FINANCING THE ENERGY TRANSITION IN SUB-SAHARAN AFRICA

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Abstract

Africa has contributed the least to climate change yet it is one of the most vulnerable regions to the adverse effects of climate change in the world. It is projected that up to 116.8million people are likely to be exposed to effects of rising sea levels in low coastal areas with women and girls at the most risk for internal displacement as a result of climate related disasters. The African Development Bank has estimated that Africa requires between US$1.3 to 1.6 trillion from 2020 until 2030 to mitigate the adverse effects of climate change in Africa.

In addition to climate related challenges, Africa has a significant energy deficit with more than 700 million people with no access to electricity. Electricity demand is projected to increase within the next decade because of urbanisation, technology, regional integration and climate change. The energy transition offers Africa the opportunity to leapfrog fossil fuels dependent technologies and adopt climate-friendly and energy-efficient technologies to meet Africa's developmental energy needs.

The paper will highlight the clean energy finance gap in selected countries in Sub-saharan Africa and the challenges to financing renewable energy projects in those countries. For research, I will review the energy transition plans of the selected countries, use data from secondary sources and reports and interview stakeholders in the energy sector.

Lastly, the paper will discuss innovative financial models, instruments and policy initiatives which will spur increase in private and public finance for renewable energy projects in Africa.

Introduction

According to the State of Climate in Africa report[1], Africa is in a climate crisis. African regions are experiencing heavy rainfall, heatwaves, droughts, flooding, tropical cyclones, wildfires, and sandstorms resulting in significant adverse consequences with millions of people internally displaced.[2]

In addition to the global climate crisis, Africa faces multi-layered developmental challenges exacerbated by a significant energy deficit. More than 600 million people in Sub-Saharan Africa have no access to electricity[3] and about 70% of Africans still rely on dirty fuels for cooking.[4] Lack of access to clean cooking is one of the leading causes of premature deaths with women and children particularly at risk.[5]

Clean energy transition provides Africa with an opportunity to close its energy access and infrastructure gap, improve the livelihoods and productivity of millions and reduce greenhouse gas emissions. Increasing investment in clean energy will not only help alleviate the devastating effects of climate change but will also accelerate the achievement of the other sustainable development goals (SDGs)[6].

Globally, there has been a remarkable surge in clean energy investments over the past few years but very little of these funds flow to Africa. According to a recent IEA report[7], out of about $770 billion invested in renewable energy in emerging and developing economies annually less than 2% is invested in Africa.

The clean energy investment gap in Africa is huge. Africa requires over USD100 billion per annum annually to achieve its sustainable development goals by 2030 and align with its climate goals.[8]

This paper discusses clean energy investment needs in Africa, the barriers to clean energy investments and proposes solutions for the design of innovative financial instruments and policies to encourage investment in clean energy projects in Africa.

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[1] World Meteorological Organisation, State of Climate in Africa, 2022, published in 2023.
[2] Ibid
[3] United Nations Conference on Trade and Development (UNCTAD), 2023. Commodities at a glance: Special issue on access to energy in sub-Saharan Africa
[4] International Energy Agency in collaboration with African Development Bank Group, A Vision for Clean Cooking Access for All: World Energy Outlook Special Report published in 2023
[5] Ibid
[6] International Energy Agency (IEA) in collaboration with the International Finance Corporation: Scaling up Private Finance for Clean Energy in Emerging and Developing Economies, published in June 2023
[7] Ibid
[8] IEA (7)

Clean Energy Investment Needs

Presently more than 70% of the funds in the energy sector is used to finance fossil fuel investments.[9] For countries in Africa to provide sustainable energy for all in line with Sustainable Development Goal 7 by 2030 and meet their climate commitments, a significant shift is required in the financing of energy projects. Priority must be given to clean energy investments coupled with investments in transmission and distribution infrastructure. Investment in renewables and grid infrastructure must account for not less than 50% of total energy investments by 2030.

