Background Paper

Implementing Renewable Energy Initiatives in Africa

2015 ICA ANNUAL MEETING
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Disclaimer

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Executive Summary

- This paper is intended for provide a basis for discussion of the issues facing the African renewable energy sector, at the ICA 2015 Plenary Meeting. It is hoped that this discussion will help African policy makers in actualising a more effective framework for cooperation amongst regional Initiatives and their partners for promoting increased investment in African renewable energy.
- The current status of investment in African Clean Energy.
    - Africa uses approximately **3%** of the world's electricity and emits approximately **1%** of the world's carbon emissions.
    - Between 2004-2014 Africa saw investment of **US$ 21 billion** in renewable energy capacity. This is modest compared to the total global investment in clean energy over the same period. Moreover, this investment flow has been concentrated mostly in six countries.
    - **Energy Access**: **Overall, 600 million people living in Africa are without access to electricity, and 65% of this un-connected population is in 10 countries.** Given this large un-served population, energy access is now a formally adopted target pursuant to SDG7[a] in accordance with SE4ALL[b] targets for universal access.
    - **Affordability**: At the same time, industrial users in half of African countries pay well over international average tariffs, and are heavily dependent on expensive diesel back-up generation. With regard to retail customers - out of 30 countries studied, retail consumers in 23 countries have to spend over 20% of their annual income for 40 kWh per month. This begs the question as to how Africa is going to pay for this investment.
    - These issues of energy access and affordability are deemed to compound the weakness of African **utility credit**, making it challenging for them to attract investment.
    - The forecast growth in population (**2.5%** p.a.) and economic growth across Africa (estimated at **7.7%** p.a.) is expected to see electric energy use in Africa increase to **1,580 TWh** p.a. by **2030** (a **77%** increase from current levels), requiring a doubling of power generation capacity from the current level to just over **400 GW**. A proposed target of adding **10 GW of renewable energy by 2020, and 100 GW of renewable energy by 2030**, which is being considered by the African Union as part of the overall investment in African power capacity appears well within reach.
    - The challenge facing African nations in this task is not likely to be about attracting the capital for meeting these targets, or finding the technologies or skills to implement them. Rather, the challenge is likely to lie in creating an **enabling environment to absorb this capital evenly across Africa,** and in addressing the challenges facing the continent. In policy terms, the challenge is to set the continent on a path of rapid economic growth fuelled by a **low-cost, low-carbon and sustainable energy base**, i.e. to focus on **'economic adaptation'** (i.e., maintaining a high level of GDP/kWh, and at the same time increasing 'clean' kWh/capita).
- Taking the examples of countries such as South Africa and Morocco, and as in almost every other country around the world with a successful track record of clean energy investment, attracting **private sector** investment is key to implementation of these renewable energy targets.
- Private Sector project developers and investors need assurances that **'extrinsic risks'** (those beyond their control) are eliminated or at least mitigated. These extrinsic risks encompass issues such as political and regulatory stability, macro-economic issues, as well as issues such as availability of long-term finance. Such risks do precipitate from time to time, causing delays, increased costs and a higher perception of risk. There are great examples in South Africa and North Africa, where these risks have been mitigated for the benefit of the Private Sector, and significant investments have flowed into the renewable energy sector of these countries.

[a] Sustainable Development Goals7 promoted by the United Nations - Ensure access to affordable, reliable, sustainable, and modern energy for all.

[b] Sustainable Energy For All

- There are many African and partner initiatives active in addressing the challenges of investing in African Renewable Energy. In writing this paper, we have reviewed **84** such initiatives. These have had a positive impact on investment in clean energy, and consequentially mitigated carbon, created jobs and stimulated local economic growth. However, in aggregate terms, the focus of these initiatives is skewed in favour of micro-grids and off-grid applications, regionally towards East Africa and from a risk sharing perspective – towards project preparation. There are further gaps in the focus of these initiatives:
    - **None of the initiatives reviewed appear to promote clean energy for industrial users of energy, which remain heavily dependent on the use of carbon intensive and expensive fossil fuel based backup. Diesel generation across Africa is estimated at 120-150 GW, and its widespread use goes to the heart of African economic competitiveness.**
    - Project preparation facilities are geared towards late stage development, when projects are all but ready to construct. **There appear to be very few initiatives focused on early stage development risk sharing.**
    - **Only a minority of the initiatives are focused on training, job creation, and innovation.**
    - In comparison to international initiatives, many of which have been active for than five years, Regional Economic Communities (RECs) have only recently started focussing on clean energy investment. ECOWAS –ECREEE[a], one of the more established programmes, has made significant progress in helping member states adopt and harmonise renewable energy policies in accordance with SE4ALL Action Agenda. Other RECs are following suit with similar initiatives, which is very encouraging.
    - **Access to accurate and up-to-date information is difficult for the African energy sector**. This is crucial for assessing the status of investments and their impact.
- There is recognition from national governments, regional economic communities and international DFIs that they should address these development challenges faced by private investment. In recognition of these challenges, there are recent Pan-African initiatives, such as one promoted by the African Union Commission, NEPAD-PCA and the Africa-EU Energy Partnership (in liaison with SE4ALL), for the development of a harmonised regulatory framework for the energy sector in Africa.
- This paper proposes several themes for discussion at the Plenary Meeting, towards a more effective frame work of cooperation amongst regional and partner initiatives in Africa for promoting investment in clean energy:
    - **Harmonise** initiatives and assistance under African leadership so that all regions of Africa, and all sizes of projects have a fair chance of materialising, and regional synergies are maximised.
    - Embrace '**Subsidiarity**' – nationally and regionally driven initiatives are likely to address the different needs of each country better.
    - Create '**readiness**' in-country for the absorption of clean energy investments.
    - Address energy '**access**' and '**affordability**' and '**utility credit**' in a holistic manner pursuant to the SE4ALL Action Agenda framework.
    - Extract economic value from this wave of investment by promoting **jobs and skills** creation for a prosperous Africa.

[a] ECOWAS Centre for Renewable Energy and Energy Efficiency

1. Introduction

1.1. This paper on African clean energy is intended to serve as background for the ICA Plenary Meeting scheduled for November 17, 2015 in Abidjan (the "**Plenary Meeting**"), under the leadership of the **African Development Bank** and the **The Federal Ministry of Economic Cooperation and Development** (**BMZ**) of Germany, acting through the **Gesellschaft für Internationale Zusammenarbeit** (**GIZ**) **GmbH** of Germany.

1.2. There is significant momentum within Africa and internationally to accelerate energy access and adoption of clean energy in accordance with Sustainable Development Goal7 (SDG7). The Plenary Meeting is intended to focus on actualising a more effective framework for cooperation amongst international and regional initiatives for promoting investment in African clean energy. This is to set the African continent on a path to achieving **10 GW of clean energy investment across Africa by 2020, increasing to 100 GW of new clean energy investment by 2030**[a]**,** accounting for **50%** of the addition of all energy capacity in Africa in this timeframe. The objective is to fuel Africa's economic prosperity with low-cost, low-carbon and sustainable power.

1.3. In setting the scene for the Plenary Meeting, in **Chapter 2** we assess the current state of clean energy investment in Africa, and put this in the context of global trends. We have assessed the relationship between economic growth and investment, the co-dependency between energy access and affordability, supply chain, skills and jobs, the policy and regulatory environment in Africa, and sources of finance. The chapter concludes with an assessment of the challenges facing clean energy investment in Africa.

1.4. In **Chapter 3**, we assess the Institutional Landscape of Renewable Energy Initiatives. In this chapter we assess the work of **84** (DFI backed) initiatives providing capital, NGOs (providing advice and facilitation), multilateral DFIs, and donor nation organisations in promoting clean energy investment in Africa. We have used three examples of initiatives for highlighting the work that is being done by these initiatives. This paper focuses on the gaps left by the cumulative efforts of such institutions, and makes recommendations for addressing these gaps and increasing the impact of these initiatives.

1.5. In **Chapter 4**, we explore the role of the Private Sector in promoting clean energy and their experience. We have described five investments from North Africa and Sub-Saharan Africa (outside South Africa), which range from off-grid and mini-grid investments to large-scale grid connected projects, to demonstrate the success of such projects, and the challenges faced by them.

1.6. Finally, in **Chapter 5**, we have set out recommended themes for discussion at the Plenary for promoting better cooperation amongst regional initiatives and clean energy investment in Africa.

1.7. This paper is technology agnostic and does not recommend one technology over another, nor does it focus on the merits or prospects of clean energy investment in particular countries. It is an implicit assumption of this paper that every country has the potential to exploiting clean energy resources, and the mix of technologies will depend on their particular resources. Furthermore, it is recognised that each country's ability to promote clean energy will vary, and the rate of investment in each country will vary.

1.8. It is hoped that the paper will provoke feedback, discussion and sharing of ideas at the Plenary Meeting and will lead to agreement of common themes to be adopted by Governments, Regional Economic Communities and International DFIs for creating an enabling environment for clean energy investment in Africa.

[a] A proposed target being considered for adoption by the African Union.

2. Background of Renewable Energy in Africa

- **What is the experience of clean energy investment in Africa?**
- **How does African clean energy investment compare in an international context?**
- **What is the relationship between energy investment and economic growth?**
- **What are the barriers to investment in clean energy in Africa?**

The African renewable energy investment opportunity, and the imperative for a large share of the investment in new energy generation capacity to be in renewable and clean technologies, are both themes that have been extensively analysed and documented. To recap this:

- ✓ GDP growth in Africa is expected to average **7.7% p.a.** till **2019**[1], with Sub-Saharan Africa experiencing a higher rate than North Africa;
- ✓ There are many areas of reform, policy initiatives, and investment that are required to enable this growth, and access to energy is widely recognised as one of the important enablers of growth, and it is deemed to have impacted every Millennium Development Goal that has been established by the United Nations;
- ✓ **In order to meet this expected growth in population (refer section 2.3.9) and economic activity, African energy consumption is expected to increase to 1,580 TWh p.a. by 2030 (a 77% increase from current levels), requiring a doubling of capacity from the current level to just over 400 GW**[2].

2.1. The Experience of Clean Energy Investment in Africa

2.1.1. Energy Sector investment in Africa in 2014 accounted for **39%** of a total annual African infrastructure and energy investment of **US$ 326 billion**[3]. Clean Energy investment accounted for only **US$ 6.0 billion** of this. This level of investment is modest in comparison with overall African energy investment, and it is also modest compared to the nearly **US$ 339 billion**[4] invested in world wide clean energy in the same period.

