

2019 MARKET REPORT: CLEAN ENERGY FINANCING DEMAND

Insights from 530 EEP Africa Applications



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EEP Africa is hosted and managed by the Nordic Development Fund (NDF).
 Funding partners for EEP Africa are Austria, Finland and NDF.
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EXECUTIVE SUMMARY

The Energy and Environment Partnership Trust Fund (EEP Africa) provides early stage grant and catalytic financing to innovative clean energy projects, technologies and business models, with a particular focus on reaching poor and underserved groups.

In 2018, EEP Africa conducted its 14th Call for Proposals (CfP14) covering 15 countries in Southern and East Africa.¹ Project developers were invited to request grants or repayable grants between EUR 200,000 and EUR 1 million, with a requirement of 30-50% in co-financing.

This report offers observations on the state of the market and emerging trends in the renewable energy sector in Africa.

A total of 530 applications were submitted under CfP14 with the total investment request exceeding EUR1 billion. The proposed projects utilized 13 different clean energy technologies and ranged from feasibility studies to pilot projects to scale ups of successful models. Applicants were asked to demonstrate concept innovation, development impact, and a financially-sustainable business model.

Based on the CfP14 applications, this report offers observations on the state of the market and emerging trends in the renewable energy sector in Africa. These insights will strengthen EEP Africa's operations and help other donors and investors in the sector ensure their strategies are responsive to market needs.

DEMAND FOR FINANCING

The high volume of applications submitted during this call demonstrates the robust demand for early-stage financing in the clean energy market in Africa. Over 50% of the proposed projects were in the pilot or

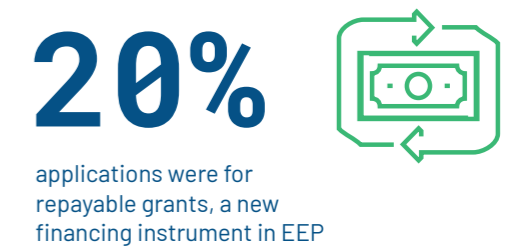
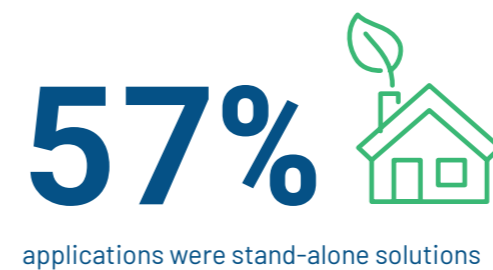
demonstration phase, showing the need for grant funds to test and prove innovations in technologies and business models or entry into new markets. Over 30% of applicants noted that the project would not materialise without EEP Africa support.

The majority of applicants (75%) were for-profit companies, indicating the critical role the private sector plays in providing energy access in the region. Most of these were small to medium-sized enterprises (SMEs) and almost 40% were start-ups. Among the non-profit/social enterprise applicants, many submitted proposals with private sector partners. This underscores a shift from project-based approaches, focused on short-term efforts to connect households, to long-term sales and business models.

EEP Africa introduced repayable grants in response to a demand for bridge financing.

EEP Africa aims to support models that are both commercially-viable and have a development impact. A high demand for bridge financing, which can mitigate risk and enable businesses to reach viability, had been identified in previous calls. In response, EEP Africa introduced repayable grants as a new financing instrument in CfP14. This proved to be popular among applicants (20%), especially for large-scale infrastructure projects developing wind or hydropower. On average, project developers participating in CfP14 expected to attract additional investments of EUR 3.4 million of investment within two years after project completion.

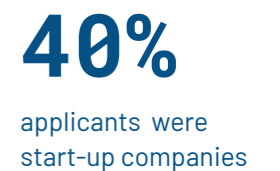
FAST FACTS



growing interest in hybrid systems, which utilize more than one technology



different clean energy technologies



¹ EEP Africa covers: Botswana, Burundi, Kenya, Lesotho, Malawi, Mozambique, Namibia, Rwanda, Seychelles, South Africa, Swaziland, Tanzania, Uganda, Zambia and Zimbabwe.

TECHNOLOGICAL EVOLUTION

Over half of CfP14 applications (57%) were for stand-alone solutions, including cookstoves. This sector is expanding rapidly as innovations in monitoring and payment technologies, many of which were tested in the vibrant solar home system (SHS) market, are adapted for other types of clean energy. Pay-as-you-go (PAYG) solutions and smart metering have been widely adopted throughout the sector, including for biogas and solid biomass solutions. New models of improved cookstoves can be linked to smartphone apps and include additional services, such as lighting and mobile charging.

Developers across the renewable energy sector are going beyond just connecting households to focus more on promoting productive uses of energy.

Solar PV technology still dominates the sector (38% of applications). Many of these projects are in the replication or scale-up stage, but a larger than usual number of applicants focused on testing innovative battery technologies and energy storage solutions. As the costs of these technologies continue to decrease, solar projects are expected to further proliferate. There is also growing interest in hybrid systems (16%) that combine multiple technologies. These can offer cost-effective solutions that ensure more constant production capacity and increased versatility to meet demand during peak periods. Biogas, solid biomass, hydropower and waste-to-energy projects were also well-represented (6-8% each).

Financing for feasibility studies is requested most often for projects utilising wind power (70% of wind applications), hydropower and waste-to-energy technologies (37% each). This reflects the need to assess the generation potential for larger infrastructure projects in order to attract and secure sufficient investments. The lack of financing for required pre-construction assessments, including environmental and social impact studies, is a continued barrier in the market for independent, large-scale utility projects.

INNOVATIVE BUSINESS MODELS

There is strong market interest and growth in the development of mini-grids (25% of applications), but companies are still testing approaches to identify commercially-viable business models. EEP Africa has been a frontrunner in supporting this market segment and recently published an in-depth study on *Opportunities and Challenges in the Mini-Grid Sector in Africa*² based on our past portfolio of 43 mini-grid projects in 10 countries. In line with the findings in that report, many CfP14 applicants moved beyond the traditional approach to mini-grids – aiming to electrify a small group of households or a single institution, such as a school or hospital – and proposed the more financially sustainable “ABC” strategy: anchor client, then local businesses, then domestic consumers.

Developers across the sector are going beyond connecting households to focus more on promoting productive uses of energy. Many mini-grid projects include sales of energy efficient appliances or entrepreneurship training. Small-scale hydropower projects are testing a portfolio approach that may include developing a local business hub. These activities increase end user demand and therefore the commercial viability, while also increasing development impact.

JOBS AND ECONOMIC OPPORTUNITIES

Development impact for clean energy projects is primarily measured in terms of households connected and greenhouse gas emissions reduced or avoided. EEP Africa also places a strong focus on the creation of jobs and economic opportunities for women, youth and marginalized populations.

In the CfP14 applications, hydropower projects expected to have the highest rates of job creation with an average of over 300 jobs per project. However, many of these are short-term construction jobs. Solid biomass, cookstoves and solar PV also reported high job creation plans (200-300 jobs per project on average). These are often long-term positions in sales and marketing, although they may not be full-time jobs.

Women have long been underrepresented in the renewable energy sector. The CfP14 data indicates some improvements in this area, with one-third estimating a greater than 50% share of women as employees, lead-



Tiny Totos partners with daycare centres in Kenya to provide working mothers with access to clean energy products and financing.

EEP Africa is committed to promoting economic and leadership opportunities for women in the clean energy sector.

ers and entrepreneurs in their value chains. However, significant effort is still needed to open opportunities for women in the sector. EEP Africa is committed to promoting gender equality across its portfolio and earlier published an in-depth study on *Understanding the Role of Women and Girls in Renewable and Energy-Efficiency Projects*³ based on its portfolio. In 2019, EEP Africa is conducting a gender-themed Call for Proposals.

RISKS AND OPPORTUNITIES

Since EEP Africa supports innovative, early-stage initiatives in a rapidly evolving sector, there is an inherent level of risk in all projects. But recent developments in terms of technologies and business models are lowering costs and helping stabilize the market. As a result, most CfP14 applicants considered their risk level to be moderate (54%) or low (36%). The greatest type of risk, as perceived by applicants, is the operating environment. Half identified the operating environment as the main risk, with the number climbing to 75% in Zimbabwe, Burundi and Mozambique. This is limiting

the growth and spread of clean energy in the region. It also confirms the need for grants and concessional financing to buy-down risks and stimulate private investment.

The remarkable volume and diversity of applications submitted under CfP14 demonstrates the strong interest and willingness of developers to work in the region, despite the challenges. It also highlights the critical role that EEP Africa plays in supporting innovation and de-risking investments. A relatively small grant or repayable grant has a large-scale impact in terms of sustainable growth and development. The insights gained from this call will strengthen EEP Africa and, hopefully, stimulate new investments in the sector.

KEY CONCLUSIONS

- Grant funding is needed to de-risk innovation, leverage private sector investment.
- Solar PV is dominant but sustainable business models are developing in other technologies.
- Mini-grids are focusing on productive uses of energy to improve financial viability.
- Technological risks are decreasing but risks in the operating environment remain challenging.
- Significant effort is needed to expand opportunities for women as leaders and entrepreneurs.

² EEP Africa 2018: eepafrica.org

³ EEP Africa 2017: eepafrica.org

INTRODUCTION

The Energy and Environment Partnership Trust Fund (EEP Africa) provides early-stage grant and catalytic financing to innovative clean energy projects, technologies and business models in 15 countries across Southern and East Africa.

EEP Africa is hosted and managed by the Nordic Development Fund (NDF) with funding from Austria, Finland and NDF. Since 2010, EEP Africa has channelled more than EUR 70 million to 250 pioneering projects in all sectors of renewable energy and energy efficiency.

EEP Africa is at the forefront of efforts to fast track clean energy access and sustainable and inclusive green growth, with positive impacts on lives and livelihoods. It supports projects in early stages of development, from feasibility studies to scale-up and replication projects. Projects are selected through competitive calls for proposals that look for strong concept innovation, development impact and sustainable business models. Selected project developers also receive business development support and knowledge sharing opportunities.

