



SOPHIA

Sustainable Off-grid solutions for
Pharmacies and Hospitals In Africa



This project has received funding
from the European Union's
Horizon 2020 research and
innovation programme under grant
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SophiA Project

**Sustainable off-grid solutions for
pharmacies and hospitals in Africa**

EU-Africa Green Deal Projects

Sustainable Places 2023

Irene Robles García

Steinbeis Europa Zentrum

On behalf of SophiA consortium

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Summary

- Title: Sustainable Off-grid solutions for pharmacies and hospitals in Africa
- GA Number: 101036836
- Start: 1 October 2021
- Duration: 4 years
- Total cost: € 8 396 688,14
- Total EU contribution: € 7 372 362,33
- Coordinator: Hochschule Karlsruhe (Germany)



SOPHIA

Sustainable Off-grid solutions for
Pharmacies and Hospitals In Africa

SophiA will develop containerised solutions using natural refrigerants, solar thermal energy and photovoltaics, to provide sustainable, off-grid energy supplies and clean water to rural and remote hospitals in Africa.

Context and background

- Rural areas across Africa still lack access to health care, schools, clean water and infrastructure, which leads to higher number of illness and poverty compared to urbanized regions.
- Medical health care has to cope with the poor electricity and water supply in the remote and rural areas of Africa.
- As a consequence, small local medical care centers often operate with polluted water, no cooling (of medicine), no air-conditioning, poor sanitizing etc.

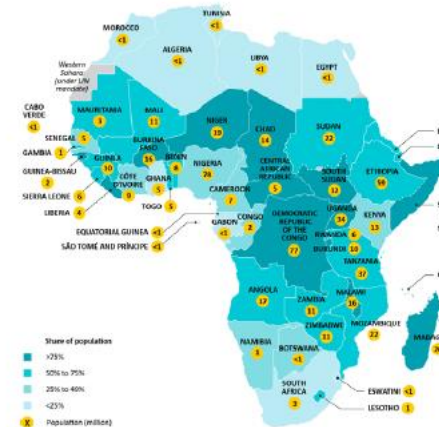


Figure 2.2: Population without access to electricity by country in Africa, 2018³⁷ “In sub-Saharan Africa 55% of people lack access to electricity; in thirteen countries, more than three-quarters of the population do not have access to electricity.”

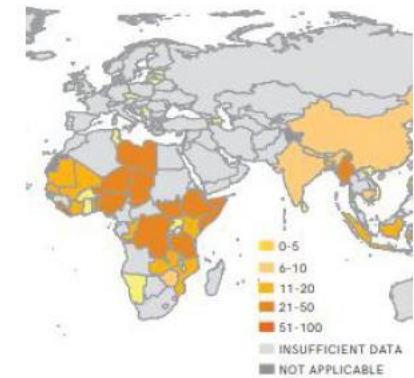


Figure 2.4: Proportion of health care facilities with no water service, 2016 (%). At least 17 out 69 countries with data available, at least 20% of health care facilities has no water service in 2016.³⁸

SophiA Project – Objectives

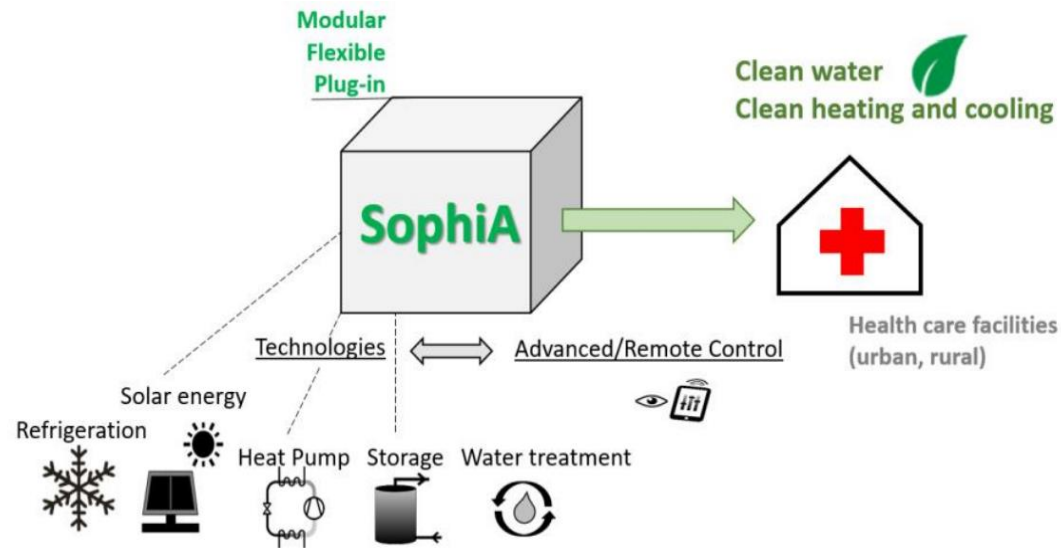
The objective of the SophiA project is to provide **sustainable off-grid energy supplies, refrigeration, clean and safe water** for rural and remote health facilities in Africa.

