IRENA
International Renewable Energy Agency

RENEWABLE ENERGY AUCTIONS

CASES FROM SUB-SAHARAN AFRICA

IRENA
International Renewable Energy Agency

ISBN: 978-92-9260-042-6

Citation: IRENA (2018), *Renewable energy auctions: Cases from sub-Saharan Africa*, International Renewable Energy Agency, Abu Dhabi.

About IRENA

The International Renewable Energy Agency (IRENA) is an intergovernmental organisation that supports countries in their transition to a sustainable energy future, and serves as the principal platform for international co-operation, a centre of excellence, and a repository of policy, technology, resource and financial knowledge on renewable energy. IRENA promotes the widespread adoption and sustainable use of all forms of renewable energy, including bioenergy, geothermal, hydropower, ocean, solar and wind energy, in the pursuit of sustainable development, energy access, energy security and low-carbon economic growth and prosperity. **www.irena.org**

About the GSB

The Graduate School of Business (GSB) at the University of Cape Town (UCT) provides world-class teaching, learning and research that is directed towards building a more economically prosperous, more equitable and more integrated continent. Based at the UCT's GSB, the Management Programme in Infrastructure Reform & Regulation (MIR) aims at enhancing understanding and building capacity in infrastructure investment, reform and regulation, in support of sustainable development. **www.gsb.uct.ac.za**

ACKNOWLEDGEMENTS

This report has benefited greatly from the input of national and international experts, notably including Dan Croft (International Finance Corporation), Kathrin Kaestle (KfW – German development bank), Joseph Kapika (World Bank) and Rene Meyer (independent consultant). IRENA colleagues Diala Hawila, Paul Komor, Tobias Rinke and Michael Taylor also provided valuable input.

IRENA and the GSB would like to extend their gratitude to the expert speakers and participants of a high-level seminar, "Renewable Energy Auctions: Sharing the Lessons from Sub-Saharan Africa", held at the Graduate School of Business at the University of Cape Town on 24 and 25 November 2016 in Cape Town, South Africa, and to the Government of Norway's support, which has allowed deeper research and better insights.

Contributing authors: Professor Dr. Anton Eberhard (GSB), Wikus Kruger (GSB) and Dennis Volk (IRENA)

For further information or to provide feedback: **publications@irena.org**

DISCLAIMER

CONTENTS

Executive summary . . . 1

1 Introduction . . . 3

2 Renewable energy in sub-Saharan Africa . . . 6

3 Auctions for renewables in sub-Saharan Africa . . . 8

South Africa. . . . 8

Procurement of renewables from independent power producers. . . . 9

Auction demand . . . 10

Qualification requirements . . . 13

Winner selection process . . . 18

Sellers' and buyers' liabilities and obligations . . . 21

Conclusion . . . 23

Uganda. . . . 24

GET FiT Uganda . . . 25

Auction demand . . . 30

Qualification requirements . . . 30

Winner selection process . . . 34

Sellers' and buyers' liabilities and obligations . . . 35

Conclusion . . . 38

Zambia . . . 39

Scaling Solar . . . 40

Auction demand . . . 42

Qualification requirements . . . 42

Winner selection process . . . 45

Sellers' and buyers' liabilities and obligations . . . 46

Conclusion . . . 47

4 Focus on price results in the auction cases . . . 49

Possible three main factors at play . . . 49

Emerging high-level lessons. . . . 50

5 Success factors and lessons . . . 52

Programme management factors . . . 52

Programme design factors. . . . 53

Market factors. . . . 55

6 Recommendations . . . 56

Embedding auctions into countries renewable energy deployment strategy . . . 56

Designing auctions to balance between diverging objectives. . . . 58

Focus on price results in auctions . . . 59

References. . . . 60

ABBREVIATIONS

BBBEE	Broad-based black economic empowerment
BW	Bid window
CA	Connection agreement
CEC	Copperbelt Energy Company
CEM	Clean Energy Ministerial
COD	Commercial operation date
CPI	Consumer Price Index
CSL	Contributor status level
CSP	Concentrated solar power
DA	Direct agreement
DFA	Developer finance agreement
DFI	Development finance institution
DOE SA	Department of Energy, Republic South Africa
E&S	Environmental and social
ED	Economic development
EOI	Expression of interest
EPC	Engineering, procurement and construction
ERA	Energy Regulatory Authority
ERB	Energy Regulation Board
ESIA	Environmental and social impact assessment
FOREX	Foreign exchange
FC	Financial close
FiT	Feed-in tariff
FIP	Feed-in premium
FPC	Facility power curve
GDP	Gross domestic product
GET FiT	Global Energy Transfer Feed-in Tariffs
GoU	Government of Uganda
GSA	Government support agreement
GW	Gigawatt
GWh	Gigawatt hours
HFO	Heavy fuel oil
IA	Implementation agreement
IDC	Industrial Development Corporation
IEA	International Energy Agency
IFC	International Finance Corporation
IPP	Independent power producer
IRENA	International Renewable Energy Agency
IRP	Integrated resource plan
ITPC	Itezhi-Tezhi Power Company
kWh	Kilowatt-hour
LHPC	Lunsemfwa Hydropower Company Limited
MDB	Multilateral development bank
MIGA	Multilateral investment guarantee agency
MW	Megawatt
MWh	Megawatt-hours
NDP	National Development Plan
NECL	Ndola Energy Company Limited
NERSA	National Energy Regulator of South Africa
NWEC	Northwestern Energy Corporation
O&M	Operations and maintenance
ODA	Official development assistance
OECD	Organisation for Economic Co-operation and Development
PPA	Power purchase agreement
PPP	Public-private partnership
PRG	Partial risk guarantee
PV	Photovoltaic
QSE	Qualifying small enterprise
RET	Renewable energy technology
REDZ	Renewable Energy Development Zone
REFiT	Renewable energy feed-in tariff
REIPPPP	Renewable Energy Independent Power Producer Procurement Programme
RFP	Request for proposal
RFQ	Request for qualification
RSA	Republic of South Africa
SA	South Africa
SEA	Strategic environmental assessment
SED	Socio-economic development
SHP	Small hydropower plant
SME	Small and medium enterprises
SOE	State-owned enterprise
SP-IPPPP	Small Projects Independent Power Producer Procurement Programme
SPV	Special purpose vehicle
SSA	Sub-Saharan Africa
TWh	Terawatt hours
UETCL	Uganda Electricity Transmission Company Limited
ZESCO	Zambia Electricity Supply Company

FIGURES AND TABLES

Figure 1 Utility-scale (> 5 MW) solar PV: Average bidding tariff (USD/MWh), 2010-16 4

Figure 2 Investments in power generation, five-year moving average: SSA (excluding South Africa), 1994-2013 6

Figure 3 Structure of South Africa's electricity market 8

Figure 4 Weighted average bid tariff (across all selected projects) per bid window 10

Figure 5 Proposed REDZ and preliminary EGI corridors. 15

Figure 6 REIPPPP tender process timeline. 21

Figure 7 Structure of the Ugandan electricity industry 24

Figure 8 Geographic distribution of projects in Uganda's GET FiT portfolio. 26

Figure 9 GET FiT governance structure 27

Figure 10 GET FiT solar facility priority zones 32

Figure 11 The GET FiT project cycle 35

Figure 12 Structure of the Zambian power market 38

Figure 13 Price drivers explaining auction result differences in Uganda and Zambia 49

Table 1 Ministerial determinations on renewable energy technologies in South Africa 111

Table 2 Capacity and investment outcomes of BWs 1-4. 122

Table 3 Contracted capacity permitted per project 14

Table 4 Comparison of ED thresholds and targets between REIPPPP and SP-IPPPP. 17

Table 5 Average local content as a percentage of total project cost versus thresholds and targets 18

Table 6 Price caps and average bid tariffs for BW 1-4. 19

Table 7 Elements of South Africa's economic development criteria. 20

Table 8 FiTs and donor top-ups for Uganda's GET FiT projects 28

Table 9 Overview of approved GET FiT projects, Uganda 28

Table 10 GET FiT pre-qualification criteria matrix 31

Table 11 Summary of technical bid evaluation matrix. 35

Table 12 Winning prices in the Zambian solar auction (prices in USD c/kWh). 41

EXECUTIVE SUMMARY

Zambezi River and Victoria Falls in Zambezi National Park

During the past decade, interest in the use of renewable energy auctions has grown faster worldwide than interest in feed-in tariffs (FiTs) or feed-in premiums (FIPs). It has also grown faster than interest in quotas or renewable portfolio standards. The growing use of auctions is mainly motivated by their ability to apply a competitive mechanism for price determination. Auction-based price determinations, for wind and solar photovoltaic (PV) in particular, have indeed suggested a generally positive impact on prices.

Since 2010, the depth and speed of progress made in the solar PV industry in particular has taken many by surprise. The latest auction results indicate that solar PV and wind energy are now cost competitive in many jurisdictions, including several in sub-Saharan Africa (SSA).

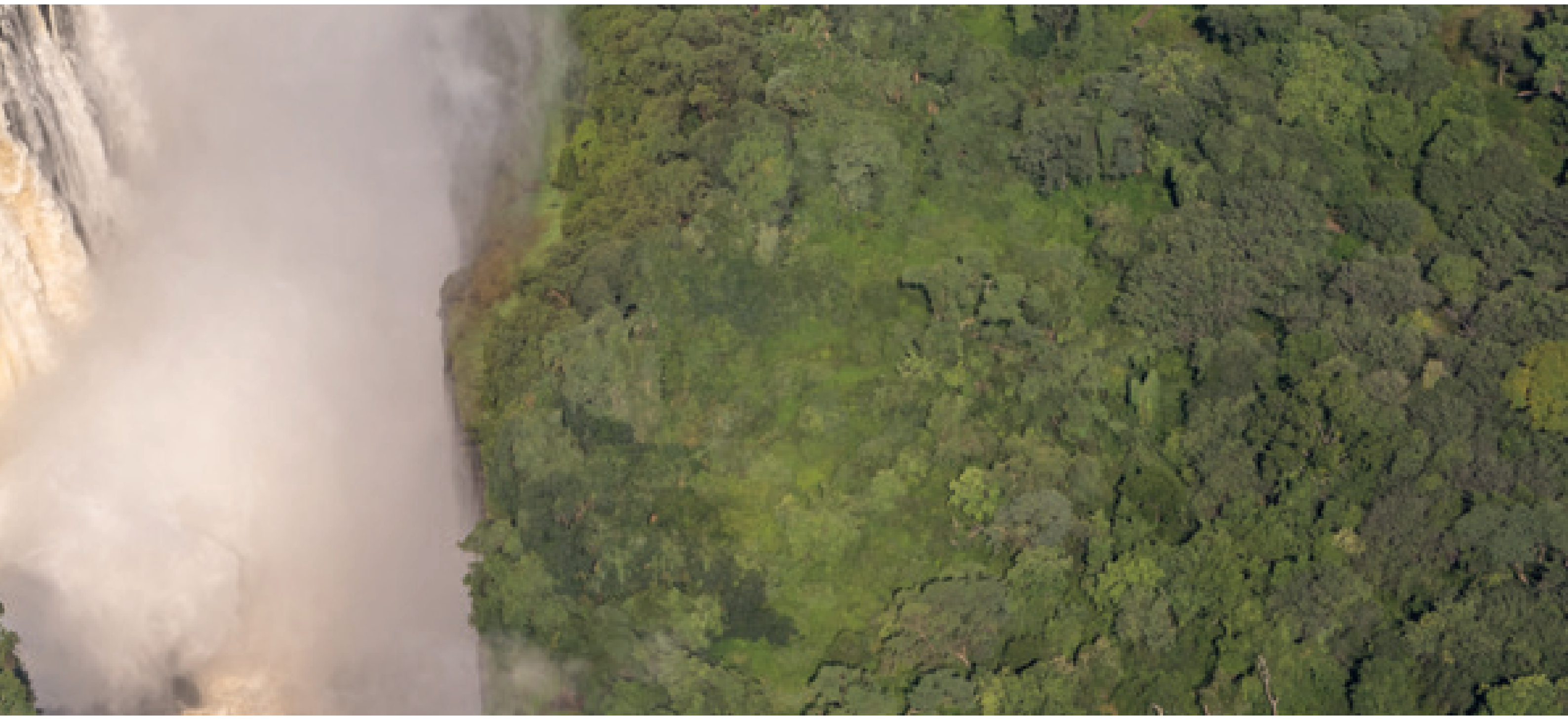
At the same time, however, often, auction prices reflect only one part of the entire investment framework. Many other factors influence the auction price. Price comparisons require a more holistic and in-depth look at the underlying drivers, including access to finance, investment risks resulting from macro- and micro-economic conditions, and auction design details.

This report analyses the design details and price outcomes from three renewable energy auctions in SSA, specifically in Uganda (Get FiT), South Africa (Renewable Energy Independent Power Producer Procurement Programme, or REIPPPP) and Zambia (Scaling Solar). The aim of this analysis is to unearth a set of lessons and recommendations emanating from these three country cases that can inform good auction design in the context of emerging market economies.

Among the key findings and lessons learned:

1. Auctions can be successfully implemented in **emerging market economies** such as Uganda, South Africa and Zambia, and auction design plays an important role in achieving timely and efficient outcomes.

2. The success of auctions in these markets builds on clear linkages with a country's **renewable energy deployment strategy**, which incorporates political commitment, long-term targets, high-quality planning and reliable contractual schemes, such as power purchase agreements (PPAs).



3. Competent, transparent and independent **programme leadership**, introduced at the earliest programme stages from auction design all the way through to winner selection, will enhance the commitment of interested bidders and reduce their (perceived) investment risks.

4. Successful auctions are designed to balance **diverging objectives**. This is reflected in design choices on issues such as the auction volume (ensuring that the volume auctioned is large enough to attract investor interest, but small enough to ensure competition), project scale (local development benefits vs. economics of scale vs. power system stability) and repetition (balancing the need to learn and adjust auction design over time with the need for quick investment results).

5. Upfront clarity is needed on **social and environmental performance** standards and **socio-economic development (SED)** goals, as well as tailored auction design elements and *ex post* evaluation, to ensure these standards and objectives are met at the lowest cost and implementation time.

6. Auction **qualification criteria** and **technical standards** should maintain a reasonable degree of freedom for investors to come up with innovative and high-quality solutions whilst ensuring bidders' ability to develop and implement their projects.

7. The use of **concessional finance** needs to be well targeted to crowd-in commercial finance.

8. Comparing **auction prices** across different times or jurisdictions requires consideration of auction design details, as well as underlying cost drivers, such as financing costs, costs of capital, risk allocation amongst stakeholders and resource quality.

9. Government selection and preparation of project sites can increase developer risks, which can in turn delay project realisation if not well managed.

INTRODUCTION

Renewable energy has come to dominate new investment in the global power sector. The year 2015 was crucial, marking not only the largest annual addition of new renewable power (155 gigawatts [GW]) and the sector's highest level yet of capital investment (USD 312.2 billion), but also the lowest-ever prices for long-term renewable power contracts. It was also the year that renewable energy investment levels in low- and medium-income countries surpassed those of high-income countries for the first time (FS-UNEP, 2017; IEA and IRENA, 2017).

In 2016, the trend in record installed capacities continued, with 161 GW added. Yet investments fell by 23% to USD 241.6 billion, and developed economies regained the lead in renewables development. Nevertheless, the latest data show that installed capacity for renewables has now overtaken coal and that renewables remain the fastest growing source of electricity generation (IEA, 2016).

Prices for renewable energy installations continued to fall in 2016, a trend that was also evident in the outcomes of renewable energy auctions. In February 2016, Peru's renewable energy auction saw solar photovoltaic (PV) prices of USD 48 per megawatt-hour (MWh); in March that record was broken by prices of USD 45/MWh coming out of Mexico's auction. Chile's auction in August produced a price of USD 37.8/MWh, and in September, in Mexico's second auction, the average price came in at USD 32/MWh. Dubai's auction in June was the first in which the USD 30/MWh barrier was broken, and Abu Dhabi announced prices bid in at USD 24.2/MWh for its anticipated 1.17 GW installation, following an auction in September.[1,2]

Figure 1 illustrates recent price developments over time for solar PV auctions (average prices), differentiated by country. Significantly, prices do not always fully incorporate the total costs associated with a project and/or do not necessarily fully reflect a project's entire (required) revenue stream. For example, in some cases projects are required to cover costs associated with system integration, while in other cases these costs are socialised amongst end users. In other examples, the indicated prices reflect a maximum payable price to be received during specific times of the day, season or year, with lower prices applicable during the remainder of the period.

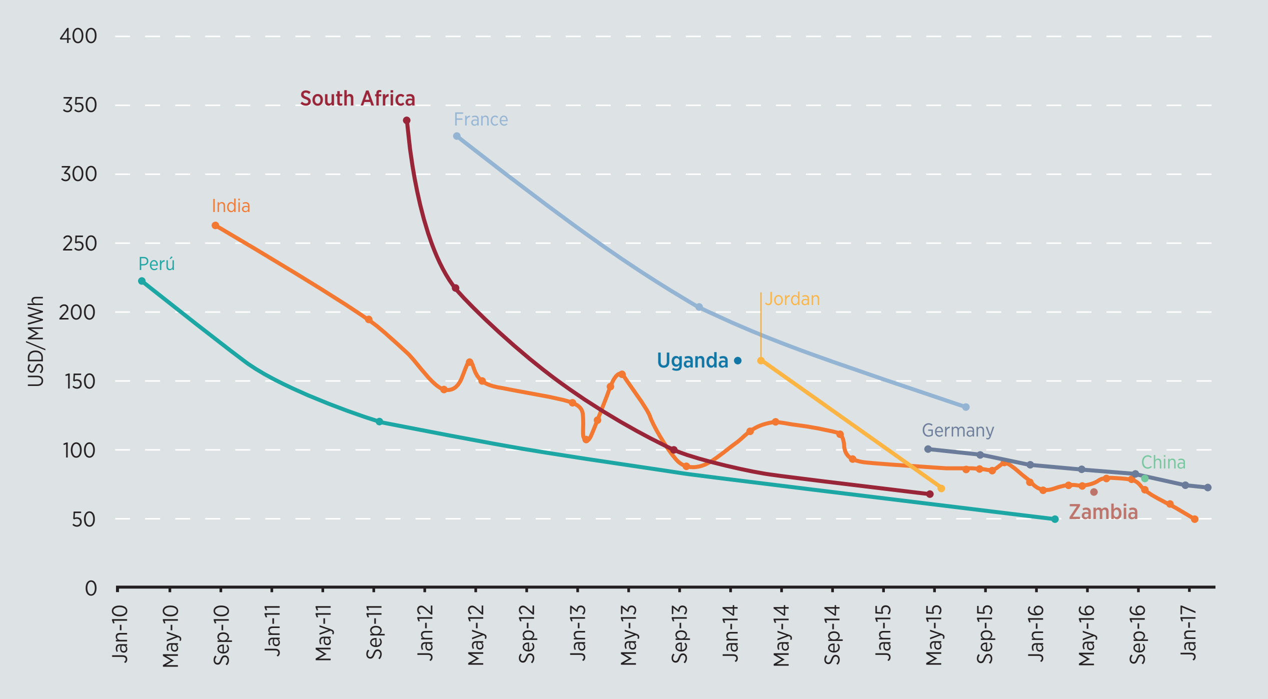
As these price-driving differences exist, a comparison of auction prices (as in the graph below) can only be the starting point for a deeper comparative assessment, which would account for the relevant price-driving differences, accordingly.

The global trend in renewable energy investment – both in terms of increasing volumes as well as falling prices – is in large part driven by favourable governmental support mechanisms, such as feed-in tariffs (FiTs) and auctions. Auctions are interchangeably referred to as competitive tenders or bids for long-term contracts between independent power projects (IPPs) and off-takers (typically the national or local utility). These are gaining global relevance, as more than 67 countries – most of them developing – are using these competitive procurement mechanisms to contract renewable power. While in absolute terms there are still more countries using FiTs as their renewable energy support mechanism (80+), the overall growth trend suggests that more countries will use auctions than FiTs very soon (REN21, 2016).

1 All values for solar PV projects at average auction prices.

2 Saudi Arabia's solar PV auction, initiated in August 2017, closed at USD 23.4/MWh for a 300 MW facility, marking the world's lowest solar PV auction price thus far. Furthermore, by November 2017 Argentina had identified winning bidders from its third auction round for solar PV at an average price of USD 43.46/MWh, continuing the country's price decline from the first (USD 58.98/MWh) and second (USD 48/MWh) auctions, held in September and November 2016, respectively; and by December 2017 Brazil announced results from its fourth power auction, including for 574 MW solar PV capacity at an average price of around USD 44/MWh).

Figure 1 Utility-scale (> 5 MW) solar PV: Average bidding tariff (USD/MWh), 2010 17



Based on IRENA (2017).

Running effective renewable energy auctions requires good planning, procurement, and contracting capacity, and can involve significant transaction costs. These costs are, however, usually offset by the benefits of lower tariffs. Some auctions face the risk of "low balling" in bid prices, which might result in delays in reaching financial close (FC) and construction. While these are important to consider, a well designed programme can effectively mitigate these risks (Eberhard and Naude, 2016a; IRENA and CEM, 2015). A recent article has touched upon the value of auctions as a mechanism for price determination and policy support for renewables in the sub-Saharan African context (Lucas, del Rio and Sokona, 2017).

This report investigates the design of renewable energy auction programmes in sub-Saharan Africa (SSA), focusing specifically on three ground-breaking countries in their pursuit of new renewable power: South Africa, Uganda and Zambia. Guiding the analysis is a framework developed by IRENA and the Clean Energy Ministerial (CEM) suggests four broad categories to investigate (IRENA and CEM, 2015):

- *Auction demand*: This is the choice of the volume auctioned and the way it is shared among different technologies and project sizes. This includes specific demand bands, determining the auctioned volume, periodicity and long-term commitments, and demand side responsibilities.

- *Qualification requirements*: These determine which suppliers are eligible to participate in the auction, as well as the conditions with which they must comply and the documentation that they must provide prior to the bidding/evaluation stage. This includes reputation requirements, technological requirements, production site selection and documentation, securing grid access, and measures to ensure socio-economic development (SED).

- *Winner selection process*: This involves the bidding and clearing rules as well as the process of awarding contracts to the winners. This includes bidding procedure, requirements of minimal competition, winner selection criteria, clearing mechanism and marginal bids, and payment to the auction winner.

Solar PV plants provide increasingly cost-competitive power generation

- *Sellers' and buyers' liabilities and obligations:*[3] These are the characteristics of the product being auctioned, along with certain responsibilities and obligations spelled out in the auction documents. These include commitment to contract signing, contract schedule, remuneration profile and financial risks, the nature of quantity liabilities, the settlement rules and underperformance penalties, delay and underbuilding penalties, assigned liabilities for transmission delays, and risk mitigation and credit enhancement.

The aim of this analysis is to unearth a set of lessons and recommendations emanating from these cases that can inform good future auction design in the context of emerging market economies.

