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Counteracting market concentration in renewable energy auctions: lessons learned from South Africa

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Highlights

- South Africa's renewable energy auctions have led to some market concentration.
- Market concentration appears not to have resulted in market domination.
- Market concentration coincided with increasing competition and lower project prices.
- Preferential procurement conditions can limit market concentration.
- Policy certainty is also needed to counteract market concentration and dominance.

Abstract

Competitive bidding programmes, or auctions, are becoming the dominant method for procuring utility-scale renewable energy generation capacity and have coincided with significant cost reductions of renewable energy (RE) technologies. The use of price in auctions as the main awarding criterion has been criticized for apparently leading to market concentration and dominance in project ownership. We investigate: to what extent South Africa's renewable energy auction programme has contributed to market concentration and dominance; if market concentration and dominance have a negative impact on electricity cost in the auction; and to what extent measures taken to counteract market concentration and dominance have led to improved competition and diversity of project ownership.

The study analyses bidding data from awarded solar photovoltaic (PV) and wind projects, complemented by interviews with key stakeholders in the industry and in government. While there has been some degree of market concentration, it was not observed to have an adverse impact on project pricing or market development. Introducing preferential conditions for small, local players has been more effective at counteracting market concentration than an overall lowering of entry barriers. Finally, policy certainty and predictability seem more important to counteract market concentration and dominance than any auction design measures.

Keywords

Renewable energy; Auctions; Market Concentration; South Africa.

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1 Introduction

Competitive bidding programmes, or auctions, are becoming the dominant procurement method for the deployment of new renewable energy projects – globally and in particular in developing countries (Haufe and Ehrhart, 2018; IRENA, 2017). Auctions harness competitive pressures between bidders to reveal true costs (also called price discovery) and reduce profit margins along the value chain (Eberhard and Naude, 2016a; Hubbard and Paarsch, 2016; Kemplerer, 1999). The use of auctions has coincided with significant support cost reductions for several renewable energy (RE) technologies across various jurisdictions, including Brazil, China, Morocco, Peru and South Africa (Lucas et al., 2013); Cyprus (Kylili and Fokaides, 2015); Spain, Denmark, France, Germany, Ireland, Italy, Netherlands, Portugal, UK, Poland, Russia, Chile, Argentina, California, Mexico, Quebec, Panama, Uruguay (del Río, 2017a); the UAE (Griffiths, 2017); Uganda, Zambia and Ghana (Lucas et al., 2017).

Some have argued that there is a substantial 'price' being paid for this auction-based reduction in renewable energy support costs. Auctions are criticized for seemingly leading to market concentration and dominance – with large, often international industry incumbents reportedly being able to out-bid smaller, newer and/or local bidders (del Río, 2017a; Grashof, 2019; Lundberg, 2019). This can be especially concerning for jurisdictions where renewable energy deployment has traditionally been driven by small, community-based projects (e.g. Germany, Denmark)[1]. It has also been argued that the dominance of large, international players in auctions may depress the development of a nascent domestic renewable energy sector. Market dominance is furthermore a concern for the efficiency of auctions in general, since an increasingly smaller number of large actors may lead to less competition

[1] In Germany's 2015 solar PV auction, for example, no small-scale bidders were awarded any contracts (Lundberg, 2019; Tiedemann, 2015).

during consecutive bidding processes, resulting in higher prices in the long-run (del Río, 2017a; Held et al., 2017).

Several countries, including Germany, Colombia, and Zambia, have attempted to limit or counteract market concentration and dominance in or through their renewable energy auction programmes. This has resulted in higher project prices in Zambia (Kruger and Eberhard, 2018) and Germany (Lundberg, 2019), and even the cancellation of an entire auction round in Colombia (IRENA, 2019). These examples highlight the persistent uncertainty regarding the dynamics behind auction-linked market concentration, its costs and, maybe most importantly, appropriate policy responses to counteract it.

This paper aims to improve our understanding of auction-induced market concentration and dominance and its potential remedies through a detailed empirical account from the South African context, where auctions remain the only viable route to market for utility-scale renewable energy projects. It contributes to the literature by providing empirical evidence of the prevalence and impact of auction-induced market concertation, as well as the effectiveness of two potential remedies. In the tradition of empirically rich and valuable single-country auction case studies on Turkey (Yalılı et al., 2020), Germany (Grashof et al., 2020; Lundberg, 2019), Brazil (Bayer, 2017; Rego and Parente, 2013), South Korea (Kwon, 2018), Chile (Reus et al., 2018) and Italy (Cassetta et al., 2017), among others, it provides input to a 'conceptual generalisation', i.e. that findings explained by theoretical concepts will support the case for generalisation of these concepts (Flyvbjerg, 2006; Yin, 2003).

Specifically, we investigate the following questions: (1) Have auctions contributed to market concentration and dominance of project ownership in the South African renewable energy sector?; (2) Does market concentration and dominance appear to have a negative impact on support costs resulting from the auctions?; (3) Have any of the measures taken by the auctioning authority in South

Africa to counteract market concentration and dominance led to an improvement in competition and the development of domestic renewable energy project ownership?

The paper continues with a presentation of the conceptual framework in section 2, followed by a description of the research design and methods in section 3. The analysis starts by outlining the design and modalities of the South African auction programme (section 4), followed by the quantitative and qualitative results - presented in section 5. Conclusions and policy recommendations are presented in section 6.

2 Conceptual Framework

2.1 Market concentration and dominance

For the purposes of this study, market concentration refers to the extent to which market share is distributed amongst the majority shareholders of awarded renewable energy projects, whereas market dominance refers to the power resulting from a single firm (or a small group of firms) owning a very large share of the market. We define the market as awarded renewable projects in auctions, and market participants as bidders (majority project shareholders) in those auctions.

Market concentration is most commonly measured using one of two measures: the concentration ratio (CR), calculated as the sum of the percentages of the market share of the largest enterprises in the industry concerned; or the Herfindahl-Hirschman Index (HHI), calculated by summing the squares of each firm's market share, thereby giving a larger weight to firms with large market shares. A HHI score of 10,000 denotes a situation where one firm owns 100% of the market (monopoly), whereas a score of 1,000 might denote e.g. 10 firms of equal size, each with 10% market share (Rhoades, 1993). For practical use, the US Department of Justice uses a HHI score of 2500 to identify a highly concentrated market (Rhoades, 1993).

In this paper, we analyse market concentration as defined and measured by the Herfindahl-Hirschman Index (HHI) since it does not leave any firms unaccounted for – a key criticism of CR (Pavic et al., 2016) - and since it has a history of real-world application in RE auctions (IRENA, 2019). The HHI has e.g. been used in Colombia's RE auction programme to determine whether the renewable energy auction programme was able to diversify the industry. As a result, the country's 2019 auction was cancelled after initial analysis of the results showed that the HHI score would be 7836, well above the maximum limit of 2800 set by the auctioning authority and corresponding to a situation in which a single bidder would be awarded 88% of the auction volume (IRENA, 2019).

The literature suggests that market concentration in RE auctions is mainly driven by larger companies being able to bid projects at lower prices due to: i) benefitting from economies of scale in project development and implementation (Dobrotkova et al., 2018; Grashof, 2019; Hochberg, 2018; Lairila, 2016), ii) being able to bid from project portfolios (Amazo et al., 2017; Grashof, 2019), iii) being more able than smaller companies to absorb the sunk costs of unsuccessful bids (Grashof, 2019); iv) having access to better financing options, e.g. corporate finance (Del Río and Linares, 2014; Grashof, 2019; Hochberg, 2018; Toke, 2015), v) squeezing project development and implementation margins and benefitting from multiple revenue streams through bringing more services in-house (i.e. vertical integration) (Dobrotkova et al., 2018; Hochberg, 2018); vi) having more experience with auctions (Grashof, 2019; Hochberg, 2018; Lairila, 2016) and vii) having more negotiating power to drive down supplier and service provider costs (Amazo et al., 2017; Dobrotkova et al., 2018). The literature also mentions a number of counteracting factors at play favouring local and smaller companies such as i) the potential willingness to accept lower investment returns (Grashof, 2019; Lairila, 2016), ii) less risk sensitivity (Haufe and Ehrhart, 2018) (although this is disputed in the case of community owned projects by Grashof (2019)), iii) better knowledge of local political contexts (Grashof, 2019; Lairila, 2016), iv) better understanding of local cultural phenomena (Grashof, 2019; Lairila, 2016), and v) a higher ability to manage political clientelism (Del Río and Linares, 2014; Grashof, 2019).