- To develop renewable, flexible and modular energy systems based on photovoltaics and thermal energy, which are adaptable, scalable and easy to integrate in existing infrastructures
- To develop new **business and job opportunities**, by using local resources in the manufacturing and installation of the SophiA systems.
- To develop **materials and opportunities for knowledge exchange and capacity building**, by involving local workforce in the installation process of the containers, as well as through dedicated trainings.
- To perform **social acceptance studies** to understand the acceptance of innovation and renewable-based solutions providing access to clean energy and safe water in the African continent.
- To **assess the sustainability** of the SophiA solutions in environmental, social and economic terms, as well as provide roadmaps towards upscaling and uptake of the solutions

This way, SophiA will **contribute to accelerating sustainable development, growth and economic transformation, and ensure improved access to energy and health services for all.**

Concept

Overview of SophiA's technologies



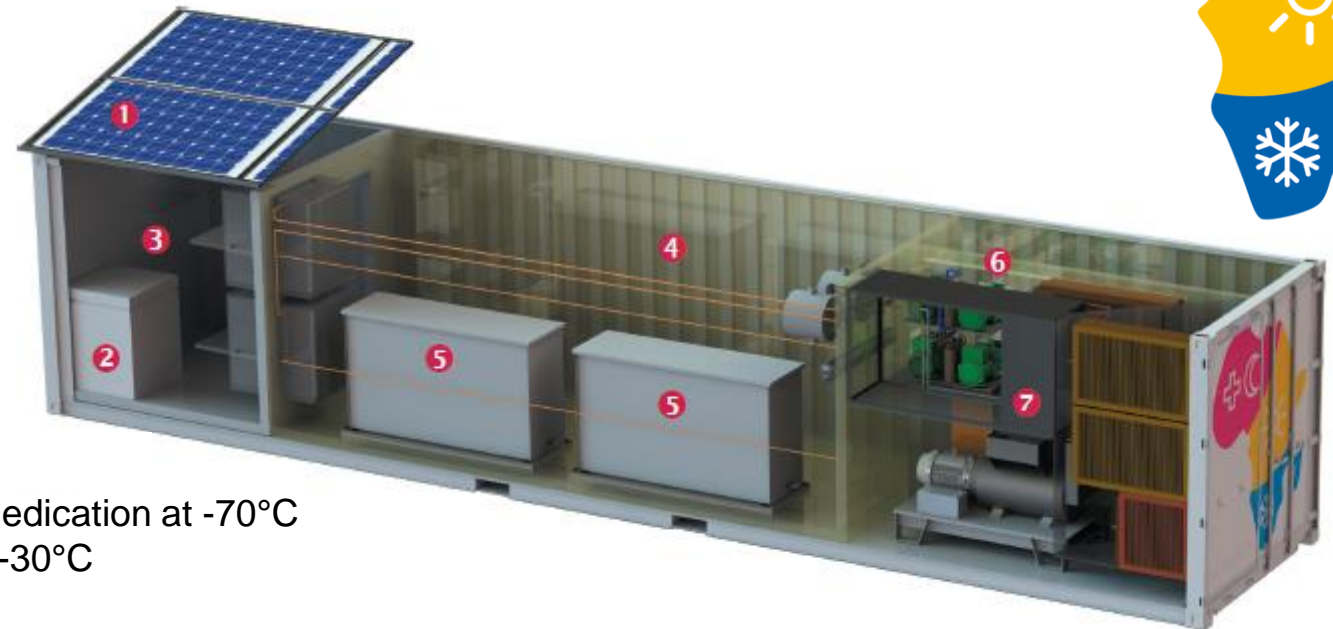
SophiA will provide:

- Safe and clean drinking water
- Hot water; steam if required
- Refrigeration of medicines at +5 °C; Possibly refrigeration of food
- Low temperature storage of blood plasma at -30 °C
- Ultra-low temperature storage of sensitive drugs (e.g., some Covid-19 or Ebola vaccines) at -70 °C
- Emergency electricity supply in case of power failure