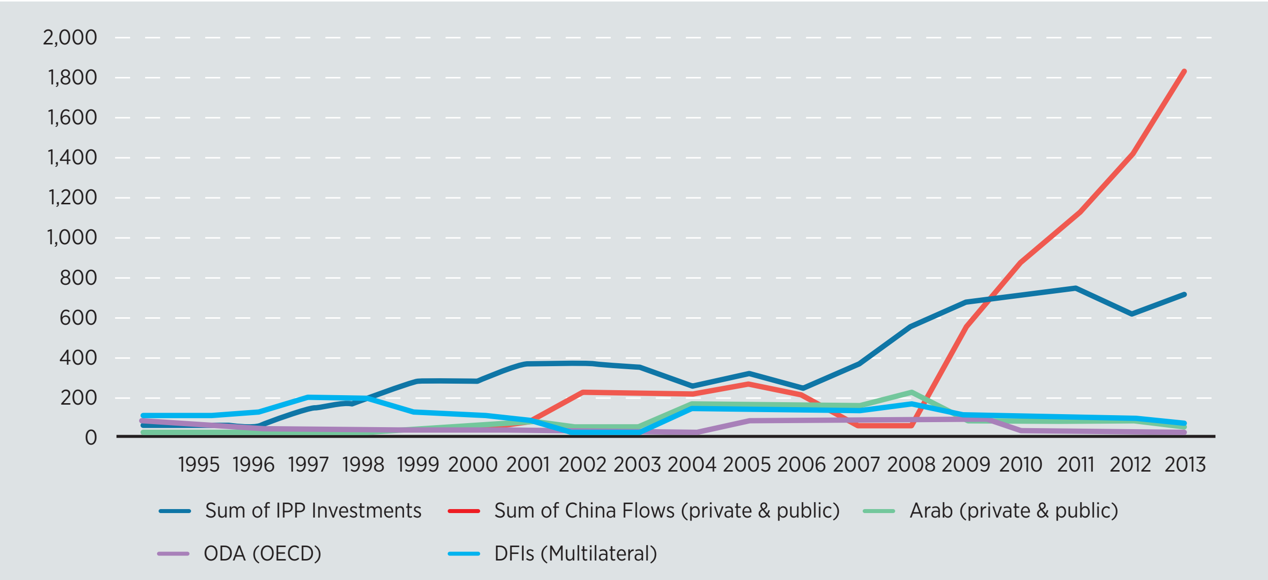
3 The category has been expanded here to include buyers' liabilities and obligations, which were not included in earlier IRENA studies.

1 RENEWABLE ENERGY IN SUB-SAHARAN AFRICA

SSA is facing a severe shortage of installed power generation capacity (90 GW including South Africa; about half without), despite considerable renewable energy potential (Eberhard *et al.*, 2016; Findt, Scott, and Lindfeld, 2014). It is the world region with the lowest per capita energy consumption and the only world region where the absolute number of people living without electricity is increasing (Africa Progress Panel, 2015; IEA, 2014). Thirteen countries account for more than 80% of the installed power generation capacity in SSA. Twenty-seven countries have installed capacity of less than 500 megawatts (MW) each, while 14 countries have power systems of less than 100 MW. While South Africa uses mostly coal to generate its power, the remaining regional installed capacity is made up primarily of hydropower (51%) and fossil fuels (24% natural gas, 18% diesel/heavy fuel oil [HFO]). The situation is further exacerbated by low capacity utilisation and high transmission and distribution losses. Additionally, despite having comparatively high electricity tariffs, pricing is for the most part not cost reflective, resulting in insolvent utilities unable to install more capacity or, in many cases, maintain current equipment (Eberhard *et al.*, 2016; Quitzow *et al.*, 2016).

Very little generation capacity was added in SSA between 1990 and 2000 – only about 1.83 GW. Since 2000, there has been an increase in the rate of capacity additions, resulting in the development of 13.8 GW of new capacity between 2000 and 2016, albeit from a very low base. Public-sector financing of new generation capacity is severely limited, remaining constant at around 50% of total investments in the period 1990-2013 (Eberhard *et al.*, 2017, 2016). The fastest growth in power-sector investment in SSA in recent years has come from privately financed independent power projects (IPPs) and Chinese investments. In addition, while the majority of IPPs are still thermal-based (gas or diesel), renewable energy IPPs are breaking through in a significant way on the continent, largely driven by auction-based procurement (Eberhard *et al.*, 2016).

Figure 2 Investments in power generation, five-year moving average: SSA (excluding South Africa), 1994 2013



Note: DFIs = development finance institutions; ODA = official development assistance; OECD = Organisation for Economic Co-operation and Development.

Source: Eberhard et al. (2016).

Despite this breakthrough, the contribution of renewable energy sources (excluding hydro) remains very small, representing less than 1% of SSA's installed capacity (IEA, 2014). This is notwithstanding the fact that most SSA countries (40+) have renewable energy targets in place, and more than half have some kind of support mechanism on the books – whether FiTs, tenders or net metering (Quitzow *et al.*, 2016; REN21, 2016). Previously, FiTs were the most widespread renewable energy support mechanism in SSA, but they delivered only 1% of all incremental renewable energy capacity in SSA until 2014. Auctions, although more recent, have already delivered more investment – around 52% of the added renewable energy capacity – and at lower prices (Eberhard *et al.*, 2016). Currently, at least eight SSA countries have announced results from at least one round of auctions (Ethiopia, Ghana, Malawi, Mauritius, Namibia, South Africa, Uganda and Zambia), and another handful of countries are at some stage of developing and launching a competitive renewable energy procurement programme. In only two of these countries have projects reached FC to date: South Africa and Uganda. In general, these kinds of infrastructure projects are viewed as high-risk investments and are consequently priced accordingly. While this remains seemingly true in some of the initial procurement rounds for renewable energy in these countries, evidence from South Africa and from other countries seems to suggest that these risks and costs can be significantly reduced (Eberhard et al., 2016; Eberhard, Kolker and Leigland, 2014; IRENA, 2013; IRENA and CEM, 2015). The following section will therefore investigate three renewable energy auction schemes in SSA in more depth to leverage some of this experience for wider application in the context of emerging market economies.

Southern Africa has enormous wind power potential

2 AUCTIONS FOR RENEWABLES IN SUB-SAHARAN AFRICA

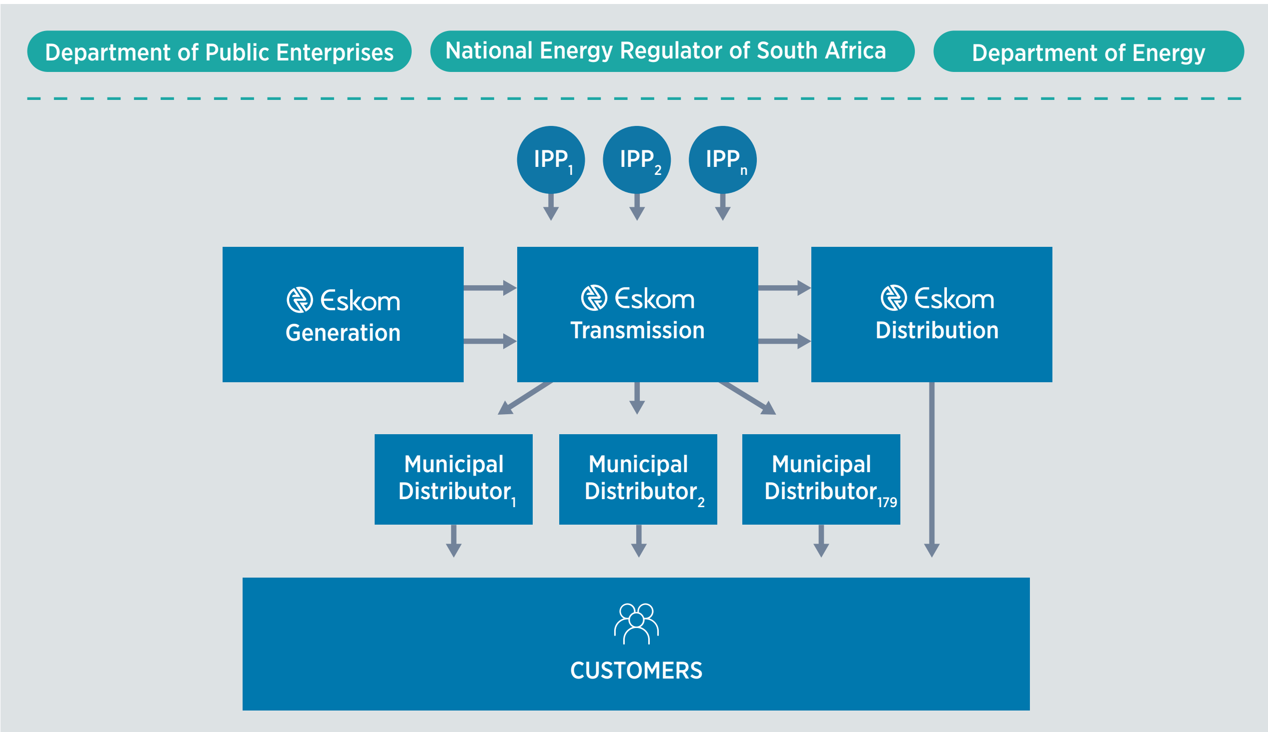
South Africa has been the trailblazer on the continent, launching the Renewable Energy Independent Power Producer Procurement Programme (REIPPPP) in 2011. It was followed by Uganda's GET FiT solar facility auction in 2014 and Zambia's Scaling Solar auction in 2015. The analysis will follow this chronology of events to show how and where different factors and actors might have influenced each other.

SOUTH AFRICA

With a population of 54 million people, South Africa is a middle-income country with the second-largest economy in Africa and well developed financial, legal, communications and transport sectors. The country also has a sophisticated and well regulated banking and financial sector (Bank Stability Index rating: 61), and its stock exchange is the 16th largest in the world (Country Watch, 2016a). Despite rapid advances in many areas since the country's first democratic election in 1994, it still struggles with high unemployment levels (28%) – especially among young people (68%) – inequality, and widespread, persistent poverty (45% of population). Economic growth has been sluggish, with real gross domestic product (GDP) growth rates of between 2% and 3% remaining below SSA's average growth rate of 3.5% (Country Watch, 2016a).

South Africa has the largest power system on the African continent, generating more than 265 terawatt hours (TWh) per annum from 45 GW of installed capacity. Most of this electricity is generated using coal (Eberhard *et al.*, 2016). The country's electricity sector (Figure 3) is dominated by ESKOM, a state-owned and vertically integrated electricity utility. ESKOM is responsible for most of the generation and transmission assets and

Figure 3 Structure of South Africa's electricity market



Source: Eberhard et al. (2016).

owns almost 50% of the electricity distribution network infrastructure. The remainder of the distribution infrastructure is owned and operated by 179 municipalities, with ESKOM supplying their bulk electricity demand. The Department of Energy (DOE) provides oversight over the national electricity sector, with the Department of Public Enterprises governing Eskom through a shareholder compact. The electricity sector is regulated by the National Energy Regulator of South Africa (NERSA), who is responsible for tariff approvals as well as licensing of generators, transmitters, distributers and traders (Eberhard *et al.*, 2016).

A key planning document that guides the energy mix for electricity generation is the integrated resource plan (IRP). The existing plan, which was published in 2011 by the DOE, determines the demand profile for South Africa over the next 20 years and details how this demand can be most effectively met using different sources such as coal, gas, nuclear energy and renewable energy. The existing (out-dated) IRP envisages 19 GW of renewable energy to be installed by 2030 – out of a total capacity of 90 GW. The outcomes for renewables targets from the current process to develop the IRP 2016 remain to be seen.

Until recently, South Africa had almost no private participation or investment in the power sector. This all changed in 2011 when the IPP programme was introduced. NERSA had already started exploring the introduction of renewable energy using FiTs in 2009, but this was later rejected in favour of competitive tenders (Baker and Wlokas, 2015)

Procurement of renewables from independent power producers

The South African REIPPPP is designed as a tender process to facilitate competitive and private investment into utility-scale and grid-connected renewable energy generation. Four bidding rounds (referred to as bid windows [BWs]) were completed between 2011 and 2015. An additional bidding round was held for concentrated solar power (CSP) only.[4] The BWs were highly competitive, receiving 390 submissions, with less than a quarter (92)[5] of these being selected for procurement. The selection amounted to bids of 6 328 MW, representing ZAF 193 billion (USD 20.5 billion) in investment. Fierce competition has drastically reduced prices over the bidding rounds (Figure 4), and as an outcome of the last tender, solar PV and wind energy seem now to be cheaper compared to ESKOM's average cost of supply. Prices for solar PV and wind are also far below the cost of new coal power stations in South Africa (Bischof-Niemz and Fourie, 2016; Eberhard, Kolker and Leigland, 2014). The implementation of the programme advances towards adding 7 GW of *operational* renewable energy generation capacity by 2020, which is the National Development Plan's (NDP's) interim target, and towards adding 17.8 GW from renewable energy by 2030, which is the IRP's long-term target (DOE SA, 2015).

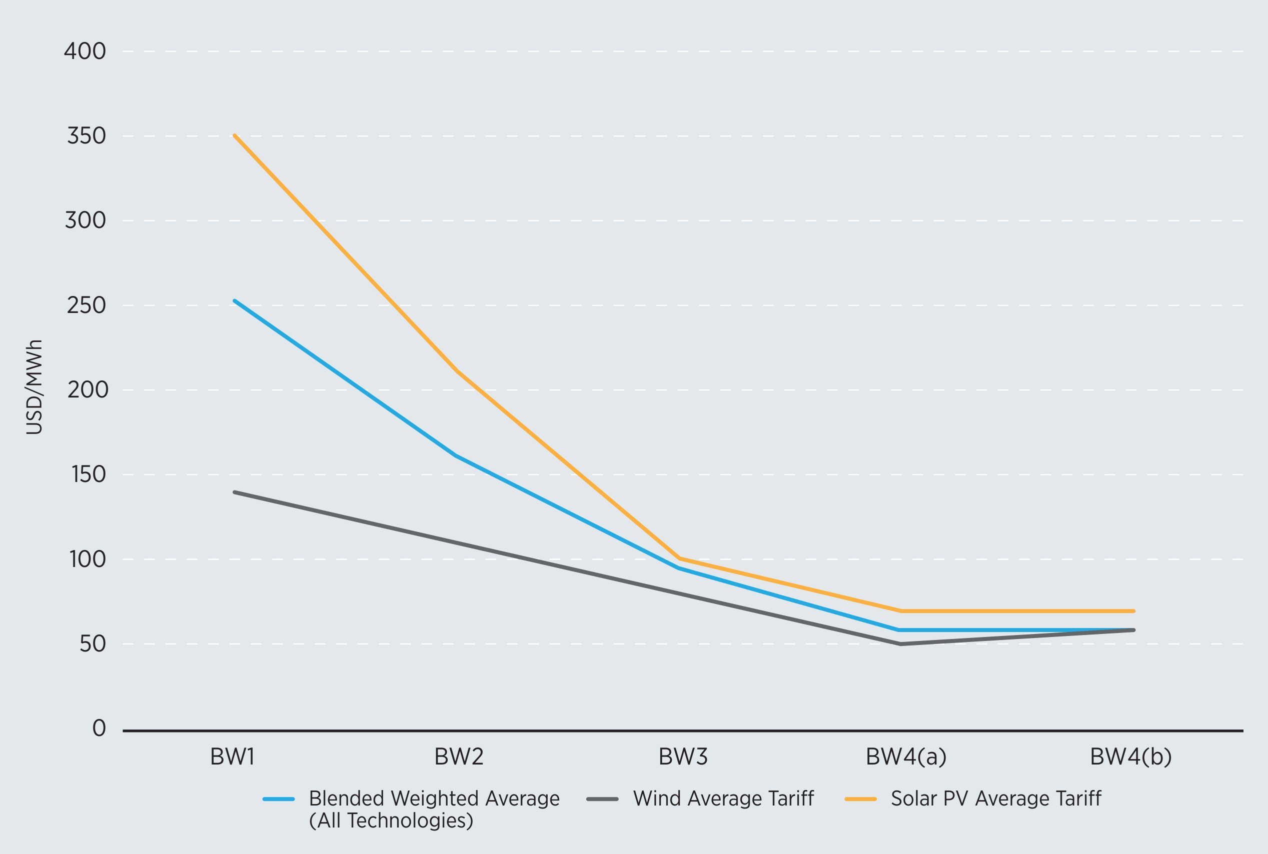
The Small Projects IPP Procurement Programme (SP-IPPPP) was introduced by the DOE SA in 2013. The SP-IPPPPP aimed at projects of 15 MW size each, with a total aim to procure 200 MW. Simplified rules aimed to allow for less expensive bidder participation in order to encourage small and medium enterprises (SMEs) to participate. The SP-IPPPP offered 50 MW for tender in October 2013 and, after a prequalification phase in March 2014, received 139 MW (29 bids) in November 2014. Of these, 49 MW (10 bids) were awarded in October 2015 (DOE SA, 2016), and an additional 10 projects were awarded in January 2017.

The REIPPPP was generally regarded as well designed and managed through a separate unit from the DOE, the DOE IPP unit, and the process was seen to be transparent and fair. The DOE IPP Unit is led by a management team seconded from the public-private partnership (PPP) Unit of the National Treasury, which had extensive experience, expertise and credibility with both public- and

4 In response to the bids received in BW 4 (amount and prices), the DOE SA increased the auction demand and split the awarding of preferred bidders into two stages (see "Clearing Mechanisms and Marginal Bids" below). The 13 highest ranked bid responses received were awarded in the first stage, BW 4(a), and the following 13 bids were awarded in the second stage, BW 4(b).

5 Including projects from the Small IPP Programme, the total is 112.

Figure 4 Weighted average bid tariff (across all selected projects) per bid window



Note: Weighting by share of contracted capacity for each round; BW 3.5 excluded from this illustration as only CSP was auctioned.
Source: Eberhard et al (2016).

private-sector stakeholders. In addition, local and international technical, legal and financial transaction advisors provided substantial input. The key to the REIPPPP's success can be found in the DOE IPP Unit's emphasis on problem solving, rather than an enforcement of administrative arrangements, as well as the largely *ad hoc* institutional status of the unit (Eberhard, Kolker and Leigland, 2014).

The REIPPPP is well known as the pioneer for renewable energy in South Africa, but it has also loosened the monopoly hold of Eskom through the introduction of IPPs: within four years, IPPs have achieved more investment in South Africa than has the rest of SSA over the past two decades. The REIPPPP can provide valuable lessons for other developing countries looking to design and run competitive auctions for grid-connected renewable energy IPPs.

Auction demand

The South African REIPPPP was designed to allow a range of renewable energy technologies to be bid. Overall development requirements were established through ministerial determinations based on the IRP, which specifies the time, technology and owner of new required generation capacity. The determinations bind the regulator to issue associated licenses. So far, three determinations have supported the REIPPPP, with the first determination in 2011 allocated 3 725 MW to be generated by renewable energy sources from IPPs. As a result of the significant positive response, an additional 3 200 MW (2012) and 6 300 MW (2015) have been allocated to renewable energy based generation. These determinations are differentiated by technologies, including onshore wind, CSP, solar PV, biomass, biogas, landfill gas and small hydro (< 40 MW).

As part of the determinations, there has also been a separate allocation for small renewable energy projects of 15 MW, which covers onshore wind, solar PV, biomass, biogas or landfill gas. An important difference between the "regular" and small IPP programme is that there are no exclusive demand bands for technologies in the small programme; in other words, renewable energy technologies compete against each other in the small IPP programme, whereas this is not the case in the utility-scale programme. Evidence suggests an overestimated market readiness for the first bidding round, resulting in limited competition and bid prices closer to the price caps (Eberhard, Kolker and Leigland, 2014). Subsequent bidding rounds saw a reduction in the volume auctioned and resulted in more competition and lower winning prices.

Table 1 provides a breakdown of the allocations by technology per ministerial determination. It shows that onshore wind and solar PV dominate in terms of the amounts set out, in large part in response to the rapidly decreasing costs for these technologies over the bidding rounds.

The ministerial determinations have been translated into separate bidding rounds based primarily on the IRP – each again offering specific demand bands per technology.[6] Evidence suggests beneficial outcomes from the REIPPPP as a long-term auction programme, as the programme timeframe contributed to attracting a larger number of bidders and supported the development of a local industry (IRENA and CEM, 2015). Table 2 provides a breakdown of the capacity offered and awarded by round and technology, including price and investment outcomes.

Table 1 Ministerial determinations on renewable energy technologies in South Africa

	Megawatts allocated by Minister of Energy to date				
Technology	**First Determination (Aug-2011)**	**Second Determination (Oct-2012)**	**Third Determination (Aug-2015)**	**Total**	**Percentage of total**
Onshore wind	1 850	1 470	3 040	6 360	48%
CSP	200	400	600	1 200	9%
Solar PV	1 450	1 075	2 200	4 725	36%
Biomass	13	48	150	210	2%
Biogas	13	48	50	110	1%
Landfill gas	25	0	0	25	0%
Small hydro (≤ 40 MW)	75	60	60	195	1%
Small projects (1-5 MW)	100	100	200	400	3%
Total	**3 725**	**3 200**	**6 300**	**13 225**	**100%**

Note: Determinations made under REIPPPP and SP-IPPPP, South Africa's programmes governing procurement from independent power producers (IPPs) for renewables and small projects, respectively

Source: DOE SA (2011a), South Africa Government (2012), South Africa Government (2015).

6 The determinations are not automatically translated into BWs; so far, the amount of power procured through the four BWs is only about half of the three determinations' volume.

Table 2 Capacity and investment outcomes of BWs 1-4

	Wind	PV	CSP	Biomass	Biogas	Landfill	Hydro	Total
BW 1 (2011)								
Capacity offered (MW)	1 850	1 450	200	13	13	25	75	3 626
Capacity awarded (MW)	649	627	150	0	0	0	0	1 425
Projects awarded	8	18	2	0	0	0	0	28
Average tariff (USD/MWh)	140	350	340	N/A	N/A	N/A	N/A	N/A
Total investment (USD m)	1 734	2 945	1 486	0	0	0	0	6 166
BW 2 (2012)								
Capacity offered (MW)	650	450	50	13	13	25	75	1 276
Capacity awarded (MW)	559	417	50	0	0	0	14	1 040
Projects awarded	7	9	1	0	0	0	2	19
Average tariff (USD/MWh)	110	210	320	N/A	N/A	N/A	13	N/A
Total investment (USD m)	1 736	1 743	642	0	0	0	91	4 212
BW 3 (2013)								
Capacity offered (MW)	654	401	200	60	12	25	121	1 473
Capacity awarded (MW)	787	435	200	17	0	18	0	1 457
Projects awarded	7	6	2	1	0	1	0	17
Average tariff (USD/MWh)	80	100	170	14	N/A	10	N/A	N/A
Total investment (USD m)	1 721	826	1 820	108	0	29	0	4 504
BW 3.5 (2014)								
Capacity offered (MW)			200					200
Capacity awarded (MW)			200					200
Projects awarded			2					2
Average tariff (USD/MWh)			150					15
Total investment (USD m)			1 741					1 741
BW 4 (a) (2014)								
Capacity offered (MW)	590	400	0	40	0	15	60	1 105
Capacity awarded (MW)	676	415	0	25	0	0	5	1 121
Projects awarded	5	6	0	1	0	0	1	13
Average tariff (USD/MWh)	50	70	N/A	120	N/A	N/A	90	N/A
Total investment (USD m)	1 122	709	0	100	0	0	20	1 951
BW 4 (b) (2015)								
Capacity offered (MW)								
Capacity awarded (MW)	686	398	0	0	0	0	0	1 084
Projects awarded	7	6	0	0	0	0	0	13
Average tariff (USD/MWh)	60	70	N/A	N/A	N/A	N/A	N/A	N/A
Total investment (USD m)	1 226	669	0	0	0	0	0	1 895
TOTALS								
Capacity offered (MW)	3 744	2 701	650	126	38	90	331	7 680
Capacity awarded (MW)	3 357	2 292	600	42	0	18	19	6 328
Projects awarded	34	45	7	2	0	1	3	92
Total investment (USD m)	**7 540**	**6 892**	**5 690**	**207**	**0**	**29**	**111**	**20 470**

Calculated based on DOE SA Project IPP data

The national utility (Eskom) is the official off-taker charged with signing the 20-year power purchase agreements (PPAs). An intergovernmental framework agreement obliges the regulator, NERSA, to pass on the REIPPPP costs to consumers through the Eskom tariff.

Qualification requirements

The REIPPPP functioned as a single-round bidding programme; in other words, it had no prequalification round. The decision for a single-round bidding programme was in large part driven by the need for speed in the procurement process. South Africa was facing considerable power capacity constraints during the years that the programme was being conceived and therefore needed to contract and build new power as quickly as possible. Due to this urgency, several stringent qualification requirements were put in place to ensure that only serious, high-quality bidders were selected.

