



Evidence of the positive effects of access to renewable energy

Banana value chain in Tambacounda (Eastern Senegal)

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

Country	Senegal
Implementer	Energy 4 Impact (E4I)
Target groups	Banana growers, persons working in processing and packaging (especially women), schools, health post
Other stakeholders	Association des Producteurs de la Vallée du fleuve Gambie (APROVAG), solar supply companies (Bonergie, NRJ solar, FLEX NRJ)
Project duration	02/2021 – 07/2023



PROJECT APPROACH

Less than 50% of the rural population in Senegal has access to reliable electricity. With limited access to grid electricity, banana growers and processors in Senegal rely heavily on diesel-powered equipment in the banana supply chain. This has negative environmental consequences, including high CO₂ emissions and river pollution. In addition, the fuel supply is unreliable and costly,

while the diesel-powered equipment is expensive to maintain. The unreliable equipment has a negative impact on banana production and, therefore, on smallholders' income generation.

To address these challenges, the Green People's Energy (GBE, Grüne Bürgerenergie) "AproVert" project, in cooperation with the implementing organisation Energy 4 Impact (E4I), is supporting the *Association des Producteurs de la Vallée du fleuve Gambie*

(English: Association of Producers of the Gambia River Valley) (APROVAG) to facilitate the use of solar energy in the banana value chain. APROVAG is an umbrella organisation that brings together banana growers and processors and focuses on organic farming methods. APROVAG's members are organised in ten community-based economic interest groups that are involved in the banana supply chain (French: *groupement d'intérêt économique*) in seven villages. In the context of the project, E4I is responsible for the coordination of activities, management of funds, reporting and accounting.

The AproVert project aims to promote the use of solar energy in rural areas without access to grid electricity in order to improve the income and living conditions of banana producers and processors. It focuses on four areas: solar-powered irrigation systems for banana growers; solar processing equipment for banana processing units run primarily by women's groups; solar power for rural packing micro-enterprises; solar systems for community infrastructure in the target area. Not only did the project provide access to the solar equipment, it also included training and mentoring for the banana growers and processors on running businesses.



The AproVert project has a gender dimension, as a third of the 728 members of APROVAG are women, and it also has a special focus on supporting young people. AproVert is being implemented in three communes (Dialacoto, Missirah, and Nétéboulou) of the Tambacounda department in eastern Senegal.

The project's financing is based on a grant made available by GBE that funds the upfront equipment costs. APROVAG is set to recover half of the asset costs from its members, who become the owners of the equipment and are responsible for the maintenance, through a loan and a repayment plan. E4I provides the expertise to develop business plans for APROVAG's members on how to repay the investments and on the modalities of the repayment. The underlying rationale for the investments is to increase the profitability of banana production by lowering operating costs and by increasing competitiveness in terms of quality and quantity through sustainable access to renewable energy. In particular, the move away from diesel-powered equipment has a positive impact on production costs and on increasing the reliability of the equipment. The recovered costs will be used by APROVAG to fund additional solar investments to reach more farmers.

METHODOLOGY OF DATA COLLECTION

The data for this case study report was collected through

- (i) a review of project documents;
- (ii) five guided interviews with one representative of GIZ/GBE, three representatives of APROVAG, as well as with one representative of a solar supplier. Additionally, a quantitative survey was conducted to which six schools (out of seven), one health centre (out of one), and eight representatives of the community-based economic interest groups (out of nine) responded.

The case study was conducted between March and May 2023. At that time, some project activities were still ongoing. Accordingly, not all effects are fully captured.

KEY FINDINGS

Project Achievements

Interviewees were broadly satisfied with the timely achievements of the project. The project supported APROVAG's members in developing and implementing their investment plans and in purchasing solar irrigation pumps for banana growers and equipment for the solar processing units as well as for the packing stations. The project directly targeted 1,014 people, of which 473 were women and 161 were young people.

Five out of eight respondents, who are representatives of the community-based economic interest groups, reported that the solar appliances have increased productivity a lot, two report a slight increase and one reports no change.

The two installed 30 kWp solar irrigation pumps improved irrigation on the farms. The solar pumps reduced costs by saving on fuel expenses and they proved to be more reliable than the replaced fuel-powered pumps. One interviewee explained that the irrigation equipment is ready for use four to five days a week compared to three days before the installation. The increase in yields as a result of the installations was positively noted in the interviews.

