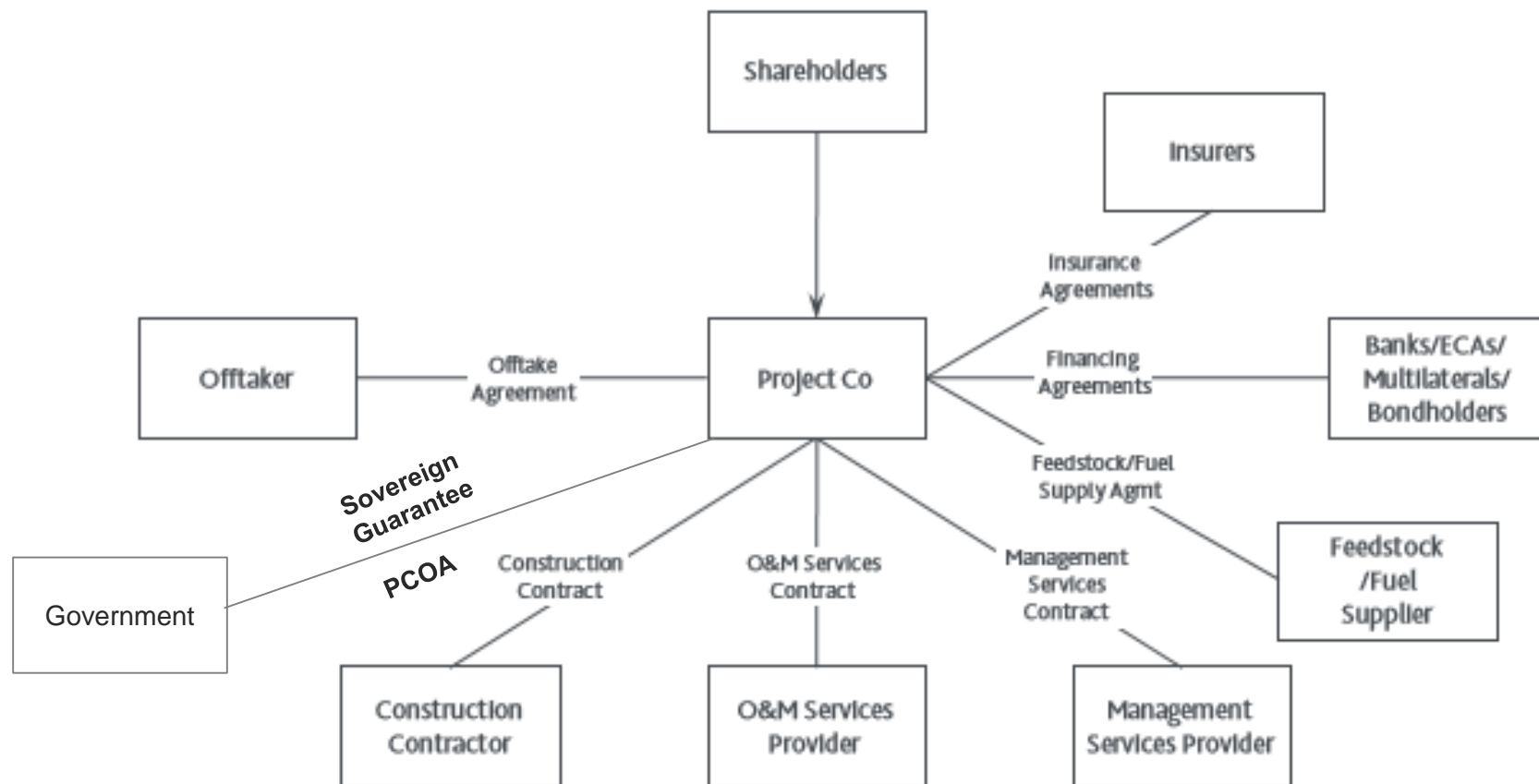
MARKET POTENTIAL AND OPPORTUNITY



RISK PROFILE IN THE MARKET



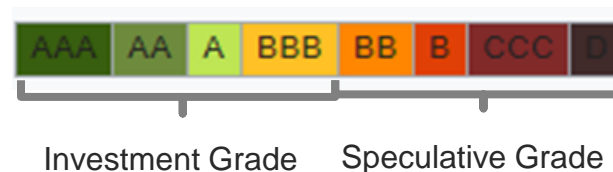
Project Finance Scheme and Associated Risks



Associated Risks: **Sovereign Risk**, **Off-Taker Risk**, **Currency Risk**, Construction Risk, Sponsor Risk, Technology Risk, etc.