■ *Reputation*

A great deal of attention was paid to the financial health and past experience of bidders. Financial standing was established using fairly standard requirements such as audited financial statements for all corporate finance and equity providers, as well as net asset tests and/or track record tests – also for engineering, procurement and construction (EPC) contractors (a requirement that was relaxed in later rounds). To establish the robustness and deliverability of the funding proposal, bidders were further required to provide a clear breakdown of all sources of funds and their uses, as well as financial due diligence plans and risk mitigation strategies.

A defining feature of the REIPPPP has been the requirement that finance providers submit letters of support. In practice, this requirement "outsources" projects' due diligence to the banks or other finance providers, ensuring that bids are bankable and robust at submission. Finance providers also had to agree that they accept the risk allocation in the PPA, implementation agreement (IA) and direct agreement (DA), and submit the term sheets for financing. Bidders furthermore needed to prove the robustness of financial models used by submitting two financial models (sponsor and banking cases), including sensitivity analyses on foreign exchange (forex) movements, disclosures on tax and accounting treatments, and any other assumptions used in the models. Lastly, bidders had to submit a declaration in respect of success payments, broadly defined as the reimbursements of costs incurred in the development of the bid project, payable only on achievement of FC.

In terms of legal qualification requirements, bidders had to establish a special purpose vehicle (SPV) by bid submission (a condition relaxed since Round 4); confirm acceptance of the PPA, IA and connection agreements (CAs); and provide all key sub-contracts that formed part of the bid.

■ *Technology*

Due to the multiple technologies featured in the REIPPPP (Table 3), various technical requirements formed part of the bidding process. Project size constraints were set out for each technological category, and technology-specific PPAs were provided as part of the request for proposal (RFP). Bidders were required to provide independently reviewed forecast energy sales reports, with differing minimum requirements per technology, such as at least one year of site-specific data for onshore wind projects and ten years of data for solar PV. For biomass and biogas projects, bidders had to provide documentary evidence of energy resource certainty by way of a fuel supply agreement or market study that covered at least the project's first two years of operation. Projects were furthermore required to provide evidence that their equipment met international or European standards, their components met the "proven technology" requirements and certain component models adhered to prescribed certification programme designs, and their projects met minimum prescribed technical availability standards.

The REIPPPP has largely been a location-agnostic auction programme, placing the responsibility for site selection and land acquisition/leasing on bidders. Site-specific documentation requirements have therefore been fairly onerous, with bidders required to submit proof of land acquisition (title deed/notarial lease/unconditional land option),

Table 1 Contracted capacity permitted per project

Technology	Minimum	Maximum
Onshore wind	1	140
Solar PV	1	75
CSP	1	100
Biomass	1	25
Biogas	1	10
Landfill gas	1	20
Small hydro	1	40[7]

Source: DOE SA (2014).

various environmental consents (environmental impact assessments, water use applications, civil aviation commissioner consent, heritage authority approval, etc.) and proof of applications for land use change, subdivision and zoning (removed as a requirement from Round 3). These requirements have been costly and time consuming, both for developers as well as the various government departments and authorities involved. Some cases have required upward of 20 permissions and have taken more than a year to process. To speed up the project development process, the government has now established better co-ordination between renewable energy generation and transmission planning and environmental licensing. In 2016, eight Renewable Energy Development Zones (REDZs) and five Power Corridors (see Figure 6) were approved to guide the locational choices of investment. For these locations, strategic environmental assessments (SEA) are performed prior to bidders' site selection. The SEAs pre-assess the environmental sensitivities within the development areas, and projects in these areas are subject to simplified environmental impact assessments. These new rules apply from Round 5 onwards and are expected to reduce environmental review and decision-making time from 300 days to 147 days.

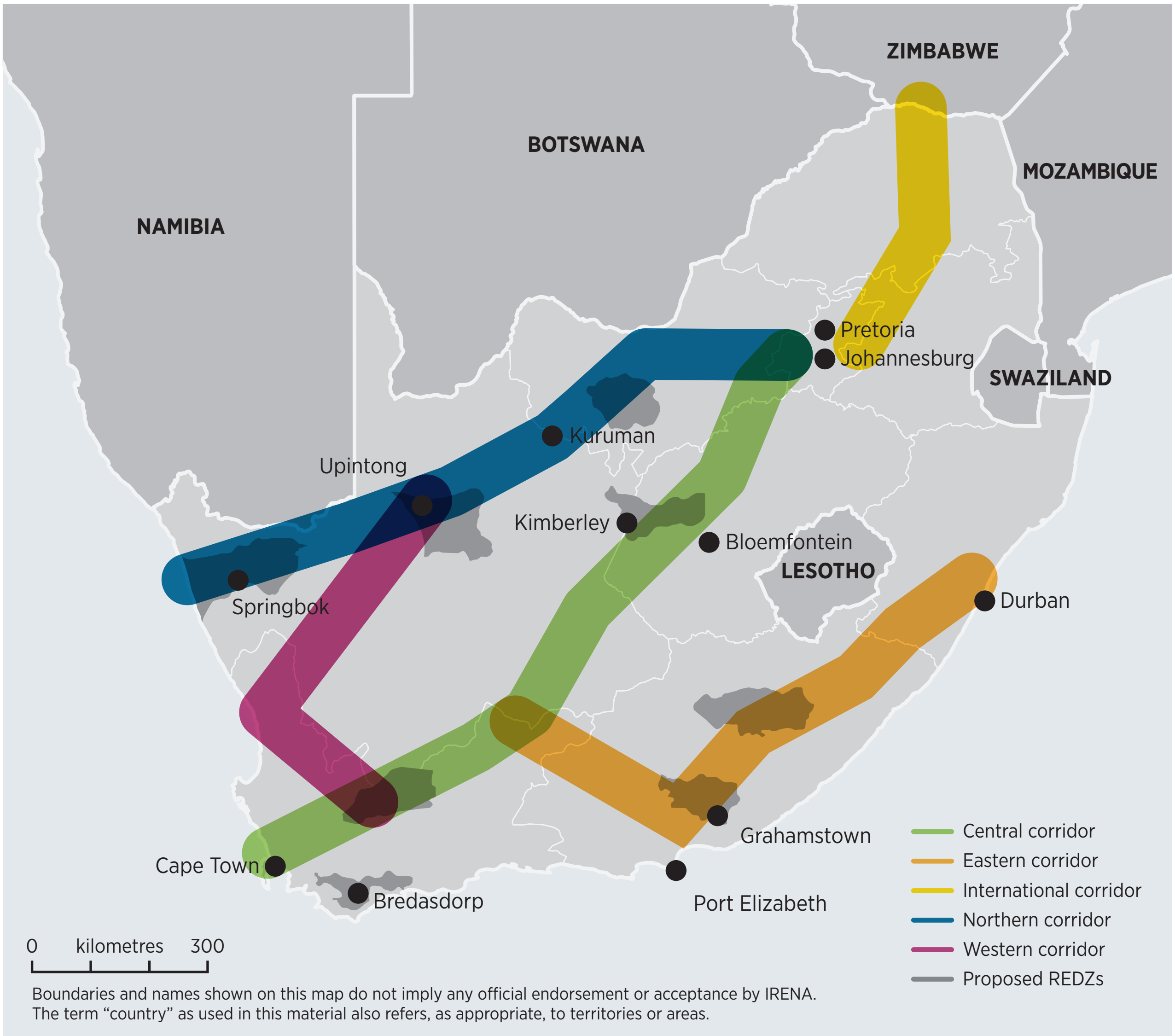
Bidders were primarily responsible for securing grid access. Bidders would already have confirmed with the grid provider (Eskom) that there was sufficient capacity in the designated substations and distribution and transmission lines; failure to do so could result in their bid being disqualified. Depending on where projects were located, and on the location of the point of connection, projects could either connect to the transmission system (in which case the grid provider was the Eskom transmission business unit) or to the distribution system (in which case the grid provider could either be a municipality or Eskom distribution). Preferred bidders would therefore have to sign either a transmission agreement or distribution agreement as part of their PPA with the relevant grid provider. In cases where the grid provider was a municipality, bidders were required to ensure that the relevant agreements (amendment agreement to the electricity supply agreement and an implementation protocol) were in place or would be in place before FC as part of their bids.

In general terms, bidders were responsible for "shallow connection works" – works for the dedicated customer connection of the facility to the system – and the grid operator for connection works on shared assets ("deep connection").[8] Shallow connection works could be done in three ways: Eskom-built, self-built (in which the bidder built the connection works and then transferred it to the grid provider) or own-built (in which the bidder retained ownership of the connection works, requiring an additional transmission license or distribution license). Bidders therefore had to obtain (and pay for) a cost estimate letter from Eskom or a municipality – depending on where they intended to connect – that provided an indicative timeline and associated costs for the required ("deep") connection works. Bidders were furthermore expected to provide a signed letter stating that they were able to comply with grid codes prior to the commercial operation date (COD). Bids were required to further clarify which parts of the grid connection works would be performed by the bidder (including a cost estimate). Once bidders were assigned "preferred bidders" status, the

7 The maximum limit was amended to 40 MW (versus 10 MW prior to this).

8 The grid provider is still required to undertake a portion of the shallow connection works, which should be included in the cost estimate letter.

Figure 5 Proposed REDZ and preliminary electricity grid infrastructure corridors



Source: McEwan (2017).

Grid connections are a crucial aspect of renewable power development cost estimate letter was required to be replaced by an up-to-date and accurate budget quote from Eskom or the municipality.

- *Instruments to promote socio-economic development*

For a bid to be considered compliant, two primary economic development (ED) thresholds had to be passed. The ED thresholds require a minimum of 40% "South African Entity Participation" in the project company. The definition changed over time, with BW 3 narrowing down the participation requirement by South African citizens[9] to "the *ultimate natural citizens* to whom the shareholding benefits would accrue" (DOE SA, 2013). This decision amended the initial definition, which allowed entities "based and registered in the Republic of South Africa, which have legal and beneficial participation in the Project Company" (DOE SA, 2011b). Compliance was proved by the submission of authorised letters indicating the respective shareholdings, shareholders' agreements and constitutional documents or by shareholder certificates. Furthermore, the bidders had to provide the identity numbers and identity copies of the ultimate natural citizens.

As a second requirement for a bid to be compliant, bidders based in South Africa needed to achieve a broad-based black economic empowerment (BBBEE) contributor status level (CSL) of at least five, with the CSL being determined in accordance to the BBBEE codes.[10] Only an eligible entity[11] could issue the proof of compliance in the form of a valid verification certificate.

Lastly, bidders were required to meet or exceed any minimum thresholds indicated in the ED scorecard to the RFP and had to provide supporting documentation as proof. These thresholds for both the REIPPPP and SP-IPPPP are provided in Table 4, showing that the minimum qualification criteria were relaxed significantly for the small projects programme.

In accordance with the local content criterion, a certain percentage of the total project cost has to be spent in South Africa (DOE SA, 2011b) and will account for 25% of the ED score (to be discussed in more detail as part of the winner selection process). During BWs 2 and 3, the definition of local content was more strictly applied and further refined and monitored respectively. Table 5 provides a comparison between the local content thresholds and targets per technology against the outcomes for each BW. The thresholds function as minimum obligations for bidders.

BW 1 generally witnessed commitment towards local content being much closer to the minimum prescribed levels. Despite this, the all the technology-specific targets were further increased by 10 of 15% in BW 2, and the average local content commitment increased significantly.

Thresholds were increased by 10-15% in BW 3, and target levels increased by another 5% for all technologies. Despite these changes, the average outcomes for the primary technologies – wind, solar PV and CSP – remained almost unchanged, pointing towards constraints in achieving higher local content expenditure. Thresholds and targets remained unchanged in BW 4, and for most technologies the achieved local content commitments were much closer to the threshold than target. Solar PV is a notable exception to this development, as outcomes increased most significantly across all BWs and almost reached the target established for BW 4. It could provide lessons for other technologies in future rounds. It has, however, been noted that there are questions regarding the impact and "validity" of some of the local content commitments in the REIPPPP, especially in the solar PV sector, where some developers have used methods such as transfer pricing to meet local content requirements (Baker and Sovacool, 2017).

9 As direct or indirect shareholders in the project company.

10 Broad-Based Black Economic Empowerment Act (53/2003) on the issue of Codes of Good Practice, from the Government Gazette No. 36928 General Notice 1019.

11 An eligible entity can be a chartered accountant registered with the SA Institute of Chartered Accountants, an auditor registered with the Independent Regulatory Board for Auditors or a verification agency that is accredited from the South African National Accreditation System. In case the verification certificate does not specify the actual qualification score (in addition to the BBBEE status and recognition level), a verified letter needs to be provided that indicates this score.

Table 4 Comparison of ED thresholds and targets between REIPPPP and SP-IPPPP

		REIPPPP		SP-IPPPP	
Element (weighting)	**Description**	**Threshold**	**Target**	**Threshold**	**Target**
Job creation	RSA-based employees who are citizens	50%	80%	-	90%
	RSA-based employees who are black people	30%	50%	-	60%
	Skilled employees who are black people	18%	30%	-	50%
	RSA-based employees who are citizens and from local communities	12%	20%	-	30%
	RSA-based citizens employees per MW of contracted capacity	N/A	N/A	N/A	N/A
Local content	Value of local content spending	40-45%*	65%	50%	70%
Ownership	Shareholding by black people in the seller	12%	30%	-	40%
	Shareholding by local communities in the seller	2.5%	5%	-	10%
	Shareholding by black people in the construction contractor	8%	20%	-	30%
	Shareholding by black people in the operations contractor	8%	20%	-	30%
Management control	Black people in top management	-	40%	-	40%
Preferential procurement	BBBEE procurement**	-	60%	-	70%
	QSE and SME procurement**	-	10%	-	20%
	Women-owned vendor procurement**	-	5%	-	10%
Enterprise development	Enterprise development contributions***	-	0.6%	-	1.0%
	Adjusted enterprise development contributions***	-	0.6%	-	1.0%
	Enterprise development contributions on SMEs	N/A	N/A	0.5%	1.0%
Socio-economic development	Socio-economic development contributions***	1%	1.5%	-	3.0%
	Adjusted socio-economic development contributions***	1%	1.5%	-	3.0%
SME participation	Key components and/or equipment and balance-of-plant spend on SMEs	N/A	N/A	50%	70%

**Depending on technology; 45% for solar PV, 40% for all other technologies.*
***As percentage of total procurement spend.*
****As a percentage of revenue.*
Note: QSE = Qualifying Small Enterprise; RSA = Republic of South Africa.
Source: DOE SA (2014).

Electricians working on high-voltage power lines in Johannesburg, South Africa

Table 5 Average local content as a percentage of total project cost versus thresholds and targets

	BW 1			BW 2			BW 3			BW 3.5	BW 4		
Technology	Min.	Target	Average bid	Min.	Target	Average bid	Min.	Target	Average bid	Average bid	Min.	Target	Average bid
Onshore wind	25%	45%	27.4%	25%	60%	48.1%	40%	65%	46.9%	n/a	40%	65%	44.4%
Solar PV	35%	50%	38.4%	35%	60%	53.4%	45%	65%	53.8%	n/a	45%	65%	62.3%
CSP	35%	50%	34.6%	35%	60%	43.8%	45%	65%	44.3%	43.0%	40%	65%	No bids
Biomass	25%	45%	No bids	25%	60%	No bids	40%	65%	40.0%	n/a	40%	65%	47.8%
Biogas	25%	45%	No bids	25%	60%	No bids	40%	65%	No bids	n/a	40%	65%	No bids
Landfill gas	25%	45%	No bids	25%	60%	No bids	40%	65%	41.9%	n/a	40%	65%	No bids
Small hydro	25%	45%	No bids	25%	60%	76.3%	40%	65%	No bids	n/a	40%	65%	40.0%

Based on DOE SA Project IPP data

Winner selection process

- *Bidding procedure and requirements of minimal competition*

The REIPPPP made use of a single-offer, sealed bid process in which winning bidders were paid their bid prices. While competition was ensured through the use of project capacity constraints, there were no limits on the number of projects that could be awarded to a single bidder. Ceiling price mechanisms (price caps; see Table 6) were in place for all technologies and adjusted downwards in each round based on local and global influencing factors, but were removed for solar PV and wind from BW 4 due to the significant cost decreases for these sources.

Table 6 Price caps and average bid tariffs for BW 1-4 (in USD/MWh)

	W 1		BW 2		BW 3		BW 4(b)		BBW 4(a)	
Technology	Price cap	Bid tariff	Price cap	Bid tariff	Price cap	Bid tariff	Price cap	Bid tariff	Price cap	Bid tariff
Onshore wind	140	140	150	110	100	80	70	60	Re-moved	50
Solar PV	360	350	360	210	140	100	80	70	Re-moved	70
CSP	360	340	360	320	170	170	130	-	140	-
Biomass	130	-	140	-	140	140	140	-	120	120
Biogas	100	-	100	-	80	-	140*	-	-*	-
Landfill gas	80	-	110	-	100	100	90	-	80	-
Small hydro	130	-	130	130	90	-	110	-	90	90

**No biogas capacity was made available for tender under BW 4.*
Based on DOE SA project data, rounded values

■ *Winner selection criteria*

The REIPPPP is a multi-criteria auction, using both price and ED criteria to determine winning bids. The scoring of qualifying or compliant bid submissions was split between price (70%) and ED criteria (30%). Price scoring was relative, meaning that the lowest-priced bid was awarded the highest score (70) and that all other bids were scored relative to this bid. A unique feature of the South African REIPPPP was the large weighting assigned to ED criteria. While this has drawn criticism, specifically with regard to the impact on price levels, the price outcomes in later rounds seem to somewhat belie this criticism.[12] More importantly, the emphasis on ED outcomes has been essential in securing and maintaining political support for the programme. Table 7 provides a breakdown of the weighting by category applied in BW 4, as well as the thresholds and targets for each element. In this case, the auction's economic development criteria reflect specific national and governmental priorities. These include, for instance, BBBEE codes as measurable criteria for the selection of winners.

Table 7 Elements of South Africa's economic development criteria

Element (weighting)	Description	Threshold	Target
Job creation (25%)	RSA-based employees who are citizens	50%	80%
	RSA-based employees who are black people	30%	50%
	Skilled employees who are black people	18%	30%
	RSA-based employees who are citizens and from local communities	12%	20%
	RSA-based citizens employees per MW of contracted capacity	N/A	N/A
Local content (25%)	Value of local content spending	40-45%*	65%
Ownership (15%)	Shareholding by black people in the seller	12%	30%
	Shareholding by local communities in the seller	2.5%	5%
	Shareholding by black people in the construction contractor	8%	20%
	Shareholding by black people in the operations contractor	8%	20%
Management control (5%)	Black people in top management	-	40%
Preferential procurement (10%)	BBBEE procurement**	-	60%
	QSE and SME Procurement**	-	10%
	Women-owned vendor procurement**	-	5%
ED (5%)	Enterprise development contributions***	-	0.6%
	Adjusted enterprise development contributions***	-	0.6%
Socio-economic development (15%)	Socio-economic development contributions***	1%	1.5%
	Adjusted SED contributions***	1%	1.5%

**Depending on technology; 45% for solar PV, 40% for all other technologies.*
***As percentage of total procurement spend.*
****As a percentage of revenue.*
Source: DOE SA (2014).

12 Theory and practice suggest that the incorporation of ED factors results in higher costs of service provision. Depending on the circumstances as well as future developments, additional costs may be outweighed by macroeconomic benefits, overall resulting in a net gain of GDP as well as improvements in human well-being. As renewable electricity generation technologies gain sectoral competitiveness, there is growing confidence emerging on these positive net macroeconomic impacts (IRENA, 2017). At the same time, the REIPPPP shows the importance of transparent and well informed governmental decision making in administering ED goals, as well as the importance of oversight to ensure accurate adherence to the rules (Eberhard, Kolker and Leigland, 2014).

Bids were again scored relative to the bid that performed best on all the ED criteria, dependent on that bidder meeting or exceeding all the ED targets. Quarterly monitoring reports from the IPP office show that contracted projects have reached or exceeded most of their ED commitments, although these results remain to be verified and audited.

■ *Clearing mechanism and marginal bids*

At any stage during the process, the DOE SA reserved the right to reallocate the targeted MWs amongst technologies. Starting from BW 4, the DOE SA was also able to amend the targeted MWs per technology and/or for the bid round in total, which allowed for a doubling of the capacity originally offered. This amendment could take place between bid submission and the announcement of winning bidders. After the successful outcomes of BW 4 (in terms of price and ED objectives), the DOE increased the total targeted capacity. A second batch (referred to as BW 4(b)) of preferred bidders was announced, with the total capacity procured almost doubling to 2 205 MW from the 1 105 MW initially made available.

Sellers' and buyers' liabilities and obligations

■ *Commitment to contract signing*

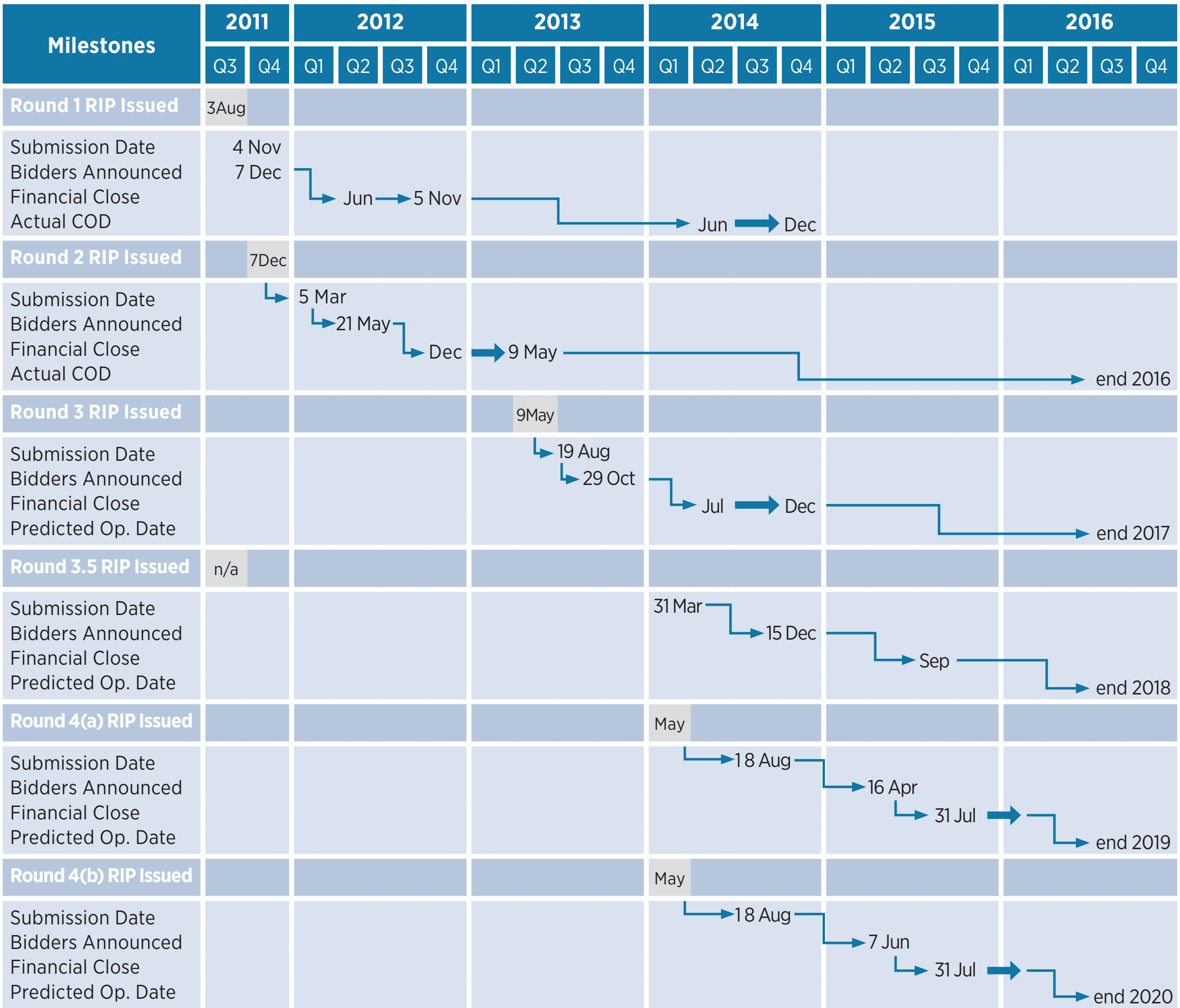
The SA REIPPPP required a bid bond of ZAR 100 000 per MW at BW 4 (equivalent to about USD 8 000 at a ZAR:USD rate of 12.5:1), which bidders were required to double to roughly USD 16 000 per MW before being officially appointed as preferred bidders. While this was considered relatively high, it was necessary because of the lack of a prequalification phase, which normally eliminates low-quality bidders.