EEP Africa aims to support sustainable and inclusive green growth, with positive impacts on lives and livelihoods.

EEP Africa leverages information from its wide portfolio to generate clean energy knowledge and help inform sustainable and inclusive energy policies. The fund aims to support countries across the region toward the realisation of a climate resilient, zero-carbon future and achievement of the Paris Climate Agreement and Sustainable Development Goals (SDGs).

EEP Africa focuses in particular on furthering progress towards Affordable and Clean Energy (SDG 7) and Climate Action (SDG 13), as well as No Poverty (SDG 1), Gender Equality (SDG 5), and Decent Work and Economic Growth (SDG 8).



OBJECTIVE OF THE STUDY

EEP Africa selects projects for financing through competitive calls for proposals. The 14th Call for Proposals (CfP14) was conducted in 2018 with a total of 530 applications submitted. The proposed projects ranged from feasibility studies to pilots to scale ups of successful models. They represented a wide variety of business models, technologies and geographical areas, with a focus on development impact and financial sustainability. Collectively, these applications provide a broad data set about the current state of the market.⁴

The objective of this study is to analyse the CfP14 applications to gain insights into the financing needs of early stage clean energy projects and current trends in the renewable energy sector in Southern and East Africa. These observations will be used to further strengthen EEP Africa's knowledge management, business development support and future financing calls. This analysis can also help other donors and investors in the sector to ensure their strategies are responsive to the financing needs of the market.



⁴ The findings in this report are based on the data submitted by applicants for EEP Africa funds and therefore are reflective of their views. The resulting analysis should be viewed as a snapshot of market trends as perceived by the applicants.



MARKET BACKGROUND

An estimated 183 million people live without access to modern energy⁵ in the countries covered by EEP Africa.⁶ A lack of access to affordable, reliable, sustainable and modern energy is a significant barrier to poverty reduction and sustainable development across Southern and East Africa. One in three people do not have access to electricity in Africa⁷ and six of the countries with the largest energy access deficit are covered by EEP Africa.

In order to achieve Paris Agreement commitments, it is estimated that USD 2.76 trillion needs to be invested in the energy sector every year up to 2035.⁸ This dramatic gap in access and financing highlights the importance of funds like EEP Africa that stimulate the renewable energy market.

Most governments in the region have set targets for achieving universal access to electricity. Traditionally, the government focus on increasing electricity access has been on grid extension. However, developments in the sector have encouraged governments to incorporate off-grid solutions in their national energy planning, especially with regard to its advantage in reaching last mile customers. During recent years, East African countries in particular have demonstrated considerable progress in developing the off-grid energy sector.

One in three people do not have access to electricity in Africa and six countries with the largest deficits are covered by EEP Africa.

Technological developments have made renewable energy generation, both on and off-grid, a viable, cost-efficient and sustainable solution. Nevertheless, private sector project developers still face a severe lack of access to patient finance with the necessary risk appetite. In order to achieve universal energy access by 2030 (as per SDG7), additional support and funding for renewable energy and decentralised energy access are required.

Early stage financing to support pilot and demonstration projects, and to de-risk investments in the scale up of innovative solutions, is critical to further growth in the sector.

Early stage financing to support pilot and demonstration projects, and to de-risk investments in the scale up of innovative solutions, is critical to further growth in the sector. In recent years, EEP Africa has supported some of the game changing companies operating in the region, such as East African Power, BioLite, Burn Manufacturing, D.light, and Zola Energy (previously named Off Grid Electric).

A renewable energy market landscape study in 2017 validated the impact of and continued need for this type of early stage financing.⁹ In 2018, EEP Africa continued its support for the sector with a new Call for Proposals and the addition of a new financing instrument in the form of repayable grants.

⁵ Renewable Energy Market Landscape Study (https://eepafrica.org/wp-content/uploads/Volume_I_Market_Landscape_Study_EEP-SEA_Report.pdf)

⁶ EEP Africa covers: Botswana, Burundi, Kenya, Lesotho, Malawi, Mozambique, Namibia, Rwanda, Seychelles, South Africa, Swaziland, Tanzania, Uganda, Zambia and Zimbabwe

⁷ World Bank (2019): This is What it's All About: Boosting Renewable Energy in Africa (<https://www.worldbank.org/en/news>)

⁸ IPCC, 2018: Global Warming of 1.5°C: Summary for Policymakers (<https://www.ipcc.ch/sr15/>)

⁹ Renewable Energy Market Landscape Study (https://eepafrica.org/wp-content/uploads/Volume_I_Market_Landscape_Study_EEP-SEA_Report.pdf)

OVERVIEW OF THE 14TH CALL FOR PROPOSALS

EEP Africa’s 14th Call for Proposals (CfP14) was launched in May 2018. In this call, applicants were invited to request funding between EUR 200,000 and EUR 1 million for early-stage off-grid and on-grid clean energy projects in 15 countries across Southern and East Africa. Companies, including start-ups, non-profit organisations, social enterprises, and research institutes were eligible to apply.

530 applications were received with proposed total investments exceeding EUR 1 billion.

EEP Africa is technology agnostic and supports projects at all stages of development, ranging from feasibility studies up through pilot, demonstration, replication and scale-up projects. In their applications, project developers were asked to demonstrate concept innovation, development impact, and a financially-sustainable business model. The additionality of EEP Africa funding needed to be clearly explained.

A total of 530 applications were received during the call with proposed total investments exceeding EUR 1 billion. This far exceeded expectations and is five times the number of applications received on average in the previous eight EEP calls.

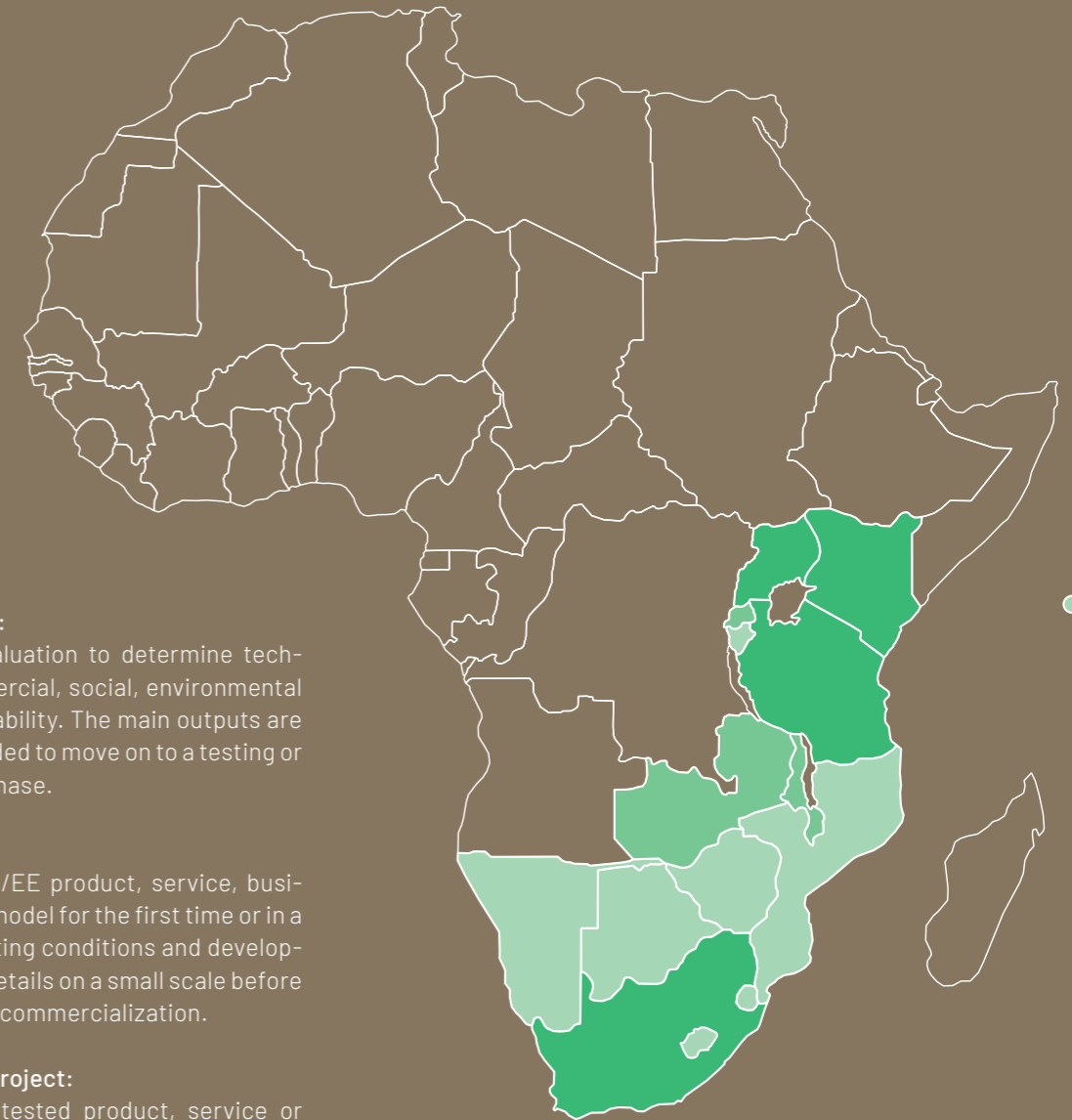
The high interest in EEP Africa reflects an increasing number of active developers in the renewable energy sector in the region and the continuing need for external financing in early stage project and business development.

Applications covered all 15 EEP Africa target countries, including 30 regional (multi-country) projects. Figure 1 presents the geographic spread of CfP14 applications. Over half of the applications were for projects in Kenya, South Africa, Uganda and Tanzania.¹⁰ These countries have growing economies and are politically committed to expanding access to energy. The regulatory framework and development of mobile infrastructure have also been key factors in facilitating the growth of their off-grid energy sectors. However, with the exception of South Africa, the rate of rural electrification and access to clean cooking in these countries is still below 15%.¹¹

Two countries were added to EEP Africa for the first time under CfP14: Malawi and Zimbabwe. A considerable number of applications were received for projects in both (30 and 19, respectively). This demonstrates the perceived market potential in these two countries.

