

FUTUREGROWTH

/ ASSET MANAGEMENT

**Demystifying
Renewable Energy**



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Abbreviations

BD1	Bid Date 1
CSP	Concentrated Solar Power
DoE	Department of Energy
CW	Gigawatt (1000kW or 1 000 000W)
IA	Implementation Agreement
IPP	Independent Power Producer
IRP	Integrated Resource Plan
kV	Kilo Volt
kW	Kilo Watts (1000W)
kWh	Kilo Watt Hour
MWp	Mega Watt peak
NERSA	National Energy Regulator of South Africa
NTG	National Transmission Grid
REIPPP	Renewable Energy Independent Power Producer Procurement
PV	Photo Voltaic
SPV	Special Purpose Vehicle

An overview of the power sector in South Africa

Traditional sources of power generation

South Africa is dependent upon electricity which is predominantly generated from coal-fired power stations. Approximately 85% of the country's power is produced from coal, 5% from nuclear and the remainder split between renewable technologies such as hydroelectric, wind and solar PV.

Given the country's economic growth since 1994 and increased roll-out of private connections, South Africa's electricity demand has increased significantly over the last 25 years. Due to South Africa's ageing fleet of power stations, their ongoing maintenance shut-downs and lack of new generation capacity coming on stream, reserve margins have become very low by international standards. These have dropped to levels where there is almost no surplus capacity to meet demand requirements compared to the acceptable global average of 15% - this has ultimately resulted in load shedding across the country from time to time.

Government estimates that the SA installed capacity will need to grow by at least 26GW i.e. 51% more capacity than now) in the next 10 years to meet current and forecasted demand. At the same time more than 25% of the existing coal power plants are scheduled to be decommissioned by 2030 and

their generation capacity will need to be replaced after having reached the end of their scheduled life spans. Renewable energy is deemed to be the least cost and most appropriate option given the country's vast natural resources, to fill the resulting supply gap as outlined in the latest update to the Integrated Resource Plan (IRP 2019).

Constraints to growing coal fired generative capacity

In addition to the detrimental impact on the environment and the water intensive nature of coal generation, the mined coal supplies are coming under pressure and projections are that within the next five years new deposits will have to be found and drilled in order to meet the country's power generation requirements. The coal supplied is also poorer quality than the more lucrative export grades, which results in less efficient power generation. Furthermore most of the coal sold to the power plants is transported by road which leads to an even more detrimental impact on the environment as well as road infrastructure.

The bulk of South African coal plants are located in the water scarce North Eastern part of South Africa (Mpumalanga and Limpopo) close to the sources of coal supply. It has been determined that power transmitted through the national grid from these generation sites to the Western Cape, Eastern Cape



and Kwazulu-Natal incurs typical transmission and distribution losses ranging between 6% and 8%. In addition, water losses occur due to transporting the water from its water source to the power station.

It is contemplated that the renewable energy power programme will alleviate some of these transmission losses as many of the projects will be located in regions closer to the consumers.

Government's long-term power procurement plan

The Government's IRP 2019¹ was signed by Minister Mantashe on 17 October 2019. The document outlines South Africa's new electricity generation plan from 2010 to 2050 and is the policy that leads the way forward for South Africa's energy sector. It sets out the proposed new power generation rollout and the mix of generation technologies, including procurement from independent power producers and other private sector generators. Procurement of approximately 30 GW (80%) of new generative capacity is targeted from renewable energy and gas-fired energy until 2030.

New procurement over the next three years is planned to include 5 589 MW from REIPPPP projects that are currently under construction and a further 5 732 MW from the operational ramp up of Medupi and Kusile.

Up to 1 500 MW from new independent coal plants is planned between 2023 and 2030 to partly replace just more than 11 000 MW of existing coal capacity that is scheduled to be decommissioned over this time. In addition the IRP 2019 plans to procure new generation capacity of 3000 MW from gas/diesel, 1 575 MW from energy storage and 20 300 MW from renewable energy -allocated to hydro (2 500 MW), solar PV (5 000 MW) and wind (12 800 MW), as follows:

