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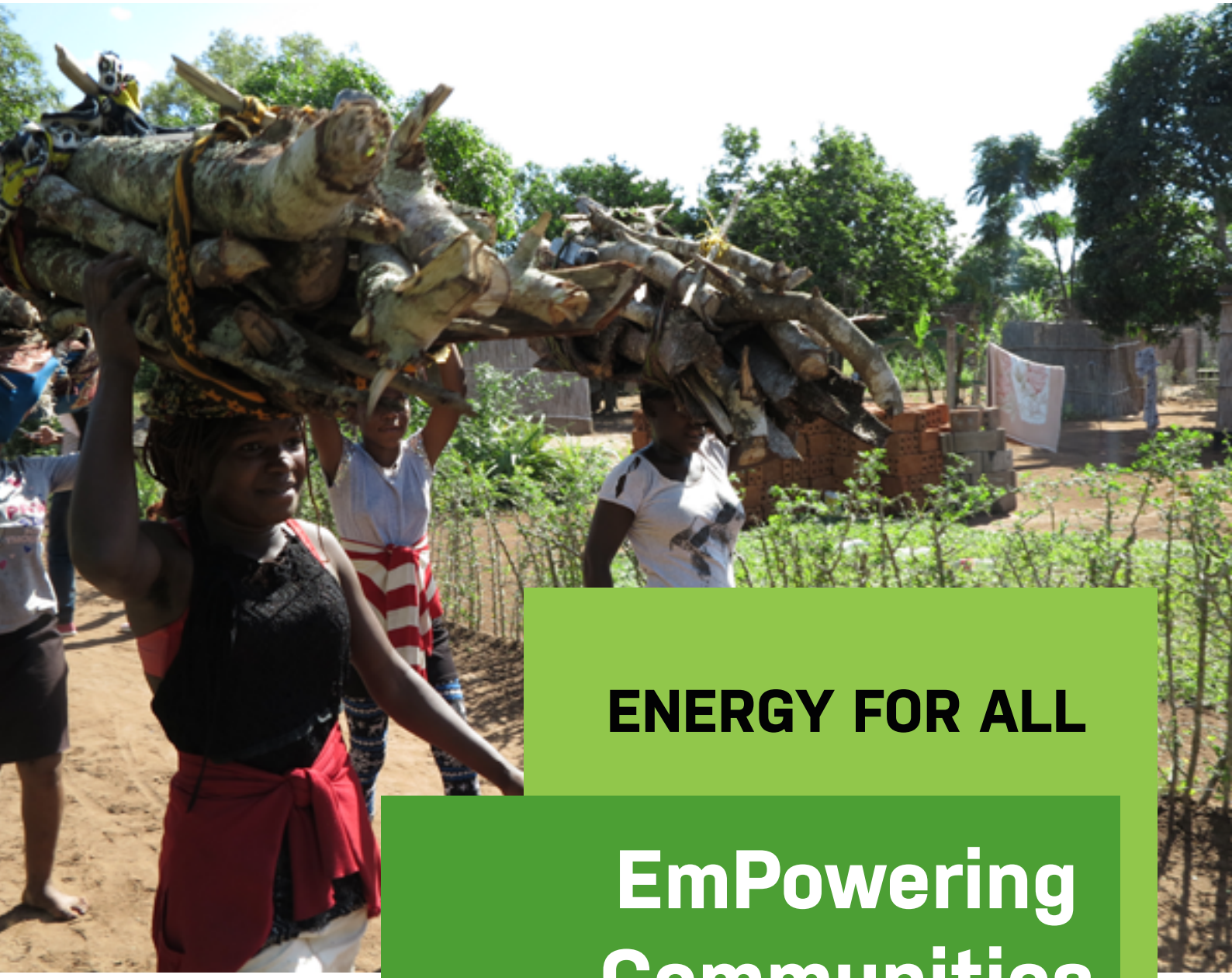

ENERGY FOR ALL

EmPowering Communities

2020

Traditional earth-kiln
for making charcoal, Togo

CONTENT

"I can see families developing. They appear to be cleaner and use the money and time saved well. The community is developing because people can open their businesses earlier and participate in the activities that develop the community. For example, it was difficult for many people to participate in community meetings because most of them had gone looking for firewood and water. Households are really satisfied with the clean energy."

