



AFRICA RENEWABLE ENERGY FORUM

2-4 NOVEMBER 2016
MARRAKECH // MOROCCO



THE PATH 2021

Outcomes of the Africa Renewable Energy Forum

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**AFRICA
RENEWABLE
ENERGY FORUM**
2-4 NOVEMBER 2016
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NOTE FROM THE AUTHOR

“Africa Renewable Energy Forum 2016 Outcomes”, the inaugural instalment of EnergyNet’s Conference Outcomes Report Series, provides a clear picture of the current state of renewable energy development in Africa, and the next steps needed to be championed in order to accelerate progress.

Spending the formative years of my career working on energy access and climate mitigation issues in the field in rural Nicaragua with non-profit blueEnergy and in various other regions with the Renewable and Appropriate Energy Laboratory (RAEL) at the University of California Berkeley has made the intersectional nature of renewable energy and development evident very early to me.

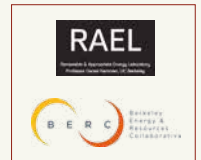
Energy access became the focal point in my work because it presents the opportunity to not only preserve our planet’s climate, but also to improve the quality of life of so many *people*. Through continued research efforts with RAEL, clean energy access campaign Power for All, and research group California Renewable and Adaptive Energy, I have been able to build up my experience, grow my knowledge base, and gain entrance to multiple spheres of the energy and development space.

The opportunity to author the 2016 Outcomes Report and attend COP22 in Marrakech allowed me invaluable access to a high-level international arena. This experience has been instrumental for my aspirations of continuing graduate work on accelerating energy access and sustainable development through the design and implementation of decentralised renewables appropriate to existing social structures in developing communities.

The insights I gained and the discourse I witnessed between officials, scientists and various stakeholders worldwide over the course of AREF 2016 and COP22, as well as speaking at side events as a member of RAEL, have provided me with perspective few are fortunate enough to garner.

It is my hope that this report could document the outcomes of AREF 2016, as well as provide a point of reference for policymakers and industry professionals alike throughout the development of renewable energy in Africa.

I wish to sincerely thank the Berkeley Energy and Resource Collaborative and EnergyNet for this opportunity, Dr Daniel Kammen for his steady guidance, support and insight throughout this report and my career, and the many scholars of the Energy Resources Group that provided me the chance to learn outside of a classroom.



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PATH 21

A Five-year Strategy for **Long-term Renewable Energy Planning**

The purpose of this document is to create a plan for private sector engagement in renewable energy to lay the foundations for projects to be developed across Africa. It is also a call to action for policymakers, investors and developers for decisions to be launched and implemented before ARF 2017 regarding the scaling up of renewable energy investments.

Africa is a global leader in renewable energy development, with Morocco and South Africa leading the way, and the continent has more potential for clean energy projects than anywhere else on earth. However, there is a clear communication barrier between global policy makers focused on Sustainable Development Goals (SDGs) and green climate funds in the international arena and the private sector operating on the ground.

The achievement of ARF's Path 21 and a sustainable energy agenda for Africa hang on synergistic actions: there is a need for a stronger synergy within public sector institutions, more precisely between Ministries of Environment, Ministries of Energy and Ministries of Finance as well as at the utility and regulator levels. Simultaneously, there is need for greater private sector engagement as they will not only provide capital with which to invest but will also drive forward the implementation of renewable power projects both commercially and sustainably.



For renewables to be further integrated with the grid and help countries to meet their Nationally Determined Contributions (NDCs) targets, we need a renewable electrification and integration implementation strategy and there must be synergies with institutions to succeed. ARF supports the creation of an enabling environment for investors and the objectives of the Africa Renewable Energy Initiative (AREI). An enabling environment should be owned, managed and run by local players, with an independent and semi-autonomous office from political powers as per the Moroccan model with Masen or the IPP Office in South Africa. This enabling environment will not only benefit the private sector but will also support empowerment of national utilities and the creation of industrial ecosystems.

The following actions are to be taken:

- Strengthen education and capacity building development within government, which will support policy implementation for private sector investors in renewable energy;
- Create a semi-autonomous/independent office that has clear targets and objectives for the government, the office itself and for the private sector, using the models of Masen in Morocco and the IPP Office in South Africa as example; and
- Establish power and trade agreements among the different players.

In conclusion, as the next steps and based on the above outcomes, EnergyNet proposes the following strategy for development:

1. Identify an 'African-led' leadership committee;
2. Hold a meeting in March 2017 in Washington at the 'Powering Africa: Summit' to present the outcomes and discuss the objectives of a Path 2021 resulting from this document for renewable energy development;
3. Present the Path 2021 at the Africa Energy Forum 2017 and create a plan for private sector engagement; and
4. Announce the implementation strategy at the 2nd Annual Africa Renewable Energy Forum (Marrakech, Nov, 2017)



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INTRODUCTION AND BACKGROUND

INTRODUCTION

EnergyNet Ltd. organises a global portfolio of investment meetings, investment forums and executive dialogues focused specifically on the power and industrial sectors across Africa.

For the last 23 years, EnergyNet has worked in Europe, the USA, China and across the African continent to facilitate investment summits where international investors can build relationships with credible African stakeholders in the public sector.

Our team spends over 220 days a year travelling to meet stakeholders across Africa; relationships and investor insights are both our business and our passion.

Best known for the Africa Energy Forum, the longest-running meeting place for senior level decision makers in Africa's power sector taking place in Europe each year, EnergyNet also produces the Powering Africa: Series in country investment meetings. These meetings provide a more detailed perspective on the investment landscape and power generation potential of countries such as Nigeria, Mozambique, Tanzania, Ghana, Ethiopia, South Africa and Egypt.

Proven to engage the decision makers and technical directors behind Africa's most exciting economies, EnergyNet places economic development at the heart of industrial solutions, helping to generate a more stable and viable investment option for your organisation in Africa. We challenge the way companies do business in Africa; the information we provide is not available on the internet and is not from a dusty old textbook.

Whilst EnergyNet is an Africa-focused team of researchers and experienced power professionals, we are owned and supported globally by the UK's largest conference and exhibitions organisation, Clarion Events. With vast resources and over 500 people covering defence, energy and utilities in Brazil, Germany, London, New York, San Francisco, South Africa, Turkey, Abu Dhabi and Singapore, EnergyNet Ltd. and Clarion Events are committed to providing global insights and local partnerships.¹

As EnergyNet entered 2016, one of the largest meetings concerning energy in the world, the UNFCCC's COP22, was set to take place in Marrakech. With such an influential series of meetings impacting the stakeholders we strive to serve, it became clear that there was a need for EnergyNet to provide the platform for African government officials, private sector investors, and researchers to instil climate-conscious energy on the African continent.

Held under the umbrella of the UN COP22 Climate Change Conference, The First Annual Africa Renewable Energy Forum brought together the public and private sector to drive forward the development of renewable energy projects across the continent.

BACKGROUND

The purpose of the Africa Renewable Energy Forum is to annually gather the continent's most influential stakeholders to discuss, collaborate and come to agreement on the outcomes,

priorities and strategies going into the UN's Annual Conference of the Parties. Why is this important?

The COP

The Conference of the Parties is the supreme decision-making body of the United Nations Framework Convention on Climate Change (UNFCCC), opened for signature in 1992 during the Earth Summit in Rio de Janeiro and later entered into force in 1994.

Through this instrument, the United Nations has equipped itself with an action framework to fight global warming.

After its entry into force in 1994, the UNFCCC Secretariat was established in Geneva. It was then relocated to Bonn in 1995 following the "First Conference of the Parties" (COP1) in Berlin. The most recent COP22 took place in Marrakech, Morocco from 7-18 November, 2016.

The COP was created and put in place to structure the efforts of the Parties to the Convention as they address climate change. The COP meets

annually to review and assess the implementation of the UNFCCC and any other legal instruments the body adopts with the goal of reducing greenhouse gas emissions and fighting climate change. These annual UN climate change conferences are commonly referred to as COP.

The main objective of the Framework Convention and its related legal instruments is to stabilise the concentration of greenhouse gases in the atmosphere at a level that would prevent "dangerous anthropogenic interference with the climate system". The term "anthropogenic" refers to the effects caused by human activity.

The Convention stipulates that "*parties should protect the climate system for the benefit of present and future generations on the basis of equity and in accordance with their common but differentiated responsibilities and respective capabilities*".

According to the UNFCCC, certain countries are particularly vulnerable to the effects of climate change. For example, Small Island Developing States (SIDS), low-lying coastal areas, arid or semi-arid zones and developing countries with fragile mountainous ecosystems. These



areas are subject to extreme weather events such as floods, droughts and desertification, for instance.

During the COP, member states, who have common but differentiated responsibilities, strive to reach agreements on reducing greenhouse gas emissions caused by human activity, assess the evolution of their commitments and review the implementation of the Framework Convention and other legal instruments that the COP adopts. Typically, a series of negotiating sessions are carried out beforehand in order to optimise the agenda and discussions.

As of November 2016 there are 197 Parties to the Convention (196 States and the European Union) including Palestine who joined in March 2016.²

From Paris to Marrakech: Agreement to Action

COP22 will take over the reins from COP21, during which important progress was made. It will focus on action items in order to achieve the priorities of The Paris Agreement, especially related to adaptation, transparency, technology transfer, mitigation, capacity building and loss and damages.

For Salaheddine Mezouar, President of COP22, this conference is an “opportunity to make the voices of the most vulnerable countries to climate change heard, in particular African countries and island states. It is urgent to act on these issues linked to stability and security”. COP22 will be one of action.

Signatories to The Paris Agreement now have to develop their National Adaptation Plans. For Nizar Baraka, President of the COP22 Scientific

Committee, “we must encourage our respective countries to commit in a strong way to sectors related to the green economy (as well as the blue economy) in order to take advantage of associated growth and job opportunities.”

This means preserving the sustainability of our development models and improving the access to, conditions of use and development of green technologies.

Driss El Yazami, Head of Civil Society activities of COP22, insists on the importance of “universal solidarity”. He adds that “COP22 must be one of equality, youth and democracy”.

For Yazami, “even if the historic responsibilities and future effects are not equally shared, we must act together. The urgency of climate change requires that we all rediscover universalism.”³

And that is where the Africa Renewable Energy Forum comes in.

The Purpose of this Document

With stakeholders attending from all over Africa and internationally from both public and private sectors, the Africa Renewable Energy Forum created a table at which the important actors in Africa were given a seat to make their needs and concerns known. Together, throughout this conference, key takeaways were established concerning the future of renewable energy in Africa – and what this means for our global fight against climate change, for sustainable development and economic growth, and supporting the empowerment of voices previously silenced in this global arena. ●

This report discusses what these conversations yielded, what these conclusions mean going into COP22, and what we should collectively aim to do before the next Africa Renewable Energy Forum in 2017.



MOROCCO

GAS OPTIONS

29-30 NOVEMBER 2017

FOUR SEASONS – MARRAKECH



INVESTOR INSIGHTS IN MOROCCO'S GAS TO POWER PROGRAMME

The **'Morocco: Gas Options'** meeting will provide future stakeholder's in Morocco's procurement programme a platform to engage with the government and national utility annually in an open forum, bringing together all major developers, investors and developers, IOCs and DFIs from across the world.

