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South Africa's renewable energy procurement: A new frontier?

LUCY BAKER and HOLLE LINNEA WLOKAS

Key points

Despite a continuing electricity crisis from its coal-fired sources, in recent years South Africa has become one of the leading destinations for renewable energy investment. This is thanks to the launch of its renewable energy independent power producers' programme for which an estimated $14 billion/R168 billion has been committed thus far and approximately 4 GW of utility-scale renewable energy capacity approved. The programme is unique in that it in order for projects to qualify, developers must commit to undertake requirements for community ownership and economic development benefits in a country with gross socio-economic inequality. As the industry facilitated by RE IPPPP continues to develop, however, concerns have arisen including: the extent to which financial returns will leave or benefit the country; that the ownership of the industry is rapidly becoming the domain of large international utilities; and emerging tensions between 'bankability' required by banks and investors and the economic benefits and community ownership criteria.

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Any errors or inaccuracies in this paper are the sole responsibility of the authors.

1. Introduction

South Africa is facing its worst electricity supply side crisis in 40 years. Regular load shedding has been taking place since mid-2014 and is now predicted to last until 2018. The construction of two coal-fired power plants, Medupi and Kusile, of approximately 4 800 MW each is severely behind schedule and subject to significant cost overruns (de Vos 2014). The monopoly utility Eskom, which to date has generated 90 per cent of the country's coal-fired electricity, is strapped for cash and ridden by crisis and has been struggling since 2005 to build an additional 17000 MW of generation capacity by 2018. By January 2015, one third of Eskom's installed capacity, approximately 15 000 MW, was down and the country's reserve margin on a knife edge. In addition to a commitment of R23 billion from National Treasury, the utility is now considering selling off its assets in an attempt to raise capital to fill an estimated funding gap of R200 billion ($17 billion) by 2018 (Reuters 2015). Electricity tariffs have tripled in real terms since 2005 and will increase by a further 12.8 per cent from April 2015 (Creamer 2015). Eskom has been relying heavily on expensive diesel peaking plants to make up the shortfall but has long exhausted its budget for this financial year.

National debates continue to rage over which options to solve the crisis are the quickest to construct, the most affordable and the most technically feasible. There are also pressures to meet national commitments to climate change mitigation pledged in 2009. In February 2015 President Zuma promised to do 'everything we can', including developing a 9 600 MW nuclear fleet; constructing yet more coal-fired power plants; importing hydro from the Democratic Republic of Congo; importing gas from neighbouring countries; developing the country's shale gas reserves; and undertaking demand-side management measures such as solar hot water heaters and rooftop solar PV. Decision-making over the ideal electricity mix reflects deeper struggles over what gets supported by the state, who gets to build it, and who gets to benefit.

In the last three years, however, carbon-intensive, coal-dependent South Africa has become one of the leading destinations for renewable energy investment. Investment has gone from a few hundred million dollars in 2011 to $5.7 billion in 2012, of which approximately $1.5 billion was for wind and $4.2 billion for solar, and $4.8 billion in 2013, of which $1.9 billion was for wind and $3 billion for solar (UNEP/BNEF 2014:27). This investment can largely be attributed to the unprecedented take off of the country's Renewable Energy Independent Power Producers' Programme (RE IPPPP), launched in August 2011. Since then a privately-generated, utility-scale, renewable energy sector is being integrated into an electricity network that has historically been dependent on the country's abundant coal resources and dominated by Eskom. The programme has now completed three bidding rounds and a separate round for concentrated solar power (CSP) only (round 3.5): 66 projects have been approved, 47 power purchase agreements totalling 2450 MW have been signed, and 32 projects totalling 1500 MW had been connected to the grid by February 2015.

RE IPPPP is the first renewable electricity initiative to have gained traction at the national level in South Africa. Despite a significant delay in the introduction of this programme since its inception in 2007 as a feed-in tariff,[1] it has been hailed as an unprecedented success (Dodd 2014). The *Renewable energy country attractiveness index* of EY (previously Ernest and Young) rated South Africa the 15th most attractive destination for renewable energy investment (EY 2015). Yet concerns have since arisen over various matters, including the extent to which the financial returns will benefit or leave the country; the fact that the ownership of the industry is rapidly becoming the domain of large international utilities; the nature of the programme's economic and community benefits in a country with gross socio-economic inequality along racial divisions; and whether it will create a long-term local manufacturing and service industry. Despite the positive gains made by the programme to date, some industry players have suggested that in no more than three years since its launch in 2011, the country's burgeoning

[1] This follows a much longer legacy of stalled attempts to introduce privately generated energy, renewable and otherwise since late 1990s. See for example Bekker et al (2008), Gaunt (2008),and Eberhard and Pickering (2012).

renewable energy industry has now peaked and, with dramatic price decreases by the third bidding round, on a 'race to the bottom'. More recently a five month delay to the financial close of round 3, the postponement of the selection of the winning projects of round 4, scheduled for November 2014 but still stalled by March 2015, now pose a threat to the sustainability of the programme. These delays are partly attributed to grid connection issues, the costs of which are a growing concern (Willis 2014). Eskom has stated that it requires additional capital of R149 billion to 2022 in order to strengthen its transmission network and upgrade substations so that all projects may connect (Roelf 2015).

The way in which RE IPPPP continues to evolve has significant implications for the country's energy and infrastructure development, including privately generated power from other sources such as coal, co-generation and gas, and potentially that of the Southern Africa Power Pool in which South Africa is the major player. What then are the challenges and trends that are emerging from RE IPPPP? Who stands to gain and lose from this programme and how might the industry develop in the medium-to-long term? What will the economic and social impacts of RE IPPPP be in light of South Africa's high levels of inequality and unemployment? – an inequality reflected in the fact that 12.3 million people or approximately 25 per cent of the population lack access to electricity (IEA 2011) in a country where 40 per cent of the electricity is consumed by the country's energy-intensive industrial users. As previously raised by Tait et al (2013), to what extent will RE IPPPP empower communities and bring about meaningful economic development and employment for the historically marginalised, and a service industry that will benefit local and national small and medium enterprises? With such questions in mind, RE IPPPP can arguably be seen as a litmus test for whether or not renewable energy can buck the trend of some of the previous failures of other sectors of the country's industrial development (Ashman and Fine 2012).

This paper evaluates the key features of RE IPPPP and builds on previous studies of its negotiation and implementation (Eberhard et al 2014; Pegels 2012; Baker 2011). We unpack the different levels of the programme and the diversity of players involved in it. In doing so, we contribute to the literature on mechanisms for renewable technology diffusion, debates over 'favourable' policy in emerging markets (Friebe et al 2014; Dinica 2006) and the global development of wind and solar PV industries (Lema et al 2012). We further highlight key tensions inherent in RE IPPPP between commercial priorities for 'bankability' under the norms and demands of project finance, and the requirements for economic development and community ownership, to which definitions and perceptions of risk are central.

2. Methodology

This paper is based on in-depth and continuing research carried out by the authors since 2010 on the political economy of energy, energy access and energy poverty in South Africa. The research has included project site visits, attendance at conferences of industry and energy finance, and over 80 semi-structured qualitative interviews with, amongst others, members of government departments, Eskom, project developers, energy intensive users, banks, lawyers, union members, civil society and community liaison officers. Interviewees cited in this paper have been anonymised because of the politically and commercially sensitive nature of the subject matter. Directly cited in this paper are: three members of the wind industry; two technical advisors to the renewable energy industry; five renewable energy project developers; two lawyers; two bank employees; an engineer working for the renewable energy sector; and representatives of the International Finance Corporation (IFC), South Africa's Industrial Development Corporation (IDC), a bi-lateral donor agency, and a South African government department.

Some information presented here has been collated as a result of collaboration by one of the authors with the Independent Power Producer's (IPP) unit located in the Department of Energy (DoE). With government permission, this has enabled the subsequent analysis of confidential procurement data. The research has also included content analysis of sources such as policy and

legal documents, minutes of public meetings, media articles, speeches by government and other energy stakeholders and parliamentary transcripts.

3. Background to RE IPPPP

RE IPPPP was initially conceived in the form of the renewable energy feed-in tariff (REFIT) in 2007 driven by individuals within the National Energy Regulator (NERSA), supported by bilateral donors and representatives from Treasury, the Department of Public Enterprises and the Department of Environmental Affairs. This drive took place despite opposition from within NERSA itself, the DoE and Eskom towards renewable energy. The negotiation of what is now RE IPPPP was part of a protracted and contested process involving different government departments, NERSA, Eskom, banks and investors, developers and civil society. This took place in a context of intense impatience from renewable energy IPPs waiting to construct and connect their projects to the electric grid (Baker et al 2014). Throughout its negotiation the process was subjected to numerous delays due to disagreements over issues including: tariff levels; who the buyer of power would be; mistrust of renewable energy from various factions; and perceived political and financial risks. The proposed REFIT, based on a tariff system was unexpectedly replaced by a competitive bidding system in the form of RE IPPPP when in August 2011, National Treasury declared REFIT illegal following an assessment carried out by Johannesburg law firm Webber Wentzel on the basis that 'the predetermined tariff would fall foul of South Africa's procurement rules' (Creamer 2011:*23 Aug*). RE IPPPP was subsequently launched by the DoE with considerable backing from National Treasury, in turn supported by various international technical advisors.

Whereas a feed-in tariff sets a fixed price for the purchase of renewable energy, paying generators a higher rate than that of the retail price for each unit of electricity fed into the grid, RE IPPPP, as a tender system, is based on competitive bidding. This means that potential project developers are invited to bid for a renewable energy contract below a certain cap. In South Africa's case, scoring of bids is allocated 70 per cent on price below a certain cap which decreases with each round (see Table 1), and 30 per cent on economic development criteria which includes factors such as job creation, participation of historically disadvantaged individuals, protection of local content, rural development, community ownership and skills development. The price submission will only be considered once the economic development criteria have been met with the bid that meets the requirements at the lowest price winning the contract. RE IPPPP projects are assessed via a comparative rating system, meaning that projects are essentially measured against their competitors. Under RE IPPPP, successful projects will sell electricity to Eskom's grid under a 20 year, local currency-denominated, government-backed power purchase agreement (PPA). RE IPPPP is central to the South African government's stated commitment to a green economy, as enshrined within key national documents such as the Green Economy Accord, National Development Plan and New Growth Path.

Launched in August 2011, RE IPPPP had an initial allocation of 3725 MW, though an additional 3200MW of capacity was later declared by the Minister of Energy in December 2012. While RE IPPPP includes allocations for a range of technologies, the majority of capacity allocated is for wind, solar PV and solar CSP, which form the key focus of this paper (see Table 2). The process was launched in the same year as the country's Integrated Resource Plan for electricity (IRP 2010), an electricity master plan covering total generation requirements from 2010 to 2030. Under revision since 2013, IRP 2010 plans to double national capacity from approximately 41 000 MW to 89 532 MW by 2030. While coal is still set to dominate the generation mix, IRP (2010) includes just over 20 per cent of installed capacity (17.8GW) from renewable energy by 2030 that will deliver 9 per cent of supply (DoE 2011a). This will be generated by projects approved under RE IPPPP and other private and state-managed projects. A project must be in the IRP in order for NERSA to grant it a licence (Pienaar and Nakhooda 2010) though according to the latest new generation regulations for electricity the minister holds the right to license generation capacity as s/he deems fit. However, the latest draft of the IRP

has made downwards adjustments to the demand forecast, reduced the allocation for wind and increased it for solar PV.