The solar equipment purchased for the processing units, including twelve solar drying tables, three solar mills, two 250-liter solar freezers, and a solar mixer has improved the situation for the – mostly female – workers. The solar mills require less manual work than the methods used previously and thus make the processing equipment self-sufficient. Products, such as banana flour, are now being processed electrically, which has increased productivity and quality. The solar-powered mixer used in soap production drastically reduced health risks for female workers, who no longer have to handle corrosive chemicals by hand. The new equipment also enables APROVAG's members to diversify by producing new products such as dried or crushed bananas and fruit yoghurt.

APROVAG's packing stations are also improved through access to solar energy: lighting kits have been installed in three stations. These stations are run by rural microenterprises that are ensuring the quality of the bananas and therefore have the potential to increase the producers' income, as these bananas can be sold in high-end markets.

Overall, the respondents are highly satisfied with the solar equipment: Six out of eight respondents stated that they have recommended the solar technology to other farmers, enterprises, or cooperatives.

The project's training, mentoring and education on business management, banana processing and value chain development covered various topics, including plot maintenance or irrigation needs in relation to solar irrigation and water conservation methods, which were considered relevant by respondents and well received.

Five elementary schools (1 kWp solar kits), two middle schools (1.5 kWp solar kits) and one health centre (2 kWp solar kit) are now connected to solar panels. 210 students swapped their oil lamps and torches for solar-powered lighting in their classrooms. At the health centre, solar power is used for lighting – replacing torches – and for other equipment, such as neonatal incubators.

Moreover, the installation of a solar pump in one of the villages allows water to be pumped from a newly constructed deep well, filtered, and transported directly to the houses of the villagers, increasing their access to clean water.

Intermediate Impact

Overall, the replacement of fuel-powered equipment in banana production and social institutions has reduced greenhouse gas and noise emissions, resulting in improved health conditions for banana growers and processors, as well as for community members. In total, the project reached 677 end users in the banana value chain and 2,000 community members through the community infrastructures.

Training and mentoring of APROVAG's members have improved the management of farming, processing, and marketing. The equipment installed has, for example, improved irrigation and the use of fertiliser and manure, thereby having a positive impact on the quality and quantity of bananas harvested. At the same time, the banana growers' production costs have fallen due to reduced fuel expenses. Consequently, the farmers' incomes have increased.

According to the representatives who took part in the survey, incomes in the project region have improved: Seven out of eight confirmed that their incomes had increased somewhat or a lot.

The project empowered women in various ways. The installed mills lift the need for women to travel to mills in distant towns, allowing them to invest their time in more productive activities and to save money.

Electrification has a positive impact on the villagers, in particular on the students and teachers. The increasing number of students attending school each day illustrates this: Five of the six school representatives reported that the number has increased slightly or a lot. Four of the six respondents reported that students are now able to study after dark and that evening classes have been introduced. Four of them reported that teachers are more motivated because they can provide better teaching and school meals. The ability to charge phones and laptops as well as to access the internet improved the quality of life and schooling for the teachers and students and reduced the need to travel to neighbouring towns.

While energy costs have remained the same for the health centre, it is now able to treat more patients, perform more surgeries, support more women giving birth, and vaccinate more people due to longer opening hours. Certain types of surgery that were not possible before can now be offered. Health workers' working conditions have also improved, with lighting in the hospital allowing them to stay in the hospital at night and provide care for patients 24 hours a day.

Challenges in Project Implementation

The challenges are mainly related to the process of introducing the new technology, which required arrangements to be made before the solar installations could take place. For example, some of the school buildings were in a dilapidated state and had to be rebuilt before the solar equipment could be installed. Getting equipment and spare parts, was often more difficult than anticipated, and it took long to get them.

Explaining the benefits of solar energy and the implementation process to the banana growers and processors requires patience on the part of project managers, as the new technology is not yet widespread in rural Senegal. In particular, it was necessary to explain their obligations and responsibilities, while emphasising the benefits.

It is difficult for social institutions, especially primary schools, to mobilise financial resources and repay the loans for the solar equipment.