2017 AGENDA TOPICS INCLUDE:

- Morocco Gas IPP Procurement Programme
- Bi-Lateral Partnerships and High-level Roundtables
- International partnerships and technology innovations relevant to the Moroccan procurement plan
- Gas Procurement IPP – Morocco's Model for Success
- Gas Utilisation: The Potential of Gas IPP Procurement Programme
- Gas Strategies: Maximising Efficiency from the Project Planning Phase
- Global Gas Partnerships with the Private Sector
- FSRU, Energy Infrastructures and Port Development

AFRICA AS A **GLOBAL LEADER IN RENEWABLE ENERGY DEVELOPMENT**



WHY PRIORITISE RENEWABLE ENERGY

Climate change is an impending threat to all of Africa. Though one of the least contributing players to the global CO₂ emissions, African countries are proven to be struck the most severely by the impact of climate change: rapid temperature fluctuations, extreme weather events, severe drought and food insecurity. The list goes on:

- **By 2020, between 75 and 250 million people in Africa are projected to be exposed to increased water stress due to climate change.**
- **By 2020, in some countries, yields from rain-fed agriculture could be reduced by up to 50%. Agricultural production, including access to food, in many African countries is projected to be severely compromised. This would further adversely affect food security and exacerbate malnutrition.**
- **Towards the end of the 21st century, projected sea level rise will affect low-lying coastal areas with large populations.**
- **By 2080, an increase of 5 to 8% of arid**

and semi-arid land in Africa is projected under a range of climate scenarios (TS).

- **The cost of adaptation could amount to at least 5 to 10% of Gross Domestic Product (GDP).⁴**
- **Significant job creation potential exists around a grand clean energy scale-up in Africa, something that is not well known to all policymakers and the private sector.^{5,6}**

Emissions from energy production is the key driver behind climate change. Whether it be for electricity, transportation, heating, or any other number of things, where our energy comes from determines the sustainability of a country.

Unlike countries like the United States, Africa has no large incumbent fossil fuel-driven energy system infrastructure. The energy system in Africa is far from complete and developed – which of course, has severe detriments. Sub-Saharan Africa has more people living without access to electricity than any other world region – more than 620 million people, and nearly half of the global total.⁷

This low electrification rate, translating to rates lower than 2% in some rural areas, means that these 620 million people are living not only without electricity, but also without the numerous co-benefits of socioeconomic development linked to it. These benefits include, among other things, increased employment and entrepreneurship, positive health impacts, empowerment of women, increased education impacts and increased economic productivity.

However, this provides Africa with an unprecedented opportunity in the energy sector. With renewable energy technology prices at all-time low costs and high efficiencies, it is more economically viable to utilise renewables instead of fossil fuels in many situations.

A phenomenon known as “leap-frogging” is the notion that areas with poorly developed technology or economic bases can move themselves forward rapidly through the adoption of modern systems without going through intermediary steps.⁸ Africa has already seen this in the progression from little to no phone service straight to cellular devices, completely skipping the installation of landlines.

For this reason, and the current global state of renewable energy technology, Africa has the potential to completely skip the first, less technologically advanced steps that other countries took in energy development, such as coal plants, jumping straight to the newest and best technologies and strategies, namely renewables.

Not only is Africa in a position to make technological progress, but the proper development of the renewable from the ground up can mean cross-cutting impacts on the continent. On 25 September, 2015, the UN adopted a set of 17 goals to end poverty, protect the planet, and ensure prosperity for all as part of a new sustainable development agenda. Each goal has specific targets to be met over the next 15 years to ultimately achieve:

- 
1. **No poverty**
 2. **Zero hunger**
 3. **Good health and well-being**
 4. **Quality education**
 5. **Gender equality**
 6. **Clean water and sanitation**
 7. **Affordable and clean energy**
 8. **Decent work and economic growth**
 9. **Industry, innovation and infrastructure**
 10. **Reduced inequalities**
 11. **Sustainable cities and communities**
 12. **Responsible consumption and production**
 13. **Climate action**
 14. **Life below water**
 15. **Life on land**
 16. **Peace, justice and strong institutions**
 17. **Partnership for the goals⁹**

These goals, though many, are not separate. To be specifically noted is SDG7, which calls for us to secure access to affordable, reliable, sustainable



and modern energy for all by 2030. Out of SDG7 came Sustainable Energy for All, which works with the UN, World Bank and other partners to ensure universal access to modern energy services, double the global rate of improvement in energy efficiency, and double the share renewable energy in the global mix.¹⁰

Special attention and priority was given to SDG7 via Sustainable Energy for All as the UN recognises that “energy is central to nearly every major challenge and opportunity the world faces today. Be it for jobs, security, climate change, food production or increasing incomes, access to energy for all is essential. Sustainable energy is opportunity – it transforms lives, economies and the planet.”¹¹

Clean, affordable and universally accessible energy is the key to unlocking progress in each of the sustainable development goals – and enabling Africa, and its people, to thrive.

In other words: Africa does not have to choose between electrification, the economy, and the environment – they all go hand in hand.

MOROCCO: SUCCESS STORIES AND LESSONS LEARNED

Let us take the host country of COP22 and the Africa Renewable Energy Forum as an example. Morocco is leading the African continent – and even the most climate-conscious states in the world, such as California – in renewable energy goals by committing to 42% renewables by 2020, and 52% by 2030.

King Mohammed VI of Morocco is deeply invested in sustainable development. Sustainable development, as defined by the UN, is “development that meets the needs of present without comprising the ability of future generations to meet their own needs”.¹² This, brought into praxis through clean electrification, demonstrates the King’s commitment to renewable energy in Morocco, and is a perfect example of the political will needed to integrate renewables effectively.

To date, Morocco has invested over 30 million (MAD) into renewables. Morocco has built and operates some of the largest solar plants in the world, such as MASEN’s Ouarzazate Solar Power Station, and has started to change their political framework to enable more renewable penetration. The country has also established top of the line renewables research institutes such as IRESN’s Green Energy Park. Yet, as a country, they still have a long way to 2030. As a continent, Africa has a long road to clean, complete electrification.

The environmental concern and championing of renewable energy that King Mohammed VI has demonstrated by his aggressive renewable integration goals and recent projects is not all it will take to sustainably electrify Africa. There must be international cooperation to not only strategically plan and implement projects, but also to establish enabling legal and financial frameworks, invest, attract foreign investment and utilise the united political will of Africa to protect its climate, while enabling development opportunities for its people.

If these are accomplished, as they are possible, Africa will be a global leader in renewable energy development. ●



ENABLING RENEWABLE ELECTRIFICATION AND INTEGRATION

DESIGNING AN ENABLING ENVIRONMENT

For renewables to be increasingly integrated into the grid and utilised to grant energy access, an enabling environment for all players in the renewable energy sector must be created. How do we do this? We must first identify the key players, analyse what policies and factors are impeding them, remove their obstacles and promote incentives.

THE KEY PLAYERS

The key players in the renewable energy sector are:

- **Public Sector**
 - **Central Governments**
 - **Agencies**
 - **Rural Electrification Agencies (REAs)**
 - **Energy Regulation Authorities (ERAs)**
 - **Utilities**
 - **African citizens**
- **Private Sector**
 - **Independent Power Producers (IPPs)**
- **International Financial Institutions**
 - **Development Banks**

Though these are separated into their own sectors, the largest mistake that we can make moving forward is to focus on one at a time. With synergistic progress being made on these fronts, nothing will get done. It is the interdependent relationship between all these players that cultivates productivity.

We must focus on tangible initiatives legally, financially and industrially that we can establish to strengthen the relationship between these players to develop the renewable energy sector sustainably. If we do so, we will not only bring clean energy to the continent, but simultaneously contribute to the UN's Sustainable Development Goals.

LEGAL FRAMEWORK

A comprehensive legal framework that facilitates renewable energy development is crucial for all other initiatives taken to operate within. Whether it is public policy to hold governments accountable for reaching goals or establishing agencies and lifting taxes to support and attract private investment, legal means must be taken to advance renewables in Africa.

In terms of a legal framework for the public sector, there must be initiatives developed for government to plan. A good example of progress is the recently announced Africa Renewable Energy Initiative. Yet, after an initial plan has been announced, there must be a roadmap drafted with specific intentions, means, partnerships and projects that must be taken to achieve the goals of the initiative.

Just like the transition from Paris to Marrakech for COP, we must take this high-level agreement and turn it into action. As a case study, let us take energy access. We will not get anywhere if we commit to the idea of “the public sector must work to enable energy access”. Of course, this

is true, but we need tangible initiatives such as “Countries X, Y, Z do not have REAs; they will establish them via Fund A by Year B. Countries with REAs will draft a step-by-step playbook for how rural electrification investors can establish projects in their country by year X, and reach out to a network of Z number of partners by year Y”. A how-to guide on how to privately invest in these projects might prove to be a key initiative as the majority of private rural electrification enterprises cite a lack of information as one of the key factors keeping them out of countries.

These are the differences between commitments and actions.

Further legal measures for promoting the renewable energy industry include, but are not limited to:

- **Utility Rate Decoupling:** These are policies designed to “decouple” utility profits from total electric or gas sales so utilities do not have an incentive to try to sell more energy.¹³ Decoupling modifies traditional ratemaking practices to adjust rates frequently to ensure that utility revenue is neither more nor less than what is needed to cover costs and provide a fair return. This encourages regulated utilities to support energy efficiency for their customers.

- **Removal of Value Added Taxes (VATs):** Removal of taxes on renewable energy materials and their associated tools will not only incline more international investors to bring their technology to African countries, but will also make projects by domestic companies that require imports more bankable.
- **Establishment of Governing Agencies:** Each African country must dedicate a government supported body to the development of renewable energy projects. Supplying a staff to oversee and regulate projects, issue licences, field inquiries from investors, and establish a government presence in the renewables field not only facilitates better projects, but also provides reassurance to investors that the country is suitable for a renewable energy investment.
- **International Cooperative Agreements:** As important as it is for national governments to establish their internal frameworks, a commonly overlooked vital component to efficient and effective renewable energy development is the chance to package together projects between countries. By packaging projects together, the allure of foreign investment increases to a level much greater than each individual project. Also, this increase in scale of project deals allows for bigger investors and firms to consider projects that they otherwise would not consider due to their small scale.
- **Allowing for Public-Private Partnerships (PPPs):** PPPs have proved to be one of the defining factors of renewable energy success in other developing countries, such as Nicaragua. By opening previously public markets to private entities, expertise, human resources and capacity are injected into national markets.
- **Streamlining of Power-Purchase Agreements (PPAs):** In a PPA, the “seller” builds or installs the technology (e.g. a solar array or a wind farm) and the “buyer” buys the power on a per kWh basis.¹⁴ In the context of increasing renewable energy investment, PPAs can serve as a tool for investors to get support from banks, as they have proof that





they will be able to pay back their capital loans. If a country can (1) streamline and (2) standardise their PPA process, they will be helping electricity producers gain financing for projects – thus attracting more investors as well.

BLENDING PUBLIC AND PRIVATE FINANCE

As already stated, public-private partnerships are essential to the development of renewable energy; but what does it look like when the public and private sector work together successfully? It is a little-known concept that public and private sector interests *can* go hand in hand, working together to fill in each other's gaps, and achieve projects neither could embark on successfully, together.

Let us talk about the finance gap. Independent power producers (IPPs) are relied on to maintain the main source of electrification going forward in many countries, due to the lack of public funding. However, the number of IPPs present in Africa and their sizes will need to scale up significantly to meet the renewable energy goals of the continent. The question therefore arises: what is stopping them?

When these IPPs seek financial support from large financial institutions, they are required to provide a sovereign guarantee to ensure that capital will be paid back in the form of a PPA. As mentioned, the public sector must work hard to better enable the PPA process, to grant funding to IPPs and to deliver renewable energy projects. However, PPAs are not the first obstacle that IPPs encounter.

