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Opportunities for Investing in Renewable Energy Sector in Africa.

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Contents

List of Figures

List of Tables

1. Introduction

This paper aims to provide a brief insight into the renewable energy potential in Southern Africa, and how the Norwegian sovereign wealth fund Government Pension Fund Global (GPFG), also known as The Oil Fund might invest in this growing industry in a manner that yields long term returns, whilst contributing towards regional economic development and improving people's lives.

For this paper, the research was mostly desktop with insights provided through interviews with five renewable energy experts (see appendix A), all of whom are currently invested in renewable energy projects in South Africa. Budgetary constraints precluded site visits.

2. The global context for renewable energy growth

The global renewable energy policy multi-stakeholder network (REN21) connects a wide range of actors, aims to facilitate knowledge exchange, policy development and action towards a global transition to renewable energy. Each year, REN21 produces a report on the status of renewable energy globally. According to the 2015 REN21 status report (REN 21, 2015), 2014 was another year of growth in the renewables sector globally. 40GW of solar photovoltaic (PV) cells were installed, bringing global capacity to 177GW, and creating 7.7 million jobs in the renewable energy sector (REN21, 2015).

Over the last decade, renewable energy technologies have experienced rapid cost reductions and increased global capacity. According to REN21, decreasing costs of solar PV production means that, in a number of locations, solar PV is becoming cost competitive with fossil fuels. In the developing world, renewable energy provides not only an opportunity for increased energy for economic growth, but distributed renewable energy systems can greatly speed up the pace for modern energy service provision in areas presently without access. REN21 (2015) identifies up-front financing, and access to the necessary equipment, as the major challenges in their latest 2015 World Renewable Status report.

The International Energy Agency (IEA) predicted that "renewable energy will represent the largest single source of electricity growth over the next five years, driven by falling costs and aggressive expansion in emerging economies." (IEA, 2015). The IEA points to government policy uncertainty as hampering such expansion. According to the IEA, renewable electricity additions will reach 700GW, and will account for about two thirds of net additions to global power capacity, with renewable energy expansion gradually shifting towards developing countries. The IEA points to the potential of renewables to become the driver of development, particularly in Sub-Saharan Africa. According to IEA CEO, Dr Birol, "…renewables can play a critical role in supporting economic growth and energy access in sub-Saharan Africa, meeting almost two thirds of the regions new demand needs over the next five years".[1]

3. Southern African context

Access to electricity for the 300 million people that live in Southern Africa has changed significantly over the last decade. For example, the share of those with access to electricity from 2000 to 2012 for South Africa, Mozambique, Tanzania and Zambia increased by 19%, 32%, 13% and 14% respectively. However, more than 200 million were affected by household air pollution in the Southern African Development Community (SADC) in 2012 (REN21 SADC status report 2015), due to

[1] https://www.iea.org/newsroomandevents/pressreleases/2015/october/renewables-to-lead-world-power-market-growth-to-2020.html

a reliance of solid fuels for cooking and space heating. There is much more that must be done to provide sustainable energy for the region.

The IEA (2015) identified regulatory barriers, grid constraints, and macro-economic conditions as posing significant challenges to renewable energy implementation in SADC. Improving financing conditions, adopting new business models and ensuring good policies and governance are key to increasing levels of renewable energy in the region, and the predicted that renewables should meet around two thirds of the power demand in sub-Saharan Africa by 2020 (IEA 2015).

In Southern Africa, the SADC is the means of coordinating infrastructure development within the 15 member states. SADC has also developed the South African Power Pool (SAPP) the Regional Energy Regulators' Association (RERA) and recently, in 2015, the SADC Centre for Renewable energy and energy efficiency (SACREE). SACREE's mandate is "..to promote market-base adoption of renewable energy and energy efficiency technologies and services in SADC member states" (REN21 SADC status report 2015). The centre is envisaged to play a similar role to ECOWAS's centre for renewable energy and energy efficiency in West Africa.

All of the SADC countries have joined the Sustainable Energy for All (SE4All) initiative of the United Nations, which enables a rapid assessment, followed by an investment prospectus.

According to the SAPP, the region will need to almost double its generation capacity by 2025. The ambitious energy plan for the region includes 73 power generation projects to increase generation from 56000MW to more than 96000MW by 2027[2], with the proportion of renewable electricity supply set to reach 32% by 2020, rising to 35% by 2030. These figures do assume a large role for hydropower, but include solar and wind share as well. While energy security has always been a priority issue for SADC, its focus is now also on linking the member states, and 6000MW of trans-border electricity connections were planned for 2014/15 alone. In 2014, Africa attracted about 3% of global investment, and USD8 billion for renewable energy investments, with South Africa taking USD5.5 billion.

Anticipated infrastructure development, both generation as well as transmission and distribution, are expected to increase over the next 5-10 years. SADC's regional infrastructure plan has a total investment for electricity generation of USD114 billion to USD233 billion from 2012-2017, with an additional USD540 million for transmission connections.

4. Scramble for Renewables in Sub Saharan Africa

A number of global initiatives aimed at increasing energy security throughout Africa have emerged recently.

A financing initiative announced after the RIO+20 summit was the US Africa Clean Energy Finance (ACEF) initiative, which has USD20 million from the US state department. The ACEF aims to catalyse private sector clear energy deals in Sub Saharan Africa[3].

The USA also unveiled the Power Africa initiative, which aims to double the number of people with access to electricity, and has committed USD1.5 billion of financing and insurance through the Overseas Private Investment Corporation, OPIC (the United States Government financing arm)[4]. The

[2] http://www.sardc.net/en/southern-african-news-features/sadc-ministers-to-review-regional-energy-programme/
[3] http://www.nextgensolar.net/?p=73.
[4] https://www.opic.gov/who-we-are/overview.

logic behind this initiative, is to provide energy that can stimulate economic growth. For example, the Kigoma solar power plant in Tanzania, has a grant-funded component which involves installing solar modules and other electric systems in approximately 45 secondary schools, 116 dispensaries, 14 health centres, 25 village markets, and 90 fishing boat pairs.

