Report D.4.1-ZA, March 2016

Auctions for Renewable Energy Support in South Africa: Instruments and lessons learnt

AURES

European Commission

HORIZON 2020

About the project

Auctions for Renewable Energy Support: Effective use and efficient implementation options (AURES)

This project helps assessing the applicability of different auction types to renewable support under different market conditions. It also explores which auction types and design specifications suit particular requirements and policy goals in European countries. By establishing best practices and a knowledge sharing network, we contribute to informed policy decision-making and to the success of auction implementations across Europe.

Target-oriented analysis: Through analysis of empirical experiences, experiments and simulation, we will create a flexible policy support tool that supports policy makers in deciding on the applicability of auction types and certain design specifications for their specific situation.

Capacity building activities: We undertake specific implementation cases to derive best practices and trigger knowledge sharing amongst Member States. We strive to create a strong network with workshops, webinars, bilateral meetings, newsletters, a website that will serve as capacity building platform for both policy makers and market participants (including project developers, auctioneers, etc.). Wherever required, we can set up specific bilateral and multilateral meetings on specific auction issues and facilitate cooperation and knowledge sharing. Additionally, we offer sparring on specific implementation options, drawing from insights gained during the first phases of the project (empirical analysis of previous auctions in Europe and the world), conceptual and theoretical analysis on the applicability of specific designs in certain market conditions and for certain policy goals issues and facilitate cooperation and knowledge sharing. Additionally, we offer sparring on specific implementation options, drawing from insights gained during the first phases of the project (empirical analysis of previous auctions in Europe and the world), conceptual and theoretical analysis on the applicability of specific designs in certain market conditions and for certain policy goals.

Project consortium: eight renowned public institutions and private firms from five European countries and combines some of the leading energy policy experts in Europe, with an impressive track record of successful research and coordination projects.

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Case Study: Renewable Energy Auctions in South Africa

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Project deliverable:

WP4 – Empirical aspects of auctions for RES-E: learning from real experiences

D4.1 – Country Studies

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Table 1. Characterisation of auctions in South Africa

Characteristics	Description
Country characteristics	With a population of 54 million and a GDP of €311.6 billion in 2014, South Africa (SA) is an upper middle income country. It was ranked 35 out of 180 in the World Bank's Ease of Doing Business Index 2011. However, 63% of its population is poor and the unemployment rate quite high (25%), which is why economic development and job creation are key policy priorities in the country (World Bank, 2015). Total renewable energy (RE) power generation capacity (including conventional hydro, but excluding pumped storage) was estimated to be less than 1,000 MW in 2011. Total electricity consumption was 240 TWh in 2010, with 93% generated from coal and only 1% from RE (virtually all from large hydropower plants). SA aims to increase its RE generation capacity to 9% by 2030, which will require 17.8 GW of additional capacity. SA ranked third among 35 surveyed nations for its ability and potential to attract capital for low-carbon energy sources (ClimateScope, 2014). Moreover, the country is now also recognised among the top-10 countries with the largest installed, utility-scale solar PV capacity, and among the top-10 RE investing countries in 2014 (Mojanaga, 2015). However, the share of RE in the electricity mix is still largely residual.
Market characteristics	Large power stations are concentrated in the interior of the country near the mines and industries of Gauteng province, and long transmission lines down to coastal areas. SA has a semi-decentralised power distribution sector, with about 180 distribution companies. Unbundling of generation and transmission has not yet taken place; both activities are carried out by the public utility Eskom, which currently holds the monopoly in the market. Eskom is a vertically-integrated actor responsible for most of the power generation (95%), transmission and distribution. The Department of Energy (DoE) periodically determines how much new power generation is needed and from which sources, based on the Integrated Resource Plan (IRP). The National Energy Regulator (NERSA) can only license new capacity within these limits. There is an existing single-buyer model, with Eskom being the off-taker. It has been expected that independent power producers (IPPs) would play a significant role in power generation. However, as the necessary policy and regulatory framework was not in place on time, procurement programs run by Eskom for cogeneration and base-load IPPs were mostly unsuccessful. Only a handful of short-term power purchase agreements (PPA) with industrial generators were signed, which amounted to less than 400 MW (Eberhard et al., 2014; Montmasson and Ryan, 2014) In 2008, the Renewable Energy Feed-in Tariff (REFIT) programme was introduced to

	encourage the participation of the private sector in the electricity generation. REFIT was later replaced by the Renewable Energy Independent Power Producer Procurement (REIPPP) programme in 2011 (Yuen, 2014; MacFarlanes 2015; Eberhard et al., 2014). In a statement on 5 September 2007, the Cabinet ordered Eskom to ensure that “30% of new generation capacity is derived from IPPs” (Montmasson and Ryan, 2014). Projects that are awarded contracts sign a PPA with Eskom, which guarantees payment of a tariff for power generated on a “take or pay” basis for at least 20 years (FutureGrowth, 2014).
Name of auction scheme	The renewable energy independent power producer procurement programme (REIPPPP), which supports the implementation of the national development plan (NDP).
Objectives	• Generation capacity expansion: current capacity of approximately 40,000 MW is regarded as insufficient to provide reliable power (MacFarlanes, 2015; McNair and Dodd, 2012). • RE sources as quickly deployable technologies. REIPPPP was designed to roll out a significant amount of power in a very short time (Eberhard et al., 2014). 17,800 MW of additional RE capacity to be added by 2030, of which 5,000 MW need to be operational by 2019, and another 2,000 MW by 2020 (Fourie et al., 2015). • Cost reduction of RE support from the previous administratively-set FITs. However, there are concerns about the impact on electricity consumers and grid connection capacity. • Legal infeasibility of the FITs: the DoE received legal advice that FITs could be challenged against SA’s public finance and procurement laws. • RE is regarded as a way to alleviate transmission losses: many of the projects will be located in regions closer to the consumers. • Development opportunity through the establishment of a “green economy”: creation of a RE industry in the country is meant to support local development objectives. The aim is for the industry to support the creation of 400,000 new direct jobs by 2030.
Contracting authority	The DoE awards projects to IPPs. Successful bidders enter PPAs with Eskom and an implementation agreement with the government. The DoE stands behind the financial commitments of Eskom.
Main features	The PPA is held for a period of 20 years in local currency. It guarantees payment of an agreed tariff for power generated on a take-or-pay basis. The tariff is agreed upon the award of the preferred bid status and is indexed to the rate of inflation over the duration of the contract with Eskom (Montmasson and Ryan, 2014). Technologies currently considered under the programme are: onshore wind, CSP, solar PV, small hydro, biomass, biogas, landfill gas and co-generation from agricultural waste or by-products. Bidders are assessed based on the following: 70% based on the offered price, and 30% on the project’s contribution to economic development (e.g., job creation, local content,