New business models have emerged with a more sustainable approach in terms of development impact and financial viability.

In addition to the large number of applications, the general quality was also higher than in previous calls. The sector has developed significantly in recent years and CfP14 attracted a strong, diversified portfolio. New business models have emerged and many applications demonstrated a more sustainable approach in terms of development impact and financial viability. This further increased the competitiveness of the call.



PROJECT TYPES

Feasibility Study:

Analysis and evaluation to determine technological, commercial, social, environmental and economic viability. The main outputs are agreements needed to move on to a testing or demonstration phase.

Pilot Project:

Testing of an RE/EE product, service, business or delivery model for the first time or in a new market. Testing conditions and developing operational details on a small scale before a large roll out or commercialization.

Demonstration Project:

Implementing a tested product, service or technology in an actual market context to establish evidence that it is a viable concept and could be applied elsewhere in similar circumstances.

Replication Project:

A project that has proven the viability of its technology and the sustainability of its business model in one market and is now looking for support to take the model to another market.

Scale-Up Project:

A project that has a high probability of reaching commercial viability with EEP “bridging finance”.

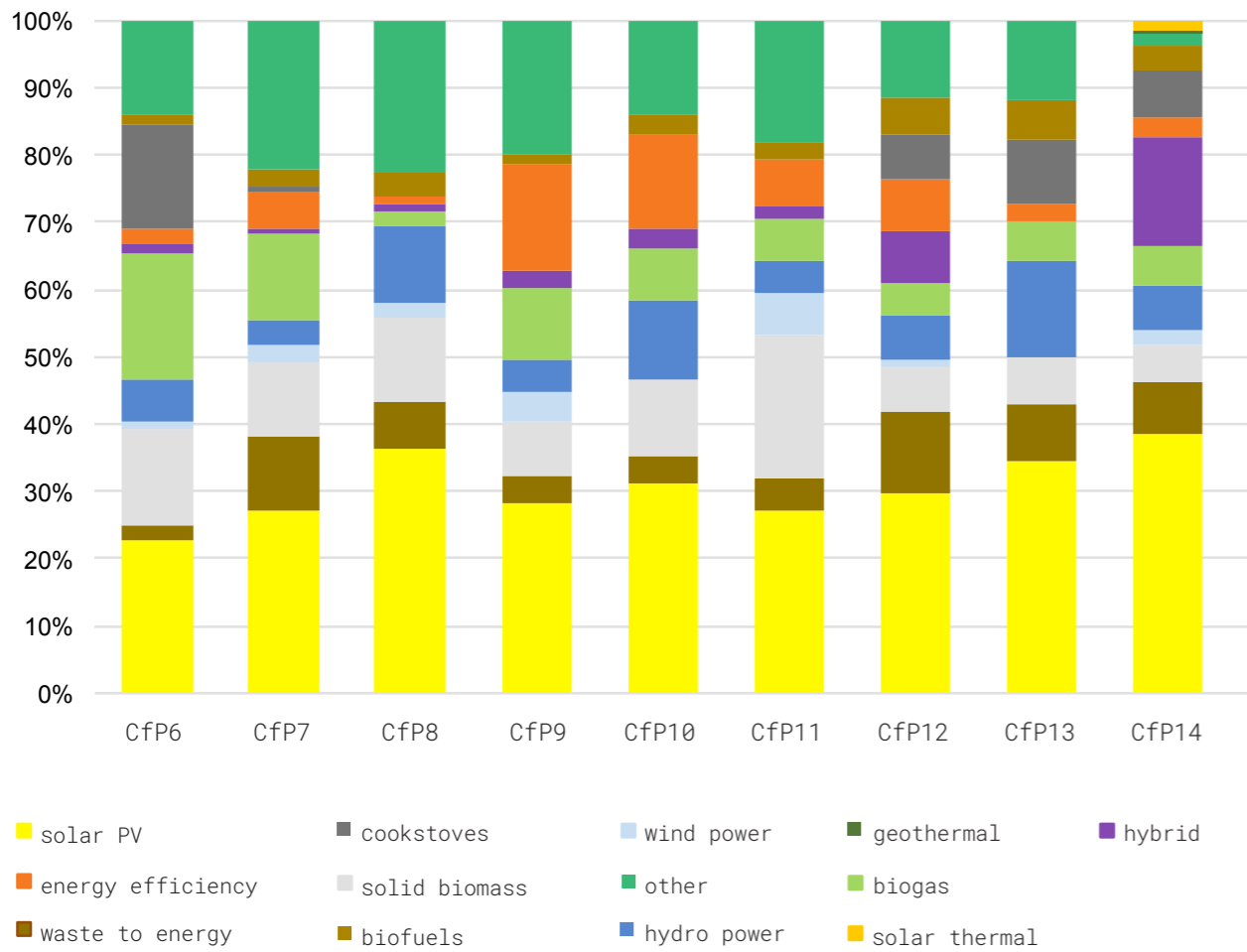
FIGURE 1: GEOGRAPHIC SPREAD OF APPLICATIONS

| | | | |
|--------------|-----|------------|----|
| Kenya | 102 | Mozambique | 22 |
| South Africa | 78 | Zimbabwe | 19 |
| Uganda | 55 | Burundi | 17 |
| Tanzania | 54 | Namibia | 15 |
| Zambia | 44 | Botswana | 12 |
| Rwanda | 39 | Lesotho | 7 |
| Malawi | 30 | Swaziland | 4 |
| Regional | 30 | Seychelles | 2 |

¹⁰ Due to the small number of applications for projects in Seychelles (2) and Swaziland (4), CfP14 does not provide a representative overview of these countries and they are largely excluded from the analysis in this report.

¹¹ Renewable Energy Market Landscape Study, Volume 1, August 2017.

Figure 2: Applications by technology in CfP14 compared to prior calls



The proposed projects ranged from feasibility studies, to early-stage initiatives (pilots and demonstration), to the expansion of successful models (replication and scale-up projects). Over half of the projects were in the early stages and seeking funding to test new products, services, markets or business models.

Over half of the projects were seeking funding to test new products, services, markets or business models.

A broad range of energy access solutions were proposed. Applications were received for grid-connected power production, mini-grids, stand-alone products, and cookstoves. Close to half of the applications received (45%) were for stand-alone solutions.¹²

The proposed projects utilise a wide range of technologies. Solar PV dominated the call, with 38% of all applications proposing solar PV as the primary energy source. This is consistent with previous calls under EEP Africa (see Figure 2).

¹² This figure excludes improved cookstove projects, which are considered as a separate category in this report.

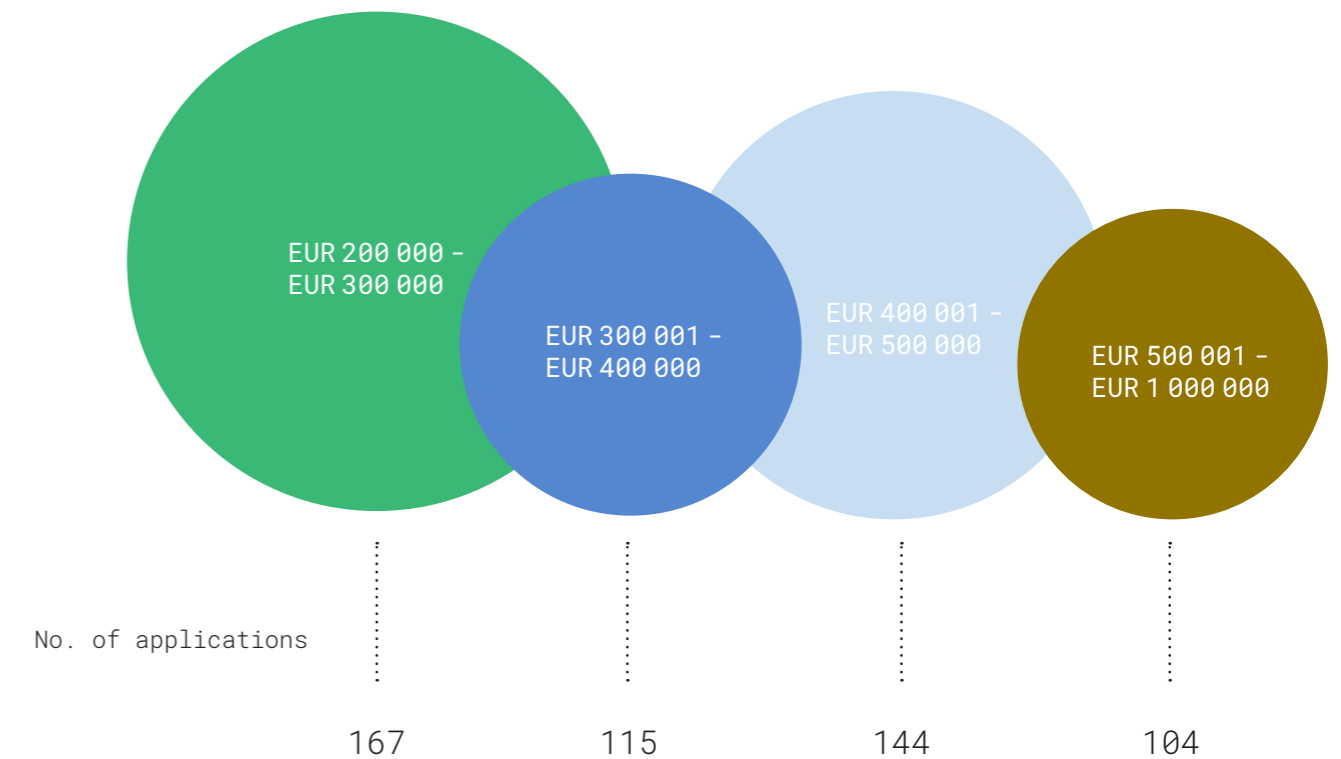
The second most common technology was hybrid (16%), which often combines solar PV with other power sources. The share of applications for this type of project grew significantly, compared to prior calls. Project developers are innovating by combining technologies as a cost-effective solution, ensuring constant production capacity, and increased versatility to meet demand during peak periods.