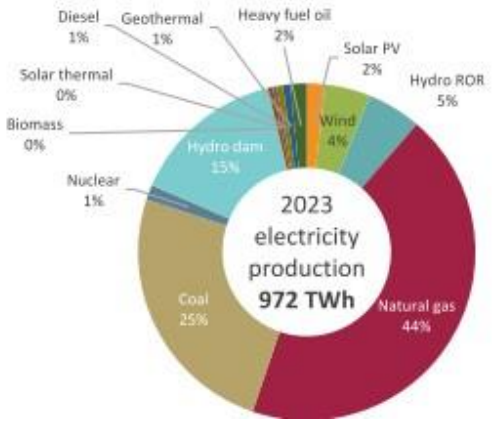

Fig 1: Africa Electricity Generation mix

Source: African Union Development Agency, Africa Continental Power Systems Masterplan, Support Studies – Solar Power

Following the global shift to renewables, Solar PV is projected to be the cheapest source of electricity in 2030. Currently, Africa has some of the best solar resources globally but has less than 2% of the total installed solar capacity globally. Significant clean energy investment is required to realise the potential of solar energy in Africa.[10]

[9] International Energy Agency (IEA) in collaboration with Africa Development Bank Group, Financing Clean Energy in Africa,

[10] International Energy Agency, Africa Energy Outlook, 2022: World Energy Outlook Special Report

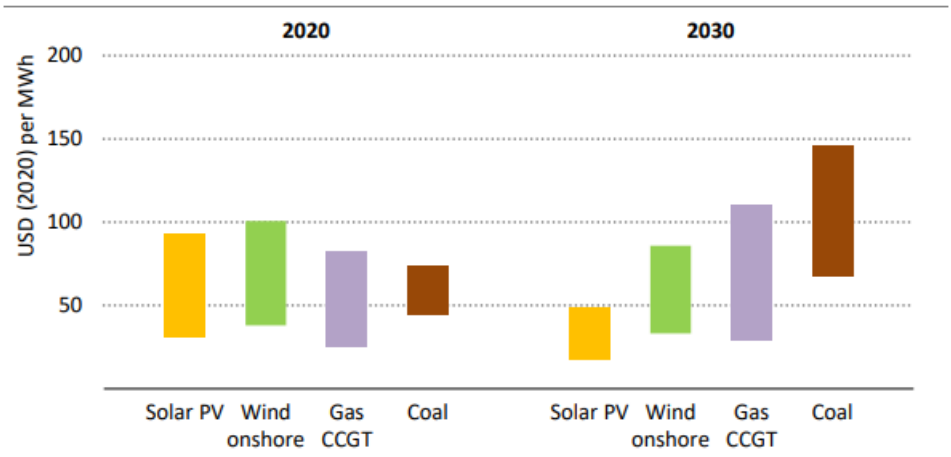

Fig 4: Levelised cost of electricity for selected sources projections

Source: IEA Africa Energy Outlook 2022

Investment must also be made in emerging clean energy technologies including battery storage, hydrogen, wind and pumped storage hydropower which will be required to mitigate the risk of unstable and unreliable energy systems due to the intermittent availability of solar.[11]

Energy Transition Financing Needs in selected countries in Sub-Saharan Africa

Nigeria[12]

The Nigerian Energy Transition Plan predicts that Nigeria requires up to $1.9 Trillion to achieve net-zero carbon emissions by 2060 including $410 Billion above projected spending in a scenario without the implementation of the energy transition plan. The bulk of the spending is estimated to be centered on power with an additional capex requirement of $270 Billion for improving power generation capacity and $135 Billion earmarked for the upgrade and expansion of the country's transmission and distribution lines. It is further envisaged that the country will save at least $121 Billion from the replacement of fossil fuel-based energy sources with renewables.

Financing of clean cooking solutions is also high on the agenda with about $79 Billion designated to push the adoption of clean cooking solutions in Nigeria.

Ghana[13]

The Ghana Energy Transition and Investment Framework envisages that Ghana would need around $500 Billion in capital investments to achieve its net-zero carbon emissions by 2060 including $140

[11] IEA (10)
[12] https://www.energytransition.gov.ng/#Finance
[13] https://www.seforall.org/news/ghana-launches-usd-550-billion-energy-transition-and-investment-plan-for-achieving-net-zero#:~:text=The%20country's%20existing%20Energy%20Transition,are%20proposed%20in%20the%20plan.

Billion above projected spending in a scenario without the energy transition and investment plan. The plan aims to intensify decarbonisation efforts across all sectors including power, transport, cooking and industry and drive the creation of about 400,000 new jobs by 2020.

Capital markets are expected to provide the largest funding pool for the projects but these would require concessional financing structures to increase lenders appetite for the project risks.

South Africa[14]

The South Africa Just Energy Transition Investment Plan (JETP) projects that South Africa will require about US$98.7 Billion to achieve the decarbonisation commitments made by the South African Government between 2023 and 2027. According to the JETP, close to 50% of the funds will be utilised for the decommissioning of coal plants, and the upgrade and extension of the transmission and distribution systems to adapt to the transition to renewables. There is also significant consideration on how to train coal workers and support their move to renewable energy jobs.