	preferential procurement, enterprise development, and socioeconomic development.
Year of introduction	The scheme was introduced in August 2011. There have been five rounds or "Bid Windows" (BW) since then: BW1 (2011), BW2 (2012), BW3 (2013), BW3.5 (2014), BW4 (2014) (SA Government, 2015d). A substantial revision took place after BW1: capacity caps were included and price ceilings were undisclosed.
Technology focus and differentiation	Technologies covered by the auction: solar PV, onshore wind, CSP, small-hydro, landfill gas and biomass (biogas included in the program, but no capacity has been allocated in any window). Technology-specific auctions. In each tender, capacity limits are set for each technology. The largest allocations have been for wind and solar PV, with smaller amounts for CSP, biomass, biogas, landfill gas, and hydro (see section 2). The rationale for these caps was to limit the supply to be bid and increase the level of competition among potential bidders. Auctions for different technologies were held simultaneously. Interested parties could bid for more than one project and more than one technology (Eberhard et al., 2014).
Lead time before auction	Bids were due within three months after the release of the request for proposals (RFP), and financial closure was to take place within six months after the announcement of preferred bidders. Construction should start within 180 days regardless of timelines for physical grid connection. There are concerns that projects will not be connected on time, especially in areas with inadequate grid capacity. If such delays occur, the programme makes provisions for certain compensation in the form of "deemed energy payments" to be paid to IPPs, although implementation remains uncertain (de Lovinfosse et al., 2013).
Min. /max. size of project	Minimum capacity for projects was set to 1 MW. The REIPPP is mainly used for installations > 5 MW. An upper limit was set on bids for different technologies: 75 MW for a solar PV project, 150 MW for a CSP project, and 140 MW for a wind project (Eberhard et al., 2014). The DOE has developed a Small Projects Programme for projects between 1 and 5 MW. As of 31 March 2015, 29 bids have been received totalling 140 MW and procurement of the first 50 MW under this programme is in process (Fourier et al., 2015). Therefore, no implications of the functioning of this programme can be derived yet.
What is auctioned?	Capacity is auctioned to be supported by a tariff (no premium)
Budgetary expenditures per auction and per year	The following table provides data on the expenditures made in the first three rounds (SA government, 2015a). It can be observed that the budgetary expenditures would represent about R612 billion over a 20 year period (around 35billion € at an exchange rate of 1€ = R17.2 as of March 26th 2016).

Table 1.2. Budgetary expenditures in South Africa's auctions rounds.

	BW 1	BW 2	BW 3
R/kWh	2.15	1.42	1.14
Government R/kWh	1.5	0.77	0.49
MW	1 315.15	1 043.19	1 456
kWh/yr	11.5 billion	9 billion	12.8 billion
R/yr	17.3 billion	7billion	6.3 billion
Rand over 20 yrs	346 billion	141 billion	125 billion
USD over 20 yrs	26.6 billion	10.8 billion	9.6 billion
Total USD in 20 yrs	47 billion		

Frequency of auctions	By 2016, a maximum of 5 rounds are planned for total of 3,725 MW across all technologies. There have already been 5 rounds ("Windows") since 2011.
Volume of the tender	Five auction rounds are planned for 2016 with a total target of 3,725 MW, and specific volumes for each technology (onshore wind 1850 MW, CSP 200 MW, solar PV 1450 MW, biomass 12.5 MW, biogas 12.5 MW, landfill gas 25 MW, small hydro 75 MW and 100 MW for small projects <5 MW). If the target capacity for a certain technology is not achieved in a given round, remaining capacity is added to the subsequent round to ensure that the total capacity target is achieved in the end (IRENA, 2013). In BW1 there were no volume caps. In BW4, the available MW for allocation was 1,105 MW, while 77 bids amounting to 5,804 MW were received (SA government, 2015c).
Auction design elements	See Table 2 below.