2.2 Approaches to counteract market concentration

In the auction design literature, two main auction design approaches are proposed to counteract market concentration and market dominance. The first is to lower the entry barriers in an auction. This is based on two assumptions: First, smaller companies are more affected by entry barriers than large companies; second, smaller bidders will bid more aggressively (being less risk averse) because of their lower winning probability (Haufe and Ehrhart, 2018) and because they are more readily able to declare bankruptcy when their bid turns out not to cover the realised project cost (i.e. the winner's curse). Given these assumptions, it is suggested that an auctioneer can potentially alter the outcomes of an auction by lowering entry barriers, after which the more aggressive smaller bidders will obtain higher market shares, thereby lowering market concentration (Estache, A; Iimi, A; Ruzzier, 2009; Estache and Iimi, 2012; Kreiss et al., 2016; Welisch, 2018).

Entry barriers in RE auctions include: i) access requirements, ii) physical qualification criteria and iii) financial qualification criteria. Access requirements refer to requirements set by the bidding authority for bidding firms to provide evidence of their technical and financial capabilities to realise the project. These can include minimum annual turnover, minimum amount of successfully developed project capacity and minimum number of projects in operation. The objective of these restrictions is to ensure a certain quality of bids and increase project realisation rates. These requirements do not have a direct financial or bidding cost implication, but still act as barriers to entry, affecting the level of competition and bidder diversity in the auction (Kreiss, Ehrhart and Haufe, 2017 and Haufe and Ehrhart, 2018).

Physical qualification criteria refer to project preparation activities that a developer has to undertake prior to entering the auction, e.g. securing the site, obtaining permits, conducting geotechnical studies, etc. Stringent physical qualification criteria lead to a 'late' entering of projects in the auctioning process, where they are already well progressed in their development process (Haufe and Ehrhart, 2018). This is generally thought to increase project realisation rates. However, the 'later' the auctions are undertaken, the more costly it is to bid (and the more equity is put at risk), which consequently may lower the level of competition and limit bidder diversity (Grashof, 2019).

Financial qualification refers to the use of financial instruments such as bid bonds: on-demand, irrevocable cash deposits underwritten by banks or insurance providers that bidders provide to the auctioning authority at the time of bidding (Ferroukhi et al., 2015; Haufe and Ehrhart, 2018). The bonds are retained for winning projects, and the auctioneer can call on these deposits if the developer fails to sign the project documents once awarded or even if the developer fails to deliver the awarded capacity. Bid bonds are implemented to disincentivise opportunistic bidding behaviour, ensuring bidder commitment through increasing the cost of non-realisation. Bid bonds can also be seen as an indirect signal of a bidder's financial strength – which has been established as important for improving an auction's effectiveness (Kreiss et al., 2016). The higher the bid bond, the more it affects the level of competition and bidder diversity since fewer potential bidders will be willing or able to deposit the bond.

While both physical and financial qualification criteria increase the cost of bidding, their impacts differ: bid bonds are released to unsuccessful bidders, while physical prequalification costs are sunk costs that typically cannot be fully recovered[2] (Haufe and Ehrhart, 2018). Higher access and qualification requirements generally make it more difficult for smaller, newer actors to participate in auctions since they are less able to meet the minimum thresholds and/or bear the associated additional costs.

[2] Consecutive bidding rounds allow bidders to "recover" some of these sunk costs through participating with the same project in several rounds. Still, many of the prequalification costs (e.g. permits) are often time-sensitive and may not be usable in a next bidding round.

Entry barriers can also be reduced by introducing a two-stage bidding process. In the first stage (prequalification phase) of a two stage bidding process, bidders are required to demonstrate their ability to meet a range of requirements before being allowed to access the bidding documents during a subsequent bidding phase. Most often, first stage requirements only include access requirements, such as proof of financial and technical capability, but in some cases it might include a lighter version of the same physical and financial qualification criteria of the second stage (e.g. half of the bid bond) (PPP Knowledge Lab, 2019). A two-stage process is seen to reduce bidding and evaluation costs for bidders and the auctioneer alike, since fewer full bids end up being submitted. Bidders that do not meet the qualification criteria are therefore spared the costs of preparing a complete bid, while auction authorities are spared the costs of evaluating these bids. It is, however, also a longer process and it has been argued that the additional phase might increase costs overall (Eberhard and Naude, 2016b)

The second approach to counteracting or limiting market concentration is to provide preferential conditions for small actors in terms of reduced financial and physical qualification criteria for specific (small) actors, different pricing rules for specific actors or quotas for small actors (Kitzing et al., 2019; Mora et al., 2017). Auctioning authorities can for example limit the auction volume that can be awarded to a single bidder[3], carve out a dedicated auction volume for smaller bidders and/or set special qualification and winner selection criteria for smaller bidders.

In practice, auction design aimed at counteracting market concentration often includes a combination of a general lowering of entry barriers and preferential requirements and conditions for selected types of bidders (small, SMEs, cooperatives, national, black owned etc), which we illustrate using the case of South Africa.

[3] While this does not directly target smaller actors, it increases their chances of winning.

3 Research design and methods

Our research presents an explanatory case study of South Africa's renewable energy auction programmes, specifically focusing on ownership of solar PV and onshore wind projects. South Africa has been widely hailed as a global best practice example, spurring auction adoption in many developing nations and in particular many African countries. The programme saw strong competition and significant price reductions in each successive round, with average solar PV prices falling by 80% while onshore wind prices reduced by more than 50% between 2011 and 2015 (Eberhard and Naude, 2016a). Data on awarded projects from the first three rounds also indicate that some of these cost reductions have been accompanied by increasing market concentration (Baker and Wlokas, 2014). With respect to market concentration, which is the focus on this paper, we consider SA to be 'general' rather than an 'extreme' case, well suited for an explanatory case study (Flyvbjerg, 2006; Yin, 2003).

The research for this study was conducted using a mixed methods sequential explanatory design (Creswell, 2003), involving quantitative data collection and analysis followed by a second stage of qualitative data collection and analysis. The second stage thus builds on the results of the first and seeks to illuminate and further explain some of the results emerging from the quantitative data. During the first quantitative phase, we analysed bidding data from awarded PV and wind projects in the South African auction programmes, focusing in particular on the origin and composition of project shareholders. Bidding data for awarded projects was made available by the South African parliament (Ministry of Energy, 2018). Through descriptive statistics as well as Herfindahl-Hirschman Index (HHI) calculations, we explored the extent to which market concentration in project ownership has taken place across the different bidding rounds and programmes.

The second qualitative phase aimed to explore the reasons behind the quantitative results of phase one. We aimed to understand whether market participants and auctioning authorities saw market concentration taking place and viewed it as a problem that required corrective action. We furthermore sought to identify the drivers of market concentration, the impact of auction design choices on market concentration and the outcomes of these choices. During this phase we interviewed 12 stakeholder organisations, including bidders, project owners, developers and contractors as well as government officials from the IPP office and the Department of Mineral Resources and Energy (DMRE). The sample included four South African and six international companies, representing about 50% of the capacity awarded in the bidding programmes. The interviews were conducted as semi-structured interviews guided by a pre-developed interview guide. Four of the 12 interviewees consented to have the interviews recorded to support the writing of notes. For the remaining eight interviewees, detailed notes were written immediately after each interview, and sent to the interviewees to confirm their accuracy.

Interview notes were coded using qualitative data analysis software (NVIVO), combining conceptual categories from the literature on renewable energy auctions with emergent themes from the interviews. The concepts were mainly grouped according to three categories:

- Auction design, which concerns the choices made about how the bidding programme is structured, including access requirements, qualification requirements, evaluation criteria, penalties, project allocation restrictions and staged bidding (del Río, 2017b; Eberhard and Naude, 2016a; Haufe and Ehrhart, 2018);
- Auction implementation, which is concerned with how the designed auction programme is executed – both with regards to the process and the institutions involved (Eberhard and Naude, 2016a; Saussier et al., 2009; Zitron, 2006).
- Auction outcomes, which is concerned with the results from the auction programme (incl. tariffs, market concentration, realization rates, socio-economic objectives), how it impacted various categories of stakeholders (incl. developers, lenders, EPCs) and the possible reasons for these outcomes (incl. barriers to entry and market concentration drivers) (Del Río and Linares, 2014; Dobrotkova et al., 2018; Grashof, 2019; Hochberg, 2018).

For a detailed listing of the codes and their descriptions, please see appendix A.

4 Analysis

South Africa's auction programme offers examples of both approaches to counteracting market concentration described in section 2: the utility-scale Renewable Energy Independent Power Producers Procurement Programme (REI4P) saw a gradual lowering of qualification criteria over successive rounds, which would theoretically have allowed a larger pool of bidders to take part and potentially be awarded bids. The Small Projects IPP procurement programme (SP-I4P) was in turn specifically set up for the benefit of smaller South African companies that were unable to compete with larger international bidders in the REI4P. These programmes are thus able to offer preliminary insights into the effectiveness of both approaches to limiting market concentration.

