Sustainable Development Goals: The EU at the global partnership forefront

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In September 2015, the United Nations General Assembly adopted the 2030 Agenda for Sustainable Development; featuring a set of 17 measurable and time-bound Sustainable Development Goals (SDGs) with 169 associated targets for 2030. This comprehensive set of goals succeeds the Millennium Development goals (MDGs), which focused efforts over the last 15 years on improving the material quality of life of the planet's poorest. The SDGs have a broader focus on development, in both rich and poor countries. The new goals cover a range of topics from poverty eradication to combatting climate change and how global partnerships should be established to achieve these goals.

While energy did not appear, distinctively, in the Millennium Development Goals (MDGs), for the first time it is recognized as a key enabler of sustainable development by the creation of a dedicated SDG7. With investment in energy infrastructure accelerating, the focus in this HET is placed on both SDG7 as well as an SDG that emphasizes the importance of GHG mitigation and adaption to climate change (SDG13). The two are strongly related. The energy sector is the largest emitter of anthropogenic emissions, and investments made now will lock in emissions trajectories. At the same time irrigation, hydro flows and cooling are required for biofuel, hydro- and thermal based power generation respectively. And water availability is strongly affected by a changing climate. Thus ensuring energy systems are also climate adaptive is important.

Given the development imperative, this Hot Energy Topic (HET) places emphasis on the importance of SDG 17, which relates to global partnerships. We focus on how the European Union (EU) should play a significant role to assist developing economies in Africa in meeting their energy targets.

Thus, this HET analyzes advancement to SDG7 (access to a clean energy) and SDG13 (combat and adapt to climate change) in Africa through the prism of SDG17 (partnership).

Why a focus on Africa?

In 2015, 32% of sub-Saharan Africa had access to electricity, while the rural electrification rate scarcely reached 18% [1]. By 2030, the number of African people without access to electricity is set to increase by 11% if a global and coordinated action is not launched quickly [2]. Furthermore, the UN's Intergovernmental Panel on Climate Change (IPCC) has declared the African continent most vulnerable to the impacts of projected climate change [3]. With the GDP of Sub-Saharan countries expected to increase annually by 4.7%[1] over 2016-18, the need for energy, food and water are bound to increase

[1] http://www.worldbank.org/en/publication/global-economic-prospects/data

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multifold, exacerbating the burden on available national resources. This will necessitate additional financial and technical support from developed economies. Sectors are bound to emerge where European firms, with the appropriate technical know-how, can invest and assist. While European institutions can play an important role in policy design to successfully achieve the SDGs by 2030.

Meeting SDG7.1: Ensure access to affordable, reliable, sustainable and modern energy for all

Promoting adapted electrification strategies in Africa - Grid extension

Providing access to the grid has long been the most favoured option by governments, as it is often considered as a central tool for social and development policies. The recently announced New Deal on Energy in Africa [4] clearly illustrates this focus. But if grid extension is essential to the completion of the SDGs, it has proven extremely challenging. The cost of extending the grid sharply rises with the remoteness of areas to connect and low population density. However, the strong political support for grid extension often ignores this reality. Further, extending the grid to millions of new customers provides regulatory, operational and financial challenges that require strong institutional strengthening. Often, adding new large generation capacities shift the focus to target industries, providing large single demands, rather than households, waiting years before being connected. While distributed systems allow for distributed operation and management which can (if undertaken correctly) relieve stress on central institutions.

That is not to say that support is not needed for grid based electrification. Extending the grid to large cities lacking a clear and long-term urbanization plan is a challenge in itself, while coping with demographic growth and rural exodus is a situation that many African States have not been able to sustain. In 2012, Africa only counted 33% of urban dwellers among its population. Half lived in slums without access to energy services [5]. It is estimated that the share of urban population in Africa will more than double by 2050. This follows an annual growth rate of 3.4%, largely exceeding the current speed of electrification. At the same time, cities like Kinshasa, which report high electrification rates based on the number of grid interconnections (90%), actually suffer severe blackouts because of poor design, maintenance or load management [6]. However, lack of reliable information makes the situation difficult to effectively quantify. And, herein, lies a clear opportunity for the EU.