Design elements for the assessment of auction schemes for RES-E

Table 2 Design elements of auction schemes in South Africa

Design elements	
Single- or multiple-item auctions	Multiple-item auctions.
Auction procedure	Pay-as-bid, sealed-bid auction. Each bid must include two prices: a fully indexed price and a partially indexed price. When selecting preferred bidders, the DOE has complete discretion to decide which price to use for winner selection (MacFarlanes,

	2015). There are two stages. In the prequalification stage, bidders must meet a set of minimum criteria in six areas: financial, technical, commercial and legal, land, economic development, and environment. They must demonstrate the readiness of the project (land acquisition, funding, technologies, suppliers, ability to meet deadlines, environmental consent, etc.), its financial viability, and the arrangements to meet minimum requirements in terms of economic development. Bids meeting all these requirements move on to the second stage. In the second stage, bids are reviewed based on weighted criteria: 70% for their price offer and 30% for their additional contribution to economic development (i.e. over and above minimum requirements). Of the 30 points awarded for economic development, job creation counts for 25%, local content for 25%, ownership for 15%, management control for 5%, preferential procurement for 10%, enterprise development 5%, and socio-economic development 15% (DOE, 2013). In a given category, only meeting the minimum threshold translates into zero points, while reaching the target grants the maximum number of points (Montmasson and Ryan, 2014).
Pricing rules	Pay-as-bid.
Ceiling price	There were price caps per technology. In BW1, these were disclosed and based on the previously administratively set FITs (Eberhard et al., 2014). Since BW2 they are no longer disclosed before the bidding procedure has ended. Most recently, published price caps are: onshore wind (R 760/MWh, 44 €/MWh), solar PV (R 870/MWh, 50€/MWh), CSP (R 1370/MWh, 80€/MWh), biomass (R 1475/MWh, 85€/MWh), landfill gas (R 990/MWh, 57€/MWh), small hydro (R 1117/MWh, 65€/MWh), biogas (R 1475/MWh, 85€/MWh) (Allen and Overy, 2015).
Qualification criteria	• Project structure: bidder must provide, among other things, a structural diagram showing its debt and equity participants, contractors and key equipment suppliers; • Legal requirements: bidder has to declare its acceptance of the terms of the PPA, the implementation agreement (IA) and other designated project agreements; • Land acquisition and land use requirements: secured the project site, identified all permits and licenses regarding land rezoning, subdivision and water use; • Environmental consent requirements; • Financial requirements: price, method of financing, sufficient progress in securing financing, and proof of its ability to raise such financing • Technical requirements: information on the technology to be used, resource data, contractor capability and track record, and a cost estimate for the grid

	connection; • Economic development requirements: share ownership by black South Africans and local communities, local content, job creation, preferential procurement, management control, socio-economic development and enterprise development • Value for money: project must provide net benefit to the South African government and consumer (MacFarlanes, 2015). The bidding process would be open to all unsuccessful bidders from previous auctions (BWs 1 to 4) which are ready for re-submission (SA government, 2015b).
Penalties	The last resort penalty for non-compliance is the termination of the contracts. So far there has been no use of the guarantees or penalties (De Lovinfosse et al., 2013).
Monitoring of realisation progress	Monitoring does take place but currently there are no details available.
Exceptions from requirements for small plants/developers?	(See "Min. / max. size of project" section in Table 1 above)
Different options regarding what is effectively tendered and what is asked for as bids	Compliant bidders are then selected on a 70/30 split, where bid prices account for 70% of the total score, and economic development for the remaining 30.
Transferability of support right	Information not available

2. Evaluation criteria for the assessment of auction schemes for RES-E

Actor variety and social acceptability

There is some evidence that the auction procedure has resulted in bias against small players (Eberhard et al., 2014; WWF, 2014; Yuen, 2014). Moreover, Grashof (2015) shows that there has been concentration on big players.

The Small Projects IPP Procurement Programme may mitigate this negative impact on actor diversity. This programme was launched by the government in August 2013 and is aimed at projects of 1 to 5 MW of installed capacity. It is designed to promote partnerships between large experienced developers and small local entities to facilitate skill transfer and risk sharing (Fourier et al., 2015).

However, competition has driven prices down to a level at which smaller companies find it hard to operate. Indeed there is a genuine concern among investors that large utilities, backed by corporate finance, are in a better position to meet upfront administrative requirements and will dominate the market in the future, much like Enel Green Power did in the third round of auctions (Yuen, 2014). Yet the large number of investors and community trusts involved in the REIPPPP is an indication new players have been able to participate: SMEs, for instance, were brought in by bigger companies as minority shareholders in several bids. Also, the entire REIPPPP has created opportunities for SMEs in the form of advisory services, economic and social development consultants and construction contractors. The parallel, small projects IPP procurement is therefore an attempt to do more than REIPPPP did to encourage local SME involvement in the sector.

According to WWF (2014), preparation and submission of bids has required developers to bear a significant amount of risk. Obtaining land permits and costly bid bonds as well as conducting Environmental Impact Assessments (EIAs), resource assessments, and technical studies are all actions to be undertaken without any guarantee of success. Increased competition and downward pressure on successful bids has impacted the risk-versus-return profile for developers. An uneven playing field has emerged between large, well-capitalised RE developers (often international players such as foreign utilities) and smaller, local start-up enterprises. On the other hand, the economic development requirements have helped to build support for the REIPPPP from politicians, investors and the general public (Eberhard et al., 2014).

Policy effectiveness (effectiveness of auctions)

Policy effectiveness has been high, both regarding the capacity being procured as well as the capacity expected to enter into operation. The Renewable Energy IPP procurement programme has successfully procured 6.3 GW from 92 IPPs in BW1 to BW4. Of this, 3.9 GW (from BW1, BW2 and BW3) are at various stages of construction or have started commercial operation. Only 0.7 GW remains to be auctioned in order to meet the 2020 installation target. The number of qualifying and competitive bids in BW2 onwards exceeded the auctioned capacities. This suggests that, if more RE capacity were to be integrated in the system, supply would be available. According to Eberhard (2014), industry players, initially sceptical, seeing the successful roll-out and falling electricity costs, are now asking why SA is not contracting more capacity. An additional 6,300 MW was announced in August 2015, which allows project developers to be informed about the programme roll-out and maintains momentum for it.