Paulo Simone Uache, Local activist in Muelé 1 community, Inhambane province, Mozambique.

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Bags of charcoal heading for Beira, Mozambique

EmPowering Communities

Empowering Communities is a program initiated by Naturvernforbundet to achieve basic energy access for households in villages in Mozambique, Nigeria and Togo. It is implemented by local partners that have worked together for 10 years to promote universal access to modern clean energy and to develop affordable energy solutions in practice. The program has financial support from the Norwegian Agency for Development Cooperation (NORAD).

Through the program, more than 360,000[1] people benefit every day from practical solutions that give them improved access to clean, reliable and affordable energy services at home. This creates work and income opportunities in local production and marketing of various types of improved stoves, small solar systems and solar charging stations.

Hundreds of persons currently make an additional income from these energy activities. In cooperation with local leaders, communities have been made aware of the health and economic benefits of clean energy. The families cut their energy expenses by half, in addition to health benefits and a cleaner kitchen. More than 90 per cent of the users with improved stoves report substantial health improvements. Finally, unsustainable cutting of forest is reduced.

Leading by example, the partners in EmPowering Communities lobby for improved polices in support of Sustainable Development Goal number 7, ensure access to affordable, reliable, modern energy for all within 2030.

For more information:

Norway	Naturvernforbundet	www.naturvern.no
Mozambique	Kulima	www.kulima.org
	Livaningo	www.livaningo.co.mz/
	ADEL-Sofala	www.adelsofala.org.mz/
Nigeria	Environmental Rights Action	www.erafoen.org/
Togo	Jeunes Volontaires pour l'Environnement	www.jve-international.net

1 Number of persons in the households that have got one of the 110,555 improved cook stoves and 16,313 solar lights during 2017-2019.

Energy for all

Solar lantern at market, Togo

In 2040, 90 per cent of those without access to electricity and almost 50 per cent of those without access to clean cooking will live on the African continent[3].

Energy is important to reduce poverty. Energy is not only for industries and offices in the formal economy, but just as much for people living in the slum districts and in rural areas. In developing countries, most of the population gets their daily outcome from small-scale farming or from trade and services in the informal sector. These are the people paying the price for the lack of basic modern energy services.

Globally, the number of people without access to clean cooking has barely changed since the Sustainable Development Goals (SDGs) were agreed on in 2015 or even during the two decades before that. Almost 3 billion people live without access to clean cooking solutions - two out of every five people on the planet[2].

Access to electricity has increased in absolute terms, but slightly less than one billion people continue to live without access to electricity.

Of these, 600 million live in Sub-Saharan Africa, where planned efforts to provide access to electricity barely keep up with population growth. In 2030, the International Energy Agency expects that on global level 530 million people will still lack access to electricity, and nearly one billion people will lack access to clean cooking.

Mozambique is a typical example, where around 30 per cent are using electricity and only 3.2 per cent are using clean cooking. Electricity access does not automatically make households stop their traditional cooking on wood and charcoal. Partly, the electricity system is too weak and unreliable, but costs are also too high. Cooking is an energy demanding process in general, but the traditional inefficient use of biomass is extremely energy demanding. As a result, 75 per cent of the primary energy consumption in Mozambique is biomass (wood and charcoal), while electricity is 15 per cent and fossil fuels 10 per cent.

2 Sustainable energy for All (2019). Tracking SDG7: The Energy Progress Report

3 IEA (2019) Africa energy outlook

How energy can reduce poverty

Access to modern energy services is not only a question of having access or not, but also a question of quality and quantity. The international organization Sustainable Energy for All operates with five levels (tiers), from basic to full access. Basic access for households is defined to include a minimum of electricity for four hours of light, possibilities to charge a phone, and clean cooking.

