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ECOFYS sustainable energy for everyone

Lessons for the tendering system for renewable electricity in South Africa from international experience in Brazil, Morocco and Peru

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South African – German Energy Programme (SAGEN)

Hatfield Gardens

333 Grosvenor Street

Pretoria 0028

South Africa

Contact: Dr Soeren David (soeren.david@giz.de)

Website: www.giz.de

Consultants:

Ecofys

Am Karlsbad 11

10785 Berlin

Deutschland

Contacts:

Dr Isabelle de Lovinfosse (i.delovinfosse@ecofys.com)

Luis Janeiro (l.janeiro@ecofys.com)

Malte Gephart (m.gephart@ecofys.com)

Dr Corinna Klessmann (reviewer) (c.klessmann@ecofys.com)

Website: www.ecofys.com

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0 Introduction

Policy-makers face different barriers in promoting the deployment of electricity generated from renewable energy (RE), depending on their stage of maturity as well as on country specific conditions. The experience of the last ten to fifteen years has shown that a range of different policies has effectively addressed these barriers and supported RE technologies. Today, in countries with a growing RE market, policy makers face the challenge of maintaining the RE growth while managing the level of support to a reasonable level (neither too high nor too low) and adapting to an evolving market environment. Different policy instruments have been used to mitigate both the non-economic barriers (e.g. grid access, authorisation procedures) and the economic barriers (e.g. high cost of capital, low electricity market price) to the deployment of RE technologies. This study focuses on the assessment of one type of policy instrument: the procurement of electricity from RE through tenders or auctions.

Tenders and auctions are procurement systems that include a bidding process and competition between different bidders for a given volume of electricity (MW installed or MWh purchased). While some analysts use the terms “auctions” and “tenders” interchangeably, others make a clear distinction between them. According to the latter group, in a **tender** (also referred to as ‘multi-criteria auction’) the price of a bid is only one selection criterion among others, in contrast to a purely price-based **auction** when selection is made on price only (see Figure 1). In tenders other characteristics of the bid than its price are considered in the selection process for instance: the local content, the environmental impact, and local/social acceptability of the project. In auctions, even if selection is typically made based on price only, a phase of prequalification of the eligible bidders can be used to allow only qualified bidders (according to predefined criteria) to participate in the auction.

In this report we present cases on how these auction or tender processes are implemented and how successful they have been in South Africa, Brazil, Morocco and Peru. The aim is to identify lessons from the experience of Brazil, Morocco and Peru for the future improvement of the tendering scheme in South Africa, the Renewable Energy Independent Power Producer Procurement Programme (so-called REI4P).

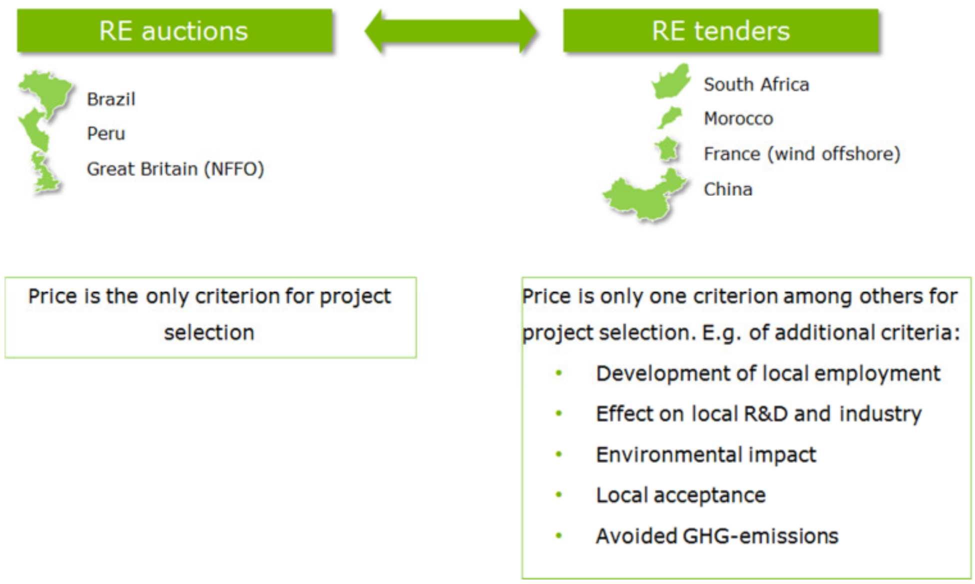

Figure 1 Definition of RE auctions and RE tenders

Different processes can be used to design and manage an auction or a tender and most processes can be used equally for auctions or tenders. Table 1 presents a comparison of common auction processes based on the typology defined in Maurer and Barroso (2011) and indicates what processes are used in South Africa, Brazil, Morocco and Peru, the international examples analysed in this report.

Sealed-bid auction/tender		Hybrid auction/tender
Pay-as-bid sealed-bid	**First-price sealed-bid**	**Descending clock stage followed by pay-as-bid**
Multiple units of same product to be allocated	One single product to be allocated	Multiple units of same product to be allocated
Multiple contracts with different winners at different prices	One contract with single winner	Multiple contracts with different prices
Limited volume auctioned, selection of a number of bids to match the volume target	Limited volume auctioned in specific locations, one bid selected per location	Limited volume auctioned, selection of a number of bids to match the volume target
Technology neutral or technology specific	Usually technology specific	Technology neutral or technology specific auction
Ceiling price (disclosed or not) used for selection. Other selection criteria than price can be used (e.g. South Africa).	No price ceiling	Price discovery in phase of descending clock auction; discovered price serves as ceiling price for second round
E.g. South Africa and Peru	*E.g. Morocco*	*E.g. Brazil*

Table 1 Comparison of different renewable energy auction processes. Ecofys own compilation based on typology presented in Maurer and Barroso (2011)

In so-called *sealed-bid auctions or tenders* bidders simultaneously submit sealed bids with an offer of price and quantity and no bidder knows the bids of any other participants. There are different ways of designing sealed-bid auctions or tenders, and the two main types of sealed bid auctions analysed in this study are the *pay-as-bid* and *the first-price sealed-bid*. In a pay-as-bid process typically several bids are selected, which together make up to the volume to be procured. In contrast, in a first-price sealed-bid process only one offer is selected and awarded a contract for the volume to be procured. The timeframes within which the bids have to be submitted and the selection does not depend so much on the type of process used but depends on the details of its implementation in different countries.

Other interesting types of auction or tender processes are the *hybrid types* like the one used in Brazil. In Brazil the first phase of the auction operates as a *descending clock auction* then the second phase operates as a *pay-as-bid sealed-bid auction*. The descending clock auction differs from sealed-bid auction in that it is an interactive process of multi-round bids in which the auctioneer starts with a high price and progressively lowers the price until the quantity offered matches the quantity predetermined. This round serves to discover the ceiling price that will be used in the second phase. In the second phase the amount of electricity to be procured is lower than that of the 1st phase to create competition among the bidders of the first round that have been selected to enter into the second round. This is a more dynamic auction system where participants know and react to each other's bids and adapt their price and quantities accordingly in subsequent rounds.

The report is divided into 4 sections:

1. An analysis of the main features and challenges of the REI4P in South Africa
2. An overview of international experience in tendering and/or auctioning systems in Brazil, Morocco and Peru with a focus on lessons learnt
3. A comparison of the international experiences to identify lessons learned
4. Policy recommendations for further steps in improving the REI4P in South Africa

1 REI4P in South Africa

1.1 Characteristics of the REI4P

General features of the tenders

The REI4P is the main support scheme for large scale renewable energy and the only tariff-based support scheme that South Africa currently has in place. According to the country's power sector planning policy, the Integrated Resource Plan for Electricity 2010-2030[1], renewable generation capacity should rise to 9% by 2030 requiring an estimated additional capacity of 17.8 GW.

The REI4P was launched in August 2011 by the Department of Energy (DoE), after a failed attempt to implement a feed-in tariff scheme (REFIT). The REFIT was initially adopted in 2009 but never came into effect. In March 2011 the National Energy Regulator of South Africa (NERSA) undertook a review of the feed-in tariffs with a (proposed) cut of up to 40%. There were also legal concerns that public support in the form of a feed-in tariff might have been in contradiction with public procurement provisions under the laws of South Africa. Besides, the REFIT did not provide a number of the incentives that the REI4P provides, including local job creation and local economic development, and ownership by local companies. These factors led to a rethinking of the whole support mechanism at the DoE and the National Treasury.

The REI4P established a short-term target of 3,725 MW renewable energy capacity. It is scheduled to stay in place at least until 2016 when power purchase agreements (PPAs) for the last tendering (referred to as bidding windows in the context of the REI4P) are expected to be signed and when all IPP projects should have come on-grid. The REI4P is used to tender large-scale installations (over 5 MW), although there are 100 MW which are reserved for small-scale projects (between 1MW and 5 MW).[2] These projects are tendered under the umbrella of the Small Projects Renewable Energy IPP Programme[3]..

Eligible technologies

The first three windows were launched in 2011,2012 and 2013. In total, there are five tenders planned to allocate the total target of 3,725 MW, with specific amounts of capacity targeted 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 the 100 MW for small projects <5 MW. In each tender capacity limits are set for each technology, so there is no competition between different technologies. If the capacity limits are not achieved in the precedent tender, the capacity is added to the subsequent tender to ensure that the total capacity target is achieved in the end.

Selection process

South Africa operates a **pay-as-bid sealed bid tendering system** (see Table 1). Individual tenders or windows are announced on a special website of the DoE, the state-utility Eskom and NERSA. The DoE is the custodian of the REI4P and in charge of managing the programme together with the National Treasury.