The following table shows the capacity being procured per round and per technology.

Table 3. MW allocation per technology and round and remaining.

Technology	MW capacity allocated in First Bid Window	MW capacity allocated in Second Bid Window	MW capacity allocated in Third Bid Window	MW capacity allocated in Fourth Bid Window	MW capacity remaining
Solar Photovoltaic	632 MW	417 MW	435 MW	415 MW	626 MW
Onshore Wind	634 MW	563 MW	787 MW	676 MW	660 MW
Concentrated Solar Power	150 MW	50 MW	200 MW	N/A	-*
Small Hydro (≤ 40 MW)	-	14 MW	-	5 MW	116 MW
Landfill Gas	-	-	18 MW	-	7 MW
Biomass	-	-	16 MW	25 MW	19 MW
Biogas	-	-	-	N/A	60 MW
TOTAL	**1 416 MW**	**1 044 MW**	**1 456 MW**	**1 121 MW**	**1 488 MW**

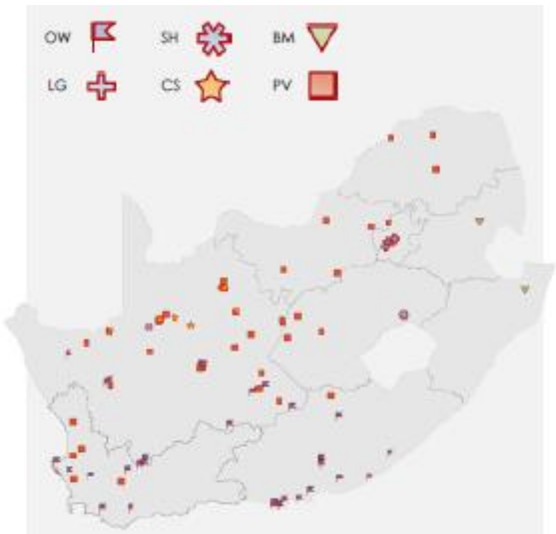
** 200 MW was allocated in the March 2014 CSP Bid Window*

Source: SA Government (2015b).

The mix of renewable energy has changed very little between BWs (see table 3). Solar PV and wind have dominated the first two BWs. Small hydro capacity was procured in BWs 2 and 4, biomass in BWs 3 and 4, and landfill gas in BW 3 only.

Regarding geographical distribution (see figure 2), solar projects (PV and CSP) are concentrated in the Northern Cape where the radiation intensity in the country is the highest. Wind projects are largely located along the coastal regions of the Eastern Cape and Western Cape provinces based on the strong wind flows along these shores.

Figure 2. Project distribution (number of projects).



Source: SA government (2015d). Note: OW=On-shore wind, LG= Landfill gas; SH=Small hydro; CS = Concentrated solar power; PV = solar PV.

By end June 2015, 1.9 GW of the procured capacity had already started operations (i.e. 37 IPPs). 87% of IPPs scheduled to be operational have started commercial operations (1,860 MW over 2,143 MW) (SA government, 2015d). Operational capacity (1,860 MW) is made up by solar PV (960 MW), onshore wind (790 MW), CSP (100 MW) and hydro (10 MW) technology.

The average time for project completion for these projects has been 1.6 years. 4,294 GWh have already been generated by the RE portfolio since its inception to date[1]. It is projected that 100% of the capacity procured active projects in BW1, BW2, and BW3 (62 projects) will be operational by November 2018. In terms of national targets for renewable energy capacity, capacity being operational represents 10% towards the 2030 target and 27% towards the 2020 target[2].

Total shortfall between planned and actual capacity fell to 283 MW and the average time delay between scheduled and actual commissioning operation date was 49 days. BW1 projects were mostly responsible for the delay. According to the SA government, the lag is partly ascribed to:

- Under-delivery against contracted capacity. A few IPPs that have started operation have done so below the contracted capacity.
- A delay due to damage caused by lightning strike (50 MW).
- Delays in construction and in grid connection.

In addition, there was a delay in schedule: BW4 was about 18 months delayed (McDaid 2014). However, it is currently too early to infer overall conclusions about the realisation rate, since only the BW1 is over.

Static efficiency or cost effectiveness (including transaction and administrative costs)

Prices went down in successive rounds, from R3.27 (€19ct) / kWh in BW1 to R1.56 (€9ct) in BW2, R1.26 (€7ct) in BW3 and R0.77 (€4ct) in BW4[3]. However, it is probably too early to tell whether this reduction in prices has been successful, since the realisation rate from BW2 is still unknown.

Pricing and trends vary across the respective technologies, but have shown a similar downward trend. The price for wind power has dropped by 50% to R0.71 (€4ct) / kWh, with the BW4 price directly comparable to that of new coal generation. Solar PV has seen a price decrease of 75% to R0.85 (€5ct) / kWh between BW1 and BW4. The average CSP rate decreased by 6% to R3.13 (€18ct) / kWh between BW1 and BW2 and by 7% to R1.70 (€10ct) / kWh from BW3 to BW3.5 (average base rate[4]) (SA government, 2015d).

One reason behind the lower prices might be higher competition. Overall, the number of bidders increased by 49% from BW1 to BW2, and another 18% in BW3. (Eberhard et al., 2015). In BW1, almost all bidders were awarded contracts. In BW2 24% of the responses to the Request for Proposals were accepted as preferred bidders. The percentages went down in BW3 (18%) and BW4 (16%) based on data from Yuen (2014) and the SA government (2015d).