■ *Contract schedule*

Bids generally had to be submitted within three months of the RFP release date, with an initial screening for compliance with qualification criteria and general requirements. Within 9-12 months, projects were expected to reach FC and signing of contracts. CODs were expected generally within 24 to 30 months of FC, although, as shown in Figure 6, the DOE SA allowed for some delays in these timelines.


One of South Africa's solar PV plants

Figure 6 REIPPPP tender process timeline



Source: DOE SA (2015)

Remuneration profile, financial risk and quantity liabilities

Bid prices are indexed according to the South African Consumer Price Index (CPI) over the 20-year period of the PPA. Bidders were required to submit both fully indexed and partially indexed (20-50%) prices, with fully indexed prices required to be below the price caps set for each technology. Bid tariffs were also denominated in South African rand per kilowatt-hour (kWh) and based on an energy purchase agreement (take-or-pay). This limits forex market exposure risks for the off-taker, since prices are guaranteed to only increase with inflation and no more. Clearly sellers are exposed to forex risks on certain upfront capital expenditures and operating costs to be incurred after COD. As per the RFP, it was permitted to adjust the prescribed spot rate in respect of capital expenditures, which has been used at bid submission (and corresponding adjustments to bid tariff) at FC. However, similar adjustments on operating costs have not been allowed by the DOE SA. Starting from BW 3, the forex exposure between bid submission and FC was limited by the DOE SA and capped at minimum from 60% of the project's capital expenditure (in line with the 40% local content requirement) or the actual forex exposure on capital expenditure.

■ *Settlement rules and underperformance penalties*

Different technologies had different requirements in terms of temporal aggregation of performance. Wind projects were, for example, required to have a reference mast in place, and readings from the first year were used to determine a facility power curve (FPC). This then constituted an approved FPC and would be in place as a performance reference measure unless an update was requested. The main application of this reference mast seemed to be concerned with scenarios in which deemed energy payments needed to be calculated, *e.g.* when Eskom might not be able to take power from the project.

If the capacity achieved on COD was less than the contracted capacity, the contracted capacity would be adjusted downward. Achieved capacity was required to be at least 50% of contracted capacity; anything less constituted a seller default, which would result in the PPA being terminated. The project contracts and agreements contained no provision for increasing the contracted capacity.

■ *Delay and underbuilding penalties*

No completion or performance bonds were required from bidders. However, if construction had not started more than 180 days after the effective date, the contract was terminated. Similarly, for every day that COD was delayed beyond its scheduled COD, the operating period of the contract would be reduced by an additional day; in other words, one day's delay resulted in loss of revenue of two days.

While the contract resolution and default clauses seem relatively standard, what was unique to the South African REIPPPP was that a PPA could be terminated due to a project failing to comply with its ED obligations. Projects could be awarded financial penalties and/or half a termination point for performance below 65% on any ED obligation, which they needed to report on quarterly. A project would not be awarded more than three termination points in a quarter, but if it was fined nine termination points within a 12-month period, the PPA could be terminated.

■ *Assigned liabilities for transmission delays*

As has been discussed above, the project was usually responsible for the majority of shallow connection works, while Eskom was responsible for "deep" works. Project developers were responsible for getting a budget quote from Eskom or alternative grid providers within six months of being appointed as preferred bidders. Failure to do so could result in a bidder losing its preferred bidder status. Bidders also carried all risks associated with any discrepancies between the cost estimate letter provided for bid submission and the budget quote required prior to signing the PPA. This provision cost some developers dearly, as in many cases Eskom quotes increased substantially from the initial cost estimates used in bids. Projects were relatively protected once they had this quote in that, if transmission was not provided by Eskom as set out in the budget quote, it counted as a system event, meaning that the project would be paid for energy that it would have delivered and last COD would be moved out in accordance with the delay.

■ *Risk mitigation and credit enhancement*

Winning bidders signed an IA with the DOE, which functions as a sovereign guarantee. This contingent liability for the government was mitigated by the aforementioned Intergovernmental Framework Agreement, which in effect guarantees that NERSA passes through the cost of the PPAs to the consumers via the Eskom tariff. This specific issue has recently led to a great deal of speculation about the sustainability of the programme, with Eskom reportedly refusing to sign winning bidders' PPAs and even suggesting that the treasury might pay for the REIPPPP through triggering its liabilities (Van Rensburg, 2016). This obstruction of government policy is fuelling calls for Eskom to be restructured, with various parties arguing that the utility's conflict of interests is due to its vertically integrated model and that its obstructive behaviour threatens the survival of the IPP programme in South Africa (De Vos, 2016; Eberhard, 2016; Steyn, 2016). Indications are that NERSA is considering launching an official investigation into whether ESKOM is in contravention of its license (Ola, 2017). In early December 2017, South Africa's minister of Energy announced that PPAs had been signed for projects awarded in BWs 3.5 and 4, after an almost two-year delay in the process (Creamer, 2017). The minister also refrained from the application of an arbitrary price cap of ZAR 0.77/kWh, which had been introduced earlier in 2017, and would have rendered several projects that had been awarded preferred bidder status non-bankable. There is currently no clarity regarding the signing of the PPAs of projects in the expedited rounds, as well as the awarded small IPP projects. This latest development has done little to allay investor fears regarding the future of the programme. Whether South Africa can fully capitalise on the significant momentum built through its renewable energy procurement programme remains to be seen.

South Africa has been the continent's trailblazer for renewables

Conclusion

South Africa's REIPPPP is rightly regarded as a major success in terms of renewable energy procurement, globally and especially on the African continent. Much of what has been learned through the REIPPPP process has come to influence developments in the rest of the continent, with many of the same advisors, financiers and project developers being involved in subsequent renewable energy procurement programmes in other African countries. South Africa has shown that renewable energy IPPs can be brought into a vertically integrated power market and that low prices and rapid capacity expansion can be achieved the African context while potentially providing local benefits. While there are of course considerable differences between South Africa and most other SSA countries (such as market size, deep local capital markets and reasonable credit ratings), the REIPPPP offers many relevant lessons for renewable energy procurement programmes. Uganda, the second country after South Africa in the SSA region to have embarked on a competitive renewable energy procurement programme, provides some insight into what these lessons are.

UGANDA

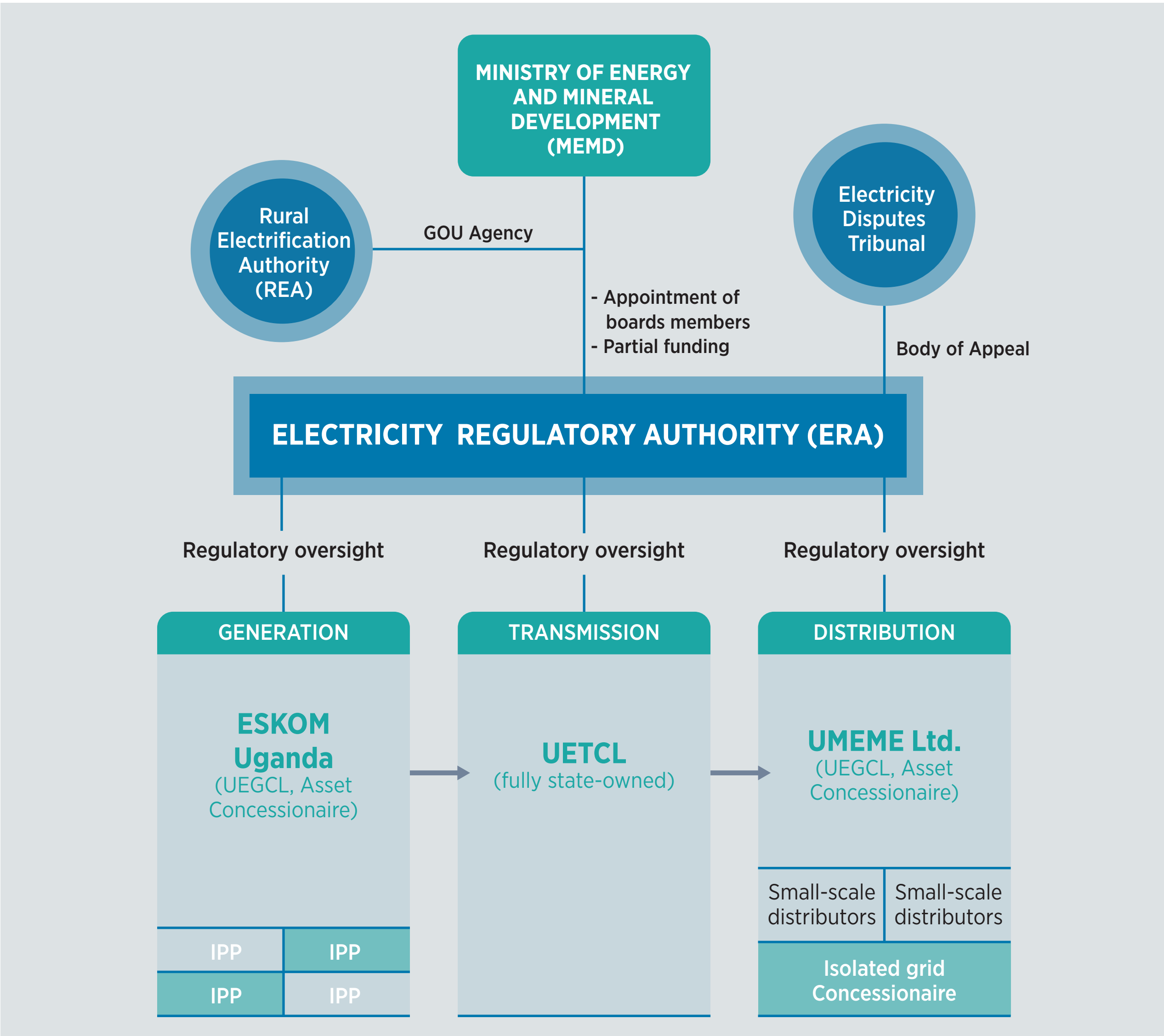
Uganda, a landlocked country in East Africa, is home to almost 40 million people. After gaining independence in 1961, the country was gripped by internal conflict and power struggles until 1986, when President Museveni came to power (Country Watch, 2016b). Uganda has since been experiencing considerable GDP growth rates of up to 10% per annum in the early 2000s, slipping to 3.2% in 2013 but recovering to just above 5% in 2015 (World Bank, 2016). Recent GDP growth has mainly been driven by infrastructural development funded primarily by China. The UGX (Ugandan shilling) has depreciated considerably over the past few years, resulting in high borrowing costs. As a result, commercial lending rates in the country are on average 25%, which is a considerable impediment to local investment (Deloitte, 2016). Most of the country's foreign earnings are based on coffee exports, although there is also the prospect of oil becoming a major source of future revenue. Uganda has seen its national poverty rate fall considerably over the past few years (currently at less than 20%), while the middle class has grown at an appreciable rate from 10.2% in 1992 to 37% in 2012. Unemployment is currently sitting at 6.8% (UNDP Uganda, 2014). In general, Uganda is characterised as a country that is maintaining macroeconomic stability and is projected to see GDP growth increase to above 6% in the short- to medium-term (Deloitte, 2016).

The Ugandan economy has been largely deregulated, and most state-owned enterprises (SOEs) have been privatised. In fact, Uganda's history of power-sector reform and investment is unique in the context of Africa. Uganda was the first country to separate generation, transmission and distribution into different utilities and to provide split, private-based concessions for the generation and distribution of electricity (Figure 7) (Eberhard *et al.*, 2016).

In 2013, 74% of Uganda's 840 MW installed power capacity was based on large hydropower projects and 12% was from thermal power plants. IPP-based (1.492 GWh) and public generation (1.291 GWh) had an almost similar market share in 2013. In 2012, the market share from IPP projects increased dramatically with the commissioning of the Bujagali hydropower plant. This development has also reduced the need for emergency power generation. Due to considerable investment in recent years, renewable energy (excluding large hydro) now represents a sizable portion of installed capacity, with more than 120 MW of installed bagasse and small hydropower (Eberhard *et al.*, 2016).

Despite a relatively low ranking in the World Bank's Doing Business index (122 out of 189), Uganda was ranked as the ninth-best investment destination for renewable energy in developing countries in 2015, and third in Africa (GET FiT, 2016; Country Watch, 2016b). Currently, the country has the second most IPPs in SSA, beaten only by South Africa. The Ugandan government and its entities, mostly the Electricity Regulatory Authority (ERA), have further developed policies and regulations to attract private investment in renewable energy. These policies and regulations, including an interconnection policy (2012), the establishment of an interconnection task force (2014), and the implementation of the Global Energy Transfer Feed-in Tariffs (GET FiT) programme, have addressed several regulatory shortfalls in Uganda. The GET FiT programme is discussed in more detail below (Eberhard *et al.*, 2016; GET FiT, 2015).

Figure 7 Structure of the Ugandan electricity industry



Source: Eberhard et al. (2016).

GET FiT Uganda

The GET FiT programme in Uganda was formally launched in May 2013. The initiative was spearheaded and implemented by Uganda's ERA, the Government of Uganda (GoU) and the German development bank KfW (Kreditanstalt für Wiederaufbau), with funding contributions from the governments of Germany, Norway and the United Kingdom, as well as the European Union. GET FiT sought to address some of the key barriers confronting potential private investors that wanted to fast-track the development of a portfolio of 20-25 small-scale renewable energy generation projects (1-20 MW) by IPPs. Its target was to facilitate the installation of 170 MW of clean generation capacity. The aim was to rapidly plug a supply-demand gap in the period before two new large Chinese-funded hydro projects, Karuma and Isimba, came on line (GET FiT, 2015; Meyer, Tenenbaum and Hosier, 2015).

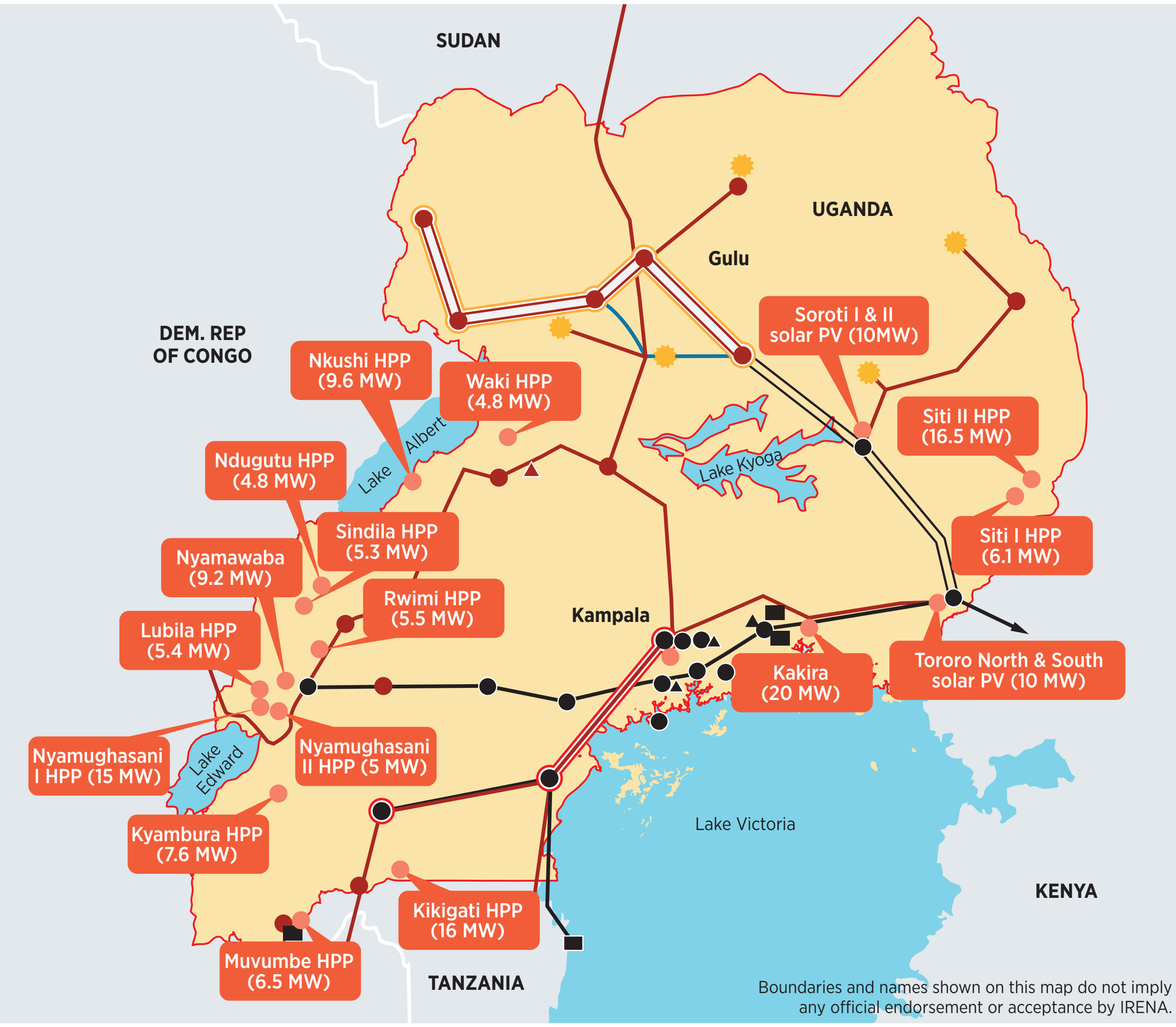
The primary feature of GET FiT was that successful renewable energy projects were eligible to receive premium payments under the GET FiT Premium Payment Mechanism in order to "top up" the relevant renewable energy feed-in tariffs (REFiTs) per kWh set out by the Ugandan regulator ERA. The REFiT was payable by the state-owned single buyer, the Uganda Electricity Transmission Company Limited (UETCL), while the premium payment was paid from aforementioned donor funding, front-loaded in the first five years of the project. The GET FiT-related premium payments for solar PV generation capacity were determined through auction processes. Furthermore, GET FiT supported technical identification and finance for electricity network infrastructure associated with the integration of the renewable energy projects under GET FiT. The World Bank also supported the programme by offering developers a partial risk guarantee (PRG) facility to mitigate core risk components that might typically deter developers. The objective was to provide additional financial incentives to investors, who widely viewed the REFiT levels alone as insufficient, and to tackle all major barriers to investment in one programme.

Initially, GET FiT supported only small hydro, biomass and bagasse projects. In the first two tender rounds, 13 projects totalling 108 MW were selected. An additional six projects were approved in a third round of bids, although not all projects will receive support due to funding constraints. In addition, the GET FiT Solar Facility was launched in January 2014 to run Uganda's first solar PV tender. This was in response to a specific request by ERA for solar PV due to its plummeting technology costs, short lead times and the ability to be built close to demand centres.[13] The solar tender differed to the previous hydro and biomass tenders in that the project bids were evaluated not just in terms of their quality but also on price.

GET FiT funding for the Solar Facility – provided by the EU – was used to not only develop a full set of standardised documents (including request for qualification [RFQ], RFP, PPA, IA and direct agreement [DA]), but also paid for the services of the tender agent. The tender agent implemented the various tenders on behalf of GoU and appraised the bids and prepared the decision of the Investment Committee, a body made up of seven independent international renewable energy sector and infrastructure investment experts that was responsible for ultimate appraisal and selection of the projects. GET FiT also funded the work of a permanent secretariat that was tasked with the day-to-day management, co-ordination and supervision of the GET FiT programme. All policy-related principles of GET FiT were determined by the GET FiT Steering Committee, made up of representatives of each of the funding development partners, as well as two representatives from the GoU. The co-ordination and capacitation of the ERA as part of the programme has contributed to a timely and high-quality process for issuing generator licenses. These licenses are essential as they grant permission to a specified company to develop and run power stations under inclusion of conditions and rules of operation (Figure 8).

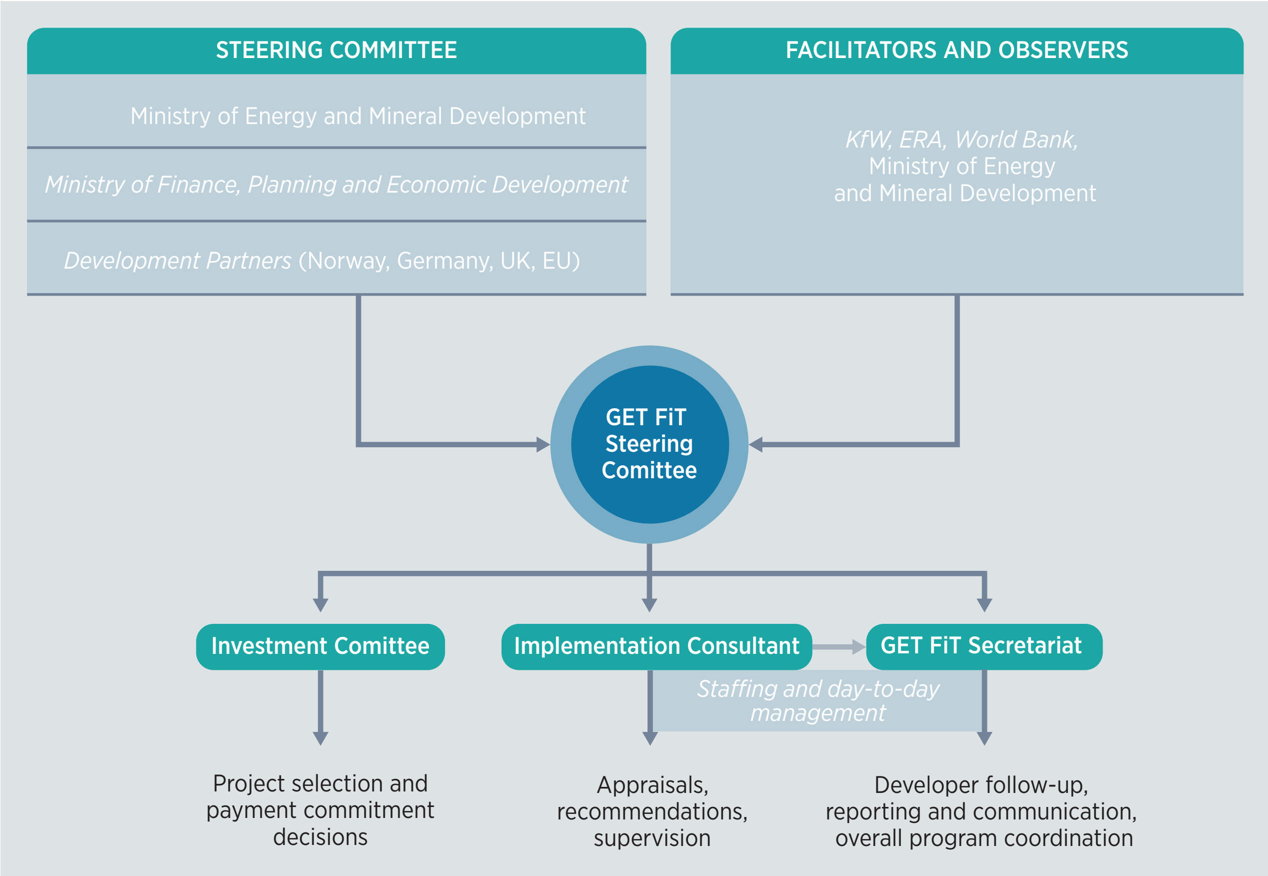
13 This reduces transmission losses and stabilises the grid.