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[1] Department of Energy (2011) Integrated Resource Plan for Electricity 2010-2030. Available from: http://www.energy.gov.za/files/irp_frame.html (last accessed 09/04/2013)

[2] Department of Energy (2012) IPP Procurement Plan: http://www.ipprenewables.co.za/#site/index (last accessed 09/04/2013)

[3] The first stage of this programme has already been launched with deadline for submission of bids in October 2013. Several more windows for submission of bids are planned until March2016. Request for qualifications and proposals available from: http://www.energy.gov.za/files/tenders/Tender-DoE-004-13-14.pdf
Further info on the Small Projects Renewable Energy IPP Programme is available at: http://www.ipp-smallprojects.co.za (last accessed 18/09/2013).

The tendering process operates in two stages:

- **A qualification stage.** To qualify, bidders must demonstrate that the site where the project is planned has been secured and that all necessary approvals have been received; they must also demonstrate that the project will be commercially viable by showing for instance that it is working with reliable suppliers and that the deadlines for realisation are realistic. The following evidence or declaration must be submitted:
  - Legal
  - Land acquisition
  - Environmental consent
  - Finance
  - Technical
  - Economic Development
  - Bid Guarantee

- **A selection stage.** This stage is conducted as a pay-as-bid sealed bid auction, implying that a number of sealed bids are selected to meet the volume of RE electricity tendered. These are called preferred bidders. At this second stage the qualified bidders are assessed on two criteria: the price they offer and the local economic development they will induce. At the start of the tender DoE holds a conference for bidders to understand the tender criteria and the different requirements for each technology. Ceiling prices are disclosed for each technology and used to cap the prices of the offers. The prices determined under the REFIT were used as ceiling prices for the first windows.
  - The *price* accounts for 70% of the project evaluation.
  - The *local economic development* accounts for 30% of the project evaluation. The requirements for assessing economic development are:
    - Job creation
    - Local content
    - Ownership
    - Management control
    - Preferential procurement
    - Enterprise development
    - Socio-economic development (SED).

<u>Financial guarantees and penalties</u>
Bid guarantees are required by the bidders at the qualification stage. The last resort penalty for non-compliance with the developer's commitments under the agreements is the termination of the contracts. So far there have been no use of the guarantees or penalties.

<u>PPAs and project finance</u>
Successful bidders sign a PPA for 20 years with the transmission operator Eskom (see Figure 2), and an implementation agreement with the DOE. NERSA is in charge of the licensing procedure for the IPPs and the re-invoicing of the costs of the REI4P with Eskom.

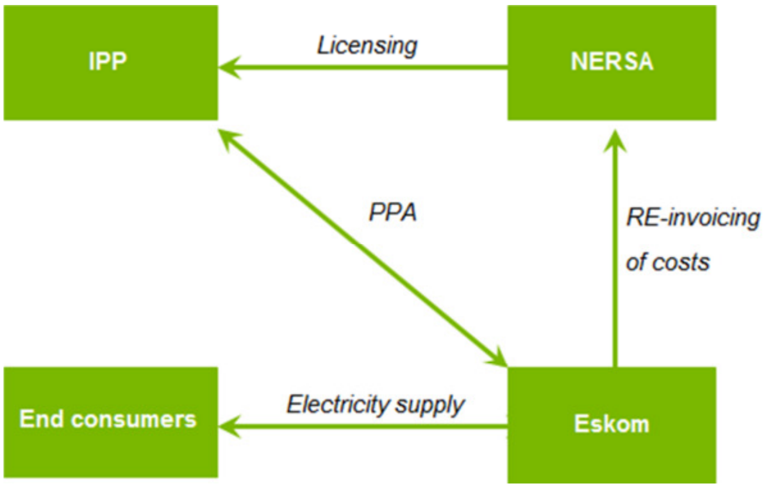

Figure 2 PPA structure in South Africa

The signature of the PPAs and financial close for the first two windows were delayed for several months. The initial deadlines were too ambitious in light of the success of the programme and the inevitable learning process needed at the start of new programme. Access to finance through local commercial banks was not an issue in the first windows because most of the projects anticipate relatively high returns on investments. This may change in the future as competition and price-pressure increases. The Renewable Energy Finance and Subsidy Office (REFSO) offers advice to developers and other stakeholders on renewable energy finance and subsidies.

1.2 Experience from the past and challenges for the future of the REI4P[4]

Since the start of the program in August 2011, South Africa has opened three renewable energy tender windows. For the first two windows the preferred bidders have been selected. The third window is closed on the 19th of August 2013 with the decision on preferred bidders. The original agenda of having this third window close at the end of 2012 has been revised due to delays accumulated in the processing of window 1 and window 2. So far DoE has allocated projects with a total volume of 2,458 MW, of which it allocated 1416 MW in the first window, and 1040 MW in the second (details in Table 2).

[4] The overview of successes and failures in this report are based on the available literature, including the reports by Camco Clean Energy (2012 and 2013) commissioned by GIZ Deutsche Gesellschaft für Internationale Zusammenarbeit.

	Onshore Wind	Solar PV	CSP	Biomass	Biogas	Landfill Gas	Small Hydro
Volume Tendered (MW)	1850	1450	200	12.5	12.5	25	75
Price cap (R/kWh)	1.15	2.85	2.85	1.07	0.8	0.60	1.03
Awarded 1st window (MW)	634	631	150	0	0	0	0
Price 1st window (R/kWh)	1.14	2.76	2.69	-	-	-	-
Awarded 2st window (MW)	562	417	50	0	0	0	14
Price 2nd window (R/kWh)	0.9	1.65	2.51	-	-	-	1.03
Total awarded	1196	1048	200	0	0	0	14
Percentage awarded to so far	65%	72%	100%	0%	0%	0%	19%

Table 2 Capacity tendered and allocated per RE technology[5].

The signature of PPAs for the projects in the first window was delayed from the initial deadline in June 2012 to November 2012 when all PPAs were eventually signed. Due to this delay, projects could only start the construction phase in January 2013. Financial close for window 2 projects has been postponed from December 2012 to May 2013. For this reason it is still too early to provide an evaluation of the impacts of the tenders. However, a number of conclusions can be drawn about the design of the scheme, its practical implementation as well as the challenges for the future.

Despite initial problems with the implementation of the first window of the programme, overall there has been a positive response from industry on the way the tender has been structured and implemented, in terms of creating a **well-designed and flexible tendering framework** for encouraging renewable energy IPPs. The system is flexible enough so that lessons from past windows can be incorporated in the subsequent windows.

Despite the sudden change from a feed-in into a tendering scheme, the programme has drawn significant **attention from international developers**. International developers are involved in every project of the first two windows. Developers were ready with well-prepared projects to bid for in the REI4P tenders because of the early market interest created by the REFIT announcement two years before. In the first window, 53 bids were submitted, totalling 2.128 MW, including onshore wind, solar PV, solar CSP and small hydro; which confirmed the market readiness.

All **CSP capacity (200 MW) has already been allocated in the first two windows**. This suggests that CSP conditions are very attractive and real costs are well below the ceiling prices. Therefore in the future:

- It will be possible to support this technology at further stages
- The ceiling prices should be lowered in future tenders and possibly undisclosed to stimulate price competition
- It is an indication of the need to introduce some flexibility in the definition of the target allocation per technology to respond to the signals from industry.

The first window of the tendering scheme failed to achieve enough scarcity to drive down the prices. In the end **price of the preferred bidders were high** since they were close to the

[5] Source: Department of Energy http://www.ipprenewables.co.za/#page/1209 (last accessed 09-04-2013) and data from GIZ SAGEN programme.

disclosed ceiling prices, themselves set high (according to the assessment of the tenderers and compared to international price levels). In the first window no volume cap was decided apart from the total 3.725 MW target of the programme. This volume was not realistic given the time available and the existing demand for project development at that moment. The lack of competition to meet the capacity resulted in high average prices[6]. This problem was addressed to an extent in the second window by reducing the total volume offered to 1,044 MW. But the ceiling prices were not revised and stayed high[8]. Average prices for wind and solar were reduced[7] but still substantially above competitive international prices (which might, however, not be fully comparable to South African market conditions). Driving down the prices in future auctions to guarantee the efficiency of the programme is one of the key challenges of the REI4P.
No successful bids have been received so far for **biomass, biogas, and landfill gas technologies**. One possible reason is that the ceiling price for these technologies may have been set too low[8] and that may need to be revised for future tenders. Other reasons may include relatively higher transaction costs and typically smaller project sizes which result in higher financial risk associated with these projects.

The **deadlines to submit the bids were too short** in light of the requirements, in particular for the first window. The administrative process is too complex for many project developers, creating a barrier, especially for small companies. Local companies have struggled to submit bids due to the financial, institutional and documentation requirements. The structure and content of the request for proposal may in reality give an advantage to large-scale projects with experienced and international partners.

The signatures of Direct Agreements, Implementation Agreements, Connection Agreements and financial close for the first two windows were delayed for several months. These **delays** created a lot of uncertainty among project developers and other stakeholders. In some cases the effect of the delay might have been beneficial for the project developers (e.g. if the costs of the technology drops or when the delay gives more time to agree on a more advantageous financial structure with partners and/or financial institutions). However the effect of these administrative delays may also drive up the development costs, reduce the project margin and put the project at risk financially. This is particularly the case for small IPPs that are more vulnerable to these additional costs.

Given the current lack of competitive domestic RE industry and manufacturing capacity, some stakeholders have raised the concern that the **local content requirement** may be too stringent for the early stages of RE development in the country.

	Onshore Wind	Solar PV	CSP	Biomass	Biogas	Landfill Gas	Small Hydro
Window 1	25%	35%	35% / 25%[9]	25%	25%	25%	25%
Window 2	25%	35%	35% / 25%	25%	25%	25%	25%
Window 3	40%	40%	40%	40%	40%	40%	40%

Table 3 Minimum local content requirements per technology.

