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GRÜNE BÜRGERENERGIE (GREEN PEOPLE'S ENERGY)
RESULTS CASE STUDY

Supporting PV Market Development in Rural Namibia through a Results-Based Financing (RBF) Mechanism

Country	Namibia
Implementer	Green People's Energy (Grüne Bürgerenergie, GBE)
Target groups	Solar suppliers, rural commercial enterprises and farmers
Other stakeholders	Rural communities, The Renewable Energy Industry Association of Namibia (REIAoN)
Project duration	09/2021 – 03/2023

PROJECT APPROACH

Some rural areas in Namibia have no prospect of being connected to the public electricity grid. Production and employment opportunities as well as living conditions are limited by the lack of electrification.

However, the country has enormous potential for the use of solar energy. Namibia has one of the highest solar radiation intensities in the world. The renewable energy sector is an emerging industry that has the potential to address the energy deficit in the country and to create new job opportunities at the same time.

The idea behind this project is to promote the marketing, sale and distribution of solar PV products and services to rural commercial enterprises and farmers across the country through a marked-based incentive system. In rural areas of Namibia, it is often difficult for solar companies to operate profitably e.g. due to long geographical distances. This results in high transport and time costs for solar companies. The incentive enables solar companies to operate more profitably in rural areas and to offer solar technology to end-users at more affordable prices. In this way, the incentive scheme directly supports the installer companies and end-users can benefit indirectly. The project is therefore expected to contribute to the long-term development of the PV market in rural areas, ultimately leading to improved economic development, employment and a better living standard.

The project uses a results-based financing (RBF) approach as an incentive mechanism. Suitable solar suppliers are selected through a public call for proposals. The chosen RBF contractors identify interested customers and submit proposals for individual installations to the national GBE office. GIZ reviews each proposal, requests clarifications or adjustments if necessary, and finally agrees on the required standards and the incentive amount for each installation with the supplier according to a pre-defined calculation methodology. The RBF contractor then carries out the work and submits post-installation documents to the GBE office. After reviewing and approving these documents, GBE conducts a site assessment and releases the final incentive to the RBF contractor if no further improvements to the installation are required.

Picture 1: Solar energy can replace carbon intensive sources

METHODOLOGY OF DATA COLLECTION

Data for this case study report was collected through a review of project documents, four qualitative interviews with representatives of GIZ, two RBF contractors and a representative of the Renewable Energy Industry Association of Namibia (REIAoN), as well as a quantitative survey among 34 end-users who had been using the subsidised solar technology for at least four months. 26 of the 34 end-users (35 % female end-users) took part in the survey. The case study was conducted between December 2022 and May 2023.

KEY FINDINGS

Project Achievements

As of February, 2023 40 end-users (48 % women) have benefited from the market incentive provided by the project. The installation of various solar-powered applications, mainly pumps for irrigation and refrigerators for cold storage, was supported. 54 % of end-users surveyed gained access to electricity through the installations, while in 46 % of cases old systems and appliances were replaced.

Using the installed solar-powered equipment for PUE has a number of benefits. For example, installed solar-powered pumps enable better irrigation and cultivation of fields, and refrigerators reduce food spoilage.

27 % of survey respondents are using installed solar technology for private (consumptive) use only and not for PUE. Since PUE promotion in particular was the focus of the project, the statistics presented hereafter refer to the end-users that use solar energy for PUE.

42 % percent of end-users state that their running energy costs have decreased significantly, 11 % report a slight decrease (see *figure 1*). Running energy costs have remained unchanged for 1/3 of survey respondents, because these end-users were replacing old solar-powered appliances or had no energy consuming appliance before. Increased energy costs, cited by 16 % of respondents, can occur where end users now have maintenance costs but previously had no device and therefore no costs.

