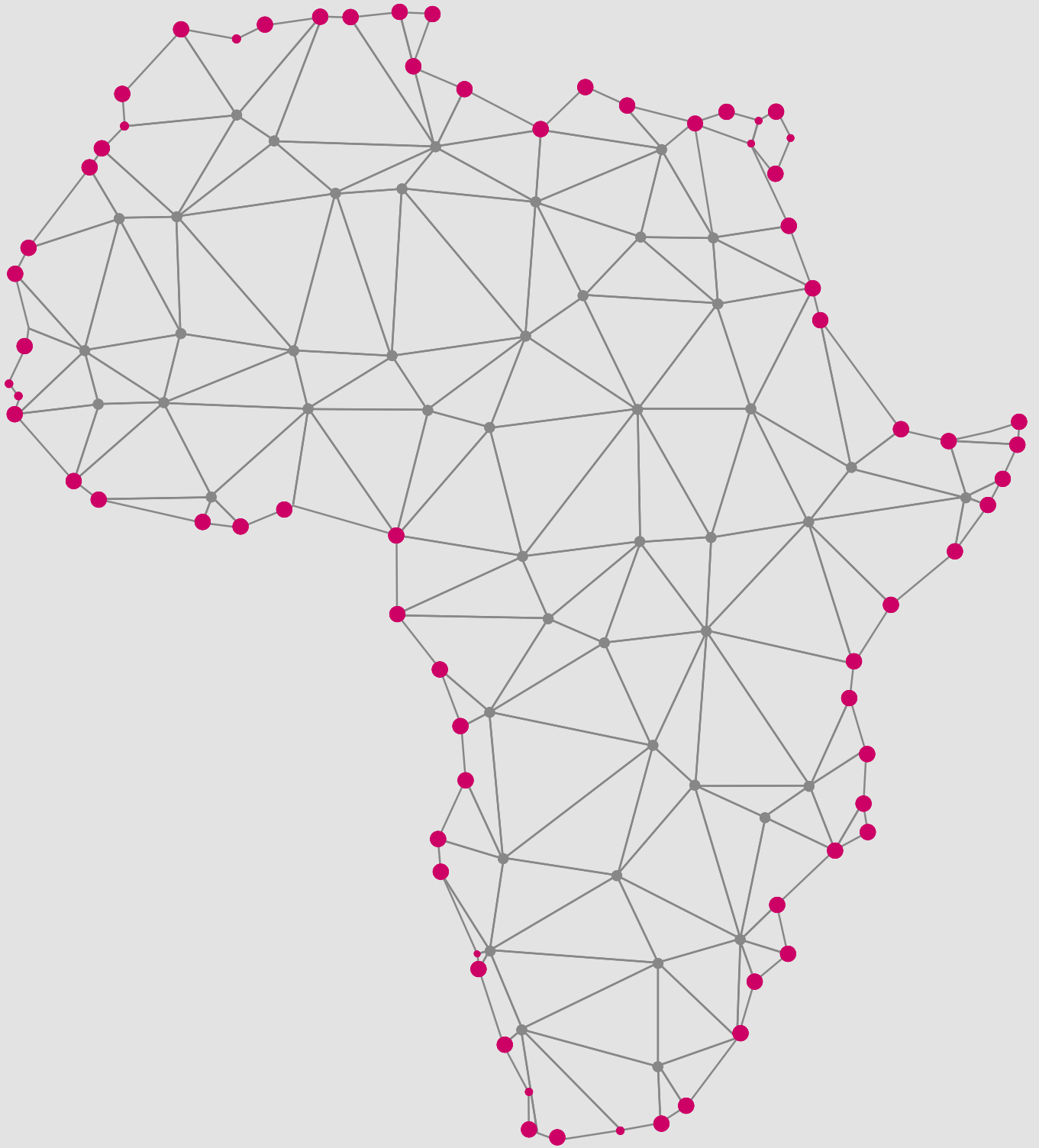


What's holding Africa back?

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Delivering renewable energy in a challenging market.





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1.

Foreword: What's holding Africa back?

Delivering renewable energy in a challenging market.

There has never been a more positive environment for businesses interested in global investment in renewable energy. A record capacity of renewable power was added last year (\$280 billion)¹, far outstripping new fossil fuel generating capacity; and as renewable technologies become more efficient and widely used the production cost is falling rapidly.

“There is a strong future in Africa, it is definitely one of the continents where we believe there will be massive demand in the next decade.”

Patrick Lagrange, Managing Director,
Yingli Namene (Developer)

Africa presents a particularly exciting prospect for further investment growth. Economic development and democratisation in the region has resulted in increasing domestic and industrial demand for power, with the current levels of investment lagging far behind these fast-growing needs. The International Energy Agency predicts that the demand for electricity in sub-Saharan Africa will increase by 4.6% annually, and by 2030 demand will be more than double the current electricity production.

“Renewable energy is the next big thing in Africa: it is going to be the next agent of transformation.”

Tara O'Connor, Executive Director, Africa Risk Consulting (Risk Consultant)

The continent's natural resources, sun and coastline and the impetus provided by all 54 African Union countries having a unified voice promoting the Paris accord also contribute to making Africa a potentially exciting and lucrative location for renewable projects.

With every opportunity comes the challenge: how can developers, investors and governments ensure that the huge potential on the continent is converted into long-term sustainable projects?

We believe that this report provides critical insight into the African market at a vital juncture in its development, providing an expert view on how to overcome some of the challenges and barriers facing the renewable energy project journey - from site selection and planning through to financing, construction and distribution.

The findings are derived from an in-depth research program (comprising interviews and focus groups) with senior experts who have direct experience of managing,

funding and consulting on African renewable development projects and are able to provide first-hand advice on how to navigate the diverse mixture of markets, opportunities, and political and investment climates in Africa in order to capitalise on the exciting opportunities.

We would like to thank everyone who contributed to the research.

David Gilchrist, Partner, DWF
Christian Hellmund, Partner, DWF

“Technology has matured so much and renewable projects are now competitive with conventional projects. That is a huge shift - there is huge potential, not just off-grid but producers selling directly to industrial consumers.”

Anes Jusic, Principal Banker, EBRD (Funder)



2.

Executive summary

While the political environment in African countries will continue to be highly influential in site selection, it is in the financing and bankability of projects where the critical challenges lie. The drive to overcome these challenges

will inevitably increase as the cost of producing renewable energy decreases, while technologies such as blockchain and innovations in financing will provide new opportunities for developers and investors.

Where do the key challenges lie?





Site selection, feasibility and planning

- A stable and supportive political environment is the primary influencer of the success of renewable energy projects in Africa. Developers and investors need to be confident that the political will exists to support and see through pro-renewable policies and initiatives to the end of the project cycle.
- Selection of a project location should begin with sound fundamentals: a positive business environment, good transport, adequate grid infrastructure and stable and secure off-takers.
- Identifying effective local partners is key. Extensive networking through existing contacts and visits to regional events will help build local business and political contacts.