If the DoE does not take into account the real evolution of local capacities it may result in a bottleneck for projects, increasing the costs and risk of failure in the construction phase. A

[6] The average prices of the first round were: wind $0.17/kWh; solar PV $0.41/kWh; CSP $0.40/kWh
[7] The average prices of the second round were: wind $0.13/kWh; solar PV $0.25/kWh; CSP $0.38/kWh.
[8] See details on prices in Table 2.
[9] 35% with storage / 25% without storage

solution would be to start smaller and gradually ramp up the programme with the appropriate investments in local infrastructure, training and economic development. Local economic development and job creation is one of the key objectives of the REI4P and the focus of the local content requirement should be on the parts of the value chain that maximise local employment. Another key challenge will be the monitoring and verification of the local content impact of the projects as they are moving to construction and operation phase. There is no certainty yet on how this will be managed and DoE is exploring the options.

Despite project developers being in general satisfied with approvals and quotes for **grid connections** in the first windows, the requirement to start construction within 180 days regardless of timelines for physical grid connection constitutes an important risk. There are concerns that Eskom will be unable to connect the REI4P projects in time, especially in areas with inadequate grid capacity. If such delays occur, the programme makes provision for certain compensation payments in the form of “deemed energy payments” to be paid to IPPs, but the implementation of these payments remains uncertain. The announced appointment of an independent transmission, system and market operator (ISMO) would be absolutely necessary to remove the barriers to grid connection and route to market for the developers. Different ISMO scenarios have been drafted but no definite implementation plan has been adopted so far.

The DoE and National Treasury have been **relying significantly on** support from **transaction advisors** (private legal, financial and consulting companies) for the design and the implementation of the REI4P so far and there is no sign of transfer of capacity and capacity building within these institutions to appropriate the process in the future. This strong dependency on private transaction advisors puts a risk and a cost to the management of the REI4P, especially because the private experts in charge change very frequently, and these advisors are also advising the developers. A solution would be to build the capacity of the DoE and National Treasury (and future ISMO) for a transfer of competence and independent management of the tendering system in the future.

Although interest from project developers has been high, the need for a **long-term vision** on the programme and its targets is a critical success factor for future investment (both in project development and local manufacturing). In particular, foreign investors have shown a high level of interest. But the perception of local financial institutions is that the actual amount of foreign investment is likely to be limited. Reasons for this concern are: the limited security of investment in the country, higher market entry costs as compared with other emerging economies, and also the uncertainty over the long-term future of the programme. DoE addressed this concern by confirming that the REI4P is to be extended into a rolling procurement programme with an additional 3200 MW allocation by 2020[10], but as the programme expands and its cost increases there are concerns about rising electricity prices. In February 2013 NERSA approved an 8% average increase in electricity prices until 2018. One of the reasons presented by Eskom for the rising electricity prices is the cost of the REI4P. Prices are expected to increase from 65.51c/Kwh in 2013/14 up to 89.13c/kWh in 2018[11].

[10] http://www.energy.gov.za/IPP/Minister%20Remarks%20-%20IPP%20W1%20Announcement%20-%2029Oct2012.pdf
[11] http://www.eskom.co.za/content/AnnouncementNERSAs_decisionEskomsRevenueApplicationMYPD2013-14to2018.pdf

2 International experience with RE tenders and auctions

2.1 Lessons from RE auctions in Brazil

2.1.1 Characteristics of the RE auctions in Brazil

General features of the auctions
In Brazil, the procurement of new renewable electricity capacity is part of the general procurement system that auctions both conventional and renewable electricity. The auction system is managed by ANEEL[12] under the guidelines of the Ministry of Mines and Energy (MME). There are two different types of auctions organised by ANEEL:

- New energy auctions - so called A-3, A-5 auctions[13] - are mandated by law and carried out once a year. They allow distribution companies to procure the volume of electricity they deem necessary 3 and 5 years in advance. Distribution companies submit their updated electricity demand forecast once a year to determine the volume to be auctioned. They can purchase energy through auctions only and they are not allowed to establish bilateral agreements with generating companies. The rules and process of the auction (price cap, eligible technologies, etc.) are decided by MME, the volume auctioned is decided by the distribution companies. In principle, these auctions are technology-neutral but MME has been interfering for instance to avoid oil and coal-fired generation and to contract renewable electricity. The costs of electricity contracted through new energy auctions are born only by the so-called regulated electricity consumers[14]. They pay the cost of the electricity auctioned in proportion of the volume of electricity their distribution company contracted in the auction.

- In addition to these annual auctions, reserve energy auctions are organised at the discretion of MME for procuring additional electricity capacity. These are fully determined by MME, who decides on the price cap and technologies eligible but also on the volume to be auctioned (as opposed to A-3 and A-5). Reserve energy auctions serve to address any potential shortcoming of electricity supply from the new energy auctions. Since 2007 reserve auctions have been used to support the deployment of renewable electricity in technology-specific auctions. The costs of energy contracted through reserve auctions are born by all electricity consumers, included the unregulated consumers[15].

Eligible technologies
In the past all auctions were technology-neutral and all technologies were eligible. Hydropower projects traditionally won most of the new energy auctions until 2006 when they started to experience problems to fulfil environmental requirements. Electricity generation from oil and coal plants then started to be more competitive and successful in the auctions, but MME intervened to exclude coal and oil projects from the auctions. MME identified wind

[12] ANEEL: Agência Nacional de Energia Elétrica
[13] A-5 and A-3 refers to the number of years prior to entry in operation. For instance, an A-5 auction is calling projects that will start operating 5 years later (e.g. wind onshore projects contracted in 2009 are scheduled to enter operation in 2014).
[14] The regulated consumers are those who are not allowed to choose freely their electricity supplier and are supplied by one of the 62 distribution companies. They represent about 75% of the electricity market.
[15] The unregulated consumers are the large industrial and commercial consumers, who are allowed to choose freely their electricity supplier. They represent approximately 25% of the electricity market.

onshore as a potential competitive source of electricity for Brazil and from 2007 on encouraged the development of a wind onshore industry in Brazil through technology-specific auctions targeting RE technologies (wind, but also bioelectricity and small-hydro). So far, solar power has not been included in the auctions because it is still considered not competitive in Brazil.

Selection process
Brazil operates a hybrid auction system with a selection of bids executed in two stages; a descending clock auction followed by a pay-as-bid sealed bid auction (see Table 1). In order to participate in the auction, bidders have to fulfil a number of qualification criteria. These are:

- a prior environmental license,
- a preliminary grid access authorisation,
- financial qualifications and guarantees (bid bond 1% of investment costs),
- other technology-specific documentation such as fuel contracts for biomass or certified production estimates for wind.

The selection of the project sites is left to the project developers. There is no requirement for local content in the bids. However, in practice all selected projects turn to the Brazilian national development bank BNDES (Banco Nacional de Desenvolvimento Econômico e Social) for funding, which requires 60% of the financed items to be manufactured locally.

The final selection of winners is based exclusively on the offered price. The two stages of the auction function as follows:

1. The **first stage** aims to provide **price discovery**. It operates as a descending price clock auction with competitive bidding between bidders with lowest prices. ANEEL initiates the process with a high price (see Figure 3, left hand side figure) that is expected to create excess supply. Bidders state the quantity they would supply at this price. All bids with this price and lower are summed up. Progressively the price is lowered and the quantity of electricity offered decreases until the envisaged amount of electricity is met (yellow line) and the lowest price is discovered (intersection between yellow and green lines).

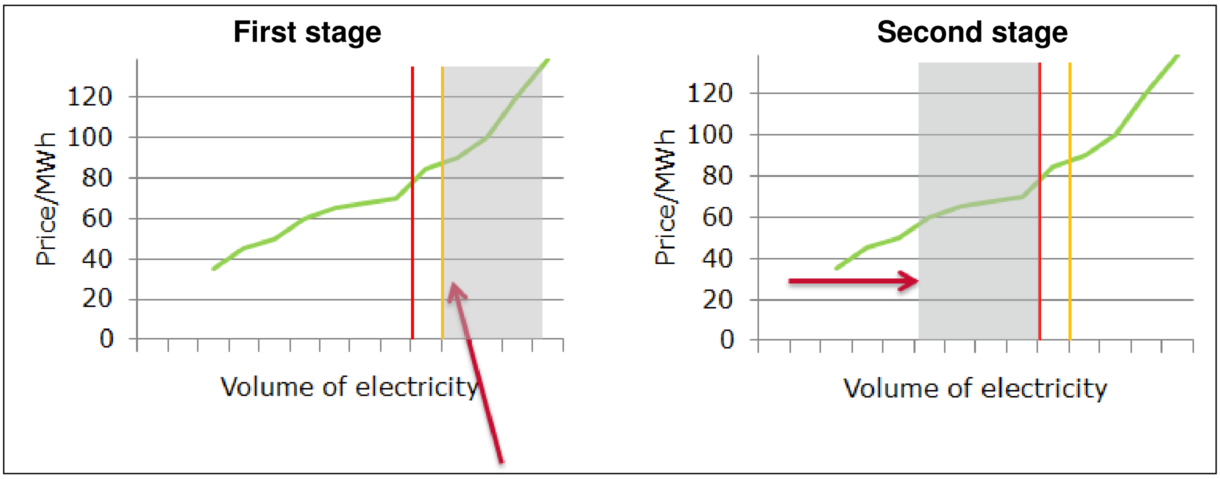

Figure 3 Illustration of descending price clock auction in Brazil

2. The **second stage** operates as a **pay-as-bid** auction. Winners of the first round bid a final sealed price taking the price discovered in the first round as the ceiling price. Competition between bidders is created by decreasing the amount of auctioned

electricity by a margin (see Figure 3, right hand side figure difference between yellow and red lines).

The two stages of the auction are fully automated and web-based. The whole auction process takes only about three hours between the introduction of the bids by the preselected participants and the decision on the selected bids.