SophiA – solar powered cooling container



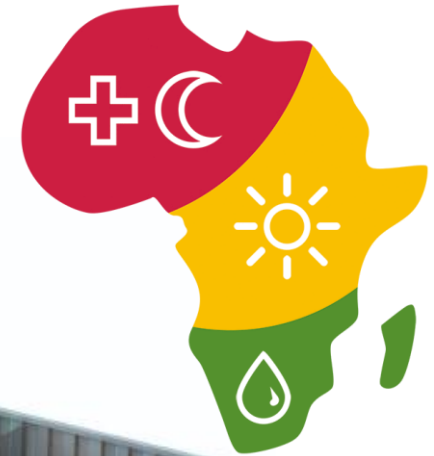
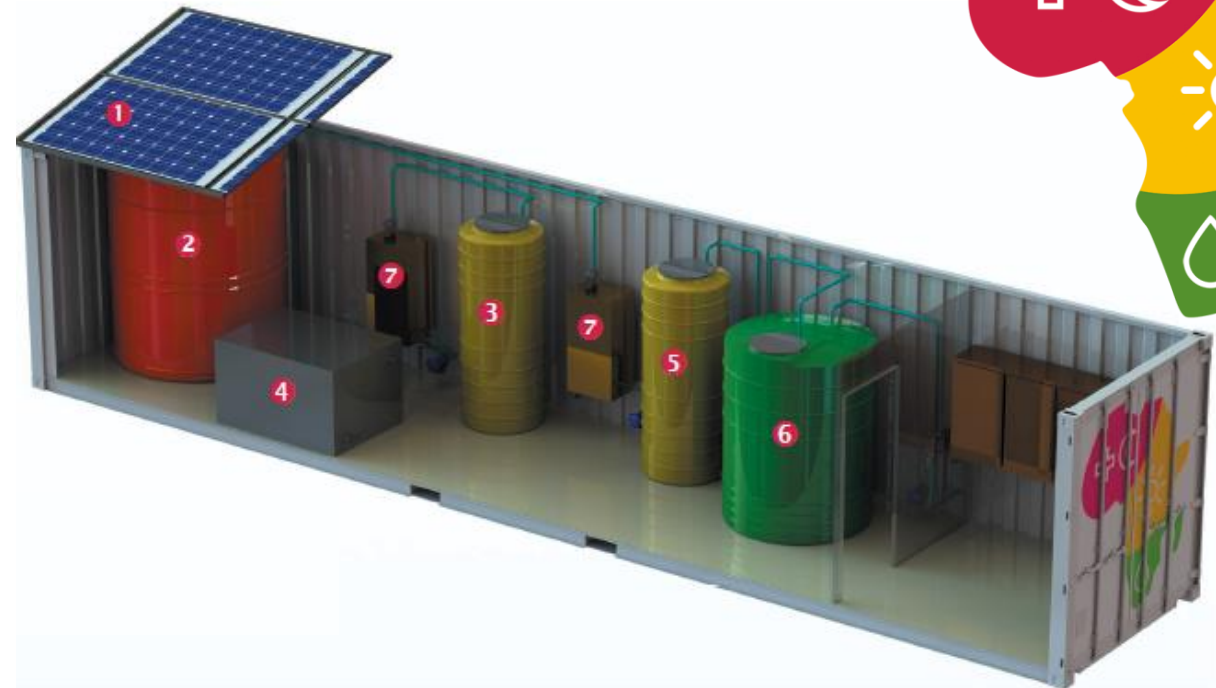
- ❶ PV-Power systems
- ❷ Storage at -70°C
- ❸ Storage at -30°C
- ❹ Storage at +5°C
- ❺ Thermal energy storages
- ❻ Machinery room
- ❼ Emergency lithium batteries



- Ultra-low temperature storage for sensitive medication at -70°C
- Low temperature storage of blood plasma at -30°C
- Cooling for medicines and food at +5°C
- Based on **natural refrigerants** with low global warming potential

SophiA – solar powered water container

- ❶ PV-Power systems
- ❷ Storage tank for drinking water
- ❸ Deionized water storage tank
- ❹ Solar steam generator
- ❺ Buffer tank for UF treatment
- ❻ Ultrafiltration (UF) tank
- ❼ Capacitive deionisation (CDI) modules



- Safe, clean drinking water and distilled water for medical purposes
- Hot water and steam production for hospital thermal requirements