Finance and bankability

- Projects have a greater chance of getting off the ground if developers have access to funds at an early stage. Investors can also avoid competition for projects by getting on board quickly, but they are often reluctant to do so because of the high risks and possibility of low returns. This mismatch is one of the main barriers to projects coming to fruition.
- For larger projects Development Finance Institutions (DFIs) bring capital and strategic strength to developers, but may come with conditions attached and private investors can be crowded out.
- Securing a robust Power Purchase Agreement (PPA) is critical to securing third party finance. Developers need to ensure their PPA has mitigated against credit, currency, operational, schedule and arbitration risks.
- Developers need to make the social and community impact of the project attractive to government and investors.



Construction and commissioning

- Risks at the construction stage are relatively limited and manageable assuming the right people are in place. However, developers should allow generous time contingencies in the construction schedule as it *will* take longer than planned.
- Community buy-in is important for construction to run smoothly. Local communities should be reassured about the costs and benefits of a development and be involved in decision-making.
- Establishing supply lines and a good forwarder who will deliver in remote or hard-to-reach locations is important.



Distribution and technology

- Grid infrastructure is often poor and there is little that can be done to improve it once the project is in progress. This risk needs to be mitigated at the due diligence and financing stages.
- Grid-operators aren't necessarily experienced in integrating renewables; they should be consulted at an early stage to help avoid problems.
- Battery storage technology has significantly improved and costs are coming down. This is enabling renewable energy companies to partner with advanced technologies to offer 24/7 solutions. However, we are probably many years away from completely self-sufficient, large-scale, battery based renewable projects.



Solutions

- Financial aggregators (who wrap multiple smaller projects around the same financing) are emerging that provide opportunities to achieve a project size and reduction of risk that encourages investors who would not consider individual projects.
- Decentralised crowdfunding is developing rapidly, providing new sources of funding for smaller and higher risk projects.
- Blockchain peer-to-peer technology enables crowdfunding innovations and also provides the potential for African renewable projects to utilise innovative energy management and supply models.

3.

Site selection, feasibility and planning

Top 3 success factors

1

Understand the political landscape

Ensure the political will exists to support and see through pro-renewables policies and initiatives to the end of the project cycle.

Be aware of recent and upcoming elections and how these might influence strategy and funding and understand the dynamic between national and local power.

2

Make sure the fundamentals are sound

Choose a market with healthy macro-economic indicators and good transport, stable and adequate grid infrastructure and meteorological data that supports solar, wind or hydro projects.

3

Find the right partners

Network extensively (preferably in-market and in person) to select the right partners.

Setting the scene: Africa

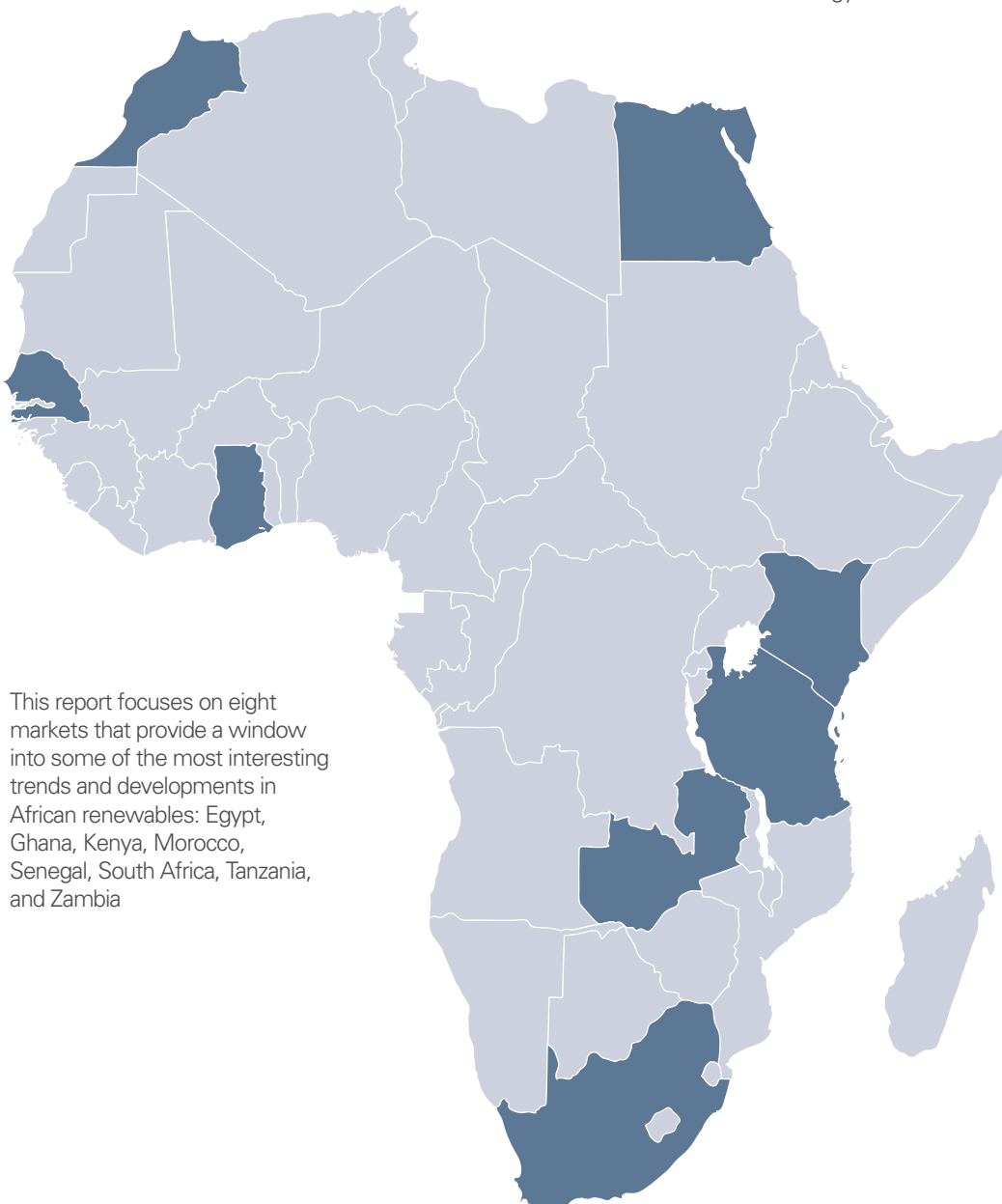
Africa presents a particularly diverse mixture of political and investment climates. Although current World Bank forecasts for 2018 GDP growth across North Africa (4.5%) and sub-Saharan Africa (3.2%) are relatively positive, developers and investors must do their homework based on the specific conditions they face in each country.

Renewables are attractive to African leaders across the region for a multitude of reasons beyond the continued reduction in the cost of production relative to conventional energy sources.