4.1 The Renewable Energy Independent Power Producers Procurement Programme (REI4P)

The REI4P programme was set up as a single-stage, pay-as-bid, sealed-bid reverse auction with dedicated technology bands for solar PV, onshore wind, concentrated solar power (CSP), small hydro, biomass and landfill gas. Ministerial determinations formed the basis for bidding windows (rounds) implemented by the IPP office: a quasi-independent procurement agency set up by then Department of Energy (DoE) and National Treasury's PPP unit. Bidders were competing for a 20-year power purchase agreement (PPA) countersigned by the country's vertically integrated monopoly utility Eskom and backed by a sovereign guarantee. While there were no formal limits on the amount of capacity that could be awarded to a single bidder, project sizes were capped, varying by technology (e.g. 75 MW for solar PV, 140 MW for onshore wind) (for more detail, see Appendix B).

Bids were essentially required to be financial-close ready by the time of submission, needing to have secured all land rights, grid connection agreements, permits, bankable resource assessments and financing commitments. REI4P featured not only several late-stage physical qualification criteria, but also financial qualification criteria including a ZAR100 000/MW bid bond. Qualifying bids were scored 70% on price and 30% on a basket of socio-economic and economic development (SED & ED) criteria, including job creation, local content, ownership, management control, preferential procurement, enterprise development and socio-economic development contributions (for more detail please see Appendix B).

There have been four REI4P rounds, or bid windows (BWs), held since 2011, with a special additional bid window (BW 3.5) for concentrated solar power (CSP). While some of the SED and ED qualification thresholds have been increased over time, several physical qualification criteria have been alleviated or removed (see Tables 1 and 2). As an example, bidders needed to submit priced and signed sub-contracts for all major service providers (including equipment suppliers) during the first three rounds, but not in the fourth. Also, several permitting requirements were removed in later rounds, including the need to obtain rights over land to be traversed by connection lines (BW3), and land use, subdivision and zoning approvals by bid submission (BW4) (Eberhard & Naude, 2016).

Table 1: Changes to legal requirements during REI4P Bidding Windows (BW) (compilation drawing from Eberhard & Naude, 2017) (Indicators: √ : same as previous BW; ÷ : requirement removed)

BW 1	BW 2	BW 3	BW 4

Single Purpose Vehicle [1]	Constitutional Documents of the Project Company	Legal status of the Project Company	√
Shareholders Agreement [2]	√	√	÷
Confirmation of acceptance the PPA, Implementation Agreement (IA), Direct Agreement (DA) & Connection Agreements and adherence to the requirement that no mark-ups or amendments are permitted.	√	Confirmation of acceptance of the PPA, IA, DA the & the Connection Agreements and submission of Returnable Schedules	√
Statement by the Members [3]	√	÷	÷
Key Subcontracts [4]	√	√	÷

1: From BW 1, the bidding documents required that sellers under the PPA must be Project Companies that have the sole purpose of undertaking the project. However BW 2 added that if such a company was already established at bid submission then its Constitutional Documents must be submitted.

2: The bidder was required to submit a fully developed Shareholders Agreement, between the Project Company and its shareholders, with written proof of acceptance of this agreement by all equity participants.

3: Each shareholder of the bidder had to provide a statement discussing any investigations, complaint proceedings or material legal proceedings, amongst others, against them in the past 5 years.

4: The bidder had to submit detailed heads of terms of the contracts it would enter into with its key Contractors, Equipment Suppliers and any other Contractors.

Table 2: Changes to permitting requirements during Bidding Windows (BW) for PV and wind projects (Eberhard & Naude, 2016) (Indicators: √ : same as previous BW, ÷ : requirement removed)

BW 1	BW 2	BW 3	BW 4

PV and Wind	PV	Wind	PV	Wind	PV	Wind
Environmental Impact Assessment or Basic Assessment Report	√	√	√	√	√	√
Water use application[1]	√	√	√	√	÷	÷
Civil Aviation Commissioner Consent	√	√	√	√	÷	√
Consent from the Heritage Authority in terms of the National Heritage Act	÷	÷	÷	÷	÷	÷

Access requirements were similarly restrictive in all bidding rounds: bidders needed to demonstrate that either the net assets of each ultimate corporate and/or equity finance provider(s) over the preceding three years were at least 100% of the financing it was proposing to invest in the project (net asset test), or that the provider had a proven track record in the preceding five years of raising corporate/equity finance equivalent to at least 100% of its proposed financing (track record test). A similar test was required for debt financing. Finance providers also had to provide signed term sheets and signed letters of support that required firm financing commitments and pledges that they had conducted due diligence of the proposal. Furthermore, REI4P bidders had to prove that their proposed EPC firms had experience with at least two similar projects and their wind assessment experts had 5 years of relevant experience. In addition to the wind assessment expert performing the forecast energy sales report, another independent expert had to review it. Equipment, including wind turbines and solar PV panels used for proposed projects, had to be internationally certified[4].

[4] This requirement of an international certification (in terms of the wind turbine's design) was not meant to exclude the local manufacturing of the turbine.

4.2 The Small Projects IPP procurement programme (SP-I4P)

The SP-I4P programme was launched in 2014 and ran along similar lines to REI4P as a sealed-bid, pay-as-bid reverse auction. Bidders were competing for a similarly framed and tenored PPA as in the REI4P, although for smaller projects (up to 5MW). Unlike REI4P, SP-I4P was run as a technology-neutral programme with all eligible renewable energy technologies competing against each other.

While the REI4P programme followed a single-stage bid submission process, the SP-I4P followed a two stage process to eliminate underprepared or under-resourced bids, with the stated aim of mitigating the risk of new and inexperienced developers incurring significant bid preparation costs on projects that may have little or no chance of success (Department of Energy, 2013). Most RE auction prequalification rounds in sub-Saharan Africa require only proof of financial and technical capability, but the SP-I4P required several physical qualifications in the first phase (stage 1), albeit in a lighter version than in the second phase (stage 2) (see Table 3).

Table 3: SP-I4P (pre)qualification criteria (GreenCape, 2014)

Evaluation Criteria	**Stage 1**	**Stage 2**
Legal Criteria & Evaluation	✓	✓
Land (Acquisition & Use rights)	✓	✓
Environmental Criteria & Evaluation	✓	✓
Technical Criteria & Evaluation	✓	✓
Economic Development Criteria	✓	✓
Financial Criteria & Evaluation	×	✓
Structure of the Project	×	✓
Value for Money	×	✓

Physical qualification requirements were slightly relaxed for SP-I4P compared to the REI4P programme. The environmental permitting requirements for SP-I4P (stage 1) were generally less onerous than for REI4P, only requiring an environmental impact assessment report if deemed necessary by an independent, qualified practitioner. Regarding access to land, SP-I4P bidders (stage 1) merely needed to submit a letter from the land owner indicating that they were willing to enter into negotiations with the project once awarded, and another letter indicating the types of legal authorisations that would be required with respect to the site. Bidders were not asked to submit any bid bond either.

Access requirements were also slightly relaxed for the SP-I4P. Project equity providers still had to pass either the net asset or the track record test, but lenders were only required to submit a letter in support of preliminary credit approved term sheets, as well as a plan for obtaining final credit approval. EPC providers only needed to have experience with a single previous project, and the wind assessment expert only needed 3 years of relevant experience. The expert was also simply required to be independent of the bidder and no review was prescribed. The SP-I4P did not require international certification of equipment, instead using the standards developed by the South African Bureau of Standards (SABS) and required by the national grid codes in an attempt to encourage local manufacturing.

A key objective of the SP-I4P was to ensure significant participation of South African firms who are emerging, small power developers. Accordingly, bidders were required to have 40% South African Entity Participation at bid submission (same as under the REI4P), thereafter increasing to 60% within no more than one third of the Scheduled Operating Period. Another notable difference to the REI4P was that small and medium enterprises (SMEs) were required to have shareholding of at least 10% in the Project Company at bid submission, which had to increase to 30% within one third of the Scheduled Operating Period. The programme also removed most of the SED thresholds - although it maintained the categories for bid scoring purposes; increased the local content requirement to 50%;

and also introduced an additional category – SME participation and spending. This changed the relative weighting of the SED criteria (Table 4).