2.1.2. It is estimated that approximately **10,000 MW**[a] of Renewable Energy at a cost of **US$ 21.7 billion**[5] has been installed in Africa over the last 10 years. This is **0.9%** of global clean energy investments of **$2.35 trillion**[b] that have been invested in the global clean energy sector in this same period. **South Africa alone accounts for 47% of the Africa total. It is noteworthy that 90% of this investment flow (fig 2.1.2) has benefited only six countries.**

2.1.3. A targeted increase of **100 GW** of renewable energy in Africa over the next 15 years will likely require an investment rate of **$ 10-12 billion** per annum. **This implies a need to double the annual rate of African clean energy investment, and appears well within the reach of the African and International finance community.**

[a] author estimate

[b] Bloomberg New Energy Finance data

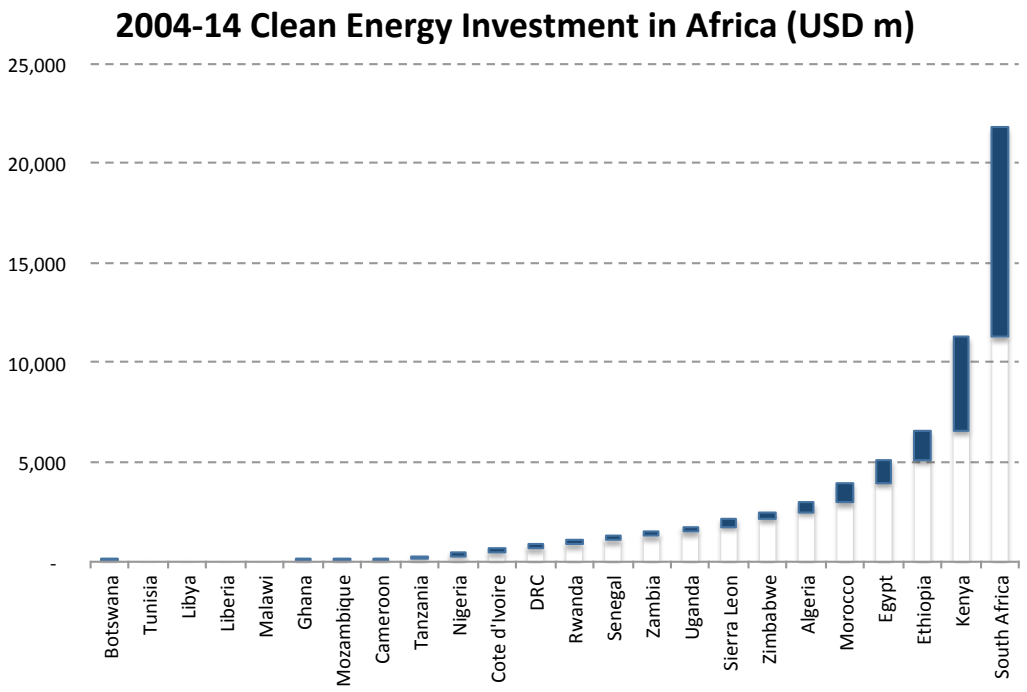

Fig. 2.1.2 Clean Energy Investment in Africa[2,5]

2.1.4. There are signs that the pace of investment is indeed picking-up. As shown in the figure below, there is substantial project development activity in countries outside the leading six countries.

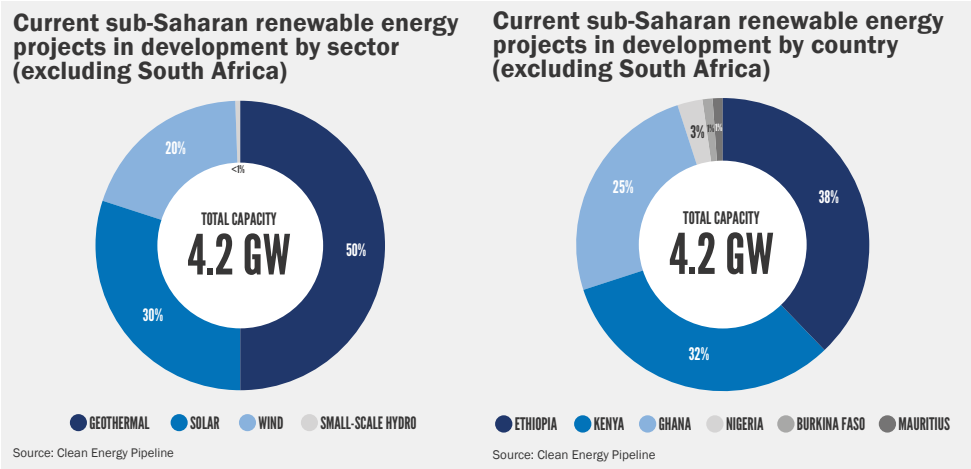

Fig.2.1.4 Sub-Saharan renewable energy development pipeline (excl. South Africa)

However this still leaves forty countries with very low levels of investment activity, and the challenge is to make sure that all countries in Africa get the benefits of clean energy adoption.

2.1.5. The call for investment in African clean energy comes at a pivotal time for the global energy sector. The $ 2.35 trillion invested in global clean energy over the last ten years has also created a global supply and experience base of clean energy deployment, which encompasses policy makers, the supply chain and capital providers.

- ✓ For the last three years, investment in global renewable energy has (nearly) matched global investment in fossil fuel power. **This is a reflection of the fact that clean energy generation economics are within parity with fossil fuel generation;**

- ✓ There is now evidence of a decoupling of carbon emissions from economic growth globally[6], where over the last three years, carbon emissions have reduced while global GDP has climbed (albeit modestly)[7];
- ✓ We now have an active international dialogue for curbing carbon emissions, and African nations along with over 100 other nations are moving towards a process of self defined targets for adaptation and mitigation. These targets (INDCs[a]) are due to be agreed at the UNFCCC convened Conference of Parties (COP21) scheduled for December 2015 in Paris;
- ✓ It is widely recognised that Africa has a marginal contribution to global CO_2 emissions, while being highly vulnerable to the impacts of climate change[b]. Africa is expected to be a beneficiary of international funding arrangements that are to be agreed pursuant to these evolving international climate change negotiations – in particular the $ 100 billion per year commitment that OECD countries will make to developing countries.
- ✓ **The key challenge facing African nations is to maximize the deployment of these levers (international capital, skills and resources) to set the continent on a path of rapid economic growth fuelled by a low-cost, low-carbon and sustainable energy base.**

2.2. The Relationship Between Economic Growth and Energy

2.2.1. There is a mutuality in the relationship between economic growth and increase in energy consumption [8], where increased energy consumption contributes to industrialisation and urbanisation, which in-turn increases GDP, and increasing GDP results in higher energy consumption in a country. As shown in fig. 2.2.1, there is a fairly clear linear relationship between GDP per capita and energy consumption per capita across the economic spectrum.

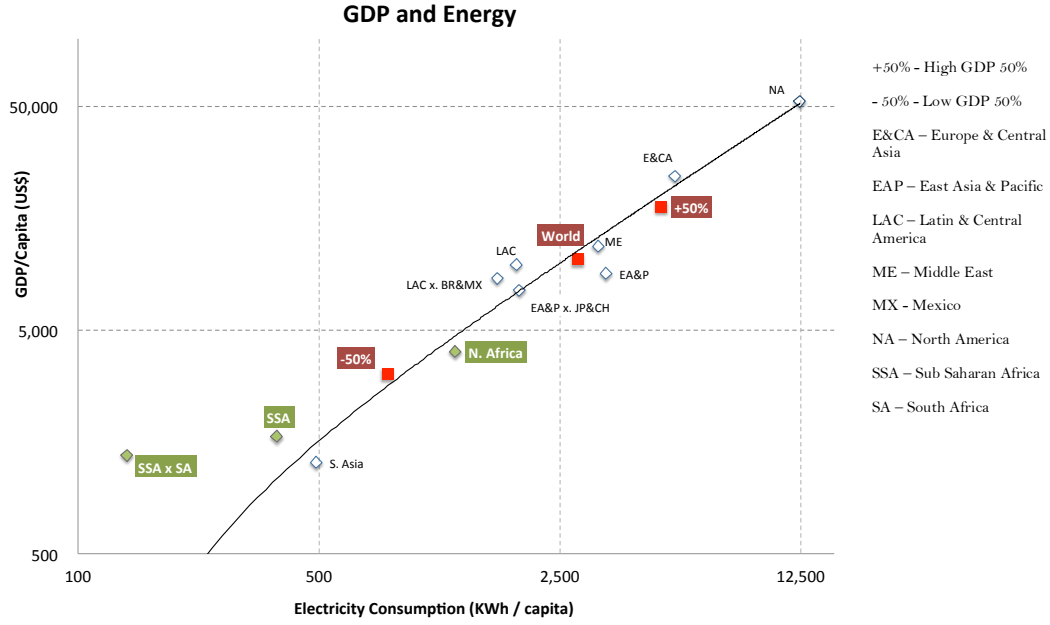

Fig. 2.2.1 relationship between GDP and Electricity – World Bank Data 2013[8]

[a] Intended Nationally Determined Contributions as part of UNFCC COP21

[b] It is estimated by UNEP that Africa contributes to less than 0.8 tones CO_2/capita, which is approximately 20% of the Developing world average, and 1% of the OECD average. UNEP has also estimated that Africa faces climate change adaptations costs of $150 billion or more per year by 2070 even if global emissions targets are met.

2.2.2. This graph highlights the vast gap between GDP and consumption of Africa compared to the rest of the developing and developed world. African energy consumption and GDP levels were **13-15%**[a] of the world average in 2013, and taking Sub-Saharan Africa (excl. South Africa), energy consumption in 2013 was **5%**[a] of the global average.

2.2.3. A more interesting dynamic is demonstrated in fig. 2.2.3. An assessment of GDP/kWh consumption (using energy as an input in economic activity), shows a relatively flat curve across the development spectrum of approximately **3.7 US$/kWh**[b]. However, Sub-Saharan Africa (excluding South Africa) shows an unusually high average of **9.9 US$/kWh**[b]. This is particularly interesting given that extractives dependent economies such as Nigeria and Angola demonstrated a very high GDP (2013) of **25-27 $/kWh**. The World Bank energy consumption data used for this study is known to exclude captive-generation data, and it is our estimate that in Africa there exists back-up capacity equal to **60-75% (120 – 150 GW)**[c] of total installed generation. If the power generation (and carbon) from this capacity were to be taken into account, GDP/kWh figures would be in-line with international levels.