In addition, South Africa is looking to spur investments in renewables including solar PVs, wind and batteries. Investment is also required for the development of local electric vehicle manufacturing companies and local supply chains.

Barriers to clean energy investments in Africa

Despite the continent's huge potential for the deployment of renewable energy and clean energy and decarbonisation technologies, investments in renewable energy remain scant. From discussions with key stakeholders in the clean energy sector, the following were identified as barriers to scaling clean energy investments in Africa.

High cost of capital and limited access to capital[15]

Rising debt profiles of many States in Africa coupled with weak fiscal policies and financially weak utilities have resulted in high cost of finance for clean energy projects in many African countries. Many Africa countries do not have the fiscal space to grant concessions to the private sector to spur investments in clean energy projects. This translates to high electricity tariffs which reduces affordability especially in rural areas where most of the end users have little or no income.

[14] South Africa's Just Energy Transition Investment Plan (JET IP) for the initial period 2023 – 2037
[15] IEA (7)

In addition, investors are not able to access the capital they require due to the lack of sufficient liquidity and depth of local capital markets.[16] Also, due to regulatory restrictions e.g pension funds, many investors are not able to access significant long-term local currency financing for their projects.

There is also limited access to equity finance for clean energy investments due to the risky nature and small scale of the projects. As a result, project sponsors are not able to provide project development costs without support from third parties including development financial institutions and donors. This also increases the need for project finance since most sponsors do not have enough liquidity to fund the project. The loans are then secured with future cash flows. For projects in low-income communities where affordability and offtake risks are high, this can pose a challenge.

Furthermore, due to the political instability and macroeconomic conditions in many African countries, the cost of political insurance[17] and hedging instruments for long-term hard-currency financing for clean energy projects is prohibitive.

Legal and regulatory uncertainty

To rapidly increase the flow of finance to clean energy investments in Africa, a stable legal and regulatory environment is crucial. Countries must have clear legal and regulatory frameworks for business establishment, permitting and licensing process and foreign exchange regime.[18] For instance, to support investments in mini-grids in underserved rural communities which are not connected to national grids, there must be guidelines to protect mini-grid developers in the event of an extension of the grid to such rural communities.

Adverse and unstable regulatory changes weaken investor confidence and impedes clean energy investments.

Poor grid infrastructure and system integration[19]

Poor grid infrastructure and low system integration is one of the drawbacks to investment in clean energy projects in Africa. Over 50% of utilities in sub-Saharan Africa are not able to meet their debt obligations as a result of high network losses, inefficient collections and tariffs which are not cost-reflective. Isolated power systems further increase the cost of deploying renewable energy on a large scale especially for solar PV projects.

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[16] IEA (7)

[17] Hannah Mayer, Political risk insurance and its effectiveness in supporting private sector investment in fragile states, LSE-Oxford Commission on State Fragility, Growth and Development

[18] IEA (7)

[19] African Union Development Agency (AUDA), Africa Continental Power Systems Masterplan, Support Studies – Solar Power

Limited availability of bankable projects and limited technical capacity

Investors have identified the unavailability of bankable projects as one of the barriers to scaling investment in clean energy and decarbonisation projects in Africa. According to a recent report, limited technical capacity, weak supply chains and limited incentives were highlighted as some of the challenges to the development of renewable energy projects in Africa[20].

Designing policies and finance solutions for Clean Energy Projects

This section discusses policies and financial solutions which could be deployed to address the challenges to clean energy investments in Africa.

Mini-grids and standalone systems for productive use[21]

A proper legal and regulatory framework is critical to support investment in the development of mini grid infrastructure. Mini-grid developers need to be assured that the regulatory framework will protect their investments if the national grid is extended to areas covered by the mini-grids.

Mini-grids projects also require public concessional finance to mitigate the high upfront costs and increase the viability of the projects especially for those in underserved areas which are not connected to national grids. These could be in form of performance-based grants and concessional consumer loans.

One of the major challenges to investment in stand-alone productive-use systems is the fact that most of the projects are small. The economies of scale coupled with the lack of willingness and ability of low-income customers to pay does not support the investment of long-term capital without government leverage. In addition, local companies struggle to get financing from private equity investors and commercial banks due to the lack of understanding of the nature and peculiarities of off-grid business models.