The World Bank also has a programme to attract private investors to Sub-Saharan Africa. One initiative of the World Bank Services is "Scaling Solar", which aims to create viable markets for solar power in each of the World Bank's client countries. They are aiming to be a "one stop shop" to attract investors. One example in Zambia is the 600MW "scaling solar" project. In Zambia, the Industrial Development Corporation (IDC), has pre –qualified 11 bidders to develop 2 50MW solar PV projects under a competitive bidding process. However, all eleven pre qualifiers are foreign, with only one being African, namely Mulilo Zambia PV1 Consortium, based in South Africa.

The United Kingdom government's Development Finance Institution, CDC, owns 70% of Globaleq (an experienced power company that operates and actively develops power projects across Africa) and uses its GBP4.3bn to provide debt and direct investment to businesses. The Norwegian development finance group, Norfund, owns the other 30%[5]. According to one of the experts interviewed, Globaleq aims to extend its footprint in Africa. Globaleq has invested in various renewable projects in the region, including 3 renewable energy projects in South Africa, totalling 238MW. This is an indication of where this institution sees an area of future growth.

Due to commercial confidentiality issues, it was not possible to provide a detailed analysis of the various renewable energy projects seeking finance. The data for the projects in Table 1 below, was extracted from a variety of sources, primarily web based, with likely outdated investment data. However, what is apparent, is that there are a number of renewable energy initiatives underway in the region. Table 1 below, summarises several of the solar, wind and biomass projects underway north of South Africa. The table provides an indication of the size of the power plant, and its investment, the partners involved, and the impacts projected for the local community. The private investors are likely to have other projects in the pipeline, and there could potentially be opportunities for future investment partnerships.

Table 1 Selection of Renewable Energy Projects in Southern Africa (excluding South Africa)

Name of power project	MW	description	Partners/investors	Investment amount	Social benefits/ impacts
Kigoma Solar power plant, Tanzania	3MW expanded to 5MW	Solar power connected to a mini grid, replacing diesel	NextGen Solar/ TANESCO Power Africa project	US$7.6 mill[6]	[7]Beneficiaries for solar grid include dispensary local school, fisher community
Makambako wind farm, Tanzania	100 MW wind	Wind farm PPA linked to grid	MCC20 Hainan International (25%)/ Norsk Vind Energi (50%)	USD 150 mill	
Singida wind farm	100 MW		Aldwych International LTD	USD 285 million	

[5] http://www.globeleq.com/about_us
[6] https://www.usaid.gov/powerafrica/partners/african-governments/tanzania
[7] http://www.rexsolarenergy.com/wp-content/uploads/2015/06/Rex-Investment-and-Camco-International-has-Launched-the-Tanzanian-Largest-Solar-project-in-Kigoma.pdf

			(80%) IFC 20%		
Aldwych Lake Turkana wind Farm, Kenya	310MW wind	Wind power equivalent to 25% of current installed grid capacity	Power Africa project. Aldwych International LTD (51%), IDC (25%) other (24%)	BOO project with 20 year PPA contract USD 764m[8]	Has carbon credits
Kinangop Kenya	60MW wind		Aeolus Kenya ltd Power Africa project		
Ngong, Kenya	100MW wind		Kipeto Energy limited Power Africa project		
Menengai, Kenya	400MW geothermal		Power Africa project		
Mubuga, Burundi	7.5MW solar pv power plant	Solar	USTDA grant for feasibility – financing progress?		Would increase Burundi elec generation by 15%, help power 60 000 hhs and businesses[9]
Otjozondjupa solar park, Namibia	5MW	Solar pv using thin film solar. 52000 modules, providing 14 000MHh per year	HopSol / NamPower utility	To be completed by June 2016, 1% of national capacity	Save 19000 metric tons water because solar doesn't need water, Displace 300 000 liters of gasoline per year Provide 3700 hhs with energy[10]
UAG Diaz wind farm	44MW	Wind linked to grid PPA	Korea Midland Power Corporation (KOMICO) (20%)/ Sojitz Corporation (20%)/ United Africa Group (UAG) (60%)	Complete date 2015? USD151 million	
TBE Kampala Biomass plant, Uganda	40MW	Biomass	Taylor Biomass Energy Uganda/ Selling to public entity – assume Govt utility.	Started in 2012, USD160 m?	
Mocuba	40MW	Solar pv with	Scatec Solar	US$84million	Climate resilient

[8] http://ppi-re.worldbank.org/advanced-search#Economies
[9] https://www.ustda.gov/news/press-releases/2015/ustda-supports-solar-power-development-burundi
[10] http://www.esi-africa.com/news/namibia-hopsol-works-with-first-solar-on-otjozondjupa-solar-park/

Solar pv Mozambique	solar pv	25 year ppa with EDM	(52.5%) Norfund (22.5%) Electricidade de Mozambique (EDM 25%) EDM is the state own public power utility.	A loan US$21m from IFC, B loan US$21.1 from Emerging Africa Investment Fund	project as mitigating flood damage, and enhancing energy security
Lusaka south Zambia	2 x 50MW Solar pv		Zambian IDC/ world bank "scaling solar", bidder (11 prequalifiers at this stage)	IFC procurement model, drawing on world bank finance potentially	Low water levels in dams led to inadequate hydro capacity.

Appendix B provides a list of the 93 projects in the South African programme, and these are discussed in more detail below.

5. The South African Success Story

In 2011, South Africa hosted the annual UN Climate Change negotiations, COP17. As part of the preparation for hosting this event, South Africa put in place a procurement system for renewable energy. It was based on an electricity supply plan, called the Integrated Resource Plan (IRP), which called for 42% of all new generation to be renewable by 2030. The government then implemented a number of bidding rounds to procure renewable energy.