Table 4: SED criteria weighting of the REI4P vs. SP-I4P (Eberhard & Naude, 2016)

Element	**REI4P Weighting**	**SP-I4P Weighting**
Job Creation	25%	**20%**
Local Content	25%	**20%**
Ownership	15%	15%
Management Control	5%	5%
Preferential Procurement	10%	10%
Enterprise Development	5%	5%
Socio Economic Development	15%	15%
Participation by SMEs	0%	**10%**
Total	**100%**	**100%**

5 Results & Discussion

5.1 Impact of REI4P on market concentration and dominance

Our analysis of the four REI4P rounds since 2011 revealed that competition increased in each round (Bid Window) (see Table 5) and coincided with such decreases in prices that price caps were removed for solar PV and wind from BW4. Prices in BW4 were so low that the DoE decided to double the capacity awarded, meaning that 26 instead of the originally planned 13 projects were secured. A separate expedited round was implemented in 2015, which allowed previously compliant bidders to submit bids without having to go through the full qualification process. The majority of bids and capacity across all rounds were awarded to wind and solar PV projects (Tables 5 and 6).

Table 5: Number of bids per REI4P bid window (IPP office, 2019)

Bid Window	Year	Number of bids received	Number of bids awarded	PV and wind bids awarded
1	2011	53	28	26
2	2012	79	19	16
3	2013	93	17	13
3.5	2014	3	2	
4 (a&b)	2014	77	26	24
Expedited	2015	106	19	Not available

The REI4P achieved a 95% project realisation rate for BW1 to BW3, which makes it exceptionally effective in the context of global auction programmes. Interviews revealed that REI4P is perceived as one of the most onerous bidding programmes in the world. The projects awarded in BW4 (as well as one project awarded in BW 3.5) were, however, not able to reach financial close for more than four years after being awarded due to Eskom's refusal to sign their PPAs. While these projects have now all reached financial close after their PPAs were eventually signed in 2018, the projects awarded in the expedited round have still not been announced. The government's integrated resource plan (IRP), which was gazetted in October 2019, announced annual PV and wind capacity development of 1 and 1.6 GW from 2020 to 2030, but so far no new procurement rounds (BWs) have been announced for the auction programme (Department of Mineral Resources and Energy, 2019).

Table 6: REI4P results for PV and Wind (based on Eberhard & Naude, 2016)

	Wind						PV					
	BW 1	**BW 2**	**BW 3**	**BW 4a**	**BW 4b**	**Total**	**BW 1**	**BW 2**	**BW 3**	**BW 4a**	**BW 4b**	**Total**
Capacity awarded (MW)	649	559	787	676	686	**3,357**	627	417	435	415	398	**2,292**
Projects awarded	8	7	7	5	7	**34**	18	9	6	6	6	**45**
Average tariff (ZAR c/kWh)	114	90	74	62	72		276	165	99	79	85	
Exchange rate (Zar/$)	8	7.94	9.86	12	12.5	**12.5**	8	7.94	9.86	12	12.5	**12.5**
Average tariff (USD c/kWh)	14	11	8	5	6		35	21	10	7	7	
Total investment (ZAR m)	13,876	13,783	16,969	13,466	15,330	**73,423**	23,559	13,841	8,145	8,504	8,363	**62,411**
Total investment (USD m)	1,734	1,736	1,721	1,122	1,226	**7,540**	2,945	1,743	826	709	669	**6,892**

Analysing awarded REI4P bids based on the projects' majority shareholders (ranging between 25% to 95% shareholding, with a median of 60%) shows that each round of bidding generally saw more capacity being awarded to a smaller pool of mostly large international bidders (e.g. ENEL Green Power). The Herfindahl-Hirschman Index (HHI) scores, as depicted in Figure 1, crossed the 2500 threshold that the US Department of Justice uses to identify a highly concentrated market (Rhoades, 1993) in BW3, but decreased for BW4 – though it should be noted that the doubling of awarded capacity for BW4 is responsible for this lower score.

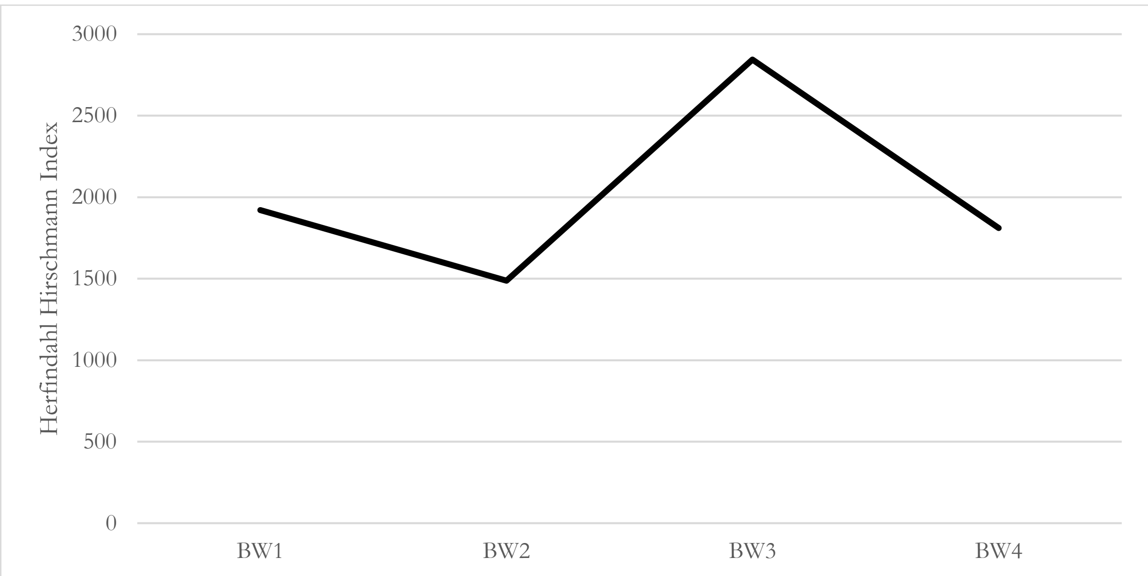

Figure 1: Herfindahl-Hirschman Index scores for REI4P bid windows based on capacity awarded

When disaggregating the data according to the technology bands within which bidders were competing, we can conclude that the market for onshore wind became concentrated from BW2 onwards, as indicated by high HHI scores (see Figure 2). Interviews indicate that this may in part be because the barriers to entry for the wind sector are relatively high, with a wind project bid generally costing twice as much to prepare as a solar PV project bid. For solar PV, the market saw relatively low levels of concentration in BW1 and BW2, which changed dramatically in BW3 and remained relatively high in BW4, despite the doubling of awarded capacity.

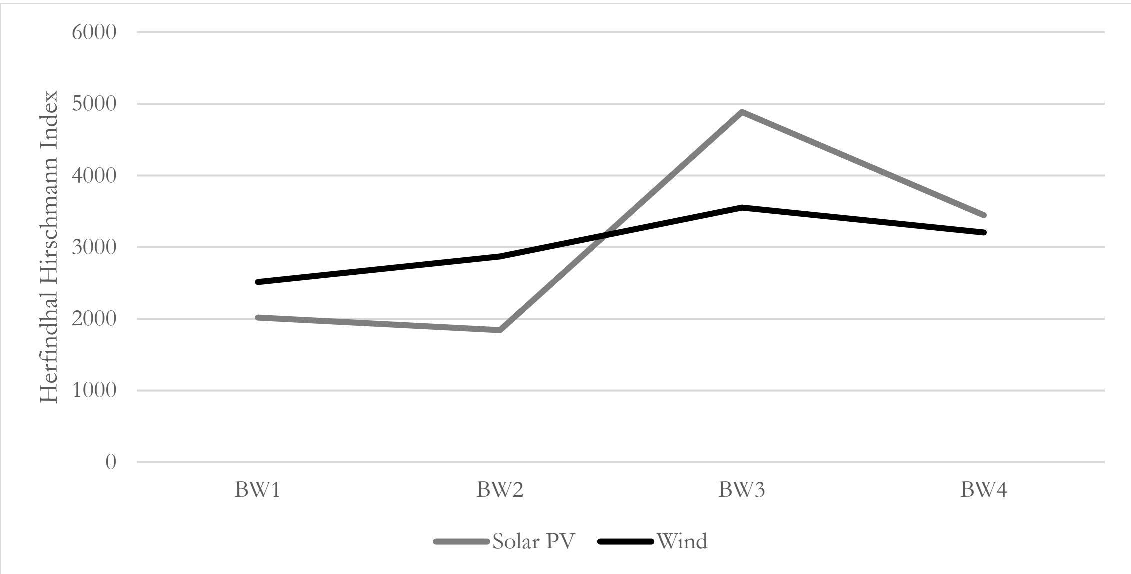

Figure 2: Herfindahl-Hirschman Index scores for REI4P bid windows by technology based on capacity awarded

It would, however, be amiss to conclude that market concentration has been taking place to a significant degree. What the HHI analysis does not show is that the successful bidders tended to differ from round to round. In BW3, only three bidders – ENEL Green Power, Sonnedix (in partnership with Mulilo) and Total (also alongside Mulilo) – secured solar PV capacity. ENEL Green Power, Longyuan (in partnership with Mulilo) and Mainstream Renewable Power secured all onshore wind capacity in BW3. In BW2, the only bidder from this group to have secured any award was ENEL Green Power, with a single 9MW project. BW4 saw more bidders awarded, and while ENEL

Green Power was awarded most of the onshore wind capacity, Old Mutual[5] and Scatec were awarded the lion's share of the solar PV projects (Figure 3 and Table 7). This is confirmed by a cumulative HHI score of 1590 for solar PV and 1156 for onshore wind across all bid windows.