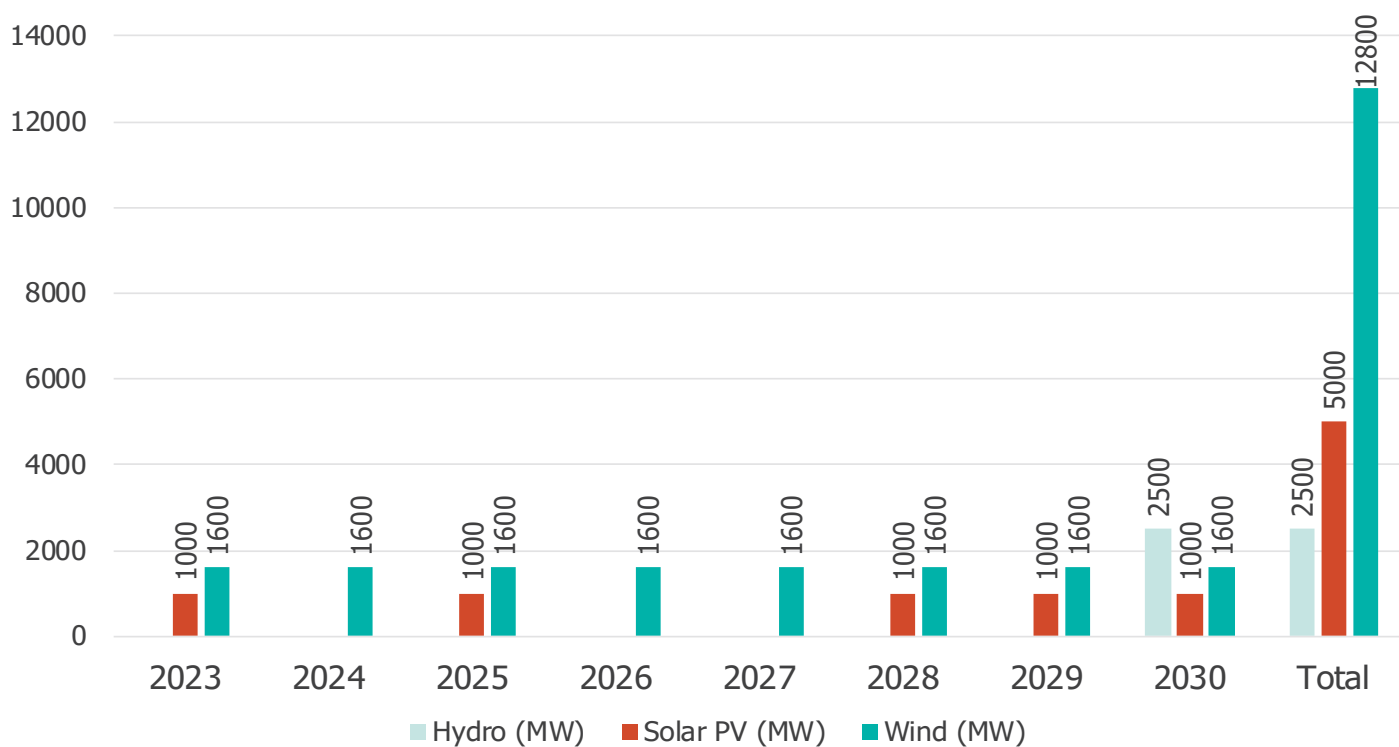


Figure 1 Additional renewable energy

The 2 500 MW allocation to hydro in 2030 is expected to be sourced from the next phase of the Grand Inga Hydro Power Project located on the Congo River in the Democratic Republic of the Congo. The existing Inga hydroelectric dams are to be expanded, but development was recently delayed following the withdrawal of funding from the World Bank due to political concerns in the DRC. Apart from the completion of this project, a transmission line to South Africa would need to be constructed and it is uncertain at this stage whether this will ever materialise.

The updated energy mix, including the decommissioning of existing Eskom coal plants, will result in coal comprising around 59% of generation capacity by 2030 and renewables (solar PV, wind and hydro) around 33%. New capacity beyond 2030 will continue to be dominated by renewables and gas which are projected to comprise between 50% and 70% of installed capacity by 2050 in terms of the least-cost option modelled under the IRP 2019.

¹ Integrated Resources Plan (IRP 2019)
<http://http://www.energy.gov.za/IRP/2019/IRP-2019.pdf>

What is the Renewable Energy Independent Power Producer Procurement (REIPPP) programme?

Independent power producers

In 2003, Cabinet approved private-sector participation in the electricity industry and decided that future power generation capacity will be divided between Eskom and independent power producers, or (IPPs). These are privately owned entities established by developers of renewable energy projects whose shareholding is typically taken up by the developers, technology providers, project operators, institutional and community trust investors.

Structure and size of the programme

The Renewable Energy Independent Power Producer Procurement (REIPPP) programme has been designed by the Department of Energy (DoE) to procure private-sector participation in power generation through a competitive bidding process. The Independent Power Producers (IPPs) that are awarded preferred bids enter into a power purchase agreement (PPA) with Eskom and the DOE to supply all the power they produce to the national grid at an agreed inflationary linked tariff for 20 years.

The IPPs design, build, own and operate their renewable energy projects and use the revenue earned from the sale of power to repay the debt

and equity used to fund the development costs. The programme ensures that diversified primary energy sources are developed within the electricity sector and include solar photo voltaic (solar PV), concentrated solar power (CSP), wind, small hydro, biogas, biomass and landfill gas.

The DoE has invited suitable IPPs to submit proposals for the finance, construction, operation and maintenance of renewable energy generation facilities under the framework of the REIPPP programme. This has involved four bidding rounds over the past seven years for a prescribed amount of renewable energy capacity per round. Under the first four rounds, 6.3 gigawatts of renewable energy capacity was allocated across 92 projects located across the country and have cost more than R210 billion to construct.