Financial guarantees and penalties

Participants have to deposit a bid bond of 1% of the project's estimated investment cost in the qualification phase, and then a project completion bond of 5% of the estimated investment cost for the selected projects.

Penalties are applied for delays in project delivery. If the delay exceeds one year, ANEEL has the right to terminate the contract and to keep the financial guarantee. So far there has been no enforcement of these penalties and extensions have been granted to delayed projects because the delays have partially been caused by public entities and not necessarily by project developers. In order to avoid facing unexpected delays, solutions are being discussed, such as putting in place early warning systems to identify slippages early on.

PPAs and project finance

PPA contracts are standardised and conditions are defined upfront. The PPA template is available on the internet prior to the auction. The process to carry out the required administrative work and to sign the PPA contracts after winning the auction is seamless and usually takes less than 3 months. For regular A-5 and A-3 auctions, project developers typically sign a PPA agreement with different distribution companies in proportion to the volume of electricity they purchase (see Figure 4). The duration of the PPAs is typically 20 years for wind, 15 years for bioelectricity, and 30 years for hydro.

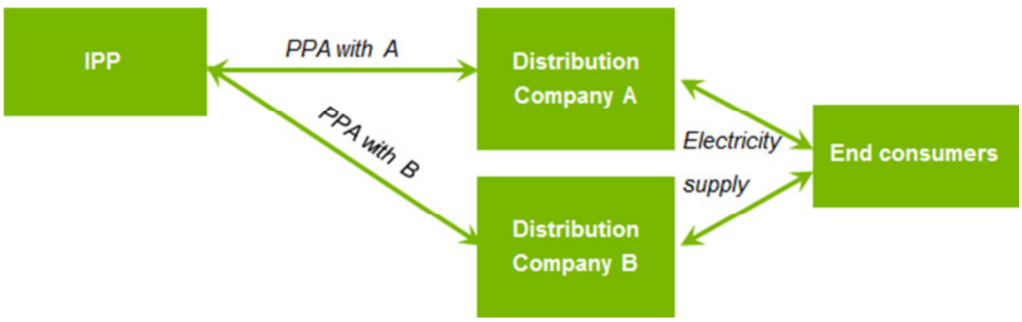

Figure 4 PPA structure in Brazil

In Brazil, access to finance is facilitated by the national bank BNDES. It offers very attractive financing conditions, including low interest rates, long amortization periods and up to 80% leverage, depending on the project. BNDES is involved in designing the clauses of the standard PPA so it can provide easier and cheaper access to finance than other institutional or commercial banks. Typically all project developers seek financing at BNDES. Financial close can usually be achieved within 1 year, except for those projects that fail to meet BNDES requirements (e.g. debt to equity ratio, 60% local content, etc.). In these cases the process to reach financial close may be seriously delayed.

2.1.2 Experience from the past and challenges for the future of the RE auctions in Brazil

Up to 2011 Brazil had contracted through energy auctions a total of over 6900MW RE capacity (wind, small scale hydro and bioelectricity). This reveals that the auction system has served as a mechanism to stimulate a substantial volume of RE investments in the Brazilian energy procurement system. With the experience accumulated, a number of conclusions can be drawn. We focus our analysis on the case of wind power, given that this technology has been the most successful in the recent history of the RE auctions in Brazil.

Brazil has been able **to attract a high number of bidders**[16], creating enough competition to contract high volumes of wind power **at very competitive prices** (in the order of 75$/MWh in the first wind-only auction in 2009, below 50$/MWh in the last auction of December 2012). In the 2011 technology-neutral auction wind power won the highest share at a lower price than gas (average price of $62.07/MWh). It was the first time an RE technology proved more competitive than fossil fuel based power. But the question remains whether these prices can be materialised in practice (that is, whether project will actually be realised).

The reasons for the high level of competition and the low prices achieved in Brazil include:

- Favourable global market conditions: Brazil opened energy auctions to wind power in 2009, when the effects of the economic crisis slowed down wind investment elsewhere in the world. Brazil therefore attracted the wind industry in search of new markets.
- Incumbent energy companies did not have monopolistic positions in electricity generation and the market was effectively open to new players.
- Brazil is a new market for wind power and the best sites with the highest load factors are still available.
- Project pricing based on a P50 production estimate were accepted by ANEEL and the MME. P50 projections are less conservative than the usually required P75 or P90 and contributed to significantly driving the prices down.
- The public development bank BNDES finances RE projects with very advantageous conditions for developers (16 years amortization, 6-7% interest rates) and can provide up to 80% of the investment funds.
- Wind manufacturers also participate in the auctions as project developers. They can submit lower prices by providing cross subsidies between their different businesses.

RE auctions in Brazil have also contributed to the **development of a local renewables industry** in the country, especially for wind power, drawing from the experience of leading international companies that implanted locally.

However, there are substantial delays in projects that were expected to already be in operation; so far only 35% of auctioned wind projects are up and running. Out of the 1800 MW of wind power contracted to enter into operation by 2012, **65% are delayed**[17] (these correspond to projects auctioned in 2009). In view of this, there are also reasonable **concerns about the financial feasibility** of more recently auctioned projects that have been contracted at substantially lower prices. Since the volume of wind electricity contracted is marginal in the Brazilian electricity system and since Brazil has huge hydro reserves, the danger of serious undersupply as a consequence of these delays is limited.

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[16] In the last A-5 technology-neutral auction launched in December 2012, 525 bids were qualified to participate (a total of 14.181MW). The total energy auctioned was fulfilled with 12 projects (a total installed power of 574MW). The average price for successful wind bidders in this auction was 87,94 R$/MWh (1R$~0.5US$). Source: ANEEL (http://www.aneel.gov.br/)

[17] Interview with Luiz Augusto Barroso (PSR, Brazil) on March 28th, 2013.

The main reasons for the delays are:

- Difficulties to secure financing for the projects. One of the main problems encountered to finance the projects is that project developers used P50 production estimates in the bids but financial institutions (commercial or institutional) are typically more conservative and would only finance projects on the basis of P90 data. Another reason for delays in financing is that due to the large number of funding requests that are submitted to the BNDES and their limited resources a bottleneck is created in the BNDES.
- Issues with access to transmission infrastructure. According to Abeeólica (the Brazilian wind energy association) 50 wind farms equivalent to 637MW are waiting for transmission lines that should have been built by the Companhia Hidrelétrica do São Francisco (Chesf). For some wind farms this has resulted in a delay of more than 17 months.[18]

There have been a number of proposals to address both challenges:

- Qualification only for bids presenting conservative (P75-P90) production estimates. In auctions starting in 2013 the bids must present certified production certificates from a minimum of three different wind certifiers and only the most conservative certificate will be considered.
- The delays are often identified too late to correct the situation and to deliver the contracted energy within the agreed deadlines. Ensuring timely delivery can be improved by establishing progress monitoring/control milestones that serve as 'early warnings' of potential delays in the projects. Such an early warning system has been discussed in Brazil but has not yet been implemented.
- Investors with little experience in the sector are more likely to face problems obtaining financing and implementing projects on time. In order to avoid this, the qualification stage may be improved by establishing more stringent requirements regarding the project experience of participants.

More stringent qualification requirements are likely to negatively affect the level of competition in the auction (as it would pose an additional barrier for new market entrants). In addition, a more conservative production estimate is likely to drive the price cap up, resulting in higher contractual prices. However, these solutions are also likely to have a positive impact on the success rates of project implementation and therefore also on the long-term sustainability of the auction system.

There are indications of **collusive behaviour** between the bidders in the Brazilian auctions:

- Experts estimate that web-based auction increases likeliness of strategic and of collusive behaviour.
- Illegitimate coordination between bidders is hard to track, contact between bidders during auction is easily possible.

[18] http://www.opovo.com.br/app/opovo/economia/2013/01/22/noticiasjornaleconomia,2992460/50-eolicas-estao-com-linhas-de-transmissao-em-atraso.shtml

2.2 Lessons from solar tenders in Morocco

2.2.1 Characteristics of the solar tenders in Morocco

General features of the tenders

The Ministry of Energy and Mines (MEMEE) has the overall responsibility for RE targets and RE policy in Morocco, but the RE tenders are designed and managed by two different organisations: ONE (Office National de l'Electricité, the public transmission and distribution grid operator and dominant electricity generator) on the one hand for hydro and wind tenders, and the Moroccan Agency for Solar Energy (MASEN) on the other hand for solar tenders. For this reason the characteristics and experience from the ONE and MASEN tenders may differ. However, both ONE and MASEN use the same type of selection process called first-price sealed-bid auction and the main features of the tendering systems are very similar. Our analysis in this report will primarily focus on lessons learnt from the solar tenders managed by MASEN. MASEN benefited from the support of ONE, the World Bank and other international organisations for the design and implementation of the solar tenders and they are regularly acknowledged as 'state of the art'.

ONE has been tendering hydro projects since the 1960s wind projects since 1998, and through this method has accumulated about 280 MW of wind and 1306 MW of hydro power. The rules for wind tenders changed in 2010 when ONE adopted a new **Integrated Wind Energy Programme**. Under the Integrated Wind Energy Programme there are plans for six wind parks: one in Taza for 150 MW; and five sites under the 850MW auction.

- One of the key features of the Integrated Wind Energy Programme is that ONE imposes a **public private partnership** with the project developers in order to share the risk and facilitate access to finance, but also to have a share in the project and keep its competitive advantage in the Moroccan electricity market.
- Another key feature of the wind tenders under the Integrated Wind Energy Programme is one of the selection criteria is **industrial integration**. There is a new feature in the Integrated Wind Energy Programme. For the first 150 MW tender launched in 2010 the size of the project was too small to aim for a full industrial integration, so the condition was limited to the purchase of a percentage of the materials directly or indirectly used in the project from local industry. For the second auction of 850 MW, the conditions of the industrial integration criteria are still to be designed but will be more ambitious.