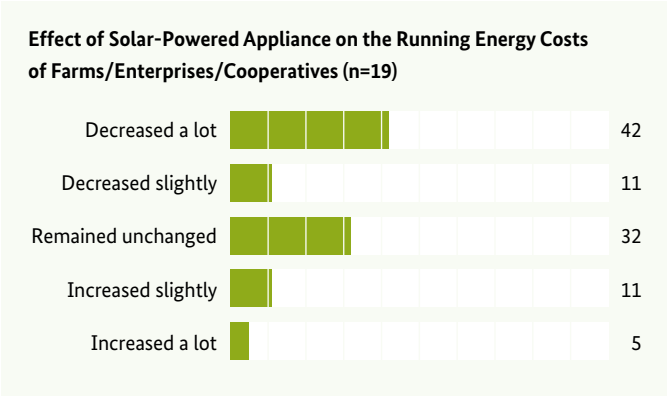

Figure 1: Effects on Running Energy Costs

Furthermore, some non-monetary effects can also be observed. For example, one female end-user gained significantly more motivation for running her farm through the installation and the improved farming possibilities.

On the part of the solar suppliers, the project has had the effect of "pushing" them to operate in rural areas and thus, despite existing challenges, to "unlock a new market segment" as formulated by an interviewee.

Intermediate Impact

More than half of survey respondents state that their productivity has increased a lot due to the use of a PUE appliance. A further 42 % have experienced a slight increase, while for only 5 % no change has happened (see *figure 2*).

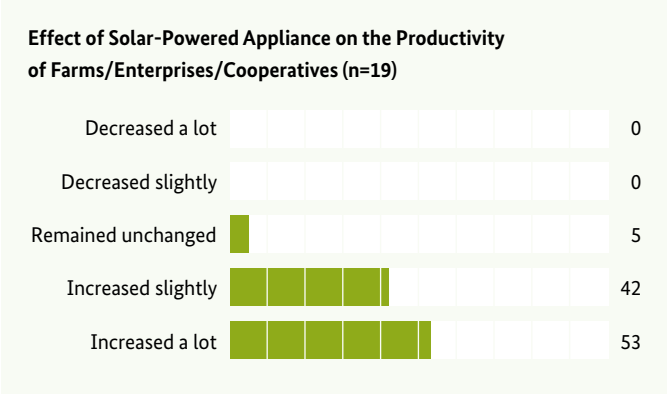

Figure 2: Effects on Productivity

Reduced energy costs and improved productivity have led to a slight income increase for more than half of survey respondents. Around a quarter state even significant income increases, while 21 % do not have any income effect (see *figure 3*). One explanation why reported income effects are not as strong as productivity gains is that not all extra output is (equally) saleable.

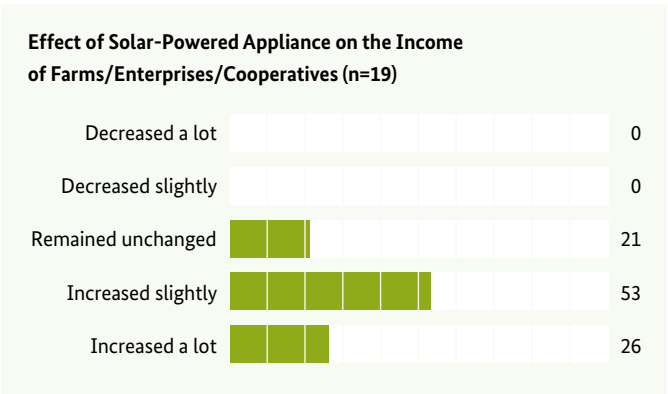

Figure 3: Effects on Income

Increased income can improve life quality of end-users. At the same time, the installations have direct impacts on end-users' living standards. According to one interviewee, a farmer was struggling to get enough water for his family, but the solar pump has significantly improved his access to water. Other farmers could save time, because time-consuming travel to get fuel for the formerly used diesel generators is not necessary anymore.

In some cases positive impacts beyond the end-users' life quality are reported. For example one farmer has been able to open an additional business and set up a bakery, providing bread to the local community including the school.

Despite some cases where business activities have been expanded, the survey data shows limited intermediate impacts on employment. Five end-users (26 %) report that they have hired additional labour force and one end-user states to have saved workforce. The fact that the employment situation has not changed for many farms and businesses is understandable, as they are often micro or small enterprises.