The programme has been designed to contribute towards South Africa's supply of electricity, and in addition, contribute towards sustainable socio-economic and environmental growth. The project evaluation criteria contemplated by government focuses on local procurement, local and black equity participation, community upliftment and the cost of electricity supplied by the project.





With Government's estimates that the installed capacity will need to grow by some 26 gigawatts in the next 30 years to meet current and forecast demand, up to 70% (or 55 gigawatts) of all generation is expected to come from renewable sources in terms of the updated IRP 2019.

Evolution of the risk profile of projects bid

Local investors in the projects bid under REIPPP have had to develop risk approaches from scratch after the programme created the first ever financing opportunities in renewable energy in the country. The successive bid windows have brought risk adjusted prices down, including the cost of finance, as banks and other lenders have developed their models and become more comfortable with the risks. At the same time covenants and loan conditions have shifted to be more favourable to the project borrowers.

Government's role in the programme

Current electricity generation is predominantly supplied by Eskom, the national wholly state-owned utility, which supplies about 95 percent of South Africa's electricity and also owns and operates the national electricity grid. In global terms, Eskom is among the top seven utilities in generating capacity and among the top nine in terms of electricity sales.

Renewable power projects that are awarded contracts by the Department of Energy will enter into a Power Purchase Agreement (PPA) with Eskom that will guarantee payment of an agreed tariff for power generated, on a "take or pay" basis for at least twenty years. Essentially this means that irrespective of power demand by the grid, if the power is generated by the renewable plant, the tariff will be paid by Eskom for each kilowatt of energy produced. In light thereof, investors in the projects place much reliance on the historical wind or solar resource studies to underpin the budgeted project cash flows and equity returns.

Though electricity supplied by renewable energy developers was more expensive than conventional power (and will be paid for from an Eskom tariff) in rounds one and two, consumers can take comfort in the fact that renewable energy will not be a significant contributor to their spiralling energy costs as subsequent rounds have been in line with new build coal costs. So-called grid-parity, or the price at which tariffs for coal-and renewable-based energy intersect has been reached.

Steps in the REIPPP programme process

The design of REIPPP as a rolling, competitive bid window procurement programme has attracted vibrant investor interest locally and from abroad, with the potential to maintain and grow a pipeline of new power generation projects. The REIPPP programme bid process comprises six distinct stages:

STAGE Request for Proposals (RFP)

1

A bid round or bid window is opened with a request for proposals (RFP) issued to the market. A targeted quantity of power procurement is determined up-front by the DOE as well as the proposed allocations to a mix of technologies under the bid window.

STAGE Bid Submission

2

Interested bidders prepare and submit bid submissions in response to the RFP within specified timelines. As minimum qualification criteria, every project has to show a very advanced stage of development, as demonstrated by:

- Having secured land rights to the project site via ownership, leases or options;
- Having certain permits in place, most notably an authorisation under the country's environmental legislation;
- Having the whole project structure finalises, complete with technology suppliers, EPC contractors and financiers (both equity and debt);
- Fulfilling a range of technical requirements such as a yield assessment based on at least 12 months or measurements or data;
- Meeting minimum economic development requirements such as job creation and localisation;
- Offering an electricity tariff that is equal to or less than the technology tariff cap R/kWh; and
- Providing a bid guarantee to Government.

STAGE Preferred Bidders Announced

3

Qualifying bid submissions are adjudicated during an extensive evaluation process using independent advisors before preferred bidders are announced by the DOE.

STAGE Financial Close

4

Preferred bidders are then required to finalise and sign all project and financing agreements and meet all required conditions contained in them to reach financial close. This culminates in the signing of the Implementation Agreement and the Power Purchase Agreement with the DOE and Eskom respectively.

STAGE Construction

5

Following financial close the construction phase for the IPP project commences. Each project procured under RE-IPP is required to complete construction and achieve commercial operation by not later than the dates set out in the RFP. Within this prescribed window period, each IPP is contracted to their commercial operation date (COD).

STAGE Commercial Operation Date (COD)

6

Commercial operation date marks the successful completion of the project and its integration with the grid. From this point all power produced for the next 20 years is purchased by Eskom in terms of the off-take agreement under the PPA.

Bids totalling 17.5GW from 305 bid submissions have been received in the RE-IPP bidding process across all bid windows to date. From these 6.3GW have been selected for procurement. The number of qualifying and competitive bids in window 2 onwards well exceeded the available allocation or cap that could be procured.

The enthusiastic market response has allowed selective procurement ensuring that the strongest bids in terms of price, capacity, technology and developmental criteria could be selected. Selecting the most desirable bid options has clearly communicated the message that offering the most competitive bid.



The role of the PPA

One of the most important arrangements under the REIPPP programme was the directive for Eskom to enter into Power Purchase Agreements (PPAs) with the IPPs selected as preferred bidders, securing an off-take agreement for renewable energy for the next 20 years. The PPA provides for firm revenue projections, which in turn comprise the single most important criterion to render a power generation project bankable and appealing to investors. The guaranteed power off-take from preferred bidders, as secured through the PPAs, has provided the foundation for the RE-IPP programme's success.