MASEN is a new organisation created in 2010 to design and manage the tenders for concentrated solar power and solar PV. It is responsible for procuring a total of 2000 MW of solar power capacity by 2020. MASEN was created as a separate entity because solar CSP technology is more expensive than wind technology (existing wind projects are already at grid parity in Morocco) so the cost of supporting these projects could not be borne by ONE's balance sheet. The development of solar CSP in Morocco is expected to require substantial subsidies from the State of Morocco and international donors. MASEN was created with the ambition to minimise the costs of the projects and develop solar CSP efficiently. Therefore MASEN is not only designing and managing the auctions but it is also involved at different stages of the project development to mitigate the risks (financial and non-financial risks).

MASEN wears many hats:

- It designs the requests for interest and the terms of reference for the tenders and manages the tender process. MASEN benefited from the support of international organisations, especially the World Bank.
- It is the sole buyer of the electricity generated by the solar projects selected.

- It acts as intermediary between the projects, ONE and the MEMEE
- It helps in leveraging finance for the solar projects selected. Five different development banks were involved in the 1st tender.
- It participates in CSP investments by providing equity through public private partnership (PPP).

There is a close cooperation between MASEN and ONE:

- ONE is one of the shareholders of MASEN with 25% of the shares. Other shareholders (all with 25%) are the State of Morocco and 2 foreign investment funds.
- MASEN negotiates grid access with ONE for the selected sites.
- The quantity of solar electricity auctioned and the technical requirements of the solar projects follow the needs from ONE in terms of electricity demand (E.g. ONE needs electricity at peak time which is after sunset, therefore MASEN tenders CSP technologies with storage that can provide dispatchable electricity).

Selection process

ONE and MASEN operate a **first-price sealed bid tendering system** (see Table 1). The tenders are carried out in two stages.

The first stage is a **pre-qualification stage** following the publication of an expression of interest. Projects are invited to express their interest and form consortiums. It is a pass/fail stage and participants must comply with strict qualification conditions: qualified based on an assessment of three criteria:

- **Experience** in developing the **solar technology** tendered. E.g. the lead company of the consortium must also have developed and operated a minimum capacity of 45 MW thermal solar power plant and not be liable for penalties or damages in performance or delay in excess of 5% contract value (Norton Rose, 2010).
- **Experience** in operating and managing **thermal power projects** elsewhere. E.g. the lead company of the consortium must have developed, operated and managed a thermal power plant in the last ten years totalling at least 500 MW including a minimum capacity of 100 MW in the last seven years (Norton Rose, 2010).
- **Financial requirement**: strong balance sheet. E.g. the lead company of the consortium must have developed, operated and managed a thermal power plant in the last ten years totalling at least 500 MW including a minimum capacity of 100MW in the last seven years (Norton Rose, 2010).
- **Material dispute**: A bidder (and each member of any consortium) must not have a material dispute pending or resolved against it in the past 10 years. “Material dispute” means a dispute where the amount in dispute is at least half of the net worth of the relevant company or where termination of a material agreement was sought. This is an unusual criterion and, on the face of it, applies to disputes in any part of a bidder’s worldwide activity (Norton Rose, 2010).

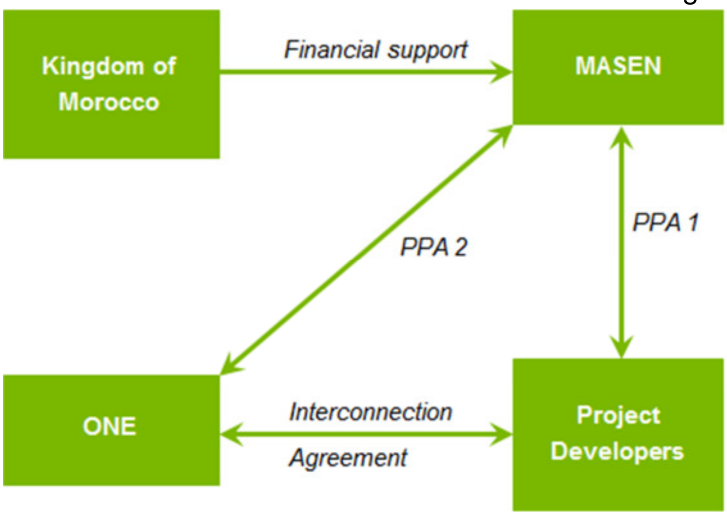
Only the qualified consortia participate in the tender. The projects are evaluated on their compliance with the technical specification of the tender (pass/fail) and then selected based on price. The consortium that complies with the technical specification and offers the lowest price wins.
For the first tender (Ouarzazate I), this process occurred in 2 stages. The 1st stage intended to build the capacity of MASEN on how to design the technical specifications and might be skipped in future tenders.

- First stage of tender aims at **defining the technical specifications** required from the offers. It is not a selection or elimination stage but a stage when MASEN and the prequalified bidders (e.g. four consortia in first tender) communicate and discuss the technology risks of solar projects and the required minimal technological specifications that the winning project must comply with. Because the Ouarzazate I tender was the first of its kind and MASEN had little technology experience, this stage was useful to select only technologically robust projects. At the end of this stage MASEN amended the minimal technological conditions for the projects participating in the second stage.
- Second stage with **selection of winning consortium** based on compliance with **technical conditions and price**. The price is the real selection criteria at this stage because the technical conditions do not require an assessment and ranking (only pass or fail).

Local content is not a mandatory requirement in the selection of projects, but a local content of minimum 30% is asked by MASEN in the tender document. It is in the interest of Morocco and the project developers to develop local content for local economic development. The main reason why local content is not a qualification criterion is because the international institutions supporting MASEN must guarantee fair international competition. Two studies were conducted to assess how much local requirement could be expected without distortion of competition and the figure of 30% came out (one World Bank study on local capacity in MENA region and one study on local capacity in Morocco). The winning consortium of the 1st tender indicated that they will include more than 30% local content.

PPA and project finance

MASEN operates with a double PPA structure that involves the signature of two PPAs back



to back (see

Figure 5). PPAs are typically guaranteed for 25 years.

- **PPA 1** between MASEN and the solar project company for the purchase of all electricity output from the project.
- **PPA 2** between MASEN and ONE according to which MASEN sells the electricity directly to ONE.

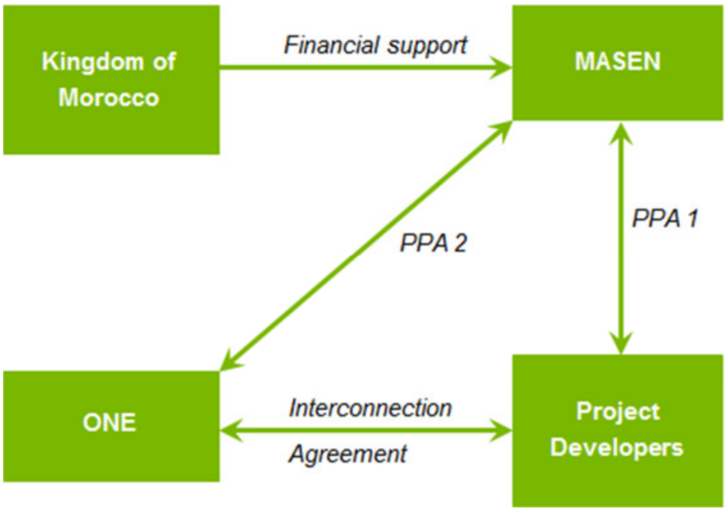


Figure 5 Double PPA structure. Source: Norton Rose, 2010.

Electricity flows directly from project company to ONE according to the interconnection agreement. MASEN only deals with financial flows: it pays the project price then recovers the price of electricity from ONE (ONE tariff at market price), and recovers the difference between the ONE tariff and the solar project tariff from the State of Morocco public budget. The benefit of this structure is that the cost of CSP projects is financed from 2 different sources: the electricity bills (via ONE) and the public budget (via MASEN).

There is no standard PPA so far for solar projects, but the PPA from first tender could serve as standard in future tenders. However, a term sheet of PPA conditions was communicated to the pre-qualified consortiums during the bidding process and Q&A sessions were organised. This helped to manage uncertainties for the consortiums and bring down the price.

For wind tenders managed by ONE, a standard PPA is available and easily bankable, although final PPAs are ad hoc.

Financial guarantees and penalties

Requirements and enforcement rules for financial guarantees and penalties are defined in the contract with the winning projects (which is confidential). MASEN requires financial guarantees like completion bonds and performance bonds from the winning project consortium, but the details are not transparent to the public. A reason for the lack of stringent guarantees as operated in other countries could be the PPP nature of the projects. Penalties for project delay vary with the severity of the non-compliance, but there have been no case of enforcement so far.
Moreover, the fact that solar and wind projects in Morocco operate under PPP means that risks are shared between the developer and ONE or MASEN and therefore the need for stringent guarantee from the developer to cover the risk of failure is less important than in purely privately owned projects.

2.2.2 Experience from the past and challenges for the future of solar tenders in Morocco

It is still too early to draw conclusive lessons from the solar tendering scheme in Morocco, as the first project has only recently been awarded. But some initial lessons can still be learnt from the tendering experience so far.

By having financial backing from consortia of international finance institutions led by the World Bank, the Moroccan Government was able to set up a dedicated governing agency and build technical and financial capacity to launch its first CSP auction. Also, Morocco was able to benefit from international experience when choosing, designing and procuring its auction process. However, the involvement of five international financing institutions with different sets of procurement rules also complicated the procurement process and makes the tendering system relatively complex.