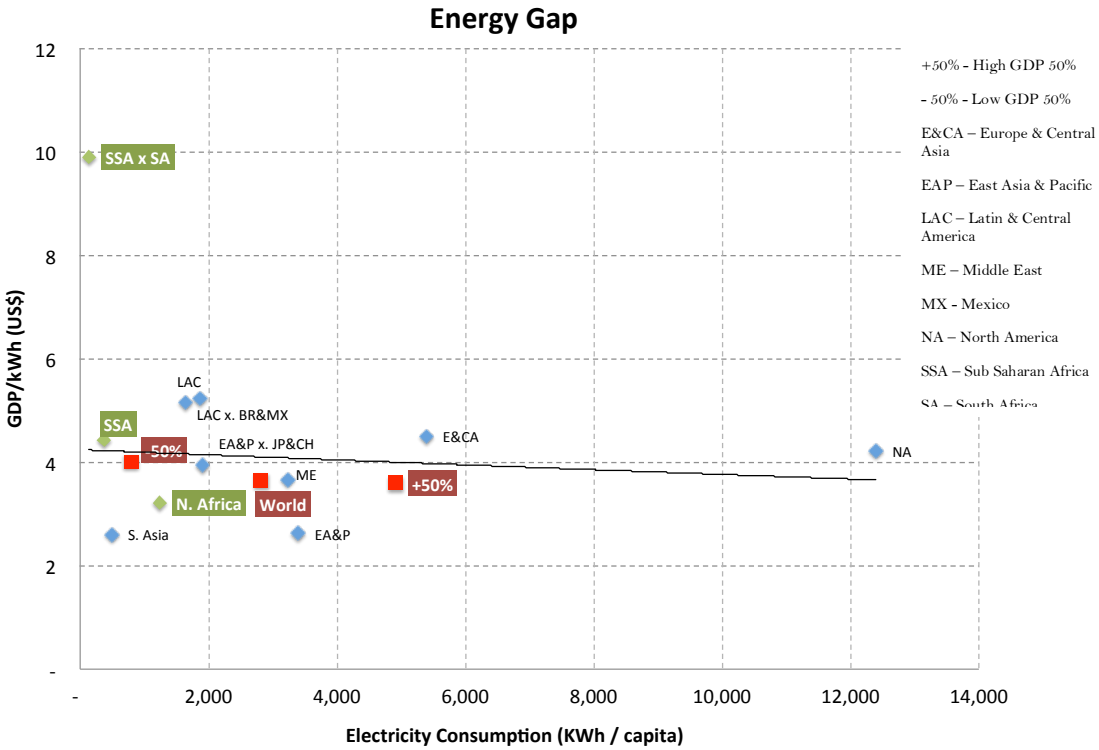

Fig. 2.2.3 relationship between GDP and Electricity – World Bank Data 2013[a]

2.2.4. **While most of the developed and upper middle GDP countries are working towards 'mitigation' of energy use (i.e. using less fossil fuel kWh/capita), the challenge for Africa (and its opportunity) is to embrace a development path that is focused on**

[a] Analysis of World Bank Data conducted by the author

[b] A high GDP/kWh is indicative of energy efficiency in the country. However, combined with a low consumption/ capita and low energy access discussed above, a high GDP/kWh is indicative of a high level of non-energy related GDP activity such as manually tilled farm produce and/or un-accounted for generation – such as captive generation.

[c] Author's estimate based on analysis of World Bank Data.

'economic adaptation' (i.e. maintain a high level of GDP/kWh, and at the same time increasing clean kWh/capita).

2.3. The Barriers to Investment in Clean Energy in Africa

Energy Access, Affordability and Utility Credit

2.3.1. It is widely understood that **600 million**[7] without access to electricity reside in Africa. A disproportionate number of these people live in rural areas. Where urban electricity access averages around 50%, rural electricity access in Sub-Saharan Africa tends to be lower than 15%.

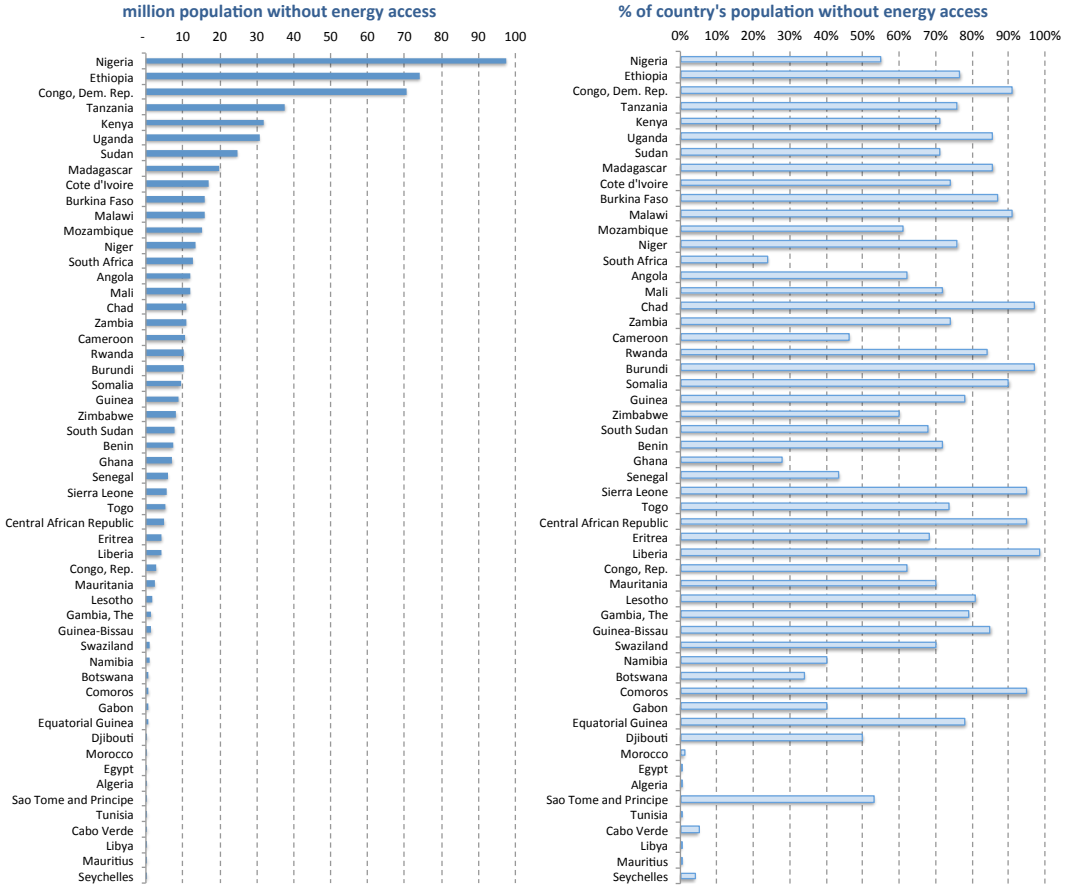

Fig.2.3.1. Population without Energy Access in Africa (millions and %)[9]

With reference to fig.2.3.1, **38** countries have over 50% of their population without access to modern energy. However, only ten countries have **65%**[a] of Africa's unconnected population, and aggregate energy access levels in these ten countries is estimated at **28%**[a]. The rate of increase in energy access would perhaps be more rapid, if policy initiatives are proportionate to absolute levels of population, rather than percentages of population,

2.3.2. Another interesting dynamic is demonstrated in fig. 2.3.2 below. It is intuitive to infer that low income countries with low GDP per capita (less than $ 1000) will have low access to energy. However, this pattern of low access to energy is also prevalent in relatively rich African countries, which have GDP/Capita higher than the world average.

2.3.3. This points to a need for additional investment in infrastructure such as transmission and distribution along with investments in renewable energy generation. **There exists an**

[a] Author calculations

estimated deficit of US$ 1,000 billion[8] in transmission and distribution today to provide energy access to all in Africa. This investment dwarfs the investment required for the 100 GW of clean energy targeted for 2030. **It is imperative that a significant portion of this investment in transmission and distribution be channelled to regional grid integration to allow small nations with large renewable energy resources to access a wider regional market.**

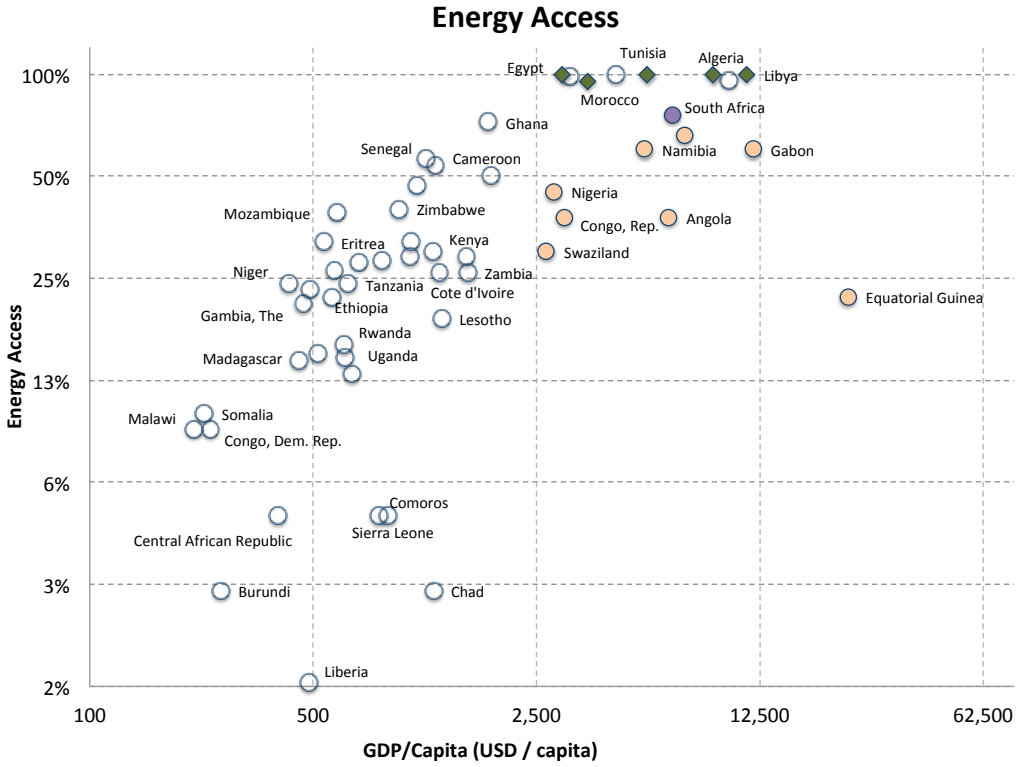

Fig. 2.3.2 Energy Access 2009 – 2013. Data from World Bank[9] and IRENA[10]

2.3.4. Contributing to this challenge of co-dependent investments is the issue of **affordability**.

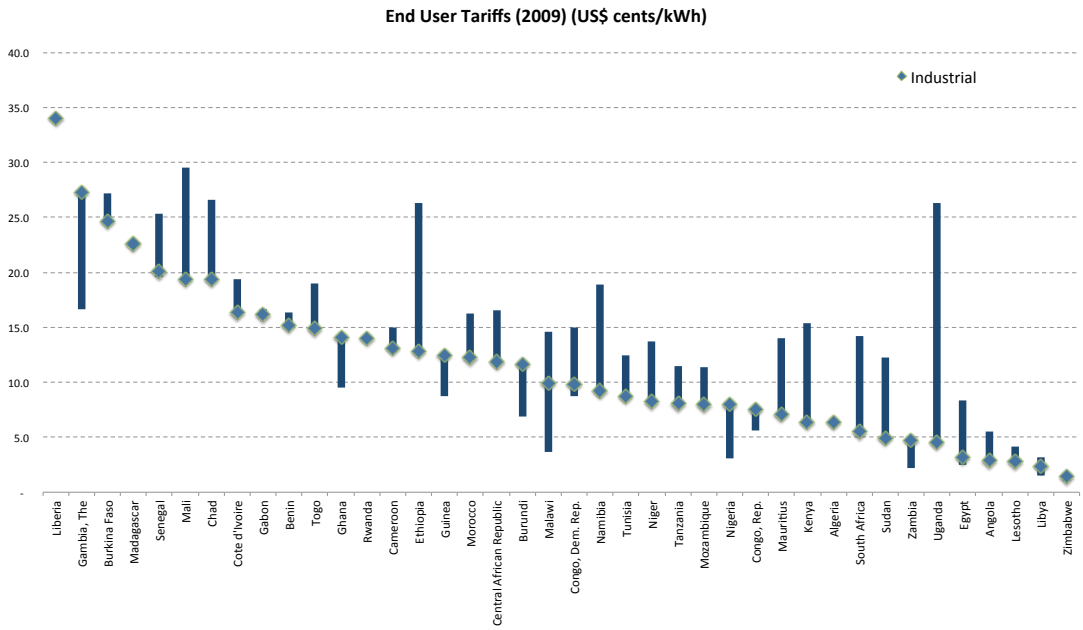

Fig. 2.2.4 Electricity Tariffs - World Bank Data[9]