A financing model that allows the government to share the offtake and project risks, subsidise electricity tariffs and guarantee the operation and maintenance of the stand-alone systems will reduce the affordability challenges and encourage more investment in the stand-alone productive-use systems. It is also important to build local capacity in the sector to ensure the long-term sustainability of the projects.

[20] Sustainable Energy for All, Africa Renewable Energy Manufacturing, Opportunity and Advancement, https://africacarbonmarkets.org/reports/

[21] IEA (10)

Transmission and Distribution network Infrastructure[22]

Africa requires significant investment in transmission and distribution infrastructure to improve energy access and allow for better integration of renewables into the energy mix of households especially those within urban areas. A good regulatory and institutional framework is critical to attract the required investment for the upgrade of grid infrastructure.

Public-private partnerships have the potential to unlock the financing required to upgrade transmission and distribution networks. Governments could also encourage private sector participation in grid infrastructure projects by introducing cost-reflective tariffs, derisking investments using public concessional finance instruments like sovereign risk guarantees and granting long-term concession rights to private sector players for the development and operation of grid infrastructure projects.

Development financial institutions also have a key role to play in financing grid extension projects as they are better structured to absorb the political and foreign currency risks associated with projects of this scale.

Large-scale Solar PV projects

Due to the high risks associated with large-scale renewable energy projects, it is important to design financial solutions that derisk investments, include credit enhancement mechanisms and encourage local currency borrowing.

Governments could encourage the development of distributed Solar PV projects by implementing tax incentives, import duty waivers and instituting carbon taxes on the use of fossil fuels. Mandatory renewable energy capacity targets and portfolio standards for energy service companies will also increase investments in large-scale solar PV projects.[23] Feed-in tariffs/ feed-in premiums which guarantee the purchase of generated renewable energy at a fixed price or premium over a period will also reduce off-take risks for project developers.[24]

Furthermore, a cost-reflective tariff system together with a standardised power purchase agreement will further mitigate the risks of structuring large scale Solar PV projects in Africa. Investments to expand and upgrade the grid infrastructure will also be required to increase the ability of the grid to integrate variable renewables seamlessly.

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[22] IEA (10)

[23] IEA (10)

[24] The World Bank in collaboration with the African Development Bank, Asian Development Bank, European Bank for Reconstruction & Development, Inter-American Development Bank, International Finance Corporation and Climate Investment Funds, Financing Renewable Energy: Options for Developing Financial Instruments using Public Funds

Lastly, efforts should be made to increase the involvement of local banks and private equity firms in the financing of solar projects in Africa. Multilateral financial institutions can provide technical support to commercial banks and offer credit enhancement instruments to mitigate project risks.[25]

Clean Cooking projects

Historically, financing for clean cooking projects was heavily dependent on international public funding.[26] However, given the emergence of modern clean cooking solutions, like electric cooking, biogas, and LPG, investors and financiers are looking to more innovative financing models to scale clean cooking projects. For example, energy service companies are increasingly deploying pay-as-you-use models to mitigate affordability challenges due to high upfront costs.[27]

Governments can also provide concessional consumer financing (CCF) to improve the bankability of clean cooking projects. CCF could be provided through energy service providers, mini-grid developers or through third parties like development banks and micro-finance institutions.[28] For example, the Kenyan utility, KPLC is exploring on-bill repayment for households to purchase electric cooking appliances.

Results-based financing and performance-based grants could also be deployed to encourage investment in clean cooking projects and minimise project costs for project developers and investors. Appliance financing which allows consumers to pay for the clean cooking devices over a period could similarly drive-up demand for clean cooking devices and incentivise additional investment in clean cooking projects.

Carbon markets also play a big role in accelerating the flow of private finance to the development of clean cooking projects.[29] It is projected that the increased demand for high quality carbon credits globally coupled with the development of innovative metering methodologies for cooking devices will unlock up to $800million for clean cooking projects through carbon finance within the next decade.[30]

[25] AUDA (20)
[26] S. Stritzke et al, Impact Financing for Clean Cooking Energy Transitions: Reviews and Prospects, https://doi.org/10.3390/en16165992
[27] ibid
[28] Energy Saving Trust, Road to Zero Interest: The Potential Role of Concessional Consumer Financing in Energy Access, May 2023
[29] S. Stritzke (27)
[30] Ibid

Industry

A clear sector-specific policy roadmap is required for the decarbonisation of hard-to-abate industries like steel manufacturing companies, especially companies involved in primary steel production.