Legal protections for investors

The legal rights, obligations and recourse by all parties, including the project owners, Eskom and the DoE, are very clearly stated in the PPA and Implementation Agreement (IA), in the event of a default by any party. These standardised legal agreements, which are not subject to negotiation by the parties (ie they are set by DOE), govern the offtake arrangement between Eskom and all REIPPP programme projects.

The agreements include recourse to the DoE which has, in turn, received written concurrence by National Treasury to ultimately guarantee the REIPPP payments by Eskom. A contingent liability of R147 billion has been recorded by the Government in the February 2019 Budget Statement relating to this contingent exposure to IPPs.

Key qualifying criteria for projects under the REIPPP programme

A pre-requisite of the REIPPP programme is that bids submitted by IPPs must show how their project will deliver social and economic development for South Africans. Only those with acceptable social and economic plans may advance to have their projects judged on feasibility and price.

Bid tariff

Approximately seventy percent of the bid evaluation criteria is weighted towards the bid tariff that the IPP seeks to earn from Eskom for every kilowatt of electricity generated. Lower cost producers are typically favoured to win preferential bids. The tariffs awarded in subsequent rounds of the programme have dropped significantly compared to the first round (75% lower for solar PV and 50% lower for wind) which translates into the lowest cost per unit of new energy in Bid Window 4 (BW4) compared to the cost of building any other form of energy technology, including new coal fired plants.

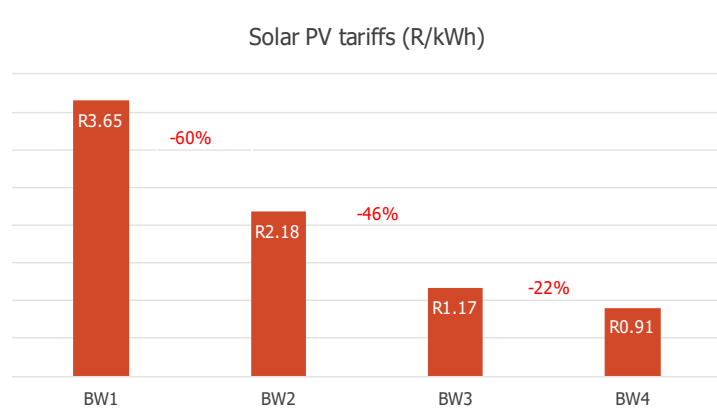


Figure 2 Solar tariffs

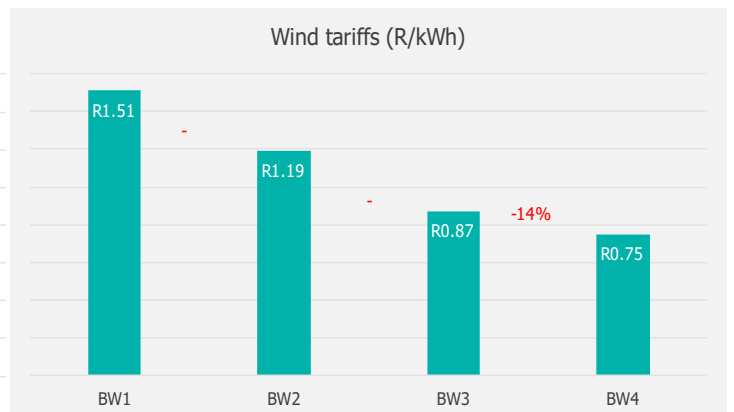


Figure 3 Wind tariffs

Local procurement

Job creation and local procurement of technology, skills and services for the project make up a significant part of the bid evaluation criteria which has forced many developers to establish manufacturing facilities in South Africa. At least 40% of the project's construction materials and services must be procured in South Africa.

Black and community ownership

At least 25% of the shareholding of every Independent Power Producer awarded a contract under the REIPPP programme must be held by a black empowerment group or individuals. In addition, at least 5% must be held by a trust representing the local community where the project is located to ensure that there is economic empowerment for South Africans resulting from the projects as well as environmental and social benefits.

Key differences between wind and solar generation

Site locations

Most of the wind farm developments are located in coastal areas where the wind strength is higher and more predictable than inland. In contrast, the solar parks are typically located in the Northern Cape and Limpopo regions where sun incidence is the highest in the country and the landscape is flat ensuring minimal shadow effect.

The Northern Cape, offering the most favourable solar radiation levels, has attracted the majority of the Solar PV projects and all the CSP projects. The province, host to 48 of the 92 IPP projects in the country is expected to contribute 3,566MW to the total procured renewable energy capacity once construction of Round 4 is complete.

The Eastern Cape has attracted 17 of the 92 IPPs totalling 1,509MW, the second largest share of total procured capacity. Corresponding to the province's excellent conditions for the generation of on-shore wind power, 16 of these are wind projects representing 43% of the procured wind power to date.