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[1] Only BW1, BW2 and BW3 data is reported – BW3.5 and BW4 have not completed financial close

[2] 7 GW RE capacity to be procured by 2019 and commissioned by 2020

[3] Prices are stated in April 2015 terms, energy weighted average (R/kWh) considering average technology RFP submission price (published) per BW and projected)(SA government 2015c

[4] CSP rates in BW3 and BW3.5 were differentiated with a base and peaking rate component and are therefore indicated separately

The South African case shows that auction design can negatively affect the level of competition: static vs. dynamic auctions, short time spans between the auction announcement and the deadlines for bid submissions, local content requirements, large capacity volumes being tendered, and high price ceilings in BW1 (Montmasson and Ryan, 2014; Yuen, 2014). Other factors may also account for the reduction in bid prices: reductions in the costs of the technologies, project developers becoming more familiar with the programme, an increased maturity of technologies, aggressive (price) competition, reduced price ceiling for some technologies, and the allocation of a capacity limit for each technology from the second round onwards (Montmasson and Ryan, 2014).

On the other hand, there is some evidence that administrative procedures have been burdensome for bidders and administrative costs for the government have not been negligible. Regarding the later, the government spent approximately $10 (€8.9) million on the tender design and the first round of bud evaluation (Yuen, 2014).

Critics of REIPPPP argue that there have been significant upfront administrative requirements (Eberhard et al., 2014). Key advisors, such as legal experts, are particularly costly for project developers, and can represent up to 15% of project development costs (Montmasson and Ryan, 2014; Yuen, 2014). Notwithstanding, Eberhard et al. (2014) argue that transaction costs were ultimately small for investors compared to overall project costs. Acknowledgement of the high transaction costs has led to streamlined procedures in BW4 (Allen and Overy, 2015).

Dynamic efficiency

The scheme has led to technological diversity, and government officials see a potential to boost local manufacturing in a sector that is completely underdeveloped (Eberhard et al., 2014). For instance, two local tower manufacturing facilities have been established in the Eastern Cape and the Western Cape provinces, and a number of solar panel assembly plants have been set up in various parts of SA, with similar initiatives in the pipeline (MacFarlanes, 2015). However, according to McDaid (2004), little local manufacturing and sustainable local economic development has been realised to date. An in-depth analysis of the impact of REIPPP on innovation is lacking.

Compatibility with market principles and integration

Auctions are used to set the tariff levels. As of 31 March 2015, under the REIPPPP, 15% of the generated capacity has been delivered to the power system during peak demand periods and has consequently alleviated the constrained domestic power supply (SA government, 2015d).

Distributional effects & minimisation of support costs

Data on excessive remuneration for RE plant operators is scarce. IRRs of the former FITs were between 20 and 25%. These IRRs have been reduced to about 10% in BW4. Thus, the burden on electricity consumers has decreased in comparison with the FITs. In addition, local economic development has likely had a positive effect on communities near the project (see local impacts below). Because of the distributed nature of RE generation, project sites offer an unusually intense business focus on rural areas that otherwise may have little potential to attract investment (Eberhard et al., 2014).

Local socioeconomic and environmental impacts

The RE programme may have had an economic and employment impact on the manufacturing sector. The programme obliges bidders to meet demanding minimum local content requirements (LCRs). Opponents of the policy argue that: I) LCRs result in higher tariffs bid in REIPPPP because local components are not cost-competitive with those sourced abroad; and ii) RE projects create short-term jobs by nature so money spent on higher tariffs is not justified for the total number of jobs created.

Proponents of the policy maintain that significant socioeconomic benefits can be derived. Total foreign equity and financing invested in REIPPPs reached R53.2 (€3) billion, which is equivalent to 53% of total FDI in 2013 (SA government, 2015d). IPPs have committed a total of R145.5 (€8.4) billion in investment[5], of which South Africans own the majority stake. Similarly, 48% of IPP construction spend has been procured from local suppliers against a contractual commitment of 44%. 50% of IPP ownership has been placed in the hands of South African citizens and 31% has been placed in the hands of black South Africans as part of broadening black economic empowerment (Fourier et al., 2015). Data on employment are provided in the table below.

Table 4. Data on job creation in the construction (Const.) and operation stages (Oper.) for each technology and round.

	BW1			BW2			BW3			BW4		
	Const.	**Oper.**	**Total**	**Const.**	**Oper.**	**Total**	**Const.**	**Oper.**	**Total**	**Const.**	**Oper.**	**Total**
Solar PV	2381	6117	8498	2270	3809	6079	2119	7513	9632	3825	9273	13098
Wind	1810	2461	4271	1787	2238	4025	2612	8506	11118	2831	8161	10992
Small hydro	NA	NA	NA	409	144	553	NA	NA	NA	30	30	24090
Biomass	NA	NA	NA	NA	NA	NA	96	240	336	149	1947	2096
TOTAL	4191	8578	12769	4466	6191	10657	4827	16259	21086	6835	19411	50276

Source: Own elaboration with data from SA government (2015b).

[5] Total debt and equity investment up to project commercial operation

3. Lessons learnt: key best practices and pitfalls identified

- Transitioning from administratively-set FITs to auctions does not need to be problematic. On the one hand, FITs may have already created the basis of a RE energy market which will be useful for an appropriate functioning of the auction scheme. And, of course, auctions may help tariffs come down sharply.
- Competition in auctions can be negatively affected by short time spans between the auction announcement and the deadlines for bid submissions, requirements for local content, and high amounts of capacity being tendered. Lack of competition may lead to an incentive to bid close to the price ceiling.
- In addition to programme design, there are other factors which have had an impact on the success of the REIPPP, including:
    - Program management factors such as a high level of political commitment, a supportive institutional setting, the experience and knowledge of the REIPPP management team, the management style, the largely off-budget program financial resources, and the quality of advice given to bidders
    - Market factors, which include: characteristics of the market environment (i.e. the slow-down of RE support in OECD markets), favourable characteristics of the South African banking sector, and the existence of other advisory services (Eberhard et al., 2014).