Lack of modern energy services is linked to poverty in general. This does not mean that poor people do not use energy, but that their use is extremely inefficient, polluting and costly.

Introduction of modern energy services is a way out of poverty by saving costs and time, and by giving access to new opportunities, improved health, and wellbeing.

Improved cookstove with chimney, Togo

Saving money

Improved cooking stoves save fuel, and small solar systems (lamps with light and a USB port) give electricity for light and possibilities to charge a phone.

Households make economic savings by a reduced need for buying batteries and kerosene for light, and wood or charcoal for cooking.

The direct economic benefits are highly appreciated by the households and easy to document.

In random monitoring visits to the beneficiary households in Mozambique[4] , the users interviewed inform that they typically save 6 -7 out of 10 bundles of firewood per week at a value of 300 MT.

For use of solar lamps, the savings on batteries, fuel, and charging is 350 MT per week. This adds up to 650 MT, equal to 10 USD per household every week.

Smoke from cooking and light with kerosene makes a heavy impact on households, especially on women and small children, who spend most time around the three-stone fire and indoors. In inquiries among users that have left the three-stone fire and now use a simple, locally made, improved cook stove, 98 per cent say that they previously had severe negative health impacts from the smoke. After half a year, 97 per cent report that the health impact is substantially reduced or has disappeared.

4 Monitoring made by Kulima in 2020 as part of the EmPowering Communities program

Training on making improved kilns for charcoal production, Mozambique

Backing development

Access to energy interacts with and reinforces other development activities. For instance, school enrolment will be more effective if students can do homework at night, and improved health will give greater benefits if additional income opportunities are in place.

Typical results of improved access to clean energy are economic savings, time savings, additional working hours with better light, better and cheaper communication with mobile charging, and fewer respiratory and eye diseases. When asking households how they spend their economic savings, most of them say it is spent on providing a better diet for the family. To ensure enough of food every day is the main priority for low-income households. Savings also mean that more families can give lunch for their children to take to school. The next priority is to pay school fees and purchase school materials, such as books, pencils, and pens for their children. Clean energy contributes to education for pupils not going to school previously due to the poor financial situation of the household. Many also use the savings for medicine and hygiene products, and investment in agriculture, like buying seeds and hiring additional manpower. Saved time and better light give children the possibility to study after dark and for adults to do income-generating activities, in addition to increased comfort and security.

The accumulated benefits can be quite high, given the multiple channels through which access to modern energy services can lead to positive development effects, including greater income, better health, and higher levels of education[5].

There is little research on what degree of modern energy services is needed to create a chain of positive development effects. There is good reason to believe that the first step has a high impact, with just enough of electricity to have light and charging opportunities, and a clean and efficient stove for traditional biofuels. Further climbing up the energy ladder towards full and unlimited services is important but might provide less impact per watt or investment unit. Traditionally, energy policy aims for full access, and limited governmental funds are spent on expensive grid connection for a limited portion of the population, while those who are out of reach are left to fend for themselves.

5 Inter-American Development Bank (2018): Measuring the benefits of energy access

How to make a village smoke-free

Cooking on only one piece wood, Mozambique

Improved stoves have been on the agenda for decades, but progress is still limited. In urban areas, there is a transition towards use of gas and electricity, but, in rural districts, these types of fuel are only a distant dream. They are neither available nor affordable.

In Moamba district in southern Mozambique, the first improved stove was constructed five years ago. Today, 6,400 stoves have been constructed, and the project is about to be completed. The district, with 60,000 inhabitants, can be the first in Mozambique to be declared smoke-free.

The stoves are made from clay by local activists under the supervision of a technician from Kulima. The model is developed and adapted to local conditions with inspiration from Nepal and Tanzania.