Winners of rounds 1, 2 and 3 were announced in December 2011, May 2012 and November 2013 respectively. All projects approved under rounds 1 and 2 have reached financial close and, as discussed above, many are now connected to the electric grid with a deadline of 2016 at the latest. Projects range in size from 20 MW to 139 MW for wind; 5 MW to 86 MW for solar PV; and 50 MW to 100 MW for solar CSP. Projects in rounds 1 to 3 collectively represent a combined foreign and domestic investment commitments of approximately $14 billion/ R168 million (Eberhard et al 2014).[2] The future of the programme beyond round four is currently unclear. Project bids for round 3.5, which is dedicated solely to CSP were submitted in March 2014 and following various delays the two winning projects were announced December 2014 (Muirhead 2014).

Table 1: Price caps and averages RE IPPPP: Rounds 1 to 3
Source: DoE (2013)

Tariffs	***Round 1 bid cap (Aug 2011)***	*Round 1 average bid (per kWh)*	*Round 2 average bid (per kWh)*	*Round 3 average bid (per kWh)*	*Percentage drop Rounds 1-3*
Wind	R1.15	R 1.14	R 0.90	R 0.66	42%
Solar PV	R2.85	R 2.76	R 1.65	R 0.88	68%
CSP	R2.85	R 2.69	R 2.51	R 1.46[3]	

Table 2: Selected preferred bidders in RE IPPPP: Rounds 1 to 3
Source: Adapted from http://www.ipprenewables.co.za

Techno-logy	*MW awarded Round 1 (Dec 2011)*	*No. of projects awarded Round 1*	*MW awarded Round 2 (May 2012)*	*No. of projects awarded Round 2*	*MW awarded Round 3 (Oct 2013)*	*No. of projects awarded Round 3*	*MW awarded Round 3.5 (CSP only) (Dec 2014)*	*No of projects awarded Round 3.5 (CSP only)*	***Total MWs awarded Rounds 1-3***	***Total projects awarded Rounds 1-3***	***MW capacity remain-ing***
Solar PV	632	18	417	9	435	6	n.a	n.a	**1 484**	**33**	**1 041**
Wind	634	8	563	7	787	7	n.a	n.a	**1 983**	**22**	**1 336**
Solar CSP	150	2	50	1	200	2		2	**400**	**7**	**100**
Landfill gas	0	0	0	0	18	1	n.a	n.a	**18**	**1**	**7**
Biomass	0	0	0	0	16	1	n.a	n.a	**16**	**1**	**43**
Biogas	0	0	0	0	0	0	n.a	n.a	**0**	**0**	**60**

RE IPPPP has been applauded for its high quality regulatory framework, tough qualification criteria, and strong economic development and community ownership requirements. All of these, it is argued, provided the demanded positive policy signal to investors and developers (Eberhard 2013). However, many stakeholders assert that the reverse side of these requirements has meant that RE IPPPP has been a complex and expensive process with high compliance costs. As a wind industry member stated (October 2013), 'people deliver bids consisting of 5000 pages of original documents with seven copies. You can imagine the work that goes into preparing that'.

[2] At exchange rate 1 April 2015 $1 = R11.97.

[3] Round 3 had a new tariff system for solar CSP: base prices were to be payable for 12 hours per day and 270% of the base price payable for five peak hours per day (Eberhard et al 2014).

Beyond the national developments that led to the launch of RE IPPPP, a number of parallel exogenous factors can be attributed to its development and the resulting new industry. These include the impacts of the 2008 global financial crisis on renewable energy markets in Europe and US which led to the reduction or removal of subsidies by governments, policy uncertainty and a slump in project development. Subsequently, renewable energy development and related investment started to shift to developing countries (Lema et al 2012), with South Africa as a key target (SolarServer.com 2014; UNEP/BNEF 2013:13-16). Global overcapacity in technology hardware has played a key role, led to fierce competition and has resulted in significant cost reductions, particularly in the case of solar PV. As reflected in the price drops between rounds 1 and 3, globally speaking the levelised cost of solar PV has decreased by an average of one third between 2011 and 2012 (UNEP/BNEF 2013:11), while wind has experienced a 15 per cent decrease in cost between 2010 and 2014. Meanwhile, as renewable energy has become more profitable, debt financiers and equity investors with a long-term history in conventional energy and other infrastructure sectors are developing an emerging interest. With this in mind, the following sections now seek to explore the take-off of South Africa's renewable energy industry since the launch of RE IPPPP within the context of the first three rounds of the programme.

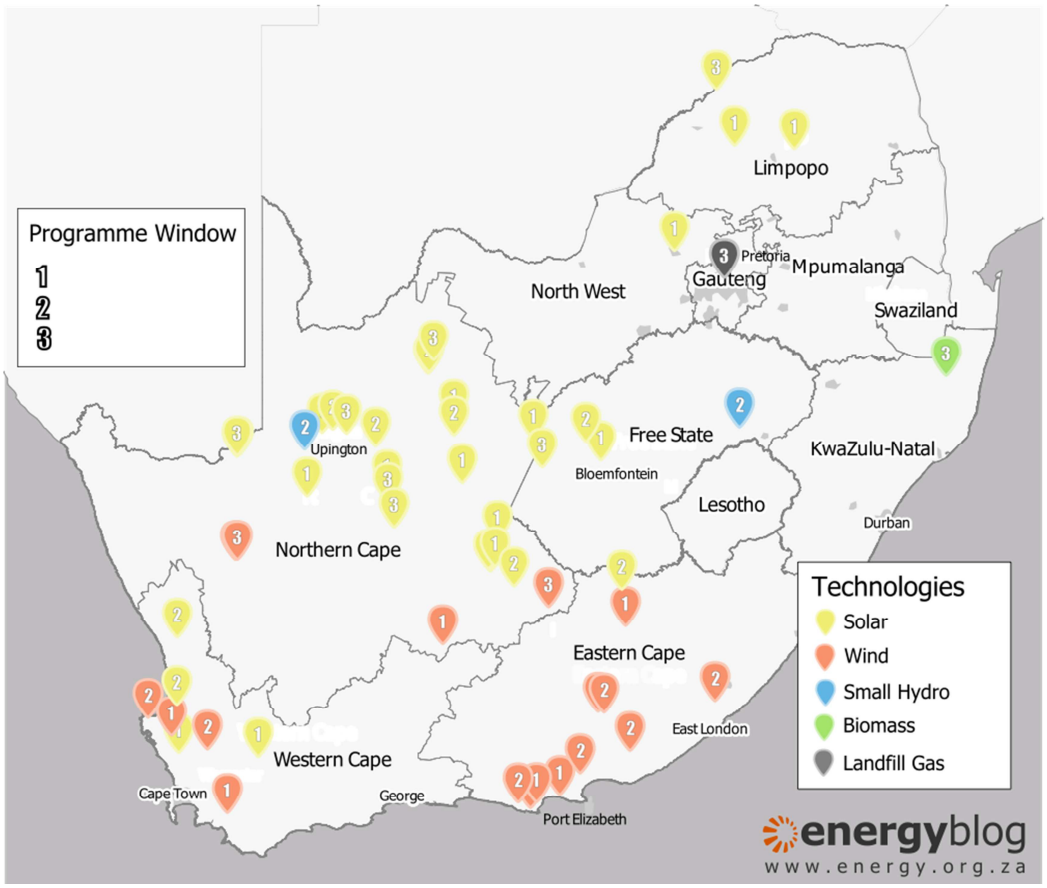

Figure 1: Map of approved RE IPPPP projects in South Africa after three bid windows
Source: Stephen Forder, http://www.energy.org.za/

4. Developers, engineers and technology suppliers

4.1 Ownership

Some developers are really glorified estate agents… you get people who see a gap in the market and an opportunity to make money, whereas the engineers probably see it as a chance to be involved in something new in South Africa and I wouldn't say it's a noble

> *cause, but it's green energy, it's clean energy. It's a chance for the private sector to get involved in selling energy.* (Technical advisor interviewed October 2013)

As the quotation above illustrates, RE IPPPP involves a diversity of stakeholders, national and international and interests. Most project companies are special purpose vehicles, usually a limited company set up by the developer for the exclusive purposes of developing, operating and owning the actual project. Each project company must have a minimum of 40 per cent South African entity participation, a minimum black ownership of 12 per cent with a target of 20 per cent, and a minimum of 2.5 per cent ownership by communities living within a 50km radius of the project site. Project companies demonstrate a complexity of ownership structures involving the developer and other international, national, private and public players and technical, financial, black economic empowerment (BEE) and local community shareholders. While some developers involve a South African company in a joint venture with a foreign company, such as Cennergi, a 50/50 venture between South African coal major Exxaro and a subsidiary of India's Tata Power, others consist of an international company that has set up a South African subsidiary, such as Norway's Scatec Solar. Some involve a more intricate consortium of players with one or more majority stakeholders usually international, for instance the UK's Globeleq acting with Ireland's Mainstream Renewable Power and South Africa's Thebe Investment Corporation, the Rebuna Litsatsi Trust, Enzani Technologies and Usizo Engineering. Others are a South African company with access to foreign capital, like Biotherm Energy Ltd, backed by international equity firm Denham Capital.

The difficulty of attributing project ownership reflects the complex, transient and at times opaque nature of global trade and production networks, and transnational and multi-national flows of investment and finance (Grimes and Sun 2014). As project developer (2) explained in January 2014, 'you are not going to be able to say, 'this project is from country x or company y'. The South African developers who are purely South African either don't have projects that are successful, or they are partnered in some form with someone who brings in international experience… money, technology…'. Similarly a project company may be headquartered in one country, have offices and operating assets in various others, and be listed somewhere else. As we further discuss in section 4.1, the ownership structure is also subject to change given that equity shares may be on-sold or restructured after three years which will make it difficult to keep an accurate record. With this in mind, based on publicly available information at the time of writing, lead developers in the wind, solar PV and CSP industry from rounds 1 to 3 have been compiled in Figures 2, 3 and 4**.**

While round 1 favoured early entrants to the industry who had secured sites and complied with the necessary bid criteria such as EIAs and land tenure agreements, it also overestimated the number of projects that were 'market-ready', which meant that bid prices were close to the price cap, with limited competition (Eberhard 2013:2). By the second round things became more competitive, with 'more of the best projects winning' according to project developer (2) and prices starting to drop (see Table 1). By round 3 the process had become hugely competitive and while only 17 projects were selected, a total of 93 bids had been submitted.