As the renewable programme has rolled out, the cost of renewable energy, particularly solar PV, has fallen, in line with the global cost decline. Rising electricity prices for fossil fuels have also led to favourable cost comparisons with renewable energy. Press reports indicated that in South Africa, Eskom's coal-powered electricity was likely to reach R1.69c/kWh in 2020, while solar PV would cost between 74c/kWh and R1.36c/kWh[11]

As renewable costs are mostly up front, and there is no fuel, the project operating costs are typically low and predictable, unlike fossil fuelled generation. In South Africa, tariffs have tripled over the last 5 years, in order to cope with the rising costs of coal, and require the continuous use of expensive diesel power peaking plants to meet 24 hour demand.

This South African Renewable Energy Independent Power Producers Procurement Programme (REI4P) has been lauded overseas. Since its inception 5 years ago, 4 bidding rounds have been run. Over 5000MW have been procured, and 1860 MW are already on line.

A comparative study, by the CSIR (Bischof-Niemz T. 2015) of the benefits of renewable energy to the power system and economy over 2014-2015, highlighted the role that renewable energy had played in the South African economy. The study showed how renewables had compensated for outages of fossil fuel power stations, and showed the financial benefits to the power sector as well as the positive impacts on the economy as a result is presented in Table 2 below.

[11] http://www.iol.co.za/business/news/solar-pv-energy-costs-to-undercut-coal-1592553

Table 2 Benefits of renewable energy (CSIR, 2015)

	2015 (6 months)[12]	2014 (12 months)
1	R3.6 billion Saving in diesel and coal fuel costs	R3.64 billion Saving in diesel and fuel costs
2	200 hours Of unserved energy avoided, saving at least an additional R1.2 billion – R4.6 billion for the economy	120 hours Of unserved energy avoided, saving at least an additional R1.67 billion for the economy
3	Generated R4 billion more financial benefits than cost of renewable supply	Generated R0.8 billion more financial benefits than cost

Image: Mulilo Sonnedix Prieska 86MWc plant 50% completed

In addition to the broader economic impacts outlined in Table 2 above, by June 2015, 37 projects (1860 MW) were operational, with an average lead time of 1.6 years. Appendix B includes a map of the distribution of projects across the country. 4294GWh have already been generated, offsetting 4.3Mt CO2 emissions and creating 19 000 jobs. R53.2 billion Rand has been invested, black South Africans hold 29% of the equity, and local communities have 10% of the equity (Dept. of Energy et al 2015).

For investors in the South African market, a report[13] by the Public-Private Infrastructure Advisory Facility (PPIAF) provided an indication of returns on investment. In Round 1 of the REI4P, real returns were close to 17% (in local currency). In Round 2, equity returns dipped slightly for wind, with dollar returns of 12-13% reported. Due to increased competition, the decline in international prices for renewable energy equipment and ongoing innovation and economies of scale, prices fell again in round 3 (Eberhard A. et al 2014).

Image: Kitchen staff at Huis Pickard celebrating the new equipment

Image: Huis Pickard residents are treated to a Christmas party

Of the 64 projects (total of round 1,2,3), 56 were project financed, with one project issuing a corporate bond of ZAR1bn. In Round 3, six out of 17 projects were financed by Italian utility, Enel. Reports indicate the return on equity for the corporate funded projects in round 3 was low. In the future, the trend towards corporate financing may or may not continue but according to Eberhard et al (2014), it is likely that "more international utilities will be interested in entering the South Africa renewable energy market, especially European utilities that are struggling to grow market share in their home markets".

Three South African success stories are provided in Table 3 below, in order to highlight the benefits of renewable energy projects.

[12] IPPPP overview 2015 by Dept of Energy, Treasury and DBSA

[13] Authors Anton Eberhard, University of Cape Town business School, Joel Kolker, World Bank Institute, James Leigland, Private Infrastructure Development Group 2014

Table 3 Three South African Success Stories[14]

Name of power project	MW	description	Partners/ investors	Investment amount	Social benefits
Mulilo [15]Sonnedix Prieska Solar PV	86	Solar PV farm under construction to be connected to the grid in 2016 / PPA with Eskom	Mulilo (20%) Gestamp Solar (60%) Mulilo community trust (20%)	Over R1.3 billion	R1.5 million per annum, has created 500 jobs, Will supply equivalent for 20 000 homes, supported old age home, estimated 900 jobs in construction, 24 in O&M
De Aar Solar	50MW	Solar PV Connected to grid PPA with Eskom	Globaleq/ Mainstream/ Thebe Investment Corporation / Genesis Eco-Energy[16] 8% owned by Sibona Ilanga Trust[17]	USD 150 million	80% of support focused on education. Literacy, maths and science programme, scholarships for engineers
Jeffreys Bay wind farm	138MW	Wind farm connected to grid / PPA with Eskom	Globaleq (20%) Mainstream Renewable Power (20%) Old Mutual (20%) Genesis Eco-energy 6% owned by Amandla Omoya trust	USD 296 million	Funded recycling project, scholarship programme for engineers, donation to wilderness training programme. 602 jobs in construction 11 jobs in O&M

[14] The facts and figures were drawn from various websites, included the company's own. Individual websites have been included where relevant

[15] http://www.nersa.org.za/Admin/Document/Editor/file/Consultations/Electricity/Presentations/Mulilo%20Renewable%20Energy%20Solar%20PV%20Prieska.pdf

[16] Genesis Eco energy sold their share in the projects recently but are still listed as owners on some databases. For consistency, I have kept them here http://www.doingbusiness.org/re/advanced-search#Economies

[17] http://deaarsolar.co.za/benefits/community-benefits/community-trust/

There have however been some negative impacts associated with these projects. For example, initially fewer jobs were created for locals and small businesses than expected, and the social benefits have not yet materialised. In addition, local power plant projects failed to adequately consult local authorities over their planned interventions. As the projects mature, these negative impacts should be corrected[18].

As the aim of the programme was to attract private sector investment, the South African government set up a partnership of the Department of Energy (DoE), the Treasury, and the Development Bank of South Africa (DBSA), in order to ensure that there was a transparent, fair and accountable procurement process. This Renewable Energy Independent Power Producer Procurement Programme Office, is not housed in a government building, but has office space in a commercial area.