Figure 8 Geographic distribution of projects in Uganda's GET FiT portfolio



Source: GET FiT (2015).

Figure 9 GET FiT governance structure



Source: Adapted from GET FiT (2015).

By October 2014, four 5MW solar projects were selected, totalling around USD 59 million in foreign investment. The solar facility delivered an average levelised tariff of USD 163.7/MWh (Table 8) – lower than the average retail tariff of USD 166/MWh in 2013 (Meyer, Tenenbaum and Hosier, 2015). Excluding the GET FiT premium, the effective solar tariffs payable by UETCL are USD 110/MWh.

The complete list of awarded projects – small hydro, biomass, bagasse and solar PV – is presented in Table 9. The primary focus of this case study is the solar PV facility, as this was the only component of Uganda's GET FiT programme that used competitive bidding based primarily on price.

Auction demand

The solar PV facility under GET FiT was conceived as an additional, stand-alone auction. The size of the auction was 20 MW, composed of four 5-MW projects, with project developers allowed to be

Table 8 FiTs and donor top-ups for Uganda's GET FiT projects

Technology	Current REFiT tariff (USD/MWh)	GET FiT premium (USD/MWh)	Maximum capacity factor (%)
Hydro (9-20 MW)	85	14	60
Hydro (up to 9 MW)	115-85	14	60
Bagasse	95	5	0
Biomass	103	10	40
Solar PV	110	53.7	0

Note: Premium calculated for 20-year payment period but disbursed in first 5 years of plant's operation. For solar, top-up payments calculated as the difference between the accepted bid price and feed-in tariff set by ERA.

Source: Meyer, Tenenbaum and Hosier (2015).

Table 9 Overview of approved GET FiT projects, Uganda

Name	Capacity (MW)[a]	RET	Total investment cost (USD million)	REFiT (USD/MWh)	GET FiT top-up (USD/MWh)
Nyamwamba	9.2	SHP	26.8	85	14
Rwimi	5.5	SHP	20.8	98	14
Kikagati	16	SHP	64.4	85	14
Kakira Cogen extension	32 (20)	Bagasse cogeneration	60.7	95	5
Muvumbe	6.5	SHP	14.1	94	14
Lubilia	5.4	SHP	18.7	99	14
Siti I	6.1	SHP	14.8	96	14
Siti II	16.5	SHP	34	85	14
Sindila	5.2	SHP	17.1	99	14
Waki	4.8	SHP	18.11	101	14
Tororo North/ South	10	Solar	32	110	53[b]
Soroti I/II	10	Solar	27	110	53[b]
Nyamagasani I	15	SHP	36.7	(85-115)	14
Nyamagasani II	5	SHP	19.8	(85-115)	14
Ndugutu	4.8	SHP	15	(85-115)	14
Kyambura	7.6	SHP	24	(85-115)	14
Nkusi	9.6	SHP	23	(85-115)	14

a For plants with captive use (bagasse), only the generation capacity available to the grid will be supported through GET FiT premiums.
b Average top-up.
Note: RET = renewable energy technology, SHP = small hydropower plant.
Project status in 2015, based on various primary and secondary source data.

awarded up to two projects. The size of the solar auction was the result of several factors, including concerns about the grid's ability to handle large volumes of variable capacity, as well as the donor's limitations in terms of funds available for premium "top-up" payments (to be discussed in more detail below) (Meyer, Tenenbaum and Hosier, 2015). While the country appears to have ambitions for more solar grid-connected capacity, there are currently no additional auction rounds lined up.

The off-taker for the solar power was the UETCL, the state-owned transmission company. While the company's financial position was relatively weak, it has been improving since the introduction of cost-reflective tariffs in 2012 (Eberhard *et al.*, 2016).

The GET FiT tariff was in essence made up of two parts. The first part was a FiT set and announced by the regulator (ERA) of USD 110/MWh prior to bidding, based on an estimate of what UETCL could pay without impacting average supply costs. Important to note is that this was not based on ERA's assessment of the levelised cost of producing electricity from solar PV; instead, the regulator was working primarily with feasibility factors in mind, trying to balance a complex set of institutional, economic and political risks. The second part of the tariff was the donor-funded top-up tariffs, which were front-loaded at the start of the project (payment profile to be discussed in more detail under "Seller's and buyers' liabilities and obligations") (Meyer, Tenenbaum and Hosier, 2015).

In terms of contracting, this has meant that winning bidders signed two payment contracts: the first a standard PPA with UETCL and the second a premium payment contract (developer finance agreement, or DFA) with KfW. More details in terms of how the payments related to both these contracts are structured will be discussed as part of "Sellers' and buyers' liabilities and obligations"; suffice to say at this point that contractors are entering into two different contracts with two different institutions for the purpose of selling the same power.

Qualification requirements

The GET FiT Solar Facility was run as a two-stage bidding programme, with a pre-qualification (expression of interest, or EOI) stage followed by the launch of a RFP stage about two months later. Bidders had around three months to prepare their final bids once the RFP was launched. The programme received 23 expressions of interest, with nine bidders qualifying to receive the RFP. Interested bidders needed to score 70 or above on the prequalification criteria matrix (below) to pass the prequalification stage. Of these nine, only seven elected to submit proposals. The EOI stage included the provision that, if more than ten bids were received that passed the prequalification threshold, only the top ten would receive the RFP documentation.

- *Reputation*

While the two-stage bidding process theoretically allows for reduced transaction costs – especially for unsuccessful bidders – the reputational, technological, site-specific, grid-access and SED requirements during the RFP stage were in most cases similar to, if not more onerous than, the South African REIPPPP. Given the relatively small size of the auctioned volume, one would perhaps expect slightly less onerous qualification requirements, or at least requirements in line with the small-projects IPP programme in South Africa.

Bidders for the Ugandan GET FiT Solar Facility were therefore required to have an SPV registered once they had been shortlisted and invited to submit a full proposal. This was a requirement for early rounds that had been dropped in later rounds of the South African REIPPPP. In terms of financial qualification requirements, interested bidders had to provide evidence of the lead bidder having generated at least USD 25 million per annum, as well as having raised sufficient finance (debt and equity) for similar projects of more than USD 5 million – in other words, both an asset test and a track-record test. Bidders were also required to provide between 5 and 15 project references (including performance ratios) showing experience in developing, installing and operating solar PV projects of 5 MW and above in SSA; eligible projects had to have been commissioned in the past five years and been operating for more than two years.

Table 10 GET FiT pre-qualification criteria matrix

Category	Max Points
General experience (min 5 projects > 5 MW in past 5 years)	30
Regional experience (in developing countries, preferably SSA)	10
Financial capacity (minimum turnover, net profit margin and liquidity requirements)	20
Technical capacity (technical knowledge on board and quality of technology to be used)	20
Organisational capacity (resource deployment)	5
Site selection, description and quality (GPS co-ordinates, energy per year, < 3 km from grid)	10
Completeness and quality	5
TOTAL	**100**

Source: ERA[14].

14 Information taken from the Ugandan Electricity Regulatory Authority's 2014 invitation for expressions of interest to develop, install, finance and operate solar PV projects under the GET FIT UGANDA programme.


Solar PV in rural Uganda

Equity and finance providers also had to provide letters of support indicating that they accepted the provisions and risk allocation of the PPA, IA and DA; that they had performed the required due diligence; and that they had credit approval (in the case of lenders). RFP requirements further included the need for detailed financial model submission, including sensitivity analyses on not only forex movements but also funding terms, capital expenditure, operations expenditure, annual energy yield inflation indices and a detailed breakdown of all sources and use of finance. An additional provision was that KfW and the World Bank would also perform due diligence checks on all bids, specifically to check potential ethical non-compliance. Bidders could also declare general interest for the World Bank PRG in their proposal, although this was not binding.

■ *Technology*

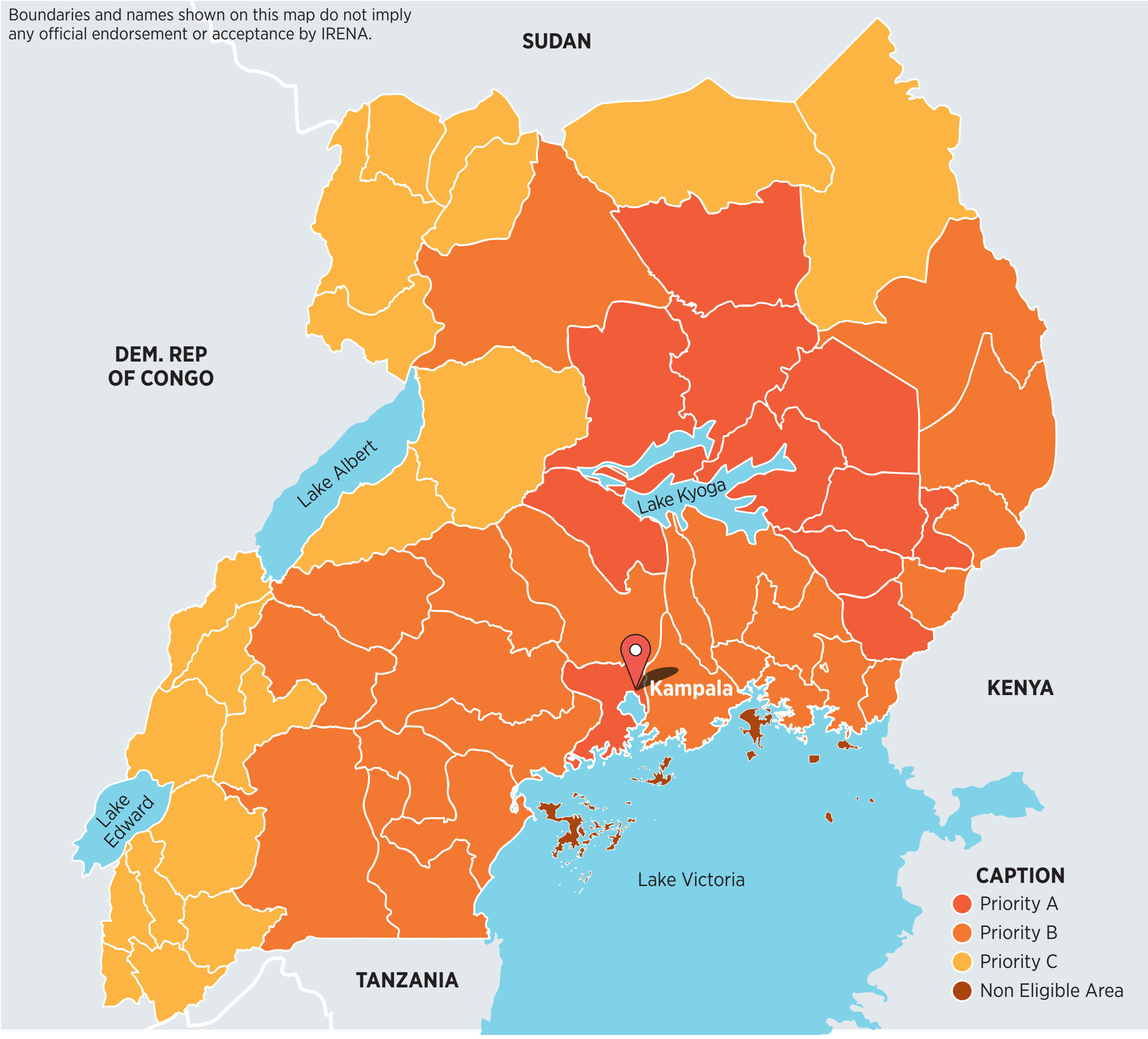
While the GET FiT facility has been a multi-technology platform, the solar facility as a bidding round was strictly reserved for solar PV plants. As with the reputational requirements, the programme was quite stringent with respect to technical aspects of the bids. The RFP, for example, included very strict and detailed equipment specifications, down to the level of the cabling used in the plant. Projects were also not allowed to use any tracking equipment, a decision that potentially limited the performance of the plants. In terms of project size, the bid was clearly limited to a 5 MW facility only (although in practice some bidders submitted two 5MW facilities adjacent to each other – effectively making it a 10MW project).

■ *Production site selection and documentation*

Bidders were able to choose their sites, but the pre-qualification stage included the provision that projects could not be located more than 3 km away from the grid. An additional requirement that was only included in the RFP documentation was the inclusion of priority zones close to load centres and sufficient grid capacity (areas highlighted in Figure 9). Projects located in these areas would receive additional points during bid evaluation, acting as an incentive to have projects located as close as possible to load centres. This had been the subject of some criticism from bidders, since it was not included during the pre-qualification stage and bidders therefore might have selected project sites outside of these priority zones without realizing that this would impact their evaluation results.[15] Bidders were furthermore required to submit evidence of land contractual arrangements at the prequalification stage, although a draft memorandum of understanding for a land purchase agreement was considered sufficient.

15 Bidders were allowed to change site location between RFQ and bid submission.

Figure 10 GET FiT solar facility priority zones



Source: GET FiT (2015).

■ *Securing grid access*

Bidders were required to conduct their own feasibility and grid stability studies, as well as propose grid interconnection facilities during the EOI stage. This had been one of the major development cost drivers in the programme, in large part due to the lack of information provided by UETCL/GoU. The costs of extending the grid from the generation facility to the main network delivery point ("shallow" connection works) were to be borne by the project developer, with the grid interconnection works beyond the delivery point ("deep" connection works) remaining the responsibility of the grid operator upon COD. Shallow network costs had to be included in the bid and covered by the applicable tariff. For the solar PV tender, the costs associated with refurbishment and expansion of the network infrastructure were funded either directly by GET FiT or other donors co-ordinated by GET FiT. The projects from the solar PV tender seem to have benefited from experiences with earlier GET FiT projects, where no such support was envisaged and transmission infrastructure build-out was delayed. The GET FiT built-in capacity building component for ERA on interconnection processes, tariff design and wheeling charges may have had further positive impact on investors as well as on processing time.

■ *Social and environment standards*

All bids were required to comply with the International Finance Corporation's (IFC's) Performance Standards on Environmental and Social Sustainability[16] (IFC, 2012). The standards are considered the international *de facto* "gold standard" on social and economic impact assessments and mitigation schemes for infrastructure projects, with many financiers and investors requiring compliance even in the absence of IFC funding (Meyer, Tenenbaum and Hosier, 2015). The standards (IFC, 2012) cover the following eight areas:

- *assessment and management of environmental and social risks and impacts*
- *labour and working conditions*
- *resource efficiency and pollution prevention*
- *community health, safety and security*
- *land acquisition and involuntary resettlement*
- *biodiversity conservation and sustainable management of living natural resources*
- *indigenous peoples*
- *cultural heritage.*

Bidder compliance with these standards was scored for both qualification and evaluation purposes (discussed under "Winner selection process"), although the weighting of these factors was of less significance than the South African SED criteria. The IFC performance standards are generally viewed as quite stringent, but are also seen as important in terms of securing project support and ensuring long-term sustainability. Complying with these standards imposed considerable costs on developers, especially within the timeframes of the bidding process. In part, this was driven by uncertainty resulting from a lack of sufficient upfront communication on the way the standards would be interpreted in the GET FiT context. The award for a GET FiT bagasse project was revoked due to its inability to comply with these standards, and compliance with the standards has also led to some delays in project implementation. Compliance is furthermore seen as one the main high-risk categories by GET FiT management, especially given bidders' relatively limited exposure to these standards previously (GET FiT, 2015).

The GET FiT programme did not apply local content requirements. This is to some degree understandable given the small market size and limited manufacturing capacity in Uganda. Local community development investment requirements could have been a requirement, but this was also omitted.

Winner selection process

■ *Bidding procedure and requirements of minimal competition*

The GET FiT Solar Facility used a sealed bid process, with developers allowed to submit bids for a maximum of two 5MW plants on a pay-as-bid basis. No ceiling price was announced, but the FiT level (USD 110/MWh) was public by submission; in addition, bidders were also aware of the total amount of grant funding available for the top-up subsidy and could technically therefore estimate what a potential maximum bid price might be even in the absence of a ceiling cap.

■ *Winner selection criteria*

Winner selection was based to some degree on the South African methodology, with a 30:70 technical:financial bid evaluation basis, strongly weighted in favour of price. Bidders needed to pass the technical evaluation stage before financial bids were opened. The technical evaluation stage analysed responsiveness to and compliance with environmental and social factors (IFC performance standards), technical and organisational performance, and economic criteria (Table 11). Bids had to achieve a threshold score of 70 to advance to the financial evaluation stage. Additionally, bids that scored less than 50% of the points in one of the technical evaluation categories were automatically disqualified. Price evaluation was based on placement relative to the lowest price.

16 For bidding purposes, only a scoping study was required. A full IFC-compliant Environmental and Social Impact Assessment (ESIA) was only a requirement after award.

Table 11 Summary of technical bid evaluation matrix

Category	Possible Total Points
1. **Environmental and Social (IFC Compliance)**	**30**
A. Assessment and management of environmental risks	15
B. Assessment and management of social risks	15
2. Technical and Organisational Performance	**50**
A. Technical quality of proposed project and compliance with technical specifications	40
B. Technical advanced stage of development of project (studies, land, grid concept)	10
3. Economic Criteria	**20**
A. Timeline from award to COD	10
B. Project based in priority green zone	5
C. Project close to substation/demand centre	5
TOTAL	**100**

Source: GET FiT (2014)

Sellers' and buyers' liabilities and obligations

■ *Commitment to contract signing*

Continuing the trend of stringent requirements for relatively small bid volumes, the Ugandan GET FiT Solar Facility required a bid bond of USD 10 000 per MW. This was higher than the South African bid bond of around USD 8 000 per MW, which was already considered high.

■ *Contract schedule*

Timelines were more lenient than in the REIPPPP: bidders had seven months to prepare their final bids (if the EOI and RFP submission stages are added together) as opposed to South Africa's three-month RFP response time. While FC requirements appear to be more or less similar (nine months after bid selection), the deadline for COD was shorter in Uganda: 1316 months after bid selection vs. 18 months after FC in South Africa. This is somewhat understandable given the difference in scale between the contracted projects, but still presents a tight performance window for winning bidders. In practice, timelines turned out to be longer. The Soroti plant was however commissioned in 2016, while the Tororo plant was commissioned in September 2017 (GET FiT, 2017).

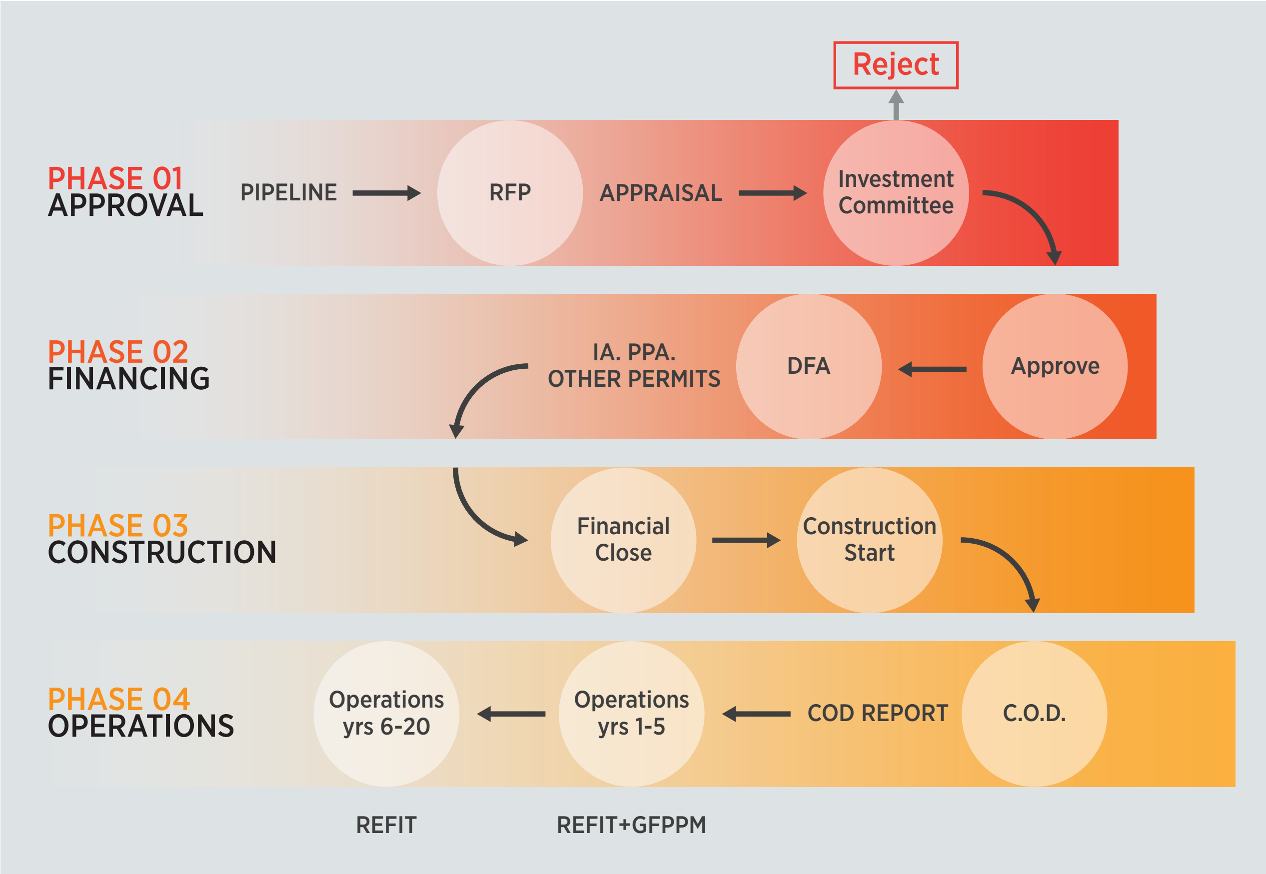
■ *Remuneration profile, financial risk and quantity liabilities*

Projects under the GET FiT Solar Facility were competing for a 20-year PPA – again, similar to the South African case. However, this is where the similarities end. For one thing, the Ugandan PPA payments (USD 110/MWh) are denominated in US dollars, and only the operations and maintenance (O&M) component of the tariff is indexed (to the US inflation rate) – as opposed to the South African rand-denominated, fully indexed South African tariffs. The premium (top-up subsidy) payment is furthermore denominated in euros[17] and front-loaded in the first five years: 50% of this total amount is paid at COD, while the remaining 50% of the premium payments are spaced over the first five years and paid against the performance of electricity delivered. This payment profile has greatly reduced some of the initial risks during the critical debt repayment phase for project developers.

The GET FiT facility also illustrates the importance of clear and complete information communicated during the bidding process. Certain key issues related especially to value-added tax, other taxes and import duty treatment were for example not clearly communicated by GoU, and have been

17 The EUR/USD exchange rate was fixed.

Figure 11 The GET FiT project cycle



Source: GET FiT (2015).

subject to amendment during the formulation of the programme. This has led to inaccurate representation in the RFP, leading to subsequent negotiations with winning bidders.

- *Settlement rules and underperformance penalties*

While payment was based on a relatively standard energy-oriented agreement (take-or-pay, USD/MWh), the PPA also contained several baseload provisions that one would not expect in a renewable energy based contract, *e.g.* ancillary services, responding to dispatch instructions and availability guarantees. Similarly, bidders were expected to provide a performance bond, although this appears to have functioned more like a completion bond: USD 20 000 per MW was required for the bidder to obtain a scheduled construction start date and USD 10 000 per MW to schedule the COD. Additionally, if the scheduled COD was not met, the bidder had to pay UETCL USD 2 000 per day of delay – capped at USD 300 000. If the performance bond was drawn on to cover this delay, the payments owed would be reduced by a similar amount.