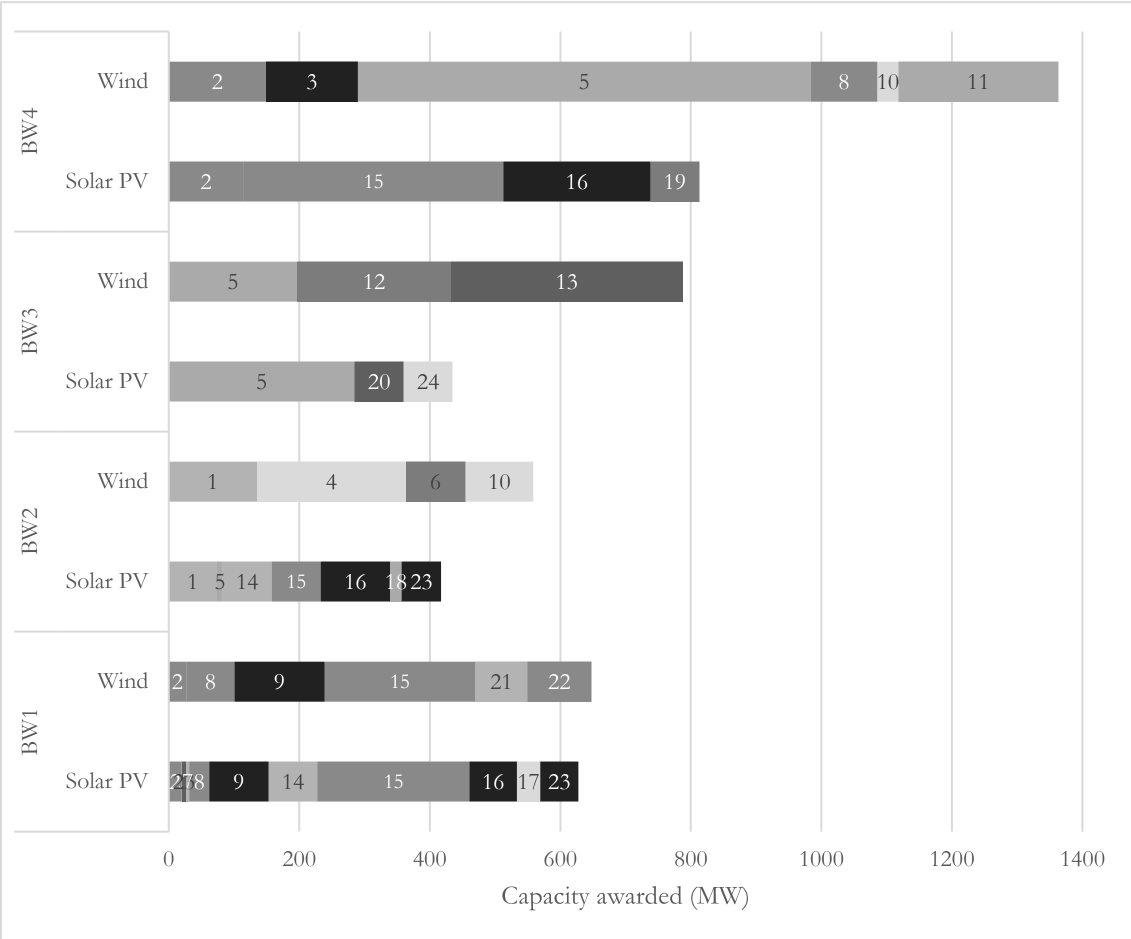

Figure 3: REI4P capacity awarded to project majority shareholders by technology, BW1 to BW4

[5] Old Mutual bought SunEdison's projects after the latter declared bankruptcy in 2016. While there have been other transfers of equity in the period after projects reached financial close, we have limited our analysis to shareholder at the time of bidding (except for the SunEdison projects, which happened under extraordinary circumstance). This is due to the fact that the project contracts do not allow any transfer of ownership within the first three years of operation, and after that only with the explicit consent of the IPP office.

Table 7: List of majority shareholders for REI4P projects awarded BW 1 - 4

			BW1		**BW2**		**BW3**		**BW4**	
Nr	**Majority Shareholder**	**Country of Origin**	*Solar PV*	*Wind*	*Solar PV*	*Wind*	*Solar PV*	*Wind*	*Solar PV*	*Wind*
1	Acciona	Spain			74	135				
2	Biotherm	South Adfrica	20	27					115	150
3	Building Energy	Italy								140
4	Cennergi	South Africa				229				
5	Enel Green Power	Italy			9		285	197		694
6	Engie	France				91				
23	Evolution One	South Africa	7							
7	Franco Afrique Technologies (Pty) Ltd	South Africa	5							
8	Gestamp	Germany	30	74						102
9	Globeleq	UK	91	138						
10	InnoWind	France				104				32
11	Lekela	Netherlands								244
12	Longyuan	China						235		
13	Mainstream	Ireland						355		
14	Moncada Energy Group	Italy	75		75					
15	Old Mutual	South Africa	233	231	75				397,9	
16	Scatec	Norway	73		106				225	
17	Soitec Solar GmbH	France	36							
18	Solaire Direct	France			18					
19	Solar Capital	UK							75	
25	Sonnedix	UK					75			
20	Standard Bank	South Africa		80						
21	Summit Wind	Japan		98						
22	SunEdison	USA	58		60					
24	Total	France					75			
			628	**647**	**417**	**559**	**435**	**787**	**813**	**1363**

Analysis also shows that the observed market concentration has to an extent coincided with market dominance by international firms, especially for onshore wind (Figure 4).

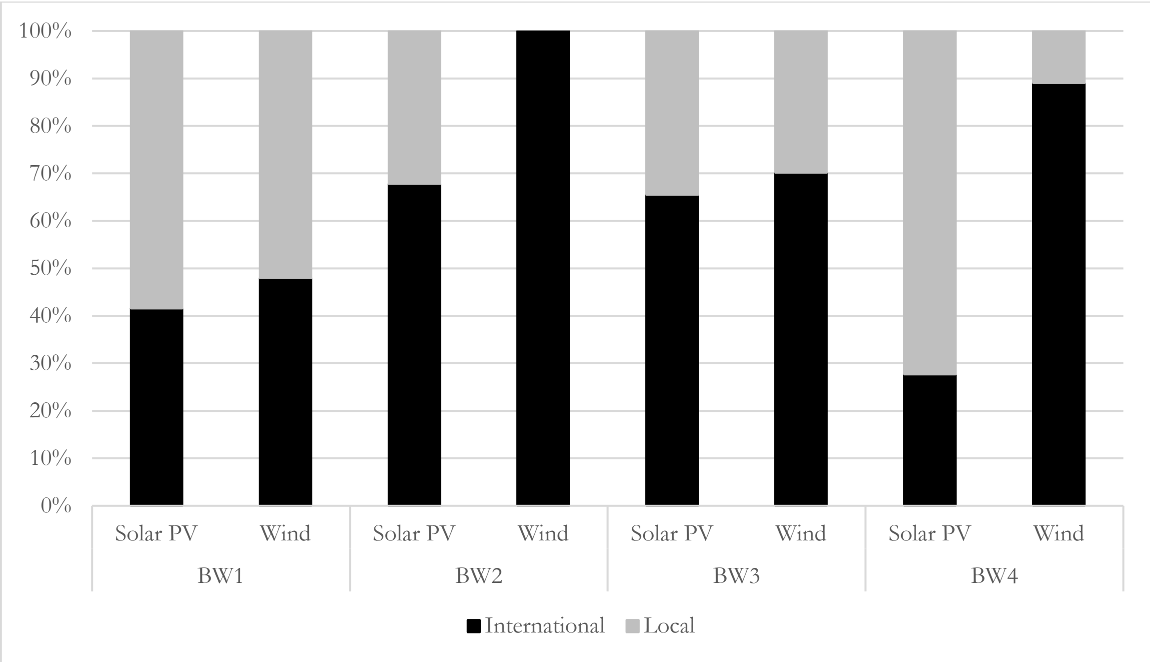

Figure 4: Market shares of local vs. international companies in REI4P

Despite the lowering and even removal of certain qualification and access criteria over time, bidding costs decreased only marginally, and interviewees in general did not consider the lowering of qualification criteria to have any effect on reducing market concentration. This could be because the interviewed bidders did not see the lowering of entry barriers as signalling a significant improvement in small bidders' winning probability. When asked about the main drivers of market concentration, interviewees identified five elements that are unique to the types of bidders that dominate the market: i) their ability to access cheaper capital, often in the form of corporate financing; ii) economies of scale; iii) their ability to develop and bid a portfolio of projects, thereby aggregating and reducing costs across the portfolio; iv) their negotiating power that comes with being a major international player, driving down supplier and service provider costs; and v) their ability to integrate the project development and operations functions, thereby squeezing margins across the value chain and opening up additional sources of revenue for a project. Interestingly, the perception of the larger stakeholders was that the five explanations related to company size, structure and value chain integration were far more important than the level of entry barriers in terms of physical and financial qualifications, while the smaller companies tended to acknowledge some effect of lowering the entry barriers.