The EU can be a crucial partner in assessing the needs and enhancing electrification. Through the Africa-EU Energy Partnership the EU has been involved in assisting large-scale electrification projects for about a decade, with innovative financial instruments such as *ElectriFi* combining EU funds and private sector investment for smaller projects. Such efforts would do well to coordinate with recent global analysis, such as undertaken by the open effort of UNDESA[2] with the UNECA. The EU's Technical Assistance Facility (TAF) provides support for energy policy design and has helped levy EUR 25 billion over the past four years [7]. The EU has also a role in supporting the emergence of renewable energy technologies where technical knowledge, institutional strength and access to finance remain an obstacle to their grid integration. Various analysis indicates that Africa has a potential for more than 10TW of economic renewable power production capacity. However, large potential centralized projects based on fossil fuels still remain high

[2] See the Global Electrification Pathways tool here: http://un-desa-modelling.github.io/Electrification_Paths/index.html

on political agendas [4]. Thus while access to electricity is a development priority, its trajectory will impact emissions mitigation, SDG13. Off-grid projects would particularly benefit from EU assistance to support a market-based approach even in populated suburban areas. This might provide a useful approach to help overcome hurdles associated with slow, ineffective or unreliable grid extension.

Off-grid and Mini-grid

According to the International Energy Agency (IEA), off-grid and mini-grid systems should be deployed in 70% of remote areas to ensure the completion of SDG 7.1 by 2030 [8]. Among these, renewable systems are a competitive alternative to backup generators. Africa relies heavily on diesel or kerosene generating units which constitute a significant economic burden: in 2012 they covered 16TWh of electricity demand at an average cost of USD 310 per MWh [9].

While renewable off-grid systems have remained expensive and relatively unreliable for decades, a 75% drop in the price of photovoltaic modules since 2009 and a 42% drop in the price of batteries, along with improved efficiency, should lead to a reappraisal of their role for electricity access [10]. Combined with efficient appliances, such technologies could help households climb the energy ladder for a fraction of the cost expected from grid-based electricity [11]. The case of Bangladesh showed that in relatively high population density areas, off-grid systems benefit from economies of scale and can be deployed more rapidly than the grid.

Numerous large energy companies now drive off-grid energy access programs, with promising results. The Global Off-Grid Lighting Association estimates that USD 500 million should support the takeoff of a robust off-grid market. Although return rates remain low (3-6% expected after the third year), the energy industry foresees a USD 3 billion market for off-grid lighting and USD 6 billion for Solar Home Systems [12]. The growing involvement of start-ups in the sector is a sign of strong economic dynamism.

However, several prerequisites (mainly capacity building, regulatory framework and improvements in financial support) must be put in place before witnessing a real take-off, where EU institutions have a significant role to play.

1) The EU has outstanding experience in developing regulatory frameworks that may prove useful for African States. For now, mini-grid development (for example) is hampered by electricity regulations and tariffs adapted to large grid systems, while different regulatory frameworks in neighbouring countries limit market development. Indeed, companies cannot hope for economies of scale at the regional level. Adapting to a new legal environment necessitates the mobilization of important resources while this industry needs standardization. Quality standards and norms must also be enhanced so as to ensure that poor quality products (like lead batteries) do not destroy the market and the confidence of potential beneficiaries.

2) Improving data collection and analysis is essential to improve insights on where and to which extent investments are needed. Currently, electricity supply is supposed to be effective when the connection to the grid exists, which does not match the reality.

3) The EU may help countries in capacity building in order to enhance long term planning taking into account all the electrification options. At the moment investors have troubles assessing the risk they face since authorities are often unable to clarify grid extension plans. They could

promote acceptance towards new electrification solutions and help channel the benefits of this new sector to local communities. A part from the economic benefits they would provide to people relying on biomass or diesel, the emergence of a market will create opportunities to invest in local training, distribution networks, and recycling structures supporting local economies. But a clear development plan for all these sectors must be set up to show the benefits of fostering off-grid electrification.

4) The EU's support may thus develop, in partnership, a multi-dimensional support activity that ends with access to financial support and risk mitigating instruments. Dimensions would include: based on (1. and 2. above) A. Developing transparent resource, demand and supply data-collection, modelling and mapping. B. Undertaking institutional and financing gap analysis. And, C. Support to fill those gaps, including capacity building (noted in point 2) and going on to incentives and risk mitigating instruments for investors. One identified opportunity is to mainstream the scaling up of innovative or proven business models. (Note that many successful small scale private electrification projects exist, but it is postulated that they might be significantly scaled up.) Bigger pools of capital might be made available – or be secured through financial instruments - to make these business models scalable, while at the moment commercial banks are timorous in supporting off-grid projects. Financial support and instruments have to be better tailored to suit different energy needs across different 'market segments', especially the poorest that are considered as not profitable enough. At the moment, the EU supports only projects larger than EUR 0.5 million.