The programme has run for a number of bidding rounds, with complex assessment criteria which awards projects 70% on price, but then also awards projects on local content and local services, as well as job creation, enterprise development and social responsibility. Community ownership is mandatory, mostly through the formation of a community trust. Such trusts were loaned money in order to buy their equity in the project, mostly by development finance institutions such as the Industrial Development Corporation (IDC).

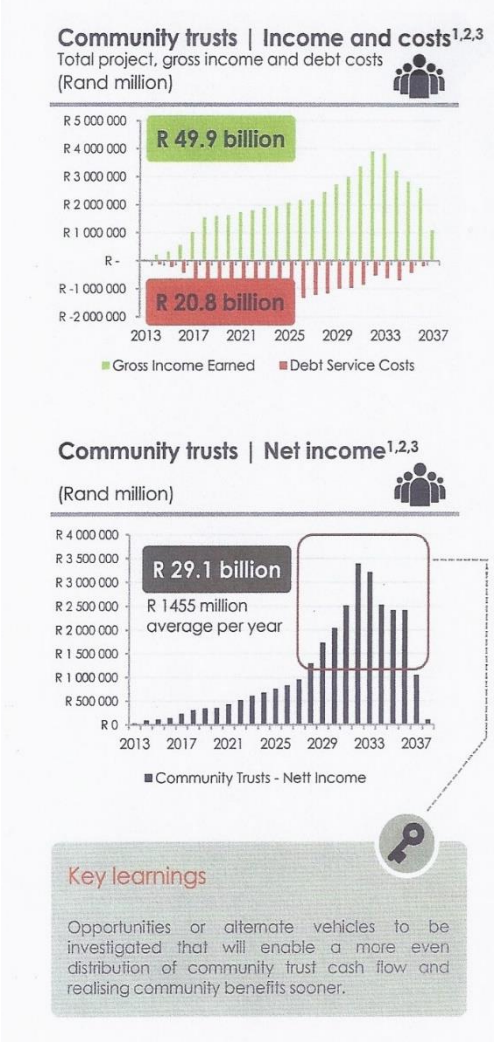

Figure 1 Community Trusts: income and costs

The structure of these loans are such that the trust receives a trickle dividend until the financial costs are paid off (see Figure 1: Community trusts: income and costs). However, the impact is that little actual community development can take place during the first years, and in this challenge lies opportunity.

6. Transforming Challenges into Opportunities

Historically, Renewable Energy investment has been seen as risky, with the costs of regulation and application procedures seen as barriers to investment. One of the challenges to the development of the South African small scale project sector has been a risk averse commercial banking sector which has limited the extent to which the banks were involved in the REI4P (Eberhard 2014).

The IEA (2015) has outlined a virtuous cycle for renewable deployment which could be created should there be clear set of policies to push for dramatic scale up of renewable energy. For developing countries, such policies include certainty in long term implementation of policy frameworks, improving the power system and grid integration, reducing regulatory barriers, strengthened financial sustainability through removal of fossil fuel subsidies, good design of price competition mechanisms and improved financing conditions.

[18] http://thegreenconnection.org.za/wp-content/uploads/2014/09/EGI-REI4P-review-2014.pdf

In Southern Africa, a number of these challenges are being addressed.

International and local policy shifts towards renewable energy are also driven by climate change considerations. The UNFCCC Paris agreement reached in 2015 is likely to drive this at an increased pace. Policymakers are also aware of the risks that increasing fossil fuel emissions might pose to country competitiveness (Eberhard et al 2014). Presently, SADC is largely reliant on hydro generated electricity. However, recent climate changes and related droughts are therefore resulting not only in water shortages, but also in electricity shortages. For example, Zambia's most recent (2015) solar project was initiated by a direct order from the President to address the power shortages due to lack of water.

Namibia is also a country with very little water and mostly desert climate. The Namibian Otjozondjupa Solar PV Park project provides a climate change adaptation solution, that helps both water and energy security.

In order to assist and promote investment in renewable energy, countries like Uganda and Tanzania have produced guidelines which identify the risks, and outline the mitigation measures that have been put in place to address the risks.

For example, in Tanzania, the government has acknowledged it needs to take a proactive approach to renewable energy rather than wait for unsolicited bids. This proactive approach has included the development of streamlined set of procedures, a regulatory framework, model contracts and tariff rules, for larger projects above 10 MW.[19] Uganda has a 55 page investment guide[20] which includes a section called "Must Know and Must Have" for investors. This guide outlines the process to be followed when investing in projects, including power purchase agreement templates.

One example of how investment can be funnelled into a specific project is the Mocuba solar project in Mozambique. A special purpose vehicle (SPV) has been established through which the 3 funders channel their investment. The electricity generated is sold through a long term contract of 25 years[21]. This project is anticipated to meet up to 5% of the country's peak demand, and is expected to help mitigate the impact of the floods through building more climate resilient power generation infrastructure. The World Bank's International Finance Corporation (IFC) also points to the lead role it is playing in mobilizing finance for the project, and that this project will signal that utility scale projects are bankable in Mozambique.

This is a similar model of long term Power Purchase Agreements (PPA's) that was followed in the South African Renewable Energy Independent Power Producer Programme (REI4P).

In Uganda, the Ugandan Energy Credit Capitalisation Company (UECCC) has support of the German development bank (Kfw) in offering advisory services, and, in November 2015, had invited renewable projects to apply.[22]

Old Mutual Pension Fund, together with Macquarie, formed African Infrastructure Investment managers (AIIM) and have USD12 billion in equity across 5 infrastructure funds. For example, they

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[19] https://www-cif.climateinvestmentfunds.org/sites/default/files/meeting-documents/srep_tanzania_investment_plan_design.pdf

[20] http://uganda.nlembassy.org/binaries/content/assets/postenweb/u/uganda/embassy-of-the-kingdom-of-the-netherlands-in-kampala/import/development-cooperation/renewable-energy-investment-guide.pdf

[21] Ifcextappsifc.org

[22] http://www.newvision.co.ug/new_vision/news/1411452/ugandans-invest-renewable-energy

hold 14% in Cookhouse windfarm in South Africa, and 81% in Kinangop Wind Park in Kenya. In an interview with Bloomberg, Old Mutual's Chairperson, Patrick O'Sullivan, stated the Old Mutual Group was taking a long view on Africa. "A good example of this is Hopefield Wind Farm in the Western Cape where Old Mutual Group has achieved a gross return of over 20% on its initial investment. When Patrick visited the project during a trip to South Africa, he pointed out that after expenses and currency step-downs the final return is still 'well into double digits'"[23].