As Figures 2, 3 and 4 illustrate, between rounds 1 and rounds 3 ownership of the industry has become increasingly concentrated, with fewer companies winning more MWs, particular in the case of wind and solar PV. For example, the 435 MW awarded for wind in round 3 were split between only three developers: Italy's Enel Green Power, Ireland's Mainstream Renewable Power, and China Longyuan Power, a wholly owned subsidiary of the China State Power Corporation. Of these three players, Enel also leads in terms of MW awarded for solar PV while. Mainstream, in JV with Globeleq, is also developing projects for wind and solar PV under round 1. With a total of 234 MW awarded for wind, China Longyuan Power is now in joint second place with Cennergi in terms of total MW awarded for wind under rounds 1 to 3. This also marks the first time that a Chinese company has become involved as a developer in RE IPPPP, though Chinese companies have been involved in the supply of technology in wind and solar PV. In keeping with the practice of Chinese developers using Chinese technology, Longyuan's parent company, Guodian United Power, China's fourth largest state-owned utility

company, is providing the technology for both projects. It is understood that Chinese companies tend to be more tolerant of risk than their European and American counterparts, attributed in part to the fact that they are either state-owned or state-backed and bring with them attractive funding packages that others cannot meet (Lema et al 2012). A project developer surmised (December 2013) that 'interest rates tend to be 40 to 50 per cent of the project cost in the long run, so China has a huge competitive advantage. Someone setting up a project using bank finance will be paying 7 or 8 per cent interest, whereas a pre-packaged Chinese project will come with less than one per cent interest. Over the life of a project, that's a third of the project cost that is avoided.'

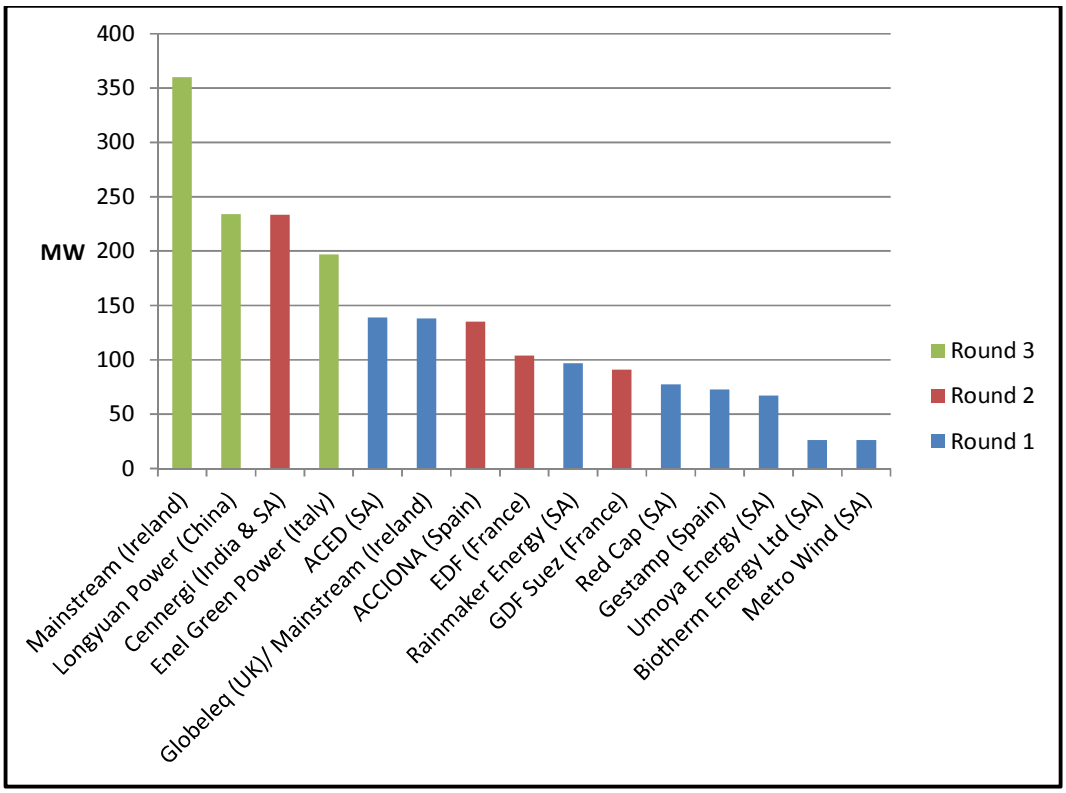

Figure 2: Approved capacity for wind by lead developer, rounds 1 to 3[4]

[4] Figures 2, 3 and 4 reflect the author's own compilation from publicly available sources at the time of writing. Figures do not reflect the all shareholders involved in the JVs or consortiums that make up the project companies.

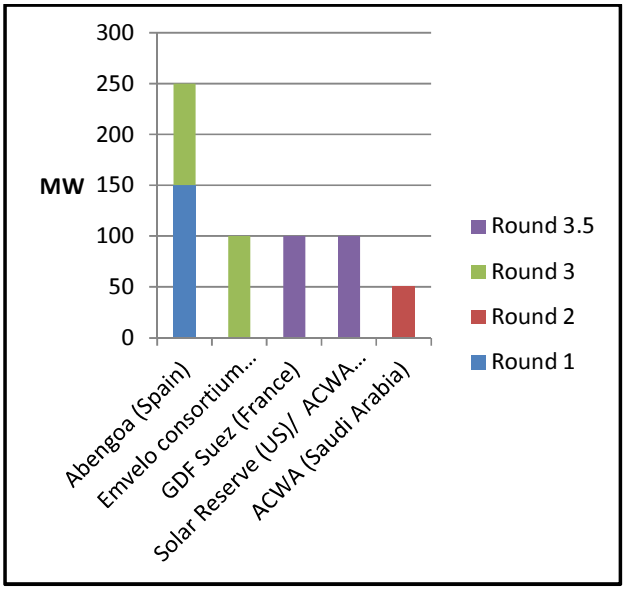

Figure 3: Approved capacity for solar CSP by lead developer, rounds 1 to 3

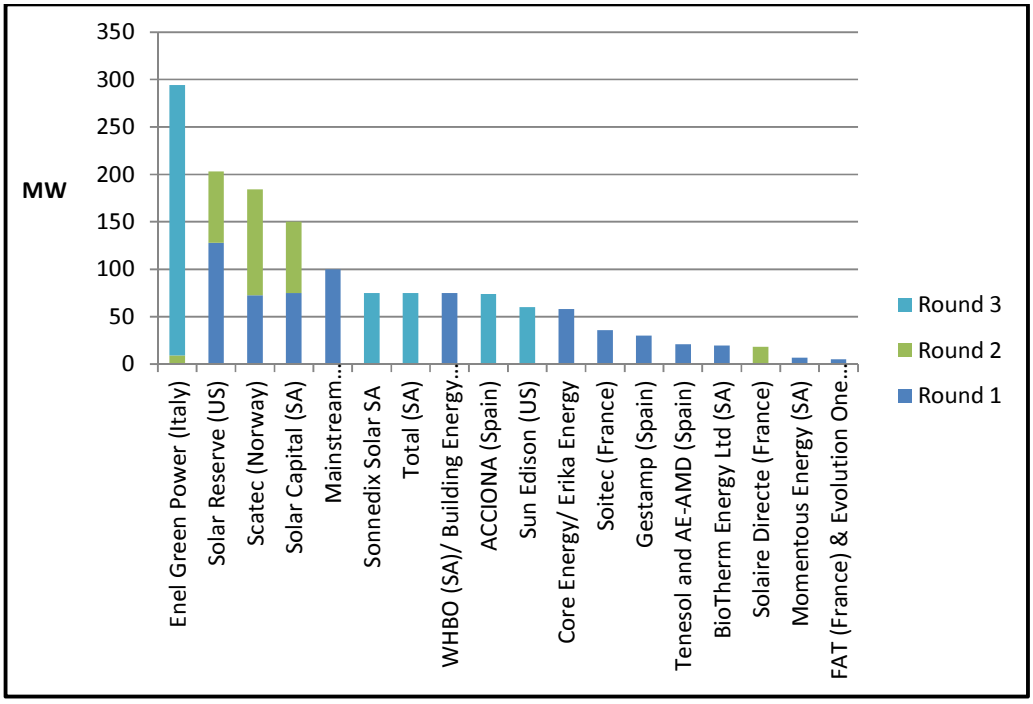

Figure 4: Approved capacity for solar PV by lead developer, rounds 1 to 3

4.2 Engineering, procurement and construction

Project developers hire an engineering procurement and construction company (EPC) to be solely responsible for project design, procurement of equipment and construction, and the timely completion and commercial operation of the project. Under RE IPPPP bid requirements the EPC company must have a minimum black shareholding of 8 per cent with a target of 20 per cent, and 40 per cent South African entity participation. For this reason the EPC is usually an international company with a South African subsidiary, or an international company in JV or consortium with one or more South African entities. Consequently, South African construction

companies such as Murray and Roberts, Group 5 and Aveng are quite appealing to international companies, for their extensive experience in the construction industry (Ahlfeldt 2013:57) as well as their black ownership levels which remove the need 'for complicated JVs or unincorporated JVs with BEE parties', according to a lawyer interviewed in November 2013.

As the EPC contract is generally the largest cost item in the budget at an estimated 60–75 per cent of total project cost (Yescombe 2013:210), it is considered a major risk, for which reason South Africa's lenders have usually insisted that under rounds 1 to 3 at least the EPC provide a fully 'wrapped guarantee' or fixed-price turnkey contract around the whole project. While a fully wrapped EPC in turn increases project costs by about 10-20 per cent (Ahlfeldt 2013:52), it gives lenders 'the confidence and guarantees that the plant will perform the way you have agreed prior to awarding the contract' (bank employee; November 2013). Banks tend to insist on internationally experienced contractors who have carried out a minimum number of analogous projects elsewhere in the world. However, despite the EPC's overall responsibility, much of the work will be carried out by national sub-contractors.

The significant EPC selection criteria include the reputation, experience and expertise of the company, the type of technology and the supplier, and the ability of companies to demonstrate financial liquidity and pay a bond up-front. Thus, according to a member of the wind industry (October 2013) 'the bank looks for a single counterpart who they can hold responsible for everything that goes wrong and who has the ability to pay damages if the plant does not perform'. However such an arrangement does not always run smoothly given that the foreign contractors in question tend not be familiar with the specifics of national requirements and so consider them a greater risk, which will in turn have cost implications. As a project developer explained (November 2013):

> the EPC contract [for wind] is often a turbine supplier from Germany or Denmark or somewhere else. We have asked them to come into South Africa with all of our complexities, labour conditions, BEE and all of that, and find construction firms to do civil and electrical works for them. And they are really unsure about a lot of that and what does that do to risk, and their view of risk and their pricing of risk. They are not best equipped to take the risk of local construction... So they are going to charge a whole lot more for it.

The EPC construction phase is usually for a two-year term but with liabilities and equipment warrantees generally lasting for five years after construction. After project construction the operation and maintenance (O&M) contract takes over on the commercial operation date with a tenure length that can vary between the full term of the PPA or a five-year rolling contract. 'Heads of terms' for both the EPC and O&M are submitted at the time of bidding and, while details will be expanded after project selection, any significant deviations will have to be approved in writing by the DoE. A notable development is that, while in round 1 agreements between the Bank, EPC contractor and developer were set out in quite basic terms, by round 3 'full contracts were being negotiated pre-bid, sometimes up to 90 pages' (a technical advisor; October 2013). According to Ahlfeldt (2013:37), this shows that EPC contactors have had to reduce their profit margins, which another technical advisor states is an illustration of 'the certainty that developers demand at pre-bid. They need to have pinned down their risk with their EPC contractors so that their price is as low as it can get.'