Renewable energy: a pillar for the development of Africa with important challenges and opportunities for cooperation with the EU

By targeting an "affordable, reliable, sustainable and modern energy for all"[13], SDG 7 does not only aim at ensuring energy access for the poorest (SDG 7.1), but also aims specifically at promoting the share of renewable energy in the global energy mix (SDG 7.2.) and at improving energy efficiency (SDG 7.3.). This section explores the market potential for the penetration of renewable energy technologies and how European entities can play a part in it.

4

A shift in the energy mix towards more renewables would support the goal of broader energy access as small-scale and off-grid technologies are well adapted to supply energy at a decentralized level, in remote and rural areas, which still represent 60% of the population on the African continent [14]. Moreover, the geographical and climatic features on the African continent are particularly suitable for variable renewable technologies such as solar and the wind; 85% of the continent's landscape receives at least 2000 kWh/m²/ year[3]. The potential of renewables in Africa is huge but often underutilized. In 2014, the total installed renewable power capacity on the African continent amounts to about 36 GW, when compared to nearly 410 GW within the European Union[4], while the African population is two times larger than Europe's [14].

A shift towards more renewables requires significant investments and, therefore, financial support, capacity building, sharing of know-how and technology transfer are a

[3] SolarGis; http://solargis.info/doc/free-solar-radiation-maps-GHI

[4] Enerdata, Global Energy and CO_2 data; http://services.enerdata.net/

necessity to ensure a sustainable and stand-alone renewable industry and market in Africa. With clean technologies available at an affordable cost, a stable and transparent policy framework will foster a conducive environment for long-term investments.

Investments and financial support as impulse for the renewable market in Africa

Although Africa (inc. the Middle East) has seen investments in renewables (excl. large-scale hydro) grow at an impressive rate of 25% per year over 2010-2014, compared to a declining rate in mature European markets of 12%, the continent still represented less than 5% of global new investments in renewables (excl. large-scale hydro) in 2014 [15].

According to the African Development Bank, a total investment of USD 547 billion would be required by 2030 to reach the target of universal access to reliable and cleaner power on the continent [16]. With more than USD 3 billion spent over the period 2009-2013, the European Union has historically played a key role in investing in Africa. At average spending of USD 600 million per year, European institutions indeed represent the second biggest multilateral provider of official development aid (ODA) to the African energy sector behind the World Bank [17]. Although the EU has reinforced its commitment to support development in Africa with the launch of a Pan-African Development Cooperation Instrument (DCI) Programme in 2014, the recent economic crisis has also raised concerns about the ability of the EU to spend 0.7% of its Gross National Income (GNI) on overseas assistance as committed. In 2014, the total net Official Development Assistance (ODA) from the EU-28 amounted to 0.41% of its GNI[5].

Furthermore, less than 5% of the total ODA provided globally by the EU is specifically allocated to "energy generation and supply", without explicitly mentioning renewable energy [18]. Specific objectives focussed on renewables were however set out by the Africa-EU Partnership (AEEP), especially through the reaffirmation in April 2014 of clear renewables capacity targets for 2020: build 10 GW of new hydropower facilities, 5 GW of new wind power capacities, 500 MW of new solar power, and triple the capacities for all other renewables [19]. If investments are required for Africa to develop its renewable energy sector, it is also a great opportunity for European companies and organizations to establish themselves in such a promising market.

By 2040, the African final energy demand, driven by GDP and population growth, should increase at an average annual rate of 1.4%. In order to address these increasing needs, power generation capacity is expected to more than double. By 2040, the total installed renewable power generation capacity is expected to reach 230 GW which is six times the currently installed renewable capacity. Installed solar capacities (PV and CSP) alone are expected to reach more than 50 GW in 2040 [20].