Initially, before investment can even be sought, in many cases IPPs must prove the bankability of their project. This requires the IPP's project to meet the following requirements:

- **Demonstrate the political will and public support of the IPP.**
- **Ensure participation in a transparent and competitive bidding process.**
- **Thorough investigation into socio-political externalities of the project site and community.**
- **Prove the possibility for economic development co-benefits within the community via:**
 - **inclusions of local communities in project equity**
 - **employment**
 - **trainings and capacity building**
- **Proven technical viability of project design**

This list is long and makes sense upon first glance; of course, one would want all of these aspects in an IPP project. However, the issue arises with the fact that all these investigations, or feasibility studies, are required *before* any funding is granted. This is where we find the largest paradox of the IPP world: the IPP must fund all these procedures themselves before seeking any funding. Here is where the public sector can come in to support the private sector.

The public sector in many countries may not have the funds to support the actual implementation of these projects themselves, explaining why IPPs are so important to them. However, they can use their limited funding to support these initial feasibility studies. This would assist IPPs in getting actual project implementation

funding from international institutions like the International Monetary Fund (IMF) or the World Bank Group (WBG), and effectively turn around to help out the public sector once again, as the IPP can carry out more electrification projects after receiving international funding.

Additionally, IPPs are poised in a unique position to further assist the public sector, as well as contribute to the SDGs. IPPs have the opportunity, and obligation, to integrate community members into their projects, providing employment, project equity, and even better electrification. By bringing electricity to rural areas, IPPs can support the development of small to medium sized enterprises (SMEs) by local entrepreneurs. SMEs are proved to empower women as well.

Through collaboration and cooperation, the public and private sector can provide bankable projects that create jobs and could improve the quality of life for Africans all over the continent.

OPPORTUNITIES WITH OTHER FUNDING STREAMS

Keeping in line with the synergistic cooperation and collaboration themes of efficient and effective renewable energy development of the African continent, we must consider all funding streams to finance the projects necessary. There are many funding streams available to develop clean electrification projects from ideas to kWh, some newly developed and some simply just aside from those commonly brought up in political discussions.

Looking further to these funding streams, we find:

- **The Global Green Climate Fund (GCF):** Created by the UNFCCC, unique global platform to respond to climate change by investing in low-emission and climate-resilient development. The GCF is the only stand-alone multilateral financing entity with the sole mandate to serve the Convention and that aims to deliver equal amounts of funding to mitigation and adaptation.¹⁵ As renewable energy projects fit the mission of the GCF perfectly, this ever-growing and ample fund can provide substantial funding to IPP and government projects alike.
- **The Climate Innovation Centres (World Bank infoDev):** The WBG's Climate Technology Program establishes a global network of Climate Innovation Centres in seven countries around the world, including African countries Ethiopia, Ghana, Kenya, Morocco and South Africa. The centres are locally owned institutions that provide clean technology ventures with the knowledge, capital and access to markets required to launch and scale their businesses.¹⁶
- **The Investment Plans of the African Development Bank (AfDB):** The AfDB serves as an implementing agency of the Climate Investment Funds (CIF). Established in 2008 as one of the largest fast-tracked climate financing instruments in the world, the USD8bn CIF gives developing countries worldwide an urgently needed jump-start toward achieving low-carbon and climate-resilient development. The CIF provides developing countries with grants, concessional loans, risk mitigation instruments and equity that leverage significant financing from the private sector, multilateral development banks, (MDBs) and other sources.¹⁷ The President of the AfDB, Akinwumi Adesina, announced in April of 2016 that the AfDB "will invest a further USD12bn into Africa's energy sector over the next five years."¹⁸
- **The Africa Renewable Energy Initiative (AREI):** The AREI is a transformative, Africa-owned and Africa-led inclusive effort to accelerate and scale up the harnessing of the continent's huge renewable energy potential. The AREI is set to achieve at least 10 GW of new and additional renewable energy generation capacity by 2020, and mobilise the African potential to generate at least 300 GW by 2030.¹⁹ The Funding and Financing Work Area of the AREI focuses on enabling the utilisation of public and concessional funds to create appropriate financing instruments

that address the main barriers and risks presently holding back both public and private investment. The use of public funds in this way yields the twin advantages of leveraging larger investments while maximising access to credit for both public and private investors and renewable energy project developers. This approach is in line with obligations and commitments of developed countries under the UNFCCC to cover incremental costs for mitigation in developing countries.²⁰

These funds, when combined with traditional funding methods mentioned in prior sections, can collectively finance the renewable energy future of Africa – but only if we use them collaboratively.

INDUSTRIAL ECOSYSTEMS

Building up and developing local industry is vital to sustainably develop the renewable energy sector of Africa. To build up an industry, it is important not to underestimate the complicated structures within one industry – linkages, dependencies and cash flow alike.

To create a stable industrial and political climate for these interactions to flourish and expand, governments should initiate renewable energy clusters in their respective countries. A cluster is a concentration of companies in a geographic space that work together to allow the economy and the industries to grow efficiently. The main purpose of a cluster is to make the private sector work with research and development (R&D) institutions to collaborate, so we can ensure progress. After its initial founding, the management thereof should be left to the private sector in order for the cluster to be autonomous.

A prime example of a cluster facilitating industry growth is Moroccan agency MASEN's Cluster Solaire. Created in 2014, Cluster Solaire is an innovative and ambitious platform that facilitates the development of a competitive solar industrial sector. The objectives of Cluster Solaire, which

demonstrate what successful clusters could offer to sectors in other countries, include:

1. **Networking the various players in the sector**
2. **Improving business productivity**
3. **Increasing their capacity for innovation**
4. **Promoting the development of skills**

MASEN achieves these by providing:

1. **Moroccan Green Business Network:** A social media networking based platform to help companies interface and build partnerships.
2. **Green Business Booster:** Provides funding to help companies overcome entry barriers.
3. **Green Business Advisory:** Provides advice on strategy, marketing and prospection.
4. **Economic Intelligence:** Consolidates information into regular energy intelligence reports sent out to industry players, disseminates information and accelerates progress of sector.
5. **Capacity Building Programme:** Provides training and awareness workshops, organises conferences to increase know-how and advance skills to be applied.

These, coupled with R&D progress like IRESN's initiative to build and develop new solar research facilities such as the Green Energy Park in Benguerir, are a perfect example of how a cluster can work together to not only establish an industry, but also to push it forward. ●



RENEWABLE ELECTRIFICATION AND INTEGRATION IMPLEMENTATION STRATEGIES

Development of a proper enabling environment, though crucial, is only a part in the much grander scheme of pushing forward renewable energy in Africa. Our actions must continue into our carefully planned and calculated action strategies for how we will act within our enabling environment to further the renewable energy sector.

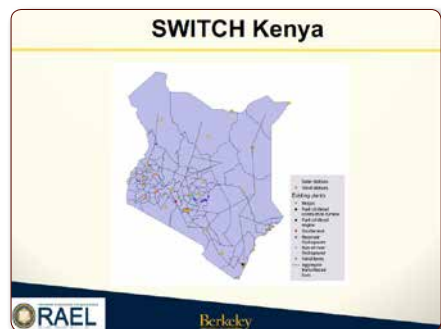
ACHIEVING THE RIGHT ENERGY MIX

With renewable energy being the central focus, there are naturally two questions that come into focus when discussing energy mix, namely (1) is a 100% renewable energy mix viable? and (2) what is the ideal energy mix for Africa?

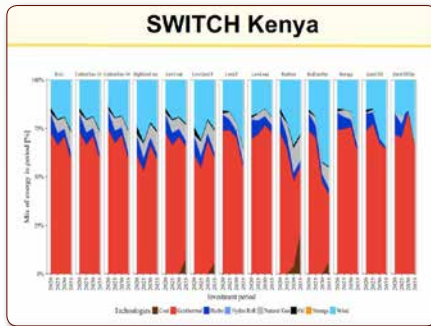
To make responsible decisions in energy mix, one must first assess the availability of resources, take into consideration socio-economic and political factors in each location, and then use this information to model different energy mix scenarios. We must understand that before we even begin, even the most advanced modelling will not provide exact and precise outcomes. When done thoroughly and with accurate input information, modelling can provide the insight necessary to make responsible decisions regarding energy mix.

SWITCH (solar and wind energy integrated with transmission and conventional sources) is a linear programming modelling platform used to examine least-cost energy systems designed to meet specific reliability, performance and environmental quality standards.

SWITCH is a capacity expansion model that examines least-cost energy systems designed to meet specific reliability, performance and environmental quality standards. It also invests in new generation and transmission assets as well as in end-use and demand-side management options (including electrified vehicles and storage) with a high-resolution assessment and planning package to explore the system performance resting from different scenarios.²¹



Based on the Renewable and Appropriate Energy Laboratory (RAEL) at University of California Berkeley, SWITCH was initially developed for California, but has been expanded and refined to explore energy choices with plans to cover the East African Power Pool (EAPP). RAEL has recently finished the SWITCH model for Kenya – a key highlight of Professor Kammen’s keynote talk at the Africa Renewable Energy Forum.



All SWITCH Kenya Slides Courtesy of Dr Daniel Kammen

By inputting data surrounding the current energy mix in Kenya, and other key factors, SWITCH produced projects of energy mixes that can be achieved through various scenarios. Planning tools such as this model are essential to enable policymakers to know how different energy mixes can be achieved, and how viable each is. One can see in the figure below what Kenya can achieve in a business-as-usual scenario, with just the implementation of energy efficiency policies, with increased investment in geothermal and an additional 1 GW of storage in the eight highest load zones, and much more.

A 100% renewables energy mix certainly is toward where the world must work in the future as an ultimate goal. However, the process of electrifying Africa is a complicated one, which is why complex modelling and planning are essential.

Modelling like SWITCH is essential to achieving energy mixes that enable renewable energy development – from energy mix to transmission plans.

OVERCOMING TRANSMISSION BARRIERS

Not only planning is essential to addressing Africa’s transmission networks, but so is regional cooperation. The network must efficiently and reliably exchange electricity from a generation site to a substation in order to utilise large available project sites that may be further from large load centres.

The issue at hand is that each country has their respective vision for what the grid should look like; this means different standards exist, if any. The domino effect of this lack of international collaboration amongst countries is two-fold: (1) it does not utilise the large potential for countries to optimise electrification rates and financial costs through joint projects, and (2) interconnection of now more isolate transmission projects may not be possible if the technical parameters do not match country to country.

The development of regional power pools is a great step forward in international cooperation for transmission. A power pool is a cooperation of the national electricity companies in a region that is overseen by broader regional governance. Founded in 1995, 2000, and 2005 respectively, the South African Power Pool (SAPP), West African Power Pool (WAPP), and East African Power Pool (EAPP) were great starts in regional cooperation towards transmissions. Now, they must push forward more initiatives.

Technical standards must be established for transmission projects – and throughout the renewable sector for IPPs and utilities alike – if the true aim is to scale renewable energy in the most responsible, effective and sustainable way possible. Cooperative agencies, either to be established or already established in regions, must determine these standards and ensure regulatory systems for projects to enforce them.

If countries worked together to develop and strategise transmission plans, not only could costs and potential for interconnection be addressed,

but resource allocation could be optimised as well. Reports indicate that Africa is only using 5 to 10% of its hydropower potential.²² Uganda has a large hydropower potential, with the 250 MW Bujagali project completed in 2012 as the largest private sector investment in the country's history.