African markets are rich in natural resources of wind, sun, water and land and have a huge electricity supply deficit. They also lack the extensive large-scale legacy infrastructures that may stand in the way of making a transition to renewables, not least because, according to World Energy Outlook, only half of the population currently has regular access to electricity; falling to only 30% in sub-Saharan Africa. This means they are well placed to 'leapfrog' conventional infrastructure development and invest directly in renewables and 'off-grid' schemes (stand-alone power systems that are not dependent on an established power grid).

China (responsible for almost half of the world's investment in renewables in 2017) has been at the forefront of exploiting opportunities in Africa with strong investment in hydro-electric projects in multiple markets including Nigeria and Uganda; and the establishment of the China-Africa Renewable Energy Cooperation and Innovation Alliance (CARECIA) to boost cooperation between Chinese and African finance institutions, grid providers and core manufacturers in the renewable energy supply chain.

Although China is a powerful competitor, armed with the right information and foresight there is considerable potential to prosper in Africa's dynamic renewable energy environment.



This report focuses on eight markets that provide a window into some of the most interesting trends and developments in African renewables: Egypt, Ghana, Kenya, Morocco, Senegal, South Africa, Tanzania, and Zambia

Political environment

The political environment is the single biggest factor to consider when selecting a location to invest in renewable energy projects. The potential impact of the electoral cycle on the momentum, stability and ongoing security of a development is immense; and it can also be particularly challenging to understand and predict.

It is vital to be confident that there is a will to implement pro-renewables policies and initiatives and to encourage private sector presence in the energy sector; and ideally this political agenda is secure over at least two terms of office. Embedding agility into planning is recommended - is there a Plan B to negotiate deals if the political landscape and priorities change?

The move towards democratisation in the region over the past 30 years has resulted in a greater risk of short term shifts in policy caused by regime change or political expediency. Observers such as Freedom House (a US based independent

watchdog) have noted improvements in political rights and civil liberties in Nigeria, Liberia and Ivory Coast amongst other countries, but this also creates policy changes as the number of African states in which the government has been defeated at the ballot box increases. It is important to keep an eye on recent and upcoming elections and how these might influence energy strategy and funding. It may be best to avoid the uncertainty of entering a country close to elections which brings with it the increased prospect of political parties expecting contributions.

It is imperative to not only examine the stability and policies of the national government, but to also understand the relationship between the national and local government structures. The trend towards democratisation has been accompanied by increased devolved power which means potential internal domestic struggles for the strategic and financial control of renewable projects. An example of tension between national and devolved power is playing out in South Africa, where local municipality

Cape Town has set a target to achieve 20% of its energy from renewable resources by 2020, but does not have the authority to sign off on applications without ministerial approval. Cape Town is challenging the national government in court to get a ruling on the matter.

However, the trend may also present opportunities in specific areas of a country that may not be available elsewhere – for example, Kenya’s constitutional reforms of 2009 created 70 counties, each headed by executives with decision-making authority, thus enabling the possibility of development negotiations at a local rather than national level.

“In Kenya’s case, since all the political drama in 2007, there is this power struggle between the central government and the newly enthused local authorities.”

Tara O’Connor, Founder & Executive Director, Africa Risk Consulting (Risk Consultant)

Economy, infrastructure and resources

The feasibility of a renewables project is dependent on a number of fundamental economic, infrastructure and natural resource factors including:

- A good business environment with healthy macro-economic indicators (including GDP growth and stable interest and inflation rates);

- Stable and adequate grid infrastructure and an off-taker with a track record of paying bills and a secure financial position. For public sector off-takers it helps if the government is fiscally responsible and has good relationships with institutions such as the World Bank and the International Monetary Fund);

- Adequate transport infrastructure;
- Meteorological data that supports solar, wind or hydro projects. Reliable and accurate information can be very difficult to find although programs to help develop the necessary infrastructure, such as the Trans-African Hydro Meteorological Observatory (TAHMO), are under way.

Comfort factors

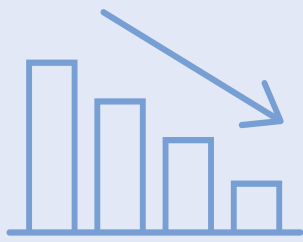
For some developers and investors “comfort factors” play an important part in the decision of where to locate: do they speak the language, does the legal system resemble that of markets with which they are already familiar (which is often

influenced by colonial history) and is the country in a similar time zone? These attributes simplify every aspect of the project journey including the vital task of identifying local partners.



South Africa in focus

GDP: \$294.13 billion



Five-year economic growth rate: -26.00%



Installed power capacity 48.27GW

Total clean energy investments, 2012-2016

\$17.26 billion



Renewable share:

7.00%



55.91^{Population}m

Total clean energy generation:

7,646.05GWh

Climatescope 2017 data

• South Africa is a mature African market with a relatively well established regulatory regime and contractual arrangements. It also has better grid connectivity than many other African markets.

• Biomass is currently the largest renewable energy contributor in South Africa with 9-14% of the total energy mix², and the natural resource potential for solar and wind renewables is high.

• However, the political system is difficult to navigate and has identified problems with corruption. High domestic crime rates are also a concern.

• Jacob Zuma's replacement by Cyril Ramaphosa as the country's president in February 2018 is a good example of political change changing the attractiveness of a market. The consensus is that Ramaphosa's government is trying to resolve policy uncertainty and get renewable energy projects underway again. The new Minister of Energy in South Africa (Jeff Radebe) signed 27 renewable PPAs in April 2018.

• Partly due to its extensive coal reserves South Africa is the continent's biggest emitter of carbon dioxide (bigger than the UK despite having 10 million fewer people and a much smaller economy). This is likely to be a big motivator of renewable solutions in the future, but nuclear options are also very much in consideration.

“A lot of the developers that I know in South Africa were thinking of shutting up shop. With the new administration, they have decided coal and gas are not the way forward, renewables are. Last year I would have said don't touch South Africa with a bargepole. Now it's got to be one of the most attractive countries in the world to invest in with renewables.”

Charles Perry, Co-founder, Managing Director, SecondNature (Sustainability Expert)

2 “The potential contribution of renewable energy in South Africa” Sustainable Energy & Climate Change Project

Building local partnerships

Identifying effective local partners is key to navigating the complexities of any African market. Partners may be necessary for a wide range of roles depending on the circumstances of each project including:

- Developing contacts and relationships with key institutions, government departments and relevant advisors;
- Understanding issues relating to national/local government relationships and how to address them;
- Building stakeholder engagement into a project's foundations and future, for example by addressing community misconceptions or concerns about the project;
- Securing land rights: understanding who has claims on the land, how to negotiate with local stakeholders and how to ensure any lease or purchase is legitimate;
- Understanding the business culture;
- Translating languages and understanding local customs;
- Obtaining licenses and permits;
- Opening bank accounts and making local and international transactions;
- Supporting back office functions (understanding what types of fees and salaries will need to be paid, tax regulations etc.).

There are no easy routes to finding the right partner for any given project. Many developers meet partners by chance or through referrals: the most successful method is to network extensively through existing contacts and by visiting renewable energy conferences, preferably located in the country of interest. Visiting regional events is essential to build local business and political contacts, generate recommendations and face to face meetings with prospective partners and to get a clear picture of the real issues.