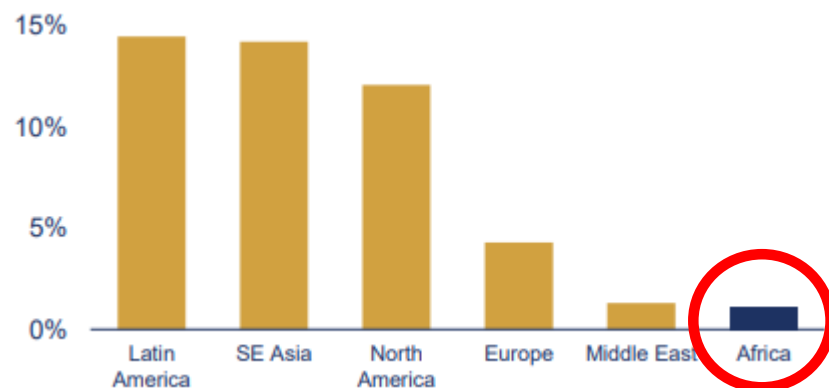
Sovereign Risk and Default Rate

Most of off-takers in Africa are technically bankrupt and most African states have a credit rating below investment grade.



On the other hand, “in the last 30 years, African power projects have defaulted, lower than default rate of USA according to Moody's
Default and Recovery Rates for Project Finance Loans

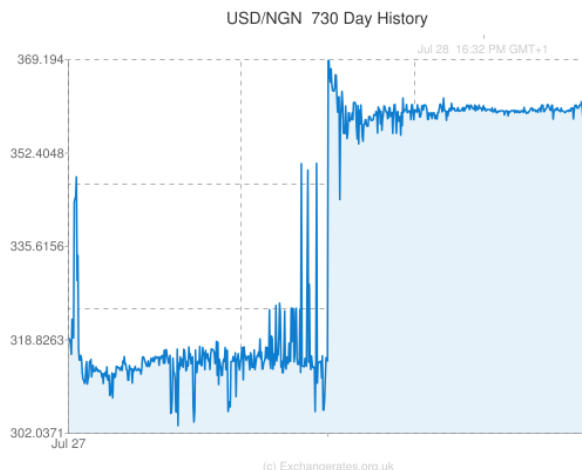
Default, Recovery Rates for Project Finance Loans



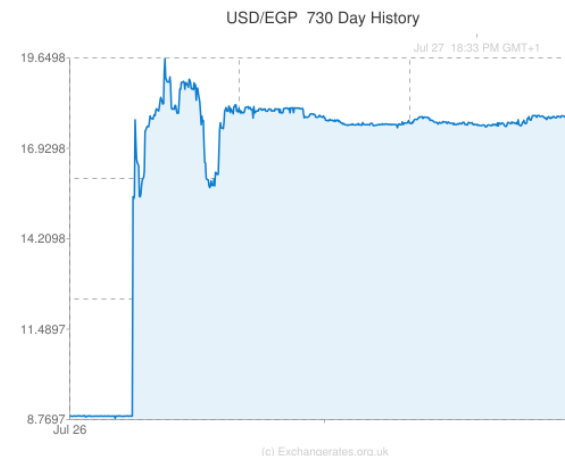
Currency Risk in PPA

The PPA is denominated in USD or EURO, however often payment is made in local currency based on the preset spot rate or invoice/payment date.

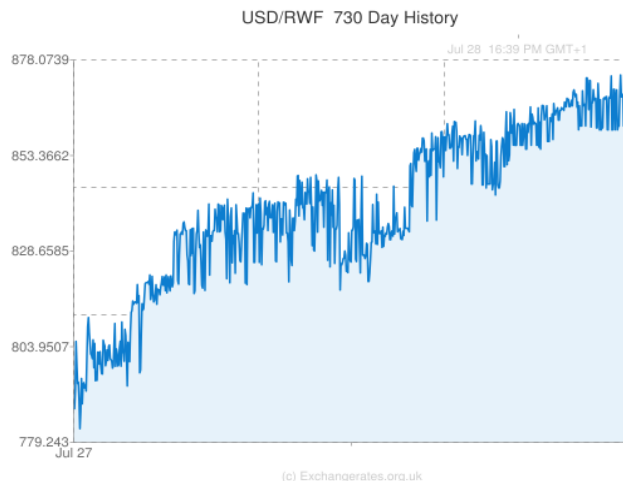
USD/NGN



USD/EGP



USD/RWF



USD/UGX



Sovereign/Off-taker's Risk and Currency Risk



Associated Risks

Sovereign /Off Taker's Risk

- PPA, IA, Sovereign Guarantee, PCOA (change of the law, termination clause, gov. coverage for off-taker's obligation)
- MIGA Political Risk Insurance
- AfDB/IDA Partial Risk Guarantee
- DFI's involvement as lender