The EPC, O&M and technology supply for RE IPPPP projects is dominated by international companies with expertise in project development for utility-scale projects (Ahfeldt 2013, see Figures 5 and 6). In light of the vertically integrated nature of the wind industry and its supply chain (Szewczuk et al 2010:23-28), in the case of wind the EPC contractor is often the same company as the technology supplier and in some cases the O&M. In the case of solar PV, however, the EPC is less often involved in technology supply given the more dispersed and complex nature of the supply of components involved, such as panels, inverters, transformers, tracking system. While there is less information in the public domain relating to CSP, Spain's Abengoa and Saudi Arabia's ACWA Power are lead players.

While rounds 1 to 3 have seen international companies subcontracting to national companies, there is an expected shift from a 'fully wrapped' EPC to multi-contracting (Ahlfeldt 2013:53) which, according to a bank employee (November 2013), 'means that there has been a skills transfer in this country and that going forward many of those sub-contractors can then act as the sole contractor'. Multi-contracting will inevitably be more complex to manage in view of the interdependencies between the different contractors but it will also be cheaper as an engineer explained (October 2013): 'this way you don't have one company that marks up all the little bits and gives you a massive price'.

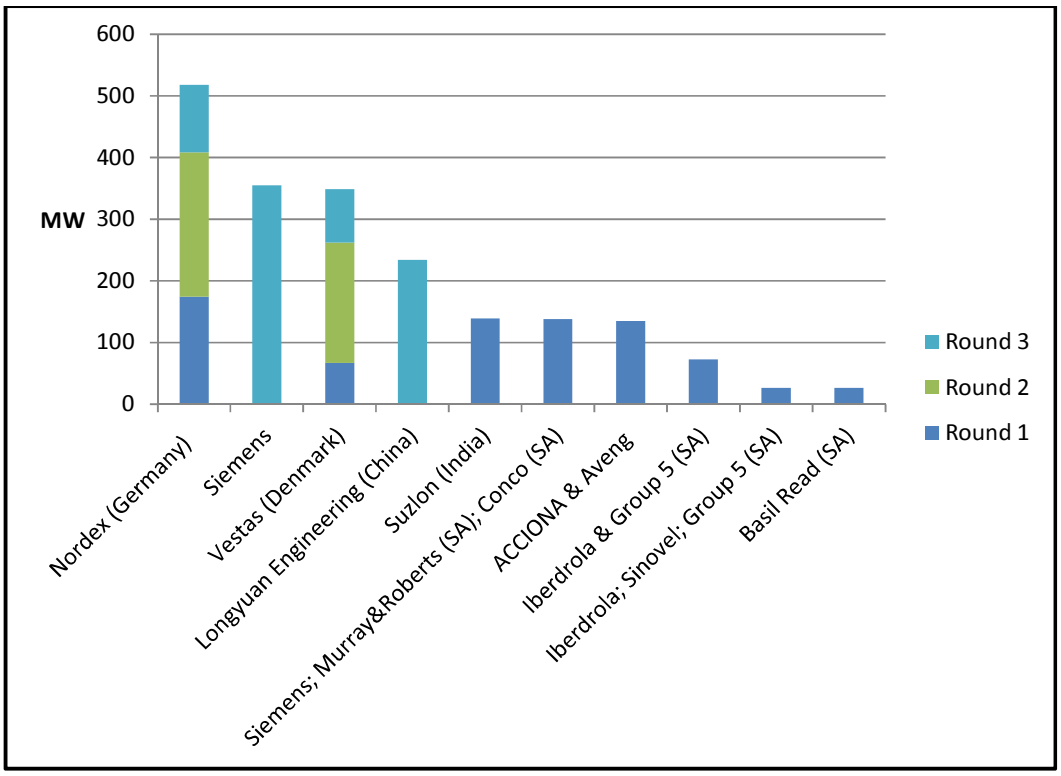

Figure 5: EPC (lead company) by MW allocation for wind, RE IPPPP, rounds 1 to 3[5]

[5] Figures 5 and 6 reflect the author's own compilation from publicly available sources at the time of writing. The figures do not reflect all shareholders involved in the JVs or consortiums carrying out the EPC.

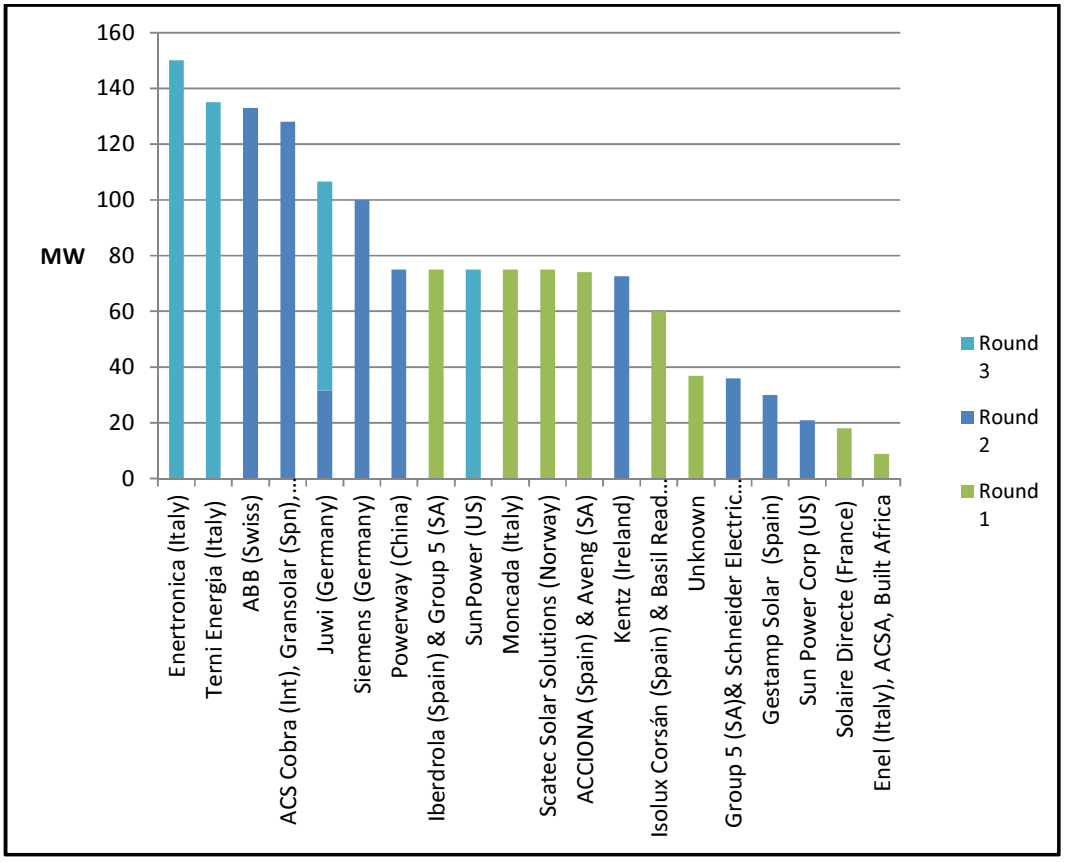

Figure 6: EPC (lead company) by MW allocation for solar PV, rounds 1 to 3

4.3 Technology supply

As previously mentioned, the 2008 financial crisis resulted in a slowdown in renewable development in Europe and the US, creating a manufacturing surplus from European, US and Chinese companies seeking markets elsewhere to absorb this. In light of this, a wind industry member; December 2013) argued that South Africa should seize the moment in light of such historically low prices: 'We are unbelievably lucky that we are building now when everyone has too much lying in their factory and they beg you to take this stuff off their hands.'

Reflecting global trends (Walz & Delgado 2012), European companies dominate in terms of technology supply for wind in South Africa while China, as the world's leading manufacturer of solar PV (Mazucatto 2013:144), plays a leading role in the supply of solar PV components. This hardware is either provided directly by state-backed or state-owned Chinese companies (Ahlfeldt 2013:11) or companies headquartered elsewhere but which source from China where the hardware is made under licence. Chinese companies supplying to RE IPPPP include Suntech,[6] Yingli Solar, Trina Solar, Jinko solar, Build Your Own Dreams and Renesola. Meanwhile, the supply of inverters appears is dominated by German companies, with SMA Solar and Schletter as two main players.

European companies dominate in the supply of technology for wind, as well as EPC, with German Nordex in the lead, followed by German Siemen's (Figure 6). It is notable, however, that there is a significant minority of emerging market companies now involved, including

[6] Once the world's largest solar PV equipment maker; following its collapse in 2013, Suntech was bought by Chinese company, Shunfeng Photovoltaic International (UNEP/BNEF 2014:78).

India's Suzlon and China's Sinovel[7] in round 1 and China's Guodian United Power in round 3. The norms of project finance still favour contractors and technology suppliers with extensive experience that to date tend to be European, as an International Finance Corporation spokesperson (November 2013) qualified:

> Using an emerging market company may make the cost of capital higher, but it is hard to prove this (or find conclusive evidence)…. European and American companies are more established in South Africa and it may be harder for Chinese companies to operate for this reason. Some barriers may even be cultural.

Concentrated Solar Power currently constitutes 600 MW of the total 3 916 MW allocated in windows one to three of RE IPPPP. Not only are its technology costs higher than wind and solar PV but its prices are two to three times higher than competing wind and solar PV technologies; but it is considered an 'unproven' technology in commercial terms. For this reason, there has been less 'appetite' from commercial banks to finance it and more involvement from national and international DFIs. That the technology in question be 'proven' is a fundamental consideration for the lender with regards to a project's commercial viability (Yescombe 2013). Yet the flip side of this is that lending patterns can 'lock-in' less innovative technologies at the exclusion of more experimental ones that in the long term may be more effective. For instance, a bi-lateral donor (November 2013) explained that the demands of project finance for CSP excludes storage other than molten salt, which the industry does not consider particularly effective.

5. Project finance demystified

Project finance has emerged since 1980s as a mechanism for long-term, capital-intensive financing for privately generated energy projects, prior to which infrastructure projects were typically financed by public sector debt. The rise of project finance in energy has been driven by global trends in the unbundling of utilities, the privatisation of public sector capital investment, and the internationalisation of investment in large infrastructure with power generation projects as the most important sector (Yescombe 2013:9-11). South Africa largely evaded the trend of electricity liberalisation unsuccessfully imposed by structural adjustment programmes in other low- and middle-income countries during the 1980s and 1990s (Tellam 2003; Gratwick & Eberhard 2008). For this reason, project finance for renewable energy IPPs is being introduced into what was otherwise a monopoly-run electricity sector, with the national utility Eskom as the sole transmitter of electricity via the country's high-voltage grid, responsible for 96 per cent of generation, and 60 per cent of distribution. In this section we investigate how project ownership is structured and financed and what have been the significant changes between the first two bidding rounds and the third.

