PLANAIR
Ingénieurs de la transition énergétique

BECQUEREL INSTITUTE
Strategy Consulting in Solar PV

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Agrivoltaics Water-Energy-Food nexus

Presentation and guidance
27/03/2026

UN environment programme | CTCN UN Climate Technology Centre & Network

ISO 9001 14001

Introduction

By combining agricultural production with energy generation, **agrivoltaics** represents an innovative opportunity for the African countries to advance their energy transition goals while helping agriculture adapt to climate change. Key benefits include:

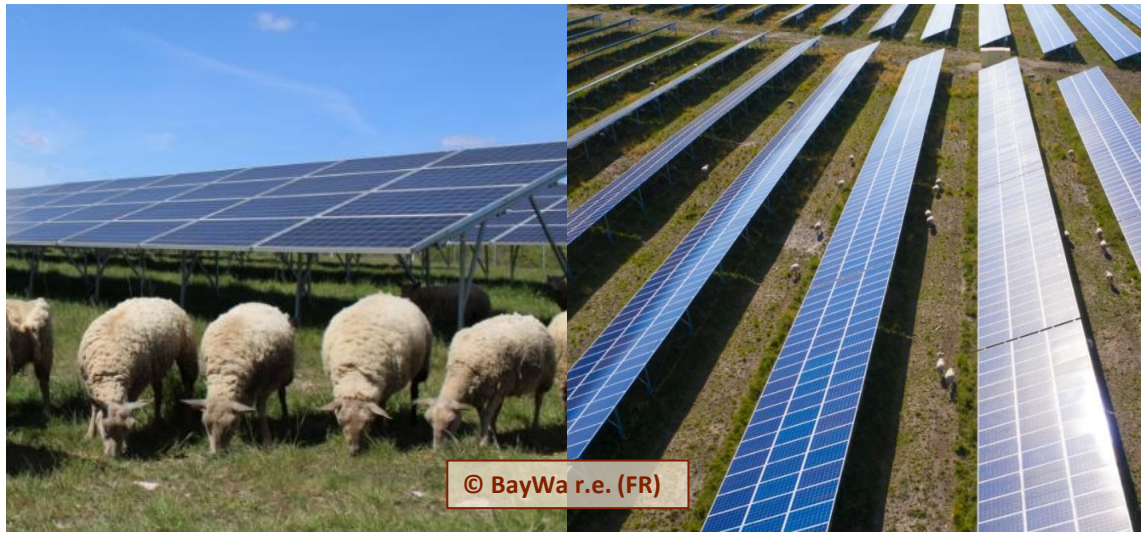
- Crop shading that **reduces evapotranspiration and limits photo-inhibition**.
- Water savings, with potential rainwater collection for **supplementary irrigation or livestock**.
- Shelter for livestock.
- **Lower energy costs for farms and populations**, especially those far from the national grid.

The core principle of agrivoltaics is efficient land use and balanced light sharing to increase total output per hectare, with agriculture remaining the primary activity.

The following slides illustrate the different agrivoltaic system architectures used around the world, including the first experiences in sub-Saharan Africa.

Large ground-mounted PV power plants are sometimes accompanied by crops or pastures.

Ground-mounted PV systems with pastureland

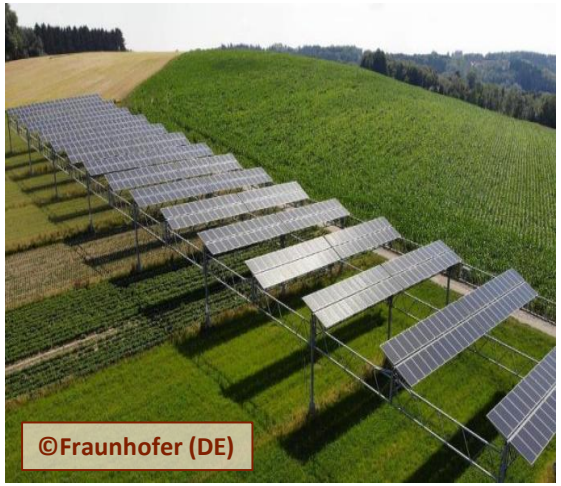


Ground-mounted PV systems with crops between rows of modules (inter-row)

PV systems with trackers

Vertical bifacial installations adapt to the space required for agriculture

Mobile PV shading systems, whose position can be adjusted according to crop requirements



Fixed shading structures with specific elevation for agricultural activities

Some greenhouse roofs can incorporate a PV installation

The roofs of agricultural buildings, particularly barns, are also used

Agrivoltaic projects on the African continent

Mali and Gambia – APV-MaGa

- Objective: Techno-eco sustainability, local economic model, WEF Nexus
- Facilities: 5 demonstration sites. 1 x 200 kWp in Mali (IPR/IFRA) and 4 in Gambia (~62.5 kWp each) dedicated to various uses (rice farming, cold storage, processing platform, rainwater harvesting).
- Stakeholders: IPR/IFRA, University of Gambia, Fraunhofer ISE, local SMEs
- Duration: 15/08/2020–31/07/2024

Agrivoltaic projects on the African continent

Kenya - Kibwezi Living Lab

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©MIT D-Lab (US)

- Objective: Food security, solar irrigation, economic self-sufficiency, youth integration, agricultural training, research into local varieties
- Facilities: 1 pilot site (in St. Patrick Ngomano), 252 households, 1 acre/household, solar panels + pumps, 3-year agricultural cycle
- Stakeholders: Kasser Joint Institute, Jewish National Fund–USA, University of Arizona, Arava Valley (Israel), Makueni County Government
- Target crops: Kale, spinach, amaranth, butternut squash, watermelon, okra
- Inauguration date: 2023
- Results: Significantly increased yields (spinach, cowpeas, courgettes)