Finally, several interviewees pointed out that the BW4 PPA signing delays and continued policy uncertainty played a much bigger role in limiting market development and bidder diversity than the auction process or its design. This type of market concentration is not visible in the analysed data (based on awarded capacity), but it will be interesting to see the effect of this instability when the next bidding round has been launched.

The implications of the observed market concentration are difficult to assess, but there are some indications that auction efficiency in terms of price reductions has not been seriously affected, with prices continuing their steep decline over the bidding rounds, even as larger volumes were being awarded to fewer bidders. Neither have we seen a significant decrease in competition levels; in fact, there has been a general trend of more bids being submitted during each round. According to the interviews, the perception amongst stakeholders is that in spite of the prevalence of some market concentration, the level of competition is rather increasing than decreasing.

Further, according to our interviews, it is important to note that the prominence of large, international firms in the awarded pool of bidders does not necessarily imply a crowding out of other players. They represent only one part of the value chain – in this case majority shareholding – which is in the South African programme still coupled with community, Black Economic Empowerment (BEE) and local shareholding. More generally, the South African renewable energy industry has expanded significantly over time and an increasing number of project developers, investors, lenders, advisors and service providers are engaged in REI4P (Matsuo and Schmidt, 2019; Morris et al., 2020).

5.2 Impact of the SP-I4P on market concentration and dominance

Under the SP-I4P programme, two stage bidding was applied in two bid windows. The number of bids received in the two Small Project Bid Windows (SP BWs) compared to bids awarded is shown in Table 8. Ten projects totalling 50 MW including biomass, onshore wind and solar PV were announced and awarded in SP BW1 in 2014 , and ten projects totalling 50 MW, all solar PV, were awarded in SP BW2 in 2016. The data illustrates that competition was fierce in SP BW1, but decreased significantly for BW2 (Table 8).

Table 8: Number of bids submitted, qualified and awarded in the SP-I4P (source: IPP office)

Bid Window	Number of bids received (1st stage)	Number of bids received (2nd stage)	Number of bids awarded
SP BW1	102	43	10
SP BW2	29	20	10

Despite the apparent easing up of competition in SP BW2, average project prices were lower compared to SP BW1 (see Figure 5). Average prices for both SP BW1 and 2 were generally slightly above those for REI4P BW3 for solar PV, although the price difference for wind was more pronounced (Figure 5). This is to be expected due to economy of scale, considering that the REI4P wind projects were on average 28 times as large as those awarded under SP-I4P. However, even though solar PV scales down more easily than wind, solar PV bid prices of the SP-I4P projects were significantly higher than those of REI4P BW4.

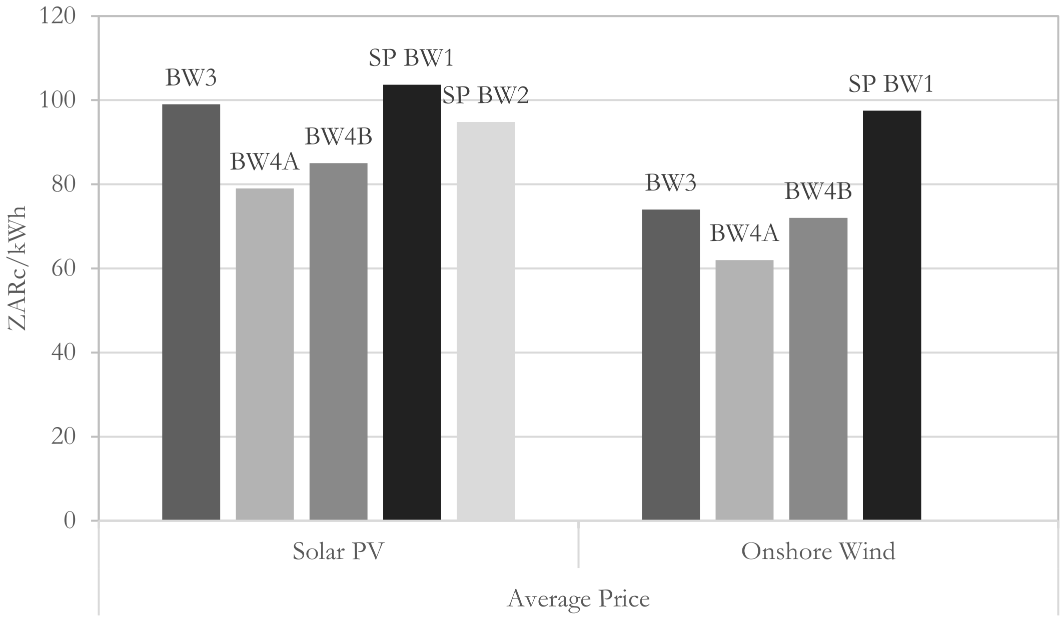

Figure 5: Comparison of REI4P BW3 & BW4A & 4B bid prices with average SP-I4P BW1 & 2 prices for PV and wind (source: Mew, 2019)

At first glance, the SP-I4P programme appears to have done better at providing local business opportunities for South African companies. Of the successful projects, the majority of project shareholding is in South African hands; many of these shareholders did not take part in any previous REI4P bid windows. According to interviews with preferred bidders, the fact that the SP-I4P projects were so much smaller than the REI4P projects meant that local players who were previously unable to meet the access and qualification requirements were suddenly in a much better position. The amount of finance, experience and information required was also small enough to allow these companies to participate and win. Perhaps more significantly, interviews with larger international developers reveal that the small project sizes meant that many of these developers or project owners active in REI4P were simply not interested in bidding, since the costs involved in bidding were still high for a much lower reward and because the prominence of local shareholding and SME participation evaluation criteria increased the competitiveness of local firms.

The introduction of a two-stage bidding process did not, according to interviews with preferred bidders, considerably help smaller bidders, mainly because of the large number of physical qualification criteria to be met in the first phase. They rather considered the two-stage process as increasing overall costs by setting significant physical qualification criteria at both stages and by prolonging the tender period and preparation intensity, as also noted in Eberhard and Naude, (2017) and GreenCape, (2014).

Several projects were awarded to companies that had experience from other projects outside of the SP-I4P (Figure 7). These include: i) a consortium led by Cronimet, a multinational company that develops, constructs and operates its own power projects in the mining and industrial sector; ii) a number of minority and majority shareholders in REI4P, such as Building Energy, an Italian company; Mulilo, a large South African developer & owner-operator of several REI4P projects; Aurora/SOLA future, a South African developer of commercial and industrial solar PV projects, also active in REI4P, and Old Mutual, South Africa's largest institutional investor with several projects in REI4P. This raises the question whether the SP-I4P is truly affording "smaller", "emerging" power project developers or sponsors an opportunity for project award or simply awarding smaller projects to entrenched players. On the other hand, the award of Aurora's/SOLA Futures' projects has demonstrated the SP-I4P's ability to facilitate local players competing at a higher level. Aurora/SOLA Future only had minor shareholdings in its REI4P projects since it was unable to pass the access requirements on its own, whereas it now owns a significant 80% of its SP-I4P projects and will serve as the EPC and O&M contractor, thereby deriving much greater economic benefit (Eberhard and Naude, 2017).