The average project budget, including co-financing, was EUR 2.1 million. Financing requests above EUR 500,000 were considered as repayable grants.

The total amount of financing requested from EEP Africa was EUR 240 million and the average project budget was EUR 2.1 million, including co-financing. About 80% of all applications were for EUR 500,000 or less, which counted as full grants. Requests above EUR 500,000 were considered as repayable grants.

One third of applicants requested funding of just EUR 200,000-300,000 (see Figure 3). This indicates the significant need for seed financing for proof of concept projects that test technological innovations, innovative business models and new markets.

Figure 3: Levels of EEP Africa financing requested



PRIVATE SECTOR GROWTH

FOR PROFIT COMPANIES SEE OPPORTUNITIES

The success of companies entering the sector through EEP Africa and other initiatives is attracting more private sector players to enter the off-grid market. In CfP14, private sector companies accounted for 75% of all applicants. Applicants were primarily small to medium-sized organisations (9-14 permanent employees) and almost 40% had been operational for three years or less. EEP Africa stimulates innovation and market transformation by providing not just early-stage financing but also business development support to strengthen the viability of start-up companies that are selected for funding.

The applications underscore a shift in the sector from project-based approaches, focused on short-term efforts to connect households or distribute improved cook stoves, to the development of long-term sales and business models. Many applicants in CfP14 were able to demonstrate the viability of their business model from several years of operations and verifiable sales figures. There was a shift towards scale-up projects aimed at establishing a credible path to financial sustainability.

Non-profit organisations and social enterprises (21% of applicants) also integrated sustainable business models into their approach. Many of these applicants partnered with private sector actors to develop models that are both commercially-viable and have a sustained development impact.

The public sector is also looking to private operators to serve last mile customers. Governments in the region are revising their legal and regulatory frameworks to encourage private companies to fulfill this role. Tanzania and Rwanda are often highlighted as having made significant progress in developing an enabling framework for mini-grid developers. Both countries have de-regulated tariffs and offer guarantees that assets will not be stranded by grid expansion, either by providing for compensation, integration, or relocation. In Tanzania this has resulted in the installation of more than 100 mini-grids with an installed capacity of 157.7 MW.¹³

GRANT FUNDS LEVERAGE PRIVATE INVESTMENT

The value added by EEP Africa financing is one of the key criteria considered in the evaluation of applications. More than one third of all applicants stated that the project would not materialise without EEP support (see Figure 4). Financing was identified as especially crucial for pilot projects and projects utilising biofuels and biogas. Previous EEP Africa experience affirms that these sectors are particularly challenging due to complex technology deployment, cultural barriers and the lack of proven business models.

EEP Africa financing is also needed to expand the scale of implementation and accelerate investment. Over half of the proposals for hydropower, wind power and improved cookstoves specified this as their reason for applying. Many of the hydro and wind power projects expected to move forward on construction without support from EEP Africa; the project developers were often seeking funds to incorporate community engagement and increase local development impact.

Project developers emphasize the role of EEP Africa support in mitigating risk and attracting financing from other investors.

A significant number of project developers emphasized the role of EEP support in mitigating risk and attracting financing from other investors. Replication projects had the highest leverage ratio (8.5), while pilot projects had the smallest (0.5). The average leverage ratio for all applications in CfP14 was 3.6. In terms of technologies, solid biomass, waste-to-energy and hydropower projects attracted the highest level of co-financing (see Figure 5). Prospects for follow-on investment also appeared to be positive. The average estimate for private sector investment within two years after project completion was EUR 3.4 million per project.

Figure 4: Additionality of EEP Africa financing

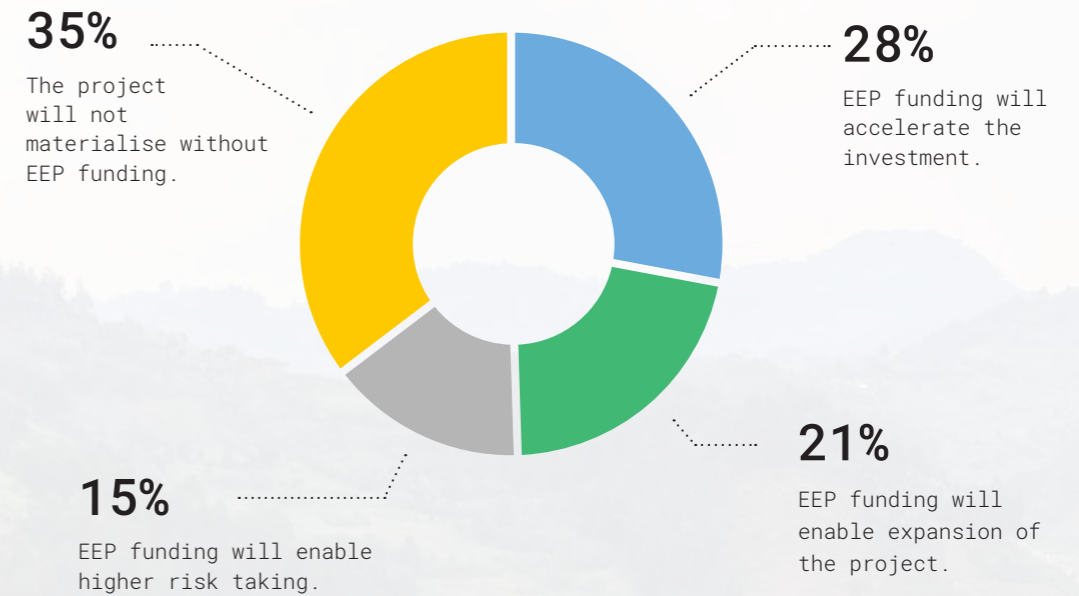
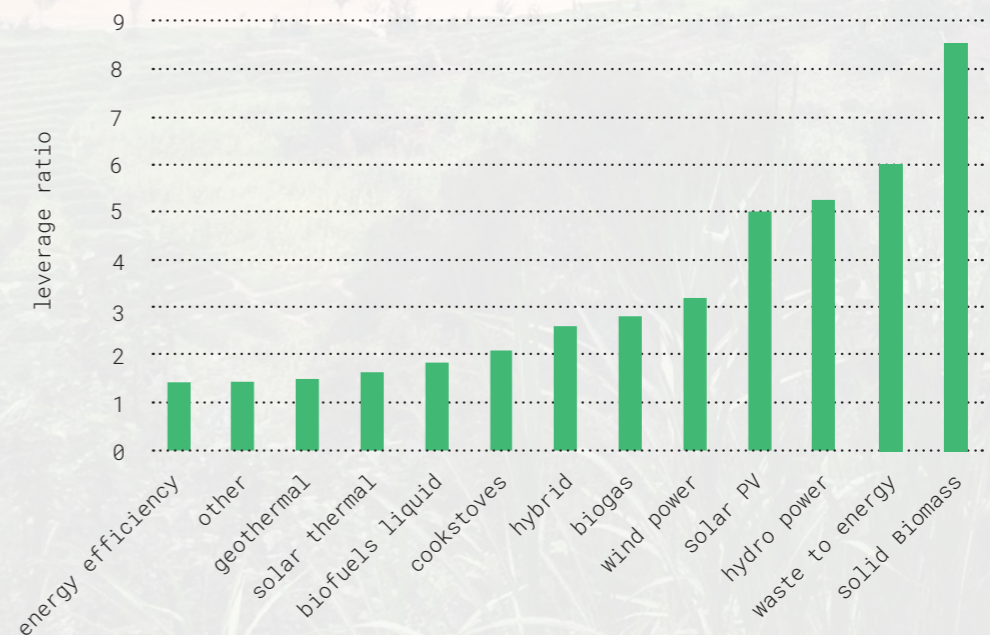


Figure 5: Leverage ratio by technology



¹³ World Resources Institute, 2017



Songa Energy is building the first IPP hydropower plant in Burundi.

REPAYABLE GRANTS HELP DEVELOPERS REACH FINANCIAL CLOSE

The intention of EEP Africa is to enable companies to establish a business model and track record that will help them secure follow-on financing. There is high demand among developers for bridging financing to take projects to financial close or to a point at which commercial viability is reached. To help meet this need, EEP Africa added a repayable grant financing mechanism for funding requests above EUR 500,000.

This new mechanism was made available for the first time in CfP14. Despite the significantly higher requirement for co-financing (50% as opposed to 30%), more than 100 applications were received for repayable grants. This confirmed a need in the sector for repayable financing options. EEP Africa will further expand its efforts to include targeted loans and other instruments under its new financing window, EEP Catalyst.

Hydropower and wind power projects in particular require significant investment due to high infrastructure costs. Thus the average financing request for both of these technologies was at the repayable grant level. In these technologies, the prospect of reaching financial close and creating stable revenue streams through power purchase agreements (PPAs) reduces the risk of applying for a longer-term repayable grant. In addition, these types of projects are often better able to secure significant co-financing.

A new repayable grant financing mechanism was made available by EEP Africa to help projects reach financial close or commercial viability.

EVOLUTION IN PROJECT TYPES AND TECHNOLOGIES

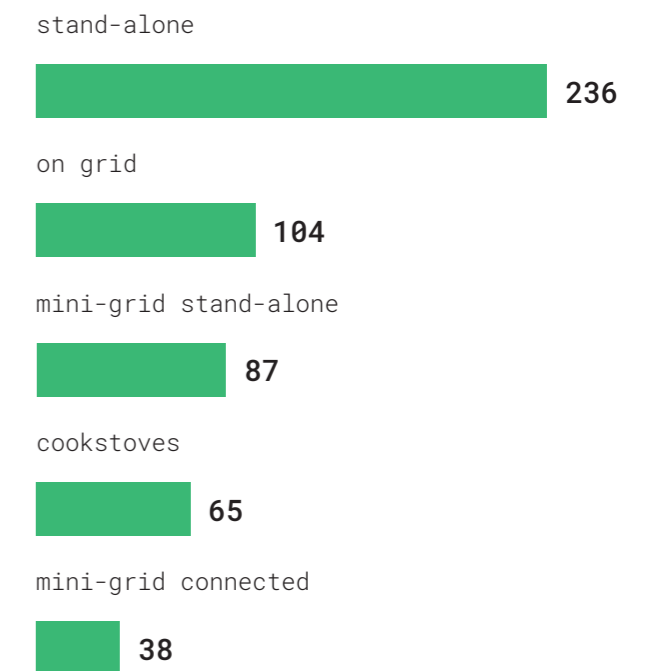
STAND-ALONE SYSTEMS AND MINI-GRIDS

Almost half of all applications (45%) were for stand-alone systems¹⁴ (see Figure 6). While the success of solar-home systems (SHSs) is widely acknowledged, the CfP14 applications demonstrated an array of stand-alone innovations in terms of technology, productive use applications, sales and distribution models, and multi-functional clean cooking solutions.