References

- Allen and Overy (2015): South African Renewable Energy Independent Power Producer Procurement Programme (REIPPPP): Salient Features Of And Changes To The Bid Window 4 RFP For Purposes Of The 1800MW Expedited Bid Submission Window. *http://www.jdsupra.com/legalnews/south-african-renewable-energy-80365/*
- *De Lovinfosse, I, Janeiro, L., Gephart, and M. (2013): Lessons for the tendering system for renewable electricity in South Africa from international experience in Brazil, Morocco and Peru. Commissioned by: Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH. South African – German Energy Programme (SAGEN).Department of Energy (DoE). (2013). Background Information on the REIPP Programme and the RFP.*
- *Eberhard, A., Kolker, J., Leigland, J. (2014): South Africa's Renewable Energy IPP Procurement Program: Success Factors and Lessons. Public-Private Infrastructure Advisory Facility (PPIAF) and World Bank.*
- *Fourie, D., Kritzinger-van Niekerk, L. and Nel, M. (2015): An overview of the renewable energy independent power producers procurement programme (REIPPPP). Energize RE: Renewable Energy Supplement - June 2015, PP.9-12.*
- *Future Growth (2014): Demystifying Renewable Energy. Newlands, South Africa.*
- *Grashof, K. (2015): Ausschreibungssysteme für Erneuerbare Energien –ein Überblick. Konferenz des Bundesverbands WindEnergie e.V. "Ausschreibungen für Windenergie an Land„ am 15./16.Oktober 2015 in Berlin*
- *IEA (International Energy Agency) (2012): "Key World Energy Statistics 2012", IEA, Paris.*
- *IRENA (2013): Renewable Energy Auctions in Developing Countries.*
- *McDaid, L. (2014): Renewable energy independent power producer programme review 2014. Electricity Governance Initiative of South Africa downloaded from the EGI website (Tools and Downloads) at: http://www.egi-sa.org.za/downloaded-documents/*
- *McNair, D and Dodd, A. (2012): South Africa's REIPP –Lessons to date. Project Finance International November 28, PP.46-48.*
- *McFarlanes (2015): South Africa's Renewable Energy Programme. An African success story. London (first appeared in the Clean Energy Africa Finance Guide: 2015 Edition (Clean Energy Pipeline)).*
- *Mojanaga, L. (2015): Department of Energy. Energy Programmes and Projects Electricity Infrastructure/ Industry Transformation. 13th January 2015*
- *Montmasson-Clair, G. and Ryan, G. (2014): Lessons from South Africa's Renewable energy regulatory and procurement experience. Journal of Economic and Financial Sciences | JEF | September 2014 7(S), pp 507-526.*
- *South African Government (2015a): South Africa's Renewable Independent Power Producer Procurement Programme (REIP4).*
- *South African Government (2015b): Renewable Energy IPP Procurement Programme.*
- *South African Government (2015c): Media Statement BW Four Announcement Bid window 4 – total contracted capacity from Preferred Bidders*
- *South African Government (2015d): Independent Power Producers Procurement Programme (IPPPP) An Overview. As at 30 June 2015 TEM Bonn – June 2015*

- *World Bank (2015): Data on South Africa. http://data.worldbank.org/country/south-africa*
- WWF 2014. Enabling Renewable Energy in South Africa: Assessing *the Renewable Energy Independent Power Producer Procurement Programme*
- *Yuen, K.S.E. (2014): REIPPP - A New Dawn for South African Renewables? An analysis of renewable energy prices in the South African Renewable Energy Independent Power Producer Procurement programme. Master Thesis by Kai Simon Eikli Yuen M.Sc. International Energy Sciences Po, Paris School of International Affairs. June 2014*

ANNEX1. Details on preferred bidders per round (Bid Window)

Bid Window 1: Preferred bidders[6]