In total there are five sites planned to be tendered across Morocco for a total of 2000 MW. The first tender aims for a 500 MW capacity at Ouarzazate. It will be the largest CSP project in the world (combined with some PV), and will be implemented in four phases. Phase one for tendering 160 MW (Ouarzazate I) started in 2010 and was concluded in 2012 (though financial close is still not finalised). The winning bid was the Acwa Power consortium at MAD 1.6 ($0.189)/kWh (compared to MAD2.06 ($0.23)/kWh from the ENEL consortium and MAD 2.06($0.23)/kWh from Abeinsa consortium). The expression of interest for the second phase (Ouarzazate II) was published in January 2013 for a total of 300 MW over two projects with different solar CSP technologies (200 MW + 100 MW).

MASEN does a lot of risk management in order to reduce the risk premium of the solar projects and drive down the tariffs. MASEN commissions a number of studies and take a number of actions in order to limit the cost/kWh and mitigate the risks related to non-financial barriers:

- Initial environmental and socio-economic impact assessments for each project site.
- Potential study with a pre-feasibility study for determining the type and size of CSP technology to be tendered.
- MASEN takes an active role in negotiating the conditions and costs of grid connection with ONE. Grid access is guaranteed to the winning project by MASEN and the details on cost-sharing is set in 2 conventions:
    - One between MASEN, ONE and the government of Morocco on cost-sharing for grid development
    - One between MASEN and ONE on grid development and grid connection of projects.
- MASEN manages and invests in the infrastructure development of the site selected for the project: road, water, telecom, grid, etc.

MASEN takes a number of actions to facilitate access to **finance at low cost** for the winning solar project:

- The winning consortium must create a special company under an EPC contract (engineering, procurement and construction) with MASEN to build the solar project. MASEN does not take directly any risk in the construction of the solar project, but it provides the debt to the EPC company (up to 100%) from its international sponsors at low interest rates.
- MASEN invests directly through a PPP not in the EPC company but in the solar project company (company that will manage the project after it is built). This solar project company will be a PPP with 25% equity from MASEN.

The provision of concessional finance through the international financing institutions and the financial backing provided to the bidders by MASEN led to a favourable financial result of the auction, i.e. low prices in the solar bids submitted. In the 1st tender the **final price was 1/3 lower than expected** (MAD 1.6/kWh). Such a relatively low price was achieved for different reasons:

- MASEN managed most of the risks (financial, permits, grid access…) and therefore lowered the risk premium of the project
- The winning consortium sees this investment as a strategic move to enter the Moroccan local and Northern African regional market because it will be the first of its kind project in the region.
- Significant part of the products are expected to be manufactured locally at low cost.

The experience from the first tender shows that the **tendering process is long**: prequalification started in March 2010, winner was announced end October 2012, and financial close is not yet finalised (but very close to being finalised). This first tender was exceptionally long because of the learning process for all the actors involved. A two stage bidding process was used in the first solar tender managed by MASEN to better understand the technical risk involved in setting up CSP projects. Both the International financing institutions and MASEN had no experience of CSP tenders of this scale so discussions with individual consortia were undertaken to carefully go through the technical specifications of each bidder. The challenge for the future is to build on the lessons from the first auction to simplify the selection process and speed it up.

The **PPP requirement** in both MASEN and ONE tenders is useful to facilitate access to finance and mitigate the risk premium, but the downsides are that:

- it maintains the competitive advantage of the public utility ONE on the electricity market
- it fails to open the Moroccan market to independent power producers and increase the competition in the electricity generation

MASEN managed to raise the interest of a number of consortiums in the first tender, but about one third of them were disqualified because of **demanding prequalification requirements**: 12 consortia expressed their interest, only 4 were pre-qualified, and 3 consortia participated in the final bidding (one company of one of the consortia went bankrupt so the consortium was disqualified). Again because of the demanding prequalification requirements only large and experienced companies have the experience, expertise and resources to participate in the tenders.

RE local development is still very uncertain in Morocco. MASEN is committed to support the development of a local solar industry and local solar capacity, but there are no mandatory local requirements in the solar tendering system. ONE introduced requirements for industrial integration of wind power in Morocco in its tendering system in 2010, but the implementation of the requirements is still unclear and proving challenging.

2.3 Lessons from RE auctions in Peru

2.3.1 Characteristics of the RE auctions in Peru

General features of the auctions

In 2008, the Peruvian government issued a new legislative decree for the promotion of investment in electricity from RE.[19] This decree designates the Ministry of Energy and Mines (MINEM) to be responsible for the design of the national renewable energy policy. Every five years, MINEM is mandated to define a certain amount of renewable electricity (excluding large hydro) that must be purchased by the Peruvian system operator at a premium price. For the first five years (until 2013), this quota was set at 5% of the total national electricity consumption. Unlike in other countries where the auction aims at procuring a capacity of renewable electricity, in Peru the auction calls for volumes of guaranteed electricity generation. A key benefit of this procurement system is that the contracted electricity is given guaranteed grid access and priority dispatch, which gives significant security to the investors.

With the exception of large hydropower, Peru had very limited experience in the development of RE projects and policy support for these technologies prior to 2008. The main motivation to design an auction scheme in Peru was to attract international consortiums to develop RE projects in the country. For this reason, the Peruvian scheme establishes almost no administrative barriers for companies to participate in the RE auctions (e.g. no prequalification, no local content requirement). Moreover, the resources available at the Ministry and the Peruvian Energy and Mining regulator (OSINERGMIN) to design, implement, and manage the auctions is very limited. As a result, the design of the auction scheme is very simple and straightforward, and therefore attractive to a large range of RE companies.

Eligible technologies
Peruvian auctions are technology-specific. Biomass, solar, wind and small hydro were the eligible technologies in the past two auctions. Quotas for each technology were defined by MINEM in each auction[20].

Selection process
Peru operates a **pay-as-bid sealed bid auction system** (see Table 1). The selection of projects is limited to one single round without prequalification requirements other than the submission of signed declarations. Companies have to register their projects in a web platform three months in advance of the auction. This registration stage requires very basic project data such as location of the plant, power capacity and a prefeasibility study.

The offers have to be presented in closed envelopes (sealed bids) at the premises of the regulator (OSINERGMIN) on the date established in the auction specifications. Winning projects are assigned based exclusively on the lowest prices until the volume auctioned per technology is covered. OSINERGMIN determines a ceiling price for each technology above which no offer will be accepted. Several factors are considered to determine the ceiling price, including the type of technology, capital costs, operating costs, a contract (license) period of 20 years, a rate of return of 12% per year, the size of the projects, the connection costs and other factors that encourage investment in cost-efficient projects.

Financial guarantees and penalties
Project developers have to provide three guarantees:

- A bid guarantee of 20.000$/MW released at signature of the contracts
- A construction guarantee of 100.000$/MW that can be increased if delays occur
- An operational guarantee maintained during the whole duration of the contract

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[19] EL PRESIDENTE DE LA REPÚBLICA, Decreto Legislativo de promoción de la inversión para la generación de electricidad con el uso de energías renovables DECRETO LEGISLATIVO Nº 1002, 2008 http://www2.osinerg.gob.pe/EnergiasRenovables/contenido/Normas/DL_No_1002.pdf

[20] Quotas defined per RE technology can be found at: http://www2.osinerg.gob.pe/EnergiasRenovables/contenido/SubastasAnteriores.html

Auction winners are given 60 days to sign a contract, releasing the bid guarantee and activating the construction guarantee. Once the project is successfully built, the operation guarantee is maintained during the whole duration of the contract. This guarantee can be exercised as a reduction in price proportional to the deviation of the actual annual energy generated from the annual energy offered in the auction[21].

A number of penalties are applicable:

- For delays in construction
  - Construction guarantee increased by 20%
  - Delay of more than 1 year: contract termination or extension with increased guarantee by 50%. Termination enforced in 1 case.
- For annual under/over production
  - Over production sold at market price (lower than contract price)
  - Under production penalised by reduction of tariff

PPA and project finance

The winners of the auction sign a contract with the government giving them priority dispatch and guaranteed access to transmission and distribution networks for 20 years (see Figure 6). This contract provides the guarantee for the project developer to receive the price resulting from the auction. No additional contract has to be signed with distribution companies. PPAs are standardised and templates are communicated to the developers before the auction. The process leading to PPA is short and seamless.

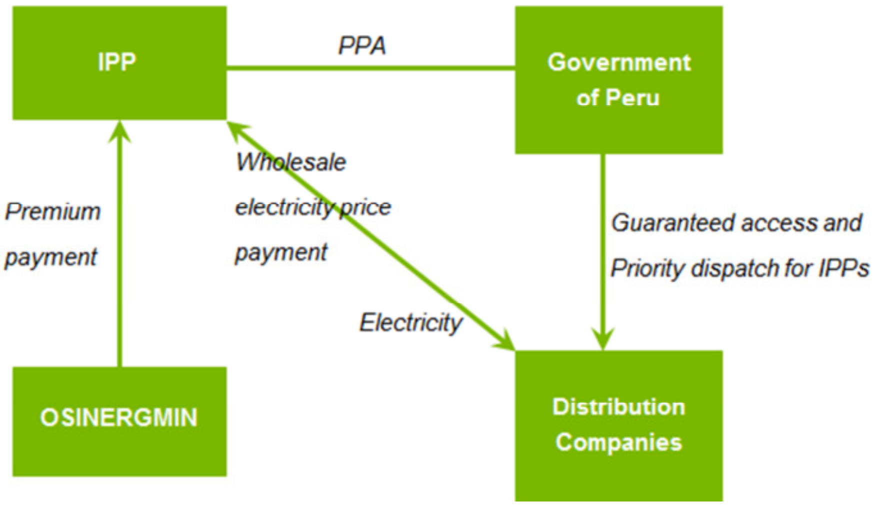

Figure 6 PPA structure in Peru

RE producers receive two types of payments under the PPA (see Figure 6):

- **Monthly payment for the electricity** generated and fed into the grid at wholesale prices from the power market operator
- **Quarterly premium payments** from the regulator OSINERGMIN. These quarterly premium payments close the gap between the wholesale prices paid by the market operator and the project price awarded in the PPA.