7. Shifting Investment into Renewable Energy

Many development funds have already, and are continuing, to demonstrate the viability of renewable energy projects. These funds can invest in higher risk projects, which then provide higher returns.

In the South African and Zambian situations, local energy firms cannot access capital at the rates that international firms can, and so, in South Africa for example, the high transaction costs for the REI4P, led to international firms crowding out the local economic players. This could then undermine the local economic development goals of the South African programme. In some bids Small and Medium Enterprises (SME's) were bought in as minority shareholders by big players, and there has been some benefit to local consultants and contractors[24]. However for the recent Zambian 100MW bid, only 1 out of the 11 firms that qualified were African, and in this case it was a South African company, not Zambian.

Other funding partnerships include that of Lereko Metier, partnered with the South African Public Investment Corporation (PIC), the German development finance Institution Deutsche Investitions und Entwicklungsgesellschaft (DEG), and the Dutch Development Bank (FMO).[25]

The experts consulted for this paper suggested that, for the Norwegian Oil fund, with an asset value of USD802.6 billion, holding one percent of global equity markets, it would not be efficient to invest on a project by project basis. Also, given its current lack of experience in the African renewable sector, it would make sense for the Norwegian Oil Fund, at least in the beginning, to invest in finance institutions that are currently financing renewable projects, i.e. adopting a phased approach for investment in this sector.

It was definitely believed by those interviewed (see appendix A) that here exists a space where a fund like the Norwegian oil fund, partnered with a financing partner, could offer attractive finance to local renewable energy companies who are currently forced to use commercial banks, with unattractive finance charges. There was a strong view amongst renewable experts consulted that there is a gap here for an institution like a pension fund, that does not need to have high returns over a short timeframe, but is investing for the long term. Such an institution would be able to offer finance at commercial rates to local firms who are wanting to get into the renewable energy sector, but cannot compete with international players in terms of access to finance.

The USA Power Africa initiative, mentioned earlier in the report is also a platform to smooth the path for investors into the renewable sector.

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[23] https://www.oldmutual.com/rb/in-practice-display.jsp?caseStudy_id=28071&currentKeyArea=14275&currentBusinessUnit=All&currentYear=All&allItems=true

[24] http://www.ppiaf.org/sites/ppiaf.org/files/publication/South-Africa-REIPP-Report_final_web.pdf

[25] http://www.pfie.com/sa-renewables-funding-in-place/21014044.fullarticle

A second, and also low risk path of investment, is to pick up the refinancing of viable operational projects. At this point, there is an indication that a number of operational renewable energy projects owners who are looking to sell their projects. In South Africa, these projects have a 20 year PPA with the power utility, and this PPA is backed by the national Treasury.

According to a Greencape (2015), "As the REI4P[26] matures, the financial structuring of projects has changed. This has been driven by several factors including lower risk profiles, increasing competition and economies of scale benefits". These projects have existing 20 year contracts and are operational and the original investors may now want to move on. In South Africa, there is a compulsory 3 year window where ownership cannot change, but the South African Department of Energy has indicated it would consider changes to the capital structure of projects ahead of the 3 year timeframe (Greencape 2015).

Norwegian Oil fund could find partners interested in setting up a special purpose vehicle (SPV)[27] or superfund in Africa that can invest (debt or equity) into renewable projects. SAREI4P projects are certainly amongst those that a pension fund could look to invest in, either through forming its own Special Purpose Vehicle, or through taking a share in one of the existing project funders. For renewable projects in SADC, both Zambia and Uganda have started a bidding process and are likely to be a source of increasing numbers of bankable projects for investment.

The South African business model requires a structured contribution to socially responsible local development, as well as a proportion of community ownership. This is an indication of ethical considerations underpinning the programme.

One particular suggestion for enabling local economic development while investing in a sound project would be to consider refinancing the trust funds of South African projects. As shown in Figure 1, many of the South African projects have community ownership through Community Trusts. The financial set up is that the trust receives a trickle dividend each year until the financing costs are paid off. Given the capital intensive nature of renewable energy projects, this in effect means that the money that could be invested in local community development projects, for example schools, hospitals etc. is not available in significant amounts until much later in the project life. The structure of these Trusts is such that they could be refinanced to allow a greater share of the dividend to be used for community development up front, with the project income guaranteed for the next 20 years through the PPA. This refinancing of the local trusts would resonate with the ethical criteria of the Norwegian Oil Fund.

Again, it is not recommended that the oil fund invest in individual projects but that oil fund set up an intermediary superfund that would then manage the investments into individual projects. In South Africa, 32 projects have been built, and a further 77 committed to the pipeline over the next few years. 1500 MW is connected to the grid out of the 5000MW procured so far, and with community trust shares of between 1 to 25%, an estimated R29 billion of investment could be available.

Some investigation would be needed into the impact of currency devaluation over time, but one expert explained that their company had calculated that the rate of currency devaluation would be matched by increasing tariffs, and would effectively cancel each other out. Other experts suggested that forms of insurance are available to address this particular risk.

[26] The South African Renewable Energy Independent Power Producers Procurement Programme

[27] A SPV is a legal entity (usually a limited company or limited partnership) created to fulfil a narrow, specific objective for example to invest in renewable energy projects in Southern Africa.

Old Mutual pension fund has created an alternative investment fund and has done very well out of this renewable portfolio, and further investigation in the manner in which they have invested would be worthwhile[28].