In the beginning, it was a challenge to convince households to leave three-stone cooking, which has been used as long as anyone can remember. The key to success has been to reduce costs. This has been possible by working closely with local leaders in awareness raising, setting up a list of interested households and collection of local contributions. A local activist has produced stoves using local materials. The households pay a small fee to cover transport of clay and must provide zinc for the chimney, and they give a small reward to the activist building the stove in their home.

Locally-made clay stoves have many advantages, but also some drawbacks. The main challenge is maintenance. The stoves need regular care, where cracks are sealed with a thin clay plaster.

This is simple work, but must be done regularly, and the caretaker needs to have a small amount of clay in the house.

To have an efficient draft, the chimney also needs to be cleaned from time to time. In the beginning, it is therefore necessary to provide awareness raising and monitoring, where the local activist goes back to the household for inspection and, if needed, explains issues to the user and corrects errors.

The clay stoves need a proper kitchen as they cannot withstand rain. In December 2019 in South Mozambique, 2,331 families had a monitoring visit. 252 stoves had water damage, mainly by the heavy rainstorms in November. 185 of them were reconstructed; 39 stoves with some minor faults were corrected; and 28 stoves were not used, but the beneficiaries were instructed again on why and how to use them.

A three-stone fire needs 6-12 wood sticks to burn properly. Heat and smoke go in all directions. Less than 10 per cent of the energy is utilized for heating the food. In an improved stove, 1-3 sticks are enough to keep the fire running in the insulated chamber, where the smoke is partly burned at a higher temperature and the rest escapes through the chimney. The efficiency increases to around 30 per cent and wood use is reduced by 60-70 per cent.

The stoves are custom-made and can be constructed in order to give better ergonomic working conditions and to give space for organizing kitchen equipment. With the smoke and soot out through the chimney, it provides a huge improvement for the management and hygiene of the kitchen.

No end to coal?

Cooking on charcoal is the most inefficient, costly, and environmentally damaging way to prepare food. Many countries have tried to ban charcoal to halt deforestation. This has had limited impact. In absence of affordable alternatives, it is an increase in charcoal usage in Sub-Saharan Africa[6]. There is a tremendous potential for increased efficiency in production and use of charcoal.

Charcoal is the main fuel for cooking in urban settlements in Africa. The forests around the cities have long been gone, and charcoal must be transported over longer and longer distances.

Charcoal is used in stoves made by iron sheets. Iron conducts heat and most of the energy in the charcoal will never reach the pot on the top. An improved stove is simply made with an insulation clay liner. That is all that is needed to cut charcoal consumption by 50 per cent.

An improved stove is very cost-efficient. Payback time for the users is only 1-2 months. Nevertheless, there are three important barriers. First of all, the household needs to know and be aware of the benefits. Secondly, there needs to be improved stoves available for purchase locally. And finally, it is a challenge for many families living from day to day to prioritize the small investment needed, despite the short payback time.

Experience shows that business initiatives do not manage to get activities off the ground without support. In Togo, the organisation JVE have teamed up with local potters and blacksmiths to establish three production centres.

The producers were supported through training and quality improvement. Finally, the stoves were certified by the University of Lomé after a laboratory test that proves the stove's efficiency. To build a market, it is important to deliver uniform products of high quality, but you also need promotion and distribution. Here, the producers benefit from awareness raising campaigns and, finally, the network of 213 sales points built up by JVE.

In this way, stoves are made available for households. JVE activities gave 13,087 sold stoves in 2019 and 3,300 tons of charcoal were saved annually, benefiting more than 44,000 people and the environment in one of the countries with the highest deforestation rates in Africa.

The production of charcoal has also a huge efficiency potential. Most of the charcoal is produced in simple, traditional earth kilns. In this process, 90 per cent of the energy in the input wood is lost. Simple adjustments in the kiln design double the output of charcoal from each tree. JVE's training and cooperation with charcoal producers also include selection of species, re-forestation and improved control and regulations of the production.