Currency Risk

- PPA clause (payment terms)
- Sovereign Guarantee, PCOA, IA (hard currency payment, convertibility loss guarantee mechanism)
- Market liquidity (Contract with Commercial / Central Bank(s))

Thank you



Naoshige Kinoshita

Chief Investment Officer, Energy Financial Solutions, Power, Energy,
Climate Change and Green Growth Complex,
African Development Bank

n.kinoshita@afdb.org

www.afdb.org

LIGHT UP AND POWER AFRICA

ENERGY MARKET IN AFRICA

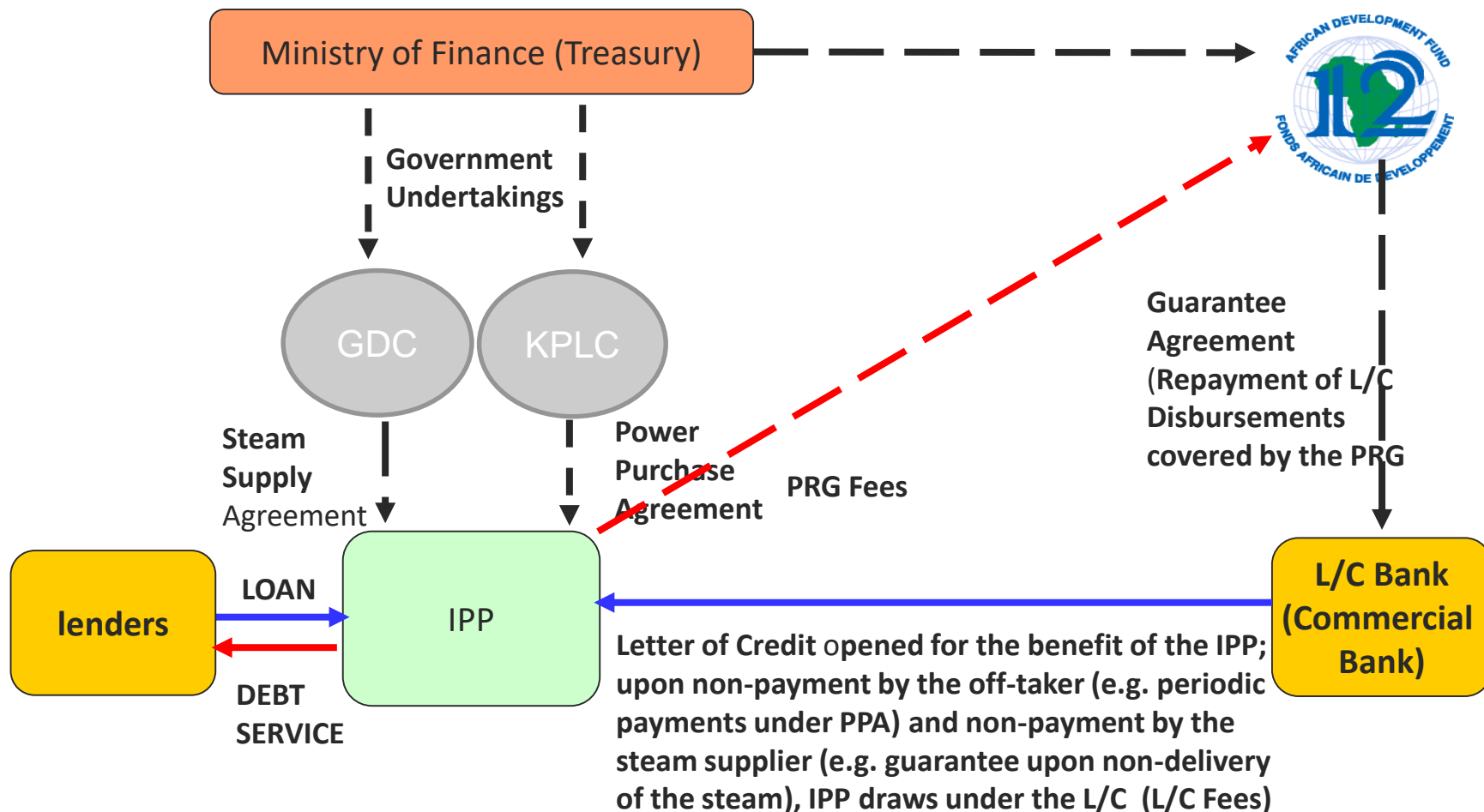
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ANNEX

Partial Risk Guarantee (e.g. Menengai Project)



