



YESPV-NIGBEN – PV assisted food production and drying in Nigeria-Benin

CLIENT II – International Partnerships for Sustainable Innovation

With an average annual population growth rate of 2,5 percent in the past ten years, Africa has the fastest growing population of all continents. This implies a growing demand for food and energy as well as attendant land use challenges. Post-harvest food wastages caused by poor storage facilities and a general lack of access to clean energy are key issues affecting sustainable development. The German-African project YESPV-NIGBEN focusses on innovative ways of maximizing food and energy production through maximized land-water use by implementing photovoltaic-supported greenhouses for simultaneous food and energy production. Both the PV-supported greenhouse and the conventional solar drying systems will be tested in the tropical climate of Nigeria and Benin.

Imminent Food and Energy Crisis in Sub-Saharan Africa

Due to a growing population, Sub-Saharan Africa is faced with the threat of a food and energy crisis. There is an urgent need to find climate-smart ways of generating energy as well as producing and preserving food. One major issue in this context is the need to resolve the usual conflict between using land for food or energy production. In the light of the global climate crisis, it has moreover become increasingly relevant to employ energy and food production methods that mitigate against climate change.



PV-supported greenhouse.

The main aim of YESPV-NIGBEN is to support food and energy production in Nigeria and Benin by employing climate-friendly and efficient land-use means of food and energy production. Of particular interest is

an integrated food and energy production concept that utilizes a photovoltaic-supported greenhouse to produce food and energy at the same time.

The partners in this project aim to understand this concept through research and transfer the knowledge to the local host communities. The project results shall contribute towards a clear roadmap for implementing renewable energy technology in Africa and shall be used as a guideline for policy makers, investors, researchers and other relevant stakeholders.

Performance Data Collection and Socio-Economic Impact Assessment

The usual practice in land use for energy and food production is to use separately designated lands for food production and for energy. This often results in conflict in terms of choice especially in regions where land availability is a challenge.

The technology of combining energy generation through photovoltaics (PV) and food production in a PV-driven greenhouse is a relatively new concept. The energy balance in such a system and its overall yield performance needs detailed investigation especially in the tropical African climate where limited reference data is available. YESPV-NIGBEN will carry out a detailed study of PV and PV-supported greenhouses as well as conventional solar drying greenhouses deployed in the tropical climates of Nigerian and Benin.



PV-supported greenhouse with growing vegetables.

The project will employ both theoretical analysis and field experimentation. It will firstly assess the current status of energy production and utilization in the host communities. This will serve as a reference to which a socio-economic impact assessment will be compared at the end of the project. New PV systems, a PV-supported greenhouse and conventional solar dryers will be deployed for field studies after proper design for the designated uses. The systems will be monitored through all seasons. The data collected is analysed to obtain all the necessary information related to the systems performance and their yield profiles.

Reference Data and Capacity Building

YESPV-NIGBEN will result in a thorough assessment of the socio-economic impact of PV systems and PV-supported greenhouses for integrated food and energy production as well as solar drying on their host communities. The project will also deliver a reference data set on the yield profile of PV systems in the tropics which will be relevant for PV system designers, installers, potential investors and marketers.

Local capacity building in PV and PV-powered integrated food and energy production through hands-on training of up to 500 local people and students is targeted in the project.

Overall, YESPV-NIGBEN aims not only to improve the socio-economic well-being of the local people in the project's target areas but also to stimulate the local economy by creating job opportunities and new markets.

Funding initiative

CLIENT II – International Partnerships for Sustainable Innovation

Project title

YESPV-NIGBEN – Yield Analyses and Socio-economic Impact Assessment of Photovoltaic and Photovoltaic-supported food and energy hybrid Systems in Tropical Nigerian-Beninese Climate

Duration

01.05.2019–31.05.2025

Funding code

03SF0576A

Funding volume

2,086,829 Euro

Contact

Dr. Solomon Agbo
Forschungszentrum Jülich GmbH
Wilhelm-Johnen-Straße
52428 Jülich, Germany
Phone: +49 246 1611666
E-mail: s.agbo@fz-juelich.de

Project partner

Sunfarming GmbH; National Centre for Energy Research and Development der University of Nigeri; Center for Atmospheric Research – National Space Research and Development Agency; WASCAL

Internet

bmbf-client.de

Published by

Bundesministerium für Bildung und Forschung/
Federal Ministry of Education and Research (BMBF)
Division Energy, Hydrogen technologies
53170 Bonn, Germany

January 2024

Editing and layout

Project Management Jülich, Forschungszentrum Jülich GmbH;
adelphi research GmbH

Photo credits

Sunfarming GmbH