If the project underperformed by delivering less than 90% of the expected energy in year 1, the entire subsidy (premium payment) amount might not be paid. The PPA also differentiated between contracted capacity and effectively available capacity at COD, with the latter becoming the *de facto* contracted capacity (also for determining the COD subsidy payment). For on-going premium payments under the DFA, bidders were only paid for electricity actually delivered to UETCL (or deemed energy delivered). If the achieved capacity was however less than 70% of the contracted capacity, the PPA could be terminated immediately. If the actual energy delivered was 90% or less than the expected annual energy, the premium payments under the DFA could be terminated. Bidders might be allowed to increase their capacity if they were to receive written consent from UETCL.

- *Assigned liabilities for transmission delays*

The developer was expected to fund and build the required shallow transmission infrastructure, which would be handed over to the relevant authority on COD. If developers reached COD and had constructed their shallow interconnection, they were entitled to deemed energy payments, essentially transferring transmission risk to the grid operator. The programme tried to deal with the issue of "deep works" transmission planning by indicating preferential zones for projects (already discussed). If the plant was commissioned and ready to connect, but for any reason UETCL was unable to so integrate the plant into the system, a deemed commissioning date would occur on the first day of the month following the day after the independent engineer certified the plant ready for synchronisation. As a result, deemed energy payments would be made.

In order to overcome UECTL's possible growing reluctance to sign PPAs with projects, the GET FiT programme funded the development of network infrastructure required to integrate GET FiT projects or co-ordinated the funding. According to GET FiT, adequate and timely interconnection of projects to ensure power evacuation remains a key risk for several projects, and for the programme in general, although this appears to apply mainly to hydropower projects (GET FiT, 2016). The use of project location constraints and incentives in the solar facility, as well as the funding support for network infrastructure, appears to have played an important role in ensuring that solar PV projects have not thus far faced this risk.

- *Risk mitigation and credit enhancement*

The GET FiT programme has made use of several guarantee and credit enhancement mechanisms; this included the IA with the GoU, which is effectively a sovereign guarantee, as well as a DA that provides lenders with step-in rights. In order to address off-taker and termination risks, World Bank PRGs were also made available to successful projects. The PRGs were designed to backstop the government support regarding letters of credit to be issued by commercial banks to manage the utilities' default risks. Developers received drawing rights for the letters in case the UETCL interrupted its PPA-related payments, whilst the issuing bank's debt was secured through the PRGs. For lenders and project developers, these measures offered certainty regarding liquidity. None of the winning solar facility bidders have however opted to use the PRGs. This was possibly due to the high up-front initiation fee (USD 100 000) or the fact that the DFIs providing some of the finance to these developers were not eligible to use the PRG and/or considered that they had enough leverage to ensure payment without this guarantee (Meyer, Tenenbaum and Hosier, 2015).

Conclusion

GET FiT Uganda has been instrumental in proving that the competitive procurement of renewable energy is possible in an African country that is very different from South Africa. In this sense, Uganda is building on its trailblazing credentials as one of the only African countries to have fully and successfully unbundled its power sector – in a context where many said this would be impossible due to the small size of its power system (Kapika and Eberhard, 2013). There are however several important caveats that need to be highlighted at this point: the Ugandan programme has resulted in bid tariffs that are very generous to developers compared to the two other country cases in this report, especially considering the payment profile and despite the relatively small sizes of the projects.

More could probably be done to enhance competition and drive down prices. In general, the programme has been marked by possibly unnecessarily detailed and stringent requirements, in many cases even more so than in the South African programme, despite the massive difference in the scale of these two programmes. The resulting high costs and risks for project developers is one area that might therefore be highlighted as a driver of the high bid prices. The small sizes of the projects, Uganda's limited experience with solar bids and the risky environment (including off-taker financial sustainability) have also been pointed out as possible reasons for the high bid prices (Meyer, Tenenbaum and Hosier, 2015). The risk for project developers has further been exacerbated by a lack of clarity regarding whether the solar facility was a one-off initiative or the start of a larger, recurrent procurement programme. This brings us to another potential high-risk African solar auction – Zambia's Scaling Solar initiative – that could possibly help to gain further understanding of the impacts of these important factors.

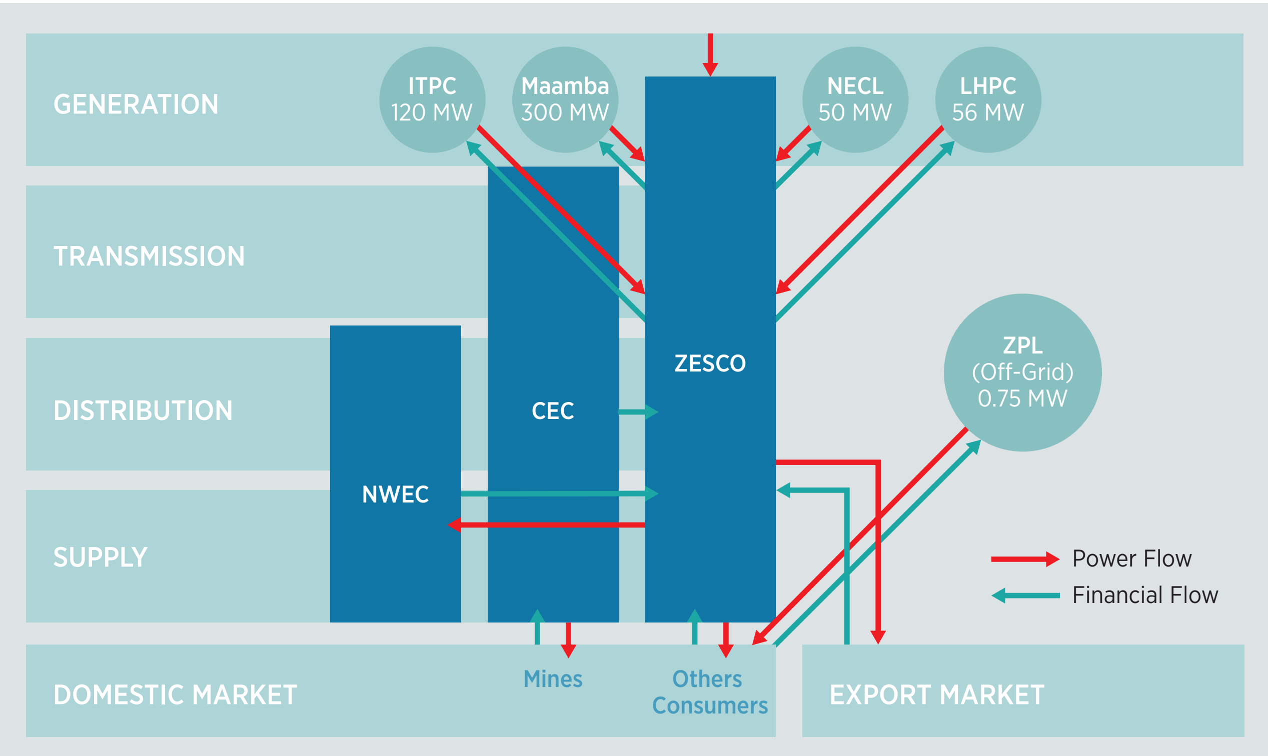
ZAMBIA

Zambia (14.5 million people) has been one of the world's fastest-growing economies for the past ten years, with real GDP growth averaging 6.4% per annum between 2010-14. The country now faces declining economic growth rates, with annual GDP growth below 4% for first time since 1998. This is in part due to falling commodity prices – specifically for copper, the country biggest export product –expensive borrowing on international markets and a weakening currency (Smith *et al.*, 2015).

This situation was exacerbated by the 2016 electricity supply crisis, which caused blackouts of up to eight hours per day on a rotational basis. Zambia currently produces about 13 000 GWh of power annually, while electricity demands sits at around 16 000 GWh (Smith *et al.*, 2015). Although Zambia's installed generating capacity (2 411 MW) exceeds electricity demand, the amount of electricity actually generated is insufficient. This is largely due to the fact that most electricity generation is hydro-based (95%), and recent periods of drought have restricted production (Power Africa, 2016; Smith *et al.*, 2015).

Zambia Electricity Supply Company (ZESCO) is a vertically integrated power utility, generating, transmitting and distributing most of the country's electricity. The majority of the country's generating capacity is state-owned, with four IPPs added to the system in recent years, primarily using hydro (Ndola Energy Company Limited [NECL], Lunsemfwa Hydropower Company Limited [LHPC], Itezhi-Tezhi Power Company [ITPC]) or coal (Maamba) (Figure 12). The Copperbelt Energy Corporation (CEC) owns and operates the transmission and distribution network in the

Figure 12 Structure of the Zambian power market



Source: Energy Regulation Board (ERB, 2015).

copperbelt area of the country, purchasing power from ZESCO and supplying it to the mines in the area. CEC also operates six gas turbines (80 MW installed) for emergency power. Northwestern Energy Corporation (NWEC) is a distribution company that services residential, commercial and light industrial users around some of the mines.

Mines, which consume about 45% of the country's electricity, were asked to reduce their electricity use by 30% in 2015. The electricity supply problems have putt severe pressure on the country's economic growth sectors, with most manufacturers and industrial players having suffered substantial losses due to reduced production capacity (many manufacturers claim to only be meeting 3040% of production) as well as increased input costs due to expensive back-up power generation and the changing of shifts (Smith *et al.*, 2015).

As a result of recent emergency measures, ZESCO started importing expensive power from the Southern African Power Pool. Combined with the weakening Zambian currency, this meant the Zambian government had to provide ZESCO with an additional USD 340 million, at November 2015 rates, to cover emergency power costs in 2016 (Smith *et al.*, 2015). For a country already facing severe economic problems, this is an unsustainable situation, draining financial resources that are needed for investment in the power sector.

Part of the government's response has been to target the procurement of 600 MW of solar PV in the next two to three years, in large part due to the rapidly declining costs of solar PV and the quick installation turnaround times. The World Bank's Scaling Solar programme forms an important part of achieving this target.

Scaling Solar

Scaling Solar is an approach that aims to rapidly develop privately owned solar PV projects in SSA using a range of World Bank resources and services in a "one-stop shop" package. This includes advisory services, standardised contracts and a stapled offer of financing, guarantees and insurance (which bidders may apply for if they wish). The programme was a response to the IFC's analysis of 20 promising solar markets in Africa, which found that large developers were avoiding the continent's markets due to limited market sizes and a host of risks, costs and uncertainties. IFC therefore sought to emulate the success of, for example, South Africa, and identified scale, transparent competition, a bankable contractual framework and repetition as key success factors. Yet not all SSA governments could, or wanted to, dedicate extensive resources to renewable energy programmes. In addition, many SSA countries do not have sufficiently deep financial markets, and various constraints and issues related to the small power markets in most SSA countries make off-taker credit quality and political risks significant risk factors for investors in SSA (Fergusson, Croft and Charafi, 2015). Scaling Solar therefore sought to create a programme that includes the abovementioned success factors, while at the same time dealing with these identified risks.

Zambia was the first country in which the Scaling Solar programme was implemented, with the Industrial Development Corporation (IDC) of Zambia officially engaging the IFC as lead transaction advisor. IDC is a development finance institution wholly owned by the Zambian government that serves as an investment holding company for SOEs and new investments. Zambia's IDC acted in much the same way as South Africa's IPP project office: as an agile and nimbler procurement unit outside of the official ministerial department channels, well respected by both industry and the public sector alike.

The approach taken in Zambia, and standard practice for the Scaling Solar programme, is focused on bringing solar projects of 50+ MW onto the grid within 24 months. It consists of the following elements:

- conducting initial feasibility studies, site selection and legal due diligence
- initiating a competitive bidding process with IFC acting as transaction advisor
- developing a bankable, standardised contractual set of documents
- offering stapled finance
- offering additional risk mitigation instruments (*e.g.* PRGs, Multilateral Investment Guarantee Agency [MIGA] political risk insurance, etc.).

Power Africa and USAID Zambia have supported the World Bank and IFC by providing more than USD 2 million for the Scaling Solar programme to help finance the critical costs necessary to establish and implement a transparent, competitive bidding process.

A pre-qualification round was launched by IDC in October 2015 for two 50MW solar PV plants, which attracted submissions from 48 interested bidders (twice the number of bidders that responded to Uganda's GET FiT EOI). The RFP was provided to 11 pre-qualified bidders in February 2016, seven of which submitted bids. Two winning bidders were announced in June 2016: Neoen/First Solar, with 52 MW,[18] and ENEL Green Power, with 34 MW.[19] The prices achieved (Table 12) were significantly lower than expected, and are some of the lowest prices globally; this becomes even more apparent when one considers that the USD 60/MWh is non-indexed over 25 years[20] (IDC, 2016; World Bank, 2016).

Despite these achievements, Scaling Solar has faced some criticism: some project developers believe the prices achieved created unrealistic expectations among African governments for solar prices. They argue that the concessional finance and PRGs; the solar resource; and the provision of land, permits, interconnection facilities and other information/studies are not necessarily replicable in other contexts – all issues that have been instrumental in achieving these price outcomes. This criticism is somewhat tempered by recent price announcements in other African jurisdictions, although none of these projects has reached FC yet.

More specifically, there has also been criticism that the IFC is crowding out commercial finance by covering the entire loan portfolio required (Elston, 2016). This critique is not fully supported by analysis of the IFC stapled finance, as IFC is not covering the entire loan portfolio. IFC is offering one tranche of debt financing on what it considers commercial terms and another tranche on concessional terms based on available grant funding. A third tranche of financing needs to be sourced by bidders from other financiers, whether commercial banks, export credit agencies or other sources. The reasoning behind offering stapled finance is in large part an attempt to strengthen the non-negotiable, bankable nature of the contracts offered.[21]

The role of development financing for the next rounds (also in other countries) remains to be further assessed, especially given the amount of de-risking that is already part of the programme. To that end, IFC is currently considering the extent to which concessional elements become standard practice in the setup and design of the programme going forward.

Table 12 Winning prices in the Zambian solar auction (USD/MWh)

	West Lunga Site	Mosi-oa Tunya Site
Neoen / First Solar	60.15 (winning bid)	61.35
ENEL Green Power	77.99	78.39 (winning bid)
Access / EREN Zambia 1	82.88	89.51
MULILO Zambia PV1 Consortium	84.00	84.00
EDF Energies Nouvelles	100.40	99.85
SEP / AVIC Intl.	106.00	10.60

Adapted from IFC (2016).

18 This is a DC number. The actual AC number is 47 MW.

19 This is a DC number. The actual AC number is 28.2 MW.

20 Based on an international estimate by the IFC, the price may equate to around USD 47/MWh assuming that bidders had been bidding on an indexed basis similar to the SA REIPPPP.

21 Internal IFC sensitivity analyses seem to indicate a price impact of less than USD 10/MWh due to concessional elements in the financing, indicating a limited impact on the market.

Despite these criticisms, the results from this auction are important in several ways: they show that low prices are achievable outside of South Africa, that auction procurement mechanisms can contract solar PV projects rapidly in Africa and that there is significant appetite on the continent for this technology.

Auction demand

Zambia's Scaling Solar auction was exclusively focused on solar PV as eligible technology, with one 100-MW project or two 50-MW projects put out to tender. The 100-MW auction was the first round of a systematic programme, with a target of 600 MW based on feasibility studies carried out. Round 2, during which an RFQ was launched, will see 150-200 MW (or more) put out to tender (IDC, 2016). While GET FiT in Uganda was the first competitively procured renewable energy power programme outside of South Africa, the Zambian programme was the first programme of significant scale outside of South Africa.

Developers in Round 1 were competing for a 25-year PPA with the state-owned utility ZESCO. However, in an interesting departure from standard practice on the continent to date, IDC would together with the winning bidders be setting up SPVs post-award; the majority (80%) of shares in the SPVs would be owned by the winning bidder for a predetermined price. IDC retained 20% of the shares at full cost. This is but one of several ways in which the Zambian Scaling Solar programme sought to reduce bidder's transaction costs *ex ante* winner selection to enhance competition and lower price outcomes in the bidding process. More aspects of this cost-reducing approach will be discussed in the following sections.

Qualification requirements

Similar to GET FiT, the Zambian Scaling Solar auction programme was based on a two-step bidding process, with a request for pre-qualification round followed by the official RFPs. Interested bidders had to comply with a set of legal, financial and technical requirements to proceed to the RFP stage. Unlike the process in Uganda and South Africa, no details about the proposed power plant were required; instead, technical pre-qualification was based on a company's previous experience, as evidenced by relevant project references (discussed in more detail below). The pre-qualification stage was stringent, and only 11 of the 48 interested bidders proceeded to the RFP stage.

- *Reputation*

Legal requirements for pre-qualification were largely similar to Uganda and South Africa, with bidders required to provide letters of confirmation, registration documents, ownership declarations, organisation charts, evidence that they are not being investigated or have been convicted of fraudulent or similar conduct, and so forth. A significant departure from the previous auctions was however the fact that bidders were not required to register a SPV in Zambia, as this would be done together with the IDC post-award.

The financial health of bidders was assessed by looking at the net worth of bidders (minimum: USD 75 million if a single bidder; the same amount was applied to consortiums, but the lead sponsor was required to make up at least half of the amount) and the net worth to total assets ratio (15% minimum if single bidder; 20% if consortium). To encourage local participation, a special multiplier of 1.5 was applied to the net worth of Zambian companies to help them pass this test.

The determination of the bidders' financial health was based on audited financial statements from the past two years. An additional requirement in the RFP stage was for bidders to sign a letter indicating that they would be using (and have approval for using) the IFC's term sheets; in the absence of such a letter, initialled term sheets from other lenders were required. This requirement did not seem to play the same due-diligence outsourcing role as was the case in South Africa and Uganda, instead acting as an indication to the evaluators that finance had been sought and provisionally secured. However, through offering stapled term sheets, IFC had already performed due diligence on the projects, in essence playing the same role as the letters of credit provided in South Africa's case.

Further to establishing reputational requirements, bidders were also expected to provide evidence of at least one of the following:

- one or more grid-connected PV plants in Africa of at least 25 MW
- one or more grid-connected power plants of 75 MW in Africa
- three grid-connected PV plants, each in different countries in any region of the world, with a minimum aggregate installed capacity of 100 MW
- one or more grid-connected power plants of any technology anywhere with a minimum aggregate capacity of 1500 MW.

During the RFP phase, bidders were additionally required to provide project reference details of EPC and O&M contractors.

Technology

In addition to providing evidence of previous successful projects, bidders were provided with indicative equipment specifications as part of the pre-qualification round, with various technical standards and certifications in place for modules, inverters and mounting. While stringent, these standards were less detailed than those for Uganda's GET FiT programme (*e.g.,* not including wiring standards) and included provisions for tracking equipment (which GET FiT excluded). Notably, at the pre-qualification stage, bidders were not required to provide any technical details as part of the pre-qualification bid; this was only required as part of the RFP. Bidders were furthermore required to provide evidence of equipment manufacturers' capacity, either by having installed more than 10 000 MW or having a manufacturing capacity of 500 MW per year (minimum). The RFP included specifications for power transformers as well.

Production site selection and documentation

The Zambian Scaling Solar programme was much more specific in terms of its project location requirements than South Africa and Uganda. This was part of an overall strategy to reduce the costs and risks for the programme (land acquisition being a particularly significant risk in most African countries), as well as to ensure the rapid implementation of the projects. Choosing project sites beforehand was aimed at ensuring not only that the required transmission infrastructure was in place, but also that required data (*e.g.* solar resource data), permits and other requirements could be handled and co-ordinated by the government. In addition, given the small size of the Zambian grid and the relatively large scale of the solar projects, projects had to be optimally sized and sited.

Site selection was therefore carried out by the IDC, with the Lusaka South Multi-facility Economic Zone chosen as the site for the two projects. The zone has a total area of 2 100 hectares and is located about 10 km from Lusaka's city centre. It combines features of free trade zones, export processing zones and industrial parks, blending physical infrastructure provision with streamlined administrative and regulatory provisions.

Zambia's IDC leased land for the two solar plants in the economic zone and will on-lease these tracts to the SPVs for the duration of the PPA, significantly reducing the project development and capital expenditure costs for developers. At the same time, however, anecdotal evidence seems to point towards possible drawbacks of this site selection and preparation process.

Technical, geotechnical and social site specifics seem not to have been fully accounted for, and the quality of the resource assessment for site selection may have been below the requirements to perform more in-depth site preparation. Furthermore, the standardisation of site selection may have reduced the likelihood for smaller-scale local developers to outperform international competitors due to better field knowledge. Selected projects have failed to reach FC deadlines, in large part due to problems with the site selection and preparation process.

IDC led the ESIA permitting process, but all other permits had to be sourced by the projects (of which the IDC will of course be a shareholder). IDC provided site climatic studies, grid interconnection information, grid stability and integration studies, site surveys, environmental and social scoping reports, legal due diligence reports, tax and accounting due diligence reports, non-negotiable project agreements, term sheets for (IFC) financing, political risk insurance, and PRGs (Smith *et al.*, 2015).

■ *Securing grid access*

Although bidders were responsible for the grid connection works, the project sites already had suitable substation and transmission infrastructure in place. Bidders were therefore required to only fund and build the grid interconnection works (purchaser interconnection facilities) and hand over the infrastructure on the buyer's side of the supply point to ZESCO on COD. No additional "deep connection works" were required, and the necessary data as well as detailed specifications about the required Purchaser Interconnection Facilities was included in the PPA that was provided to bidders as part of the RFP documentation, as well as in the programme's "Virtual Data Room".

■ *Social and environmental standards*

As with the Ugandan GET FiT programme, bids were required to comply with IFC's environmental and social (E&S) performance standards. However, unlike Uganda, where E&S performance standard compliance played a role in both bid qualification and evaluation, these standards had no bearing on the evaluation of Zambian bids, acting only as the basis for qualification on a pass/fail basis. Such standards are not surprising, given that this is a World Bank Group package solution. Apart from the aforementioned preferential multiplier applied to Zambian firms in terms of financial prequalification, there were no other explicit provisions that would seem to benefit Zambian firms or persons. While local content was encouraged, this was not a requirement for any bids to be considered compliant.

It is thus interesting to note that both the Ugandan and Zambian programmes opted to steer away from the explicit and heavily weighted SED provisions of the South African programme, perhaps signalling the very different priorities of these governments in the pursuit of their renewable energy programmes. For South Africa, the REIPPPP was initially conceived as a response to the country's climate change mitigation commitments, as well as a means to achieve other ED goals (*e.g.* job creation, local ED, etc.).

Both Uganda and Zambia initiated their renewable energy procurement programmes in a context of significant power shortages and economic pressures, with the goals of their respective programmes being first and foremost the contracting of additional power at the lowest cost possible and in very short timeframes. Moreover, South Africa had existing legislation and procurement rules in place that were quite explicit regarding black economic empowerment, local content requirements, etc.; this is a legacy that is perhaps not as present in Uganda or Zambia.

Winner selection process

■ *Bidding procedure and requirements of minimal competition*

As with the South African and Ugandan cases, the Scaling Solar auction made use of a sealed bid process. As such, bidders were required to submit their proposals in three sealed parts:

- the **technical proposal**, covering all technical aspects of the proposed plant;
- the **commercial proposal**, containing an offer letter, "Project Agreement Information Schedule",[22] debt financing term sheets, details on any guarantees or insurance products to be used, and a bid bond;
- the **financial proposal**, providing the proposed energy charge in USD per MWh.

Bidders first had to pass an evaluation of their technical and commercial proposals, assessing whether they were compliant in their response to the RFP. Once a proposal passed this stage, the financial proposals of compliant bidders were opened and ranked. Bidders were allowed to bid on both sites (and all did) but would only be awarded one of the projects, which ensured some hedging of non-delivery risk for the IDC and ensured competition, especially for later bid rounds.

■ *Winner selection criteria*

All three countries used a pay-as-bid type auction: in other words, bidders submitted the price that they knew they would be paid in case they won the bid. A key difference between the South African and Ugandan cases, on the one hand, and the Zambian Scaling Solar programme, on the other hand, is

22 Bidders completed schedules one and two of the RFP, which was directly inserted into the PPA and signed on bid award.

that competitive evaluation in Zambia was based purely on price. In the other two countries, bids were scored on a number of additional elements as part of their evaluation. Arguably, this strong commitment to price competition signalled the importance of low tariffs to the market and ensured that bidders responded accordingly. According to previous analysis, competing on elements apart from price alone introduces additional costs, and therefore results in higher price outcomes (Eberhard, Kolker and Leigland, 2014).