The norms of project finance set by the main providers of debt finance are highly deterministic over the nature of the project's development and contractual arrangements like choice of technology, the nature of the EPC contract and the equity structure. The majority of renewable energy project costs occur at the beginning of the project, with the initial capital outlay constituting up to 90 per cent of the total cost. This is in comparison to conventional energy such as coal or gas which incurs greater costs further into the lifetime of the project (Nelson & Shrimali 2014:iv). Though fuel costs for wind, solar PV and CSP projects are non-existent, the high upfront capital costs must be met by the project developer and the related debt investment and equity finance.

Renewable energy project financing is generally structured on the basis of a 70:30 debt to equity ratio of the capital cost of the project (Mendonça et al 2010:24) though in South Africa's case

[7] Suzlon was to have held a market larger share but lost an EPC contract to Nordex at the last minute due to concerns of financial solvency.

this is sometimes up to 80:20. Simply put, the more debt there is, the lower the average cost of funding, the lower the tariff and the cheaper the project. Lenders provide finance-based debt on fixed loan terms and therefore the minimisation of risk is their key priority (Yescome 2013:199). While lenders are in first receipt of the financial revenues generated by the project, returns for equity investors or project sponsors are more dependent on the project's successful generation of a return (Yescome 2013: 13). Equity investors therefore carry far greater risk for which they expect to generate a higher return. As explored below, renewable energy project finance in South Africa is uniquely characterised by RE IPPPP requirements for minimum levels of BEE and community ownership. Figure 7 illustrates the way in which the different entities involved within project finance in RE IPPPP may fit together. The three main phases of project finance can be summarised thus:

i. Setting up the IPP, which involves finding an international shareholder that will bring finance and reputation to the project, and starting the work – e.g undertaking an environmental impact assessment, land tenure agreement and energy resource assessment; and negotiating technology supply and EPC. This is a high-risk phase for finance and involves venture capital and international investors.

ii. Securing project finance which focuses on building the asset and establishing project finance. The debt/equity ratio is defined at which point commercial banks get involved.

iii. Operational phase: the project is generating and is now minimal risk. In South Africa's case debt can be sold at commercial operation date and equity after three years.

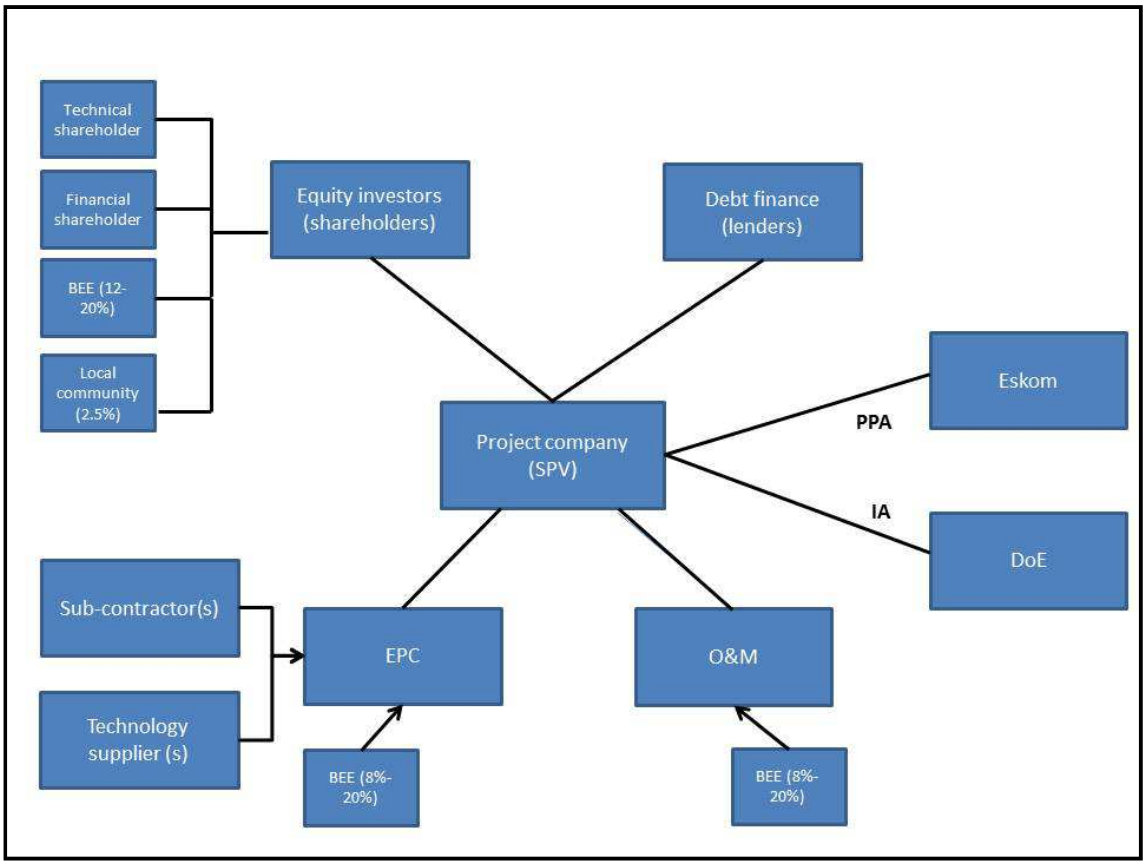

Figure 7: Project structure, ownership and development

5.1 Debt

In rounds 1 and 2, South Africa's four main banks (Standard, Nedbank, ABSA Capital, and Rand Merchant) were the majority providers of debt financing, in addition to financial services group Investec providing a total of R57 billion (see Table 3). The balance was provided by development finance institutions (DFIs) and export credit agencies (R27.8 billion) and insurance funds (R4.7 billion) (Eberhard et al 2014:1). In the case of large projects, developers generally appoint two or three banks to co-finance in light of funding limits. In some cases debt financing is also provided by the project developer, such as by Electricité de France in the case of the Waainek wind farm (Innowind/EDF 2012). As discussed in section 5.4, round 3 saw a shift to corporate financing and a reduced role for South Africa's banks.

The average cost of debt for renewable energy projects financed under RE IPPPP is understood to be based on an average interest rate of 12 per cent per year for a 20-year term (according to informal discussions and interviews with project developers and industry stakeholders). This is significantly higher in comparison to European countries or the US, where interest rates are generally fixed around seven per cent per year for a 10 to 15 year term (Nelson and Shrimali 2014:1).

As a DFI, South Africa's Industrial Development Corporation (IDC) has played a major role as a debt financier but also as an equity investor and in supporting BEE companies and community trusts to buy their share of equity. It has financed 22 renewable energy projects at a cost of R13.5-billion in rounds 1 to 3, of which R2.7-billion was for community participation (IDC 2014). The Development Bank of South Africa (DBSA) has played a similar role. International DFIs, such as the World Bank's International Finance Corporation (IFC) and International Bank for Reconstruction and Development, and the European Investment Bank are lenders in a small number of projects, usually restricted to financing 'unproven' technology i.e. CSP, and always in partnership with other lenders[8]. As an IFC spokesperson explained (interview, November 2013): 'Where commercial banks participate, IFC prices in line with the commercial lending market. We often have longer tenures however, and thereby take on more risk.'

There has been minimal appetite for international banks to get involved in debt financing given the currency risk involved. A bank employee (November 2010) explained that, as South Africa's exchange rate is floating, the rand has witnessed dramatic fluctuations in recent years, meaning that international banks are not likely to get involved except for syndicated debt, after it has been de-risked.

Table 3: RE IPPPP main lenders

Nedbank Capital	Supporting over a third of approved allocated capacity in rounds 1 and 2 (Old Mutual plc 2014) comprising 875 MW. In round 3 it has underwritten debt funding to a total of R6.8 billion for seven projects (two solar PV, two wind and two solar CSP and one landfill gas), valued at R26.2-billion. Nedbank is owned by Old Mutual Plc (see Table 4).
Standard Bank	Has underwritten R9.4-billion for wind and solar projects in round 1 and R6.4-billion in round 2 (Odendaal 2014). Limited involvement in round 3.
Rand Merchant Bank	A division of First Rand Bank Limited, the second-largest listed banking group (by market capitalisation) on the Johannesburg Stock Exchange. RMB committed R8.4 billion to five projects in round 1 and R3.4 billion to four projects during round 2 (RMB 2013).
Absa Corporate and Investment Banking	A subsidiary of Barclays (UK), ABSA is providing R10.8-billion in debt funding to six projects, comprising wind, solar PV and CSP to a combined capacity of 635 MW in round 3, which is about one-third of the total debt committed overall by South Africa's commercial banks for this round (Odendaal 2014).

[8] For instance, the World Bank's IFC and IBRD are lending to Abengoa's 100 MW KaXu Solar CSP trough solar plant, and the IFC and the EIB to Abengoa's 50 MW Khi CSP tower project.

Industrial Development Corporation	A major player in both debt finance and equity investment, South Africa's IDC is involved in 17 projects in rounds 1 and 2, and at least three projects in round 3. Set up in 1940 for the development of national industrial capacity. Owned by the South African government, under the supervision of the Economic Development Department.
Development Bank of South Africa	A DFI wholly owned by the government of South Africa. DBSA is a major player in debt finance and equity investment.
Investec	A specialist bank and asset manager operating in UK, South Africa and Australia, Investec has provided an estimated R75 billion ($7.5 billion) [in rounds 1 and 2 (Gecelter 2013). It differs from other private banks in that it operates as a provider of debt and equity as well as lead arranger (Investec 2014). For example it is providing debt finance and 34.5% of equity to the West Coast 1 wind farm for which it is also lead arranger.
Future Growth Asset Management's Power Debt Fund	Part of the Old Mutual Group, registered in UK (see Table 4). Future Growth's Power Debt Fund is providing R4 billion in debt finance to 18 projects in rounds 1 and 2 (www.energy.org.za/news/13-media-releases/83-south-african-based-asset-manager-involved-in-23-local-renewable-energy-projects).
Other DFIs	Includes: IFC, EIB, IBRD

5.2 Equity

Equity investment is provided by a diversity of players, including various different combinations of: national and international infrastructure and investment funds; South Africa's DFIs as discussed above; BEE investors and partners; and community trusts, themselves often funded by the IDC, DBSA and PIC. In many cases the majority equity shareholder is the international renewable energy developer, as for instance with Acciona, Abengoa, Scatec Solar, GDF Suez and Gestamp Solar. Other major players identified to date are included in Table 4. Some less than usual foreign equity shareholders include: Google (US), providing $12 million (R144 million)[9] to the Jasper PV plant in the Northern Cape and the Japanese Sumitomo Corporation which holds a 60 per cent share in the Dorper wind farm. In rounds 1 and 2, internal rates of return for equity ranged 'primarily in the late teens to mid-twenties', considerably higher than the returns obtained on projects built in developed countries and which makes South Africa's market so attractive to investors (Ahlfeldt 2013:xiii). In round 3 however these rates are understood to have dropped dramatically in parallel with the drop in tariffs. Of the R44.4 billion provided for both debt and equity in round 3, 35 per cent (R15.6 billion) came from foreign investment, of which 50 per cent for equity and 25 per cent for debt (DoE 2013).