“You have to do your own networking and find the partner that fits - every company has to find out on its own. There are global companies that can be the first door opener, but then you have to find your own way.”

Michael Keller, Deputy Head of Sales UK/Ireland, Vensys (Wind Turbine Manufacturer)

“Be clear on what you expect from a local partner but also give them a lot of shares for it, so that when it becomes a success they are getting a significant benefit out of it as well. Don't be greedy because then you don't have a motivated local partner who will help you.”

Haijo Kuper, Managing Director, Solinc East Africa (Supplier)

It is important to make sure that partners are a good match: meet them in person, visit their operations and conduct due diligence to ensure that they are experienced, reliable and have compatible culture, values, and objectives. It is also important to set incentives for delivery that are motivating and realistic. Having people on the ground to identify partners and forge relationships is vital. Larger consultancies based within markets may also be a helpful source of introductions.

“I don't think you can fully understand what is happening on the ground unless you go there and spend a decent amount of time talking to as many people as possible.”

Charlie Troughton, Zambia Director, Buffalo Energy (Developer)





Kenya in focus

GDP: \$68.92 billion



Five-year economic growth rate:

37.00%



48.46m Population

Total clean energy investments, 2012-2016
\$3.56 billion



Installed power capacity
2.34GW



Renewable share:

33.00%

Total clean energy generation:
5,254.78GWh

Climatescope 2017 data

- Kenya is the largest producer of geothermal power in Africa, with a fairly well-established regulatory regime and a track record of paying its bills. Kenya leads Africa in the number of solar power systems installed per capita.
- Renewable energy investment has grown rapidly since 2009 across wind, geothermal, small-scale hydro and biofuels. In 2011, Kenya was also the first country in Africa to open a carbon exchange.
- Over the past 10 years project developers identified sites and applied for licences to deliver power at a pre-set price. The Ministry of Energy has drafted a bill for this to change to a tender system where projects with the lowest price earn the right to sign a Power Purchase Agreement (PPA) enabling the government to achieve lower power prices via competition amongst developers.
- President Uhuru Kenyatta was elected in August 2017, but the Supreme Court declared the election null and void because of irregularities and his re-election in the October re-run was boycotted by the opposition, raising some concerns about the stability of government commitment to the sector and about project bankability. However, over time, political uncertainty is diminishing.



4.

Finance and bankability

Top 3 success factors

1

Secure financing at an early stage and consider DFI backing

Investigate innovative financing methods such as aggregation to help a project get off the ground and enable investors to get on board early. Explore DFI funding to bring capital and strategic strength to the project, but be aware that funding may come with conditions attached.

2

Get community buy-in

Make the project compatible with the political and social priorities of the local community as well as governments, DFIs and other stakeholders in order to improve the chances that all involved will keep their commitments for the whole of the project's duration.

3

Mitigate risk in the Power Purchase Agreement (PPA)

This contract between the developer and the off-taker is critical to securing finance so carefully ensure potential risks are, as far as possible, mitigated.

Developer-investor funding gap

There is a mismatch between developers who need funding and funders who need projects. Developers rely on equity and grants for early-stage project funding and are desperate for investors to get involved earlier in the process. Often investors have a lot of money to deploy for a project but are not willing to put funds into the development of the project due to the small size of the investment and the high risks and possibility of low returns involved with any venture in emerging markets. Developing projects in Africa can take up to ten years (in contrast, similar projects in Britain can take only a year or so) and subsequently developers often run out of financing before securing long-term investment.

Once the project is bankable, the balance shifts, and there is more money available than projects to spend it on, resulting in competition among investors. There is a lot of potential money for investment and a potential incentive for investors to get involved earlier in the development cycle to secure deals and be a step ahead of competing investors.

How can developers persuade investors to enter earlier? Grouping developments (aggregation) wrapped around common financing and innovations such as blockchain and crowdfunding provide potential answers. Alternative funding methods are explored in more detail in our Conclusion.

“When I speak with investors, they all tell me, ‘We have £100 million to deploy. We have £50 million to deploy.’ Very little is deployed because there are not enough projects, many times because the developers don’t have enough equity to bring their project to completion or because they bring to the investor a project which does not meet all their investment criteria. As a developer, the main feeling is that investors are missing out on opportunities by waiting far too long before stepping in, whereas developing stronger links with the right developers at an earlier stage would surely help them to reach their investment targets.”

Patrick Lagrange, Managing Director, Yingli Namene Solar (Developer)

“One of the difficulties for investors in Africa is the scarcity of deals. There seems to be more money than there are deals. I think investors know that they need to get in earlier in the development cycle to secure the project and to influence key elements of the deal structure. A wise investor maps out the landscape of later stage developers, assesses viability of the projects and finds creative ways to make a match with the developer on a commercial deal.”

Lisa Pinsley, Director of Energy, Actis (Funder)



The role of DFIs

Development Finance Institutions (DFIs) are organisations created by governments to promote economic growth, support social development and provide credit for projects where finance is not sufficiently served by private banks or local capital markets. The UK created its DFI, CDC, in 1948 and the Overseas Private Investment Corporation (OPIC) was created by the US Agency for International Development (USAID) in 1971. In 1992 the Association of European Development Finance Institutions (EDFI) was established to strengthen cooperation between European DFIs, and it now has 15 members. Several multilateral DFIs work at a regional level, such as AfDB (African Development Bank) and at the global level, such as the IFC (International Finance Corporation). DFIs will typically get involved in larger scale projects, but the wide variation in scope, range and type of DFI organisation means that there are no all-embracing conventions.

DFIs usually ask for less interest than private investors, which increases access to capital but can crowd out private investors seeking higher returns. Being backed by a DFI can put a developer in a position of strength due to the country's potential dependency on other commitments across multiple sectors from the DFI and the leverage that this brings. However, projects can get caught up in a larger plan that the DFI has and a project can become contingent on the political or market reforms that the DFI may impose as a condition of funding.

Some developers also complain that DFI-subsidised projects, such as the IFC Scaling Solar project in Zambia (the first project to be financed under the World Bank Group's Scaling Solar program) have set unrealistically low tariff expectations across Africa. This means that developing a project with a private investor that is financially attractive to investors and off-takers becomes more difficult when a precedent has been set for energy rates that are unsustainable without a significant subsidy.

“Most renewables projects in Africa today still require DFI funding or ECA support. The shorter debt tenors available from commercial banks don't work when you have a 20 year or 25-year project because the tariff available will not allow you to repay your debt in 10 years.”
“Competitive bidding is increasing which is a good thing. However some bid processes can be a challenge for developers. You have some processes that are structured to focus on companies with a large balance sheet to the exclusion of smaller developers that are active locally and have invested to develop project sites. That can be a challenge but, on the flipside, it is also a way of encouraging big European or US companies who haven't been active in Africa to come into new markets”

Richard Avery, Regional Manager for West Africa, EleQtra (Developer)

“The African Legal Support Fund (ALSF) is managed by the African Development Bank, and includes financial support from many donors including Power Africa. ALSF pays for international project finance lawyers to represent African utilities and ministries of finance in negotiations with investors. The utilities and government agencies often lack in-house lawyers with a track record of completing power deals. The project finance lawyers who have been doing the deals for decades are based in Europe, US, Dubai or other international hubs, and African utilities often don't have the budget to utilize them. The ALSF addresses this problem head on.”