■ *Clearing mechanism and marginal bids*

While the Zambian government could theoretically vary the number of projects and total capacity at any time, bidders were effectively bidding for two 50MW projects. While this seems to resemble the Ugandan auction, an important difference is that bidders actually had the flexibility of sizing their plants between 33 MW and 55 MW – with the important proviso that they need to do so to minimise costs. The two winning bidders actually made use of this provision, with the winning bid of ENEL Green Power sized at 34 MW and the NEOEN/First Solar bid sized at 52 MW. While no official ceiling price was communicated, the IFC's term sheets included in the RFP documentation listed a price of USD 160/MWh as the maximum it would consider as lender.

Sellers' and buyers' liabilities and obligations

■ *Commitment to contract signing*

The Scaling Solar programme has made use of a number of bond instruments to ensure compliance and commitment from bidders – more so than either the South African or Ugandan programmes. Bidders were required to post a bid bond of USD 1.3 million per project – or USD 26 000 per MW (assuming that the proposed project was 50 MW). The bid bond amount was only stated in the RFP documentation, although bidders were made aware at the pre-qualification stage that a sizable bid bond would be required. This is significantly higher than either of the bid bonds in the South African or Ugandan cases, and these bonds might have been perceived as a barrier to entry into the Zambian market. Still, the large number of respondents for the RFQ and RFP seems to indicate that project developers did not view this as an unnecessarily troublesome amount.

■ *Remuneration profile, financial risk and quantity liabilities*

While the South African winning tariffs were fully indexed, and the O&M costs were indexed to US inflation for Uganda, the Zambian programme offered no indexation for bids. Winning bid tariffs were therefore actually significantly lower in real terms than what was initially announced as the winning bid prices. This serves to further underscore the significantly low prices achieved by the programme. As with the Ugandan programme, tariffs were denominated in US dollars – potentially exposing the Zambian government to significant forex risks, especially given the significant depreciation of the local currency in recent years. This is a risk that is becoming increasingly common and problematic in many African jurisdictions, with some development partners calling for alternative or complementary interventions to try to limit these risks through innovative solutions that can increase the use of local currency (Duve and Witte, 2016). A slightly unusual characteristic of the Zambian power market is the fact that the mines, which consume about 40% of the country's electricity, pay their electricity tariffs in US dollars. This can therefore potentially offset much of the forex volatility concerns.

■ *Settlement rules and underperformance penalties*

Winning projects were expected to pass a PV plant performance ratio test (85% threshold, based on the estimated PV plant performance ratio) as part of the test signalling the COD. The PV plant performance ratio would also be calculated at the end of each contract year. If the project failed to achieve an annual PV plant performance ratio of at least 75% of the estimated PV plant performance ratio, the project would have to pay ZESCO liquidated damages at the rate of USD 7 500 for every 0.1% below 75%. The total liquidated damages payable is limited to USD 750 000 per year. The programme therefore has quite a strong performance incentive in place, in line with the Ugandan programme, but with slightly different incentive mechanisms to enforce compliance.

■ *Delay and underbuilding penalties*

Winning bidders were required to post a performance bond of USD 15 million, which in practice seems to have acted more as a construction bond as it was set to expire after the project reached its COD (similar to Uganda). Failure by projects to complete commissioning by the longstop COD would result in the PPA being terminated. Winning bidders are also required to post a decommissioning bond of USD 100 000 per MW (USD 5 million for a 50MW plant) at least one year prior to the expiry date of the PPA. After this, non-generation is a seller risk.

In addition, COD is dependent on projects achieving or exceeding their contracted capacity; if, however, by the longstop COD date the achieved capacity is equal to or above the minimum acceptance capacity (75%), the contracted capacity will be adjusted to reflect the achieved capacity. Developers therefore have something of a grace period between scheduled COD and longstop COD to try to ensure that projects are at contracted capacity and not just above the minimum acceptance capacity. While the purchaser (ZESCO) is only obliged to buy power up to the contracted capacity, there is a clause in the PPA that allows for more power to be delivered if the purchaser provides written acceptance of this.

■ *Assigned liabilities for transmission delays*

The government – represented by ZESCO – was responsible for providing a point of connection for the PV plants five months prior to the scheduled COD. Failure to do so would enable a project to claim "deemed energy payments" for the period during which it was unable to deliver power due to transmission delays. If this affected the plant's commissioning date, the contract would be extended by one day for each day's delay.

■ *Risk mitigation and credit enhancement*

As for guarantees and credit enhancement mechanisms, the Zambian auction had relatively standard liquidity support mechanisms in place, including letters of credit, as well as World Bank PRGs for payments and (if required by commercial lenders) loans.[23] The market opted for the payment guarantees, but not the loan guarantees, indicating the better fit and sufficiency of the established payment guarantees. In addition, the Zambian auction dealt with the issue of host government sovereign credit ratings and possible off-taker default/insolvency by using a government support agreement (GSA). In the event of buyer default, the government would not step into the shoes of the off-taker to assume responsibility for all PPA payments, as would be the case in a standard sovereign guarantee; instead, the government would buy the asset or shares in the project company at a pre-determined price.

Conclusion

The Zambian Scaling Solar programme has played a key role in advancing the rollout of renewable energy auctions in SSA. It has shown that countries in the region can procure renewable energy in a competitive, transparent manner at large scale, and at very low prices, despite what is considered a high-risk investment context. The programme is explicitly focused on creating a "virtual market" that is able to scale investment volumes and leverage the World Bank Group's de-risking instruments. While countries will not always be able to provide the same financing terms or risk mitigation products in the absence of World Bank Group involvement, Zambia has shown that there are many feasible steps that a committed government can take to reduce investor risk and ensure a highly competitive tender process (*e.g.* securing land, providing transmission infrastructure, providing data and permitting support, company registration, upfront clarity on PPA and IA, etc.). Scaling Solar Zambia has also learned from regional experience, incorporating many lessons from South Africa as well as Uganda. As such, the programme has much to teach the rest of the continent.

23 Covering six months' worth of PPA payments. The presence of the World Bank PRG means that ZESCO does not have to cash collateralise the letters of credit, since the banks are essentially providing credit to the World Bank.

3 FOCUS ON PRICE RESULTS IN THE AUCTION CASES

A great deal of attention is paid to auction prices as one of the key process outcomes. In general, as for example pointed out in *Renewable Energy Auctions: Analysing 2016* (IRENA, 2017), several categories can be identified that affect the prices resulting from different auctions. These include auction design, country- to project-specific risk factors, access to finance and the possible existence of further governmental measures supporting the development of the renewable energy industry.

The information provided throughout this report describes a variety of price driving factors, including technical, economic, business, political, regulatory as well as programme-related factors. Decision makers, including those on the governmental side, need to understand the importance and possible impact of these price drivers. This knowledge can help to manage expectations *ex ante* the auction processes, inform the design and implementation of auction programmes in its details, and balance a potential variety of often diverging objectives (*e.g.* allocation of costs between single generation facilities and the rest of the electricity system; widespread replicability and limited risk mitigation measures). It also facilitates *ex post* programme evaluation and improvement.

To compare auction results across multiple auction rounds or jurisdictions, a quantitative impact assessment seems inevitable to identify the relevance and significance of each price driver. It is beyond the scope of this report to perform such an assessment in all its required depth. Nevertheless, a high-level comparison between the country cases of Uganda and Zambia points to the need for further research, while in the meantime offering key lessons for decision makers.

Possible three main factors at play

Three main factors stand out as key price drivers: the cost of capital, investment costs, and solar resource quality. Variations of these factors within a realistic bandwidth can explain observed price differences between Uganda and Zambia. More in-depth research is required to identify the impact of all relevant sub-factors at play (*e.g.* policy risk as part of the cost of capital, de-risking instruments, technical specifications and/or costs in obtaining land as part of the investment costs and locational restrictions as part of the quality of the solar resource base, etc.).

The Dobrotkova, Audinet and Sargsyan (2017) report a cost of capital between 5% and 10% in developing markets, including Uganda and Zambia, reflecting the use of different degrees of development financing, as well as country- and sector-specific risks and ease of doing business. While there is no direct evidence on the applicable cost of capital for each of the projects in Uganda and Zambia, a high-level assessment points toward the availability of lower costs of capital in Zambia. This can be largely explained by the use of PRGs in Zambia (Ugandan project developers did not make use of PRG), a seemingly deeper level of debt finance by development banks and/or the more likely use of balance sheet finance for projects in Zambia.

The Dobrotkova, Audinet and Sargsyan (2017) furthermore indicate average specific investment costs for the two country cases at USD 1 850 per kW in Uganda and USD 1 200 per kW in Zambia. The higher costs in Uganda probably reflect the costs of obtaining land, more stringent technology requirements, cost allocation for shallow network infrastructure and generation balancing to project developers, and application of ED requirements. Uganda also shows economies of scale through smaller project sizes (5 MW compared to 50 MW), shorter PPA contract durations (20 years compared to 25 years), cost reductions in solar PV manufacturing processes over time (Ugandan projects had to be commissioned in 2016, and Zambian in 2017), and possibly also the influence of companies' market size.

The *Global Atlas for Renewable Energy*, hosted by IRENA (n.d.), provides an indication of the solar resource quality for both geographical locations, revealing a 5% better capacity factor in Zambia based on higher-quality solar resource.

Altogether, the price differences between the two auction programmes in their entirety can be explained by changing the discussed price drivers (cost of capital, investment costs, solar resource and depreciation) within the abovementioned bandwidth. Figure 15 summarises the price developments under a subsequent variation of price drivers from left to right, showing the price from the Uganda auction, a price with reduced cost of capital, a price with lower specific investment costs, a price with a higher capacity factor and a price with a longer PPA term/depreciation period in Zambia (equalling the price outcome from the Zambian auction programme).

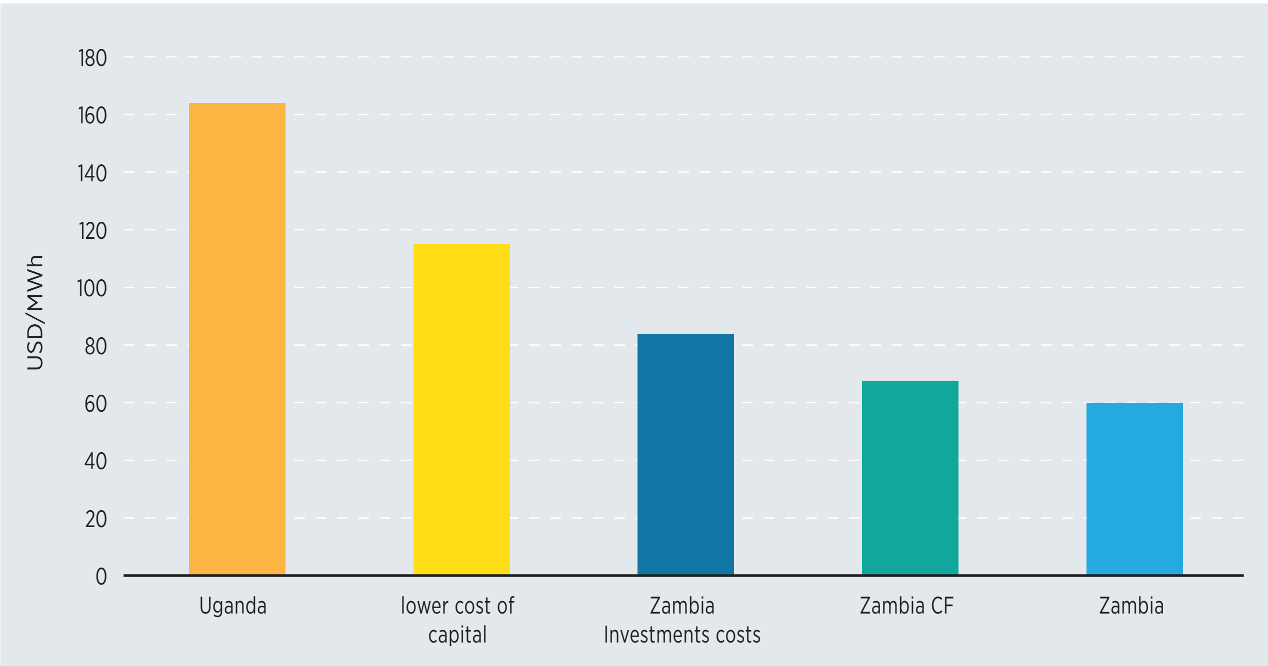
A sensitivity analysis of each price driver indicates that the impact of reduced investment costs and reduced cost of capital seem to be on par and more significant compared to the location-specific variations in the capacity factors or the PPA term.

Emerging high-level lessons

There are several high-level lessons emerging from the assessment, including the fact that decision making about auction programme design and implementation will have direct and indirect repercussions on the auction price. There are ***price driving factors*** whose impact on the price outcome ***cannot be influenced*** by informed decision making in the auction process as they represent natural (*e.g.* availability of the renewable energy resource base), industrial (*e.g.* market situation of the solar PV industry and technology maturity) or wider economic (*e.g.* country/sector risk, investment costs) factors. Their impact on the auction should be well understood to generally contribute to managing expectations about auction outcomes, to put comparisons into perspective and to focus the attention on factors that ***can be influenced*** by decision making.

Especially in the context of larger and recurring auction programmes, a deeper focus on ***price driving factors*** whose price impact ***can be influenced*** by informed decision making in the auction process seems beneficial. Such a focus

Figure 13 Price drivers explaining auction result differences in Uganda and Zambia



Source: IRENA analysis

Factors apart from size can have an impact on tariffs

can, if applied in the context of pre-programme preparation, lead to more competitive auction results, balance a potential variety of often diverging targets (*e.g.* allocation of costs between single generation facilities and the rest of the electricity system, widespread replicability and limited risk mitigation measures, localised development and availability of the resource base) and contribute to *ex post* programme evaluation and improvement. Assessing the price driving factors and their impacts can also contribute to more long-term related efforts to reduce political and regulatory risks in the economy and/or the energy sector.

More in-depth research is needed to further disaggregate (*e.g.* capital costs, investment costs that incorporate various factors such as cost of land, grid costs, state of the industry, etc.) and understand the price drivers (*e.g.* impact from level of competition, participating companies' sizes, etc.) in their significance.

Zambia's capital city, Lusaka

4 SUCCESS FACTORS AND LESSONS

Based on the preceding analysis, as well as Eberhard, Kolker and Leigland's (2014) framework developed for the South African REIPPPP, the following section seeks to identify success factors and lessons learned for renewable energy auctions in SSA in the following categories: programme management, programme design and markets.

Programme management factors

1. Political support

In all three cases, the renewable energy procurement programmes benefitted enormously from political support at the highest level, with presidential and ministerial statements establishing certainty on the capacity development targets and technologies, as well as on using auctions to ensure competitive procurement of renewables. Additional policy certainty seemed to have had a positive influence on investors as a medium- to long-term target for capacity development was established. This target seems to be most reliable in South Africa, as the target share is part of the official long-term electricity-sector development plan. In a policy context where there is ambiguity regarding the role of the private sector, and where power-sector plans might not be readily implemented, this level of support is essential.

2. Institutional setting

In all three cases, none of the auction implementing units is formally part of an official line ministry. While there is some variance in terms of the institutional setup of these units among the countries, all three units are acting at arm's length from their official line ministries. This allows for an approach that prioritises problem-solving to make the programme successful, rather than automatically following governmental operational policies and procedures that emphasise enforcement of rules. Auction programmes in South Africa and Uganda seem integrated into the institutional landscape of the respective electricity sectors, consulting all relevant stakeholders and incorporating regulatory agencies for the required generation project licensing procedures. This is important to ensure sector-wide buy-in, preparedness and timely implementation of institutional tasks with sufficient upfront certainty and quality. The Uganda case, with built-in institutional capacity development, shows how implementation processes can also be used to develop further the local institutional capacities in relevant fields (*i.e.* project licensing, tariff adjustment and interconnection processes) to address main investment barriers at once.

3. Management team

In all three countries' auction units, a mix of private-sector experienced local government officials, as well as local and international non-governmental experts was used. The use of local staff ensured credibility and integrity of the auction activities, while (international) expertise was used to overcome knowledge gaps.

4. Management style

Close co-operation and dialogue with the private sector has been a hallmark of success, especially in the case of South Africa. This includes the extensive use of external, private-sector advisors on programme design and implementation elements.

5. Programme resources

Ensuring that the procurement programmes are adequately resourced has been a key feature. Through utilising the support of development partner institutions, special government programmes and fees from closed projects, these programmes remained largely off formal government budgets.

6. Quality of transaction advice

The extensive use of high-quality international (and where available, local) transaction advisors has enabled the transfer of international best practice to the continent. This required good co-ordination by the management teams and close co-operation between the advisors.

7. **Programme management shortcomings**

The transaction costs of auction administration remain high for the hosting governments, and in some cases mean that these programmes remain dependent on external support made available for free. Though the use of external advisory capacity has led to high-quality programmes, the challenge of institutionalising this capacity remains for all three countries. This seems to be most significant in the case of Zambia, where reliance on external expertise was the highest. Additional shortcomings can be observed in the (lack of) provision of accurate information (*e.g.* changing tax regimes in Uganda).

8. **Programme management risks going forward**

The fact that none of the countries' implementing units is formally integrated in a governmental line ministry leaves them exposed, both politically and financially, and could endanger the sustainability of the programmes. In addition, the development and retention of the necessary capacity within these units remain a challenge. Due to critical programme evaluation, it can be expected that communication gaps will be accurately addressed during the next auction rounds.

Programme design factors

1. **Accelerated roll-out of new generating capacity**

The rapid contracting and commissioning of projects has been instrumental in building the case for supporting this sector and procurement modality, especially in countries that are desperate for more power capacity.

2. **Programme size**

The case studies have shown that size seems to matter: the programme sizes in both South Africa (Africa's largest IPP programme) and Zambia (forming part of a much larger IFC Scaling Solar programme) stand in contrast with the programme size in Uganda, where a much smaller programmatic ambition seems to have constrained interest from the industry. In part, this difference seems to have contributed to the tariff deviations amongst the country cases, especially between Uganda and the other two cases. However, as the competitive results from South Africa's small-scale tender indicate, factors beyond size may have a more significant impact on tariffs.

South Africa's experience also shows that starting too big might result in low competition and high prices. Finding an optimal size requires accurate planning, extensive communication with the private sector, and the ability to learn and adjust as the programme unfolds.

3. **Potential project profitability**

The amount of interest from developers for these programmes indicates a clear appreciation for the profitability of the sector, especially in a market environment that is seeing rapidly falling technology costs. The higher tariffs in Round 1 for the REIPPPP, the premium payment mechanism in GET FiT and the concessional elements in Scaling Solar all played an important role in ensuring private-sector interest.

4. **Multiple bidding rounds**

The use of multiple bidding rounds has been shown to allow institutional learning and programme improvements for governmental decision makers, to build confidence in the programmes and to increase competition. The fact that Uganda has not indicated whether it will be contracting more power through successive bidding rounds is limiting the potential cost-cutting and industry-building impact of the GET FiT programme.

5. **Non-negotiable programme characteristics**

The use of non-negotiable contracts, standardised bidding requirements (including financial data) and, in the case of South Africa, the requirement for bids to be fully underwritten for debt and equity all contributed to bidder behaviour being adequately controlled. Feedback further seems to suggest that, especially for attracting new developers, the *ex-ante* availability of standardised and non-negotiable project documents (*e.g.* IA, PPA) played a decisive role in ensuring private-sector interest, especially in the smaller markets of Uganda and Zambia.

6. **ED requirements**

South Africa's, highly-weighted ED requirements have been controversial, often criticised as being confusing and expensive. Nevertheless, these requirements have been crucial in securing political support for the programme. For both Uganda and Zambia, project requirements for compliance with the IFC's E&S Performance Standard regulations underscore the importance of considering the impact of these kinds of distributed projects, not only from a risk-mitigation point of view, but also in terms of building long-term support.

7. **Sovereign guarantee**

In all three countries, off-taker risk was considerable enough to require the issuing of sovereign guarantees. In South Africa's case, the liability risk for government was mitigated using a Government Framework Support Agreement. Both Uganda and Zambia also provided risk-mitigating liquidity arrangements (letters of credit) backstopped by (optional) PRGs from the World Bank. The availability of adequate risk-mitigating instruments seems essential in most SSA jurisdictions. However, a comparison of the cases of Uganda and Zambia indicates that even for countries with high risk ratings and general concerns about off-taker reliability, several risk-mitigation strategies are possible and preferred. While project developers rejected the use of PRG in Uganda, they were applied in the Zambian context.

8. **Programme design shortcomings**

The programmes had to be amended to incorporate experiences made with various design shortcomings, including overestimating market readiness in South Africa's first bidding rounds, overly onerous technical design specifications and limited project size in Uganda, and potentially problematic site conditions and risk allocation in Zambia. The Uganda case also shows the importance of *ex ante* clarity and continuous application of all standards (*e.g.* E&S) and evaluation components (*e.g.* location-specific benefits) to avoid lengthy re-negotiations or even project implementation failures.

What the South Africa case clearly demonstrates in practice, and the Uganda case demonstrates in theory through in-depth programme evaluation (KfW, 2016), is the importance of incorporating learning experiences through programme adjustments over various bidding rounds.

9. **Programme design risks going forward**

Delivery failure, whether on ED commitments or the projects themselves, remains an important risk for these programmes. In addition, the dependence on a single off-taker, often struggling with its own transmission constraints and potentially threatened by the success of an IPP programme, is another important risk factor going forward, especially for larger-scale programmes. The latter highlights the importance of well integrated, high-quality regulatory decision making as part of electricity-sector oversight.

Market factors

1. **Global supply and demand for renewable energy**

The slow-down in deployment of renewables in OECD markets while the South African programme was starting clearly benefitted the country. However, prices for most renewable energy technologies have continued a downward trend, with this most evident for solar PV (and to a lesser degree, onshore wind). While some fluctuation in prices may occur due to global demand and supply shifts, the overall downward trend continues unabated.

2. **Donor and multilateral development bank (MDB) support for renewable energy**

Donor and MDB support has been considerable in all three programmes, although to a lesser degree in South Africa than in the other two countries. Nevertheless, donors have been instrumental in funding and providing technical assistance, resourcing programme setup and implementation, providing risk management and credit enhancement support, and, in many cases, financing some of the projects. The notable difference between price outcomes in Uganda and Zambia represents the combination of many factors, with the use of PRGs and deeper MDB lending involvement (IFC stapled finance) taking a lot of risk from project sponsors in Zambia, and certainly showing a significant impact on a risk-adjusted tariff level.

3. **The local banking sector**

This is an area where South Africa stands in sharp contrast with the other two case studies: the country has the largest, deepest and most sophisticated banking sector on the continent, able to offer long-term debt and being quite comfortable with project finance. This resulted in most of the finance for the REIPPPP projects being sourced from South African banks. Neither Uganda nor Zambia can draw on their local banking sectors in the same way, largely due to limited capital market sizes and limited experience with project finance. Nevertheless, these kinds of projects could potentially play a key role in developing the required capacity in local banking sectors.

4. **Other advisory services**

South Africa was again able to draw on a relative wealth of local legal, technical and financial advisory capacity, which has not been the case to the same degree in the other two case study countries. For those countries, this has meant that a great deal of advisory capacity has had to be "imported" as part of the project design and implementation process. As with the banking sector, it is important to consider how these programmes can be used to strategically develop this local capacity.

5. **Market shortcomings**

Even with all the local advisory capacity mentioned above, the size of South Africa's programme meant that this capacity was stretched to the limit in the country. Uganda and Zambia are also facing small, underdeveloped markets for renewable energy, with significant support needed to realise any investment.