Building an enabling framework for investors in renewable technologies

At present, business environment, policy and legal frameworks at the Pan-African and countries' levels have not been robust enough to stimulate very large scale, international, regional or local private and public

[5] http://www.oecd.org/dac/stats/documentupload/ODA%202014%20Technical%20Note.pdf.

investments. Political instability, lack of transparency in regulations, unclear or inexistent government strategies in the energy sector are a significant barrier for investors or industrial actors. In many countries, electricity tariffs in place are not cost-effective and there are no proper incentive systems for renewable technologies. Moreover, competition and customer-oriented practices have not been encouraged due to the domination of government owned monopolies. Building enabling frameworks is a pre-requisite for the sustainable development of the renewables market. Since the policy framework and the power market in each of the African countries are at different levels of maturity, the design of strategies must be differentiated and adapted to the local context. Indeed, initiatives and reforms are emerging at national levels in all parts of the continent. For an example, Ghana introduced feed-in tariffs as well as renewables purchase obligations for large customers in 2012; since 2011, South Africa has successfully attracted private investors through its Renewable Energy Independent Power Producers Procurement Programme (REIPPP); Morocco has successfully implemented a Renewable Energy (RE) program. Under the REIPPP, 6327 MW of power generation capacity consisting of biomass, small hydro, solar and wind power plants have been allocated during the four completed bidding rounds [21]. Actions are taken at the Pan-African level too. At the COP21 in Paris, African leaders announced the creation of the African Renewable Energy Initiative, which sets a continental target of 10 GW of additional renewable energy capacity by 2020 and 300 GW of power generation capacity from clean energy sources by 2030.

On such issues, the EU and its member states can prove themselves as helpful partners by bringing their long-standing expertise in designing and implementing efficient strategies and policies by selecting adapted instruments (subsidy schemes, pricing methods, tax incentives, quotas on renewables…). The EU, in particular, has a unique experience in the coordination and harmonization of different national approaches into a single coherent policy framework. This is a central topic for Africa as is increasing the interconnections between regions and countries, enhancing infrastructure in the power pools through the development of cross-border projects and implementing progressively common standards. These actions will be essential for the continent to develop a mature and efficient renewables market thus enabling both an economic and socially sustainable development.

The vital role of knowledge transfers and interdisciplinary cooperation through partnerships

To meet these challenges and ensure a sustainable development of renewable energy technologies in Africa, strong cooperation is not only needed at the institutional and governmental levels, by supporting policy makers, planners and large market players; it is also vital that the European public or private partners provide dedicated know-how both to African academic and industrial stakeholders. In the market for renewable technologies, African countries are still facing a lack of local skills. These skills are abundant in the EU. They vary from developing long-term investment strategies; legal frameworks; policy formulation; institutional and regulatory frameworks; research, development (R&D) and innovation capacities – amongst others. Both providing short term services and longer term upskilling and transfer can help bring a dynamic engine for sustainable growth and a vibrant market opportunity for the European industry.

The Africa-EU Renewable Energy Cooperation Programme (RECP), launched in 2010, is

based on such an integrated approach. Besides financing facilitation and advising on policy issues, it aims at enhancing research and innovation through vocational education and training (VTET). Under the support of the European Union Energy Initiative Partnership Dialogue Facility (EUEI PDF), higher-education programs were created in cooperation with more than 20 African universities such as the Mekelle University in Ethiopia, Makerere University in Uganda and the University of Dar es Salaam in Tanzania [22].

Successful cooperation will be profitable for both EU and African partners. It could foster the socio-economic development of the African continent through the creation of energy-related jobs in maintenance, operations, and manufacturing sectors. For European players, cooperation with highly skilled and well-trained local partners guarantees a higher security for their long-term investments, easier and more qualitative maintenance of power assets. This could lead to opportunities for the creation of load sub-contracting or production schemes. In the short term, there are many mature power generation, transmission and distribution technologies that are available now. With institutional and financial support, they can be developed to service growing and profitable economic activity. Filling this gap is an immediate short-term step to be recommended.

In the longer term, the challenges for scientific and technical cooperation are to make domestic innovation thrive in African countries so that they can modify and adapt renewable energy technologies to suit their needs and thereby migrating from the category of "technology users" to "technology developers" [23].

Developing such a mutually beneficial integrated approach, where both European and African partners ultimately succeed in creating and reinforcing mature renewable markets in both continents, connected by strong imports-exports flows and interdisciplinary (technical, industrial, academic) cooperation, will pave the pathway in achieving the sustainable developments goals.