“You need to know your specific market and look for the targeted sources of funding for that early development capital. Which donors are strong in that country? Which grant facilities have provided funding to previous projects in that country? ”

Lisa Pinsley, Director of Energy, Actis (Funder)



Zambia in focus

GDP: \$21.31 billion



Total clean energy investments, 2012-2016: **\$0.00 billion**



Installed power capacity: **2.64GW**



Renewable share:

4.00%

Total clean energy generation:

241.97GWh

Climatescope 2017 data

- Zambia is perceived to be a growth market because of:
 - The rising electrification gap driven by macroeconomic and demographic factors.
 - Its relative political stability.
 - Rising energy tariffs in a move towards cost reflectivity.
 - Low capital controls.
 - Dollar-denominated PPAs.

- Small and large hydropower is the major contributor to Zambia's electricity supply and the high natural resources of solar energy offer a high potential for growth in this area.
- However, there are some concerns about the country's track record paying its bills. Both the International Monetary Fund and the World Bank have raised concerns

about the level of government debt leading to potential crisis in the future. Given the importance of DFIs in supporting private sector finance, these concerns could have considerable impact on renewable investment in Zambia.



Egypt in focus

GDP: \$332.35 billion



Total clean energy investments, 2012-2016: **\$1.08 billion**



Installed power capacity: **39.06GW**



Renewable share:

2.00%

Total clean energy generation:

2,090.60GWh

Climatescope 2017 data

- Natural resources of land, sunny weather and high wind speeds make Egypt a prime location for renewable energy sources, and the government has a strong commitment to investment in the energy sector including an ambitious project to build the biggest solar photovoltaic plant in the world at Benban, Aswan.
- Egypt intends to supply 20 percent of generated electricity from renewable sources by 2022, with wind providing

- 12 percent, Hydro power 5.8 percent, and Solar 2.2 percent.
- The plan envisions significant private sector involvement, with private organisations leading on over two thirds of projects.
- Over the next three to five years, the Ministry of Electricity and Renewable Energy plans to add 51.3 GW to current installed capacity.

- Egypt has a well-established regulatory regime for private investment in the power sector, but some private investors have been cautious because of the currency crisis of 2016 and a proposal by the government that dispute resolution for Benban projects should take place at the local level rather than be subject to international arbitration.

PPA negotiation

A Power Purchase Agreement (PPA) is a long-term contract between the developer responsible for the design, permitting, financing and installation of the energy site and a wholesale energy purchaser (or off-taker). Typically, a PPA allows the developer to secure a revenue stream (the income from the sale of energy plus any tax credits or incentives) that will help finance the project.

Securing a PPA is the single most important protection required by developers as it is critical to securing third party finance. For a PPA to get sign-off from a prudent investor, risks need to be mitigated to make it bankable. One of the main challenges faced by developers in Africa is that there are no well-defined renewable energy PPA structures or templates across any of these countries; and the off-taker may not always be operating to the highest accepted international standards. Developers therefore need to carefully consider exposure to risk across each of the following areas to secure funding and ensure bankability:

Risk considerations

- **Credit** (where off-takers have a weak financial position, poor payment history, political instability and corruption) can be mitigated through guarantees by multilateral funding agencies, development banks or the country's government.
- **Currency:** developers should avoid PPAs in local currency or include a hedging mechanism to protect against depreciation.
- **Grid integration:** developers should avoid being liable for grid integration by, for example, adding a pay-or-take clause to the PPA so that if the buyer is not able to deliver the grid capability to take the energy, an agreed payment must be made instead.
- **Land:** land acquisition risks should be incorporated within the PPA because establishing secure land rights is one of the biggest implementation risks for a developer.
- **Time:** project delay is almost an inevitability; so it is important to allow for realistic contingencies.
- **Recourse:** allowing for international arbitration of disputes is important, especially with public sector off-takers where domestic settlement may not be impartial.

Emerging solutions

Direct government guarantees are another route to mitigating risk. A new technique pioneered in Nigeria, called a Put/Call Option Agreement (PCOA) is increasingly being used with positive results. PCOA establishes a direct contractual obligation between the host government and the project company. Under this arrangement, if the PPA is terminated early, the government is obliged to pay a purchase price for the project, which covers the outstanding debt.

“In many cases you need credit enhancement of the utility from government. In Nigeria they used the “Put Call Option Agreement” structure for the Azura project. I think that that’s possibly going to be adopted more widely in other markets as well, it gives a back-stop where if the utility isn’t paying then the government has some obligation to step in.”

Richard Avery, Regional Manager for West Africa, EleQtra (Developer)



Socioeconomic contribution

PPAs are regularly discarded and renegotiated in Africa, so establishing that the PPA underpins a sustainable and mutually beneficial relationship that will last decades is key. An energy project's contribution to wider society is often just as important as the price and affordability of the power generated, further reinforcing how important it is for developers to understand the political and social priorities of the market they have chosen to enter.

The needs of the country should be balanced with the needs of the local community. It is important to have strong local partners and local community ownership and engagement from day one. If the local community directly affected by the development recognise that significant benefits are being delivered in the form of jobs and infrastructure, all participants will benefit from the reduced risk of key stakeholders reneging on long-term obligations, reinforcing the increased long-term viability of the project.

DFIs and local governments may also have social and community obligations embedded in their vision for renewables projects. For example, the Black Economic Empowerment (BEE) programme in South Africa requires developers to work with an Empowerment Partner to enable black and ethnic involvement in the project's skills development, management, procurement and ownership. Developers need to allow time to understand any such obligations in detail; and ensure that resources are available to meet the required demands.

“Projects have to make sense for the country. A PPA for a project that doesn't make sense for the country would not be worth very much.”

Richard Avery, Regional Manager for West Africa, EleQtra (Developer)

“Governments are not just seeking cheap power on a long-term basis; they are looking for macroeconomic transition and longer term national economic transformation. Whatever the kilowatt/megawatt per hour price may be, investments in renewable energy are about their wider economic impact, whether at individual, community or national level.”

Mark Vickers, Partner, Merlin Partners (Financial Advisor)

“The best way to protect your solar site is not necessarily to have fences and guards and guns, it's to have a person in every household working on the site, cleaning the modules, cutting the grass or receiving a solar light, like our own SM100, to go up the energy ladder as part of the project. They will not steal from their own job; they will protect it.

There is this philosophy of developing something sustainable, to protect the investment and really give a lot to bring the development to the community, consistent with the 17 Sustainable Development Goals defined by the United Nations. It's not just a financial investment. It's much more than that.”