2.3.5. As set out in fig.2.2.4 above, the majority of African nations have very high tariffs for industrial users (well above 10 USc/kWh which are the levels of tariffs paid by European and US industrial users). **Consistency of power supply** is another related problem. It is virtually impossible for any industry in Sub-Saharan Africa (including, of late, South Africa) to operate without significant use of back-up diesel power. In addition to the excessively high cost of diesel generation (30+ USc/kWh), industry has to grapple with problematic fuel supply chain issues, making power in Africa even more un-affordable, and carbon intensive. **This lack of affordability goes to heart of African economic competitiveness.**

2.3.6. For retail consumers, where they may have access to energy, many cannot afford electricity connections. As shown in Fig. 2.2.6 below, in most countries a modest level of energy requires a household to commit 20% and upwards of its income, which is unaffordable.

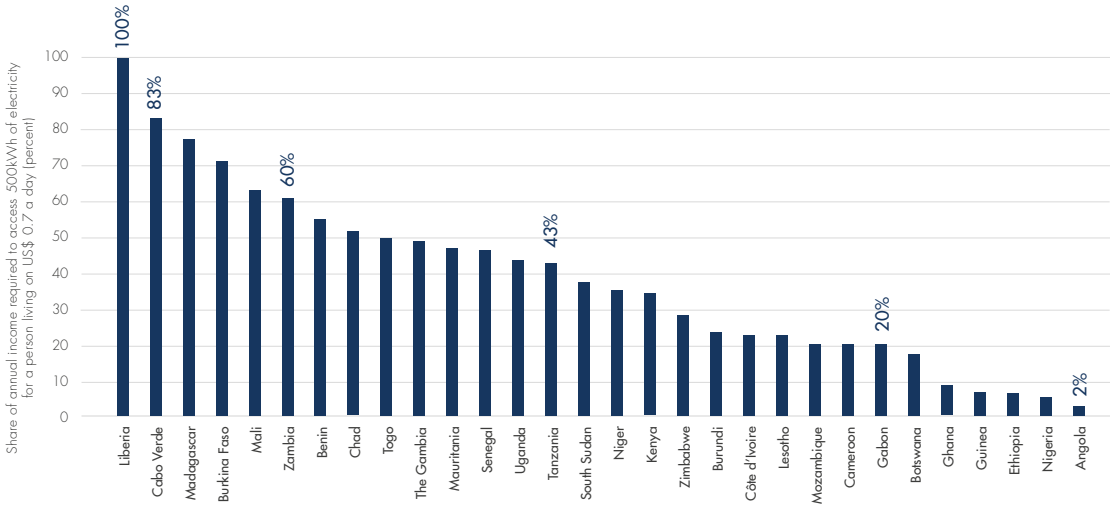

Fig. 2.2.6 Energy Affordability - Africa Progress Panel[11]

2.3.7. **It is widely recognised that the lack of both energy access and affordability are two sides of the same coin - the two are inextricably linked, and there appears to be a need for an African strategy to solve both of these problems at the same time and at the same pace.**

2.3.8. **These issues of poor energy access and weak affordability of power in Africa also tend to be major contributors of weak utility credit, which underpins the viability of long term Power Purchase Agreements ("PPAs"), and thereby the projects.** The causality is something like this – utilities have to charge very high tariffs, but have poor collection, which tends to lead to under-investment, poor service and higher tariffs, which drive end-users (who can afford energy) to rely on expensive and carbon intensive back-up power. Weak utility credit leads to a need for sovereign, and eventually multi-lateral institutional support. While there is significant multi-lateral support for clean energy invests in Africa, this support is unlikely to satisfy the step-rate increase the rate of investment in clean energy, which is required for achieving targets in Africa. **African renewable energy investments need a clear path to commercial viability, and in order to do that utility credit, affordability and energy access need to be treated together..**

Supply Chain, Skills and Jobs

2.3.9. Africa's population is expected to grow at above 2.5% p.a. for the next fifteen years, reaching **2.0 billion by 2040**[12]. The proportion of working-age population to total population in Africa is now entering a phase of rapid growth, while this ratio is set to

decline in almost every other part of the world. African GDP/capita has remained relatively flat over the last thirty years, assuming the right economic action is taken, African GDP/capital should steadily climb in accordance with the experience in East Asia and Latin America over the last thirty years (refer Section 2.2).

2.3.10. At the current time, there is limited manufacturing of clean energy equipment on the continent, with investments reliant on imports from Europe, China and other distant locations. There are also well-researched problems with the trade and transport of such equipment from ports to in-land locations. Import of such heavy-duty equipment adds to cost and brings time delays; these increase risk for investors and in aggregate increase the cost of energy to end-users. In time, as the African renewable energy market grows, it is hoped that manufacturing of equipment will follow. There are however, several areas of support this will require such as trade harmonisation and transport infrastructure improvements. One important area directly relevant to the renewable energy manufacturing sector is that of **jobs, skills** and **innovation**.

2.3.11. Today there are an estimated **7.0 million**[7] people employed in the global renewable energy sector, and less than **100,000**[a] of these jobs are estimated to be in Africa. **"Jobs in African renewable energy" has the potential to be its own success story for Africa.** As we move forward in deploying renewable energy capacity in Africa, it is imperative for policy makers to incentivise job creation through **education, skills, training, and promoting innovation**, with the dual aim of creating employment and of reducing the cost of installation of renewable energy.

Policy and Regulatory Landscape in Africa

2.3.12. All but 10 countries in Africa have policies in place to incentivise renewable energy investments. African nations have access to a wide array of expertise and experience borne out of international success with promoting Renewable Energy through targets and tariff setting, not least in South Africa, where in a short period of five years, $ 10.0 billion of mostly private and commercial capital has been mobilised in clean energy investment – creating a path for clean, low cost and resilient sources of power to light the future of South Africa. (South Africa's experience is described in more detail in Chapter 3.)

2.3.13. South Africa's regulatory success is lauded the world-over for its **strong leadership in formulating transparent, simple and clear processes and framework which were responsive to investor needs** - lessons, which will serve the aspiring African nations well in managing their regulatory processes.

2.3.14. **It is imperative for African nations to follow the early examples of success not only in South Africa, but also in Morocco and Kenya, to create an enabling environment for investment in all the sub-sectors of clean energy as described above.**

Sources of Finance

2.3.15. Overall investment in African infrastructure has been funded nearly equally between domestic capital (sovereign and private), DFIs and International investors. Funding of renewable energy projects in South Africa, is mostly from private capital (both domestic and international). **However, investment in clean energy for the rest of Africa is dominated by donor country agencies and regional and international DFIs**[b]**.** (This is demonstrated by the examples set out in Chapter 4.)

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[a] author estimate

[b] Development Finance Institutions such as the World Bank Group, African Development, European Investment Bank

2.3.16. The need for DFI support stems from a combination of several factors including:

- ✓ Shallow local debt markets (excluding South Africa) where banks are not able to offer debt capacity, terms and pricing to make projects viable
- ✓ Weak utility credit combined with macro sovereign risks (political risk, regulatory, credit and currency)

These findings have been borne out in a survey by Clean Energy Pipeline[13]

2.3.17. The involvement of international finance (DFI and commercial) brings with it some constraints:

- ✓ Requirements for 'dollarized' off-take with minimum off-take obligations;
- ✓ Multiple approving ministries and project level parties;
- ✓ Transaction costs and requirements for minimum project size;
- ✓ Long lead times often cause projects to re-visit commercial arrangements two or three times, before a project may proceed into construction. This is usually caused by macro events and changing political and economic circumstances such a major devaluation, change of government, oil price movement or global recession.

2.3.18. **There is an opportunity here for African nations, assisted by international and national initiatives, to promote domestic market financing**. This will bring multiple advantages:

- ✓ Reduce risk transfer to the country (currency and technological);
- ✓ Reduce development risk; and
- ✓ Improve access to finance for smaller projects such as off-grid, mini-grid and distributed energy.

2.4. Conclusions

2.4.1. The analysis above describes both the barriers and the opportunities faced by African nations in attracting clean energy investments. There is also a demonstrable co-dependence between electricity use and economic growth.

Recommendations for Plenary Discussion

- **While capital from continental and international sources appears plentiful, there is a need for co-ordinated regional and national effort to create an enabling environment to help absorb this capital evenly across Africa.**
- **This calls for strong institutions to enact transparent, clear and simple processes and frameworks, which should attract capital to all corners of Africa, and to all sub-sectors from small off-grid to large regional projects.**
- **Further areas of action by policy makers are;**
  - ✓ **Break the vicious cycle of poor energy access, weak affordability and poor utility credit**
  - ✓ **Promote job creation and 'made in Africa' as a means for indigenisation of technology, which also help in lowering the cost of energy generated**
  - ✓ **Promote local financing.**

3. The Institutional Landscape of Renewable Energy Initiatives

- **Example of a showcase renewable energy programme – South Africa's REIPPP Programme.**
- **Examples of mobilizing Private Sector investments**
- **Focus and constraints of international and regional initiatives for clean energy**
  - **What impact do these initiatives have?**
  - **Where are the gaps in focus amongst these initiatives?**
- **Involvement of African Union and Regional Economic Communities in clean energy?**

3.1. Introduction

3.1.1. In Section 2 above, we assessed the current state of clean energy investment in Africa. However, the section also highlights systemic and structural issues inherent in the sector, which require governmental, regional and multi-lateral intervention.

3.1.2. In writing this paper, we considered **84** development initiatives[a] (refer Annex A) focused on promoting renewable energy in Africa. As set out in Fig.3 below, these are funding agencies and non-governmental agencies (NGOs), which are promoted and funded by a combination of RECs[b], DFIs[c] and donors[d]. The DFIs and donor countries have their own initiatives, which are active in promoting clean energy in Africa. The assessment set out below is based on desktop research, which is summarized in Annex A, and has not had the benefit of discussion with the initiatives and institutions discussed herein.

3.1.3. The sheer number of agencies focused on Africa and the breath and depth of their activities suggests that clean energy investment in Africa is not short of attention from the international development community. Nor are these recent interventions – over half (nearly 50) of the initiatives assessed are five years or older.