As a result of Bujagali, Uganda's supply exceeds its demand for the first time ever.²³ With the implementation of a regional transmission network, Uganda could engage in resource sharing; providing electricity to countries in the region with less natural potential. This theme stretches further than hydropower and Uganda.

Themes like planning and technological standards are essential to extending the grid to meet the needs of the more than 620 million people in sub-Saharan Africa (two-thirds of the population) living without electricity.²⁴ However, we must note that extending transmission networks is not always the best option for electrification, particularly in remote rural areas.

Extending the central grid as an approach to energy access is inefficient due to a combination of capital scarcity, insufficient energy service, reduced grid reliability, extended building times and construction challenges to connect remote areas.²⁵ Off-grid solutions provide a gateway to bridge the gap toward immediate, efficient energy access before the long-term development of the African grid.

A PROMISING ALTERNATIVE: OFF-GRID SOLUTIONS

Off-grid decentralised renewable energy (DRE) is available on all scales and costs, from solar lanterns to mini-grids. This is a driver of accelerating energy access to everyone quickly regardless of their proximity to a city, saving money and preserving our climate. When combined, these three factors can increase a country's human development index factor, further achieving progress on our way to achieving the SDGs.²⁶

Starting small, we look at DRE's possibility to replace fuel-based lighting. Fuel-based lighting is defined as any light coming from fuel-based sources, though it primarily refers to kerosene lamps.²⁷ There are currently an estimated 500 million kerosene lamps in use worldwide,²⁸ with each of these lamps emitting 100 kg of the greenhouse gas carbon dioxide into the atmosphere each year.²⁹ The number one product of fuel-based lighting sources, such as kerosene lamps, is greenhouse gas – light is secondary.³⁰

One solution that DRE offers here is small solar home lanterns. Coming in at just USD8, the d.light S2 model is the world's most affordable high-quality solar LED.³¹ Not only this, but these LEDs offer more and better illumination than do fuels, dramatically reducing operating costs and greenhouse gas emissions.³²

Solar home systems (SHS), though not capable of providing the same quantity of energy as the national grid, are also a promising solution toward immediate energy access. A system provides connectivity via cell phone charging and TV access, for instance, improving the owner's life quality, but also enabling rural business, creating jobs and increasing income.

When installed on family households, one solar home system provides energy access to roughly four people, multiplying impacts of investment. But what if there were a larger scale solution, which could provide energy in the same quantity, and in higher quality, than the national grid?

The International Energy Agency predicts from current trends that 400 million of the global energy poor in 2030 will most effectively be served by renewable microgrids, with attendant benefits in health, education and economic resilience.³³ Microgrids – distributed systems of local energy generation, transmission and use – are today technologically and operationally ready to provide communities with electricity services, particularly in rural and peri-urban areas of less developed countries.³⁴

Renewable microgrids further support the Africa Renewable Energy Initiative goals of having the African continent leapfrog. If countries draft technical standards for these renewable microgrids, and collaborate with developers to make them modular and scalable, the energy map of Africa will be more advanced than even the richest countries.

By first focusing on building microgrids, we can provide access to energy faster while also establishing decentralised renewable energy generation stations throughout the country. If built to standard, these microgrids can eventually, after already serving reliable and high quantity energy to those currently without energy access, be interconnected to the grid.

Therefore, even with the high cost and long timeline to grid extension projects, we do not have to choose between building out the national grid and providing immediate energy access – we can do both, cost-effectively, with renewables. Also, adding to sustainable development, microgrids create local technician jobs with the system itself and provide energy to enable entrepreneurs to develop their own businesses, pushing their local economies.

LOW-HANGING FRUIT: ENERGY EFFICIENCY

Energy efficiency should be an integrated, priority component of all renewable energy efforts.³⁵ What is unique in the case of Africa is that much of the current energy shortage can be addressed without a single dollar invested in new generation sources: the energy already produced must merely be consumed more efficiently. This is a change in basic assumptions from many policymakers' thinking.

By assessing efficiency regulations, policies and standards in African countries, each country will be able to identify the barriers to increased energy efficiency. After doing so, they will be able to enhance the design incentives of these standards for the public to practise energy efficiency.

Energy efficiency, aside from being a technological concept, also comes down to education and trainings. Capacity building and training, which is beneficial and promotes economic development when paired with IPP projects, can provide a doubly impactful benefit to the country.

Through the use of these training and public awareness campaigns, countries can educate their citizens on how to use energy more responsibly. Through different behaviour, this can both save people money and spread the same amount of energy that is being produced to a wider range of people – without investing in any infrastructure. This is an often-missed opportunity that must be exploited.

NEXUS ISSUES

Although a report must be broken down into sections for the sake of organisation, this must not happen when these measures are being implemented. These strategies have a much stronger tie to one another than simply all being related to renewable energy.

As said before, electricity enables progress in all other of the SDG areas. The beauty behind the interdependency of Africa's sustainable development challenges is that solutions can be synergistic. Seeking and implementing cross-cutting solutions that impact in one or two areas affect other areas as well. As long as each strategy is designed with due consideration given to the other areas it is tied to, scalable and well planned solutions can have a positive domino effect.

Water, agriculture and energy are three of the main pillars of a nation; they are also inseparably tied to one another. Water resources, enabled for use in agriculture through electric pump irrigation, nourish the growth of agriculture that in turn provides food security to the nation. ●

FITTING INTO THE AFRICA RENEWABLE ENERGY INITIATIVE

The AREI, released in 2016, is focused on transitioning Africa to a renewable energy future with access for all. This report, and its outcomes presented, are all strategies that fit in with meeting the AREI goals, which, in the words of AREI Delivery Unit Director Dr Youba Sokona, relate to a renewable future that:

- Is Africa-led and sustainable development-focused
- Addresses major needs of major productive sectors
- Is development-focused climate compatible
- Is open to wide participation and collaboration
- Comprises multiple stakeholder involvement

committed to accelerating transition African energy economies

- Fosters a framework that cultivates the partnerships and synergies among existing and future efforts

With the AREI's release in August 2016, it is imperative that each country and their respective policymakers and private actors not only have heard of it, but champion its methodologies and attitudes. Only after they have been informed of the AREI can governments and the private sector alike execute strategies to sustainably develop Africa through its renewable energy sector. ●



MOVING FORWARD

WHAT THE 2016 AFRICA RENEWABLE ENERGY FORUM CONCLUSIONS MEAN

The conclusions in these various sectors – from why renewable energy should be prioritised, its innate ties to all areas of sustainable development to creating an enabling environment for its development and development strategies themselves – fit perfectly within the AREI. They represent the current state of renewable development in Africa, and provide a foundation for conversation about what needs to be done going forward.

Dr Youba Sokona concluded the last panel of the 2016 Africa Renewable Energy Forum perfectly by saying that the conversations at this forum provided a good opportunity to lay the groundwork for all these issues. However, this is useless if we look to convert these conversations to action separately.

The achievement of the Africa Renewable Energy Plan and the sustainable development of Africa hang on synergistic thought and action. We must not get locked up in old systems of thought when it comes to energy and development, as Africa is in a position to leapfrog as a continent – the first continent ever to be in this position as a whole.

If we are to develop renewable energy and accelerate the sustainable development of Africa, we must start from the ground up: injecting projects, investments and education into the poorest rural communities as well as more urban areas. Money in a sustainable and equitable economy flows from the bottom up.

Extending energy access in Africa provides an unprecedented scale of implementing this.

With the creation of jobs, increased capacity buildings and empowerment across genders that renewable energy provides, we are in a unique point in history. We must work together on all fronts, carefully planning and cooperatively executing, and we will make history. Africa can serve its inhabitants with climate, economies and people in mind – improving the quality of life on the continent as a whole.

ACTIONS BEFORE THE 2017 AFRICA RENEWABLE ENERGY FORUM

Going into COP22, we need to take the foundations laid by this forum and utilise them to agree on actions that must be taken before the same meeting in 2017.

We must not wait for 2017 to have these conversations again. African officials going into COP22 have the opportunity to decide to accelerate these projects now. They should decide to track the number of renewable energy projects installed, analyse why they are successful, ask what new companies came out of this and what the delta of companies is year-to-year and, if some projects are on the backburner, investigate *why*.

There is a possibility in the next two weeks to turn The Paris Agreement into action here in Marrakech. Let this report inform, be a reference, and enable key players to act to sustainably develop their continent. ●



APPENDIX

Minutes by Session - written by ESEI's Morocco 2016

DAY 1

WEDNESDAY, 2 NOVEMBER 2016

GOVERNMENT OF MOROCCO OPENING AND WELCOME KEYNOTE ADDRESS

Zohra ETTEIK, Director of Renewable Energy and Energy Efficiency, Ministry of Energy, Mines, Water and Environment, Kingdom of Morocco

FORUM SPONSOR KEYNOTE ADDRESS

Mustapha BAKKOURY, Chief Executive Officer, MASEN, Kingdom of Morocco

PANEL DISCUSSION: LEADING THE WAY ON THE GLOBAL RENEWABLE ENERGY DEVELOPMENT STAGE – IS AFRICA READY TO TAKE ON THE CHALLENGE?

Anne LAPIERRE, Head of Energy, Europe, Middle East and Africa, Norton Rose Fulbright (moderator)

Petrus Maduna NGOBENI, Director, IPP Office, South Africa

Tarik HAMANE, Director Power Generation Projects and Programmes, Office National de l'Electricité et de l'Eau Potable (ONEE), Morocco

Fatima HAMDOUCH, Strategic Steering Director, MASEN

Nabil SAIMI, Deputy Chief Executive officer, Platinum Power

Samuel BATCHO, National Coordinator, MCA, Millennium Challenge Corporation

Objectives

The objective of this introductory panel is to underline the success stories of Morocco in terms of renewable energy, and to gain a better understanding of the challenges and limits of global renewable energy.

Host welcome remarks

Mr Simon Gosling, Managing Director of EnergyNet started his speech by welcoming all guests to the African Renewable Energy Forum

– a concept born under the label of COP22. Using a video, he then presented the achievements of EnergyNet in terms of developing renewable energies. Based on this, Mr Gosling explained that learning and education are nowadays closely linked to new technological techniques. The main objectives of their accomplishment were therefore related to education, more specifically to spreading learning in African schools by providing them with electricity. These kind of successful events are changing lives in Africa, especially when the target is children, and currently the commitment of the Kingdom of Morocco is centred around these projects.

Government of Morocco opening and welcome keynote address

Mrs Zohra Etteik, Director of Renewable Energy and Energy Efficiency commenced by introducing the main assets that the Ministry of Energy, Mines, Water and Environment have fixed for the next five years. Firstly, the Ministry has set up a legal framework that will engage:

- transferring of technologies
- learning programmes
- seeking for international funds

Secondly, the Government will ensure an assisted transition to the COP22. Adopting a sustainable development strategy will guarantee an economic and social balance, especially for the rural development. Since 2011, the government has launched several protective policy and institutional reforms to give them the means to implement the strategy. For the first time, the electricity produced by renewable energy will exceed the electricity produced with fossil energy sources. Morocco is committed to reducing greenhouse-effect gas to 13% in five years.

To create the means to achieve this objective, Morocco is developing a programme of producing more than 10 100 MW by 2030, which is 52% of the produced electricity. This will be accomplished by combining solar, wind and hydraulic energy resources. This programme will reduce energy dependency from 98% in 2009 to less than 80% in 2030. Mrs Zohra Etteik focuses on the rise of renewable energies as a lever of the economy and on the engagement of the Kingdom in establishing training structures.