11 IPP projects are located in the Western Cape, contributing 592MW to total procured capacity.

The number of projects is shared roughly equally between 6 wind (458MW) and 5 Solar PV (134MW) IPPs.

The remaining 16 IPP projects are distributed among the other provinces, with Free State and North West Province sharing 5 each, Limpopo 3 and there is one project per province in Mpumalanga, Gauteng and Kwazulu-Natal.

Wind, Solar PV and CSP have attracted the most significant share of the investment across all REIPP bid windows to date:

	R'bn invested	% share of RE-IPP investment	Capacity (MW)
Wind	73.4	38%	3357
Solar PV	62.4	32%	2292
CSP	53.3	28%	600
Biomass	2.3	1%	42
Small hydro	1	1%	19
Landfill gas	0.3	0%	18

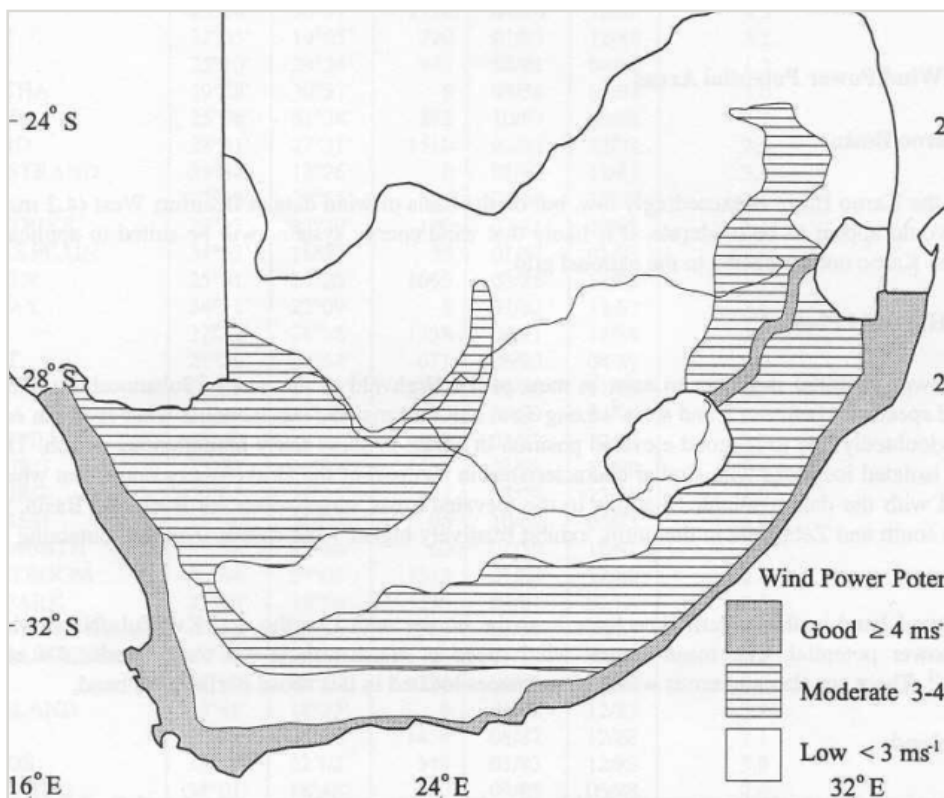


Figure 4 Wind Power potential in South Africa (Diab, 1995) from the White Paper on Renewable Energy; November 2003²

² White Paper on Renewable Energy; November 2003
<http://www.info.gov.za/view/DownloadFileAction?id=68765>