6 WHO Household Energy Database (2018) and Stoner et al. (2019).

Solar lantern for schoolwork after dark, Togo

Solar electricity to all?

To live without electricity is not easy and it is not cheap. You will need to use a kerosene wick lamp for light, or use candles or batteries for a torch, in order to be able to do anything after dark. Many people must travel long distances just to get their phone charged.

Expansion of the electricity grid is a slow process, as it depends on national policies and huge investments. However, a household doesn't need high voltage or much energy to harvest the first benefits. Less than 1 kWh/week will serve basic needs for light and for information and communication technologies, in addition to some comfort from an electric fan. Greater needs will come with cooking, refrigerators, and air conditioning.

A solar lamp with a radio and a USB port costs 30-50 USD. This will give basic access to good working light and electricity for charging a phone. For most households, it will improve living conditions substantially and reduce current expenses enough to pay the lamp within a year. So why doesn't everyone without electricity run to the shop to buy the solar lamps?

There is no doubt that households without electricity grid connection would like to have a solar system giving small, but basic access to electricity. The main barrier for a big share of the population living on a few USD a day is the upfront investment.

Here, financial solutions such as "pay as you go" (PAYG), where you pay in small instalments over a longer period of time, are very much welcomed. So far, this is mostly available for bigger systems with costs of 500 USD and higher. PAYG solutions depend on installation of a communication device, making it possible to turn off the system when payments are not received. This is too costly for the smallest solar systems.

Traditional sales by instalments will boost the business, but also pose a big risk for the vendor. It can work when a guarantee system is set up in cooperation with a client's employer or in circles of trust within a community.

Saving and loan groups are a source of financing for households. Here, 10-30 persons agree to put in a small amount every week in a common pool. Members can get short term credit from the group to be paid back with interest. After a year, the savings and the collected interest are shared by the members, who then will have the capital needed for a solar system or other needs. Experiences show that many use the opportunity to invest in small solar systems, but the majority have other pressing needs, such as seeds for the next farming season or roofs for their houses.

For the smallest systems, there is also the question of availability and quality of the systems. Many low-quality systems with short lifespans are on the market, undermining consumer confidence in the technology.

Leave no one behind

Simple improved clay stoves take smoke out of the kitchen

Energy policy is normally about electrification and large-scale energy projects to serve industries and people living in the richer parts of towns. Energy ministries are not equipped for mainstreaming of small-scale, decentralized utilisation of renewable energy, energy efficiency, or for taking the benefits of energy access to the last mile. The need of those living outside the electrical grid has been put on hold. Instead of facilitating simple but important improvement, the best has become the enemy of good.

Togo in West Africa can serve as a good example where focus has turned in favor of those before overlooked in the energy development. During preparation of the first energy policy (draft 2012) universal access was not at all addressed, this in a country where less than 7 % of the population have access to clean cooking, and less than 10 % of the rural population have access to electricity. Still, the priority was on mega projects, like construction of a new import terminal for coal and even to start research on nuclear power.

JVE has engaged in promotion of energy access for all and confronted the government with the shortcoming in the proposed energy strategy. After the interventions, the plan was never approved in Parliament, and JVE continued to mobilize actors across the country around the SDGs and to contribute to policy discussions on the National Development Plan. Finally, the governmental approach changed, and JVE was invited to join the national steering committee for drafting a new renewable energy law.

In June 2018, a new roadmap for universal access to electricity within 2030 was published in Togo. It is one of the most progressive electrification strategies in Africa, and it includes massive off-grid electrification and tax breaks on solar equipment to reach universal access by 2030.

JVE and its partners have managed to change the attitude to energy in the country during their long and active involvement with the energy sector. A lot of efforts have gone to awareness raising, education and demonstration of possible solutions for households and communities. JVE has built networks and partnered with other organizations to ensure that coordinated efforts are made towards making modern, sustainable energy solutions available to all.