Rural electrification is a major point that the Government focuses on. To reach this objective, Morocco counts on various ambitious programmes, namely the creation of the solar complex, and the creation of the largest wind parks in Africa. Furthermore, and according to Mrs Etteik, the Kingdom relies on stimulating a protective and sustainable development thanks to the contribution of both the public and private sector.

Mrs Etteik stated that Morocco is setting standards and support mechanisms in addition to the training programmes in different sectors.

Forum sponsor keynote address

After the relevant speech of Mrs Etteik, it was the turn of **Mr Mustapha Bakkoury, Chief Executive Officer of MASEN**, to share his point of view as Forum sponsor of the event.

Naturally, Mr Bakkoury talked about the COP22, but most importantly about the objectives of this major event. He said that the first objective is to establish a COP of actions, meaning that it must be a priority to take responsibility for the environment and to take the necessary actions. The second objective is that it must be a COP of Africa, where there is a real need for development. According to him, the most important problem that Africa is experiencing is poverty; therefore, we have to take responsibility in order to face this problem.

Based on a growing need of development in Africa, we had to find new effective solutions of energy resources, especially since we live in a world where technologies and new techniques of providing energy are available. Everything should be re-thought and re-stated in order not to relapse into past mistakes, and to generate real economic welfare.

The introduction of the renewable energies was described as a challenge for Morocco. It was established in 2009 under the lens of gaining 42% of the total energy resources in 2020, which was a bold bet for Morocco to move from almost 0% to 42% of the total energy resources.

Also, Mr Bakkoury has claimed that this transition was necessary if we wanted to reach the development for the following reasons.

First, the cost of a barrel was around USD149 in 2009. Second, there was volatility in prices which had not been secured for the Government. The third and last reason was the conviction of the

Moroccan King to integrate the environment as a priority in setting up strategies.

Mr Bakkoury insisted that this environmental concern must integrate all the countries that should mobilise themselves. Thereby, prices can be reduced and countries can learn from each other.

Mr Bakkoury concluded by saying that MASEN aims to develop a strong cooperation with African countries and is open to any suggestions of collaborations.

PANEL DISCUSSION: LEADING THE WAY ON THE GLOBAL RENEWABLE ENERGY DEVELOPMENT STAGE – IS AFRICA READY TO TAKE ON THE CHALLENGE?

Is Africa ready to take on the challenge?

Fatima Hamdouch, Member of the Management Board, MASEN, stated that MASEN is in the heart of the transformations of the African sector. The first question was: How can MASEN's knowledge be used to contribute to the development of other African countries? The answer lies in the following guidelines:

- Have a clear vision and smart objectives
- Develop adequate means:
 - Develop an institutional and legal framework
 - Attract developers and be transparent about their selection
 - Attract investors
- Adopt a gradual development with an accelerated rate
- Integrate local entities
- Be passionate about what you are doing

The second question was: How will all the projects be financed?

MASEN decided to give all the information to sponsors, so that they could make informed decisions and be convinced to invest in the projects. It is hoped that they regard these projects not only as related to producing energy, but also to innovate and contribute in developing the society and the African/Moroccan community. Likewise, that they will stay updated about all the new technologies that will help with producing the energy.

Tarik Hamane, Director, Power Generation Projects and Programmes, Office National de l'Electricité et de l'Eau Potable (ONEE), on the other hand, represented Morocco as a model to share his experience in renewable energy with all the African countries. He introduced a small history of renewable energy in Morocco. The first generation of renewable energy in Morocco was hydraulics, followed by thermo energy, and then natural gas. Hamane also talked about the success of involving the private sector due to a large demand in energy.

Petrus Maduna Ngobeni, Director, IPP Office, South Africa. The crisis of electricity mainly concerned the shortage of electricity available to the consumer. They needed to find a way to deal with this kind of crisis. The solution would be finding new alternatives to fossil energy in order to make and produce energy in bigger capacities. Furthermore, producing this type of energy is expensive. Prices are less controllable in private sectors. According to Ngobeni, the project had a clear vision: reducing the costs and endorsing social development. Natural resources can be hard to control because the weather can influence energy from the wind and the sun. Therefore, the project was linked to a gas programme. The gas programme was considered as a solution to what we can call supply in case of a problem with renewable energy.

Samuel Batcho, National Coordinator, Millennium Challenge Corporation started from the economic diagnostic of Benin. It has been noticed that the main problem in Benin is the lack of electricity due to a political choice. In fact, Benin at first refused

to call for private investors in electricity and was adopting a centralised approach. However, things changed in 2012 when they adopted Benin Power Program with the help of the US Government. This programme has a main objective to provide industries and communities wider access to electricity. The previous capacity was 14 MW. The idea with the programme is to reach 80 MW so they can provide every company and every citizen with the electricity they need for both lighting and production. In order to attract more investors, Batcho suggested a policy reform by creating an enabling environment at IPP and setting up strong and independent regulations.

PANEL DISCUSSION – ADAPTATION AND MITIGATION FOR ENERGY PROJECTS IN AGRICULTURE

Before talking about developing the African community and economy, we should point out some main issues. One of them is the struggles the continent is facing in energy production.

A need therefore exists to make a list of priorities, of which the first one would be to provide Africa with energy, regardless of whether it is renewable or fossil energy. The second priority is to nourish Africa and involve it in the industrialisation programmes of the world. This would result in enhancing and upgrading lifestyle in Africa.

The third and final priority concerns integrating Africa into the innovation process. What this means is that Africa should be kept up to date with all technology programmes around the world and should contribute to the sustainable development of the world.

“THE AFRICA RENEWABLE ENERGY FORUM WAS A GREAT CONFERENCE WITH FANTASTIC ORGANIZATION. IT BROUGHT TOGETHER THE RELEVANT PLAYERS FOR VERY INTERESTING DISCUSSION.”

Fatima Arthur, Executive Board,
EDM Mozambique



Green Morocco Plan (GMP)

Morocco's agriculture sector makes a great contribution to the national economy. It provides jobs to more than 4 million employees in the rural parts of the country, and to more than 100 000 in the food industry.

Why the GMP?

The GMP was established because the sector faces the following critical issues:

- Low investments
- Poor organisation
- Inadequate supervision
- Limited water resources (drought)
- Land fragmentation

Main objectives

- to guarantee the food supply for the 30 million Moroccans;
- to increase farmer revenues;
- to protect natural Moroccan resources; and
- to involve Moroccan farmers in both national and international markets. (This is clearly noticeable lately through associations and small companies that produce natural Moroccan products such as Argan's products and olive oil products.)

When was the GMP established?

The plan was established in April 2008 but was not put into action until April 2009. Until now, the plan has been updated every year to keep up to date with changes in the market.

What is Green Morocco Plan's relationship with renewable energy?

One of the fundamental principles of the plan is to preserve natural resources in order to maintain sustainable development. At the same time, since the Moroccan economy is reliant mainly on agriculture, the plan aims to keep a steady agriculture growth rate. The Government would realise this by:

“WITH MOROCCO LEADING BY EXAMPLE, ENERGYNET’S AFRICA RENEWABLE ENERGY FORUM WAS ONE OF THE MOST PRODUCTIVE SESSIONS I HAVE ATTENDED ON CLIMATE CHANGE, LOW CARBON AND GREEN FINANCE.”

Tallat Hussain, White & Case LLP

- Controlling land fragmentation by using a collaborative programme with the Global Environment Facility;
- Developing a social and economic programme to educate the society;
- Using bio-carburant instead of fossil fuels for energy; this is to avoid the side effects that fossil fuels have on the environment; and
- Using renewable energies as far as possible, whether photovoltaic, wind turbine or even biogas.

What problems we can face when producing renewable energy

The main national achievement that interests the energy programme is the creation of multiple projects that can assist in the generation of energy based on photovoltaic resources, wind turbines or even water pumps. Great results have been seen, such as growth of the production capacity.

At this stage, so many other African countries will be presented with another issue. Before implementing a renewable energy programme, you should first of all find the right conditions that will allow you to produce this renewable energy.

Adama Moussa, Principal Electrical Engineer at

ROUNDTABLE 1 – ARF/COP22 MINISTERIAL ROUNDTABLE: IMPLEMENTING THE AFRICA RENEWABLE ENERGY INITIATIVE

African Development Bank (AfDB) said, “For example, just because you have heat, it doesn’t mean that you can produce photovoltaic-based energy (solar panels), but making sure that you have the right amount of radiations that will actually help producing the energy.”

This is a problem that many countries have faced. At first, they thought that the project would work, but it did not due to the lack of detailed information about the technology and the weather conditions, to name a few factors.

Challenges African countries are facing

- Lack of electric energy
- Inaccessibility of electric energy in some areas
- The high cost related to electric energy inaccessibility

How will the new deal on energy for Africa feed into the climate change initiative?

The African continent’s development is suffering from an electric energy shortage, which equates to about 2% of the GDP. More than 645 million Africans do not have access to electricity and the number could rise to more than 730 million using biomass for cooking. If emergency measures are not taken to increase access to electric energy, this number could grow up to 1 billion by 2020.





The strategy for 2013–2022

This strategy has specific objectives:

- Support the transformation in Africa;
- Drive an inclusive growth and transition to green growth to contribute to reducing the poverty rate; and
- Promote sustainable infrastructure and improve the energy security in Africa by taking advantage of renewable energies.

The new pact: Africa has many natural resources, which differ depending on the geography, yet it remains low in energy supply. For example, in 1995 only 18% of the Moroccan population had access to electricity; in 2015 this percentage increased to 99%. In 2025, the aim is that 100% of the population will have access to electricity.

High 5s: The five main objectives of the African Bank in terms of renewable energies are:

- Energy for Africa
- Feed Africa
- Industrialise Africa
- Integrate Africa
- Improve the living conditions

What are the African Government commitments for renewable energy development?

Nationally, each government determines their commitment.

Despite the variety of energy sources in Africa (solar energy, wind energy, hydro energy, gas, coal and fuel) 53% of the population do not have access to electricity. The challenge is how to finance these kinds of projects.

According to **Mahama Kappiah, Executive Secretary of ECOWAS Centre of Renewable Energy and Energy Efficiency (ECREEE)**, African countries are now more aware of the renewable energy challenge and are ready more than ever to contribute to change. The challenge will be to attract investors. Financing is not only about public money; developers need to attract the private sector for investment.

Tunisia, for example, is planning to reduce electricity production and switch to renewable energy to fill the gap.

Through the NOOR project built on 3000 ha in Ouarzazate, MASEN focuses on three main goals:

- Local development
- Research, development and training
- Industry integration

The complex financial structure is involved in financing PPA-based renewable energy projects.

PANEL 4 – REGULATORS ROUNDTABLE: LEGAL MECHANISMS AND INNOVATIVE SOLUTIONS

Understanding regulation in energy

Regulation is carried out in two main spheres: the network and the market. Regulation in networks consists of ensuring the network's proper functioning and development, the independence of the operator system and accessibility. In the market area, the regulation body supervises transactions and distribution and provides support for energy generation. Overall, regulation is meant to promote best practices and advise Government on measures to implement to resolve energy issues in the short and the long run (MEDREG, AFUR).

Ugandan experience in regulation (Testimony of Moctar Toure, president of AFUR)

Inventory before the regulation:

- Low power generation
- High losses (up to 34%) during distribution
- Limited access to electricity
- Common shortage and massive selective power cut
- High prices and unaffordable for consumers

The regulation propositions:

- To set a price that meets both the ROI requirement and is affordable to customers
- To set industry standards for better quality
- Strategic planning to
- Transparency and accountability of the regulatory body
- Promote energy efficiency

Results of the regulation implementation:

- Detailed and ready-to-apply programme with the following objectives:
 - Power generation of 1200MW by 2020.
 - Improve the energetic mixing to further augment the renewables share, such as 87% to hydro energy, 9% to mini-hydro, 5% to biomass and 2% to other.