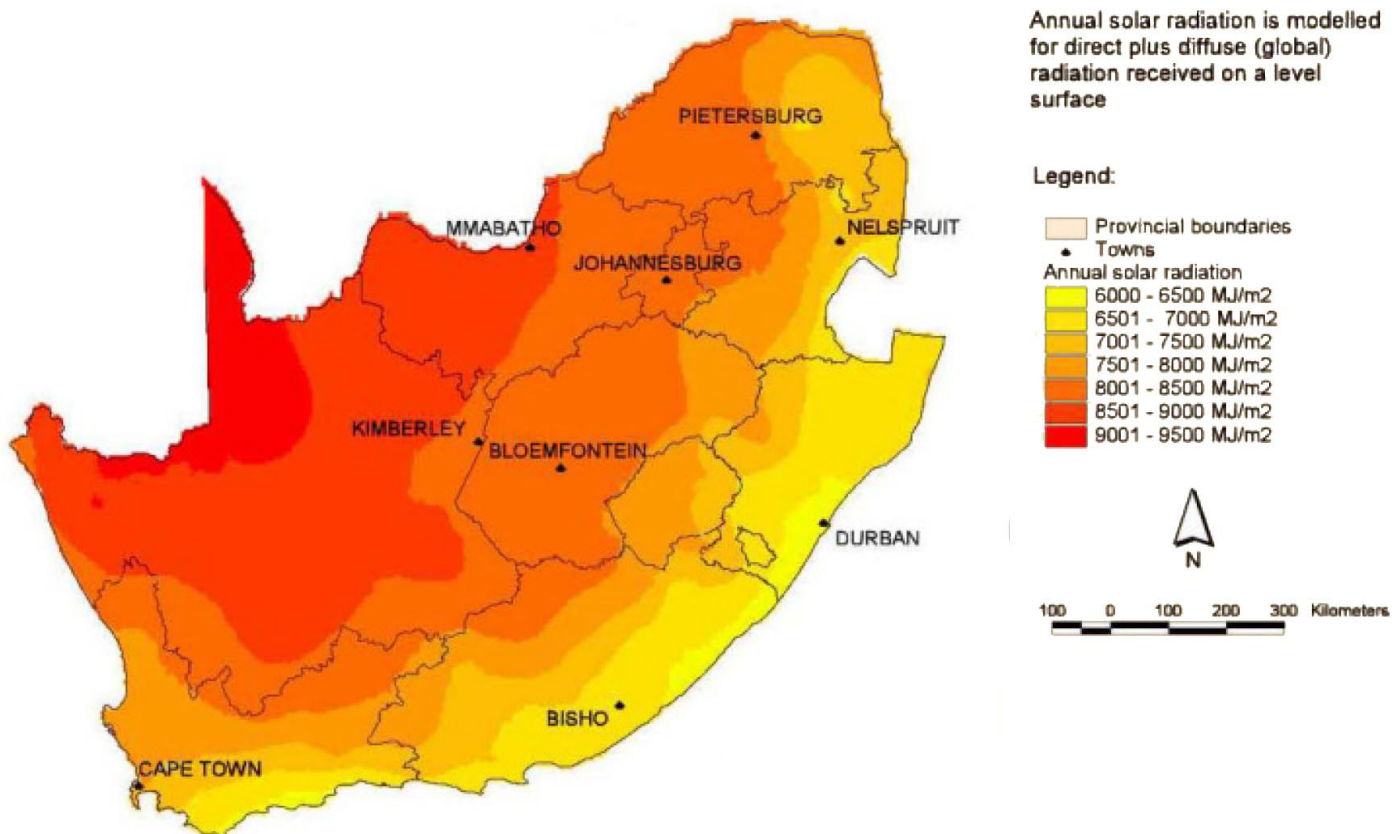


Figure 5 South African incident solar radiation from the White Paper on Renewable Energy; November 2003
 Copyright CSIR, Eskom Corporate Technology and Minerals and Energy

Technology

Given the international economic slowdown over the last few years, a surplus capacity of solar technology supply in the world has developed. Together with the increasing number of manufacturers and a rapidly evolving improvement in technology, there is a downward trend in the cost of procurement. This has created a significant driver to the lower tariffs awarded by the DOE in subsequent rounds of the REIPPP programme compared to the first round.

Solar power's land requirements are not as efficient as wind turbines due to the scalability effect of installation (e.g. 7.5 hectares of land produces as much power output as 20 Mercedes Benzes). Given that wind turbines operate at such a high altitude (80m), the surrounding land can be used for grazing.

Resource risk

Wind has been used for thousands of years as a source of energy. Wind power, as an alternative to fossil fuels, is plentiful, renewable, widely distributed, clean and produces no greenhouse gas emissions during operation. A key part of every project development is commissioning a professional engineering firm to measure the wind or solar incidence on the particular site where the project is to be located. These tests measurements are typically captured over at least a two year period, preferably longer.

One of the advantages wind has over solar power is that wind turbines can generate power both day and night assuming that the wind is blowing, however, the wind blowing is not quite as predictable as the sun shining. CSP plants are able to store energy during daylight hours and generate electricity during the peak demand evening hours and is therefore able to generate electricity at a more predictable rate.

With an average of more than 2,500 hours of sunshine every year and favourable atmospheric conditions, South Africa has in some parts excellent potential for solar power generation. Solar radiation is generally abundant in South Africa, with a daily average of between 4.5 kWh (Durban) and 6.4 kWh (Upington) per square metre per day. The Northern Cape in particular has levels of incident radiation that are comparable to the highest in the world.



Environmental, social and economic impact

Clean and renewable generation

Every project development requires an Environmental Impact Assessment (EIA) as a key criterion of the bid. This looks at the suitability of a proposed site and the impact of the project on the surrounding area, the environmental resources and the community.

Although a certain amount of energy and material is used in the construction of the renewable energy projects, this is usually recovered within a year of its operation. Renewable energy projects do not use fossil fuels, nor do they create toxic emissions or hazardous waste. Only small amounts of oil and insulation fluid are required for the operation of wind farms, making contamination of the soil or surrounding water supplies highly unlikely.

Employment and skills transfer

Creation of sustainable local jobs and the transfer of skills to communities surrounding the project sites are important qualifying criteria for projects under the REIPPP programme. Aside from procuring as much technology as possible from South African suppliers, all other services such as civil engineering and ancillary electrical equipment and expertise should be sourced locally. There is a minimum requirement of 40% of local procurement for every project and this threshold is anticipated to increase in later bidding rounds of the REIPPP programme.