Governments need to encourage industries to reduce greenhouse gas emissions by providing grants, tax incentives, implementing carbon taxes, removing fossil fuel subsidies, and designing emissions trading schemes to reward companies with low CO2 emissions. An example of a government initiative in this regard is the Nigerian gas flare commercialization program was designed to reduce gas flaring in the oil and gas industry and ensure that Nigeria can meet its climate commitments.[31] The Nigerian Government also recently removed its fossil fuel subsidies.

Public procurement processes could also be restructured to give priority to companies which demonstrate a clear reduction in CO2 emissions in the award of government contracts.[32] Low-carbon industrial products could also be certified as such by a recognized government agency to shift consumer behaviour.

Governments could also set national carbon budgets for hard-to-abate industries. A regulatory limit on local commercial lending to companies in hard-to-abate industries which exceed their carbon emissions budget will further incentivise companies to seek low-carbon alternatives.

Energy storage and low emissions hydrogen

Governments need to provide clear policy direction for energy storage and low-emissions hydrogen. Due to the high risks of investing in these frontier technologies, commercial banks are unlikely to provide early-stage finance for the development of these projects. Therefore, governments and multilateral development finance institutions would need to mitigate the commercial and project development risks by providing concessional finance and grants to support such projects. An example of this is the initiative by the German Government to provide grants for the development of low-emissions hydrogen projects in Africa. [33]

Governments could also implement supportive policies such as import duty waivers and tax incentives to spur investments in these high-risk projects.

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[31] https://ngfcp.nuprc.gov.ng/

[32] IEA (7)

[33] C. Nweke Eze and R. Quitzow, The Promise of African clean hydrogen exports: Potentials and pitfalls, https://www.brookings.edu/articles/the-promise-of-african-clean-hydrogen-exports-potentials-and-pitfalls/

Innovative financial instruments and models

A wide range of financial instruments and models are required to unlock the potential of renewable energy in Africa. This section highlights a few of the financial instruments and models that can be used to enhance the adoption of climate-smart energy solutions across Africa.

Grants and long-term equity[34]

Grants and long-term equity are usually used to derisk projects and reduce offtake costs. They are relatively easy to implement as they do not require consistent monitoring and evaluation. The viability gap funding mechanism, whereby governments provide capital grants to project sponsors to reduce project costs is a good example of this financing structure.

Venture Equity financing[35]

Venture capital (VC) firms usually finance early-stage high risk projects in anticipation of high returns followed by exit through either an initial public offer or a business sale. They are usually focused on novel technologies and high growth companies.

Given the liquidity challenges in many domestic capital markets across Africa and the small scale of local renewable energy businesses, VC firms may not be able to easily exit and this may affect their appetite for such investments. Adequately developed and robust capital markets are required to make this an attractive option for investments in VC firms.

Blended finance[36]

This is a financing model that reduces project costs by relying on a mix of financial instruments including grants, loans, equity and guarantees. This improves the project economics and the viability of renewable energy projects especially in rural communities. For example, in 2019, the U.S African Development Foundation (USADF) and Nithio used a blended finance mechanism to finance the provision of affordable clean energy to low-income households, small farmers and micro-entrepreneurs in Kenya.[37] Under the model, USADF provides grants while Nithio provides loans to the project developers.

[34] World Bank (25)
[35] World Bank (25)
[36] IEA (10)
[37] https://www.usadf.gov/press-release/972#:~:text=In%20its%20third%20year%2C%20the,to%20scale%20clean%20energy%20financing.

Public private partnerships

A public-private partnership is an agreement between a state entity and a private sector player for the development and operation of public assets or provision of public services. Several PPPs models could be deployed for the financing of very capital-intensive renewable energy projects, e.g., large-scale Solar PV projects, hydro power projects and grid upgrade and extension projects. An example of this is the concession of the Shiroro Hydro Electric Power Plant and the Gurara Hydro Electric Power Plant to North South Power by the Federal Government of Nigeria for a term of 30 years and 25 years period respectively.