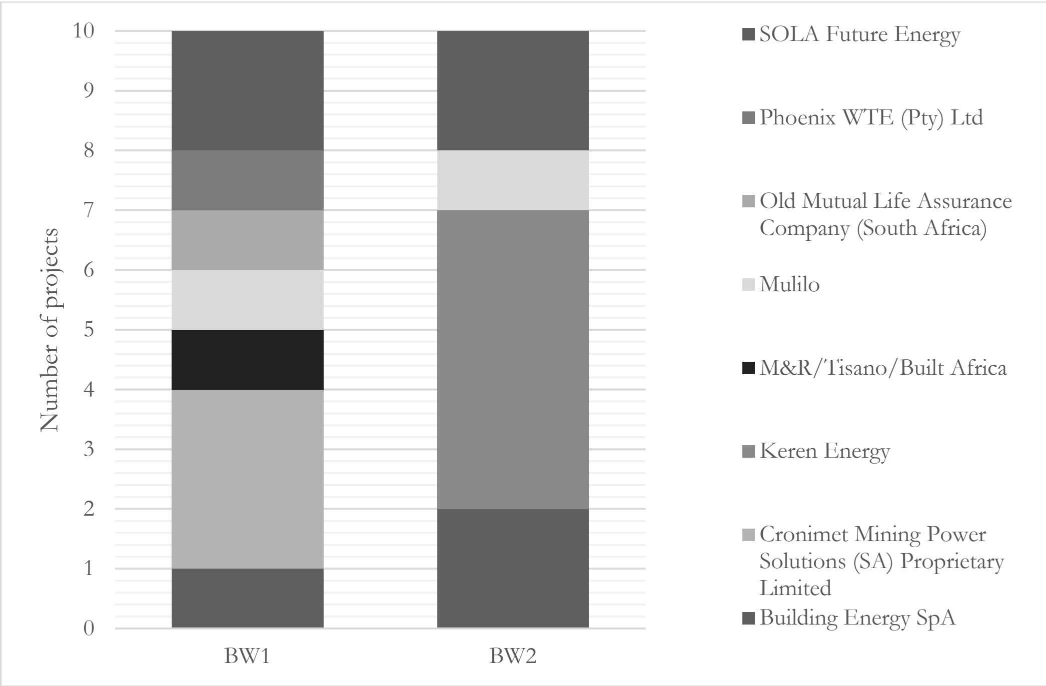

Figure 7: Number SP-I4P projects awarded to majority stakeholders in BW1 and BW2 (source: author analysis based on data from IPP office)

Recognising that the market represented by SP-I4P is much smaller than in REI4P, it is still notable by how much market concentration increased from one round of bidding to the next. Seven firms were awarded capacity in SP-BW1 (HHI: 1800), while only four were awarded in SP-BW2 (HHI: 3400). Of the four, one company – Keren Energy – was awarded half the capacity (5 projects). As a result, the HHI score for SP-BW2 is close to that for the solar PV projects in BW4. Taken in combination with the decrease in the number of submitted bids in SP-BW2, this suggests less competition in the smalls programme.

The fact that Keren Energy – a South Africa company with no track record in the renewable energy industry – was able to win so many projects while competing with some of the most successful REI4P bidders could also be an indication that market concentration in the SP-I4P is as much driven by bidder behaviour as by costs. The lower barriers to entry in SP-I4P allowed this smaller, 'weaker' bidder to be awarded many projects, perhaps thanks to their willingness to bid very aggressively.

At this point in time, the SP-I4P outcomes are unfortunately not much more than a theoretical discussion. None of the projects have had their power purchase agreements signed by Eskom, meaning that they have not been able to advance to financial close and construction. Awarded bidders have been invited by the IPP office to open negotiations on lowering project prices (including increasing project sizes to 10 MW and increasing the length of the PPA to 25 years) and increasing BEE ownership. Despite this, there has been no indication whether or when the key contracts will be signed. While South Africa is experiencing a significant shortage of power from 2018, the seeming reluctance to secure these projects at these slightly higher prices (0,3% higher for solar PV compared to BW 3, 21% higher compared to BW 4) appears to indicate a low willingness by the South African government to pay for counteracting market concentration and supporting local smaller players.

6 Conclusion and Policy Implications

Our analysis has shown that while there has been a high level of market concentration in the later rounds of the South African renewable energy auction programmes, it does not necessarily conform to a pattern that would inevitably lead to consolidation and dominance by a small group of powerful international companies. Bidding success for larger companies was never a predictable outcome, as illustrated by the variation in each round of bidding.

Further, we do not observe market concentration having an impact on project pricing or market development in general. Each round of bidding – in both the large and small IPP procurement programmes – has seen significant competition and price reductions. In addition, the South African renewable energy market has grown substantially over time as more and increasingly specialized investors, service providers and advisors have become involved.

The levels of market concentration differs somewhat with respect to programmes and technologies. The market for both large and small projects experienced increasing levels of concentration for both wind and solar PV. For larger REI4P projects, this latter dynamic is mainly driven by large, often international bidders' ability to drive down project costs through a combination of lower costs of capital, economies of scale, value chain integration and negotiating power. Given REI4P's high barriers to entry, South Africa is likely to see the continued prominence of these bidders in future procurement rounds. Market concentration for smaller projects appears to be driven in part by the aggressive bidding of smaller, less experienced players (in at least one case), although cost continues to play an important role in determining bidder competitiveness.

The results also indicate that introducing preferential conditions for small, local players has been a more effective way of increasing bidder diversity – if not necessarily limiting concentration – than an overall lowering of entry barriers. That being said, there was only a marginal reduction in entry barriers over time in REI4P; a more dramatic lowering could well have resulted in different outcomes, including potentially lowering project realization rates.

It is also worth reflecting on the costs and trade-offs of limiting market concentration. Concerns about market concentration have been raised primarily in the global North, where renewable energy markets have developed in a relatively decentralized way driven by premiums or subsidies (often through feed-in tariffs). The global South is not facing the same trajectory and some level of market concentration – or at least scale, combined with sufficient competition – may be needed to deliver affordable electricity. Similarly, the development of local manufacturing capacity requires sufficient scale, which again implies some level of concentration if the market size is generally limited (Hansen et al., 2020; Morris et al., 2020).

If market concentration is indeed of concern to a country, any auction design intervention is best coupled with policy certainty and visibility. The delays in the signing of PPAs and rolling out new rounds of procurement in South Africa may have done more to force market consolidation than the competitive pressures of the procurement model. Many smaller, local companies have been forced to close down or sell their projects, while some international firms have simply left the country. Any attempt to grow the South African renewable energy sector – and in particular the participation of local developers and project owners – will be best served by providing market certainty and predictability.

Finally, it is worth noting that this study has not analysed the market concentration impacts of auctions vs. other policy mechanisms, since there are currently no other routes to market for utility scale projects in South Africa. This paper's exclusive focus on project ownership also means that concentration in other parts of the value chain, such as equipment manufacturers, requires further investigation. The narrow focus on majority ownership also means that nuances in the changing patterns of total shareholding for projects has not been analysed.

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APPENDIX A

NAME	DESCRIPTION	INTERVIEWS IN WHICH CODED	Nr OF CODING INSTANCES
Auction Design	**Category for all nodes related to auction design (as opposed to auction implementation or auction outcomes)**	0	0
Access requirements	Assessment of bidder reputation and capacity (incl. technical experience and expertise, as well as financial standing) to select capable bidders.	3	5
ED & SED	Economic Development (ED) and Socio-Economic Development requirements that feature as part of REI4P	9	19
BEE	Black Economic Empowerment, a specific policy of the South African government meant to support previously disadvantaged sections of the population.	7	16
Community Trusts	The holding entities for many, if not most, of the shareholding by designated surrounding communities in the RE project companies.	3	4
Local Content	Stipulations in the bidding programme regarding the minimum levels of project value (content) that has to be locally sourced.	10	27
Ownership	Discussions about various ownership	12	26

	stakes and roles in the project companies, including community ownership, South African vs. international ownership, BEE ownership.		
SME	Stipulated minimum levels of project spending on small and medium-sized South African enterprises	3	4
Evaluation criteria	The criteria that determines whether/how projects are ranked and awarded	5	8
Financial Qualification	Category for financial instruments/categories that serve to qualify bidders	0	0
Bid bonds	A financial commitment to realising a project that a bidder gets back if not awarded a project or if achieving a specific milestone (usually financial close).	4	12
FOREX	Auction design choices specifically dealing with foreign exchange movements	3	3
Penalties	Penalties levied on projects for a variety of reasons, including late delivery, poor technical performance and failure to meet ED and SED commitments. Penalties include liquidated damages (financial penalties), shortening the length of	7	11

	the PPA and termination points.		
Physical qualification	Project development tasks that a developer has to perform anyway, like obtaining permits, land rights, building rights, grid access etc – used as a barrier to entry for bidding in the auction	6	12
Resource measurement	Verified resource (solar, wind) measurements taken over a specified period	3	4
Technical Standards	Technical equipment standards stipulated by the bidding authorities.	3	3
Project allocation	How projects are awarded to different bidders, including restrictions	6	7
Technologies	Category for renewable energy technologies	1	1
PV	Solar photovoltaic projects	1	1
Wind	Onshore wind projects	7	11
Two vs one stage bidding	A two stage bidding process has an initial phase during which bidders are first screened; only those passing the screening stage are provided with the full bidding documents. A single stage bidding process sees bidding documents provided to all interested bidders.	5	12
Implementation	**Category for all nodes related to how the auction programme is**	2	7

	implemented (as opposed to designed or auction outcomes).		
Delays	Delays from the implementing authorities on the signing of PPAs for round 4 of REI4P and SP4IP, as well as rolling out new procurement rounds	8	19
Institutional capacity	The capacity (human, financial) of the implementing public institutions of the auction programme	3	5
Policy certainty	Discussions around changes to or uncertainty about the enabling environment, specifically as it refers to policy in the energy sector.	4	5
Process trust	Trust from bidders/market participants in the auction process	4	9
Tariff renegotiations	Statements made by government and utility officials, and reactions to these statements from bidders, around renegotiating tariffs for projects already awarded	3	10
Timelines	The planned vs. reality of timelines for bid preparation, submission, evaluation, implementation.	4	5
International comparison	**Category for comparison of REI4P to international auction programmes**	0	0
Botswana		1	1