3.2. Example of a showcase renewable energy programme

3.2.1. The continent is also host to a world-class renewable energy programme of investment in South Africa under the REIPPP[e] Programme.

3.2.2. Starting from 2011, over four rounds of auctions (by mid-2015), the Programme had attracted **US$19 billion** of investments in **92 wind and solar projects** totalling **6328 MW**. **To date US$ 10 billion has already been invested accounting for 50% of all African clean energy investment**. There are other successes of the programme worth noting:

- ✓ Successive rounds of investments have reduced tariffs for Solar PV by **68%** and for wind by **42%**, taking clean energy within reach of grid parity with fossil fuel power;
- ✓ Over **100** international and domestic investors have participated in this process and the programme has become an important instrument for delivering the Government's goal of Black Economic Empowerment;

[a] Do not include commercial and private capital providers.
[b] Regional Economics Communities, including African Union
[c] Multi-lateral Development Finance Institutions, e.g. The African Development Bank, IFC, EIB
[d] European, American and Asian nations.
[e] Renewable Energy Independent Power Project Procurement.

- ✓ **20,000** temporary jobs and **35,000** long-term operational jobs have been created;
- ✓ A deep domestic bank financing market has been stimulated. Domestic banks and institutions have provided **80%** of the debt financing for these projects under long tenors of 15-17 years, which had previously not been deemed possible.

3.2.3. The success factors of the REIPPP programme include the programme design, programme management framework, and its accommodation of relevant market factors[14].

3.2.4. South Africa's experience with promoting renewable energy was not a success from the start, and has not been without its critics. The REIPPP Programme was introduced in a late switch, where a feed-in-tariff based REFIT programme had already been announced and was widely anticipated in the market. Technical Assistance and funding from National Treasury, DBSA, and from institutions of Denmark, Germany, Spain, and the UK, together with the Global Environment Fund helped assemble a best in class team of international advisors who applied the lessons learnt from similar programmes in other parts of the world such as Europe, India and Brazil.

3.2.5. After four rounds of investment, the REIPPP Programme is not without its critics, and has left gaps un-addressed (such as small projects and off-grid). However, on balance the Programme is a great success, and a great example to follow for African nations.

Some lessons learned:

- ✓ Make a strong case for renewable energy, including clearly defined objectives;
- ✓ Choose a path (whether through REFIT or competitive tenders) that suits the country's circumstances best:
- ✓ Provide investors a clearly articulated risk-reward framework, particularly in regard to regulatory risk, or other factors external to investor such as taxation;
- ✓ Create a credible 'Programme Champion' with strong leadership and autonomy;
- ✓ Establish well thought out procurement processes and contracting documentation;
- ✓ Establish a process of information gathering and dissemination to help in monitoring evaluating and controlling progress;
- ✓ Take full advantage of donor and DFI support for capacity building and funding.

Fig. 3.3 Lessons from the South African REIPPP

3.3. Examples of mobilising Private Sector investment

3.3.1. There are many international initiatives active in promoting clean energy investment in Africa. One such initiative is the **Private Infrastructure Development Group (PIDG)**:

- ✓ It was formed in 2002 by the governments of Australia, Germany, The Netherlands, Norway, Sweden, Switzerland, the United Kingdom, and the IFC. Its stated aim is to mobilise private sector investment, to assist developing countries in providing infrastructure vital to boosting their economic growth, and for combating poverty;
- ✓ PIDG works through several specialised financing and project development subsidiaries such as DevCo, GAP, GuarantCo, ICF, InfraCo Africa, Emerging Africa Infrastructure Fund, and the Technical Advisory Facility which offer a suite of financing solutions ranging from technical assistance, development capital, construction debt, equity and guarantees;

- ✓ **In the ten years between 2002-2013, PIDG has invested US$ 2.03 billion of its own funds, mobilised US$ 15.24 billion of funding for its focus markets, including in Africa. These investments have created 110,737 short-term and 215,417 long-term jobs;**
- ✓ An example of PIDG's capabilities were deployed in the Kalangala Infrastructure Services project in Uganda (Chapter 4), where the entire suite of capabilities of the PIDG group were brought to bear on a single project.

3.3.2. It is also encouraging to see that learning from these initiatives is being shared. An example is set out below in figure 3.5 from GVEP – which started in 2010. Over the last five years, the **Global Village Energy partnership (GVEP)** has:

- ✓ Supported over 1000 MSEEs: of which 900 are active and delivering products and services to their communities — 38% of these businesses are led by women;
- ✓ Created approximately 3,000 jobs;
- ✓ Reached over four million beneficiaries with energy products and services such as improved cook-stoves, briquettes, solar phone charging and solar lighting;
- ✓ Changed how the MSEEs do business through enterprise-enterprise linkage, marketing and promotional events, business planning, product improvement and standardisation.

The following are some lessons they have to share.

Some lessons learned:

- ✓ Livelihoods of those living at the Bottom of the Pyramid can be transformed using appropriate enterprise based mechanisms and community empowerment;
- ✓ Use of locally available resources has the ability to transform a community economy as the entrepreneurs are already working in a familiar environment (i.e. their own community);
- ✓ Women have proven their ability to engage successfully in energy businesses that are highly technical and therefore viewed as the preserve of men;
- ✓ Any BDS training should be followed up with mentorship and coaching, since a few days of training is hardly sufficient to unlock the full potential of a community;
- ✓ Financial institutions are still at a nascent stage with regards to energy financing, hence the need for more capacity building;
- ✓ The energy products standardisation process needs to be simplified and the necessary awareness of its value fully understood;
- ✓ Well applied mentorship and coaching revolutionises micro and small energy businesses;
- ✓ Training and mentoring on keeping accurate records enables entrepreneurs to get a clear understanding and better control of their accounts. This also has a positive effect on financial decision-making and learning how to separate business from personal funds;
- ✓ Entrepreneurs at the Bottom of the Pyramid have the potential to create thriving local economies and reduce community dependence on grants and relief;
- ✓ Exposure to markets via organised marketing events has changed the way many entrepreneurs carry out their business;
- ✓ Enterprise linkages have the potential to create a strong value chain once each category of entrepreneur understands the needs of the other business products and services;
- ✓ With consistent support, MSEEs have shown the capacity to improve on their product quality, to the extent of obtaining certification approvals from standardisation bodies;

Fig. 3.5 Assessment from GVEP[a]

3.4. Focus and constraints of international and regional initiatives

3.4.1. **However, there is concentration of efforts by international and regional initiatives both in terms of geographic focus and purpose and stage of project development.**

3.4.2. Of the 84 institutions surveyed, **40** institutions and schemes are focused on Small Scale projects – mini-grid and off-grid schemes. While their work is very compelling, there is an opportunity for some harmonisation of focus amongst these initiatives.

3.4.3. **In contrast to the focus on energy access, none of these initiatives appear to focus on helping industrial users move away from fossil fuel backup to clean energy. There is an estimated 120-150 GW of back-diesel in operation across Africa (refer 2.2.3). This is both carbon intensive and expensive. A switch to clean energy by these users will help them offer their employees and communities a safer and clean work environment, and these users can directly impact the carbon emissions of their countries.**

3.4.4. "**Advisory, Advocacy and Research**" activities are promoted by **30** schemes and institutions focused on these activities, followed by "**Policy and Legal Framework**" support by **29** schemes.

[a] www.gvepinternational.org

3.4.5. Between **24** and **26** schemes and institutions report a focus on large-scale grid connected projects, national and cross-border transmission.

3.4.6. **It is concerning to note that in comparison, only 15 schemes and institutions report a focus on "Training and Capacity" building.**

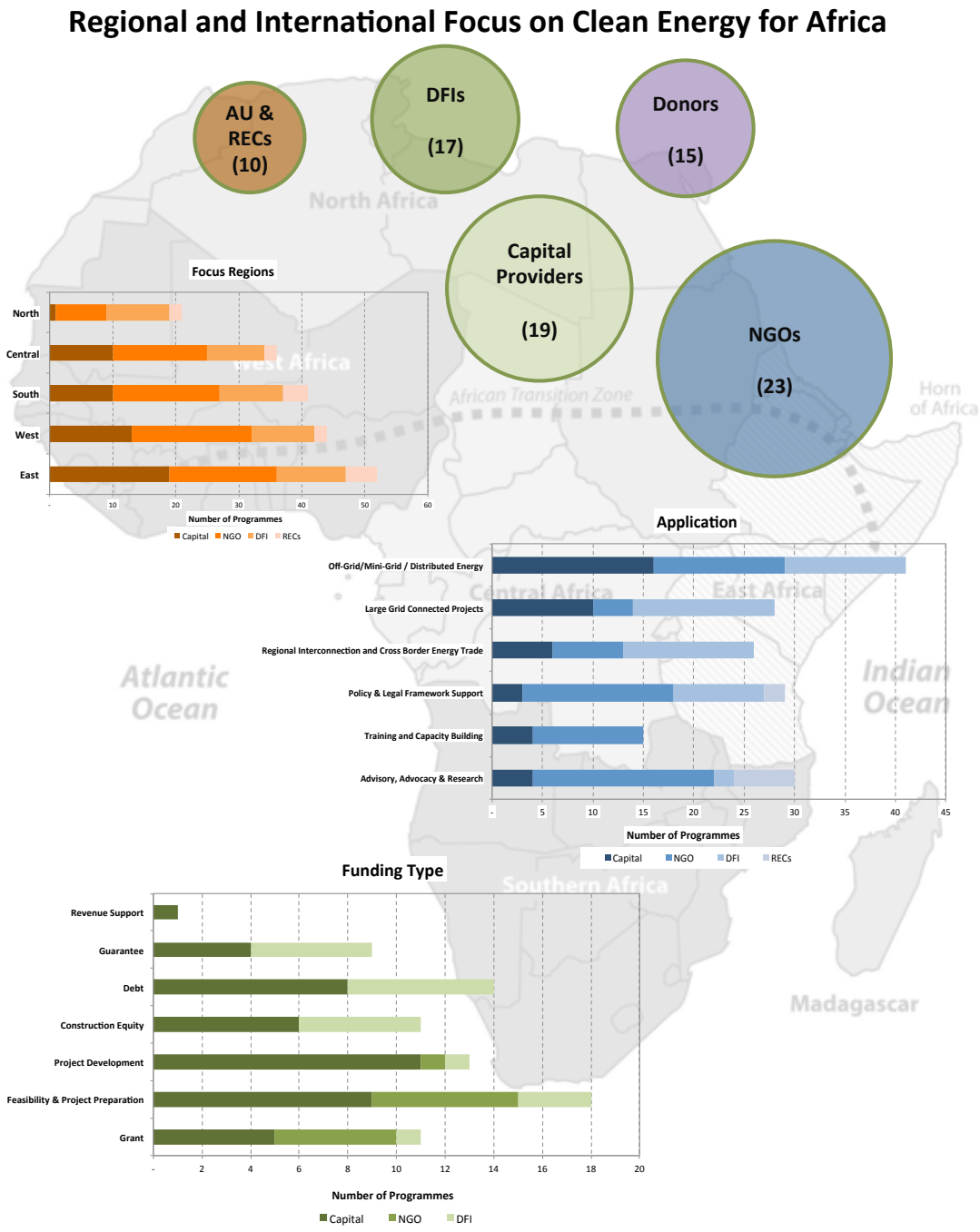

Fig.3.4.6 Development Funding for Clean Energy in Africa

3.4.7. Geographically, there is a dominant preference amongst institutions to focus on East Africa, with **52** schemes active in this region. North Africa has the least number of schemes focusing on clean energy, though this has not prevented the region from attracting large volumes of capital for clean energy investment.