RBF contractors could acquire new customers beyond those who benefited from the RBF incentive. "After a good installation you get recommendations" explained one interviewee. Thus, using the RBF mechanism as a market development tool, solar suppliers can profit from word-of-mouth to increase their customer basis in rural areas.

A positive unintended impact is that some farmers who previously had used smaller PV systems sold them to other farmers when they received new installations subsidised by the RBF mechanism. This allows other farmers to benefit from solar technology as well.

Climate Impacts

Following the calculation methodology of the United Nations Framework Convention on Climate Change (UNFCCC), the installations described above are estimated to mitigate 189,72 t CO_2e/a in the year of installation by avoiding and/or replacing the use of fossil fuels. This is roughly equivalent to the annual CO_2 emissions of more than 136 medium-sized cars in Germany.

Challenges in Project Implementation

Finding the right incentive system was a major challenge for the project. Different approaches have been tried at different stages of the project. In phase 1 of the project a subsidy of 20-50 % of the installation price was given, depending on factors such as size and kind of installation (e.g. differentiation productive use appliance or not) and number of appliances installed. In phase 2,

attempts were made to pay installers per installed watt of power or per watt-hour storage capacity. Both approaches have proven to be too complicated and set unintended incentives for RBF contractors. Thus, in the third phase a simple and more successful incentive scheme was used, simply covering 50 % of the price agreed between end-user and solar supplier.

Solar suppliers benefit financially from the incentive system, but they have high initial investment costs. Although they request end-users to pay a part upfront, installations are mainly pre-financed by solar suppliers. Additional investment costs occur, because site visits are usually necessary to assess feasibility and scope of an installation and also for advertising, time-consuming visits in rural areas are helpful (see also *lessons learned*). Furthermore, solar companies have spent a lot of resources on initiating installations that could not be realised in the end, e.g. because end-users could not pay the required deposit. So if solar companies do not have sufficient equity, cash flow can be a challenge, as a lot of investment is required before costs are recovered through the RBF mechanism.

Cash flow becomes particularly problematic when expected RBF payments fail to materialise because installations cannot be finally accepted. In one case, for example, an end-user had assured that he could produce the brackets for solar panels himself in order to save costs. This did not work. In the end, the solar supplier had to deliver the brackets, which delayed the completion of the installation and the related payments. One solar supplier interviewed even lost a creditor due to cash flow problems.

In some cases, the financial incentive offered by the project stimulated social envy in communities, because despite of the subsidy poor farmers and shop owners still cannot afford a solar installation. In particular, the deposit of around 30 % of the total price required by suppliers as an upfront cost is beyond the means of most rural farmers and entrepreneurs. The subsidy tends to benefit wealthier sections of the rural population. The fact that these are financially supported without the poor inhabitants benefiting has led to complaints to one of the solar companies interviewed.

The administrative management of the RBF mechanism was resource intensive. For example, it was complicated and time-consuming for the GBE team to track whether deviations from original installation plans were justified and followed mutual agreements between end-users and suppliers. At the same time, in the beginning companies struggled to understand the content of the contracts, which created misunderstandings. Required documentation, e.g., proving the track record for eligibility, was also perceived as time-consuming by suppliers. However, a thorough background check of installers was crucial for GBE to avoid working with unprofessional companies.

Lessons Learned

The needs and capacities of RBF contractors have to be analysed carefully. Solar suppliers need simple incentive systems and clear descriptions of the RBF mechanism and contract conditions. Flow charts as produced by the project can help to visualise and explain processes clearly. Also, the point in time of incentive payment has to be considered carefully. While it is a basic principle of RBF that payment is made when the results are visible, the burden on the supplier's cash flow due to mainly pre-financed installations should not be underestimated. Ensuring short-term access to liquid funds, e.g. through interest-free loans, could help.

The financial capacity of end-users also needs to be carefully assessed. In particular when dealing with farmers the available funds depend a lot on the time of the year. Farmers usually have most funds available after harvest and could invest, but often they do not save the money for later investments. In addition, potential end-users can usually hardly mobilise funds for the required deposit on short-notice. This means that when potential end-users are informed that their planned installation is eligible for subsidies, they must also be given sufficient time to raise the necessary funds for the down payment.