SophiA – PVMedPort for small off-site clinics

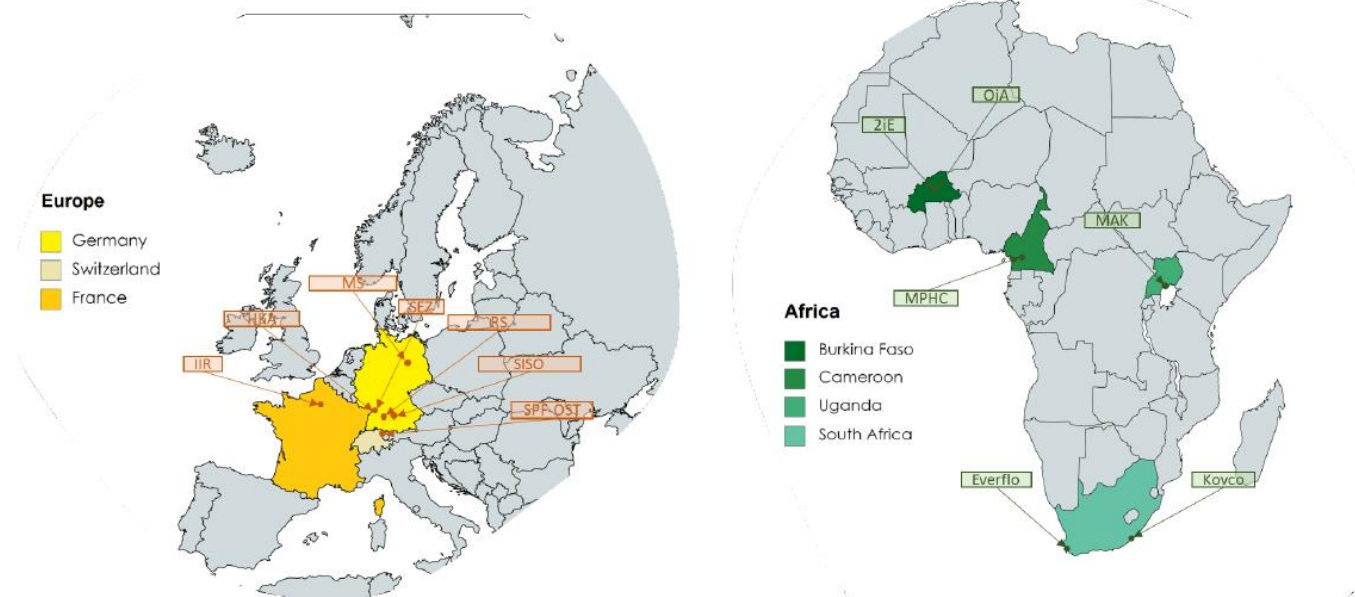


- Station powered by photovoltaic modules
- Can be used:
 - to provide additional power to existing small health facilities
 - for outreach programmes
 - As an energetically self-sufficient station (e.g. pharmacy)
- Scalable and modular
- Modules of 2kW peak, providing up to 3kW of electric power
- Very robust against wind and weather
- Remote monitoring for optimal performance

SophiA geographical focus

EU-AU collaboration

OUR PARTNERS



OUR DEMO SITES

Four hospitals will be equipped with the SophiA-Systems as demo sites.



Burkina Faso

The Léo hospital was built under the direction of the association "Opierien in Afrika e.V." which is a partner of the SophiA project.

[Read more](#)



Uganda

Buvuma Hospital is located on the main island of the Buvuma Islands in Lake Victoria.

[Read more](#)



Cameroon

Ad Lucem Hospital is located in the village of Otélé, Cameroon, in an equatorial climate.

[Read more](#)