Green bonds

Green bonds are debt instruments issued for the purpose of financing projects that offer significant environmental benefits. Renewable energy projects could be financed by the issuance of green bonds.[38] In 2019, North South Power Company Limited, the operators of the 600MW Shiroro Hydroelectric Power Plant, issued senior green infrastructure bonds for the development of renewable energy projects including the development of a 15MW pre-phase 1 Solar project. The bonds were guaranteed by InfraCredit, the infrastructure credit enhancement facility backed by the Nigeria Sovereign Investment Authority, GuarantCo, KfW Development Bank and Africa Finance Corporation.[39]

Credit Guarantees and Insurance

Credit guarantees have the potential to stimulate investment in renewable energy projects across Africa by reducing projects risks.[40] Many multilateral development banks (MDBs) offer various forms of guarantees and insurances to private sector participants to encourage investment in fragile African states. For instance, the African Development Bank (AFDB) has two types of guarantees to protect private developers and lenders. They are the partial risk guarantees and the partial credit guarantees.

The partial risk guarantee insulates private financiers against the risk of a government or government-owned entity failing to fulfil its obligations under a contract. It can be structured to cover several sovereign risks including the occurrence of political force majeure, expropriation, currency inconvertibility, adverse regulatory changes or breach of contract in host countries. The guarantee is

[38] World Bank (25)
[39] https://www.nipc.gov.ng/2021/02/08/north-south-power-company-seeks-n5-5b-for-solar-project/
[40] M. Gouett et all, Innovative Financial Instruments and their potential to Finance Climate Change Adaptation in Developing Countries, International Institute for Sustainable Development, 2023

backed by an indemnity under which the host country agrees to indemnify AFDB any payments made by it under the guarantee.[41]

On the other hand, the partial credit guarantee is tailored to address payment risks which occur under any debt instrument. It covers payment defaults arising from commercial debts, bond issues, debt derivatives like cross currency swaps. etc. However, instruments like equity participations and equity linked derivatives which do not trigger any payment default are not eligible. The political risk insurance offered by the Multilateral Investment Guarantee Agency is an example of an insurance solution provided by MDBs to mitigate government-related risks in sustainable energy projects. [42]

There has been significant concern that MDBs are not actively deploying credit enhancement mechanisms like guarantees and insurances to scale up financing of climate-smart energy solutions in Africa.[43]

Carbon markets[44]

Carbon markets have the potential to finance renewable energy projects in Africa. In voluntary carbon markets, projects which avoid certain emissions or removes CO2 emissions from the environment are validated by an independent verification body. Once certified, the carbon credits are issued and can be sold to companies looking to offset their carbon emissions and meet their low-carbon commitments.

Emission Reduction-Linked Bond[45]

Emissions reduction linked bonds are bonds that provide investors with a return linked to the issuance of verified carbon credits expected to be produced in relation to a climate-friendly project. An example of an emissions reduction-linked bond is the five-year $50million, principal protected Emissions Reduction-Linked Bond that provides investors with a return linked to the issuance of verified carbon credits expected to be produced by a project for the development and distribution of water purifiers in Vietnam. Investors to the bonds, will finance the up-front project costs and will receive semi-annual coupon payments linked to the issuance of certified carbon credits for the project.

[41] https://www.afdb.org/en/projects-and-operations/financial-products/african-development-fund/guarantees
[42] https://www.afdb.org/en/projects-and-operations/financial-products/african-development-bank/guarantees
[43] M. Gouett et all, Innovative Financial Instruments and their potential to Finance Climate Change Adaptation in Developing Countries, International Institute for Sustainable Development, 2023
[44] World Bank (25)
[45] https://www.worldbank.org/en/news/press-release/2023/02/14/emission-reduction-linked-bond-helps-provide-clean-drinking-water-to-two-million-children-in-vietnam

Results-based performance grants[46]

Results-based performance grants have been widely used to finance renewable energy projects in Africa. In some models, the project developer takes the upfront project risks, and the grants are disbursed upon independently verified evidence that the customers have been provided with energy access. This is the model adopted by the Universal Energy Facility (UEF), a multi-donor results-based facility was established by Sustainable Energy for All in collaboration with several donors and partners, including Shell Foundation, the Rockefeller Foundation, Power Africa and IKEA Foundation among others. The UEF provides incentive payments which cover up to 60% of the project cost to project developers for the development of mini-grids, stand-alone solar systems and clean cooking solutions across Africa. The result is that the project risks and affordability risks are mitigated, and the tariffs are reduced.

Conclusion

This paper highlighted the clean energy investment gap across sub-Saharan Africa. It discussed the challenges to investments in renewable energy projects and proposed policy design and financing solutions that may be deployed to drive-up investments in clean energy. It also discusses innovative financial instruments and models that could be used to mitigate the risks for project developers and lenders to clean energy projects.

[46] https://www.seforall.org/UEF