Patrick Lagrange, Managing Director, Yingli Namene Solar, (Developer)

“A real key to making projects successful is not to bring people in from outside, where they come in, they build and then they leave. If you train solar technicians within the local community you've educated people who can now go and work on the next project and you're building that human capital internally within the country”

Sarah Roberts, President, INTECH Risk Management (Risk Consultant)



5.

Construction and commissioning

Top 3 success factors

1

Allow generous time contingencies

The construction schedule will inevitably take longer than planned.

2

Foster community engagement

Inform communities of the costs and benefits and involve them in the decision-making process. Use trusted local partners and expert legal support to contest any challenges to land use.

3

Plan a reliable and robust supply chain

Ensure supply of essential components and other supplies. Identify a good forwarder and work with a single company to keep the process simple. Conduct quality checks along the route.

Community acceptance

The experts consulted for our report are clear that site selection, planning and project financing present the biggest challenges for developers along the project journey. Once a project is financed, technical on-the-ground risks regarding construction and installation are relatively minor assuming the right people are in place with the necessary skills, commitment and project management experience. However, always remember to allow generous time contingencies in the construction schedule as it *will* take longer than planned.

A key ingredient of a successful construction stage is community acceptance of the project. Communities should be reassured about the costs, benefits and environmental impact of a development; and that they will be involved in consultations and the decision-making process. The \$685 million Lake Turkana

Wind Power Project (LTWP) in Kenya is a recent example where an extensive Stakeholder Engagement Plan was implemented during the project's setup. Public meetings, workshops, and focus groups were conducted amongst the semi-nomadic Sirima encampment as part of an integrated consultation program.

Any lack of clarity over land rights creates the possibility of communities contesting the right of developers to use the land or organising to ask for high rents which make the project unviable. Cultural or religious attachment to a piece of land can be a major barrier to gaining access during construction. Often the current users of the land do not hold formal titles so involving knowledgeable local partners and expert legal support both when securing the land rights and during construction is essential to avoid potential pitfalls and address any problems as they arise.

“How are you sure that whatever lease or purchase of land you contracted is genuine? Does anybody else have claims on the land? We had a long-term lease from a reputed person from the network, so that is of course where a local partner comes in because they know this is known to be land from this family for a long time. And you always have your lawyers checking it. The rest is purely then a management task, if you have project management experience you should be able to manage.”

Haijo Kuper, Founder & Managing Director, Solinc East Africa (Supplier)

Supply lines

Prior consultation should also investigate supply lines: how easy is it to purchase essential components and other supplies on the ground? This cannot always be guaranteed.

“We skipped Ethiopia because there it is more difficult to actually be able to purchase goods on the ground.”

Haijo Kuper, Founder & Managing Director, Solinc East Africa (Supplier)

When transporting modules or components it is important to work with a good forwarder who will deliver, particularly if the locations are remote or hard-to-reach. If possible, it is better to work with a single

company to avoid gaps along the route and to keep the process simple to monitor. It is recommended that quality checks are conducted along the route to ensure materials arrive intact.

“Logistics and supply chain management is key for successful implementation of a solar project, particularly in areas where access to the site is difficult, roads are in bad condition and good quality experienced forwarders and trucks are scarce. Out of a handful of forwarders with whom we have worked for years

and who know our requirements we normally choose a single forwarder for one particular project. By doing so we try to accelerate communication and reduce complexity with regard to documentation, tracking, loading and unloading procedures, allocating responsibilities and liabilities. One should not forget: building a PV plant is all about proper logistics -inbound and outbound.”

Oliver Herzog, Managing Director, Enerparc (Developer)



Morocco in focus

GDP: **\$109.8 billion**



Five-year economic growth rate:

8.6%



Installed power capacity
8.15GW



35.74m Population

Climatescope 2017 data (Climatescope data for clean-energy investment and renewable share not available)

- The Moroccan political and economic environment is stable, with good credit and a well-established regulatory regime for private investment.
- This stability has helped attract significant DFI investment from the World Bank, the African Development Bank, the European Union's Neighbourhood Investment Facility, and the European Investment Bank.
- It launched the National Renewable Energy and Efficiency Plan in February 2008 to develop alternative energy to meet 15% of its domestic needs.
- The government plans to produce 42% of its energy from renewable sources by 2020 and plans a \$13 billion expansion of wind, solar and hydroelectric power generation capacity and associated infrastructure.
- Many initiatives are dedicated to renewable energy such as solar power plants, pumping stations, hydraulic turbines, waste recycling, water pumps, sea water desalination, air conditioning and solar water heaters.





Ghana in focus

GDP: **\$43.26 billion**



Five-year economic growth rate:

3.00%



28.21m Population

Total clean energy investments, 2012-2016
\$0.07 billion

Installed power capacity

3.57GW



Renewable share:

1.00%

Climatescope 2017 data

- Ghana has been economically volatile in recent years, but it has a relatively strong utility and electricity sector structure making it one of the more attractive countries for renewable energy developers to enter in West Africa.
- It has a relatively strong grid and its existing hydropower can be adjusted depending on demand and availability of other power sources, which also makes it appealing to renewables developers.
- A major 225-megawatt, \$525 million project is under way to build Ghana's first large-scale wind farm with a capacity to meet 4% of domestic electricity demand. The government is aiming for 10% of electricity production to come from solar, wind and biofuels by 2020.
- When President Nana Akufo-Addo took office in January 2017, he applied brakes to many projects on the drawing board due to a concern about oversupply and increasing costs and some contracts have been cancelled.
- However, he has stated a renewed commitment to Ghana's renewable energy ambitions and The Ministry of Energy recently announced that \$230 million has been earmarked to promote the use of renewable energy, particularly in off-grid communities across the country.



6.

Distribution and technology

Top 3 success factors

1

Involve grid connectors at an early stage

Consult grid connectors well in advance to help anticipate and avoid issues when grid connection and power generation commence.

2

Consider the future evolution of the national grid

Take a project-long view of the impact of national grid developments, particularly if involved in a micro-grid development.

3

Investigate battery storage technology

Explore partnerships with new storage technology providers that may enhance the feasibility and flexibility of your project.

Grid infrastructure

Although the African grid infrastructure is often poor there is little that can be practically done to improve it once the project is in progress. This risk needs to be mitigated at the due diligence and financing stages, for example by having a pay-or-take clause in the PPA so that if the buyer is not able to deliver the grid capability to take the energy, an agreed payment must be made.

Grid connection can make or break a project and the grid-operators managing the infrastructure in many African countries aren't necessarily experienced in integrating renewables, which presents a risk that when the project is completed the link-up to the grid doesn't work. Prior consultation is, again, crucial: developers should involve grid connectors at an early stage to help avoid issues when power generation commences.

Private investors are increasingly investing in national grid power lines and substations to ensure the necessary infrastructure is in place for future renewable projects. However, improving technology and a reduction in costs are making micro-grids an increasingly practical method of providing a

fast and efficient supply in remote areas that would be expensive and impractical to connect to the national grid. They can bring clean energy to the poorest areas quickly and (because they can operate with one or a mixture of wind, solar, biomass, diesel and other inputs) flexibly. Micro-grids can also be used by mines, shopping malls and other commercial enterprises to supplement and ensure secure, regular supply.