Other challenges were related to administrative tasks, such as late arrival of printers and setting up bank accounts for the growers and organisations for the repayment, which then caused a series of further delays. The COVID-19 pandemic also slowed down project implementation. While field visits were already considered very time-consuming due to the long distances between sites, the pandemic and its aftermath made site visits and meetings even more demanding. However, everyone involved – from APROVAG management and solar suppliers to the banana growers and processors – responded flexibly to the challenges that arose and adjusted their schedules accordingly. E4I was granted a three-month extension to complete the project.

Lessons Learned

Government officials – from regional to local –, schools and farming communities, as well as agricultural service providers who conducted trainings with farmers, have been actively involved in AproVert since its inception. The strong commitment to involving women and adolescents at all stages strengthens their role in the communities. According to interviewees, women are in particular welcoming the benefits provided by the project as it allows them to spend their time more productively. This creates broad ownership and momentum.

Another reason for the momentum in the project is the well-chosen location in an area that produces 80% of the country's bananas. The success of the project is largely linked to the cash crop, which guarantees a regular income and allows for credit-worthiness of the growers and processors groups; or as one interviewee put it: „The money comes from the banana!“

Close cooperation between project management and financial institutions is considered essential and should be established at the start of the project. For this project, APROVAG and a bank have set up a collection mechanism and a dedicated account into which the APROVAG's members will pay their financial contribution, which can be used as a kind of subsidy to finance further equipment for more farmers.

According to an interviewee, the collection process was challenging for APROVAG. In particular, the individual repayment plans for the members required for a repayment mechanism that APROVAG had not previously had to deal with. It was therefore seen as highly beneficial that E4I provided the expertise to develop the collection mechanism together with APROVAG.

Sustainability of the Intervention

All survey respondents report that the solar-powered appliances are still functioning, and several measures have been taken to ensure their longevity. Firstly, a contract between APROVAG, E4I, the solar supplier companies, the banana growers and processors groups, states that APROVAG will follow up on the solar supplier company's guaranteed warranty of two years. This provides the banana growers and processors security for their operations.

Secondly, the involvement of farmers and processing workers in the installation of the solar-powered equipment is invaluable in terms of developing local technical knowledge on how to maintain the equipment. For each installation, members of the community-based economic interest groups are trained to be able to do basic maintenance work on the equipment. Further maintenance agreements are made between APROVAG and the suppliers. These are furthermore supported by a technical officer that is assigned by APROVAG to each installation to assist with maintenance and ensure longevity.

Thirdly, banana growers and the mostly female employees of the packing and processing centres have been trained and mentored in methods and techniques, such as financial management, solar equipment operation and maintenance, and developing and implementing business plans. In this way, the project provides the foundation for a long-term operation of these facilities and rise in productivity and profitability.

CONCLUSION AND OUTLOOK

AproVert has convincingly strengthened the technical and organisational capacities of members of the economic interest groups and individuals that are involved in the banana supply chain in rural Senegal. It has also improved access to finance and solar equipment, which is used productively. In addition, the local population benefits from the electrification of social institutions and improved services.

The project was able to create a strong sense of momentum and ownership, enabling successful implementation. Further additional momentum in market development is likely, as the introduction of a government VAT subsidy is expected to further promote off-grid photovoltaic projects by lowering the price of solar equipment in Senegal.

The successful implementation of the AproVert project has generated interest in replicating the approach. An APROVAG representative confirmed the interest in a follow-up project based on the experience of the project. Survey respondents reported that other farms and social institutions are interested in learning about the installed solar systems and equipment. Two community-based economic interest groups and one school reported that they knew of farms that had also bought solar equipment as a result of their example and/or advice. A solar supplier company has expressed interest in replicating the project's approach. As an active project stakeholder, they are liaising with the implementing organisation to seek funding.

MORE INFORMATION

Energypedia:
[Green People's Energy Knowledge Hub](#)

Published by the Deutsche Gesellschaft für
Internationale Zusammenarbeit (GIZ) GmbH

Registered offices Bonn and Eschborn, Germany

Green People's Energy
Dag-Hammarskjöld-Weg 1 - 5
65760 Eschborn

T +49 6196 79-0
<https://www.giz.de/de/weltweit/77417.html>

As at September 2023

Text GOPA Worldwide Consultants GmbH, Arepo GmbH



Design/Layout Atelier Löwentor, Darmstadt, Germany

Photo credits Titel: © GIZ / Cordula Kropke, p. 2/4: @ GIZ

On behalf of the
German Federal Ministry for Economic Cooperation and Development (BMZ)