6. **Market risks going forward**

A global market recovery for renewable energy might see less interest in African programmes, leading to lower competition and higher prices. There are also questions regarding the extent to which prices can be further lowered in high-risk markets. Both Uganda and Zambia rely on public finance and finance from MDBs. Given the scale of investment required to develop timely electricity generation infrastructure in SSA, it remains to be seen which of these two country-specific approaches, if either, can perform better to attract private investment at scale.

Auctions could help renewables take off in Zambia

5 RECOMMENDATIONS

The rapid rise of renewable energy auctions internationally offers many lessons on ensuring high levels of interest from domestic and international investors and bidders. Many of these lessons have been incorporated in African renewable energy auctions, to good effect. However, what is perhaps even more instructive for the benefit of the region is to see how African countries have adapted these international lessons to their own contexts and learned from each other. Based on the review of the renewable energy procurement experiences in South Africa, Uganda and Zambia, and the success factors identified, the following recommendations emerge for the way auctions can be 1) efficiently embedded into a country's renewable energy procurement process and 2) tailored to the country-specific context to balance between diverging objectives, including, but not limited to, auction price results.

Embedding auctions into countries' renewable energy deployment strategy

Renewable energy auctions are a tool to support competitive price determination. Evidence indicates the importance of other factors that impact the effectiveness and efficiency of investment frameworks. Clear and strong linkages between various factors can strengthen the investment frameworks.

1. **Establish clear, politically supported policy based on transparent planning and translated into timely procurement.** Although renewable targets are powerful signals to the market, they should be based on high-quality planning and translated into a clear procurement process to be truly effective. An effective planning framework benefits from a direct link to repeatedly performed procurement processes. A strategically designed and well integrated process will enhance investor confidence and support localisation of manufacturing capacities and ancillary services. This has clearly been the case in South Africa, and the follow-up procurement rounds are having a similar effect in Zambia. High-level political support is powerful in not only signalling intent and commitment to the market, but also in protecting the procurement programme and its long-term integrity in a context that can be bound to be contentious in light of the introduction of new technologies (Montmasson-Clair and Ryan, 2014). While it is not yet clear that Eskom intends to comply with official South African government policy at this stage of the procurement programme – despite repeated statements at the highest level regarding the country's commitment to the IPP programme (Le Cordeur, 2017; Van Rensburg, 2016) – what is clear is that without this political support as well as the supporting planning frameworks, the IPP programme would have been stillborn given the utility's resistance. Similarly, the clear statements by Zambia's president regarding the country's solar ambitions and commitment to the Scaling Solar programme have also served to bolster and protect the role of the highly capable IDC in the programme, despite other government entities being officially mandated to fulfil this role.[24]

2. **Programme leadership must be authorised, competent and credible**. Political commitment must be demonstrated by appointing a programme champion or leader and management team that have a clear and visible mandate (including political support) to lead the design and implementation of the procurement process efficiently and with full authority. It is important that both the private sector and government officials view the selected team as competent in managing numerous

24 In fact, Zambia's Ministry of Energy and Water Development was developing a similar solar procurement programme at the same time that Scaling Solar was being implemented. The appetite for Scaling Solar shows that the sector is comfortable with using the Scaling Solar approach for future rounds.

transaction advisors (or is contracting a capable lead transaction advisor) and the overall procurement programme in a fair manner. The involvement of various international experts in at least the programme development phases in all three countries – in many cases funded by development partners – has been essential in successfully designing and setting up the procurement programmes. It is therefore critical that adequate resources be made available for this purpose; it may well be expensive, but the gains made will justify the costs. Procurement programmes should furthermore be explicit about ensuring that evaluations are conducted transparently and under strict security conditions, that communication with the private sector is clear and continuous, that it is market-facing and responds to changing conditions, and that deadlines are being met. South Africa's IPP projects office, which is made up primarily of officials from the National Treasury's well-respected PPP unit, is a good example of such a unit (Eberhard , Kolker and Leigland, 2014; Eberhard and Naude, 2016b; Montmasson-Clair and Ryan, 2014).

3. **Explicitly deal with local impacts and benefits to ensure project sustainability**. Given the nature of renewable energy projects (*e.g.* rural location, massive capital investments, etc.), the projects are bound to incur socio-economic impacts and risks. This should be acknowledged beforehand and explicitly dealt with by the programme to ensure sustainability. Whether this is done by including local impacts as part of the evaluation process (as in the case of South Africa and, to a lesser degree, Uganda), and/or by making use of rigorous international social and environmental performance standards as qualification criteria (*e.g.* IFC performance standards), project developers should be made aware of and plan for this from the start. There are several examples of renewable energy projects on the continent that did not deal with this reality and consequently failed (Brent and Rogers, 2010; Reuters, 2016). Furthermore, although localisation might not be feasible given the capacity of the manufacturing sector in many countries, there is definite potential to include investment in local community development as compliance and/or evaluation criteria.[25]

Designing auctions to balance between diverging objectives

Many auction design parameters entail trade-offs among a range of environmental, social, economic and technical objectives. The long-term success of auction processes increases with the implementation of a process that is in alignment with policy objectives and that is able to balance between sometimes diverging objectives.

4. **Appropriate choices must be made on auction volume, project scale and multiple auction rounds.** The SSA auction project experience has shown that striking a balance is essential for ensuring good outcomes. Auction volume should be big enough to attract enough investor interest, but small enough to ensure adequate competition. Project size should ensure economies of scale without threatening grid stability. Achieving this balance is easier when multiple auction rounds, with smaller (initial) volumes per round, are used, since it allows for learning to take place and provides the opportunity for developing a pipeline of projects. Governments might also have different, potentially competing objectives that they hope to achieve with their renewable energy procurement programmes, such as ensuring low-cost electricity supply as well as promoting local ED. Instead of trying to achieve all of these objectives through a single programme, it might be more appropriate to use complementary programmes. Bigger programmes could be focused on price outcomes, while smaller-scale programmes could focus on ensuring local economic participation (*e.g.* REIPPPP and SP-IPPP). It is important to note, however, that international experience seems to indicate that there is a strong inverse relationship between

25 The Scaling Solar programme in Zambia has apparently now incorporated a community development programme to deal with potential legacy issues around the site location.

project size and prices achieved. Countries should therefore aim to have projects of sufficient size to ensure adequate tariffs.

5. **Consider the best use of concessional or commercial financing**. In the event of concessional financing being available to support an auction, careful thought should be given to how it might most optimally be used. While there is a case to be made for premium payments (*e.g.* GET FiT Uganda), current renewable energy price levels seem to suggest that these kinds of subsidies are no longer required. However, improving the repayment profile of a PPA through front-loading some payments could play an important part in attracting investor interest (*e.g.* GET FiT). In addition, concessional financing could be used to provide interest-free loans and leverage blended finance, as has been the case in Zambia. An additional step would be to use this financing to bring local finance on board by, *e.g.* increasing loan tenors. If a programme is sufficiently de-risked, there will be more than enough investor interest. It is important that concessional financing be used to crowd-in, rather than crowd-out, commercial finance. Some form of concessional financing might be available to many African renewable energy auction programmes, and establishing the best use of these funds should be the result of careful planning and consultation.

6. **A renewable energy auction programme ought to balance responsiveness with certainty**. Developers should have some degree of "freedom" to come up with optimal, high-quality project designs within clear (but not overly onerous) parameters.[26] Similarly, procurement programme leadership should be market-facing and allow for learning to take place throughout the procurement process. A small, well capacitated *ad hoc* unit operating outside the confines of normal bureaucratic procedures tends to be able to fulfil this role much better, at least during the initial phases of the programme (*e.g.* IPP office in South Africa; IDC in Zambia). That being said, this setup can also leave the programme institutionally exposed, and careful thought should be given to how such a programme can become more formally institutionalised as time progresses. A key area of the programme where flexibility should not be an option is the contracts. PPAs, IAs and other contracts should be bankable, standardised and non-negotiable to provide certainty to the market and assist in timely completion (Eberhard, Kolker and Leigland, 2014).

7. **Qualification criteria must ensure that bids are robust**. Using stringent legal and technical qualification criteria, tendering agents should ensure that bidders are fully able to develop and implement their bids. Financial evaluation is arguably one of the most important aspects in this regard, and it requires expert evaluation of the financial models and assumptions used for the bid projects. It is therefore important that compliance thresholds are "high" enough to ensure only capable bidders advance.[27] A potential "tool" in this regard is the use of letters of support, or similar commitment statements, from finance providers. This effectively outsources project due diligence to these providers and ensures an extra "layer" of bid evaluation. In terms of ensuring bidder commitment, the use of bid and performance/completion bonds can be effective tools and have thus far been shown to be useful in the SSA renewable energy auctions evaluated.

Focus on price results in auctions

A high degree of attention is paid to auction prices as one of the key process outcomes. Prices can be driven by several factors, such as risks, access to finance, governmental support measures for the renewable energy industry and different

26 The scale of the programme should serve as some level of indication about the level of requirements – especially when it comes to, e.g. technical standards. The technical requirements used in the 5 MW projects in Uganda are for example much more detailed than those in the 50 MW projects in Zambia, indicating a mismatch of scale and costs.

27 There is a potential trade-off between developer experience (ensuring project realisation) and local participation. This needs to be decided based on the programme's objectives and context.

Kariba Dam on the Zambezi River in Zambia

attributes of the auction design. Knowledge about the impact of price drivers can support a well-informed auction design and the development of a wider enabling environment and further allows for meaningful comparisons across auction rounds and/or jurisdictions.

8. **Focus on price drivers that can reduce investment risks**. Renewable energy auctions in Africa are seen and priced as high-risk investments, especially in initial rounds (Eberhard, Kolker and Leigland, 2014; Eberhard and Naude, 2016b). Governmental decision makers involved in the auction process may want to consider reducing the risks and costs involved to ensure high levels of investor interest and competition to achieve lower price outcomes. Off-taker default is a key risk due to the precarious financial position of most utilities on the continent, inevitably requiring some form of sovereign guarantee (such as an intergovernmental framework agreement in conjunction with a sovereign guarantee[28] or a GSA instead of a sovereign guarantee in combination with liquidity support mechanisms like letters of credit). African countries are further exposed to risky forex fluctuations; while South Africa has dealt with this through using ZAR-denominated PPAs, other African countries lack the availability of efficiently functioning and liquid domestic capital markets that could allow for local currency denomination. In the meantime, denominating PPAs in hard foreign currency (*e.g.* USD) is an option, but one that exposes governments to massive risks.

9. **Focus on price drivers that can reduce project costs**. Land, permits, site and resource information, transmission infrastructure, and business registration are elements that can add massively to the costs and risks of a renewable energy project on the continent. The Zambia case shows the significant impact in cases where the government chose to re-allocate associated costs between various market participants in the electricity sector or the economy. At least in initial auction rounds, decision makers may want to consider this an effective strategy to allay investor fears and ensure very good results.

In South Africa, the regulator ensures that the PPA payments are ringfenced and passed through to the IPPs.

REFERENCES

Africa Progress Panel (2015), "Power, people, planet: Seizing Africa's energy and climate opportunities", *Africa Progress Report 2015*, Geneva.

Baker, L. and B.K. Sovacool (2017), "The political economy of technological capabilities and global production networks in South Africa's wind and solar photovoltaic (PV) industries", *PoliticalGeography,* Vol. 60, pp. 112, http://dx.doi.org/doi:10.1016/j.polgeo.2017.03.003.

Baker, L. and H.L. Wlokas (2015), "South Africa's renewable energy procurement: A new frontier?" *Research Report Series*, Energy Research Centre, University of Cape Town, Cape Town.

Bischof-Niemz, T. and R. Fourie (2016), "Cost of new power generators in South Africa: Comparative analysis based on recent IPP announcements", Presentation given for Council for Scientific and Industrial Research, Pretoria, www.ee.co.za/wp-content/uploads/2016/10/New_Power_Generators_RSA-CSIR-14Oct2016.pdf.

Brent, A.C. and D.E. Rogers (2010), "Renewable rural electrification: Sustainability assessment of mini-hybrid off-grid technological systems in the African context", *Renewable Energy,* Vol. 35, No. 1, pp. 257265, http://dx.doi.org/doi:10.1016/j.renene.2009.03.028.

Country Watch (2016a), "South Africa: Country Review", *CountryWatch Publications*, Houston, www.countrywatch.com/Intelligence/CountryReviews?CountryId=159 (viewed on 24 November 2017).

Country Watch (2016b), "Uganda: Country Review", *CountryWatch Publications*, Houston, www.countrywatch.com/Intelligence/CountryReviews?CountryId=178 (viewed on 24 November 2017).

Creamer, T. (2017), "No further IRP consultations as Cabinet approves plan and 27 renewables projects", 7 December, Engineering News, Creamer Media's, (viewed on 8 December 2017).

De Vos, D. (2016), "Eskom imperils our energy security – It is long past time to liberate the grid", 27 October, *Daily Maverick*, (viewed on 29 October 2017).

Deloitte (2016), *Uganda Economic Outlook 2016: The Story Behind the Numbers*, Deloitte, London, www2.deloitte.com/content/dam/Deloitte/ug/Documents/tax/Economic%20Outlook%202016%20UG.pdf.

Dobrotkova, Z., P. Audinet and G. Sargsyan (2017), "What drives the price of solar photovoltaic electricity in developing countries?" *Live Wire Knowledge Note Series*, No. 2017/72, World Bank Group, Washington, D.C.

DOE SA (Department of Energy, Republic of South Africa) (2016), "Briefing on the South African Independent Power Producers Procurement Programme", Presentation, DOE SA, Cape Town, www.sapvia.co.za/wp-content/uploads/2016/08/IPP-Presentation-PCE_23-Aug-2016.pdf.

DOE SA (2015), "Renewable Energy IPP Procurement Programme (REIPPPP) for South Africa", South African International Renewable Energy Conference, DOE SA, Cape Town, http://sastela.org/wp-content/uploads/2015/10/DoE-REIPPPP-for-South-Africa.pdf.

DOE SA (2014), "Request for qualification and proposals for new generation capacity under the IPP procurement programme – Part B: Qualification criteria", DOE SA, Cape Town, www.tlamelo.com/RFP-PART-B-QUALIFICATION-CRITERIA-updated-pursuant-to-first-bid-submission-date-2012-02-031.pdf.

DOE SA (2013), "Request for qualification and proposals for new generation capacity under the IPP procurement programme - Part A: General requirements, rules and provisions", DOE SA, Cape Town http://tlamelo.com/RFP%20PART%20A%20-%20GENERAL%20REQUIREMENTS%20RULES%20-%20BW3.pdf.

DOE SA (2011a), "Fact Sheet for the media briefing session on 31 August 2011 re the Renewable Energy Independent Power Producer (IPP) Programme", DOE SA, Cape Town, www.energy.gov.za/IPP/Aug%202011/Fact%20Sheet%20for%20the%20Media%20Briefing%20Session%20on%2031%20August%202011%20re%20the%20REIPPP.pdf.

DOE SA (2011b), "Request for qualification and proposals for new generation capacity under the IPP procurement programme - Part B: Qualification criteria", Tender no: DOE/001/2011/2012.

Duve, T. and J.M. Witte (2016), "Madness and prayers: The unintended consequences of power infrastructure investment in Africa", *Perspectives on Development Financing*, No. 5, pp.1-2, KfW Development Bank, Frankfurt.

Eberhard, A. (2016), *SA's power lies in breaking up Eskom's monopoly model,* www.gsb.uct.ac. za/files/SAPowerLiesIn.pdf, (viewed on 9 October 2017).

Eberhard, A. *et al.* (2017), "Accelerating investments in power in sub-Saharan Africa", *Nature Energy,* Vol. 2, Article No. 17005, http://dx.doi.org/doi:10.1038/nenergy.2017.5.

Eberhard, A. *et al.* (2016), *Independent Power Projects in Sub-Saharan Africa: Lessons from Five Key Countries*, World Bank, Washington, D.C., http://dx.doi.org/doi:10.1596/978-1-4648-0800-5.

Eberhard, A. and R. Naude (2016a), *Recommendations for the Design of Successful Renewable Energy Auctions or Competitive Tenders in Africa: Lessons from South Africa*, pp. 34, University of Cape Town Graduate School of Business, Cape Town, www.gsb.uct.ac.za/files/REIPPPPLessonsRecommendations.pdf.

Eberhard, A. and R. Naude (2016b), "The South African Renewable Energy Independent Power Producers Procurement Programme (REIPPPP): A review and lessons learned", *Journal of Energy in Southern Africa,* Vol. 27, No. 4, pp. 114, http://dx.doi.org/10.17159/2413-3051/2016/v27i4a1483.

Eberhard, A., J. Kolker and J. Leigland (2014), *South Africa's Renewable Energy IPP Procurement Program: Success Factors and Lessons*, PPIAF Report (Public-Private Infrastructure Advisory Facility), World Bank Group, Washington, D.C.

Elston, L. (2016), "IPPs get their claws out for Scaling Solar", 26 July, Natural Gas Daily, http://interfaxenergy.com/gasdaily/article/21242/ipps-get-their-claws-out-for-scaling-solar (viewed on 19 February 2018).

ERB (Energy Regulation Board) (2015), *Energy Sector Report 2015*, pp.84, ERB, Lusaka, www.erb.org.zm/press/publications/newsletters/ESR2015.pdf.

Fergusson, J., D. Croft and Y. Charafi (2015), "Scaling Solar: Making the sun work for Africa", *2015 Africa Energy Yearbook,* pp. 113117, www.energynet.co.uk/webfm_send/1260.

Findt, K., D.B. Scott and C. Lindfeld (2014), *Sub-Saharan Africa Power Outlook 2014*, KPMG Africa.

FS-UNEP (Frankfurt School – United Nations Environment Programme) (2017), *Global Trends in Renewable Energy Investment 2017,* Frankfurt School of Finance & Management, UNEP Collaborating Centre/BNEF (Bloomberg New Energy Finance), Frankfurt.

GET FiT (2017), "Commissioning of Tororo Solar North PV Plant", *GET FiT Uganda*, Kampala, www.getfit-uganda.org/home/commissioning-of-tororo-solar-pv-plant/.

GET FiT (2016), "Annual Report 2016", *GET FiT Uganda*, Kampala.

GET FiT (2015), "Annual Report 2015", *GET FiT Uganda,* Kampala.

GET FiT (2014), *Request for Proposals: GET FiT Solar Facility*, *GET FiT Uganda,* Kampala.

IDC (Industrial Development Corporation Limited) (2016), "IDC Zambia issues Request for Proposals for Round 1 of Scaling Solar Program for 100MW and starts work on Round 2 for 200MW", 18 February, press release, www.idc.co.zm/article/idc-zambia-issues-request-for-proposals-for-round-1-of-scaling-solar-program.

IEA (International Energy Agency) and IRENA (International Renewable Energy Agency) (2017), *Perspectives for the Energy Transition: Investment Needs for a Low-Carbon Energy System,* OECD/IEA, Paris and IRENA, Abu Dhabi.

IEA (2016), *Renewable Energy: Medium-Term Market Report 2016*, IEA/OECD (Organisation for Economic Co-operation and Development), Paris.

IEA (2014), "Africa energy outlook: A focus on energy prospects in Sub-Saharan Africa", World Energy Outlook Special Report, pp. 242, IEA/OECD, Paris.

IFC (International Finance Corporation) (2016), "Scaling Solar delivers low-cost clean energy for Zambia", June, IFC, Washington, D.C.

IFC (2012), "E&S performance standards", IFC Policies and Standards, www.ifc.org/wps/wcm/connect/topics_ext_content/ifc_external_corporate_site/sustainability-at-ifc/policies-standards/performance-standards (viewed on 9 October 2017).

IRENA (n.d.), "Global Solar Atlas: ESMAP", *Global Atlas for Renewable Energy*, IRENA, Abu Dhabi, https://irena.masdar.ac.ae/GIS/?map=3103 (viewed on 3 March 2018).

IRENA (2017), *Renewable Energy Auctions: Analysing 2016*, IRENA, Abu Dhabi.

IRENA (2013), *Renewable Energy Auctions in Developing Countries*, IRENA, Abu Dhabi.

IRENA and CEM (Clean Energy Ministerial) (2015), *Renewable Energy Auctions – A Guide to Design*, IRENA, Abu Dhabi.

Kapika, J. and A.A. Eberhard (2013), *Power-sector reform and regulation in Africa: Lessons from Kenya, Tanzania, Uganda, Zambia, Namibia and Ghana*, Human Sciences Research Council, Cape Town, ISBN: 13: 978-0796924100.

KfW (Kreditanstalt für Wiederaufbau) (2016), *First Performance Review and Baseline Report for GET FiT Uganda*, www.getfit-uganda.org/app/download/27050548/GET+FiT+Performance+Review+and+Baseline+Report.pdf.

Le Cordeur, M. (2017), "New energy minister delays IPP signing amid protest from unions", 11 Apr, fin24 (viewed on 9 October 2017).

Lucas, H., P. del Río and M.Y. Sokona (2017), "Design and assessment of renewable electricity auctions in Sub-Saharan Africa", *IDS Bulletin*, Vol. 48, No. 5-6, pp. 79-100, DOI: 10.19088/1968-2017.164.

McEwan, C. (2017), "Spatial processes and politics of renewable energy transition: Land, zones and frictions in South Africa", *Political Geography,* Vol. 56, pp. 1-12, http://dx.doi.org/doi:10.1016/j.polgeo.2016.10.001.

Meyer, R., B. Tenenbaum and R. Hosier (2015), "Promoting solar energy through auctions: The case of Uganda," *Live Wire Knowledge Note Series*, No. 2015/49, World Bank Group, Washington, D.C.

Montmasson-Clair, G. and G. Ryan (2014), "Lessons from South Africa's renewable energy regulatory and procurement experience", *Journal of Economic and Financial Sciences,* No. 7, pp. 507-526.

Ola, D. (2017), "Eskom under investigation by South Africa's energy regulator over PPAs", 12 May, PVTech, www.pv-tech.org/news/eskom-under-investigation-by-south-africas-energy-regulator-over-ppas (viewed on 19 February 2018).

Power Africa (2016), *Zambia: Power Africa fact sheet*, USAID (viewed on 9 October 2017).

Quitzow, R. *et al.* (2016), *The future of Africa energy supply: Potentials and development options for renewable energy*, IASS (Institute for Advanced Sustainability Studies), Potsdam.

REN21 (Renewable Energy Policy Network for the 21st Century) (2016), *Renewables 2016: Global status report*, REN21 Secretariat, Paris.

Reuters (2016), "Kenyan wind power project cancelled due to land disputes" 23 February, www.reuters.com/article/kenya-electricity/kenyan-wind-power-project-cancelled-due-to-land-disputes-idUSL8N1620QG (viewed on 9 October 2017).

Smith, G. *et al.* (2015),"Powering the Zambian economy", *Zambia Economic Brief*, No. 6, World Bank, Washington, D.C.

South Africa Government (2015), *Government Gazette, Republic of South Africa*, Vol. 602, No. 39111, 18 August, Pretoria.

South Africa Government (2012), *Government Gazette, Republic of South Africa*, Vol. 570, No.36005, Pretoria.

Steyn, L. (2016), "Nuclear build tied to outdated Integrated Resource Plan", 26 October, Mail & Guardian Johannesburg, https://mg.co.za/article/2016-10-26-00-nuclear-build-tied-to-outdated-irp/ (viewed on 23 February 2018).

UNDP Uganda (United Nations Development Programme) (2014), "Uganda Poverty Status Report 2014 launched", 8 December, UNDP press release, (viewed on 3 March 2018).

Van Rensburg, D. (2016), "Eskom boss: Let Treasury pay for green power", 23 October, fin24, (viewed on 29 October 2017).

World Bank (2016), *Uganda Country Data* (viewed on 3 March 2018).

IRENA
International Renewable Energy Agency

RENEWABLE ENERGY AUCTIONS
CASES FROM SUB-SAHARAN AFRICA

IRENA HEADQUARTERS
P.O. Box 236, Abu Dhabi
United Arab Emirates

www.irena.org