Table 4: Equity investors, RE IPPPP: Rounds one to three

Globeleq	Formed out of the UK's CDC group in 2002 (Itself wholly owned by the UK's Department for International Development), and now owned solely by the UK's Actis Infrastructure Fund. Globeleq is a majority shareholder in all six projects being developed by Mainstream Renewable Power in rounds 1 and 3. It holds a 39 per cent stake in the 138 MW ACED Cookhouse wind farm.
Old Mutual Investment Group South Africa (OMIGSA):	Part of the Old Mutual Group, registered in UK. OMIGSA is a major investor through its IDEAS managed fund and Futuregrowth fund. It is understood to be the major investor in solar PV in South Africa (Jansen 2014b).
Old Mutual's Futuregrowth Asset Management	Involved in 23 RE IPPPP projects as both debt financier and equity shareholder. Its Power Debt Fund is providing R4 billion in debt finance to 18 projects in rounds 1 and 2, while in round 3 its Development Equity Fund is investing a total of R165-million in five projects, of which four are wind (www.energy.org.za/news/13-media-releases/83-south-african-based-asset-manager-involved-in-23-local-renewable-energy-projects).
Old Mutual IDEAS Managed Fund	Created in 1998, the fund focuses on 'infrastructure investments that make a significant contribution to economic growth and/or upliftment within the sub-categories of core infrastructure, environmental infrastructure and social infrastructure' (IDEAS 2013). Shareholder in three round 3 projects to a total

[9] At exchange rate 1 April 2015 $1=R11.97

	value of R455 million.
Africa Infrastructure Investment Managers:	Set up in 2000 as a JV between OMIGSA and Macquarie Capital. AIIM is also a shareholder in the Infrastructure Empowerment Fund Managers, a joint venture with Kagiso Tiso Holdings and in turn the manager of the Kagiso Infrastructure Empowerment Fund (see below). AIIM also established the Africa Infrastructure Investment Fund in 2004 which is in turn funded by the World Bank's IFC (Trade Mark South Africa 2010) and a shareholder in the Hopefield and Cookhouse wind farms.
Inspired Evolution Investment Management	South Africa-based clean technology and energy efficiency investor through its Evolution One Fund. Shareholder in the RustMo 1 solar farm; an investor in AFPOC limited which co-owns ACED, developer of the Cookhouse Wind farm; owns joint shares in the SlimSun Swartland Solar Park, with Franco Afrique Technologies; and provided early stage risk capital for two projects developed by Red Cap Investment in round 1. (http://inspiredevolution.co.za/investments/).
Loreko Metier Sustainable Capital	A fund established by Lereko Investments and Metier with investments from South Africa's PIC, the German development finance institution and the Dutch Development Bank (Srivastava 2012).
Public Investment Corporation	Public asset management firm, wholly owned by the South African government to which major contributor is Government Employees Pension Fund. PIC is a shareholder in two CSP projects and one solar PV.
National Empowerment Fund	Established by the National Empowerment Fund Act No 105 of 1998, NEF provides financial and non-financial support to black empowered businesses.
IDC	Particularly involved in CSP. See Table 3.
DBSA	See Table 3.

5.3 Black economic empowerment and community shareholdings

South Africa's renewable energy industry is characterised by the unique national requirement for BEE. Under RE IPPPP there has to be a minimum of 40 per cent South African entity participation and a minimum black ownership of the project company of 12 per cent with a target of 20 per cent. Local communities must have a minimum 2.5 per cent shareholding, though in some cases this is much higher. A lawyer explained (November 2013) that, if your community beneficiaries are a minimum of 85 per cent black 'by making your project company 25 per cent community owned, it also ticks the black ownership box [and brings it to] above the 20 per cent target level. In this way, your local community doubles up with black ownership.' BEE and community shareholders often require financing either from the company in which the shareholding is being acquired or from a third party financier such as a bank or DFI, or from a combination of both.

Table 5: BEE shareholders, RE IPPPP: Rounds one to three

Thebe Investment Corporation	Shareholder in a consortium in all of Mainstream Renewable Power's projects. Founded in 1992, it is one of South Africa's most established broad based BEE Investment management companies (www.mirafunds.com/our-funds/private-funds#).
Shanduka group	Holds 25% shareholding in Noblesfontein Wind Power Project in round 1. Founded in 2001 by prominent businessman Cyril Ramaphosa who withdrew from the group in 2014
Soul City Broad Based Empowerment Company	Shareholder in the Sishen Solar PV plant and the Gouda Wind Farm developed by Spain's Acciona and South Africa's Aveng, holding a 10 per cent stake in both.
Jay & Jayendra	South African-based investment holding and management company providing financial backing for the two solar parks being developed by Solaire Directe
Kagiso Infrastructure Empowerment Fund	Managed by AIIM (see above), it was established in 2006 to promote 'empowerment objectives and investments in infrastructure projects'[10]. KIEF is an equity shareholder in the Hopefield and West Coast One wind farms.
Kensani Group	Involved in all three projects developed by Solar Reserve projects

5.4 Shifting risk

Risk, and the way in which it is perceived and defined is fundamental to the norms and demands of project finance. For lenders and investors, higher risks require higher returns, which inevitably puts up the cost of capital and thus 'domestic institutional, regulatory and public policy measures are crucial in reducing investor risk' (SARi 2010:21). The inability of different stakeholders to agree over how risk should be apportioned was one reason for the continued stalling of what was still at the time a feed-in tariff (REFIT) in particular with regards to the government-backed PPA on 'acceptable terms' (Baker 2011). The PPA proposed under REFIT was heavily criticised by developers and banks for allocating too much risk to renewable energy project developers as compared to Eskom as the buyer of power (Waller 2010:47). Banks insisted that the PPA be underwritten by government in light of Eskom's financial instability as this would legally enforce the government's commitment. Since the launch of RE IPPPP however, which eliminated many of these previous concerns, the risk profile of a renewable energy project is usually based on the profile of the sponsors; the experience and financial strength of the EPC and O&M companies; and the track record and guarantees of technology providers (Ahlfeldt 2013:xiii). Other risks include resource risk, determined by the reliability of predictive data for wind and solar (van Kooten and Timilsina 2009:12); and social and labour unrest (Bank 1).

For banks, the financial model must demonstrate that the project will be able to repay the debt and that the developer has a good credit rating. Bank (2) stated:

> Firstly the project has to make financial sense and generate a required rate of return. Our main concern as lender is to have our debt repaid. Secondly we look at the personal merits of the client, their capacity, expertise, people skills, equity and the likelihood of them appealing to the 'stakeholders', by which we mean the government for example. Lastly we ask to what extent is the developer serious and credible? Not all project developers have proven to be so.

In light of the very high margins involved in debt finance, many industry stakeholders felt that South African banks had inflated the risks involved and passed this cost onto the developer.' More cynically, a wind industry member expressed (December 2013):

> There were only four banks and they were clubbing together anyway as they wouldn't like to take all the risk themselves. It's a Rand denominated contract and no one can

[10] http://

> really compete with that at the moment. But they can cite you good reasons why they were so expensive.

The banks justified the level of risk with the assertion that, while in Europe the sector was well-established and well understood, in South Africa

> we have been more conservative as we are doing it for the first time…There are a number of round 1 projects where our initial concerns have materialised e.g the process of getting panels and turbines to site is a logistical challenge… Quite a few of the equipment suppliers are feeling the global financial crunch and have been in financial difficulties. So in some instances we have had to structure deals on the understanding of a relatively high probability of financial distress within the panel, inverter or turbine supplier e.g Suzlon, Suntech. (Bank employee; interview November 2013)

Lawyers have played a fundamental role in negotiating legal agreements and the terms of risk between shareholders, lenders and the companies or consortiums carrying out the EPC, particularly in light of South Africa's limited experience of project finance in energy.

5.5 From project finance to corporate finance

The nature of project finance between the RE IPPPP's winning projects in rounds 1 and 2 and round 3 announced in November 2013 witnessed a dramatic and unexpected shift away from South Africa's four main national banks as the majority suppliers of debt finance. While the majority of projects in round 1 and 2 were largely financed by local banks, six out of 17 projects approved in round 3 were corporate-financed. Corporate finance sees loans lent against a company's balance sheet and does not therefore require debt finance from the banks. The six corporate financed projects were all won by Enel, a large Italian/international utility that won four out of six solar PV projects to a total of 285 MW out of 435 MW awarded, and two out of seven wind projects to a total of 197 MW out of 791 MW awarded (see Figures 3 and 4). Projects financed with corporate finance are not subject to the same stringent loan requirements imposed by South Africa's banks providing debt finance.

The surge of corporate financed projects in round 3 which reduced the role of national banks led to what a bank employee described (interview November 2013) as 'an existential crisis' with regards to their role going forwards: 'the banks in many respects were gatekeepers in rounds 1 and 2 and ensured that risk averse structures were put in place'. Bank (1) further surmised that, as a large company, Enel would be willing to take more risk and accept lower returns because of its track record and experience, access to capital and the likelihood that it has preferential pricing agreements with equipment manufacturers. There was a strong sense amongst South African renewable stakeholders in late 2013 that the unexpectedly low prices offered in round 3 were unsustainable both financially and in terms of the longer-term development of a national industry that will have benefits for the wider economy. As a wind industry member (December 2013) stated:

> In the third round there were projects that were not project financed, it was all equity deals at returns approximating government bonds in rand unhedged. So that is really scraping the barrel. …Is RE IPPPP going to become a programme for international utilities with international equipment? We pay less, but the money is leaving the country… From the perspective of an industry…if this trend continues people will shut up shop and leave.

5.6 On-selling

Debt can be on-sold almost immediately after commercial operations date and equity after three years subject to approval from the DoE and in the case of equity, the lenders. A bank employee explained that 'we are bringing lenders in at financial close with us'. Some of this debt has been on-sold to insurance companies (Eberhard 2013:6) and local pension funds. It is expected that asset management companies (*African Review* 2015) and dedicated infrastructure investment firms will also get involved (Bornochis 2015). A project developer stated (December 2013) that

> there are secondary markets developing, whereby people are starting to syndicate and sell down their debt… I think we will get a proper secondary market share in renewable energy developing in South Africa. I think we will soon start looking at listing renewable energy companies on the JSE. Also we will see the issuing of bonds and green bond markets.

As there is a three year restriction on the sale of equity, no equity has yet been sold. Reasons for the sale of equity are sometimes lack of liquidity but, more generally, reflect the nature of project finance whereby equity investors seek to sell their shares on then seek to reinvest their equity in other projects. As an IDC representative explained (November 2014):

> Your private equity players will come in, de-risk it, sell it off, make their profit and then pension funds invest in it long term just for the cash flow. The private equity players are essentially selling cash flow to the pension funds. The equity shareholders make the profit because they took the risk and so they take the return.

Therefore, despite the due diligence undertaken before financial close in order for the project to qualify to win, equity shareholdings of these projects may very quickly become assets that are bought, sold and repackaged in the financial markets. This may result in opaque financing structures which will pose a risk to projects. As one financial analyst stated (November 2014), 'there is a rigorous due diligence bid process where everyone is vetted but then people start trading their positions. This almost defeats the purpose.' Furthermore, given that project owners are responsible for the implementation of the economic development criteria tied to the project, when the ownership structure of the project changes following the sale of equity shares, how these responsibilities will be upheld is of serious concern. Not least the project developer is likely to have over emphasised the project's economic and community benefits in order to win the bid in the first instance, while after the sale of equity 'owners … are left to actually deliver on promises' (Eberhard et al 2014:29). It therefore remains to be seen how the situation will develop and what the impacts of the sale of equity will be in coming years.