Many of the sponsors of these new projects are international developers which have partnered with local firms who have a strong knowledge of the South African market. It is envisaged that there will be a high level of mentorship and skills transfer by the international developers.

Infrastructural investment and empowerment

There is a strong emphasis on investment by the projects into local socio-economic infrastructure and services as well as employing local labour to build and maintain the plants. Many of the projects will be constructed in remote, arid areas and civil engineering (e.g. in the form of access roads) will be important for the construction and operation of the project. Every project has a minimum BEE equity requirement which must include participation by a trust representing the local community.

Futuregrowth, acting on behalf of our clients, mostly third-party pension funds, is a major institutional funder in terms of debt and equity into renewable energy projects and offers clients the opportunity to access the renewable energy sector and assets via our unitised pooled, open ended funds. So far 23 debt transactions and four equity transactions have been approved for investment into new solar PV, wind and CSP projects in the Limpopo, Northern and Eastern Cape regions. These comprise preferred bid tenders awarded by the DoE in rounds one to three and to date 17 of these projects have achieved commercial operation and are generating power to the NTG.

Investments into renewable energy projects represent a new and growing asset class in the South African capital market and offers a unique opportunity for our clients to access a pool of assets not normally available to institutional investors. They qualify under client mandates for energy investments through the Power Debt Fund, Infrastructure & Development Bond Fund and Development Equity Fund; these funds will contribute to the massive increase in development of clean and sustainable energy envisaged over the next few years.

Futuregrowth's role as an institutional investor

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Portfolio Manager



Paul Semple
Portfolio Manager (Power Debt Fund) & Joint Head: Unlisted Credit

Paul is a Portfolio Manager of the Power Debt Fund and is responsible for the origination, structuring and management of a range of debt transactions, including a specific focus on infrastructure and developmental assets. As Joint Head of Unlisted Credit he is also responsible for co-managing a team of credit analysts, developing counterparty relationships and coordination of the unlisted deal allocation and credit approval process.

Paul joined Futuregrowth in October 2007. He was previously employed by First National Bank in a client portfolio management role and has 20 years of credit experience.

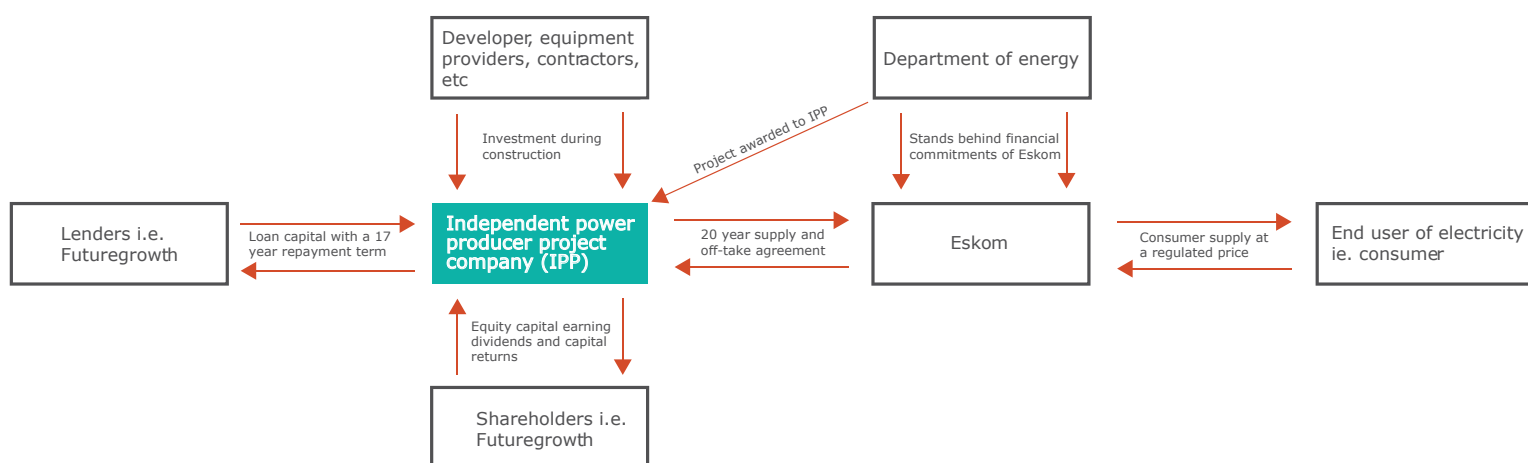


Figure 6 Overview of Renewable Energy Production and Off-take Process

Benefits to clients

- Through our proven track record in managing credit funds, we have the necessary credit experience, process and expertise to source and vet these assets.
- True to our philosophy, it is our intention to provide clients with a well diversified portfolio that will seek long-term returns and tangible social and development impact through investments in energy-related businesses and sectors in southern Africa. These include electricity generation from renewable, alternative and traditional sources, power distribution and reticulation, and supporting industries and sectors.