Brazil		1	1
Ethiopia		1	1
Malawi		1	1
Namibia		1	2
Swaziland		1	2
Turkey		1	1
Zambia		3	3
Outcomes	**Category for auction programme outcomes (and their potential drivers)**	0	0
Aggressive bidding	Bidding behavior that sees one or more bidders submit bids at very low prices.	4	7
Bankability	An assessment by (mostly commercial) lenders about the quality and level of risk of a project.	4	5
Competition	Measure of how many bidders and/or projects are competing for the same amount of capacity. More bidders/projects means more competition	10	23
Developers	Companies that find, secure and prepare projects for bidding – including land lease agreements, permits, connection agreements etc.	5	5
EPC	Engineering, Procurement and Construction companies.	5	11
Eskom	South Africa's vertically integrated	2	2

	national electricity utility		
Gaming	Bidding behavior where bidders manipulate the bidding rules or process in their favour.	5	5
Lenders	Financial entities providing debt to projects. Most often commercial banks, institutional investors (e.g. pension funds) or development finance institutions.	7	12
Market concentration	The awarding of larger shares of projects or capacity to an increasingly smaller group of bidders/companies.	11	24
Consolidation	Strengthening a bidding company's position in the market.	1	1
REIPPPP	South Africa's renewable energy independent power producers procurement programme. Sub-category for REI4P, as opposed to SPI4P.	0	0
Barriers to entry	Requirements or costs that preclude certain entities from bidding	9	17
Bidding costs	The costs of preparing and submitting an eligible bid	10	38
Grid connection	The cost of gaining certainty on the costs of grid connections.	5	12
Land	The cost of finding, securing and leasing land for the project	5	12

Legal & Advisory	The cost of contracting legal and advisory services to ensure bid compliance	5	7
Permitting	The cost of securing the necessary project permits, including environmental impact assessments, water use licenses, heritage approval etc.	8	25
Staff time	The costs of staff salaries for the project developer and/or bidder	3	3
Concentration Drivers	Issues that have been identified as causing or contributing to market concentration	0	0
Economies of scale	The trade-off between size (scale) and costs. The bigger a project, the lower the costs per unit of power.	7	13
Equity	Investment by project sponsors that equates to shareholding.	7	10
Experience	A firm's track record, in terms of how many projects they've developed, bid and built.	2	4
Finance	Cost of capital as a key driver of the cost of energy from a renewable energy plant. Refers mainly to the cost of loans (interest rates) from lenders, which make up the major portion of investment (60% - 80%), but also the cost of equity (return on equity).	8	23

Negotiating power	The ability of big companies with many projects to be in a stronger negotiating position vis a vis equipment suppliers and other contractors vs. smaller companies.	4	4
Portfolio	The strategy of submitting a large number of bids and basing pricing on an assumption that many, or most, of the projects will be awarded, and that the bidder will therefore be able to benefit from economies of scale and increased negotiating power when implementing the projects.	5	6
Utilities	Bidders that have large-scale (mostly European) companies as majority owners or parent companies. Examples include ENEL Green Power, Engie, EDF.	6	7
Value Chain Integration	Where bidders start bringing more services and parts of the project value chain "in-house". For example, instead of merely developing and bidding a project, a company might also provide all EPC and O&M services to the project, thereby opening up more revenue streams and enabling it to bid lower prices.	7	10
Small IPP Proc Prog	The South African renewable energy procurement programme specifically	11	27

	aimed at smaller (1 – 5 MW) projects		
Project size	Impacts of the smaller project sizes, e.g. reduced competition, limited space for wind projects etc.	6	10
Small players	Impact of SPI4P on smaller bidders	9	28
Objectives	What are the top government objectives for the procurement programme?	10	21
Cost vs SED	Trade-offs between projects prices/cost of electricity and other objectives (e.g. SED)	10	19
Realisation rate	How many of the procured projects are built	5	9
Specialised risk allocation	Ability to allocate risks to different entities through e.g. breaking up the EPC contract into smaller constituent parts	1	2
Tariffs	Discussions around the project tariffs	7	14
Transition	**Category for discussions about South Africa's (just) energy transition**	3	3
Labour	The role and demands of the labour unions impacted by the energy transition	1	2

Appendix B

Socio-economic and economic development (SED & ED) qualification thresholds and evaluation criteria in REI4P

		REI4P		SP-I4P	
Element (Weighting)		**Threshold**	**Target**	**Threshold**	**Target**
JOB CREATION	South African employees who are citizens	50%	80%	-	90%
	South African employees who are Black people	30%	50%	-	60%
	Skilled employees who are Black people	18%	30%	-	50%
	South African employees who are citizens and from local communities	12%	20%	-	30%
	South African citizens employees per MW of Contracted capacity	N/A	N/A	N/A	N/A
LOCAL CONTENT	Value of local content spending	40% – 45%*	65%	50%	70%
OWNERSHIP	Shareholding by Black People in the Seller	12%	30%	-	40%
	Shareholding by Local Communities in the Seller	2.5%	5%	-	10%
	Shareholding by Black people in the Construction Contractor	8%	20%	-	30%
	Shareholding by Black people in the Operations Contractor	8%	20%	-	30%

MANAGEMENT CONTROL	Black people in Top Management	-	40%	-	40%
PREFERENTIAL PROCUREMENT	Broad Based Black Economic Empowerment Procurement	-	60%	-	70%
	QSE & SME Procurement	-	10%	-	20%
	Women Owned Vendor Procurement	-	5%	-	10%
ENTERPRISE DEVELOPMENT	Enterprise Development Contributions	-	0.6%	-	1.0%
	Enterprise Development Contributions on SMEs	N/A	N/A	0.5%	1.0%
SOCIO ECONOMIC DEVELOPMENT	Socio-Economic Development Contributions	1%	1.5%	-	3.0%
SME PARTICIPATION	Key components &/or Equipment & Balance-of-Plant spend on SMEs	N/A	N/A	50%	70%

REI4P Project capacity size limits (in MW) (Naude & Eberhard, 2016)

Technology	Minimum	Maximum
Onshore wind	1	140
Solar PV	1	75
CSP	1	100
Biomass	1	25
Biogas	1	10
Landfill Gas	1	20
Small Hydro	1	40*

Awarded SP-I4P projects in BW1 and BW2 (Source: IPP Office, 2019)

Project Name	Bid Window	Technology	Contracted Capacity
Adams Solar PV Project	1	Solar PV	5 MW
Bellatrix Solar PV Project	1	Solar PV	5 MW
Du Plessis Solar PV 4	1	Solar PV	5 MW
Heuningspruit PV 1	1	Solar PV	5 MW
Steynsrus PV 1	1	Solar PV	5 MW
Steynsrus PV 2	1	Solar PV	5 MW
Hopefield Community Wind Farm	1	Onshore wind	4 MW
Klawer Wind Farm	1	Onshore wind	5 MW
Busby Renewables	1	Biomass	5 MW
George Small Scale Biomass	1	Biomass	5 MW
Augrabies Solar PV1	2	Solar PV	5 MW
Capella Solar PV Project	2	Solar PV	5 MW
Castor Solar PV Project	2	Solar PV	5 MW
Keren Energy Disselfontein	2	Solar PV	5 MW
Keren Energy Kakamas	2	Solar PV	5 MW
Keren Energy Keimoes	2	Solar PV	5 MW
Roma Energy Danielskuil	2	Solar PV	4 MW
Roma Energy Mount Roper	2	Solar PV	5 MW
Skuitdrift 1	2	Solar PV	5 MW
Skuitdrift 2	2	Solar PV	5 MW