- Investment in renewables increased to reach USD2 billion in 2015; annual growth in this investment is planned to be between 15% and 18%.
- Tremendous loss reduction by 16% in absolute value, bringing down energy loss to 18%.

Key elements for a successful regulation in energy

For the regulation body to succeed in its mission it should:

- Be autonomous and independent from political considerations;
- Promote PPPs by setting up a favourable and comprehensive legal framework;
- Provide full support to and permanently monitor the projects to be carried out;
- Use transparent competitive bidding to select best private actors by incentivising the market actors to come forward; and
- Resort to rendezvous clauses that allow the body to assess the realisation of the private actor before the term of the contract ends.

Challenges encountered in PPPs:

- Pricing the kWh in a way that satisfies both the investor (return on investment) and the customers (affordability);
- PPPs have to be agreements that still allow government intervention as it is a strategic area;
- Transparency in public offering;
- Profitability of the projects given the financial capacity of the users; and
- Sources of financing the projects. ●



DAY 2

THURSDAY, 3 NOVEMBER 2016

ROUNDTABLE – REGIONAL CO-OPERATION TO OVERCOME THE TRANSMISSION BARRIER

LEAD RESEARCH AND DEVELOPMENT AND SCIENTIFIC SPONSOR ADDRESS:

Dr Badr Ikken, Director General, Institute of Research in Solar Energy and New Energies (IRESEN), **Kingdom of Morocco**

Climate change issues concern all of us. It is our duty to think of future generations on the African continent by implementing common programmes to fight against climate change. To keep the world safe, we need to focus on three main objectives:

- Use available clean technologies and push forward research and development;
- Remove barriers and implicate all stakeholders; and
- Mobilise the funds needed to empower the transmission.

The COP22 revolves around two major elements: capacity building and energy transmission.

Capacity building, or capacity development, is about a conceptual approach to social development and the ability of understanding the obstacles that inhibit governments or organisations from achieving their objectives.

Energy transmission is about creating a network in order to exchange clean energy from a generating site to an electrical substation.

Today, these kinds of relevant topics will be covered during the Africa Renewable Energy Forum. The sustainable development will guarantee a better life for men, women and kids, who are in the heart of this dynamic change. Research

and development as well as innovation should not be underestimated because it will increase the energy transmission speed by addressing optimally the energy needs of African countries while taking into account economic development through local manufacturing of new products and services. There are big opportunities to develop win-win partnerships. The Institute has launched great renewable energy programmes in 2009.

Outcomes of the Roundtable: Regional Co-operation to Overcome Transmission Barriers

Fatima Arthur, Executive Board Member, Electricidade de Moçambique, Mozambique, insisted on the fact that interaction between countries is now a problem. When it comes to transmission, the question is how to achieve it.

African countries do not have a strong network for energy transfer. There is a need to adapt technology depending on the standards of each country before this technology can be used to produce renewable energy. The African network is very weak in terms of infrastructure.

Furthermore, it is essential to know the cost of such programmes, according to Norbert Arku. Because funds are limited, African countries need to combine their resource and technology forces. In doing so, they can grow together along with their use and production of the renewable energy. Projects should also be structured clearly with realisable objectives.

One transmission barrier is that each country has its own vision of renewable energy.

African countries should rather combine their forces and resources even in the production of renewable energy. Undoubtedly, some countries will contribute more than others, depending on their capacities. The issue is to find benefits for all.

Ali Zerouali, Director of International Co-operation, MASEN.

On the one hand, the price of electricity in Morocco is one of the most expensive in the world. On the other hand, renewable energy programmes in Africa rank well internationally. Morocco and South Africa are leaders in wind energy production. Co-operation is the key to the success of the region but this requires countries to engage their efforts. The actual transformation is compared to the 18th century industrial revolution that succeeded thanks to the co-operation of all European countries. African countries need to assume a regional approach based on interaction and support between countries producing electricity at lower costs and PPPs. Renewable energies help develop a network with bigger capacities.

Soulaymane Konate, Technical Counsellor of H.E.; Prof Alfa Oumar Dissa, Minister of Energy, Quarries, Burkina Faso.

In Burkina Faso, 300 MW of electricity can be integrated into the network. By 2020 more than 390 MW can be generated with a network reinforcement plan. Nevertheless, investment costs cannot be available and cannot cover the integrity of rural areas. Nowadays, only 18% of the population in Burkina Faso have access to electricity.

Actually, there are limits related to isolated technologies. The issue is not related to energy transmission but to interactions. There is a complete range of projects in each country but they are not connected in terms of strategies, costs management or long-term perspectives.

Fatima Arthur focused also on long-term plans that extend 15 years and give a clearer vision and ability of reform.

PANEL DISCUSSION
– HOW TO ACTIVATE
AN AFRICAN
RENEWABLE ENERGY
INDUSTRIAL ECOSYSTEM

Hosted by



What is a cluster?

The word “cluster” is defined as “a group of similar things, persons, companies... which are positioned or occurring closely together”. From the scientific point of view, a cluster is a word used to describe a concentration of companies in a geographic space, allowing the economy and industries to grow efficiently.

The question is, why do we need a cluster in the renewable energy field?

We need to create a stable industrial and political climate so that companies can operate most effectively. This is because perfect economic and legal conditions give opportunity for development and growth.

The added value of a cluster can be summarised in the following statements:

- Increase the rivalry between the members of the cluster. With intense concurrence, companies feel the need to work harder to produce the best innovations and projects.
- It gives more pre-eminence to innovation, in this case innovation in the renewable energy programmes.
- With more companies working to develop themselves, generating profits and producing new technologies (and maybe just investing in different fields), the cluster will help to increase the growth rate of the economy.

A cluster should not play the role of a consultancy agency, but it could provide advice to companies looking for information to develop projects.

The size of a cluster actually does not matter; it can contain as many as 300 companies and as

little as 15. What matters most is the composition of the cluster and the cooperation between the companies.

The governance of a cluster

To start with, the Government should initiate the cluster, after which the management should be handed over to the private sector so that the cluster can be autonomous.

Moroccan example – Cluster Solaire

The Moroccan Agency for Solar Energy (also known as MASEN) has taken the initiative to create “Cluster Solaire” along with other companies operating in the solar energy field.



CLUSTER SOLAIRE

Created in 2014, Cluster Solaire is an association between the actors of the solar energy sector. It is an innovative and ambitious platform that facilitates the development of a competitive solar industrial sector, in line with the objectives of the solar plan NOOR.

The main objectives of Cluster Solaire

- ✓ Networking the various players in the sector
- ✓ Improving business productivity
- ✓ Increasing businesses' capacity for innovation
- ✓ Promoting the development of skills

Vision of Cluster Solaire in Morocco

Beyond the dimension of energy production, the solar plan NOOR embodies the ambition of developing its own socio-economic sector, sustained green growth, and thorough support for the development of a Moroccan industrial fabric and strong deployment of R&D and capacity building. In this context, the solar cluster contributes to the creation of synergies between public and private actors, and entrepreneurs and researchers in order to promote the emergence of a competitive solar industrial sector in Morocco.

Storytelling – The experience of Cluster Solaire in Morocco

Mohammed Bernannou, Acting Chief Executive Officer of Cluster Solaire tells Cluster Solaire's story. He says that they started from nothing and are now managing huge projects. They benchmarked for two years at a global level as it was essential for them to create a cluster that would feed the global climate. They also needed to include the private sector, the R&D Centre and the public sector to have three stakeholders.

Cluster Solaire took two years to finally be established, based on the partnership between many companies, of which three were major ones (MASEN, Fenelec and Fimme).

The organisation's management felt the necessity of boosting the capacity of Cluster Solaire and the skills they have in the renewable energy field. At first, they did not even know what the structure was that they would need to succeed in managing the whole organisation of Cluster Solaire. Thus, they chose to apply an operational approach.

The organisation operates to help many companies who are interested in developing projects related to renewable energy and ecology. Many projects have been realised during the last two years of Cluster Solaire's existence, such as:

- **Solar Village** – Clean energy
- **Copag Algo** – Food (milk packaging)

Cluster Solaire is still developing the following projects for the near future in partnership with local universities and international companies:

- **Low-cost water heater:** Developed in partnership with the International University of Rabat. It is basically a water heater created using simple technologies that do not need a high level of knowledge and technical skills but can be used and assembled by anyone.
- **“Compost” technology:** Pertains to transforming waste recovery into energy.

Cluster Solaire aims to expand their area of service. Their vision is to reach and serve the

whole African continent with the services that they provide, instead of keeping it only for Morocco. *“The goal now is to be everywhere in Africa, invest in Africa, make partnerships in Africa” (M. Bernannou).*

Mali, Senegal and Burkina Faso projected to create their own version of Cluster Solaire, using the experience of MASEN. They started by creating specialised agencies in renewable energy.

PANEL DISCUSSION – PRIVATE SECTOR ENGAGEMENT IN DRIVING FORWARD RENEWABLE ENERGY DEVELOPMENT

Objective

The objective of this panel is to discuss the commitment of the private sector in the development of renewable energy and to understand what kind of projects are attractive for the investors.

Badis Derradji, Regional Managing Director of ACWA Power introduced this panel by talking about the most important criteria that are able to attract investors to commit to a project of renewable energy in Africa. He mentioned four standards:

- Political stability in the country
- Specific regulations
- Good visibility of the problem
- An increased knowledge of the organisation in charge of the project

Indeed, a country that brings together all these ingredients is inclined to attract investors.

Mr Crispin Holliday, Commercial Director, Aldwych International also had a turn to give us his point of view regarding the criteria that attracts investors. Mr Crispin agreed with Mr Derradji’s point of view and insisted on the stability of the country and the visibility of the problem. However, he added another criterion – the fiscal side.

In addition, he talked about the difficulty of working in a changing environment, especially with new technologies that are developing fast. He thus assumed that everyone has to follow this trend and accept the challenge by taking into consideration the technical solutions and finding the suitable sets for these technical solutions in the developmental stage of a renewable energy project.

From the financial side of things, **Mr Mahmoud Redouane El Aji, Executive Director of Attijariwafa Bank** tried to enlighten us about their strategies in terms of investment in renewable energy projects.

He talked about Morocco as a model, having all the advantages to attract investors. In fact, in finance, Morocco has a fixed purchase contract that generates secured cash flows and thus enables the remuneration of shares. In addition, the currency stability allows for a serene and attractive environment.

To conclude, **Mr El-Aji insisted on developing co-operation between banks and other institutions, such as the African Development Bank**, the World Bank, and the European Investment Bank.

The main ideas deduced from this panel

- The criteria that are able to attract investors to commit to a renewable energy project are: political stability in the country, specific regulations, having a good visibility of the problem, fiscal regulation, and to have an increased knowledge of the organisation in charge of the project.
- Developing co-operation between banks and other institutions in terms of financing renewable energy projects.

“THE AFRICA RENEWABLE ENERGY FORUM IS A PLATFORM TO DISCUSS A RENEWABLE ELECTRIFICATION STRATEGY AND SECURE INVESTMENTS FOR SUSTAINABLE PROJECTS.”