A final consideration is that BEE shareholders are restricted from selling their equity due to the complex nature in which the BEE shareholding is packaged within the economic development score card. As projects need a minimum BEE shareholding of 12 per cent in order to meet the economic development requirements of RE IPPPP, should they lose this quota this would be grounds for the project to lose its licence. Therefore BEE shareholders would need to sell on to another equity partner with the same BEE score (IDCrepresentative; November 2014). This is likely to mean that the BEE and community shareholdings will remain static, in addition to DFI shareholdings who as public finance institutions are also unlikely to sell, while the other equity shareholdings could change hands on a tri-yearly basis.

6. Economic development and community ownership

> *Renewable energy is an extractive industry just like any other, even though the energy may be 'clean'. The issues are still the same in terms of erecting billions of Rands of infrastructure in a place where previously there has been nothing. However, the difference in South Africa is that there is an obligation for community development and socio-economic development.* (Project developer)

South Africa's procurement programme is unique in that the projects in question must structure local communities into their equity share as well as contribute to economic development criteria. As discussed above, projects that bid under RE IPPPP are scored 70 per cent on tariff and 30 per cent on an assessment of their economic development contributions. These are outlined in an economic development scorecard which aligns with the country's Broad Based Black Economic Empowerment legislation and contains seven criteria that project developers must comply with, as indicated in Table 6. Four of these criteria, enterprise development, socio-economic development, local community ownership and job creation, stipulate actions that must

take place within a 50-kilometre radius of the project, referred to by the programme as 'local communities'.

Table 6: Economic development elements and weighting as outlined in the procurement document for the first bid window
Source: Compiled from DoE (2011a; 2011b)

	Economic development elements	*Description*	*Measurement*	*Threshold*	*Target*	*Weighting*
1.	Job creation	RSA-based employees who are citizens	Number of citizens employed number of RSA based employees	50.0%	80.0%	25%
		RSA-based employees who are black citizens	Number of black citizens employed/ number of RSA-based employees	30.0%	50.0%	
		Skilled employees who are skilled black citizens	Number of skilled black citizens employed/ skilled employees	12.0%	20.0%	
		RSA-based employees that are citizens from local communities	Number of citizens from local communities employed / number of RSA-based employees	15.0%	25.0%	
2.	Local content	Value of local content spend	Value of local content spend / total project value	Technology specific		25%
3.	Ownership	Shareholding by black people in the project company	Shareholding by black people/ total shareholding	12.0%	30.0%	15%
		Shareholding by black people in the contractor responsible for construction		8.0%	20.0%	
		Shareholding by black people in the operations contractor		8.0%	30.0%	
		Shareholding by local communities in the project company	Shareholding by local communities/ total shareholding	2.5%	5.0%	
4.	Management control	Black top management	Number of black people in top management using the adjusted recognition of gender/ number of people in top management		40.0%	5%
5.	Preferential procurement	BBBEE procurement spend	Amount of procurement spend on BBBEE Contributors recognised in terms of BBBEE Recognition levels / total amount of procurement spend		60.0%	10%
		QSEs and EMEs procurement	Amount of procurement spend on QSEs and EMEs/ total amount of procurement spend		10.0%	
		Women owned vendors procurement	Amount of procurement spend on women owned vendors/ total amount of procurement spend		5.0%	

6.	Enterprise development	Enterprise development contributions	Enterprise development contributions/ revenue		0.6%	5%
		Adjusted enterprise development contributions	Adjusted enterprise development contributions/ revenue		0.6%	
7.	Socio-economic development	Socio-economic development contributions	Socio-economic development contributions/ revenue	1.0%	1.5%	15%
		Socio-economic development contributions	Socio-economic development contributions/ revenue	1.0%	1.5%	
	Total					**100% / 30 points**

In rounds 1 and 2 of the procurement process there were minimum thresholds and maximum targets for job creation, local content, ownership and socio-economic development, while the remaining economic development criteria had maximum targets only. By round 3, however, all criteria had flexible economic development targets, which means that bidding projects are measured against each other and the benchmark is set by the project with the highest score. This led to very competitive bidding by developers and resulted in a small number of projects structuring in up to 40 per cent community ownership within the 30 per cent equity share in order to maximise their score (Wlokas 2014).

A critical challenge for project developers has been how best to design and implement responses to the various economic development criteria and ownership requirements, which, according to many interviewees, have been interpreted quite differently depending on the developer. Not only are the economic development requirements of RE IPPPP highly complex, 'incorporating 17 sets of minimum targets and thresholds' (Eberhard 2013:2), but also go beyond the core competence of most developers. In the light of this challenging new task , a number of project developers have contracted socio-economic development consultants and/or community liaison officers. The requirements have posed a particular challenge to foreign developers with no or limited experience in South Africa. As project developer (4) explained, 'It is a challenge to explain black economic empowerment, SED [socio-economic development] etc to foreign companies. Some companies are progressive, particularly those who have had a footprint in the country for some time. Others see it as a transaction cost and hope that their local counterpart will deal with it'. More extremely, one company representative was reported to have said: 'don't bother me with your African problems'. However, failure to deliver on economic and community development is a 'potential breakage event,' and can result in the PPA being terminated.

Many interviewees talked about raised expectations amongst community members as a serious issue that could pose a threat to the viability of the project. Government (1) stated:

> This is a ticking time bomb if it is not managed carefully. In South Africa with our past … communities want electricity the same as in urban areas and if they don't get it they will get very frustrated. We underestimate communities but they are lot more aware than we think and sometimes more aware than we are. So the biggest thing besides with the technical stuff that could go wrong … is with community interaction.

In the following sections, we outline some of the early experiences of efforts to implement some of the RE IPPPP's economic development and community ownership requirements.

6.1 Enterprise development and socio-economic development

While in most projects local communities will not receive equity dividends until the project has paid down its debt and started generating profit, a smaller spend of 1.5 per cent of projected project revenue for socio-economic development (SED) and 0.6 per cent for enterprise

development (ED) starts in the first year of project operation. For bid submission, project developers are obliged to assess socio-economic needs within a 50km radius of the project site and state their commitments to providing financial resources for health, education and other objectives during the lifespan of the project. A similar requirement is stipulated for ED for which project developers must identify and design programmes, such as support for small- and medium-sized enterprises or business skills training. While these are new challenges for the young renewables industry, they are common requirements for South Africa's business environment along the principles of corporate social responsibility and investment, which in South Africa are generally interpreted through the national BEE legislation (Hamann 2006). However, RE IPPPP's requirement that local communities be incorporated into the shareholding thereby creating an additional and potentially community managed source of money for local development is a new practice.

Bidders' commitments are also qualitatively evaluated. Bids are required to include a so-called 'SED plan' which evaluates the needs of the project's beneficiary communities and what measures the project will undertake to respond to them. However, different developers take different approaches to undertaking this plan and, while some assessments are carried out in participation with the local communities, others are desktop studies. A team of advisors within government, based in the DoE, assesses the SED plans submitted by developers and, as a team member explained, must assess whether or not an SED plan is 'half baked' and 'put together in the last minute'.

The committed investment from all 64 currently approved IPPs from all three rounds that will be put towards SED and ED totals over R11.5 billion over 20 years in nominal terms. The highest spend is found in the Western, Northern and Eastern Cape Provinces where the majority of projects approved under RE IPPPP are located. Project developers are obliged to quarterly report on the investments they make using project funds during the lifetime of the project. While small contributions might be invested during project construction, the committed SED and ED spends begins at commercial operation.

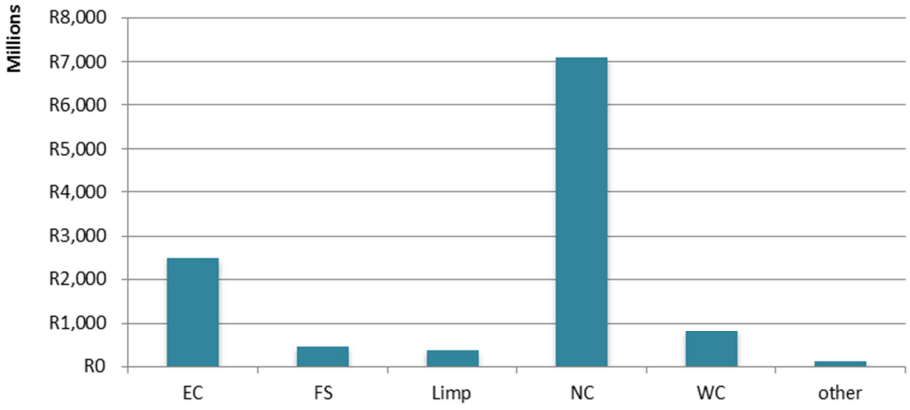

Figure 8: Accumulated SED and ED commitment of IPPs rounds 1 to 3 over 20 years by province
Source: Wlokas (2014)

Tait et al (2012) identify a number of concerns including the identification of beneficiaries within the 50km radius, how spending should be allocated in areas with more than one project, and the different approaches chosen by companies when engaging with communities. As it is at the discretion of the developer as to which communities will benefit, not all citizens living within the 50 km radius will necessarily reap the positive impacts of a project. Who the beneficiaries will be and how they may benefit can be further complicated by very different levels of population density, socio-economic development and racial mix depending on the area and whether or not the project is in a rural, peri-urban or urban area. The unequal distribution of projects and funding for local economic measures across the country is also an issue,

particularly in cases where communities may benefit from more than one project. De Aar in the Northern Cape is one potential example of this where there are seven projects being developed within the environs of the small town with limited economic development opportunities beyond the recent introduction of renewable energy. Many have argued that, for this reason, RE IPPPP will benefit a small number of communities disproportionately, as compared to sharing the benefits at a provincial or even a national level (Wlokas et al 2011; Tait et al 2012).

6.2 Bringing in the communities: local ownership

As discussed above, a unique requirement of RE IPPPP is that project companies are obliged to structure local communities into the equity shareholding, which is often funded by a South African development finance institution such as the IDC or DBSA. Local communities must have a minimum 2.5 per cent shareholding in project equity, though less commonly in some projects they own up to 40 per cent (Wlokas 2014), particularly following competitive bidding by developers in round 3. This shareholding has to be allocated to a legal entity, such as a trust, set up to represent the local community and tasked with managing the dividends. Trust deeds are generally prepared by the project team and its consultants as there is no prescribed template from government. The trusts are governed by a board of trustees, selected according to the trust deeds and can include representatives from the projectcompany, financial institutions, professional trustees, legal professionals and representatives of the beneficiary community or communities.

The number of individuals from the community on the board of trustees depends, however, on the project company's appetite to hand over control to local communities. That communities are structured into project equity does not necessarily grant them voting rights in the project. In some instances, community ownership in the project is structured into a broader BEE shareholding with other stakeholders. Lawyer (2) explained that having the community as a larger shareholder was perceived both a risk and a convenience for developers:

> On the one hand people see it as an easy option because it ticks the BEE box. You have a giant, silent investor who won't be too critical and will get their money in year 17[11] once finances have been paid down. But actually there are real people out there who have very real needs and expectations. Unless they are managed appropriately you could find yourself in a very uncomfortable situation.

