

Capacity development for solar-powered irrigation

Solar-powered irrigation is a technology that promises an increase in production without emitting further greenhouse gases. However, technical knowledge and awareness of the technology is still lacking in many countries. This is where the “Toolbox on Solar Powered Irrigation Systems” comes in. Not only does it pave the way for applying climate-friendly technology, it can also support women’s empowerment.

By Lucie Pia Pluschke, Janna Schneider and Maria Weitz

If used effectively, solar-powered irrigation systems can lead to an increase in agricultural productivity. This holds great promise for food security. For instance, today only six per cent of agricultural land in sub-Saharan Africa is irrigated, which can mean dramatic crop losses in periods of drought. According to the UN Food and Agriculture Organization (FAO), irrigation holds the potential to increase the harvest of some of the main crops on the continent by an estimated 100 to 400 per cent.

Yet, this potential is not simply realised by setting up a solar pump, it requires expertise in the design, installation and maintenance as well as knowledge of efficient water use, sustainable management of water resources and input management. “We need to generate awareness amongst the farmers to use water judiciously with an objective to improve productivity and reduce input costs. Only then can solar-powered irrigation lead to access of appropriate and nutritious food at affordable prices,” states Jacinta Gatwiri. She is a renewable energy expert from Women in Sustainable Energy and Entrepreneurship (WISEe), a women energy cooperative in Kenya that promotes women in solar energy installation and entrepreneurship in the entire country through capacity building and networking. And she is one out of five women experts who have been trained in the context of the project “Sustainable Energy for Food – Powering Agriculture” run by Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ). The project follows a capacity development approach to promote and anchor solar-powered irrigation.

Paving the way for sustainable irrigation practices

Despite relatively high upfront investment costs, the operation of solar pumps is virtually free. Therefore, solar pumping is often perceived as an irrigation method leading to unsustainable water abstraction rates, so that the issue of agricultural water management needs to be addressed. Water resources, particularly groundwater, are at risk when extracted faster



From technical skills of electricians and technicians to knowledge of adaptive water management by farmers, capacity-building is key to unleashing the potential of solar-powered irrigation. Photo: GIZ/ Jörg Böhling

than they can be replenished, leading to water scarcity, irreversible salinisation, loss of ecosystems and wetlands, land subsidence and social conflicts over competing water uses. However, groundwater depletion can be prevented through good agricultural and water management practices. Jacinta Gatwiri, aware of the problem, proposes a central role for the government to monitor and curb the excessive abstraction of ground or surface water in order to ensure that irrigation practices are sustainable. Especially in regions with little experience in irrigation, it is crucial to train farmers on simple and effective water management, such as rainwater harvesting, efficient irrigation techniques and agronomic practices.

Furthermore, the economic viability of such an investment often depends on the long-term vision a farmer has for his farm, and the information he or she has at hand about financing options. Despite an increasing palate of innovative and affordable solutions, such as pay-as-you-go models, solar pumps have not yet gained acceptance, especially among small-

holder farmers. Small farmers often lack access to finance, needed in particular to cover the high cost of purchasing a pump. A greater effort is needed to support farmers in their economic planning and financial literacy, while a direct dialogue with financial institutions and private sector is required to develop more tailored financial products for farmers.

Solar powered irrigation systems hold a great potential, but to unleash it, more work is needed to build capacities – from technical skills of electricians and technicians to knowledge of adaptive water management by farmers – reflecting the cross-sectoral nature of the systems.

The SPIS Toolbox

The Toolbox on Solar Powered Irrigation Systems (SPIS), developed by GIZ and the United Nations Food and Agriculture Organization (FAO), is an initial step towards offering a comprehensive training approach. It provides manuals and tools to guide advisors

Women of the WISEe cooperative participating in the Training of Trainers workshop.