The need for a Global Climate Finance partnership

To significantly mitigate the risks and adapt to the changing climate, the recent Conference of Parties (COP) in Paris has agreed to contain the increase in global average temperature to well below 2°C above pre-industrial levels and strive towards limiting the increase to 1.5 °C [24]. The agreement also calls for an increase in Climate Finance for developing economies to combat climate change and for the provision of technical support from developed economies. It is not a coincidence that the need to strengthen resilience and adaptive capacity to climate-related events, increased international partnership for knowledge transfer and availability of international funds are part of the list of goals under the United Nation's 2030 Agenda for Sustainable Development [14]. To Quote the UN Secretary General, Dr. Ban ki-moon "Climate change carries no passport and knows no national borders. Countries must work toward the common interest, beyond narrow national interests".

Funding for fighting Climate Change: How is the EU faring

The European commission and the EU member states have been in the vanguard to assist underdeveloped and developing economies including small island states to combat Climate Change. The Global Climate Change Alliance+ (GCCA+), the latest avatar of the GCCA, is a body which coordinates funding from the European Commission towards technical,

financial and policy support for fighting Climate Change. The GCCA has sourced about USD 326.5 million, through multilateral funds, since its inception and close to 54 % of that funding has been distributed to developing economies in the African continent[25]. Approximately 87% of the GCCA funds are channelled through the European Commission and the rest through individual contributions from a few EU states. Figure A-1 (Annex) shows the relative distribution of GCCA funds to African countries.

Individual members of the EU have pledged approximately USD 4.75 billion to the UN's Green Climate Fund (GCF) which accounts for more than 46% of the total pledged money for the GCF so far. In Africa, the GCF is active in Malawi, Rwanda, Kenya, and Senegal promoting off-grid solar and increasing the resilience of ecosystems and communities to Climate Change [26].

In the period from January 2003 to November 2014, the European Commission and the EU member states have, through multilateral and bilateral funds, pledged roughly USD 19.9 billion for fighting the effects of climate change across the globe. It is estimated that 37% of this finance is channelled to developing economies in Africa through a set of climate funds which are broadly classified into Adaptation, Mitigation, REDD+[6] and multiple foci[7] categories [25].

The Mitigation Funds focus on funding projects which contribute towards the reduction of GHG emissions. The Adaptation Funds help in improving the resilience of infrastructure, processes, and practices in the event of a changed climate. This also involves benefiting from the positive effects of Climate Change. The REDD+ involves activities related to reducing Emissions from Deforestation and Forest Degradation.

Figure 1 and Annex Table A-1 (Annex) give the split in European Climate funding by category and by source.

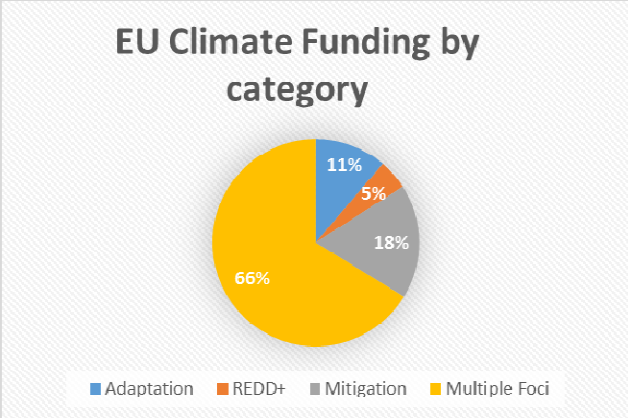

Figure 1: EU funding for Climate Change by category

The Joint Africa-Europe Strategy

The Joint Africa-Europe Strategy (JAES) was formed in 2007 in order to facilitate close cooperation between the European Union, the EU member states and the African Group of Nations (AGN).

Climate change is one of the priority areas of cooperation in their agenda. The European Centre for Development, Policy and Management (ECPDM) in their recent publication discuss the effectiveness of JAES in combatting climate change and how the JAES has evolved since its inception. The report states that this joint roadmap might have improved the communication among African and EU actors regards to their joint actions related to climate change compared to a situation without such a partnership[27]. But this Climate Change partnership has not been able to fulfil the promise to take concrete actions for mitigation and adaptation to the changing climate. The main reasons for this

[6]http://www.unredd.org/AboutREDD/tabid/102614/Default.aspx
[7] Involves Adaptation, Mitigation and REDD+ categories

appear to be the reduced involvement of political actors in decision-making [28]. In 2014, at the 4th EU-Africa Summit in Brussels, these concerns were discussed and the European Union (EU) and the African Union (AU) reiterated their willingness to work together to fight climate change and increase the involvement of political leadership [27]. The executives of the JAES convened on February the 26th of 2016, at Addis Ababa[8] to discuss the joint collaboration to complement the COP 21 agreement and develop an infrastructure roadmap to meet the SDGs. This indicates good prospects for sustained future cooperation.