Agrivoltaic projects on the African continent

Kenya - Latia Agribusiness Solutions

- Objective: Agricultural training & commercial production
- Facilities: 62 kWp / 40×20 m / 50% density
- Grid-tie system + rainwater harvesting (RWH)
- 10,000 L storage
- Stakeholders: Latia Farm (Kajiado County), Training centre & agricultural operation
- Target crops: Beans, Swiss chard, maize
- Results: Increased agricultural yields (beans, Swiss chard, maize)
- Reduced irrigation needs and grid consumption


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Agrivoltaic projects on the African continent

Tanzania - Sustainable Agriculture Tanzania

- Objective: Training, agroecology, empowerment
- Installations: 36 kWp off-grid + batteries + RWH (rainwater harvesting), 50% panel density
- Solar system with batteries, *replaces diesel generators*
- Stakeholders: SAT, European Union (PrAEctiCe funding), 2,000 farmers (since 2011), *72 groups, 52 villages* +50,000 farmers national community
- Targeted crops & livestock: Vegetables, poultry, fish — integrated agricultural system (*organic fertiliser, water/nutrient loop*)
- Launch date: 2011

Agrivoltaic projects on the African continent

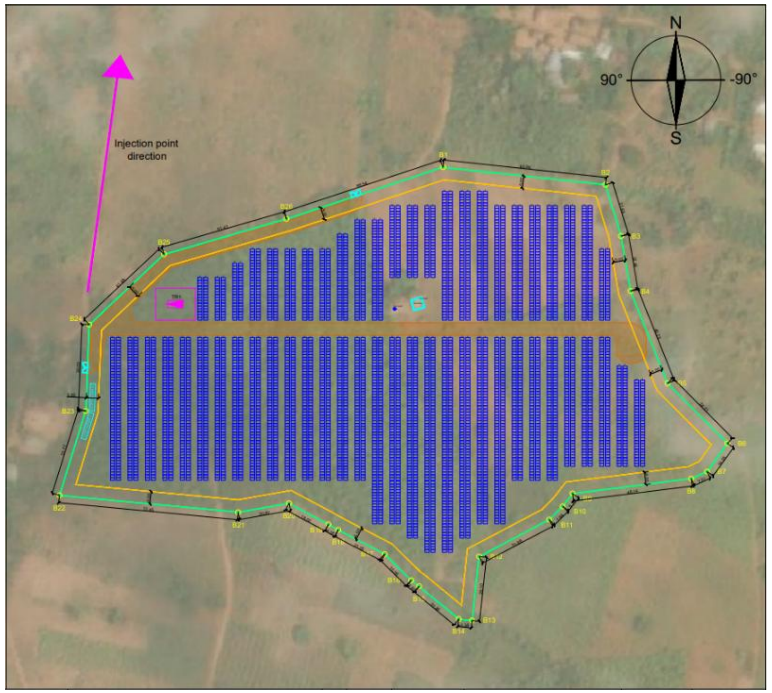
Togo - Kpessi

- SUNTEC-Togo agrivoltaic project, total target capacity 10 MW.
- Phase 1: env. 2 MW in Kpessi, on agricultural land.
- Panels installed at *3.5–4 m* to allow crops to be grown underneath.
- Includes a solar-powered drip irrigation system.
- Construction of a connection line.

Agrivoltaic projects on the African continent

Togo - Dalavé

- SUNTEC Togo SARL Agrivoltaic Project – Maritime Region, Dalavé
- *Installed capacity env 2 MWp*
- *Expected production: ~3.25 GWh/year*
- Modules: 4,800 *Solar Fabrik*
- Injection into the Togolese grid (CEET)
- Solar-powered drip irrigation
- Partnership with APRODAT under the National Development Plan
- Crops under panels: tomatoes, lettuce, okra, Artemisia



Questions for the working group

Challenges, agriculture and energy needs

- What added value could the integration of photovoltaics with agriculture and agri-food value chains bring, and which key challenges could it help address?

- Which types of farms or crops could benefit the most from agrivoltaic systems?

- What are the most pressing energy needs today in rural and agricultural areas? Which productive uses of electricity could bring the greatest value to farmers and agricultural value chains (irrigation, processing, storage, cold chains, etc.)?

Questions pour le groupe de travail

Défis, agriculture et besoins énergétiques

- Quelle valeur ajoutée l'intégration du photovoltaïque à l'agriculture et aux chaînes de valeur agroalimentaires pourrait-elle apporter, et quels défis majeurs pourrait-elle contribuer à relever ?

- Quels types d'exploitations agricoles ou de cultures pourraient bénéficier le plus des systèmes agrivoltaïques ?

- Quels sont les besoins énergétiques les plus urgents aujourd'hui dans les zones rurales et agricoles ? Quels usages productifs de l'électricité pourraient apporter la plus grande valeur aux agriculteurs et aux chaînes de valeur agricoles (irrigation, transformation, stockage, chaînes du froid, etc.) ?

Questions for the working group

Value chains, projects and implementation

- Are you aware of any agrivoltaic projects or initiatives combining agriculture and energy in your country? What lessons can be drawn from them?
- Which business models could be the most relevant for agrivoltaic projects in the African context?
- What priority actions should be taken to launch or accelerate the development of agrivoltaics in your country?

Questions pour le groupe de travail

Chaînes de valeur, projets et mise en œuvre

- Connaissez-vous des projets ou initiatives agrivoltaïques combinant agriculture et énergie dans votre pays ? Quels enseignements peut-on en tirer ?

- Quels modèles économiques pourraient être les plus pertinents pour les projets agrivoltaïques dans le contexte africain ?

- Quelles actions prioritaires devraient être entreprises pour lancer ou accélérer le développement de l'agrivoltaïsme dans votre pays ?

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