Valeria Aruffo, Regional Manager: West Africa, **EnergyNet**

PANEL DISCUSSION – TECHNOLOGY TRANSFER AND ENERGY EFFICIENCY

Session Sponsored by



Presentations



Powerhive is a technology venture founded in 2011 that partners with utility and independent power producers to provide access to productive, affordable and reliable micro-grid electricity for millions of rural homes and businesses around the globe. Their proprietary technology platform and business model enable the financing, monetisation, and management of distributed micro-grid solutions. The headquarters are in Berkeley, CA.

Powerhive's mission

The mission of Powerhive is to create a future where everyone has access to a bountiful supply of electricity.

Main projects in Africa – Powerhive in Kenya

Powerhive was the first private utility producer in the history of Kenya to obtain a concession to generate, distribute and sell electricity to the Kenyan public. They teamed up with another company to build and operate mini-grids in 100 villages in Kenya with an investment of more than USD12m between Powerhive and its partner.

This project, developed by Powerhive, consists of a portfolio of solar mini-grids with a total installed capacity of 1 MW. These solar mini-grids will be built in the western part of Kenya. The electricity service will support the use of productive equipment and critical

community services such as health clinics and schools, providing a long-term and scalable energy service to meet the current and future energy needs of its customers. This project will be an important part of Kenya's electricity infrastructure.



Iresen is a research institute established in 2011 by the Ministry of Energy, Mines, Water and Environment, ADEREE (National Agency for Renewable Energy Development and Energy Efficiency), CNESTEN (National Center for Energy Sciences and Nuclear Techniques), MASEN (Moroccan Agency for Solar Energy), OCP (National Moroccan Phosphates Company), ONEE (National Agency of Electricity and Drinking Water), MANAGEM Group, ONHYM (National Office for Hydrocarbons and Mines) and SIE (Energy Investment Corporation), in addition to the Federation of Energy. It was established in order to back up the national energy strategy by supporting applied R&D in the field of solar energy and new energies. Iresen operates in the field of R&D through its funding agency and research centre, offering many opportunities to create synergy between the socio-economic world and the scientific world on collaborative R&D projects.

Strategic lines and missions of Iresen:

- Setting up mechanisms to develop, coordinate and enhance the efficiency of research in the fields of solar energy and new energies;
- Translating the national strategy into R&D projects;
- Implementing and participating in the financing of projects carried out by research institutions and industrialists; and
- Exploiting and popularising the results of research projects.

What technology transfer is about

Technology transfer is about sharing experience and know-how through the inception of appropriate tools. It should first take place internally and then externally through cross-border co-operation and knowledge sharing.

Technology transfer in energy

The need arose to give an example of a country as a “success story” to which other countries can refer and which can provide guidance in implementing solutions to resolve energy issues. The panellists were asked what country that would be. WANNA, from UNFCC, referred to Kenya and Swaziland as good examples. Morocco was also pointed out thanks to its achievements in renewable energy (Ouarzazate, Noor) and its remarkable success in rural electrification (from 18% in 1995 to 95% in 2015). Ivory Coast and Benin have projects that will enhance their capacity building.

In 2010, Ethiopia started constructing the biggest dam in Africa, baptised the Grand Ethiopian Renaissance Dam. The dam is located approximately 500 km northwest of the capital Addis Ababa in the region of Benishangul – Gumaz next to the Blue Nile. After its completion, the Grand Ethiopian Renaissance Dam will be the largest dam in Africa at 1 800 m long, 175 m high and with a total volume of 10 million m³.

The project involves the construction of a main dam in Roller Compacted Concrete (RCC), with two power stations installed at the foot of the dam. The power stations are positioned on the right and left banks of the river and comprise 16 Francis turbines with a total installed power of 6 000 MW and estimated production of 15 700 GWh per year. The project will be completed by a 15 000 m³/s capacity concrete spillway and a rockfill saddle dam 5 km long and 50 m high, both located on the left bank.

For more details visit <http://www.salini-impregilo.com/en/projects/in-progress/dams-hydroelectric-plants-hydraulic-works/grand-ethiopian-renaissance-dam-project.html>

OCP contribution


OCP, the largest producer of phosphate in the world played a key role in Morocco’s decision to adhere to the decisions of COP21. Mohammed Soual, Chief Economist at OCP, says that OCP has invested massively in the chemical process of exploiting phosphate and that transforming it into fertiliser does not produce toxic gas like CO₂. A budget of 100 million dollars was planned for this matter.

Energy efficiency

Technology transfer is a crucial aspect in resolving energy issues in Africa as the capacity to generate energy is very low. Therefore, purpose mechanisms should be implemented to avoid or reduce the energy losses during the transportation. In addition, consumers have to be alerted and informed of the means to reduce energy consumption. Technology is important in creating electrical appliances that consume less energy and release less CO₂.



PANEL DISCUSSION – POWERING CLEAN AFRICA OFF THE GRID

Session Sponsored by 

Presentations



OPIC is the US Government's development finance institution. It mobilises private capital to help address critical development challenges and,

in doing so, advances US foreign policy and national security priorities. Because OPIC works with the US private sector, it helps US businesses gain footholds in emerging markets, catalysing revenues, jobs and growth opportunities both at home and abroad. OPIC achieves its mission by providing investors with financing, political risk insurance, and support for private equity investment funds when commercial funding cannot be obtained elsewhere. Established as an agency of the US Government in 1971, OPIC operates on a self-sustaining basis at no net cost to American taxpayers.

All OPIC projects adhere to high environmental and social standards and respect human rights, including workers' rights. By mandating high standards, OPIC aims to raise the industry and regional standards in countries where it funds projects. OPIC services are available for new and expanding business enterprises in more than 160 countries worldwide.



The Millennium Challenge Corporation (MCC) is an innovative

and independent US foreign aid agency that helps in leading the fight against global poverty.

Created by the US Congress in January 2004 with strong bipartisan support, MCC is changing the conversation on how to best deliver smart US foreign assistance by focusing on good policies, country ownership and results.

Context

Each country has a grid that provides energy to the surrounding population but it cannot be extended to remote villages, depending on the capital expenditures and the financial means of the concerning population. Consequently, rural electrification issues can be addressed through off-grid and mini-grid power generation systems, mainly photovoltaic. Off-grid energy has the advantage of being clean and does not require huge investment.

Issues regarding off the grid

Developing off-grid energy sounds like a better alternative and the ultimate solution to providing electricity to the unfortunate areas that do not have access to the grid. The unfortunate paradox, though, is that despite the cheap cost of renewables, off-grid energy is very expensive



due to its nascent technology. Research on the capacity building, mechanisms to fight the intermittence of this kind of energy and also on batteries enabling the storage of energy is key to enhancing off-grid energy systems. Another question that was raised on this topic is the fate of this system once the grid is extended to remote areas.

Why off-grid is the solution to the African energy issue

According to some of the speakers, off-grid and micro-grid systems are the remedy for the inaccessibility of electricity for households. However, they do not resolve the energy issue for companies, given their capacity. Contrariwise, others argue that these systems could actually generate enough power to satisfy the companies' energy needs.

The reasons why off-grid and micro-grid systems are the answer to the African energy issue are as follows:

- They can be greatly extended to anywhere, especially remote areas through solar home systems, for example;
- It requires low capital expenditure to build them;
- They allow investors through government to target specified localities, whereas the grid requires investing in upstream regions;
- Given constraints surrounding the gas emission, these systems and renewables in general are the solution to having clean energy, therefore complying with the COP21 objectives;
- They allow the achievement of national goals by the achievement of numerous small goals; that is, these micro-grid and off-grid systems can be connected to a centralised grid afterwards.

Despite all these arguments in favour of off-grid and renewables in general, an optimal energetic mix is of paramount importance as:

- It allows energy stability given that the

renewables as said earlier has great intermittence;

- It minimises the impact of energy production and consumption on the environment;
- It enables cost efficiency by targeting the right ratio between renewables and fossil energies.

Challenges or impediments faced by investors in Africa

- The cost of capital is very high and as such the return on investment is uncertain. According to **Samuel Batcho, National Coordinator, MCC** the interest rate in Malawi has gone up to between 24 and 26%.
- The lack of reliable data and analysis increases the uncertainty of investing in Africa, and the cost of the investment as the investors have to do the studies themselves – studies that might not be conclusive.
- A sustainable and sufficient demand combined with financial means that can allow an ROI.

Important factors to be considered by investors in energy

- Consumers' wants and financial means: François Xavier, Business Development Manager at Caterpillar Micro-grids said that they must be able to provide electricity to the customers wherever they want, whenever they want and at the price they want.
- Investment and its amortisation through time in such a way that the tariff will be affordable for consumers and at the same time profitable for shareholders.
- The investor has to optimise his costs as the tariff agreed upon with the national utilities is generally fixed.
- The cost of capital is very important as it determines the minimum required return on investment.
- Risk mitigation is of paramount importance, especially regarding political stability, local community involvement, for instance.
- The country's regulation is a fundamental factor as it is a clear expression of the political will to support or not to support the energy sector.

Perspectives of renewables

Renewables are currently cheaper than conventional sources of energy as their sources (sun, wind and water) are free and inexhaustible. Interestingly, sun and wind might one day undergo taxation by governments. This idea is not completely impossible or ludicrous as such a law was approved by the Spanish government in 2015.

PANEL DISCUSSION: UTILISING THE RIGHT ENERGY MIX TO SCALE UP RENEWABLE ENERGY DEVELOPMENT

Objectives

This panel has the objective of questioning the usability of 100% renewable energy resources. Furthermore, the discussion aims at coming up with the ideal mix that exists now and that can be implemented in the future.

Adrienne Payson, Partner in DLA Piper explained that there is no right energy mix. She mentioned three factors that can help implement the right energy mix:

- Identify the resources that are available in each country
- Assist projects
- Identify risks (political, currency, credit, etc.)

In the end, we have to verify if the project is financially feasible.

Paul van Lieshout, Technical Director, Renewable Energy, Jacobs Engineering S.A at first introduced the technical approach where we can only attend to 30% of renewable energy resources, taking into consideration limits such as technical capabilities and badly developed storage. However, he considers this approach to be wrong, and that nowadays technology has undergone much development that could lead to renewable energy sources accounting

for more than 80% of all energy sources. This means that we have to go beyond our capacity and try to develop these renewable energies as much as possible.

Arnaud Gouet, Regional Director, West Africa, WARTISILA, shared that Wartisila is an international group present all around the world and is well known as a solar energy operator. Before crossing over to the solar energy industry, Wartisila used gas, which was a good initiative back then. Hence, change towards using 100% renewable energy sources might be possible. However, for now our best option is to have a mix in energies, which must be clean, cheap and of a high quality to meet the standards of industries.

Brahim Benbachir, Business Development Director, Taqa Morocco declared that although 80% of Taqa's energy resources are fossil fuels, things are changing. As a matter of fact, wind power generating stations are being set up because it is important now to follow the trend of promoting renewable energies. The ideal will be to set up a mix of energies based on two factors. The first factor is to have an interconnection between African countries. The second one is to develop new technologies, especially in the enlargement of storage and the development of batteries.

The main ideas deduced from this panel

- There is no perfect mix of energies.
- Before implementing a renewable energy, we need to follow three steps: Identify the resources that are available, assist the project, and identify the political, monetary and credit risks.
- Develop new technologies in term of storage and batteries.
- Involve multiple nations. ●

DAY 3

FRIDAY, 4 NOVEMBER 2016

ARF – COP22 AFRICA TALKS:

Prof. Daniel Kammen, Science Envoy for the US State Department, Professor at the University of California, **Berkeley**

Planning tools

- Be more efficient in using energy, whether electricity or fuel.
- The electrification programme: use electricity for everything – transportation is one of the areas where electricity should be used to reduce the consumption of fuel.
- Use more bio-fuel and electricity to meet the needs of the country's energy demands. This would help to reduce the emission of greenhouse gasses.