Stand-alone systems were the most common type of project proposed, but the share of applications for the development of mini-grids rose to 25%.

Close to 25% of applications proposed a mini-grid solution, either on- or off-grid. This is higher than the current share of mini-grids in the renewable energy market but aligns with growing interest in developing mini-grids as an off-grid solution. Due to the challenges of achieving a commercially viable business model, there is a need to test innovative approaches to mini-grids. The International Energy Agency (IEA) predicts that mini-grids offer a EUR 170 billion investment opportunity and expects at least 40% of new power connections in the region to be provided by mini-grids.¹⁵ Almost half of the stand-alone mini-grid projects proposed used solar PV.

Figure 6: Applications by project



¹⁴ Stand-alone systems are classified as systems focusing on individual households, appliances or customers. Improved cookstoves are treated as a separate category by EEP Africa.

¹⁵ IEA World Energy Outlook 2018

EEP Africa has been a frontrunner in supporting this market segment and recently published an in-depth study on *Opportunities and Challenges in the Mini-Grid Sector in Africa*¹⁶ based on its portfolio. Since 2010, EEP Africa has supported 43 mini-grid projects in 10 countries. These have ranged from pico-systems, with an installed generation capacity of less than 5 kW, to grid-connected systems of up to 10 MW. The report made clear that smart meters, remote monitoring and demand-side management measures are reducing the cost of mini-grids and improving their efficiency. These innovations support the wider application of mini-grids as an energy access solution.

Many mini-grid developers are increasing their focus on productive use of energy as a means to increase demand and generate sufficient revenue. This means that more projects are combining mini-grid development with the sale of energy efficient appliances or creation of local business hubs. Some CfP14 applications took a traditional approach to stand-alone mini-grids, aiming to electrify a small group of households or a single institution, such as a school or hospital. But many adopted the more financially sustainable "ABC" strategy: electrify an anchor client, then local businesses, then domestic consumers. Innovation was also noted in the portfolio approach to mini-grid development proposed by some project developers. This model aims to bring economies of scale, diversification of risk and potentially lower financing costs.

Many mini-grid developers are focusing on productive use and adopting the more financially sustainable "ABC" strategy.

Among the 20% of applications proposing on-grid solutions, half were feasibility studies. On-grid proposals were primarily for hydropower or wind power projects in South Africa, Kenya, Rwanda and Zambia.

SOLAR PV IS DOMINANT

As in previous rounds of financing, solar PV projects dominated the call (38% of all applications) and were proposed in all 15 eligible countries. The high number of applications reflects the success of solar PV technolo-

gy, especially in the off-grid market. This is due to cost reductions in PV panels, the introduction of LEDs and associated energy saving, and the integration of remote monitoring and mobile payment options. Even as the quality of solar PV modules has improved, the price has decreased by 85% in the past decade. As a result, solar has become cost competitive with coal.¹⁷

The vast majority of solar PV applications received were for off-grid projects, including both stand-alone systems (53%) and mini-grids (24%). In addition to SHSs, stand-alone projects proposed systems ranging from pico-solar to productive uses of energy. Based on the CfP14 applications, the inclusion of batteries is increasing and new battery technologies are being tested and deployed. Mini-grids, and even some on-grid projects, are using battery technologies as an integral part of solar PV systems. This trend is driven by performance improvements and decreased costs. With new innovations constantly emerging from the transport industry, this is expected to continue and EEP Africa is supporting the pipeline development of projects using battery technologies.

The solar PV market has matured in recent years and many projects proposed in this sector were in advanced stages of development.

The solar PV market has matured in recent years and many CfP14 projects in this sector were in advanced stages of development. Demonstration, scale-up, and replication projects accounted for a significant portion of solar PV applications in Tanzania (70%) and Kenya (64%). These countries are leading SHS development in East Africa. Proposals for on-grid solar PV projects, including grid-connected mini-grids, came mainly from South Africa and Kenya. This may indicate proactive government policies in procuring renewable Independent Power Producers (IPPs) to feed into the grid, as well as a readiness to accommodate intermittent power sources. However, the demand for financing for early-stage SHS projects was also strong in less developed markets covered by EEP Africa, such as Burundi, Mozambique, Lesotho, Malawi and Zimbabwe.

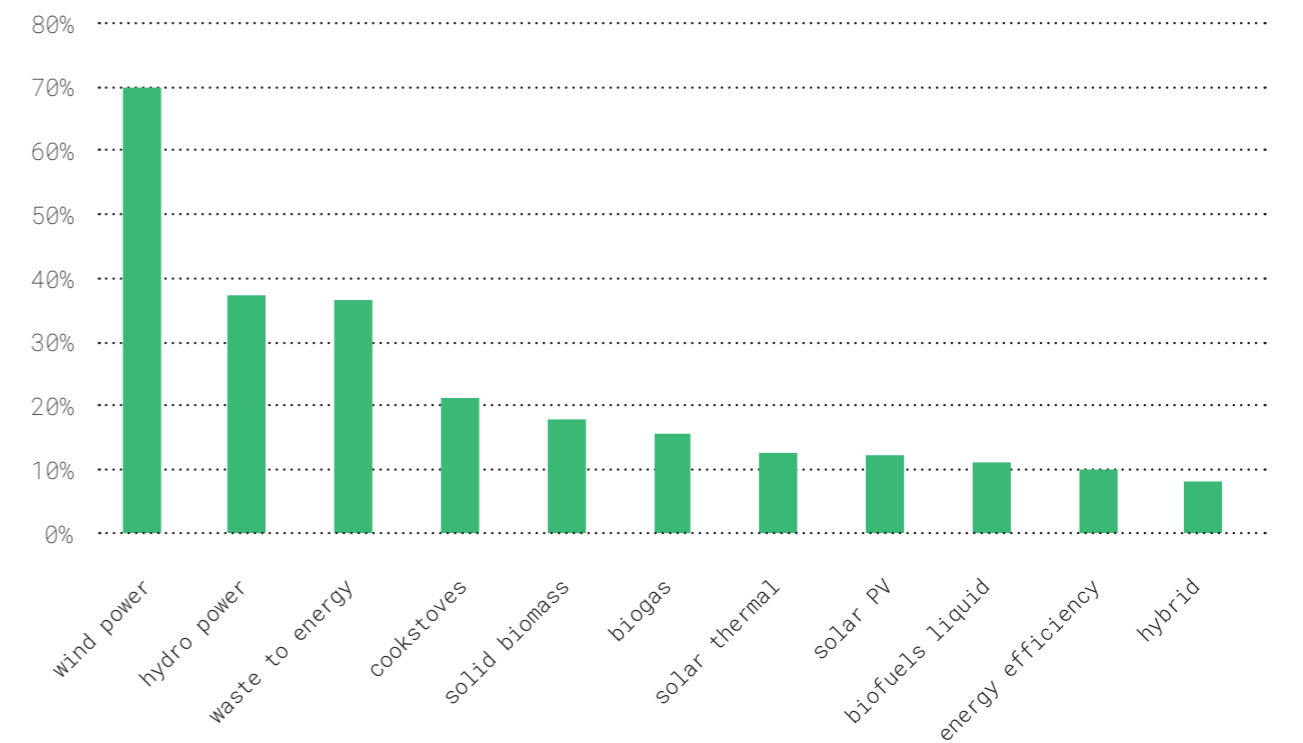
FEASIBILITY STUDIES ASSESS POTENTIAL

Overall 17% of applications requested support for feasibility studies. These were concentrated in wind power, hydropower and waste-to-energy (see Figure 7). Feasibility studies were mostly for large-scale utility projects, indicating the need to assess electricity generation potential and secure investment financing on a more significant scale. A feasibility study is a required pre-cursor to sourcing large-scale financing, particularly in terms of demonstrating how environmental and social impacts from infrastructure projects will be mitigated. The largest number of feasibility studies were proposed in South Africa, Kenya, Tanzania and Zambia. This reflects the exploratory work being done with wind and hydropower in these countries. Half of the proposed projects in Botswana were feasibility studies for on-grid solutions.

Based on the aggregated data in CfP14 applications, SHS projects offer good value for money. The average cost per household, however, varies widely among countries, project type and services provided. Solar PV mini-grid projects had a much higher average cost per household than SHS projects, according to the proposals. But most mini-grids are designed to offer a higher level of service. Providing sufficient power for productive use applications can stimulate small business development and inclusive economic growth.

The applications received by EEP Africa during CfP14 indicate decision-making processes for defining the most appropriate market segment. This includes taking into consideration the initial technology selection and associated investment, the ability of targeted users to pay a cost-reflective tariff, market coverage and development impact.