So far there have been no requirements to demonstrate financial capacity of the bids during the auction process but this may change in the future. The idea of having financial milestones to demonstrate access to finance before the signature of the PPA is currently being discussed.

[21] Projects selected in the first auction have started operation very recently (deadline for entry in operation was December 2012). There are still not enough statistics to assess whether projects are delivering the energy expected and whether these guarantees will have to be executed.

In Peru access to finance for RE projects is unregulated. There is no specific support from a public national development bank or public guarantees.

2.3.2 Experience from the past and challenges for the future of the RE auctions in Peru

Two RE auctions have been organised in Peru since 2008. In the first RE auction in 2009/2010, OSINERGMIN aimed to award contracts of 4380 GWh/year, of which 1314 GWh/year were to be generated from biomass and waste, wind and solar energy and up to 3066 GWh/year by small hydropower. A total of 33 projects were submitted and 26 projects were contracted, yet the targets were missed by far. The percentages of the targeted volumes per technology that attracted bids were: 18% of biomass, 178% of wind, 96% of solar, 32% of hydro. Consequently, a second round of auctions was launched to meet the volumes not covered. This round attracted 19 companies with 27 projects. As a result of this extra round, a single 18 MW hydroelectric project was awarded, which is a small fraction of the installed capacity targeted (338MW). The rest of participants (also including solar and biomass projects) were disqualified because the prices offered were higher than the ceiling price set by OSINERGMIN.

In the second RE auction organised in 2011, OSINERGMIN aimed to award contracts of 1300 GWh/year, generated from biomass and waste, wind and solar energy and up to 681 GWh/year by small hydropower. The volume of hydropower auctioned was substantially decreased with the intention to increase competition and level down prices[22]. A total of 39 projects were submitted but only 10 were contracted, which demonstrates a degree of increased competition between the two auctions. Nevertheless, only half of the envisaged total volume was met, which is due to the very low demand for biomass projects. Volumes for wind, solar and hydro were almost fully met.

Competitive prices (53$/MWh for small hydro, 119.9$/MWh for solar PV, 69$/MWh for wind) were achieved in the second auction when the conditions for higher competition were set: low, but undisclosed ceiling prices and lower technology caps.

With the experience accumulated in the first two RE auctions, a number of relevant conclusions can be already formulated.

The design and management of the auction scheme is very simple which benefits:

- the project developers : low administrative barriers and transaction costs
- the auctioneer: very limited resources needed to design and manage the auction.

This has enabled OSINERGMIN to implement and manage the scheme with minimal institutional costs and the limited resources available.

The simplicity of the scheme means that initial technical barriers for participants are very low. This has resulted in **new players** registering projects, contributing to an **increased diversity in the power market**. Most of the new RE volume contracted through the auctions has been assigned to independent power producers that were not present in the Peruvian market prior to 2008.

A majority of these new players are international companies. In this sense the scheme has been successful in **attracting foreign investment**. The two RE auctions from 2009 to 2011 secured a minimum of US$420 million investments[23].

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[22] Telephone interview with Riquel Mitma Ramírez, Technical Coordinator, OSINERGMIN (April 5th, 2013)

[23] FONDO MULTILATERAL DE INVERSIONES (FOMIN)/BLOOMBERG NEW ENERGY FINANCE (BNEF) (2012), CLIMA SCOPIO 2012 Cambio climático y clima de inversión en América Latina y el Caribe. Available at: http://www5.iadb.org/mif/Climatescope/2012/img/content/pdfs/esp/Climascopio2012-reporte.pdf

The **volumes of energy auctioned per category have been generally too high** to create enough scarcity (and thus competition) in the process. The volumes of energy offered in the first auction were not realistic and not representative of the real project demand existing in the country at that moment. Amounts of electricity from hydro, biomass and solar was not fully allocated and therefore there was no effective competition in price (e.g. biomass contracted only 18% of the volume offered; small hydro covered only 32%[24]). The introduction of a ceiling price was key to avoid paying very high prices for the energy auctioned, given the low demand for some technologies. The low demand was addressed by reducing the volumes offered for hydro and solar in the second auction; however biomass still has had a very low coverage (around 2%).

There have been cases of RE developers – especially small investors – experiencing problems to execute projects as planned. The reasons for these delays are varied. However, one major issue seemingly is that project developers are experiencing **difficulties in accessing finance**. Discussions are under way in OSINERGMIN and MINEM to require financial milestones in future auctions for project developers to prove their financial capacity before the signature of the PPA.

The MINEM has not decided so far on a **long-term plan** with specific RE targets per technology. This creates significant uncertainty for investors on the volumes that will be auctioned, discouraging project developers to plan in advance. In turn, this reduces the chances of the auction scheme to stimulate enough competition.

Despite stringent compliance rules with financial guarantees and despite penalties, the low level of technical barriers to participate in the auctions increases the **risk of delays and non-execution** in the construction stage. The success rate of projects starting operation on time is still not satisfactory:

- Out of the 27 projects selected in the first auction (selected in 2010 and scheduled to start operating in December 2012), 19 projects are operating[25]. Out of the 8 projects that are delayed:
    - One construction guarantee has been executed and the contract has been effectively cancelled.
    - One has suffered a force majeure incident (flood) during the construction phase.
    - The remaining 6 projects are delayed and their chances to be finally built are not clear. Among the reasons given by developers for these delays are problems with environmental permits and being unable to reach agreements with local communities. However, there are also concerns that developers are experiencing financial problems.
- Out of the 10 projects awarded in the second auction (selected in 2011 and scheduled to start operating in 2014) none of them currently present any delays in their progress reports[26].

[24] Results of the first auction can be found at: http://www2.osinerg.gob.pe/EnergiasRenovables/contenido/SubastasAnteriores.html
[25] Telephone interview with Riquel Mitma Ramírez, Technical Coordinator, OSINERGMIN (April 5th, 2013). Further details available at http://www.osinergmin.gob.pe/newweb/uploads/GFE/SupervisionContratos/sup1/SCGEE/7%20RER-TOTAL-1raSUBASTA.pdf
[26] Project developers need to submit a progress report to OSINERGMIN every 3 months after winning the auction.

3 Comparison of lessons learned from international experience

3.1 General lessons

The success of RE auctions or tenders depends not only on the design of the system, but heavily on **external factors** like:

- The preparedness of the electricity system to integrate RE IPPs (e.g. liberalised or monopolistic market, available access to markets for IPP, vertically integrated or unbundled network system)
- The institutional framework (e.g. strength and independence of institutions managing the tenders, capacity building within institutions in charge)
- The regulatory framework (e.g. procedure for environmental permits, regulated grid connection)
- The attractiveness of the RE market (e.g. RE potentials, RE project experience, local acceptability)
- The availability of a local supply chain industry and relevant local skills, especially when local content requirements are requested
- The infrastructure for project development in locations with high RE potentials (e.g. roads, energy, water, IT infrastructure)

None of the schemes has proven to be **perfect**, serving as a blueprint for other countries. And each scheme is designed to fit in a **particular** political, economic and social **context**, as well as to meet **different policy objectives** beyond the procurement of RE electricity (e.g. local economic development, attracting international investments, mitigating GHG emissions, stimulating innovation in new technologies). Applying the lessons learned from one country to another must always be handled carefully by reflecting on the context and policy objectives of the countries beyond their tender or auction systems.

A key design principle for any auction or tender is that it should create competition by auctioning a scarce product (in this case: renewable electricity). Selection criteria and volume should be defined in way that the bids will clearly surpass the auction volume. This requires, among others, an ex-ante market analysis, in order to ensure that a sufficient number of bidders exist that can meet the auction requirements. Also, the market power of bidders should be taken into account, in order to limit the risk of strategic bidding.

A number of generic lessons can be learned from the assessment of the international experience in RE auctions and tenders. The next sections present some of the key lessons. Summary tables compare whether or not these lessons are implemented in Brazil, Morocco and Peru.

3.2 Lessons for pre-qualification of bidders

- ➢ Find **right balance** between the need for pre-qualification requirements to qualify only serious bidders and the need for accessible requirements to avoid discouraging project developers and to stimulate competition
- ➢ Avoid a complex selection process and adopt **pass or fail** requirements. Clear and straightforward requirements help to make quick decisions
- ➢ Making use of an **online platform** to automatise the steps of the selection process that are simple to manage (e.g. **pre-qualification** with pass/fail criteria) help to make the entire process more efficient.

Brazil	Morocco	Peru	South Africa
Highly standardized process for pre-qualification of bidders with evolution towards more stringent requirements	Pre-qualification of bidders based on demanding project experience, financial background and material dispute as typical in first-price sealed bid tenders.	No pre-qualification	Phase of qualification of bidders before selection of preferred bidders
Auction system is fully automated (web-based) and selection is almost instantaneous	Auction process long and complex. No automatic or online process.	Auction simple and straightforward. Web platform to register projects.	Auction process complex and not automatised.

Table 4 International comparison on pre-qualification of bidders

3.3 Lessons to reduce the risk related to grid connection

- **Transparent grid tariffs, guaranteed grid access and priority dispatch** are key success factors to lower the risk premium and avoid project delays.
- **Coordinating grid expansion** and modernisation plans with RE targets helps to ensure the feasibility of grid connection.
- In case of unreasoned delay of grid connection **compensation payment for the project developer** and penalties for the TSO incentivise timely grid connection.

Brazil	Morocco	Peru	South Africa
Grid tariffs known to bidders before the auction. No priority dispatch.	Grid access guaranteed and conditions for grid access and grid tariffs managed by MASEN. They are known to qualified bidders	Priority dispatch and guaranteed grid access is guaranteed to winning projects in the PPA	Grid connection negotiated with Eskom. The requirement to start construction within 180 days regardless of timelines for physical grid connection is an important risk for developers

Table 5 International comparison on reducing the risk of grid connection

3.4 Lessons for setting ceiling price

- **Ceiling price is necessary** to cap the risk of high cost to consumers and stimulate competition. However disclosing the ceiling price before the tender can have the opposite effect (bidders bidding close to the ceiling price) when the volume tendered is not competitive enough (no scarcity of volume).
- Using **competitive bidding to determine the ceiling price** can help setting it closer to the actual generation cost, as long as collusive behaviour is avoided.