Risk mitigation

There is good diversity of underlying transactions in line with maximum concentration limits of any one transaction as a percentage spread across the funds mentioned above. The projects are located across the country and have been developed by different parties; they comprise of solar PV, wind and solar CSP technologies which have been sourced from a diversity of established manufacturers and developers, located both nationally and

internationally. Each transaction in which the funds have invested has been syndicated to Futuregrowth by one of the major commercial banks who have arranged the transactions and also invested therein on exactly the same terms and conditions as the Fund.

Liquidity

The Power Debt and Infrastructure & Development Bond Funds are not intended to be highly liquid given that the underlying transactions are unlisted, unrated and have relatively few co-creditors. The debt funds will maintain only a small holding of liquid assets to facilitate transactions and/or client cash flow needs. The underlying transactions will amortise from the end of their construction period which will ensure a constant repayment of capital and interest to the fund and also contribute to liquidity.

Where we have equity exposure, through the Development Equity fund, the same principle as above would apply in terms of liquidity requirements and constraints.

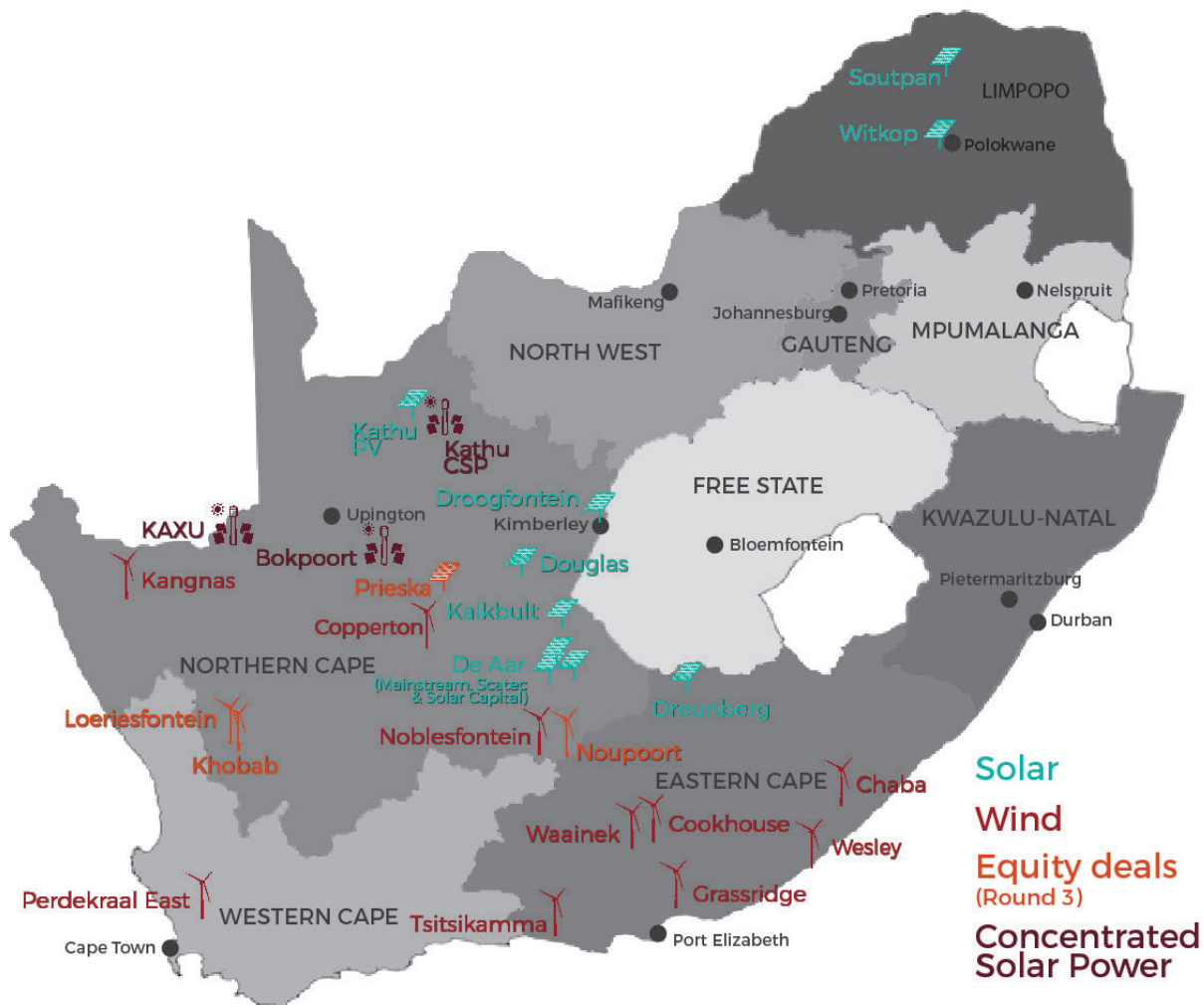


Figure 7 Diversity of Futuregrowth's REIPPPP deals

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