3.4.8. **On funding type - there is a significant focus on feasibility and project preparation, which is a positive, given that there is a need for risk sharing in development.**

However, the majority of these project preparation initiatives are focused on late stage financing support. There is a gap for supporting risk sharing and capacity building for early stage development as discussed in more detail in Chapter 4.

3.4.9. **A few initiatives are demonstrating innovation in funding structures, with innovative guarantee structures and revenue support arrangements.**

3.4.10. **Another major area of deficiency relates to 'information'**:

- ✓ **Data on energy use, and generation was found with only one REC[a], and this information was dated back to 2007 – 2011;**
- ✓ **There is limited information available on carbon emissions;**
- ✓ The majority of the reference materials for this study were from international sources.

There are further areas of research that are relevant to this study including, but not limited to, the impact these initiatives have had to date in terms of amounts of capital deployed and projects implemented - but information is not available. **There is a role for RECs to maintain accurate and up-to-date records of carbon mitigation, energy access, employment created, and overall population that benefits from these initiatives.**

3.5. Involvement of African Union and Regional Economic Communities

3.5.1. **In recognition of these constraints, there are a few noteworthy Pan-African initiatives underway, and Regional Economic Communities have more recently adopted a direct focus on promoting renewable energy.**

3.5.2. 6 of the 8 RECs surveyed have stated policies on climate change. Of these, the majority are focused on mitigation and adaption towards agriculture with a specific focus on limiting deforestation and impacts of climate change on water supply.

3.5.3. The impact of RECs on the clean energy sector are derived more from their focus on broader issues of trade, cross border transportation, overall infrastructure development, regional transmission projects, regional energy markets and harmonisation of taxation. All areas of importance to the clean energy sector.

3.5.4. There are other Pan-African examples such as the Africa-EU Renewable Energy Cooperation Programme (**RECP**) sponsored by GIZ run EnDev[b], Lighting Africa, Africa EU Partnership (**AEEP**), and the US$ 200 million Africa Renewable Energy Fund (**AREF**) sponsored by SEPA[b], AfDB and BOAD[b] that was launched in 2014.

3.5.5. There is also a Pan-African initiative underway, led by the African Union Commission, the NEPAD Agency and the Africa-EU Energy Partnership (in liaison with SE4ALL), for the development of a harmonised regulatory framework for the energy sector in Africa.

3.5.6. Another worthy initiative led by the African Development Bank is the adoption of the Sustainable Energy for All (SE4All) Action Agendas as an umbrella framework for energy sector development at the national level. These are under development in more than 20 African countries. These Action Agendas have a long-term vision, ensuring overall inclusive sector-wide coherence and synergy of the accumulated efforts towards the three SE4All goals. These have been developed in a cross-sectoral approach combining the experience and views of the private sector, civil society and development partners. They

[a] EAC – East Africa Community

[b] Refer to Annex A

recognise the links of energy to multiple other forms of critical infrastructure development and domestic policy goals, such as expanding local skilled workforce and expertise.

3.5.7. There are a few emerging initiatives by RECs as well – such as ECOWAS-ECREEE and similar initiatives by EAC (**EACREEE**), SADC (**SACREEE**) and North Africa (**RCREEE**).

3.5.8. An example of an initiative active in promoting clean energy is the **ECOWAS Centre for Renewable Energy and Energy Efficiency (ECREEE)**:

- ✓ Founded in July 2010, and based in Praia, Cape Verde, this initiative was conceived out of a three step process within ECOWAS and was supported by funding from Austria, Spain and the United States (USAID) with technical assistance from UNIDO.
- ✓ ECREEE is assisting the fifteen ECOWAS Member States in the development, adoption and implementation of national renewable energy and energy efficiency policies and targets, regulatory frameworks, standards (e.g. for appliances, generation equipment and building codes), as well as incentives (e.g. tax exemption, public procurement, portfolio standards) and financial mechanisms (e.g. feed-in tariffs, net metering, investment subsidies).
- ✓ ECREEE has a number of initiatives underway related to **Policy, Capacity Development, Knowledge Management & Awareness, and Investment and Business Promotion**.
- ✓ It has the following mandate -

> ECOWAS 2020 Vision
>
> (1) 'A region that anchors its development on sustainable development, including agricultural and mineral resource development strategy'
>
> (2) 'A region that conserves its environment and resources, promotes modes of equitable and sustainable development in economic, social and environmental fields'
>
> Specifically, ECREE's seeks to achieve the following targets of the ECOWAS 2011-2015 plan;
>
> - ✓ Strengthen the support for and the development of economic and technological infrastructure such as transportation, water, power, energy, telecommunication and ICT
> - ✓ Promote cooperation among member states for the development of a viable regional infrastructure
> - ✓ Promote provision of efficient, reliable and competitive energy sources to Member States through the common exploitation of traditional and alternative energy sources
> - ✓ Promote rural access to affordable energy in the region

- ✓ As a major milestone, the Centre developed the **ECOWAS Renewable Energy Policy (EREP)** and the **ECOWAS Energy Efficiency Policy (EEEP)**. Both policies were adopted by the ECOWAS Ministers on Energy during the ECOWAS High Level Energy Forum, held in October 2012, in Accra. All fifteen ECOWAS countries are at advanced stage of developing their National Renewable Energy and Energy Efficiency Action Plans as well as the SE4All Action Agendas in cooperation with the SE4All Africa Hub;
- ✓ On Policy, the ECREEE Business Plan aims to achieve the following results by 2016:
  - Develop and adopt one regional renewable energy policy and one energy efficiency policy
  - Develop and pass RE laws in all ECOWAS Members States

- Ensure that national minimum renewable energy targets (MRET), adopted in all ECOWAS Member States are binding
- Achieve 25% MRET across the Member States
- Develop five RE&EE support policies/strategies devoted to rural and peri-urban electrification/energy
- Achieve a 50% rate of adoption of national EE standards and labelling standards.

3.6. Conclusions

3.6.1. **As noted above, there is significant international development capital directed at African clean energy. However, this attention appears skewed in terms of geography, sub-sector and stage of development. RECs have only recently started focusing on the clean energy sector and the benefits of regional harmonisation.**

Recommendations for Plenary Discussion

- **How can lessons from successful programmes, such as the South African REIPPP Program, be best applied for the benefit of the wider African markets?**
- **What is the best way of making renewable energy initiatives more effective?**
- **Can the drive for energy access be combined with promoting the creation of skills and jobs, and fostering innovation?**
- **How can information gathering and access for the sector be improved?**
- **How can the positive start, by the African institutions and RECs, in promoting renewable energy be expanded and accelerated?**

4. Private Sector Experience

- **What are the risk and reward considerations of private sector investors?**
- **Examples of grid connected renewable energy projects**
- **Examples of off-grid and micro grid renewable energy projects**
- **What do private investors like to see in a regulatory framework?**

4.1. The risk and reward consideration of private sector investors

4.1.1. Consistent with the experience in most parts of the world, private-sector investors are the leading source of skills and capital for development of clean energy projects in Africa[a]. There will always be a role for large utilities and national and regional organisations for developing large-scale projects. However, such projects are unlikely to form the major thrust of investment in clean energy.

4.1.2. Development of clean energy projects is a broad multi-disciplinary process encompassing **land acquisition, resource assessment, environmental assessment, permitting, grid connections, procurement of equipment and construction services,** and **financing** (the "**development tasks**"). Effective project developers aim to conduct these tasks in a manner that eliminates risk (of failure or increased cost), and bring these development tasks to a successful end at the same time, such that projects can move into construction and operations. This process is both **time-intensive** and **human capital intensive**. Financial capital for development is also an important consideration (more due to the high level of risk inherent in the development process than the amounts of capital involved in development)[b].

4.1.3. Project viability and the incentive for investment in project development is driven by an assessment of **government policy**, available sources of **capital**, available **technologies** and local and international **commodity** markets (the "**investment drivers**"). In making early project development decisions, project developers assess these investment drivers, both at the present moment, and for a time in the future where their project is likely to enter the construction phase. Developers constantly evaluate these investment drivers as projects move forward. They ask questions such as *'will the technology generate according to plan for 20 or 25 years?' 'will replacement parts be available?' 'will the project get paid a fair price for its energy?', 'what foreign exchange risks exist?' 'what macro 'sovereign', 'political' or 'currency' risk could impact the project? 'is there sufficient interest from debt and equity capital to finance the construction of these projects?'*

4.1.4. Broadly, successful developers are good at assessing and managing project **'intrinsic risks'** related to location (land, resource and permitting), technology choice and long-term operations. However, they are acutely wary of **'extrinsic risk',** which they cannot control. These relate to consistent regulatory support, availability of capital and the impact of commodity markets on their projects. Most of these risks are not insurable till very late in the development process, when projects are nearing start of construction.

4.1.5. As we know from the experience of the last thirty years, extrinsic risks do precipitate regularly in both developed and developing countries, and African nations are no exception

[a] The simple reason for this is the (small) scale of clean energy projects and the nature of development, which requires significant local presence and interaction. This is consistent with experience from around the world.

[b] Typically, development capital accounts for 2-5% of the construction capital required for a project.

to this. In the least developed countries, however, the combination of risks is such that national, regional and international intervention is required to mitigate extrinsic risk early on in the development process. As each such risk materialises, projects either have to repeat some of the prior development work, or even halt development. **This increases the cost and time-lines for project development – thereby increasing risk for the developer.**

4.1.6. Each country has its own equilibrium of risk associated with clean energy investment, and each country needs to find its own mix of tools to address these risks and make the clean energy sector an attractive investment proposition for private sector investors. **As noted in Section 3.4.8 above, where there is a strong focus of international institutions on project feasibility and project preparation assistance, there is limited focus on risk sharing of early stage development, which is deemed a major gap in support for renewable energy.**

4.1.7. **The lessons of the REIPPP Programme in South Africa (ref. Section 3.2) are relevant in both the specific aspects of the REIPPP that led to $ 19 billion of investment, and also the assessment carried out by the South African Government in abandoning the REFIT programme.**

4.1.8. To demonstrate these issues, we have assessed five examples of successfully completed projects in Africa, spanning small off-grid projects, and large grid-connected projects. There are many examples under South Africa's REIPPP Programme, and in North Africa, which should also be assessed for the lessons they may provide.