Clean Development Mechanism: an update on Africa

Continental Africa's contribution to the increasing GHG concentration in the atmosphere is considered insignificant, 2-3%, compared to other developing and developed countries. The Kyoto Protocol led to the formation of the Clean Development Mechanism (CDM) where developed economies could invest in sustainable, emissions reduction projects in developing economies and use the corresponding emissions certificates to offset their own emissions. There are close to 8500 CDM projects implemented in developing economies and it is interesting to note that only 244 of them are in Africa; a meager 2.9% [29]. These projects in Africa constitute about 2.8 % of the total Certified Emission Reductions (CER) generated as of 2012. A report by an FP7 funded consortium suggests that Europe, as part of CDM investments, should not invest in large scale centralized power plants for power generation, but rather emphasize on more decentralized generation projects, such as residential-scale Solar PV plants, micro hydro plants and micro and mini-grid projects to effectively increase electricity access in Africa and contribute at grass root level towards CO_2 mitigation [30]. Despite the opinion that CDM investments in Africa have not actually contributed to slowing down climate change but actually created negative side effects by improper investments [30], the Adaptation Fund (AF) gets most of its financing from the 2% levy on the CERs sold from CDM projects [31]. With many African economies transitioning to a new era of higher GDP growth and increased energy consumption, investments from European countries in projects to promote a greener and sustainable power generation is very much a necessity. As of December 2015, 40% of the total pledged funding for the Adaptation Fund comes from the sale of CERs and additionally European countries, namely Germany, Sweden, and Spain with a respective contribution of 24%, 12% and 12%.

With the developed economies promising to contribute USD 100 billion every year by 2020 to fight climate change and increasing the cap by 2025 [24], it is evident that the EU and its member states and other developed economies in the world will have to play a critical role in both mitigation and adaptation measures to reduce the impacts of climate change. This effort does not stop by just contributing to funds but also through technology and knowledge transfer, so that the developing economies vulnerable to climate change need not depend on third parties for assistance with mitigation and adaptation measures.

[8] http://www.africa-eu-partnership.org/en/newsroom/all-news/reference-group-infrastructure-africa-and-eu-respond-evolving-challenges-arising

Conclusion

In this note, we focus on the EU's potential impact to help the least developed continent, Africa, reach the SDGs. In 2015, Sub-Saharan Africa's electrification only reached 32%. Helping Africa to reach a reasonable level of household consumption by 2030 represents a USD 1 trillion investment opportunity. Significant investments in grid extension, mini-grid and off-grid are projected. An example of an estimated optimal split for Uganda is discussed in Figure A-2 (Annex).

In terms of bulk electricity generation, assuming current growth levels, annual investment needs in the African Power system amount to around USD 30 billion by 2030. According to a recent analysis, almost half of this will be invested in renewable energy technologies, assuming a well-functioning market [32]. Africa is blessed with higher economic renewable energy resource potentials than Europe [33], higher growth prospects [34] and as a result high mitigation potential. We should also note that GHG mitigation funding (with adaptation contributions) from the EU is growing. Together these represent a significant opportunity for investment, underpinning SDG 17: Revitalizing the global partnership for sustainable development. Next steps might be a comprehensive mapping of needs, supplies and funds in an open transparent financial partnership [35].

EU institutions have a significant role to play to help African countries to implement a transparent policy framework, an investor-friendly institutional and regulatory environment aiming at developing adapted sustainable energy solutions for the continent to attract business. The EU also should also better contribute to financial support, capacity building, promoting know-how sharing and technology transfer for sustainable energy solutions.

The aim should be, in particular, to strengthen the cooperation between European and African market players and to help the development of local industries in Africa capable of implementing sustainable energy solutions. This will lead to important benefits concerning energy access, the environment, as well as social and economic development. A concern, however, is that there appears to be no clear quantification of the opportunities created by SDG7 and SDG13. In order to correctly calibrate and mobilize action into an efficient financial commitment, such a step is essential.