Micro-grid projects are often smaller scale, less reliant on DFI and government input, and as a result offer an opportunity for private companies. However, some DFIs, including the African Development Bank, are supporting micro-grids; and there are challenges that have curtailed private sector involvement. The correct level of scalability is hard to anticipate – a micro-grid project shouldn't be so big that it is underutilised, but it needs to have enough scale to be economical. Clear micro-grid equipment safety and specification standards have yet to be established, adding a further element of risk. It is also an important consideration when planning a micro-grid project that it won't become obsolete as the national grid continues to expand.

The term mini-grid is used for somewhat larger projects than micro-grids, where output might be measured in megawatts rather than kilowatts. Mini-grids usually support large commercial or industrial rather than residential or small commercial purposes and have typically attracted less investment from renewable developers than micro-grids.

“In some markets the regulator will require mini-grid operators to offer the same tariff that is available to users on the national grid. So it can be a challenge to make a full cost recovery on a mini-grid investment in such a scenario, as the mini-grid will not have the same efficiencies of scale as the national grid. There are a number of donor led solutions to offer grants and I know there are a number of successful projects as well. But on a pure commercial basis, it can be difficult to make mini-grids work without donor support.”

Richard Avery, Regional Manager for West Africa, EleQtra (Developer)

Energy storage

Battery storage technology has significantly improved and costs are coming down. This is enabling renewable energy companies to partner with advanced technologies to offer 24/7 solutions but, until energy storage is widely used at a commercially attractive price point, the intermittent nature of most renewables means that other energy sources will continue to be used to provide a reliable baseload power.

Current renewable investment in battery storage is concentrated in smaller micro-grid or off-grid projects but, as the price, reliability and performance of storage solutions continue to improve, the opportunities for commercial, industrial and grid backup applications will increase rapidly. We are probably many years away from completely self-sufficient, large-scale,

battery based renewable projects but, the rate of technical advance is hard to predict and it is important for developers to keep abreast of the latest innovations.

“We are working alongside a technology provider on a solar battery solution for rural areas but, we think there is going to continue to be a role for grids. The fact that the grid can blend consumer risk profiles, means financing utility scale projects can attract much cheaper finance and, in turn, offer consumers much cheaper tariffs. We do however see a role for battery storage retrofitted to utility scale

wind and solar projects in the future, when costs come down, and believe an active strategy for forward looking companies is to acquire projects now with storage in mind for the future.”

Charlie Troughton, Zambia Director, Buffalo Energy (Developer)



Senegal in focus

GDP: \$14.79 billion



Five-year economic growth rate:

4.00%



15.41m Population

Total clean energy investments, 2012-2016



\$0.42 billion



Installed power capacity
0.76GW



Renewable share:

6.00%

Total clean energy generation:

7.00GWh

Climatescope 2017 data

• There are currently several large renewables projects in Senegal nearing financial close, which should provide the country with sufficient capacity and limit the need for further projects to be developed.

• However, for investors Senegal is a busy market due to its demand for and political prioritisation of renewables, combined with the number of projects nearing financial close.

• In the mid to long term, Senegal has an abundance of untapped potential for renewable energy generation. Hydropower has been partly exploited and contributes 54 MW to the power mix and solar has been used in new micro-grids and to convert existing micro-grids. Wind and biomass resources are also plentiful.



Tanzania in focus

GDP: \$47.18 billion



Five-year economic growth rate:

21.00%



55.57m Population

Total clean energy investments, 2012-2016



\$0.27 billion



Installed power capacity
1.45GW



Renewable share:

2.00%

Total clean energy generation:

45.35GWh

Climatescope 2017 data

• This is part of a region with significant potential for geothermal activity and some developers target this market.

• However, there are governance doubts that cloud the future for power sector developers. John Pombe Magufuli

(President since 2015) has an unpredictable attitude towards private investment, evidenced by legal battles with Tanzania's independent power producer (IPP) Symbion Power Tanzania Ltd., leading to a perception of political risk amongst investors.

• Despite this, opportunities for micro-grids and off-grid developments are being developed and competitive international tenders being actively promoted by the government.

“We do see a role for battery storage retrofitted to utility scale wind and solar projects in the future, when costs come down, and believe an active strategy for forward looking companies is to acquire projects now with storage in mind for the future.”

Charlie Troughton, Zambia Director, Buffalo Energy (Developer)



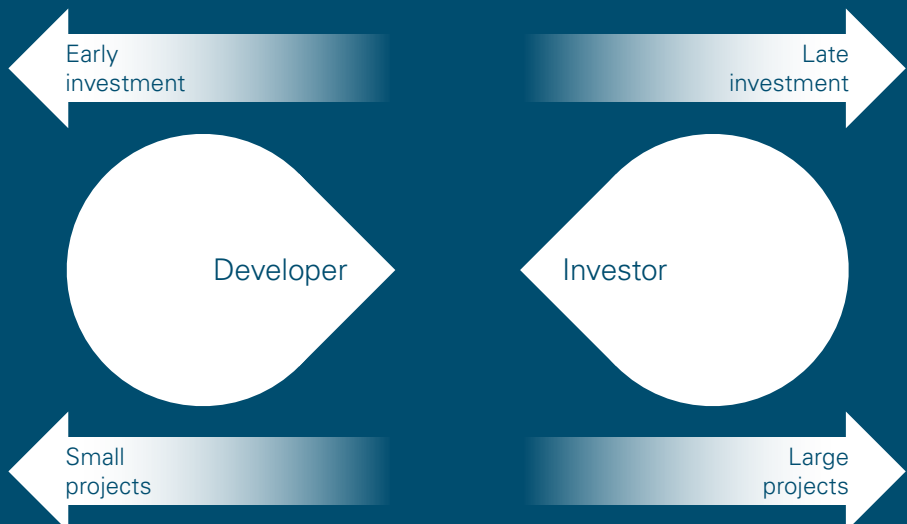
7.

Conclusion

Closing the developer – investor funding gap.

Developers and investors all identify the funding gap as a key barrier to getting development projects in Africa off the ground. Developers desire early investment but investors are wary of the risks involved and projects hit the buffers.

Smaller projects are also of limited interest to many investors. This section explores the innovations in financing being investigated with great interest by both parties to help overcome this challenge.



Project aggregation

Financial aggregators aggregate many smaller projects and wrap them around the same financing to create project scale and enable cost savings from economies in procuring legal, financial and other project support services. These bundled energy opportunities achieve a size and reduction of risk that encourages investors who would not consider individual projects. Identifying numerous available projects to aggregate is not an easy task in Africa, so it can be a challenge for aggregators to put together a coherent portfolio.