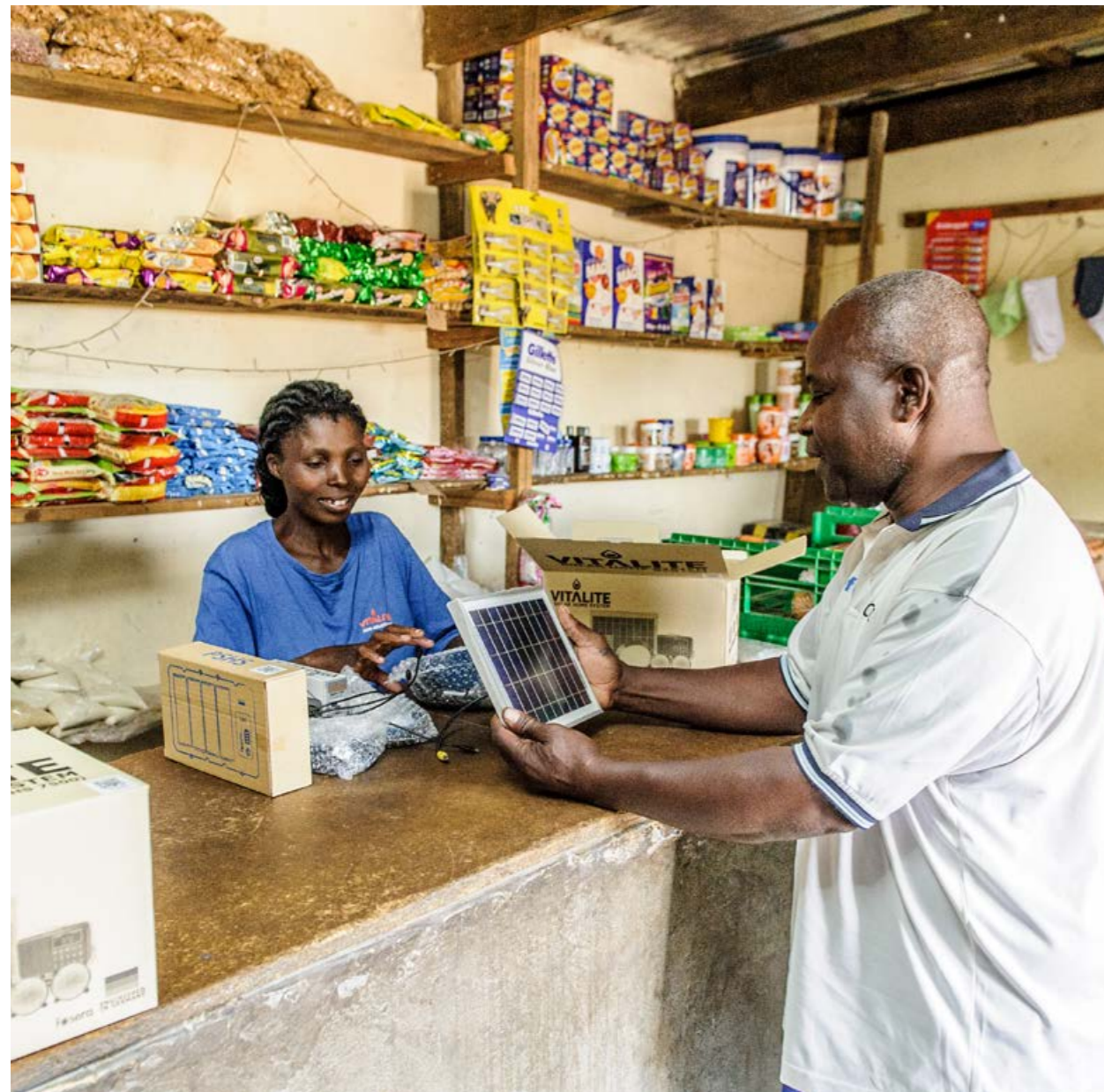
Figure 7: Proportion of applications for feasibility studies by technology¹⁸



¹⁸ Some graphs in this report do not include geothermal. Only two applications were submitted for that technology so the data does not provide a representative overview of the sector.

¹⁶ EEP Africa 2018: eepafrica.org

¹⁷ Accelerating Access to Electricity in Africa with Off-Grid Solutions, Overseas Development Institute, 2016.



NALA is establishing a national distribution network for PAYG solar home systems in Lesotho.

New market strategies connect energy access to productive use and income-generation activities. This supports both local economic development and the long-term viability of business models.

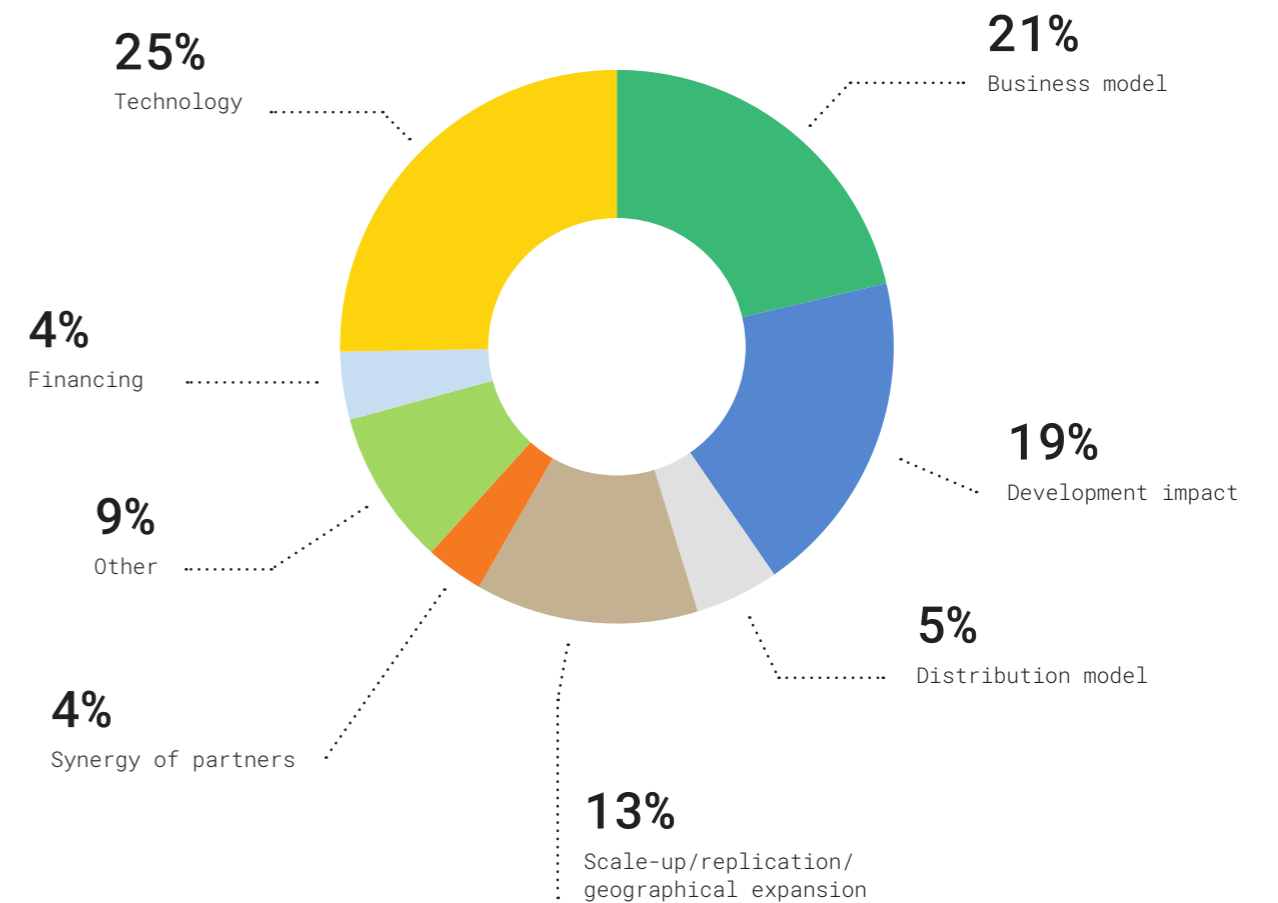
INNOVATIVE BUSINESS MODELS

EEP Africa has a strong focus on supporting innovation in the clean energy sector. Many EEP-supported projects promote technological advancements. But innovation can also be found in pioneering business models and market strategies that achieve financial sustainability while also reaching poor and underserved populations in the region.

The renewable energy sector in Africa has developed significantly through pay-as-you-go (PAYG) systems, the use of which is expanding from SHSs to cooking solutions and other technologies. New market strategies are being developed that connect energy access to productive use and income-generation, supporting the long-term viability. Mini-grid developers are moving beyond individual systems, which distribute power to all market segments in the area, towards the development of business hubs and mini-grid portfolios. This approach potentially offer economies of scale and diversification of risk. The level and type of innovation varies among countries and the maturity of each market: a standard business approach in Kenya may be a market innovation in Lesotho.

In CfP14, most applicants identified the main innovation of their project in terms of technology, business model or increased development impact (see Figure 8). Technology was the main innovation cited in projects related to cookstoves, waste-to-energy, biogas, liquid biofuels, solar thermal and solid biomass. Among solar PV projects, for which the technology is generally reliable and easy to deploy, business model was considered to be the main innovation. Development impact was identified as the main innovation in hydro and wind power projects. This corresponds to the fact, discussed earlier, that many hydro and wind projects seek EEP Africa financing in order to add a community engagement or small business development aspect to an infrastructure project.

Figure 8: Main innovation of the project according to applicants



STRENGTHENED DEVELOPMENT IMPACT

JOBS AND ENERGY ACCESS

Development impact is one of the core criteria used by EEP Africa in its evaluation and selection of projects to be funded. The development impact is primarily achieved through job creation, access to energy and reduction in greenhouse gas emissions.