Another level of complexity is added by the fact that there is no standard amount of investment that must be allocated for local communities. The amounts vary considerably depending on the size of the project, the financing terms, and the commitments made by project developers in the bidding process. It will also be some years into project operations before the communities receive any dividends. As a project developer explained (October 2013):

> In the case of … community trusts, the funding takes some time to flow. The project will be paying off the debt for years before the equity shareholders, and hence the communities will benefit financially. There are normally tenors of about 15 years before any significant financial benefits reach the communities, though [before that] there may be small 'trickle dividends'. A community often has a 5 per cent shareholding and will have a long time to wait before the debt is paid off and they benefit.

IDC funded community ownership is structured differently, allowing for trusts to receive income from year one onwards already. Therefore transparency and effective communication between companies and communities is absolutely crucial to ensure a positive relationship and the genuine acceptance of the project.

[11] Year 17 is not an absolute rule. It could be sooner or later than this.

6.3 Job creation

As indicated in Table 6, job creation constitutes 25 per cent of the economic development criteria. While developers must commit to a project-specific number of jobs to be created within local communities, it is generally understood that the long-term potential for job creation throughout the project's operational life time (from wind and solar PV plants at least) is limited. Rather, the greatest opportunity for job creation occurs during construction, which usually lasts up to two years. Therefore, according to bank (1):

> One challenge for the government and the country is trying to utilise the project to create spin off benefits for the communities in the form of relating jobs that are not directly project related. So if catering is going to be done, can this be done locally? Can the cleaning of panels be done locally etc?

While RE IPPPP has the potential to contribute to skills development and long-term employment in project areas where there has been a history of long-term unemployment and social marginalisation, not all reports indicate that this is happening. For example, technical advisor (2) asked:

> Why are there issues on site when foreign contractors can't speak to local contractors and there are issues of equality, and no training? Where are these people going after they have finished on site? Are they leaving with a construction skills certificate? Or are they just leaving with a bit of money in their pocket?'

Incidents of strikes and social unrest were also cited by various interviewees, which have had an impact on the timelines for a number of construction schedules and commercial operation. Will trends of labour unrest and strikes that have seriously affected production in the coal and platinum industry in recent years be replicated in renewable energy industry?

There are examples of apparently progressive attempts to mitigate this by regular communication with the communities via the establishment of a community liaison office, for instance as with the Cookhouse wind farm (Wlokas 2014). Some other developers, however, admitted that they were at a loss as to the best way to manage the community aspects of their project. Project developer (3) stated: 'I don't think there is enough thought given to how community development should be applied. It's really done as an afterthought to try to be able to meet the process.' In short, according to wind industry (1), 'some developers really understand and some don't'. The risk is serious and responses are starting to be institutionalised. For this reason, the South African Wind Energy Association established in 2014 the working group 'Communities for wind' to support private sector learning and positive relationship building with communities (see: www.sawea.org.za). The Photovoltaic Association, SAPVIA, followed in early 2015 with the launched of a sub-committee on the issue of SED and ED.

6.4 Local content: a 'proudly South African' industry? [12]

As Table 7 illustrates, local content requirements have increased with each round of RE IPPPP, with thresholds for solar PV being the highest in the first two rounds. In round 1 the RE IPPPP criteria defined local content as 'the total costs attributed to the project at the commercial operation date, excluding finance charges, land and mobilisation fees of the operations contractor' (DoE 2011a:8). As local content is defined as a percentage of project expenditure spent in South Africa based on rand value, its accurate measurement is problematic given the significant fluctuations in exchange rates over time and hence the prices of imported products (Ahlfeldt 2013:xxi). Notably, there has been a significant devaluation of the rand since 2012, between rounds 1 and 3 and beyond. The global surplus in manufacturing which has contributed to decreasing costs in renewable energy technologies globally, particularly solar PV and wind is another influencing factor. It is often argued that in the short term, local content requirements

[12] This term is inspired by a 'buy local' campaign launched in 2001 by government, organised business, organised labour and community organisations to boost job creation and pride in South African companies and national products and services. See: http://www.proudlysa.co.za/Index.aspx

inflate power costs by driving up the costs of manufacturing and hence electricity retail prices (ICTSID 2013:7).

Table 7: local content targets as percentage of overall project spend
Source: Adapted from DoE (2011a)

Technology	*Round 1*	*Round 2*	*Round 3*
Wind	25%	45%	65%
Solar PV	29%	48%	65%
Solar CSP (without storage)	50%	60%	65%
Solar CSP (with storage)	45%	60%	65%

Local content requirements illustrate key tensions between the realisation of government priorities for employment generation, skills development, increased local manufacturing and the green economy on the one hand, and the demands by financial institutions for 'proven technologies' and project 'bankability' on the other. Because of lenders' aversion to risk and their requirements for suppliers with international reputations, local content thresholds increase the risk profile of a project. In turn, smaller national players have been precluded from participating in RE IPPPP as technology and energy service providers (Rennkamp & Westin 2013:18) A further constraint to the participation of local companies is the requirement that technologies be certified by the International Electrotechnical Commission (wind industry 2). However, the dependence on international suppliers thus far has meant that a major share of capital expenditure and publicly funded investments are leaving the country by way of purchasing technology hardware from abroad (Moldvay et al 2013:4-9).

Given that South Africa does not have a well-established industry for the manufacture of renewable energy equipment (Ahlfeldt 2013:xiv), in global terms it is behind the curve in what is already a relatively mature and consolidated global industry (Lewis & Wiser 2007). For this reason, Eberhard (2013:6) asks whether setting up local manufacturing capability is competitive, and what the parts of the value chain are that maximise local employment.[13] The increased costs associated with the use of locally assembled or manufactured hardware have, however, helped to meet local content thresholds given their measurement in project spend. A number of manufacturing and/or assembly plants are now under development or recently opened, including two wind tower plants, an inverter factory and four solar PV module or panel plants in order to meet the local content thresholds for round 3 and beyond (see Rennkamp & Westin 2013). However, the extent to which they will they result in technological diffusion, innovation and skills development in South Africa is as yet unclear.

A number of interviewees from industry concurred that, in terms of meeting local content requirements, it is possible to game the system if you are 'creative', in part because the Department of Trade and Industry's rules and definitions of how local content should be defined still lack clarity. Project developer (3) stated that 'the RE IPPPP requires high local content which quite honestly foreign investors have to manipulate to be able to achieve', adding that 'the RE IPPPP process has got built in contradictions that make it difficult and the policing of local content where it could be possible is inadequate'.

It was further felt that in rounds 1 and 2 EPCs could have used more local products and services than they did in practice, but as foreign companies they lacked the relevant knowledge to procure nationally available supplies and so ended up importing them unnecessarily. Similarly, large international technology supply companies are often bound by their own internal guarantees and therefore obliged to draw on their own personnel and materials from abroad rather than sourcing locally. A final issue is how South Africa's local content requirements align

[13] A question that goes beyond the remit of this research but which has been considered by many including GIZ (2013) , Ahlfeldt (2013), EY (2013), Szewczuk et al (2010).

or conflict with international trade rules and agreements (see Rennkamp and Westin 2013), and whether this is a battle yet to be fought?

7. Conclusion

This paper has examined the case of RE IPPPP as a ground breaking development for the introduction of privately generated renewable energy within an electricity industry structure that has to date been dominated by a coal-fired monopoly utility. The programme, which, as we have discussed, has potentially transformative social, economic and technological impacts, has brought a diversity of new players and sources of investment to the country. Subsequently, a complex interaction of national and international stakeholders has formed within the country's complex political economy. At the national level, early entrants to the sector are now bound up in international networks of project developers, construction companies, technology providers and flows of national and international finance and investment. In reflection of such trends, the renewable energy sector in South Africa is witnessing companies from the emerging markets of India and China competing and gaining market share alongside the more established European companies.

A key finding relates to the way in which RE IPPPP is evolving and may continue to do so, particularly in light of the significant changes that have taken place between the first two rounds and round 3, and the delays experienced since. This has raised various concerns: over the ability of national players in the industry including banks to retain a stake in it; that the ownership of the market will become dominated by international companies; that the design of the programme has meant that smaller, local firms have struggled to enter and then retain a share in the market; and whether Eskom's lack of financial and technical capacity to strengthen the grid will create obstructions for the programme. Despite attempts by the South African government to create an industry with national interests at its heart, the increased competition by round 3 has seen smaller, national players priced out of the market and unable to compete with foreign companies. With this in mind, it has been suggested that South Africa's renewable energy sector will trend towards a market consolidation with a small number of large developers holding a significant market share. Exactly how this will develop in future rounds and beyond RE IPPPP is yet to be determined and will become evident as equity shares start to be sold on. It further raises the question as to whether renewable energy will end up replicating the trends evident in the country's coal mining industry in which five conglomerates control 80 per cent of production (Eberhard 2011), or indeed the highly concentrated nature of ownership in the South African economy more generally, including its monopoly electricity sector (Fine & Rustomjee 1996).

Furthermore, with a reduced role for national banks, the dominance of foreign technology companies, and the sale of debt and equity concerns have been raised over the extraction of capital from the country, as has been witnessed in other parts of the economy (Ashman et al 2011). This invokes Mazzucato's (2013:161) point that such short-term interests mean that developers are not interested in, or able to sustain, the risks of technological development in the long term. Government is providing long-term support in the form of RE IPPPP but what is the longevity and quality of the finance and investment that this support facilitates? To what extent is this finance 'long-term, patient and committed' (Mazzucato 2013), and is there a risk that it may become speculative? These are questions for further research and consideration. While some have welcomed the emergence of a secondary market in renewable energy in South Africa, including the issuing of green bonds, it must also be asked whether the investment and finance in question will socialise the rewards as well as the risks during the long term (Mazzucato). A further consideration with regards to how project finance may develop may also be influenced by the Basel III rules for bank regulation introduced by the Bank for International Settlements, which will make it a lot more expensive for banks to lend long-tenure loans of up to 20 years (Narbel 2013).

The integration of RE IPPPP's potentially progressive economic development and community ownership criteria is fundamental to the success of the country's new renewable industry. Projects have to perform not only in a challenging technical environment but also bring about meaningful economic development and create jobs. But will it be possible for developers to overcome their competitive nature and find ways to collaborate with each other as well as engage in honest and open communication with the local population and the labour force in order to achieve this? This brings us to the tension inherent in the nature of project finance between demands for project 'bankability', including proven technologies and expertise, and the critical requirements for economic development and community ownership in a country with high unemployment and gross inequality along racial divisions. How these tensions are managed over the long term is fundamental to the success of the industry and the extent to which it will result in long-term and sustainable benefits beyond the generation of renewable electricity. This raises questions over what the role of the state should be in regulating the programme and managing these tensions in order to uphold and protect the socio-economic co-benefits of energy investments. Such considerations go to the heart of how 'low-carbon development' should be defined (Mulugetta & Urban 2010), and to what a 'just', low-carbon transition (Swilling & Annecke 2012) could mean in practice.

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