28 REIPP Bid 1 Preferred Bidders							
PROVINCE	IPPID	Eskom Office	Project Name	Tech	DX/ TX	Construction Option Eskom/Self Build	MW
NORTHERN CAPE	159	Bloemfontein	Kalkbult/Scatec	PV	DX	Self-Build	75
	444		Kathu Solar Energy Facility (Reisa Pty LTD)	PV	DX	Self-Build	75
	32		Lesedi Power Company (Oakleaf Pty Ltd)	PV	DX	Self-Build	64
	36		Noblesfontein (Coria Investment Ltd)	Wind	DX	Self-Build	75
	443		Greefspan PV Power Plant (AM-D Pty Ltd)	PV	DX	Eskom Build	10
	572		Mainstream Renewable Power Droogfontein	PV	DX	Self-Build	48.25
	696		Herbert PV Power Plant	PV	DX	Eskom Build	20
	163	Bellville	Aries Solar (Biotherm Pty Ltd)	PV	DX	Self-Build	9.65
	128		Konkoonsies Solar/Paulputs (Biotherm Pty Ltd)	PV	DX	Self-Build	9.65
	118		KaXu Solar One	CSP	TX	Eskom Build	100
	798		Khi Solar One	CSP	DX	Self-Build	50
	65		Mulilo Renewable Energy Solar PV Prieska	PV	DX	Eskom Build	19.93
	64	Bloemfontein	Mulilo Renewable Energy Solar PV De Aar	PV	DX	Eskom Build	10
	564		Solar Capital De Aar (Pty) Ltd	PV	DX	Self-Build	75
	182		Mainstream De Aar Solar PV (Mainstream Renewable Pty Ltd)	PV	DX	Self-Build	48.25
FREE STATE	31		Letsatsi Power Company (Firefly Pty Ltd)	PV	DX	Eskom Build	64
NORTH WESTERN	155	Rusternburg	RustMo1 Solar Farm	PV	DX	Eskom Build	7
NORTHERN	52	Polokwane	Soutpan Solar Park (Core Energy Pty Ltd)	PV	DX	Eskom Build	28
	35		Witkop Solar Park (Core Energy Pty Ltd)	PV	DX	Self-Build	30
WESTERN CAPE	123	Bellville	Klipheuwel/Dassiesklip Wind Energy Facility (Biotherm Pty Ltd)	Wind	DX	Self-Build	26.19
	202		Hopefield Wind Farm/Umoya	Wind	DX	Self-Build	65.4
	37		Touwsrivier Project	PV	DX	Self-Build	36
	164		Slimsun/Swatland Solar (Swartland Solar Park Pty Ltd)	PV	DX	Eskom Build	5
EASTERN CAPE	43	East London	Dorper Wind Farm (Rainmaker Energy Pty Ltd)	Wind	DX	Self-Build	100
	148		Red Cap Kouga Wind Farm - Oyster Bay (Red Capa Kouga Pty Ltd)	Wind	DX	Eskom Build	80
	186		Jeffreys Bay (MainstReam Renewable PtyLtd)	Wind	DX	Self-Build	138
	225		Cookhouse Wind Farm	Wind	TX	Eskom Build	140

[6] Source: ESKOM (2015) http://www.eskom.co.za/Whatweredoing/Pages/RE_IPP_Procurement_Programme.aspx

	138		MetroWind Van Stadens Wind Farm (Nelson Mandela Bay Metropolitan)	Wind	DX	Municipality	27
						TOTAL	**1436.32**

Technology Breakdown Summary

Technology	Number
Wind	8
PV	18
CSP	2
Total # projects	**28**

Bid Window 2: Preferred bidders

PROVINCE	IPPID	Eskom Office	Project Name	Techn	DX /TX	Construction option Eskom/Self Build	MW
WESTERN CAPE	373	Bellville	Aurora	PV	DX	Eskom Build	9
	14		Gouda Wind Facility	Wind	DX	Self-Build	138
	309		West Coast 1	Wind	DX	Self-Build	94
	375		Vredendal	PV	DX	Self-Build	8.8
EASTERN CAPE	372	East London	Chaba	Wind	DX	self-Build	20.6
	364		Grassridge		DX	Self-Build	60
	303		Tsitsikamma Community Wind Farm	Wind	DX	Eskom Build	94.8
	240		Amakhala Emoyeni (Phase 1) Eastern Cape	Wind	DX	Eskom Build	140
	362		Waainek	Wind	DX	Minuc Build	23.86
	527		Project Dreunberg	PV	DX	Self-Build	75
NORTHERN CAPE	207	Bloemfontein	Sishen Solar Facility	PV	DX	Self-Build	74.4
	815	Bellville	Kakamas Hydro EPS Rev 2/Neusberg/Mulilo Renewable	Hydro	DX	Self-Build	10
	2		Bokpoort CSP Project(TX)	CSP	TX	Eskom Build	50
	764		Upington Solar PV/Harvipax/Acsa PV/Subliminary	PV	DX	Eskom build	8.9
	523	Bloemfontein	Linde	PV	DX	Self-Build	36.8
	562		Jasper Power Company	PV	DX	Self-Build	75
	168		Solar Capital De Aar 3	PV	DX	Self-Build	75
FREE STATE	750		Boshoff Solar Park	PV	DX	Self-Build	60

	490		Stortemelk Hydro (Pty) Ltd	Hydro	DX	Eskom Build	36.8
						TOTAL MWs	**1054.16**

Technology Breakdown Summary

Technology	Number
Wind	7
PV	10
CSP	1
Hydro	1
Total # projects	**19**

Bid Window 3: Preferred bidders

21 REIPP Bid 3 Preferred Bidders Projects

#	PROVINCE	Project Name	Technology	DX/ TX	Self-Build/Eskom Build	MW/Capacity
1	**WESTERN CAPE**	Electra Capital (Pty) Ltd	PV	Dx	Eskom Build	75
2	**EASTERN CAPE**	Nojoli Wind Farm/Cookhouse	Wind	Tx	Eskom Build	87
3		Red Cap - Gibson Bay	Wind	Dx	Eskom Build	110
4	**LIMPOPO**	Tomburke / Tobivox Solar Park	PV	Dx	Eskom Build	60
5	**KWA ZULU NATAL**	Mkuze	Biomass	Dx	Eskom Build	16
6	**GAUTENG**	Goudkoppies	Gas	Dx	Munic	4
7		Linbro Park	Gas	Dx	Eskom Build/Self Build	4
8		Marie Louise	Gas	Dx	Eskom Build/Self Build	4.7
9		Robinson Deep	Gas	Dx	Munic	4
10		Ennerdale	Gas	Dx	Eskom Build/Self Build	1.3
11	**NORTHERN CAPE**	Adams Solar PV 2	PV	Dx	Self-Build/Eskom Build	75
12		Loeriesfontein (Doornpan) 2 Wind Farm	Wind	Tx/Dx	Self-Build	138
13		XiNa Solar One	CSP	Tx	Eskom Build	100
14		Khobab Wind	Wind	Tx/Dx	Self-Build	138