These planning tools are quite complementary because they work together to achieve a big objective: **Reduce the emission of GHG.**

Some countries, like Kenya, use kerosene to make light. The kerosene lamps cost almost nothing, but each one of them may consume USD50's kerosene per year on average.

What is the solution? In some countries, only a few products are currently being sold on the market, of which some products are light lamps equipped with solar panels so they can recharge using photovoltaic auto-produced energy.

Even with all these renewable energy programmes, so many other companies around the world, and especially in Africa, still lack networks of energy, with large numbers of people not having access to energy. The main goal is thus to use the technologies available to reach these countries.

PANEL DISCUSSION – SUCCESSFUL BLENDING OF PUBLIC AND PRIVATE FINANCING FOR RENEWABLE ENERGY PROJECTS

Public funds are insufficient to support and develop all the interesting existing projects that will resolve energy issues in Africa; hence, the resort to private funds via PPPs. The problem is that these private projects encounter serious difficulties in finding financial resources from banks and other financial institutions.

A stumbling block to resolve energy issues

The main obstacle is that financial institutions in their fly-to safety strategy require a public guarantee to honour the terms of the agreement signed off by the national utility. This guarantee will place heavy liabilities on the given country, therefore forcing it to have large financial supports from international financial institutions like the IMF and the World Bank.

From the bankers' perspective, transforming the private risk into sovereign risk is a matter of assets and liabilities management.

Conditions required by bankers for the project to be bankable

According to **Lucy Chege, General Manager, Energy Unit at the Development Bank of Southern Africa (DBSA)**, six parameters are very important for the project to be bankable:

- A regulatory environment: DBSA uses an indicator called *Ministerial determination*

that estimates the political will and support of the PPPs.

- The procurement process: making sure the PPP signed off between the private actor and the utility was the result of a transparent competitive bidding.
- Externalities: this criterion allows the taking into consideration of the social and climate impact of the project. It encompasses the economic development aspect regarding job creation, schools and/or free clinic buildings, for instance.
- Involvement of local communities: related to the support of the surrounding communities for the project. DBSA requires them to have an equity stake in the project, offering them banking credits for this purpose.
- Technical aspects of the project: related to the feasibility of the project. The project should be well documented with a clear and reliable business plan. The main problem here is the availability of reliable data.

International institutions that fund projects in renewable energies have additional criteria:

- Political stability and legal framework favourable to these projects.
- The company's compliance to international standards in terms of local population compensation, gas emission, et cetera.
- The concessional funds have to be reflected on the tariff fixed by the utility.
- The risk associated to the project must be known, especially the exchange rate risk, and its adjustment.

How to create a liquid market in the renewable energy sector

The renewables sector would be greatly enhanced if there were a liquid market. A liquid market in this sector will require:

- Supporting fiscal policy - low tax rates, for example;
- The emergence of PPPs and the attractiveness of their terms;

- New principles in the markets by changing the structure of the market not just through financial instruments;
- Bankers will have to get out of their comfort zones and take on more risk.

Perspectives of the withdrawal of subsidies by the Moroccan Government

There are fewer projects that aim to develop technology that will enhance agricultural activities and help farmers to access water pumps for irrigation. In Morocco, investment in gas by farmers to irrigate their lands is between 200 and 700 million Dirhams. With the Government's initiative to withdraw the subsidies granted, how will these farmers be able to afford the full price of gas? This issue has not been addressed by any project. Financial measures should be taken by financial institutions and the Government.

PANEL: THE CRUCIAL CONTRIBUTION OF INDEPENDENT POWER PROJECTS (IPPS) IN SUB-SAHARAN AFRICA

Objectives

To define the actual situation of Sub-Saharan Africa in terms of renewable energies, to set up future goals in terms of the development of these energies, and to have an overview of the renewable procurement programme.

An overview of the actual energy situation in South Africa

Globally, the energy situation is beneficial. South Africa is set to undergo economic growth which might be followed by an increasing demand on electricity. Naturally, it is more profitable to be heading towards renewable energy, especially

since their prices have dropped below that of fossil fuels.

For this reason, to obtain a certain balance and mix of energies, South Africa also integrated gas.

Future perspectives and long-term goals to achieve in terms of renewable energy in sub-Saharan Africa

- There are many possible solutions for implanting renewable energy, of which each country has to choose one or many, depending on their needs and resources.
- Renewable energies remain the best options for African countries to meet a growing demand.
- Keep up with the latest trends, such as rooftop PV.
- Putting into action long-term objectives for countries in terms of strategic planning.

South Africa's planning objectives

- Ensure security of supply
- Minimise cost of energy
- Promote job creation and localisation
- Minimise impact on environment
- Minimise water consumption
- Diversify supply sources
- Promote energy efficiency
- Promote energy access

Renewable Energies Programmes

- Projects that are procured: 6376 MW to date through the rolling bid programme;
- Projects that are signed: 4006 MW until now;
- Projects that are announced but not signed yet: 2370 MW;
- Projects that are procured but not yet announced: 1850 MW.

CLOSING KEYNOTES PANEL: WHAT ACTIONS CAN WE COLLECTIVELY ACHIEVE BY ARF 2017?

Objectives

This closing panel is a discussion around different actions that can be achieved by ARF 2017.

Many speakers proposed suggestions and actions that can be achieved by ARF 2017:

- Meet the needs of the African people
- Transfer energy in all the countries
- Improve access to renewable energies
- Stakeholders must make more efforts
- Operationalising the projects
- Having full support and co-operation between countries to lead us into regional integration
- Setting up partnerships with the private sector

In the end, it is all about a South-South Co-operation in order to spread expertise. Also, to envision a completely different energy system that does not exist yet. ●



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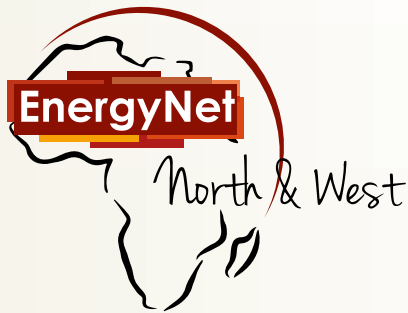


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References:

- ¹ <http://www.energynet.co.uk/page/about-us>
- ² <http://www.cop22.ma/en/what-cop>
- ³ <http://www.cop22.ma/en/cop22-marrakech-cop-action>
- ⁴ http://www.unep.org/roa/amcen/docs/AMCEN_Events/Climate-change/2ndExtra_15Dec/FACT_SHEET_CC_Africa.pdf
- ⁵ Wei, M., Patadia, S. and Kammen, D.M. (2010) "Putting renewables and energy efficiency to work: How many jobs can the clean energy industry generate in the U.S.?" Energy Policy, 38, 919–931.
- ⁶ Cantore, B., Nussbaumer, P., Wei, M. and Kammen, D.M. (2016) Promoting renewable energy and energy efficiency in Africa: A framework to evaluate employment generation and cost effectiveness. United Nations Industrial Development Organization, Department of Policy Research and Statistics Working Paper Report 04/2016.
- ⁷ https://www.iea.org/publications/freepublications/publication/WEO2014_AfricaEnergyOutlook.pdf
- ⁸ <http://leapfrog.cl/en/leapfrogging>
- ⁹ <http://www.un.org/sustainabledevelopment/sustainable-development-goals/>
- ¹⁰ <http://www.se4all.org/our-mission>
- ¹¹ <http://www.un.org/sustainabledevelopment/energy/>
- ¹² www.un.org/en/ga/president/65/issues/sustdev.shtml
- ¹³ <https://www.ase.org/resources/utility-rate-decoupling-0>
- ¹⁴ <http://www.energysmart.enemcc.com/a-practical-guide-to-renewable-energy-terms-what-are-ppas-virtual-ppas-and-recs/>
- ¹⁵ <http://www.greencimate.fund/about-gcf/secretariat>
- ¹⁶ <http://www.infodev.org/climate>
- ¹⁷ <http://www.afdb.org/en/topics-and-sectors/initiatives-partnerships/climate-investment-funds-cif/>
- ¹⁸ [http://www.cnbc.com/news/southern-africa/2016/04/11/african-development-bank-plans-to-invest-\\$12-bn-in-africa%E2%80%99s-energy-sector/](http://www.cnbc.com/news/southern-africa/2016/04/11/african-development-bank-plans-to-invest-$12-bn-in-africa%E2%80%99s-energy-sector/)
- ¹⁹ <http://www.arei.org/>
- ²⁰ (19) AREI Action Plan, (November 2016) <http://www.arei.org/wp-content/uploads/2016/11/AREI-Action-Plan-Nov-2016.pdf>
- ²¹ <https://rael.berkeley.edu/project/switch/>
- ²² Sirte, L.A.J., "Hydropower Resource Assessment of Africa," Ministerial Conference on Water for Agriculture and Energy in Africa: The Challenges of Climate Change, December 2008.
- ²³ <http://www.hydropowerworld.com/articles/print/volume-21/issue-6/articles/african-hydropower/hydro-in-africa-navigating-a-continent.html>
- ²⁴ <http://www.worldenergyoutlook.org/resources/energydevelopment/africafocus/>
- ²⁵ Schnitzer et al. Microgrids for Rural Electrification: A critical review of best practices based on seven case studies. 1 (United Nations Foundation, 2014).
- ²⁶ Bhusal, P. (2007) "Replacing Fuel Based Lighting with Light Emitting Diodes in Developing Countries: Energy and Lighting in Rural Nepali Homes". Leukos 3.4 (2007): 277–291
- ²⁷ UN Report Outlines Ways to Achieve Clean, Sustainable Off-Grid Lighting For Africa - UNEP". Unep.org. N. p., 2016. Web. 12 May 2016.
- ²⁸ B., Roberto. From Gap to Opportunity: Business Models for Scaling Up Energy Access. Rep. N.p.: IFC, 2012.
- ²⁹ Mills, E. "ENVIRONMENT: The Specter Of Fuel-Based Lighting". Science 308.5726 (2005): 1263–1264. Web. 11 May 2016.
- ³⁰ Mills, Evan and Arne Jacobson. (2011) "From Carbon to Light: A New Framework For Estimating Greenhouse Gas Emissions Reductions From Replacing Fuel-Based Lighting With LED Systems". Energy Efficiency 4.4 (2011): 523–546. Web. 13 May 2016.
- ³¹ "Millions Of People Benefit From D.Light'S Solar Lanterns". Acumen. N. p., 2016. Web. 12 May 2016.
- ³² Mills, E. "ENVIRONMENT: The Specter Of Fuel-Based Lighting". Science 308.5726 (2005): 1263–1264. Web. 11 May 2016.
- ³³ SE4ALL. Global Tracking Framework. 289 (United Nations Sustainable Energy For All, New York, 2013).
- ³⁴ Schnitzer et al. Microgrids for Rural Electrification: A critical review of best practices based on seven case studies. 1 (United Nations Foundation, 2014).
- ³⁵ (16) AREI Action Plan, (November 2016) <http://www.arei.org/wp-content/uploads/2016/11/AREI-Action-Plan-Nov-2016.pdf>



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The Forum was very well organized, the quality of discussions was excellent and it presented a unique platform for presenting lessons learnt, exchange of ideas and networking. We are keen to continue to support renewable energy and industry-wide collaborative initiatives.



Lucy Chege, Development Bank of Southern Africa

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