Case 1: Lake Turkana Wind Power Kenya

The Project

Development of a 300 MW wind farm in the north west part of Kenya

- Will consist of 365 wind turbines of 850 KW capacities
- Adds clean energy to the power grid
- Increases Kenya's national installed power by 25%
- Project Sponsor(s): Aldwych, KP&P, IDC, Norfund, Vestas, IFU

AfDB Role

- Senior lender
- **LEAD ARRANGER** of DFIs participation

Key Figures

Total Project Cost	USD 585 million
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Debt / Equity	70% / 30%
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AfDB Senior Loan	USD 100 million
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AfDB Board Approval	April 2013
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Case 2: CIPREL Combined-Cycle Power Project

The Project

Installation of a combined cycle turbine on two existing gas turbines, capable of generating an additional 111MW with no increase in gas consumption :

- Adds about 8% to the country's total power generation capacity
- Project Sponsor: CIPREL.

ADB Role

- AfDB Long-term Senior Loan;
- Co-financing of the transaction with the IFC and Proparco.

Key Figures

Total Project Cost	EUR 320 million
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Debt / Equity	70% / 30%
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AfDB Senior Loan	EUR 50 million
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AfDB Board Approval	July 2013
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Case 3: Itezi-Thezi hydropower

The Project

Development of a 120 MW hydropower power plant in the central part of Zambia and a 276 km transmission line to connect the IPP to the power grid.

- Increases Zambia's power generation capacity
- Project Sponsors: TATA Africa and ZESCO

Key Figures

Total Project Cost	USD 239 million
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Debt / Equity	70% / 30%
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AfDB Senior Loan	USD 35 million
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AfDB Board Approval	June 2012
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AfDB Role

- Lender Coordinator
- Senior lender
- Modelling bank

Source: African Development Bank



Case 4: Maamba Coal-fired

The Project

Development of a 300 MW coal-fired power plant in the central part of Zambia using abundant low-grade coal resources

- 2x150MW generation units
- Uses self-combusting low-grade coal
- Increases Zambia's power generation capacity
- Reduces vulnerability to hydrology
- Project Sponsor: Nava Bharat Ventures (NBV-India) and Zambia Consolidated Copper Mines (ZCCM)

AfDB Role

- MLA (DFI tranche)
- Senior lender
- Modelling and E&S bank

Key Figures

Total Project Cost	USD 800 million
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Debt / Equity	70% / 30%
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AfDB Senior Loan	USD 150 million
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AfDB Board Approval	October 2013
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Case 5 : XiNa Solar One Project

The Project

Design, construction, operation and maintenance of a turnkey concentrated solar power plant, with a nominal capacity of 100 MW in the Northern Cape Province, South Africa.

- stimulates the renewable energy industry in RSA and contributes to an energy mix diversification
- Project Sponsors: Abengoa Solar (40%), Industrial Development Corporation (20%), Public Investment Corporation (20%), a local community trust (BBBEE 20%)

AfDB Role

- Senior lender
- USD / ZAR Currency swap
- CTF Concessional Loan arrangement

Key Figures




Total Project Cost	USD 908 million
Debt / Equity	75% / 25%
AfDB and CTF Senior Loan	USD 142 million
AfDB Board Approval	June 2014



CREDENTIALS



Funds & Others

PAIDF - 2007  Equity : USD 19 M	OMVG (Gambia, Guinea 2007)  Grant : USD 800 K	Evolution One - 2010  Equity : USD 6 M	AIIF 2 - 2010  Equity : USD 22.5 M	Argan Infrastructure Fund – 2010)  Equity : USD 6.8 M
Carlyle Sub-Saharan – 2012  Equity : USD 5 M	AREF 2014  Equity : USD 25 M	AREF - 2014  Grant : USD 10 M	Africa 50 (– 2015)  Equity : USD 103 M	Kukuza – 2015  Equity : USD 4 M
Emerging Capital Partners – 2015  Equity : USD 12.5 M	Evolution Fund 2018  Equity : USD 20 M	EAIF - 2018  Equity : USD 32.5 M		

Commitments listed above only reflect AfDB's financing dedicated to the Energy portfolio of the listed funds

Utilities

AES SONEL (Cameroon - 2006)  Senior Loan: EUR 60 M	Eskom Holdings Limited I (South Africa - 2007)  Senior Loan : USD 500 M	Eskom Holdings Limited I (South Africa - 2016)  Senior Loan : ZAR 5.2 Bln
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Refineries

Egyptian Refining Company (Egypt - 2010)  Senior Loan: USD 200 M	Egyptian Refining Company (Egypt - 2010)  Sub. Loan .: USD 25 M	ETAP (Tunisia - 2014)  Senior Loan : USD 150 M
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