15		Longyuan Mulilo De Aar 2 North Wind Energy Facility	Wind	Tx/Dx	Self-Build	139
16		Longyuan Mulilo De Aar Maanhaarberg Wind Energy Facility	Wind	Tx/Dx	Self-Build	96
17		Noupoort Mainstream Wind	Wind	Dx	Self-Build	79
18		Ilanga CSP 1 / Karoshoek Solar One	CSP	Tx/Dx	Self-Build	100
19		Mulilo Sonnedix Prieska PV 3	PV	Tx/Dx	Eskom Build/Self Build	75
20		Mulilo Prieska PV 4	PV	Tx/Dx	Eskom Build/Self Build	75
21	**FREE STATE**	Pulida Solar Park	PV	Dx	Self-Build	75
		Total MW				**1456**

Technology Breakdown Summary

Technology	Number
Wind	8
PV	6
CSP	2
Biomass	1
Gas	5
Total # projects	**21**

Bid Window 3.5: Preferred bidders

2 RE IPP Bid 3.5 Preferred Bidders Projects						
#	**PROVINCE**	**Project Name**	**Technology**	**DX/ TX**	**Self-Build/Eskom Build**	**MW/Capacity**
1	**NORTHERN CAPE**	Khathu Solar Park	CSP	Dx	Eskom Build	100
2		Humansrus Solar Thermal	PV	Dx	Eskom Build	100
		Total MW				**200**

Technology Breakdown Summary

Technology	Number
PV	1

CSP	1
Total # projects	**2**

Bid Window 4: Preferred bidders

13 RE IPP Bid 4 Preferred Bidders Projects						
Province	**IPP Ref No**	**Eskom Office**	**Project Name**	**Technology**	**Dx/Tx Connection**	**MEC MW Allocated**
Mpumalanga	RE_BM_0261_002	Nelspruit	Ngodwana Energy	Biomass	Dx	25
Eastern Cape	RE_OW_0046_003	East London	Golden Valley Wind	Wind	Tx,Dx	117.72
	RE_OW_0024_020		Nxuba Wind Farm	Wind	Tx	138.9
	RE_OW_0154_001		Oyster Bay Wind Farm	Wind	Dx	140
Western Cape	RE_OW_0016_003	Bellville	Roggeveld	Wind	Tx, Dx	140
	RE_OW_0024_008		Karusa Wind Farm	Wind	Tx, Dx	139.8
Northern Cape	RE_PV_0308_001	Kimberley	Aggeneys Solar	PV	Tx, Dx	40
	RE_PV_0028_002		Droogfontein Solar Park	PV	Dx	75
	RE_PV_0045_012		Dyason's Klip 1	PV	Tx, Dx	75
	RE_PV_0045_013		Dyason's Klip 2	PV	Tx, Dx	75
	RE_PV_0046_012		Konkoonsies II Solar	PV	Tx	75
	RE_PV_0006_008		Sirius Solar PV Project One	PV	Tx, Dx	75
Free State	RE_SH_0377_002	Bloemfontein	Kruisvallei Hydro	Small Hydro	Dx	4.7
Total MW						**1121.12**

Technology Breakdown Summary

Technology Split	MW
Biomass	1
Wind	5
PV	6
Small Hydro	1
Total # projects	**13**

ANNEX II. Main data on REIPPP per technology and Bid Window. Source: SA government (2015a).

	Wind	PV	CSP	Hydro	Biomass	Biogas	Landfill	Total
WINDOW 1								
Capacity offered (MW)	1850	1450	200	75	12.5	12.5	25	3625
Capacity awarded (MW)	634	631.5	150	0	0	0	0	1415.5
Projects awarded	8	18	2	0	0	0	0	28
Average tariff (SAc/kWh)	114	276	269	N/A	N/A	N/A	N/A	N/A
Average tariff (USc/kWh) ZAR8/$	14.3	34.5	33.6					
Total investment (ZAR mill)	13312	23115	11365	0	0	0	0	47792
Total investment (USD mill) ZAR8/$	1664	2889	1421					5974
WINDOW 2								
Capacity offered (MW)	650	450	50	75	12.5	12.5	25	1275
Capacity awarded (MW)	562.5	417.1	50	14.3	0	0	0	1043.9
Projects awarded	7	9	1	2	0	0	0	19
Average tariff (SAc/kWh)	90	165	251	103	N/A	N/A	N/A	N/A
Average tariff (USc/kWh) ZAR7.94/$	11.3	20.8	31.6	13				
Total investment (ZAR mill)	10897	12048	4483	631	0	0	0	28059
Total investment (USD mill) ZAR7.94/$	1372	1517	565	79	0	0	0	3534
WINDOW 3								
Capacity offered (MW)	654	401	200	121	60	12	25	1473
Capacity awarded (MW)	787	435	200	0	16	0	18	1456
Projects awarded	7	6	2	0	1	0	1	17
Average tariff (SAc/kWh)	74	99	164	N/A	140	N/A	94	N/A
Average tariff (USc/kWh) ZAR9.86/R	7.5	10	16.6		14.2		9.5	N/A
Total investment (ZAR mill)	16969	8145	17949	0	1061	0	288	44413
Total investment (USD mill) ZAR9.86/R	1721	826	1820		108		29	4504
TOTALS								
Capacity awarded (MW)	1984	1484	400	14	16	0	18	3915
Projects awarded	32	23	5	2	1	0	1	64
Total investment (ZAR mill)	40590	42130	33797	631	1061	0	288	120263
Total investment (USD mill)	4683	5085	3806	79	108	0	29	14011