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Annex A

Country/Entity	Pledged CC funds (million USD)
United Kingdom	10550.19
Germany	3927.95
France	1559.19
Sweden	1015.09
Spain	510.72
Netherlands	476.07
European Commission	447.88
Italy	427.96
Finland	274.21
Belgium	261.85
Denmark	250.05
Austria	79.14
Ireland	60.82
Luxembourg	22.75
Czech Republic	11.65
Others*[9]	6.89
Portugal	6.38
Slovenia	5.92
Hungary	5.64

Table A- 1: Pledged climate funds by the European commission and the EU member states

[9] Others include: Greece, Estonia, Cyprus, Latvia, Monaco, Liechtenstein, Malta and Poland which have individual contribution less than USD 2 million

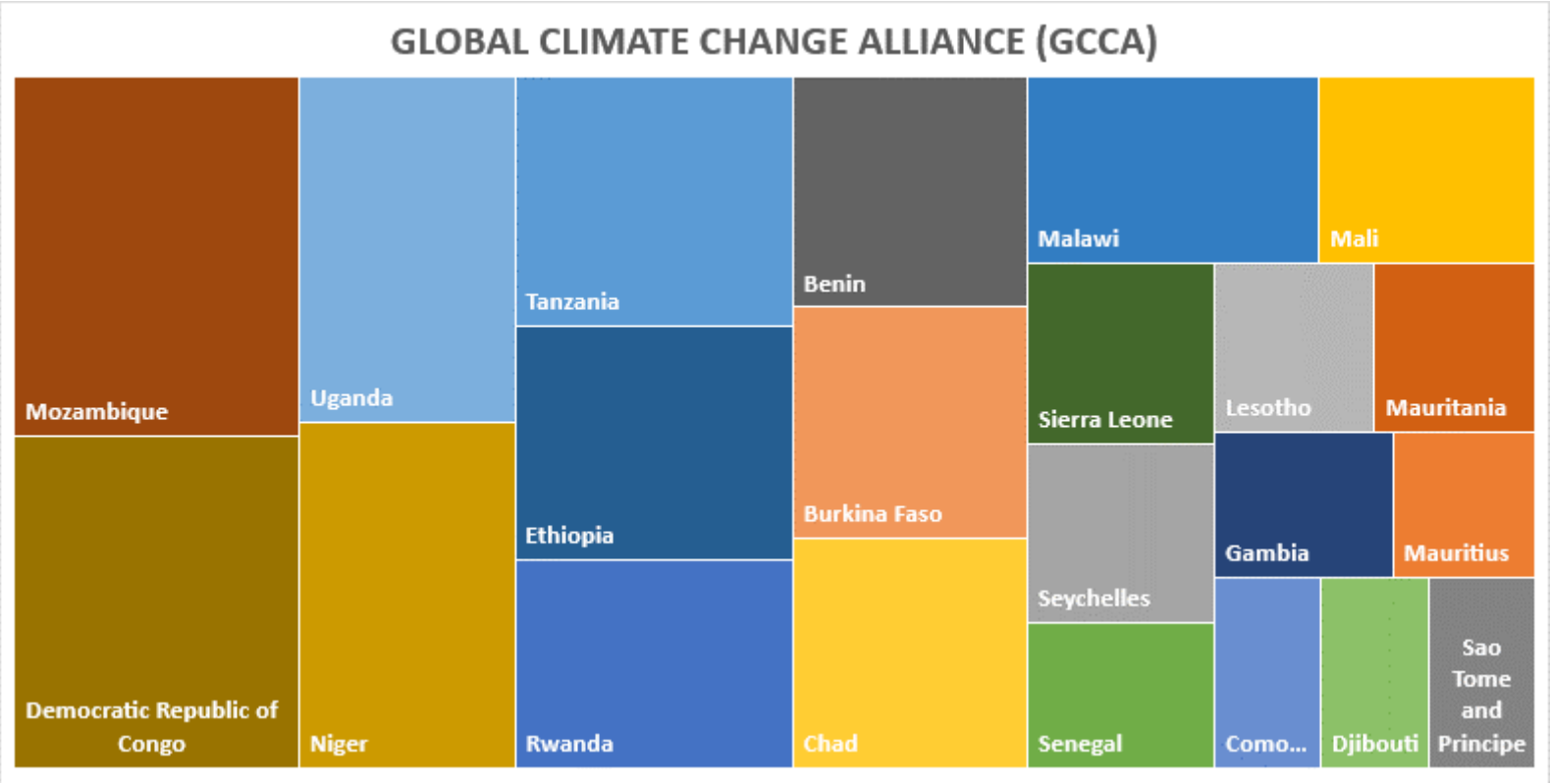

Figure A- 1: GCCA funding split by target African country[10]