Photo: Strathmore University, Nairobi

on some of the crucial questions of economics, design and installation, and irrigation management. The Toolbox has been employed in the context of the Powering Agriculture Project since 2015. Over the course of four years, it has grown from being a simple Excel-Tool to a comprehensive learning experience available in English, French and Spanish. It features tried and tested training modules, an e-learning course, online instruction videos and a pool of trainers who themselves were trained by the Powering Agriculture team. This way, the Toolbox offers different avenues of learning. The online classroom is a flexible environment that accommodates different learning styles, while the person-to-person workshops allow for a practical application of knowledge through field visits and marketplaces, where research institutions and the private sector can present their technologies.

From the beginning, the idea was not to give trainings in isolation, but to provide them as part of a project or broader curricula. FAO came on board to develop the irrigation-related modules of the Toolbox further, using it in its projects around the world. Training workshops were organised in cooperation with other GIZ projects and partners, catering to specific target groups, such as policy-makers, entrepreneurs and extension officers. Moreover, the Toolbox has now been integrated into the training curricula of several organisations, including the master programme on “Land and Water Resource Management: Irrigated Agriculture” at the Mediterranean Agronomic Institute of Bari, in Italy, and the Solar Water Pumping Training at Strathmore University in Kenya.

A catalyst for change

As interest in the Toolbox grew, it became clear that a more systematic and sustainable trainer network was needed. The first step towards this was a collaboration with Women in Sustainable Energy and Entrepreneurship (WISEe) in Kenya.

Like in so many other countries, the uptake of renewable energy in Kenya is hindered by inadequate technical support to the rural households, which are mostly not served by the national grid. Here, off-grid solar solutions can present a real opportunity, but the few



qualified solar PV practitioners can primarily be found in big urban centres where it is easier to do business. Indeed, data from the Energy Regulatory Commission (ERC) shows that over 65 per cent of the 356 registered technicians by 2018 operate around Nairobi and only a handful are female. WISEe was founded to remedy this, training women on basic technical photovoltaics skills, empowering them to educate others, developing entrepreneur skills to set up their own businesses, and making them champions of solar technologies.



Capacity development is key, because it will ensure that information on solar-powered irrigation trickles down to practitioners and end users rather than remaining in the domain of equipment manufacturers, suppliers and experts.

Jacinta Gatwiri

As such, WISEe was an obvious partner to build up a trainer pool in Kenya and the wider East African region. After a five-day Training of Trainers (ToT) workshop, five women, including Jacinta Gatwiri, were invited to contribute to – and eventually lead – SPIS training workshops. Three ToTs have been organised by the Powering Agriculture team in both English and French in order to penetrate multiple language regions. So far, 29 trainers have been qualified. On the one hand, the ToT improves the scalability of activities through these trainers, while on the other, benefiting from their knowledge of local issues and markets.

The WISEe trainers can now offer their newly acquired skills as a service to interested organi-

sations, making it a far more likely that trainings continue at the end of the Powering Agriculture project, and hence contributing to the sustainability of the Toolbox. The fact that WISEe was conceptualised and is managed by women to empower women in a largely male-dominated sector makes it a catalyst for change.

Jacinta Gatwiri and her colleagues have by now led multiple trainings on solar-powered irrigation in Kenya and other countries for both GIZ and FAO. “It was a good experience as trainees were really interested in the knowledge and seemed enthusiastic to put it into practice,” says Gatwiri.” Tameezan wa Gathui, chairperson of WISEe, agrees. “I enjoyed the experience of using flexible teaching methods depending on the background of the trainees, and the fact that there was room for trainees themselves to suggest modifications to suit their local needs based on their experiences in the field,” she recalls. Building capacity at the local level has the potential for enhancing collaboration and networking among those trained. Hopefully, the trainings will also help to promote the broader vision of WISEe of getting more women to work in the solar industry.

Lucie Pia Pluschke is the East Africa Hub Manager of the GIZ project “Powering Agriculture” and is based in Nairobi, Kenya.

Janna Schneider works for the Powering Agriculture project as a junior advisor.

Maria Weitz is an agricultural economist and works as Head of the “Powering Agriculture” project, which is based in Bonn, Germany, and in Nairobi, Kenya.

Contact: maria.weitz@giz.de

For more information on the SPIS Toolbox, see: www.rural21.com