With improving cost trends, and noting that the potential hedge value of renewables needs to be accounted for, as against fuel price volatility and environmental externalities of fossil fuels, the IEA (2015) noted that "their improving economics suggest that renewables are an increasingly valuable option in a well-diversified portfolio of energy investments from both the investor and system perspective".

8. Conclusion

Renewable Energy investment in Africa is increasing as Countries in the Southern African region turn increasingly to renewable energy to enhance energy security. Over the next 10 years, billions of US dollars are set to be invested in energy related infrastructure in Africa, as demand for energy grows. According to one expert, there are many investors coming into the African market, but there is a need for more bankable projects, while the IEA suggests market access and investment risks keep finance costs elevated.

The attractiveness of the renewable market is strongly dependent on the regulatory framework and market design (IEA 2015) but there is no longer any need to provide high levels of incentives for solar PV and onshore wind. Decreasing renewable energy prices are resulting in a natural tendency towards increasing renewable energy share of a country's portfolio. This is likely to be supported by international environmental low carbon policy developments leading to phasing out of fossil fuel subsidies and increasing carbon pricing mechanisms.

SADC structures such as the South African Power Pool (SAPP) the Regional Energy Regulators' Association (RERA) and the SADC Centre for Renewable energy and energy efficiency (SACREE) are geared towards increasing regulatory certainty, while a number of international initiatives are focused on providing an enabling environment.

The South African Renewable Energy programme (REI4P) has been financed by the private sector and has been internationally acclaimed. This model is now under consideration in other Southern African countries.

The South African market has policy stability, strong regulatory environment and has attracted over R53bn investment. South Africa presents a success story with 93 projects either operational, or in the pipeline. Decreasing renewable technology costs, together with decreasing transaction costs have led to reduced electricity prices over successive bid rounds in the South African case. Returns have dropped from double digits to single digits. However, investment in the South African market is likely to provide low but stable returns over the long term, as all of the South African renewable projects have a PPA which guarantees returns over the next 20 years

There is therefore an opportunity to invest in existing South African projects, either in equity as existing owners move on, or refinancing the debt to unlock community development as outlined above.

In the rest of Southern Africa, emerging renewable markets are likely to provide higher returns but regulatory, and policy barriers still need to be addressed in some countries.

[28] It was, unfortunately, not possible to pursue this further due to time and budgetary constraints.

Within the renewable sector, there are a number of vehicles through which investment can take place. Given the understanding that renewable energy projects are a new area of investment for the Oil Fund, it is suggested that funds be directed to existing vehicles initially. This reduces the risk as the Oil Fund would be investing in institutions that have already done the due diligence on the bankability of renewable projects.

Such institutions could be European utilities, for example, Enel; or existing pension funds, such as the Old Mutual; or partnerships at the World Bank level.

In the longer term, the Oil fund could consider setting up its own special purpose vehicle (SPV), possibly in partnership with other investors (similar to that of Globaleq), which would build a presence in the region. This SPV could then provide loan financing to new projects, or take equity in existing projects directly.

Renewable Energy now represents more than 45% of overall supply additions. Under the IEA acceleration case projection, annual investment is predicted to reach USD315bn by 2020. The question for the Norwegian Oil fund is not if it should invest in renewable energy, but where and how. It is hoped that this report has contributed in some measure to answering such strategic questions.

This report compiled by Liz McDaid of the Southern Faith Communities' Environment Institute.

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10. Appendix A: Renewable Experts consulted.

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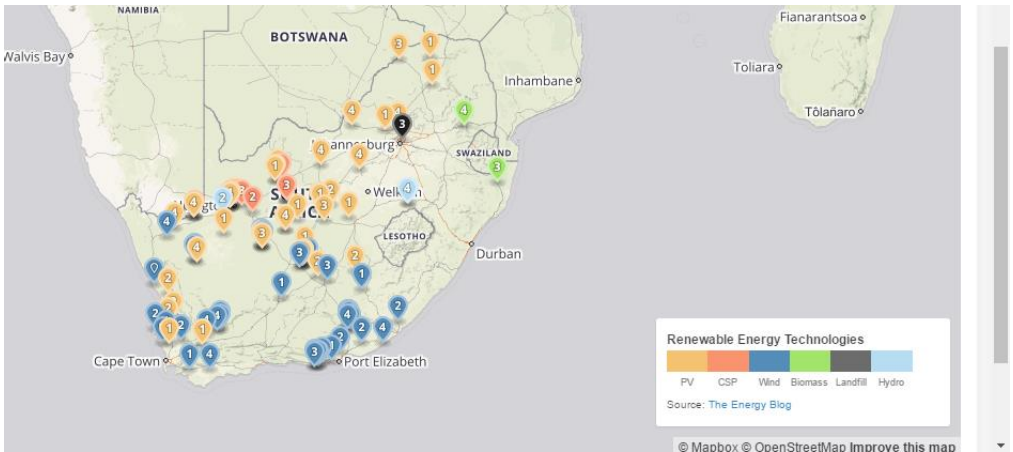
11. Appendix B: Renewable Energy Power Plants in South Africa.

This is drawn from the energy blog, a website that provides up to date information on the South African renewable energy projects. www.energy.org.za



Renewable Energy Power Plants

95 Results

Title	Technology	Closest Town	Capacity (MW)	Programme	Status
Adams Solar PV 2	Solar Photovoltaic (PV)	Hotazel	82.5	REIPPP Window 3	Construction
Aggeneys Solar Project	Solar Photovoltaic (PV)	Aggeneys	40	REIPPP Window 4	Approvals, planning and financing
Amakhala Emoyeni (Phase 1)	Onshore Wind	Bedford	134.4	REIPPP Window 2	Construction
Aries Solar	Solar Photovoltaic (PV)	Kenhardt	9.7	REIPPP Window 1	Fully operational
Aurora	Solar Photovoltaic (PV)	Aurora	10.35	REIPPP Window 2	Fully operational
Bokamoso	Solar Photovoltaic (PV)	Leeudoringstad	68	REIPPP Window 4	Approvals, planning and financing
Bokpoort CSP Project	Concentrated Solar Thermal (CSP)	Groblershoop	50	REIPPP Window 2	Construction
Boshoff Solar Park	Solar Photovoltaic (PV)	Boshof	60	REIPPP Window 2	Fully operational
Chaba	Onshore Wind	Komga	20.6	REIPPP Window 2	Fully operational
Cookhouse Wind Farm	Onshore Wind	Cookhouse	135	REIPPP Window 1	Fully operational