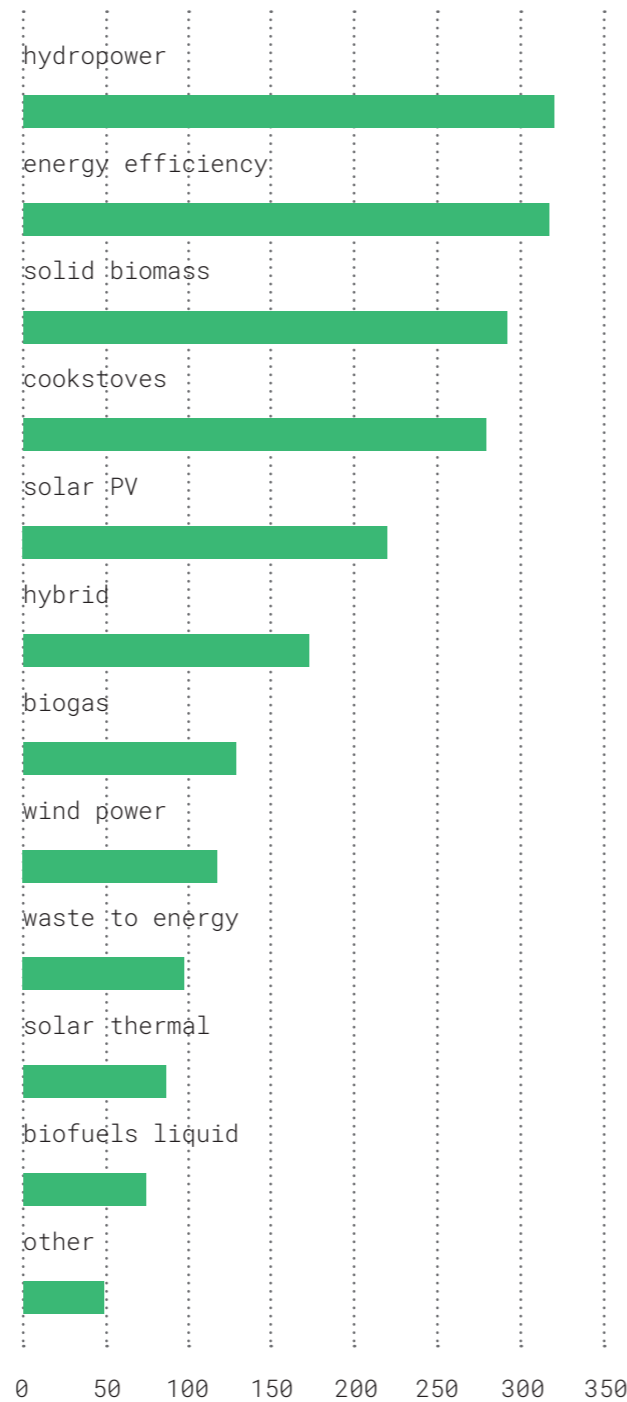
Applicants in CfP14 were asked to give an indication of the number of jobs that will be created and the number of households that will have enhanced access to energy by the end of the project implementation period. The highest employment creation estimates were reported for hydropower, energy efficiency, solid biomass and improved cookstoves technologies (see Figure 9). However, the type and length of jobs in each sector may differ greatly during the phases of implementation. Hydropower projects tend to provide a large number of short-term construction jobs, whereas solid biomass and cookstoves often create longer-term jobs in sales and marketing. However, these jobs are not necessarily full-time positions.

The development impact from most projects comes through job creation, access to energy and reduction in greenhouse gas emissions.

In terms of households reached, replication and scale-up projects projected an average of about 23,000 households. The target for pilots and demonstration projects was below 10,000 households on average. According to data from CfP14, the most easily replicated and scaled-up projects are stand-alone systems and cookstove projects. This is likely due to rapid market expansion, limited infrastructure investment needed, and a shorter implementation period.

More mature markets, such as Tanzania and Kenya, had an understandably high proportion of projects ready for scale-up (see Figure 10 on next page). More unexpected was the high share of such projects proposed

Figure 9: Average number of jobs created (by technology)



Acacia Innovations is a women-led start up in Kenya that is producing biomass briquettes for clean cooking.

in Malawi and Mozambique. However, the degree of scale-up in these countries was much smaller in terms of budget (82% were less than EUR 500,000) and expected impact.

More mature markets, such as Tanzania and Kenya, had a larger proportion of projects ready for replication or scale-up.

The smallest number of scale-up applications came from Botswana, Burundi and Namibia. Due to challenges in the operating environment (including market readiness, political willingness and donor engagement) these countries have thus far not been able to demonstrate many successful business models in the renew-

¹⁹ EEP Africa (2017): eepafrica.org

able energy sector. Botswana and Namibia struggle in the off-grid space due to sparse population. In Burundi, limited capacity and political unrest have created barriers, although there is growing private sector interest in the country.

WOMEN IN LEADERSHIP

A key aspect of fostering sustainable and inclusive green growth is the promotion of gender equality. It is clear that a lack of access to modern, affordable energy and clean cooking technologies has a disproportionately negative impact on women and girls. But it is not enough for clean energy projects to see women only as beneficiaries and consumers. More women need to participate in the sector as leaders and entrepreneurs. A gender-mainstreamed approach to planning and implementing energy projects is needed to ensure desired development outcomes.

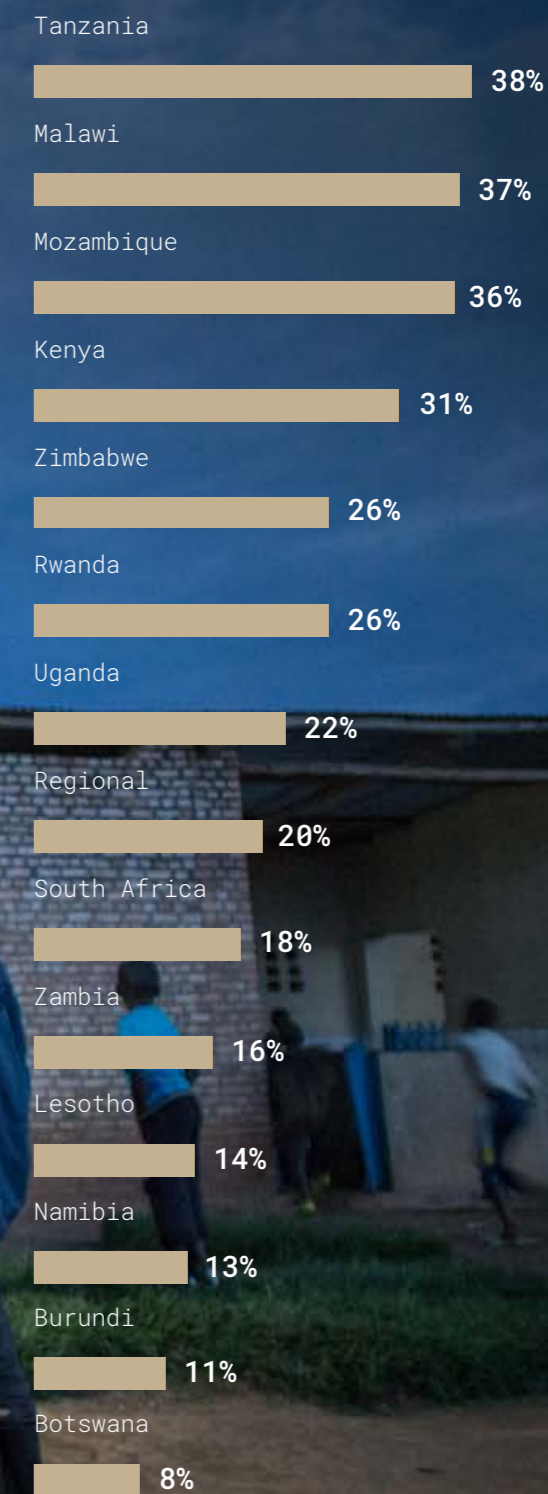
EEP Africa is committed to promoting gender equality across its portfolio of projects.

EEP Africa is committed to promoting gender equality across its wide range of projects. In 2017, EEP Africa published an in-depth study on *Understanding the Role of Women and Girls in Renewable and Energy-Efficiency Projects* based on its own portfolio.¹⁹ One recommendation was that women need to participate in all phases of energy projects: design, production, management and distribution. Significant efforts are needed to make that happen and the private sector should take note that gender differentiated approaches have been seen to improve financial results.

In CfP14, applicants were asked to specify the share of women employees, leaders and entrepreneurs in their organisations and value chains, to determine how women will be directly empowered. Most applicants (73%) reported that women are a minority. Within this, a sizeable share (11%) reported 0% of women in their organisation. Despite EEP Africa's focus on promoting gender equality, the share of CfP14 applications from women-led organisations was low and only 18% of the approved projects were led by women. In response, EEP Africa took action and CfP15 focuses on creating opportunities for women in the clean energy sector.



Figure 10: Proportion of replication and scale-up projects (by country)²⁰



OffGridBox is distributing its unique solar PV hubs in Rwanda. Each unit can provide up to 400 households with purified water, rechargeable battery packs and community wifi.

²⁰ The Seychelles and Swaziland are not listed as no replication or scale-up projects were submitted for these countries.

RISKS IN THE OPERATING ENVIRONMENT

EEP Africa supports innovative, early-stage projects operating in a complex and fast-changing sector, so the inherent risk level of many projects is high. Projects in the feasibility, pilot and demonstration stage often encounter significant challenges in implementation. In CfP14, pilot project applications had the largest share indicating significant or critical risk assessments (12%). The risk level was considered lowest among scale-up projects: 46% selected a low risk rating and only 5% marked significant or critical. Demonstrating a positive view of current trends in the sector, a strong majority of project developers indicated the overall risk as moderate (54%) or low (36%).