Brazil	Morocco	Peru	South Africa
Ceiling price determined in 1st stage of the auction through competitive bidding process called descending price auction	Not applicable because first-price sealed-bid tenders	Ceiling price set by OSINERGMIN based on assessment of technology costs. Low ceiling price in 2nd auction led to low number of projects qualifying.	Ceiling price fixed based on REFIT prices and disclosed

Table 6 International comparison on setting ceiling price

3.5 Lessons for local content requirements

- Local content can be an objective in tendering systems that shall **promote local development** but it is also a barrier to market entrance and as such it may be in conflict with WTO trade rules[27].
- Local content requirement **can limit the level of competition and/or delay project completion** if too stringent
- To be successful it **requires local capacity** building and local industries that need support and capacity building beyond the tendering system

Brazil	Morocco	Peru	South Africa
Local content not required in auction but by BNDES for access to finance. Lack of local wind energy suppliers led to low level of competition and delays in delivery of first wind auctions	Local content is no exclusion criterion, but MASEN ask for min 30% from bidders. Industrial integration is a selection criterion under the Integrated Wind Energy Programme of ONE	No local content requirement since objective is to attract foreign investors in Peru	Increasing minimum local content requirements in windows 1, 2 and 3 (25%-40%)

Table 7 International comparison on local content requirements

3.6 Lessons for PPA

- Using **standardised PPAs** with conditions known in advance by bidders can help to limit risks and uncertainties.
- **Involving financial institutions in the design of PPAs** helps to make them bankable.
- The payment of the PPA price to the project should be **simple and secure**.

[27] See WTO 2013 (http://www.wto.org/english/tratop_e/invest_e/invest_info_e.htm): "The Agreement on Trade-Related Investment Measures (TRIMS) recognizes that certain investment measures can restrict and distort trade. It states that WTO members may not apply any measure that discriminates against foreign products or that leads to quantitative restrictions, both of which violate basic WTO principles. A list of prohibited TRIMS, such as local content requirements, is part of the Agreement."

Brazil	Morocco	Peru	South Africa
Standard PPA known to bidders before the auction. BNDES involved in design of PPA. Projects have to sign PPAs with all distribution companies, this makes the payment process complex.	Term sheet of PPA communicated and discussed with bidders during bidding process. Double PPA structure for solar tenders. Standard PPA available for ONE tenders and easily bankable.	RE producers receive two payments under the PPA: • Monthly payment for the electricity generated and sold into the grid at wholesale prices from the power market operator • Quarterly premium payments from the regulator to close the gap between the wholesale prices paid by the market operator and the project price awarded in the PPA	PPA for 20 years with the transmission operator Eskom, and implementation agreement with the DOE

Table 8 International comparison on PPA

3.7 Lessons to facilitate access to finance at low cost

- Different ways to **facilitate access to finance and reduce cost of capital**: public development bank, PPP, government guarantees, Ministry act as intermediary to negotiate with financial institutions
- Risk allocation is crucial, as lower risks will lower the risk premiums and project costs but can create indirect costs to society. Explicitly addressing the question of "**who is best placed to take which risk** ?" helps to make the scheme less costly and thus more efficient.

Brazil	Morocco	Peru	South Africa
BNDES facilitates quick and cheap access to finance	MASEN plays role to facilitate access to concessional finance and invest in project equity via PPP (25%) MASEN manages a number of the risks that are usually born by the bidders. One SPE company for construction of project and other company with PPP for operation once built so risk sharing	OSINERGMIN does not facilitate access to finance. Most risks (except grid access) are the responsibility of the project developers	Access to finance through local commercial banks The Renewable Energy Finance and Subsidy Office (REFSO), offers advice to developers and other stakeholders on renewable energy finance and subsidies

Table 9 International comparison on facilitating access to finance at low cost

3.8 Lessons to avoid delays of construction and failures to deliver the contract

- Requesting **financial guarantees** that cover the whole duration of the project from bidding until completion of the contract.
- **Penalties** for delays and under/over performance increase compliance with contract: increase financial guarantees, reduce tariff, termination of contract. Differentiate between delays caused by project developer's fault and caused by external actor (e.g. environment licence or grid connection).
- Setting up **early warning systems** to identify delays at early stage helps to constructively address delays in a timely manner.

Brazil	Morocco	Peru	South Africa
Financial guarantees requested: bid bond and project completion bond. Contract termination for delays over 1 year (not consequently applied). Solutions for early warnings of problems and delays in construction of projects are being discussed	Financial guarantees requested from winning consortium (completion bonds and performance bonds, no bid bond) and penalties for delay, but details confidential in contracts. No experience yet due to the early stage of the process.	Bid guarantee and construction guarantee, with operation guarantee maintained during the whole duration of the contract. Project developers must submit a progress report to OSINERGMIN every 3 months after their selection in the auction.	Bid guarantee required for qualification of bidders Termination of contract if non-compliance

Table 10 International comparison on avoiding delays of construction and failures to deliver contract

4 Recommendations for South Africa

The analysis of the tendering scheme in South Africa presented in section 1 shows that there are still a number of challenges in the design and implementation of the REI4P. From the assessment of the lessons learned from international experience and discussions with stakeholders a number of policy recommendations can be formulated for the REI4P or its successor in South Africa.

We acknowledge that it is difficult to pin down recommendations that would be able to meet all the different policy objectives pursued by the REI4P: (a) increase of RE generation capacity by IPP to increase the country's capacity reserve problem, (b) create jobs and local development, (c) at low cost. With such different policy objectives at stake it is difficult to design and manage tenders that would be successful on all accounts. In addition, the tenders will only be able to meet these objectives if they are supported by the necessary enabling conditions, including: strength and independence of institution in charge, regulated third party access to grid, regulated planning permits, local acceptability, local capacity and supply chain, availability of infrastructure in high potential locations.

Here are some more specific recommendations:

R1 Guarantee access to the grid and priority dispatch to preferred bidders with transparent tariffs assorted with penalties and compensations in case of unreasonable delay from grid operator

Grid access and route to market are the main risks for developers in South Africa and the monopolistic position of Eskomas grid operator and single buyer makes developers vulnerable to Eskom's responsiveness. A regulation in favour of regulated guaranteed grid access, priority dispatch and route to market at transparent and regulated prices would remove uncertainties and bring down the prices. However, the delays in putting in place the envisaged ISMO and the lack of responsiveness ofEskom will make it difficult to implement in the short term.

R2 Consider using automatic tools for speeding up and simplifying the prequalification and selection of bidders, using an online platform for instance

This idea has not been concretely envisaged so far and it would help to speed up the tendering process, avoid the delays experienced in the last tenders and reduce simplify the work of the DoE and Treasury. It would require that the prequalification requirements and selection criteria are simplified and designed to be assessed automatically as far as possible. The ambition here is to fine tune the existing tending system to make it simpler, quicker and cheaper to manage. However, one can expect that it would be difficult to implement because of the lack of capacity within the DoE and Treasury and their dependency towards external transaction advisors.

R3 Use updated analysis of technology, economic and market conditions in South Africa to set the ceiling prices and avoid disclosing the ceiling price before the start of the tender

The levels of the feed-in tariffs envisaged under the REFIT programme was a useful indicator for identifying a maximum range for the ceiling prices under the REI4P but the ceiling prices used under the REI4P must be set based on updated analysis of the cost of the technologies in South Africa. The results of the first two windows shows that prices were close to the ceiling price and relatively high. This situation is positive for attracting investors at the start of the programme but to lower the prices achieved in subsequent tenders the ceiling price must be lowered to account for technology, economic and market learning, and ideally not disclosed to encourage competitive price discovery.

R4 Consider preselecting areas or corridors where projects must be developed in priority

Preselecting areas eligible for projects could bring a number of benefits for the government, including focusing construction of infrastructure (grid, roads, IT, water) in selected areas, facilitating planning procedure and engagement with local communities, and increasing competition by creating scarcity for bidders. This idea is being discussed in South Africa but it faces some challenges: it would create preferential zones for economic development and this is politically sensitive, it is difficult to put in place where the lands are private.

R5 Set up a clear and straightforward process for monitoring and verifying the impacts of the local development targets of the contracted projects.

Economic development is a key objective of the REI4P and the conditions requested from the bidders are ambitious. However, without an appropriate process for monitoring and verifying the actual impacts of the projects on the different dimensions of local development it will be impossible to evaluate the success of the programme. To set a process with clear rules and straightforward to implement would eventually limit the transaction costs for all stakeholders.

R6 Use standardised PPAs for the projects contracted under the REI4P with conditions known in advance by bidders

The use of standardised PPA with transparent conditions known in advance by bidders (therefore removing room for lengthy negotiations) would contribute to reducing the delays experienced so far to reach financial close. In addition, to communicate the conditions in advance helps remove uncertainties on the conditions of the route to market for the bidders, lower that risk with eventually a positive impact on the prices offered.

R7 Consider requesting financial guarantees from preferred bidders to incentivise timely delivery of contracts

Delays in construction or under/over performance of projects leads to costs for the society. This is especially true in South Africa where the electricity reserve margin is low and the electricity contracted through the REI4P will be needed to maintain the stability of the system. Currently the main penalty for failures to deliver is the termination of the contract. The use of financial guarantees (e.g. construction bonds, performance bonds) as penalties for delays (e.g. in construction or entry in service) and over-under performance (e.g. producing too much or not enough electricity creating instability on the market) would strengthen the enforcement of compliance and introduce solutions for early warnings and early actions.

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