Title	Technology	Closest Town	Capacity (MW)	Programme	Status
Copperton Windfarm	Onshore Wind	Copperton	102	REIPPP Window 4	Approvals, planning and financing
Darling Wind Farm	Onshore Wind	Yzerfontein	5.2	Other	Fully operational
Dassiesklip Wind Energy Facility	Onshore Wind	Caledon	26.2	REIPPP Window 1	Fully operational
De Aar Solar Power	Solar Photovoltaic (PV)	De Aar	50	REIPPP Window 1	Fully operational
De Wildt	Solar Photovoltaic (PV)	Brits	50	REIPPP Window 4	Approvals, planning and financing
Dorper Wind Farm	Onshore Wind	Molteno/Sterkstoom	97	REIPPP Window 1	Fully operational
Dreunberg	Solar Photovoltaic (PV)	Dreunberg	75	REIPPP Window 2	Fully operational
Droogfontein 2 Solar	Solar Photovoltaic (PV)	Kimberley	75	REIPPP Window 4	Approvals, planning and financing
Droogfontein Solar Power	Solar Photovoltaic (PV)	Kimberley	50	REIPPP Window 1	Fully operational
Dyason's Klip 1	Solar Photovoltaic (PV)	Upington	75	REIPPP Window 4	Approvals, planning and financing
Dyason's Klip 2	Solar Photovoltaic (PV)	Upington	75	REIPPP Window 4	Approvals, planning and financing

Title	Technology	Closest Town	Capacity (MW)	Programme	Status
Electra Capital - Paleisheuwel Solar Park	Solar Photovoltaic (PV)	Clanwilliam	75	REIPPP Window 3	Construction
Eskom CSP	Concentrated Solar Thermal (CSP)	Upington	100	Other	Awaiting construction (approved & financed)
Eskom Sere Wind Farm	Onshore Wind	Koekenaap	100	Other	Fully operational
Excelsior Wind Energy Facility	Onshore Wind	Swellendam	32	REIPPP Window 4	Approvals, planning and financing
Garob Wind Farm	Onshore Wind	Copperton	136	REIPPP Window 4	Approvals, planning and financing
Golden Valley	Onshore Wind	Cookhouse	120	REIPPP Window 4	Approvals, planning and financing
Gouda Wind Facility	Onshore Wind	Gouda	135.2	REIPPP Window 2	Fully operational
Grassridge	Onshore Wind	Port Elizabeth	59.8	REIPPP Window 2	Fully operational
Greefspan PV Power Plant	Solar Photovoltaic (PV)	Douglas	10	REIPPP Window 1	Fully operational
Greefspan PV Power Plant No. 2 Solar Park	Solar Photovoltaic (PV)	Douglas	55	REIPPP Window 4	Approvals, planning and financing
Herbert PV Power Plant	Solar Photovoltaic (PV)	Douglas	19.9	REIPPP Window 1	Fully operational

Title	Technology	Closest Town	Capacity (MW)	Programme	Status
Hopefield Wind Farm	Onshore Wind	Hopefield	65.4	REIPPP Window 1	Fully operational
Ilanga CSP 1 (Karoshoek Consortium)	Concentrated Solar Thermal (CSP)	Kimberley	100	REIPPP Window 3	Construction
Jasper Power Company	Solar Photovoltaic (PV)	Postmasburg	75	REIPPP Window 2	Fully operational
Jeffreys Bay Wind Farm	Onshore Wind	Jeffreys Bay	138	REIPPP Window 1	Fully operational
Johannesburg Landfill Gas to Electricity	Landfill Gas	Johannesburg	18	REIPPP Window 3	Partially operational
Kalkbult	Solar Photovoltaic (PV)	De Aar	72.5	REIPPP Window 1	Fully operational
Kangnas Wind Farm	Onshore Wind	Springbok	137	REIPPP Window 4	Approvals, planning and financing
Karusa Wind Farm	Onshore Wind	Sutherland	140	REIPPP Window 4	Approvals, planning and financing
Kathu Solar Energy Facility	Solar Photovoltaic (PV)	Kathu	75	REIPPP Window 1	Fully operational
Kathu Solar Park	Concentrated Solar Thermal (CSP)	Kuruman	100	REIPPP Window 3	Awaiting construction (approved & financed)
KaXu Solar One	Concentrated Solar Thermal	Pofadder	100	REIPPP Window 1	Fully operational

Title	Technology	Closest Town	Capacity (MW)	Programme	Status
	(CSP)				
Khi Solar One	Concentrated Solar Thermal (CSP)	Upington	50	REIPPP Window 1	Fully operational
Khobab Wind Farm	Onshore Wind	Loeriesfontein	138	REIPPP Window 3	Construction
Konkoonsies II Solar Facility	Solar Photovoltaic (PV)	Pofadder	75	REIPPP Window 4	Approvals, planning and financing
Konkoonsies Solar	Solar Photovoltaic (PV)	Pofadder	9.7	REIPPP Window 1	Fully operational
Kruisvallei Hydro	Small Hydro	Bethlehem	4.5	REIPPP Window 4	Approvals, planning and financing
Lesedi Power Company	Solar Photovoltaic (PV)	Postmasburg	64	REIPPP Window 1	Fully operational
Letsatsi Power Company	Solar Photovoltaic (PV)	Bloemfontein	64	REIPPP Window 1	Fully operational
Linde	Solar Photovoltaic (PV)	Hanover	36.8	REIPPP Window 2	Fully operational
Loeriesfontein 2 Wind Farm	Onshore Wind	Loeriesfontein	138	REIPPP Window 3	Construction
Longyuan Mulilo De Aar 2 North Wind Energy Facility	Onshore Wind	De Aar	139	REIPPP Window 3	Awaiting construction (approved & financed)