4.2. Examples of grid connected renewable energy projects

4.2.1. The **Ouarzazate Solar Complex – project (Morocco)** is one of the largest concentrated solar plant in the world. It also includes an innovative financing structure, which leverages the capacity of a consortium of independent power producers to sell the power to the government in a public-private partnership arrangement. Phase I began on 2013 and comprises the construction of all common infrastructure and the first 160 MW solar power plant (NOORo I), and is on target to be operational by the end of 2015. The total capacity of 500 MW will be commissioned in 2018 generating a total 1,652 GWh per year. The Ouarzazate Complex is part of the Moroccan Solar Programme to develop a capacity of 2,000 MW by 2020 in order to secure power supplies for the population and productive sectors of the economy. The Moroccan solar programme is implemented by the Moroccan Agency for Solar Energy (MASEN). The site of Ouarzazate is the first of the five sites identified for the Moroccan Solar Programme. The project will help to ensure regular energy supply for the population (over 99% of which have access to electricity) and productive sectors.

NOORo I, II and II Solar Thermal Power Projects, Morocco	
Type	Phase I: 160 MW concentrated Solar Power using parabolic troughs and molten salt Thermal Energy Storage (3 hours). Phase II: 340 MW concentrated Solar Power using parabolic troughs and molten salt Thermal Energy Storage (7-8 hours).
Investment	Phase I: US$ 840 million, phase II: US$ 1,950 million
Sponsor	Acwa Power International
Lenders	AfDB, AFD, EIB, CTF, KFW and European Union (grant)
Revenue Support	25 year contract with MASEN
Development Timeline	22 months
Financial Close	Phase I: 2013, Phase II: 2015
Start of Operations	Phase I: 2015, Phase II: 2018

Energy Access	The three phases together will comprise approximately 7% of Morocco's currently installed generating capacity
Jobs creation	2,400 during construction and 300 people for operations
Taxation	n/a
Population Impacted	The project will help improve grid resilience in Morocco, which already has over 99% access to electricity.

4.2.2. **The Lake Turkana Wind Project in Kenya** is the largest single wind power project to be constructed in Africa and is, to date, the largest private investment in the history of Kenya and arguably one of the most complex and challenging project-financing undertaken in the renewable energy space in sub-Saharan Africa. The project is a key deliverable under the Government's commitment to scaling-up electricity generation to 5,000MW and is a flagship project within the Kenyan Government's "**Vision 2030 program**".

Lake Turkana Wind Project, Kenya	
Type	300 MW wind energy project
Investment	US$ 640 million
Sponsor	KP&P Africa BV, Aldwych International, Fin-Fund, IFU, KLP Norfund, Vestas and Sandpiper
Lenders	AfDB, EIB, FMO, Proparco, PTA Bank, NED Bank, Standard Bank, EKF, DEG, East African Development Bank and Triodos
Revenue Support	20 year contract with KPCL
Development Timeline	8 years
Financial Close	Dec 2014
Start of Operations	2016
Energy Access	The project will comprise approximately 20% of Kenya's currently installed generating capacity.

This project is significant in terms of the precedent it has established for sub-Saharan Africa. It combines an investment in both power generation and transmission capacity. The project combines a broad spectrum of international debt and equity capital providers from donor countries, DFIs and commercial banks. On the negative, the project spent eight years in development, which has likely resulted in a very high cost of development and several iterations for adapting to the extrinsic risk discussed earlier.

4.2.3. Finally, the **Gigawatt Solar Power Plant in Rwanda** is the first utility scale private solar PV power project in East Africa and demonstrates the potential of solar power for the region. Furthermore, the project has led to an innovative developmental model where a joint-venture is created between a commercially viable power project and a social enterprise - in this case allowing the Agahozo-Shalom Youth Village to secure a source of long term income via the land lease agreement, while also creating local employment related to the maintenance of the solar field.

Gigawatt Solar Power Plant, Rwanda	
Type	8.5 MW Ground Mounted single tracker project
Investment	US$ 23.7 m
Sponsor	Gigawatt Global Cooperatief
Equity	Scatec Solar, Norfund, KLP Norfund Investments and Gigawatt Global
Lenders	FMO (NL) & East Africa Infrastructure Fund (EIAF – PIDG) – 17 year term loan
Revenue Support	25 yr PPA with Rwanda Energy Group – the national power utility
Development Timeline	3 months in financing
Financial Close	2013
Start of Operations	2014
Energy Access	This project has added 5% to the grid connected capacity in the country.
Jobs Creation	300 during construction and 15 people for operations
Taxation	US$ 2.9 m
Population Impacted	60,944

This project is remarkable in its wide access to international private sector and DFI capital, and the speed with which the financing was concluded. It is criticised for having a very high tariff. However, the tariff is lower than prevailing grid tariffs in Rwanda, and is reflective of the onerous capital costs of building clean energy in a country such as Rwanda.

4.3. Examples of off-grid and mini-grid renewable energy projects

4.3.1. The integrated **Kalangala Infrastructure Services Project – Uganda.** Bugala Island is the largest of 84 islands that make up the Ssese archipelago in Lake Victoria, covering 275 sq km. This project is a unique multi-sector initiative, which is developing environmentally sensitive infrastructure services to serve the island residents with improved access to water, safer transportation, and more reliable, renewable (solar powered) electricity. The venture is made up of two interrelated projects, collectively comprising four distinct infrastructure components. The success of this project lies in the application of institutional support from PIDG[a] backed initiatives for feasibility, project development, construction debt, equity and revenue support.

Kalangala Infrastructure Services – Uganda	
Type	1.6 MW Mini-Grid Solar PV project integrated with an island water utility and transport infrastructure
Investment	US$ 44.5 m
Sponsor	EleQtra - InfraCo Africa (PIDG)
Lenders	East Africa Infrastructure Fund (EAIF – PIDG), Guarantco (PIDG), USAID, Nedbank, IDC (S. Africa), Ugandan Development Corporation, DFIs

[a] Donor country and DFI backed Private Infrastructure Development Group

Revenue Support	TAF (PIDG)
Financial Close	2012
Energy Access	2,000 households
Jobs Creation	275 (construction), 74 (operations)
Taxation	US$ 1.97 m
Population Impacted	35,000

4.3.2. Another off-grid project is the **Jumeme Rural Power Supply Limited, Tanzania**. The Project, in its first phase, will provide solar powered energy access to 16 villages impacting 11,000 households, and is expected to create 500 new businesses. In addition to providing energy access, this project is a successful example of collaboration between private, international and local developers.

Jumeme Rural Power Supply Limited, Tanzania	
Type	Mini-grid Solar
Investment	To be determined
Sponsor	INENSUS GmbH, Terra Projects, St. Augustine University, Tanzania
Lenders	To be determined
Revenue Support	$420,000 technical assistance facility from SEFA (AfDB)
Development Timeline	n/a
Financial Close	July 2015
Start of Operations	n/a
Energy Access	16 villages
Jobs Creation	n/a
Taxation	n/a
Population Impacted	82,000 people and 2,686 businesses, hospitals, offices and schools

4.4. Conclusions

4.4.1. As experienced in other markets, the success of clean energy investment in Africa is going to depend on African countries attracting private sector talent and capital to investment in project development – for both small off-grid projects and large grid connected projects.

Recommendations for Plenary Discussion

- **Articulate clear targets and objectives for the private sector**
- **Create strong institutions, with transparent and clear frameworks, and**
- **Mitigate 'extrinsic risks' relating to – regulatory, capital, commodities and capital, even at early development stages**
- **Establish well thought out procurement processes and documentation**
- **Ensure the longevity and sanctity of the programmes they enact**
- **Collect and disseminate up-date information related to the sector**

5. Conclusion: The Way Forward

5.1. The foregoing chapters have assessed the state of renewable energy investment in Africa, and cast it in the context of global investment dynamics. It is not the lack of capital, or skills or for that matter interest from international investors to invest in clean energy in Africa. The challenge is in creating an '**enabling environment**' for private investment by mitigating the '**extrinsic risks**' of such investments for the benefit of these investors.

5.2. Investment in **100 GW** of power at $ 150-200 billion is itself deemed an achievable target. Along with energy access, there is a related issue of **energy access**, **affordability** and **utility credit** that needs to be addressed. The paper has analysed the linkage between economic growth and investment in energy sector. In strongly promoting the clean energy sector, Africa in aggregate has an opportunity for '**economic adaptation' (i.e. maintain a high level of GDP/kWh, and at the same time increasing clean kWh/capita)** (section 2.2).

5.3. The current mix of political frameworks, macro-economic dynamics are such that developers face uncertainty, high costs, and long lead times, which add-up to increase their assessment of risk. This constrains the availability of capital for development. Their ask from host Governments is:

- 5.3.1. Articulate clear **targets and objectives**
- 5.3.2. Create **strong institutions**, with transparent and clear frameworks
- 5.3.3. Mitigate '**extrinsic risks**' relating to regulatory support, capital, and commodities
- 5.3.4. Establish well thought out **procurement processes** and **documentation**
- 5.3.5. Ensure the **longevity** and **sanctity** of the programmes they enact
- 5.3.6. Collect and disseminate **up-to-date information** related to the sector.

5.4. There is increasing awareness of these issues amongst African and international DFIs and partner country institutions, and there are many initiatives sponsored by these international institutions – we have reviewed **84** such initiatives here. There are many success stories in the more developed countries such as South Africa, Egypt, Morocco, and Tunisia. Emerging East African and West African countries such as Kenya, Tanzania and Ghana are making great progress as well.

5.5. However, the attention provided by these initiatives is skewed:

- 5.5.1. A large majority of initiatives are focused on East Africa in preference to other regions;
- 5.5.2. A majority of initiatives are funding and facilitating off-grid and mini-grid investments, but few are supporting distributed generation for industrial users;
- 5.5.3. Many initiatives are focused on technical and project preparation assistance, however the majority of these initiatives avoid the early stage of projects where risk sharing is required;
- 5.5.4. There is minimal focus on job creation, skills and innovation;
- 5.5.5. Information gathering and dissemination is weak

5.6. It is certainly possible for 100 GW of clean energy to be installed in Africa by 2030 under a 'business as usual' scenario. However absent appropriate intervention, it is likely that this investment will be limited to a few countries, and a few sub-sectors, and will benefit only a few end-users.

5.7. There are meaningful efforts by Pan-African institutions such as the African Union Commission, the NEPAD Agency and African Development Bank to address these issues, and adopt a coordinated and holistic approach for promoting energy access, renewables and energy efficiency using the SE4ALL Action Agendas.

5.8. There are a also few emerging initiatives promoted by RECs as well – such as ECOWAS-ECREEE and similar initiatives by EAC (**EACREEE**), SADC (**SACREEE**) and North Africa (**RCREEE**).