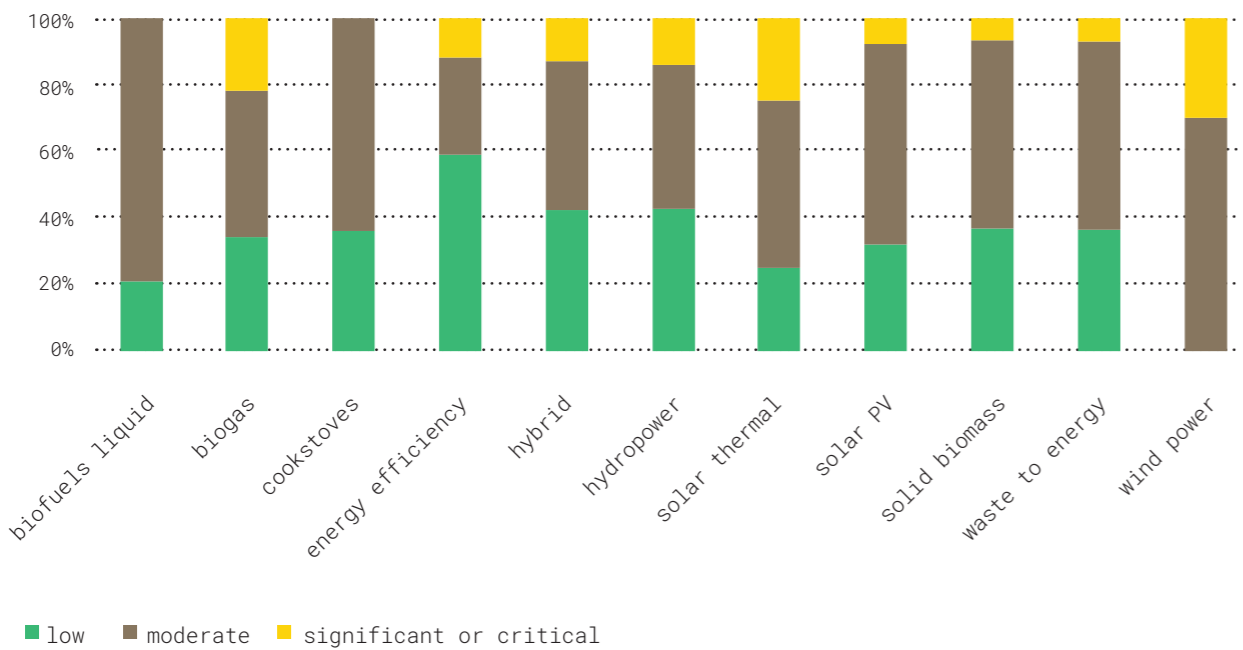
In terms of risk level by sector, significant or critical risks were identified most often (30%) in wind power (see Figure 11). Wind power projects are large scale with long lead times. As a relatively new technology in Africa, they are vulnerable to poorly defined regulatory frameworks, unreliable cash flows, changes in political

landscape, land disputes, and other challenges. Other technologies that noted a significant level of risk were solar thermal (25%) and biogas (22%).

The main risk cited by a majority of applicants was the operating environment.

The most commonly cited type of risk, selected by 51% of all applicants, was the operating environment (see Figure 12). This was especially noted in Burundi, Zimbabwe and Mozambique, where 75% selected it as the main risk for the project. As noted earlier, Burundi has had political and security challenges in recent years and it struggles with human capacity constraints. Zimbabwe is in the midst of a major political transition, which has a direct impact on the currency and business

Figure 11: Overall risk rating by technology



environment. Mozambique has also been struggling economically and EEP Africa's prior experience there highlights challenges in that operating environment. On the other end of the spectrum, Rwanda has shown political commitment to renewable energy and investment. Thus, only 25% of projects in Rwanda chose operating environment as the main risk.

The second most commonly cited risk (17%) was the business model. Early-stage projects often encounter challenges related to operationalizing the business model and achieving positive cash flows. Other risks identified by a significant number of applicants were market demand (14%), technology (9%) and sustainability (5%). Rather interestingly, a significantly higher proportion of applicants identified technology as their main innovation than as their main risk. This implies that the actual technology is not high risk, but the application of that technology in the operating environment is considered risky.

Risk assessments differed slightly depending on the stage of development of the project (see Figure 13). Market demand was of greatest concern for pilot (18%) and demonstration (15%) projects. This reflects the unpredictability of demand for new businesses. The capacity of project developers was identified as a risk for feasibility studies (10%), many of which aim to reach financial close and need to demonstrate capacity to investors. Sustainability presents the most significant self-reported risk for scale-up projects (10%). These projects are often at a stage where they are focused on obtaining follow-on financing.

Figure 12: Main risks identified by applicants

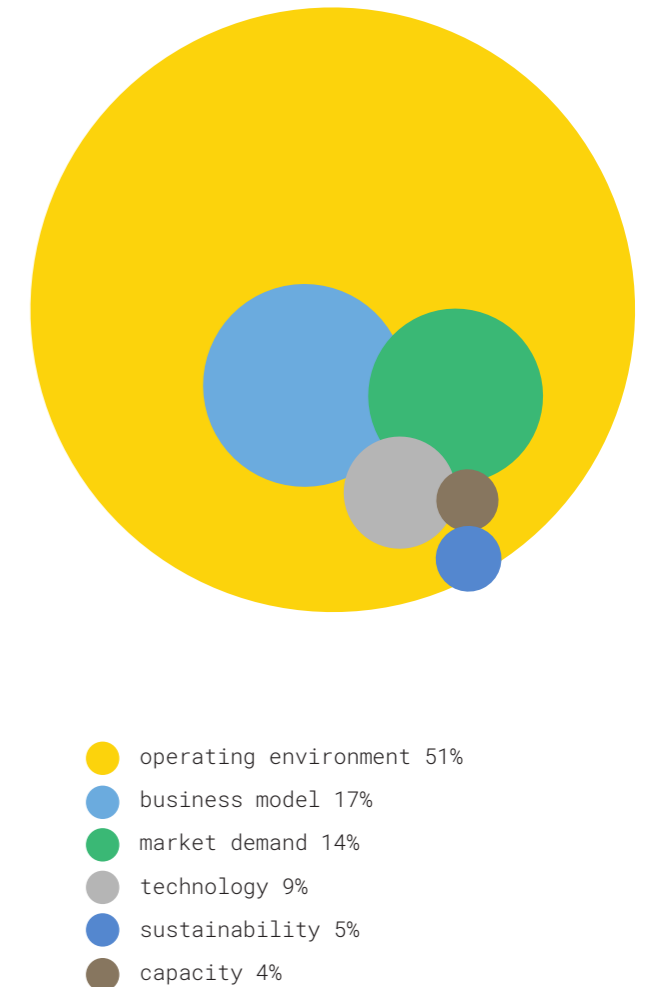
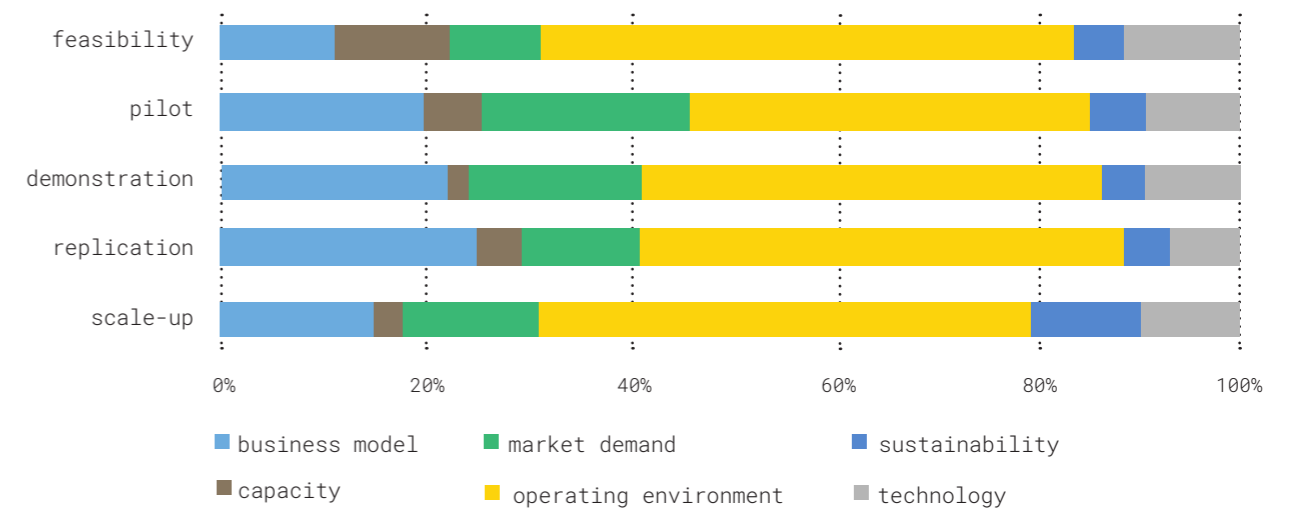


Figure 13: Main risks according to project type



CONCLUSION

Renewable energy in Southern and East Africa is a diverse and rapidly evolving sector that is stimulating growth and development in the region. The remarkable volume of proposals submitted to EEP Africa under its 14th Call for Proposals underscores the critical need for early-stage financing.

The data collected during CfP14 provides a snapshot of the clean energy market in 15 countries and covers a wide range of technologies and project types. An analysis of the applications submitted shows that:

Grant funding is still needed: One third of the proposed projects would not materialize without EEP Africa support. Demand for grant support appears to be most critical for pilot projects.

Grants leverage investment: Funds from EEP Africa can leverage significant private sector financing. The average leverage ratio for proposed projects was 3.6. Developers expected to attract an average of EUR 3.4 million in private sector investments within two years after project completion.

Solar PV is dominant: The most common technology is still solar PV (38% of applications). Technological improvements and decreasing costs, especially for batteries, are supporting the further proliferation of solar projects in the region.

Clean cooking businesses are evolving: The business models for many clean cooking projects are adapting lessons learned from the SHS sector. More projects in this area are integrating innovations such as PAYG solutions, smart metering and multi-functional products to improve financial sustainability.

Mini-grids focus on productive use: The growth in mini-grids (25% of applications) is partly driven by an increased focus on productive use of energy. Many

proposals combined mini-grid development with plans to sell energy efficient appliances or establish local business hubs, which increases demand and improves financial viability.

Infrastructure projects need early-stage support: Grant financing is needed for feasibility studies (17% of applications), in particular for projects utilising wind power, hydropower and waste-to-energy technologies. The potential environmental and social impact of infrastructure projects must be measured and mitigated against before the construction stage or large-scale investment financing.

Risk is inherent in the operating environment: Developers identify the operating environment as the main risk to project implementation (about 50% of applications), although there are wide variations among the countries. Risks associated with technology have decreased, but developers are taking risks in testing new business models and entering new markets.

Women are underrepresented: Significant action is needed to integrate women in the clean energy sector as employees, leaders and entrepreneurs. EEP Africa will organise a gender-themed call (CfP15) to promote gender inclusion and create economic and leadership opportunities for women.

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