[10] Climate Funds update: http://www.climatefundsupdate.org/data

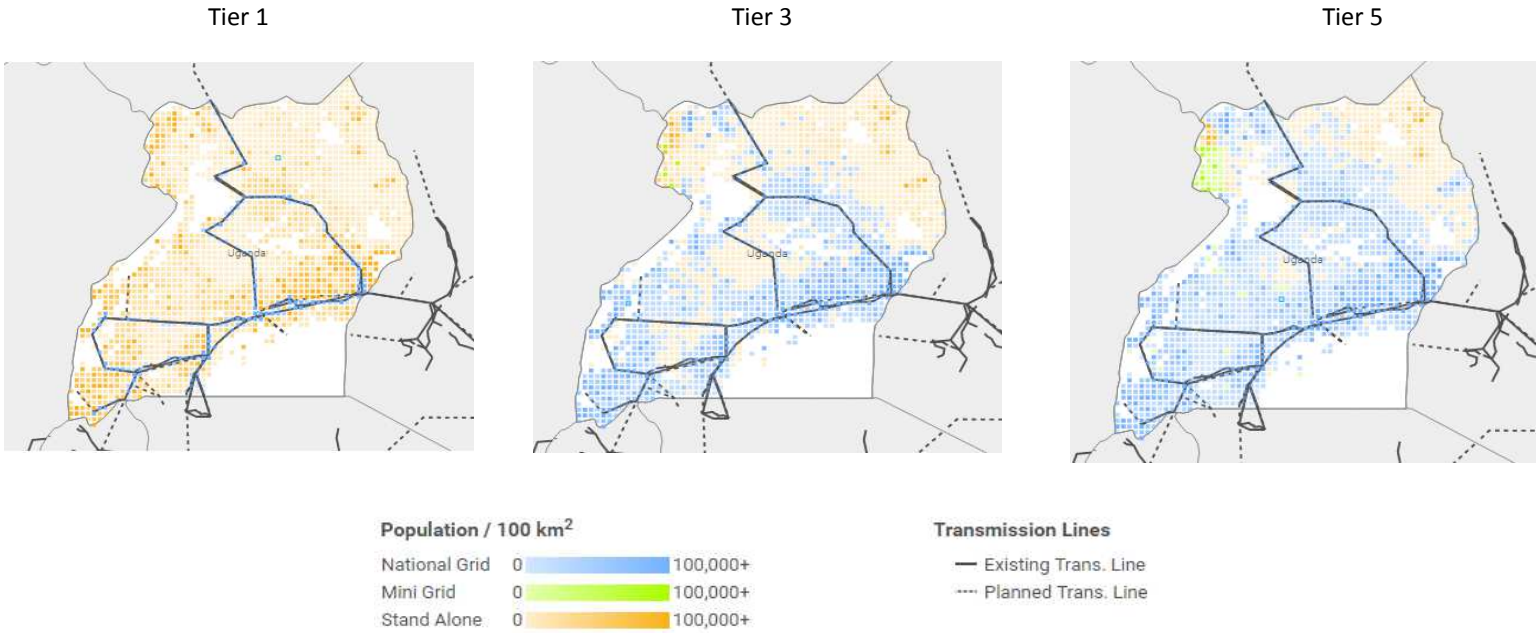

Figure A- 2: Least cost investment mix to reach different levels of electrification in Uganda [11]

Note: Least cost electrification options for reaching full residential access to electricity by 2030 were calculated and mapped for about 243,000 locations in Sub-Saharan Africa. The electrification options - grid connections, mini grid and stand-alone solutions - vary depending on the consumption levels, renewable resource availability (hydro, solar, wind), existing and planned infrastructure (road and transmission network, power plants, mines). The effects of increasing consumption on technology split are illustrated for three different targets of electricity demand (Tier 1, 3 and 5). As household demand for electricity increases the relative proportions of grid based and mini-grid solutions increase. This comes at the expense of stand-alone options. This is due to scale and operating cost considerations. It is expected that roughly 85% of the new connections will be achieved by standalone systems for low electricity levels (Tier 1), whilst for higher levels of consumption grid connections are the dominant solution; ca 65% and 76% for Tier 3 and Tier 5 respectively. An example for Uganda is shown in Figure A-2.

[11] Source: Mentis et al: Lighting up the World: The first global application of an open source, spatial electrification model OnSSET. submitted https://unite.un.org/sites/unite.un.org/files/app-desa-electrification/index.html