Recommendations for Plenary Discussion

There is a role for national, regional and international initiatives in expanding and accelerating their efforts to promote renewable energy investment across Africa by:

- **"Harmonising" initiatives and assistance under African leadership so that all regions of Africa, and all sizes of projects have a fair chance to materialise, and regional synergies are maximized.**
- **Embracing "Subsidiarity" – nationally and regionally driven initiatives are likely to address the different needs of each country better.**
- **Addressing energy 'access' and 'affordability' and 'utility credit' in a holistic manner pursuant to the SE4ALL Action Agenda framework.**
- **Creating "readiness" in-country for the absorption of clean energy investments.**
- **Extracting economic value from this wave of investment by promoting jobs and skills**

Annex A: Regional and International Initiatives for African Clean Energy

	PROGRAMME NAME	Website	Application						Funding Type							Focus Regions				
			Advisory, Advocacy & Research	Training and Capacity Building	Policy & Legal Framework Support	Regional Interconnection and Cross Border Energy Trade	Large Grid Connected Projects	Off-Grid/Mini-Grid / Distributed Energy	Grant	Feasibility & Project Preparation	Project Development	Construction Equity	Debt	Guarantee	Revenue Support	East	West	South	Central	North
	Capital Providers																			
1	ACP-EU Energy Facility	http://energyfacilitymonitoring.eu/			X	X	X	X	X	X	X					X	X	X	X	
2	Acumen	http://acumen.org/sectors/energy/						X	X				X			X	X			
3	AECF	http://www.aecfafrica.org						X	X				X			X				
4	Africa50	www.afdb.org					X				X	X	X			X	X	X	X	
5	African Renewable Energy Fund (AREF)	www.berkeley-energy.com					X	X			X	X				X	X	X	X	
6	Alldwych International	www.aldwych-international.com				X	X	X		X	X	X				X	X	X	X	
7	CleanStart	www.uncdf.org/en/cleanstart						X					X			X				
8	Emerging Africa Infrastructure Fund (EAIF)	www.emergingafricafund.com				X	X									X	X	X	X	
9	EU-Africa Infrastructure Trust Fund (ITF)	www.eu-africa-infrastructure-tf.net				X	X	X	X	X	X	X	X	X		X	X	X	X	
10	GET-FIT	www.getfit-uganda.org					X	X					X	X	X	X				
11	Global Innovation Fund	www.globalinnovation.fund		X	X			X	X	X	X					X	X	X	X	X
12	Global Village Energy partnership	www.gvepinternational.org	X	X				X		X	X					X	X			
13	Capital Access for Renewable Energy Enterprises Programme (CARE2)	www.gvepinternational.org	X					X		X						X				
14	Kenya Climate Innovation Centre	www.gvepinternational.org	X	X				X		X	X					X				
15	Energy SME	www.gvepinternational.org	X	X				X		X	X					X	X			
16	Green Africa Power	www.greenafricapower.com/			X		X	X				X	X	X		X				
17	GuarantCo	www.guarantco.com				X	X	X		X				X		X	X	X	X	
18	Harith	http://www.harith.co.za									X	X	X			X	X	X	X	
19	InfraCo Africa	www.infracoafrica.com				X	X	X			X					X	X	X	X	
	Policy Advocacy, Convening, and Project Facilitation																			
1	AFREA	www.afrea.org	X	X	X											X	X	X	X	X
2	Africa Clean Energy Corridor (ACEC)	www.irena.org	X		X	X										X		X		
3	Africa-EU Energy Partnership (AEEP)	www.africa-eu-partnership.org/	X		X											X	X	X	X	X
4	Africa-EU Renewable Energy Cooperation Programme (RECP)	www.euei-pdf.org	X	X	X					X						X	X	X	X	X
5	Ashden Awards	www.ashden.org	X	X	X											X	X	X	X	X
6	Clean Technology Initiative-Private Finance Advisory Network	www.ct-pfan.net	X		X					X						X	X	X	X	X
7	Development Bank of South Africa	www.dbsa.org		X	X	X				X								X		
8	ECOWAS - ECREE	www.ecreee.org/	X	X	X			X	X								X			
9	Energising Development (EnDev)	http://endev.info/content/Main_Page				X		X	X	X	?					X	X	X	X	
10	Energy, Ecodevelopment and Resilience in Africa (EERA)	www.helio-international.org/project/eera/	X		X												X			
11	GIZ – HERA Poverty-orientated Basic Energy Services	www.giz.de/expertise/html/2769.html						X	X							X	X	X	X	
12	Global Alliance for Clean Cook Stoves	www.cleancookstoves.org	X	X		X		X												
13	Global LEAP Awards for Outstanding Off-Grid Products	www.globalleapawards.org/		X				X	X							X	X	X	X	
14	IRENA – Abu Dhabi Fund for Development (ADFD)	www.irena.org/	X		X											X	X	X	X	X
15	Italy-Africa Initiative		X				X	X								X	X	X	X	
16	Lighting Africa	www.lightingafrica.org/	X	X	X			X								X	X	X	X	X
17	Energy Sector Management Assessment Program (ESMAP)		X					X								X	X			
18	Nigeria Infrastructure Advisory Facility NIAF)	http://niafng.org/	X		X	X				X							X			
19	Paris-Nairobi Climate Initiative	www.developpement-durable.gouv.fr/paris-nairobi	X				X	X								X	X	X	X	
20	Power Africa	www.usaid.gov/powerafrica		X	X	X	X	X		X	X					X	X	X	X	X
21	Program For Infrastructure Development in Africa (PIDA)	www.au-pida.org/	X	X				X								X	X	X	X	
22	SNV Netherlands Development Organisation – Biogas Practice	www.snvworld.org/	X	X	X			X	X							X	X	X	X	
23	Sustainable Energy for All Initiative (SE4ALL)	www.se4all.org/	X		X	X	X	X												

	PROGRAMME NAME	Website	Application						Funding Type							Focus Regions				
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	Multilateral DFIs																			
1	African Development Bank	www.afdb.org	X		X	X	X	X				X	X	X		X	X	X	X	X
2	Sustainable Energy Fund for Africa (SEFA)	www.afdb.org																		
3	African Leaders Group	www.afdb.org																		
4	Clean Technology Fund & Scaling Up Renewable Energy in Low Income Countries (SREP)	www.climateinvestmentfunds.org/cif/node/67				X	X					X	X	X		X	X	X	X	
5	East African Development Bank	www.eadb.org					X						X			X				
6	European Bank for Reconstruction and Development	www.ebrd.org			X	X	X	X												X
7	European Investment Bank	www.eib.org			X	X	X	X										X		X
8	Global Energy Efficiency and Renewable Energy Fund (GEEREF)	www.geeref.com/about/the-eib-group.html				X	X	X				X				X	X	X	X	X
9	Global Environment Fund	www.thegef.org			X	X	X	X	X	X						X	X	X	X	X
10	Green Climate Fund	www.gcfund.org			X	X	X	X								X	X	X	X	X
11	International Finance Corporation	www.ifc.org			X	X	X	X		X	X	X	X	X		X	X	X	X	X
12	Islamic Development Bank	http://www.isdb.org				X	X	X					X			X				X
13	Private Infrastructure Development Group (PIDG)	www.pidg.org/				X	X	X								X	X	X	X	
14	UNFCC	www.unfcc.int	X		X	X	X	X								X	X	X	X	X
15	UNIDO																			
16	West African Development Bank (BOAD)	http://www.boad.org			X	X	X	X				X	X	X			X			
17	World Bank	www.worldbank.org			X	X	X	X		X				X		X	X	X	X	X
	Regional Economic Communities																			
1	Africa Union	http://www.au.int/	X													X	X	X	X	X
2	Union du Maghreb arabe Arab Maghreb Union (UMA-AMU)	www.maghrebarabe.org/																		
3	Economic Community Of West African States (ECOWAS-CEDEAO)	www.ecowas.int/																		
4	Common Market for Eastern and Southern Africa (COMESA)	www.comesa.int	X													X		X		
5	Intergovernmental Authority on Development (IGAD)	www.igad.org	X													X				
6	Economic Community of Central African States (CEEAC-ECCAS)	www.ceeac-eccas.org/																		
7	Southern African Development Community (SADC)	www.sadc.int/	X															X		
8	The Community of Sahel-Saharan States (CEN-SAD)	www.au.int/en/recs/censad																		
9	East African Community (EAC)	www.eac.int/	X		X											X				
10	NEPAD	www.nepad.org/	X		X											X	X	X	X	X
	Donor Countries																			
1	Australia	Department of Foreign Affairs and Trade																		
2	Austria	Austrian Development Cooperation																		
3	China	China-Africa Cooperation Forum (FOCAC)																		
4	Denmark	EKF, Danida,NIB																		
5	France	PROPARCO, AdF, CoFace																		
6	Germany	GIZ, KfW, DEG																		
7	Japan	Africa-Japan (TICAD) Process																		
8	Korea																			
9	The Netherlands	Ministry of Foreign Affairs, FMO																		
10	Norway	Ministry of Foreign Affairs																		
11	Russia																			
12	Spain	Agency for Industrial Development Cooperation																		
13	Sweden	SIDA																		
14	Switzerland	Ministry of Foreign Affairs																		
15	USA	OPIC, USAID, USTDA, US Exim																		

Institutions from donor nations, and donor regions (such as the EU), act in-directly through their funding and support of the majority of the initiatives set out above, and also directly through their own wholly owned agencies, such as KfW, GIZ and DEG from Germany, FMO from The Netherlands, and CDC from the United Kingdom, and Proparco from France. As such these institutions are deemed to cover the entire range of activities set out in this table.

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Over the last nine years Vivek has co-founded three separate renewable energy development companies focused on India, CEE, and USA. He has held executive Board level positions at these companies and currently serves as the Independent Investment Committee member for a renewable energy private equity fund.

Over the last twenty-two years Vivek has transacted in over thirty countries covering Europe, Central Asia, South and Pacific Asia and the Americas. He has a broad based experience with technologies covering both renewable energy and thermal power technologies, including commercialization of new sectors such as the Offshore wind sector. In all, he has led the financing of more than 15,000 MW thermal power projects, and 2,000 MW of renewable energy projects, and deployed a wide range of innovative commercial structures and financial structures combining, merchant power, export credit, political risk guarantees and multi-lateral co-financing. He has successfully restructured distressed projects following past market disruptions in the UK, USA, and emerging markets.

Vivek has previously held senior positions in energy project finance at Bank of Scotland, Enron Europe Limited, Edison Capital Europe and ING Bank N.V..

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Glossary

AUC	African Union Commission
BMZ	The Federal Ministry of Economic Cooperation and Development of Germany
COP21	Conference of Parties 21 under the UNFCCC
DFI	Development Finance Institute
EAC	East African Community
ECOWAS	Economic Community of West African States
EU	European Union
GDP	Gross Domestic Product
GIZ	Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH of Germany
GW	Giga Watt = 1000 MW
INDC	Intended Nationally Determined Contributions as part of COP21
kWh	Kilo Watt Hour
MW	Mega Watt
NEPAD	The New Partnership for African Development
NEPAD-PCA	NEPAD Planning and Coordination Agency
NGO	Non-Governmental Organisation
REC	African Regional Economic Community
REIPPP	South African Renewable Energy Independent Power Project Procurement Programme
SAC	Southern African Community
SDG	Sustainable Development Goals promoted by the United Nations
SE4ALL	Sustainable Energy For All initiative of the United Nations
TWh	Terra Watt Hour = 1.0 billion kWh
UNFCCC	United Nations Framework Convention for Climate Change

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