Title	Technology	Closest Town	Capacity (MW)	Programme	Status
Longyuan Mulilo De Aar Maanhaarberg Wind Energy Facility	Onshore Wind	De Aar	96	REIPPP Window 3	Awaiting construction (approved & financed)
MetroWind Van Stadens Wind Farm	Onshore Wind	Port Elizabeth	27	REIPPP Window 1	Fully operational
Mkuze	Biomass	Mkuze	16	REIPPP Window 3	Approvals, planning and financing
Mulilo Prieska PV	Solar Photovoltaic (PV)	Prieska	75	REIPPP Window 3	Construction
Mulilo Renewable Energy Solar PV De Aar	Solar Photovoltaic (PV)	De Aar	9.7	REIPPP Window 1	Fully operational
Mulilo Renewable Energy Solar PV Prieska	Solar Photovoltaic (PV)	Prieska	19.9	REIPPP Window 1	Fully operational
Mulilo Sonnedix Prieska PV	Solar Photovoltaic (PV)	Prieska	75	REIPPP Window 3	Construction
Neusberg Hydro Electric Project A	Small Hydro	Kakamas	10	REIPPP Window 2	Fully operational
Ngodwana Biomass Power Station	Biomass	Ngodwana	62	REIPPP Window 4	Approvals, planning and financing
Noblesfontein	Onshore Wind	Noblesfontein	72.8	REIPPP Window 1	Fully operational
Nojoli Wind Farm	Onshore Wind	Cookhouse	87	REIPPP	Awaiting construction

Title	Technology	Closest Town	Capacity (MW)	Programme	Status
				Window 3	(approved & financed)
Noupoort Mainstream Wind	Onshore Wind	Noupoort	79	REIPPP Window 3	Construction
Nxuba Wind Farm	Onshore Wind	Cookhouse	140	REIPPP Window 4	Approvals, planning and financing
Oyster Bay Wind Farm	Onshore Wind	Oyster Bay	140	REIPPP Window 4	Approvals, planning and financing
Perdekraal East Wind Farm	Onshore Wind	Matjiesfontein	108	REIPPP Window 4	Approvals, planning and financing
Pulida Solar Park	Solar Photovoltaic (PV)	Kimberley	75	REIPPP Window 3	Awaiting construction (approved & financed)
Red Cap - Gibson Bay	Onshore Wind	St Francis Bay	111	REIPPP Window 3	Awaiting construction (approved & financed)
Red Cap Kouga Wind Farm - Oyster Bay	Onshore Wind	St Francis Bay	80	REIPPP Window 1	Fully operational
Redstone CSP	Concentrated Solar Thermal (CSP)	Postmasburg	100	REIPPP Window 3	Awaiting construction (approved & financed)
Roggeveld	Onshore Wind	Sutherland	140	REIPPP Window 4	Approvals, planning and financing

Title	Technology	Closest Town	Capacity (MW)	Programme	Status
RustMo1 Solar Farm	Solar Photovoltaic (PV)	Rustenburg	6.8	REIPPP Window 1	Fully operational
Sirius Solar PV Project One	Solar Photovoltaic (PV)	Upington	75	REIPPP Window 4	Approvals, planning and financing
Sishen Solar Facility	Solar Photovoltaic (PV)	Sishen	74	REIPPP Window 2	Fully operational
SlimSun Swartland Solar Park	Solar Photovoltaic (PV)	Swartland	5	REIPPP Window 1	Fully operational
Solar Capital De Aar (Pty) Ltd	Solar Photovoltaic (PV)	De Aar	75	REIPPP Window 1	Fully operational
Solar Capital De Aar 3	Solar Photovoltaic (PV)	De Aar	75	REIPPP Window 1	Fully operational
Solar Capital Orange	Solar Photovoltaic (PV)	Loeriesfontein	75	REIPPP Window 4	Approvals, planning and financing
Soutpan Solar Park	Solar Photovoltaic (PV)	Mokopane	28	REIPPP Window 1	Fully operational
Stortemelk Hydro (Pty) Ltd	Small Hydro	Clarens	4.3	REIPPP Window 2	Fully operational
The Soetwater Wind Farm	Onshore Wind	Laingsburg	139	REIPPP Window 4	Approvals, planning and financing
Tom Burke Solar Park	Solar Photovoltaic	Lephalale	60	REIPPP Window 3	Construction

Title	Technology	Closest Town	Capacity (MW)	Programme	Status
	(PV)				
Touwsrivier Project	Solar Photovoltaic (PV)	Touwsrivier	36	REIPPP Window 1	Fully operational
Tsitsikamma Community Wind Farm	Onshore Wind	Tsitsikamma	94.8	REIPPP Window 2	Fully operational
Upington Solar PV	Solar Photovoltaic (PV)	Upington	8.9	REIPPP Window 2	Fully operational
Vredendal	Solar Photovoltaic (PV)	Vredendal	8.8	REIPPP Window 2	Fully operational
Waainek	Onshore Wind	Grahamstown	23.4	REIPPP Window 2	Construction
Waterloo Solar Park	Solar Photovoltaic (PV)	Vryburg	75	REIPPP Window 4	Approvals, planning and financing
Wesley-Ciskei Wind Farm	Onshore Wind	Peddie	33	REIPPP Window 4	Approvals, planning and financing
West Coast 1	Onshore Wind	Vredenburg	90.8	REIPPP Window 2	Fully operational
Witkop Solar Park	Solar Photovoltaic (PV)	Polokwane	30	REIPPP Window 1	Fully operational
Xina CSP South Africa	Concentrated Solar Thermal (CSP)	Pofadder	100	REIPPP Window 3	Construction
Zeerust	Solar	Zeerust	75	REIPPP	Approvals,

Title	Technology	Closest Town	Capacity (MW)	Programme	Status
	Photovoltaic (PV)			Window 4	planning and financing