The extent to which a client is suitable for an installation regardless of the financing aspects (e.g. appropriateness of the requested appliance and credibility of client statements about the local framework conditions) must be carefully examined by the solar companies.

Some of the end-users who were acquired by solar suppliers beyond the RBF project scope benefited from another financing instrumented, supported by GBE in Namibia, the so called Solar Revolving Fund (SRF). This fund has facilitated access to financing for end-users with customer friendly conditions. This shows how synergies between different instruments can be created. While the RBF scheme pushed the market supply side (solar companies) to extend business operations in rural areas, the SRF stimulated the demand side (end-users) to make use of the improved offer of solar technology. However, the synergies between the two instruments could have been better exploited. For example, RBF contractors were not aware of SRF's existence for a long time. Otherwise, they could have advertised for the instrument, informing potential customers (including poorer population segments) about the financing opportunities offered by SRF. In general, RBF contractors could provide information on financing options for end users (e.g. some end-users acquired funding from banks).

Different approaches for awareness raising among potential customers were tried out. Roadshows seem to be the most effective, as personal contact with the target group can build up trust, as also explained by an interviewee: "It's good to see a face". This is important, because solar companies are not well known in the rural areas. However, roadshows are cost-intensive compared to alternative means like radio or newspaper, which

are common communication means in rural Namibian areas. In order to reduce the advertising costs for individual companies, development partners can also place advertisements for their (RBF) programme centrally. The project had good experience with a public advertisement in the local newspaper for interested farmers and rural enterprises.

Sustainability of the Intervention

The extent to which solar companies will continue to operate in rural areas after the RBF subsidies expire is difficult to say at this point. Some solar companies have discovered a new customer segment and a further spread of demand could lead to profitable business. One company wants to open a warehouse in the Oshana and Zambezi regions as a distributor for solar powered household appliances/solar kits. At the same time, there are challenges to this development, such as the limited ability of many people in rural areas to afford solar-powered appliances.

When it comes to the sustainability of the installed appliances, almost 90 % of end-users still have a fully functional solar-powered appliance, while 10 % have no or only limited functionality (see *figure 4*).

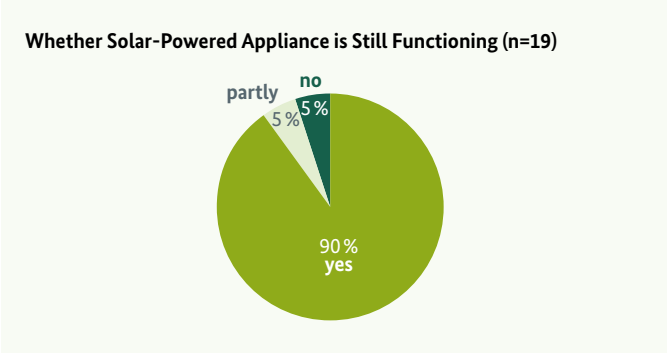

Figure 4: Functioning of Solar-powered Appliances

CONCLUSION AND OUTLOOK

The project has achieved various positive effects and contributed to PV market development in rural areas. It has been shown that positive economic effects on the end-user side can be achieved through targeted subsidies.

Statements of solar suppliers and survey data suggests that word-of-mouth recommendation can contribute to a further spread of solar technology. 95 % of survey respondents state they have recommended their appliances to other enterprises, farms or cooperatives and more than 1/3 even knows other people who have bought a solar appliance due to their example/advice.

At the same time, the project has shown that especially in the Namibian context with large geographical distances, the development of the PV market in rural areas faces various challenges. Lessons learned from the project can be used to adequately address these challenges in future.

The project also provides various interesting approaches that can be used for the design of comparable RBF approaches. These include the relatively simple RBF incentive system of the last project phase and the exploitation of synergies with other financing instruments such as the SRF in Namibia.

MORE INFORMATION

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