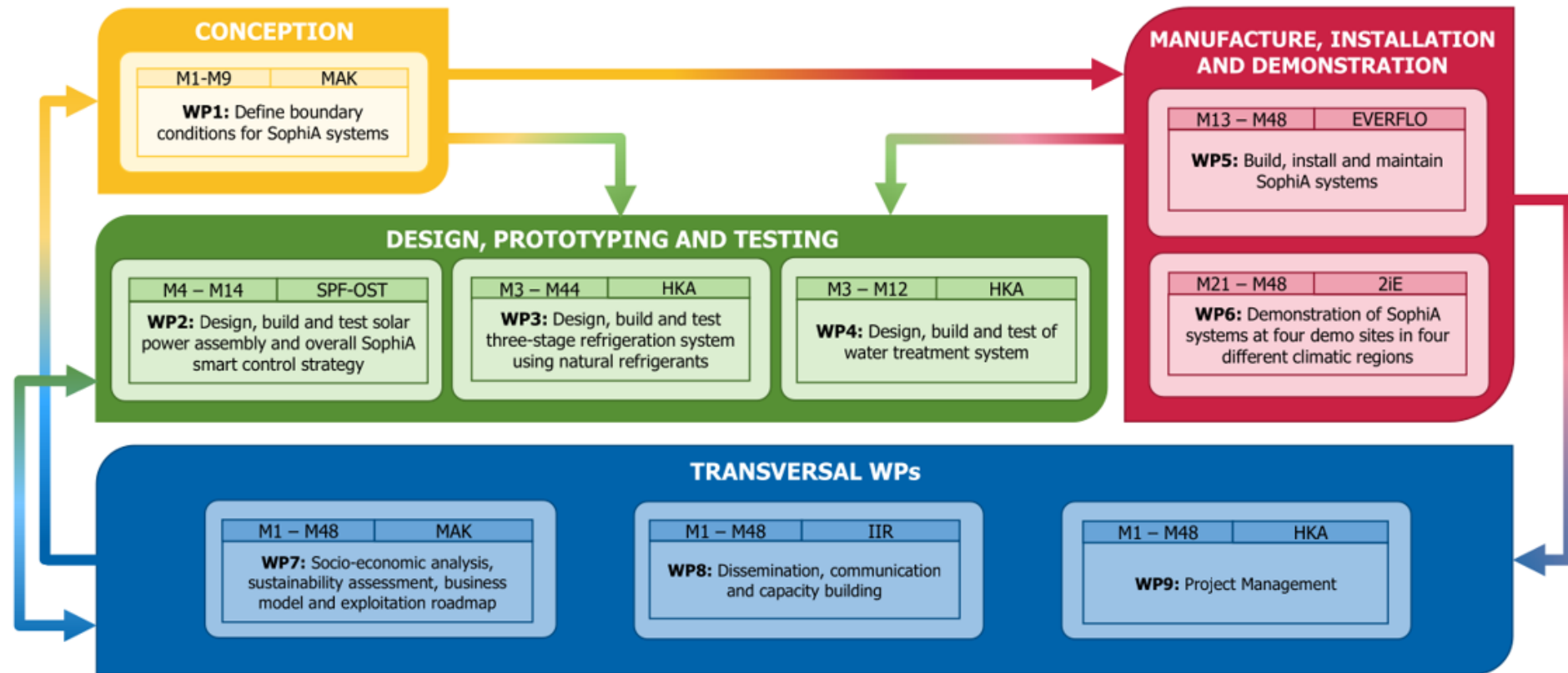
Malawi

Coming Soon!

[Read more](#)

Activities planned

Project workplan



Status – where we are now

- Needs assessment and selection of hospital demo sites complete
 - Solar, refrigeration and water technologies have been designed and tested in the lab
 - First set of two containers has been built and will soon be shipped to first demo site
 - First demo site planned in Burkina Faso
-
- Social acceptance and environmental studies are under way
 - Materials for capacity building, knowledge exchange and train the trainer courses are in preparation
 - Exploitation routes for project results are being defined by consortium
 - Active communication and dissemination of project work



Outlook – SophiA Capacity Building

- Organisation of **Demonstration Site Launch Days** and seminars
- **Training sessions**
 - To raise interest in the functioning of the SophiA systems and guarantee technical understanding of potential end-users
 - Train the trainer courses: theoretical and practical, technical courses
 - Collaboration with other local training initiatives
 - Elaboration of training manual
- Elaboration of a **handbook for building SophiA systems** on site
- **Local** workshops, meetings, synergies with local companies, etc.

Outlook - SophiA market uptake strategy

- **Socio-economic acceptance** study
- **Life cycle assessment** (LCA) and **life cycle costing** (LCC)
- Definition of **business models and tailored value chain**
- **Upscaling and roadmap** for exploitation and use of SophiA technologies as part of the green energy transition in Africa

SophiA interest for collaborations and clustering

Collaboration opportunity	Local contacts for <u>capacity building</u> activities	Local stakeholders for <u>market uptake</u>	Other projects and initiatives for joint <u>dissemination and networking</u>
Who	Local solar, refrigeration, water purification stakeholders Students, universities	Local suppliers, installers, manufacturers of solar, refrigeration or water technologies	Other EU funded projects, other local projects
Where	Demo countries: Burkina Faso, Cameroon, Malawi and Uganda Partner countries across Africa Particularly in Malawi as no local partner	Demo countries Across Africa	At local, national and international level in Africa, Europe, worldwide
How	Participants and interest in SophiA trainings Local contacts Joint trainings or other initiatives	Workshops, identification of stakeholder needs, discussion of best practices	Joint workshops or seminars, discussions, clustering sessions, joint communication

SophiA consortium



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Follow SophiA

SophiA website: <https://sophia4africa.eu/>



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