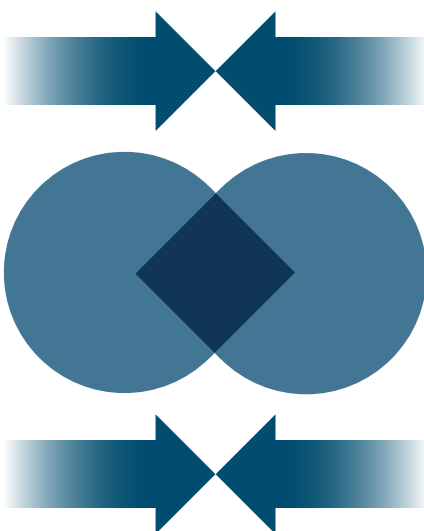
Other methods of aggregation include tax-exempt Green Bonds, such as those issued by the World Bank. These also have the potential to widen the investment pool by offering fixed income returns to institutional investors and providing smaller renewable energy projects with the funding required to get the competitive edge needed to compete with fossil fuels as a financially viable alternative.

These bundled energy opportunities achieve a size and reduction of risk that encourages investors who would not consider individual projects.

Crowdfunding and blockchain technology

Decentralised crowdfunding models have been developing rapidly in recent years and are providing developers with new sources of funding, especially for smaller projects that aren't as interesting to large-scale investors. Crucially, they may provide a source of investment to help developers fund the challenging and higher risk early stages of renewable projects. Crowdfunding can also enable developers to divide their projects into smaller shares and sell these directly to multiple investors.

New financial models are closing the gap between investors and developers



“Crowdfunding is speaking to all of us, making us feel good about putting a few hundred pounds on the table to invest into something which helps the world. There are a few players out there doing well. We work with a German crowdfunder for whom we are building a project in Ghana and developing a portfolio of projects in East and West Africa. The strength is the ability to roll out money fast for small and mid-sized projects which other traditional investors are not interested in.”

Patrick Lagrange, Managing Director, Yingli Namene Solar, (Developer)

Several decentralised energy service companies (DESCOs) have popped up, principally in Kenya, Rwanda and Tanzania, and the key to their success has been innovative consumer based finance models, including start-up capital, operating capital and end-user finance through mobile payments systems. These companies are currently small but may provide aggregation opportunities in the future.

Blockchain technology provides a potentially exciting new crowdfunding model. It uses distributed ledgers rather than a central database to store information. Because the records are distributed the information is far less vulnerable to hacking so it provides a relatively safe ledger of any form of economic transaction, including financial,

and creates new opportunities to enable peer-to-peer energy transactions such as allowing projects to be split into shares and treated as tradeable assets that can change hands often and fast, as opposed to long-term investments.

Blockchain's enabling of secure peer to peer exchange of data has been utilised most rapidly by the financial sector but the technology has significant implications beyond raising finance for the future of energy supply. Any transaction that had previously required third party validation and security has the potential for blockchain to step in. The management and supply of energy provision can be decentralised, for example, The Sun Exchange, based in South Africa, enables users to buy and earn rental income from solar panels on commercial rooftop space by feeding surplus energy into the grid. Blockchain can also be used for managing payments and implementing 'smart contracts' that can be set to execute automatically based on transaction data. This fast-growing technology provides further potential for African renewable projects to 'leapfrog' conventional infrastructures and invest directly in innovative and flexible decentralised energy management and supply models.

“With blockchain you don't need a big institution, you can just spread the investment to a lot of individuals investing only small amounts.”

Matthias Stettler, Chairman & Founder, Greenmatch AG (SaaS provider)

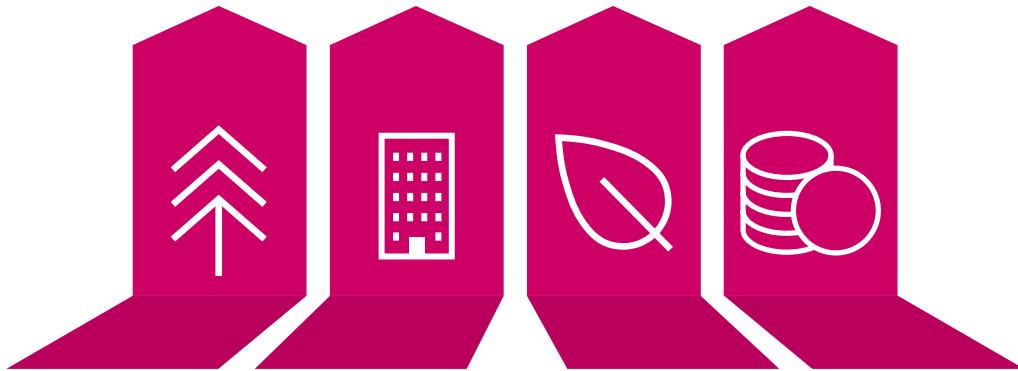
8.

The four pillars driving momentum

Despite the significant challenges there are plenty of reasons to be optimistic about the future of renewable energy projects in Africa.

“The next big political change in Africa is going to be vast improvements in state bureaucracy and governance. Private sector investment is currently picking up the gaps in essential energy services; and this will continue as governance improves because of the pressure from the big demand for energy.”

Tara O'Connor, Founder & Executive Director, Africa Risk Consulting (Risk Consultant)



Demand

Fundamentally, the enormous scale of demand will be the primary driver of growth. Two-thirds of the population of sub-Saharan Africa don't have ready access to power and rapid economic expansion will continue to exacerbate supply needs. The market for renewable energy ventures will continue to grow and private sector investments will continue to increase.



Governance

As the trend towards democratisation and devolving of power to local government continues, political leaders will be ever more aware that access to power promotes economic development and creates jobs, new industries and prosperity. Africa is abundant with sufficient renewable resources to provide terawatts of power and the rapid innovation and development in science and technology (particularly storage solutions to improve consistency of renewable supply) will encourage the stubborn attachment to fossil fuels to loosen its grip.



Climate change

Climate change will provide further impetus to renewable energy development. Although the region is responsible for just 7.1% of the world's greenhouse-gas emissions (despite making up 14% of the global population) Africa is arguably the most vulnerable continent to the impacts of global warming. East Africa is particularly exposed, with temperatures predicted to rise one and a half times more than the projected average for the rest of the world. Not all countries are low carbon emitters: markets such as South Africa, Zambia and Nigeria have emissions equivalent to more developed countries and will potentially have an even greater political will to prioritise renewable projects.



Investment

Innovations in funding are central to providing the investment required to meet the continent's infrastructure deficit. African public governance, bureaucratic processes and credit-worthiness of off-takers all need to improve rapidly, but it will be increases in the volume, diversity and speed of private capital injections into renewable developments in Africa that will build the renewable future.

9.

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The energy sector is changing rapidly. International markets present opportunities, but bring challenges from funding and regulation through to technology, innovation and supply-chain. Regardless of the jurisdiction, you will need to overcome an ever evolving legal framework whilst managing your exposure to risk, so it's vital that you are advised by specialists when you are considering the strategy for your next energy project.

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To discuss your challenges, please contact us.



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