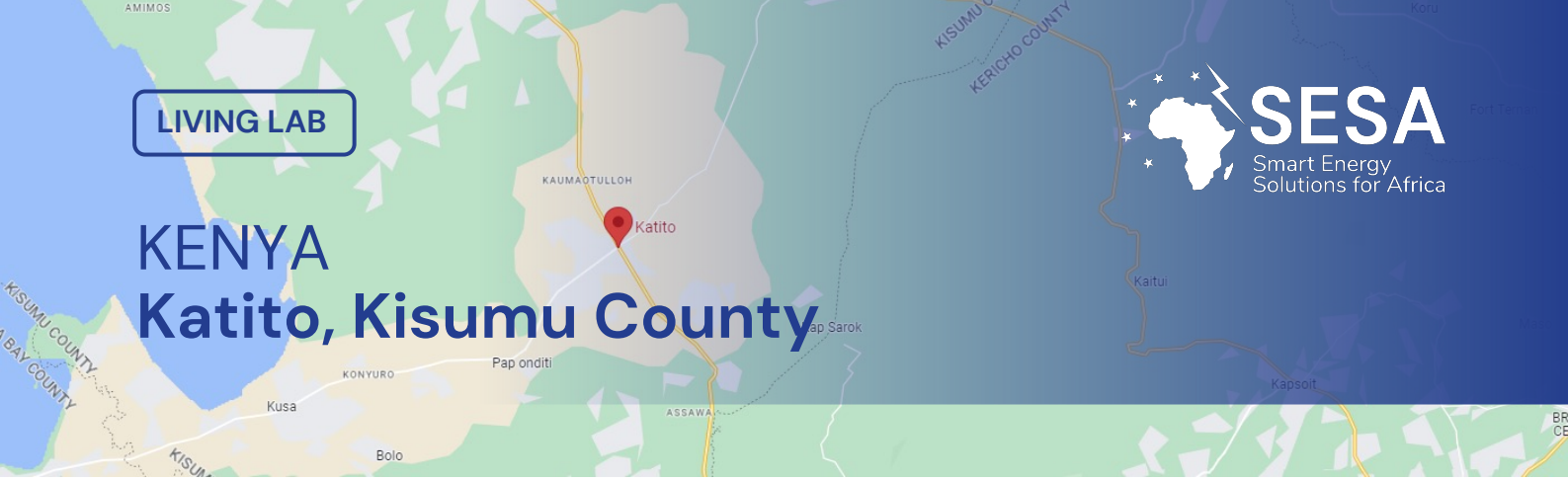
Living lab
Kenya



LIVING LAB

SESA
Smart Energy Solutions for Africa

KENYA
Katito, Kisumu County

Katito – Solar energy hub

The Kenya demonstration site in Katito emplys a solar hubs, with 36 kWp. **The peri-urban demonstration is taking place in Katito, Kisumu County, Kenya** (latitude: -0.2667, 34.9664).

Katito is a satellite peri-urban enclave in Kenya's Lake Victoria region that was awarded township status by the Kisumu County administration in 2019. In the community, there are public primary schools and two public secondary school, as well as a sub-county public hospital.

Ahero, the nearest town, is 15 kilometers away via a tarmacked road. Katito's population is estimated to be around 23.000 people. The main economic activities in Katito are small business trading, rice farming, oil seed cultivation and some fishing.

The Katito Peri-Urban Solar Energy Hub

Significant portions of the peri-urban households are considered poor and have a challenge accessing affordable electricity. Many are not connected at all. Furthermore, local electricity rates are sometimes among the world's most costly.

Technologies tested

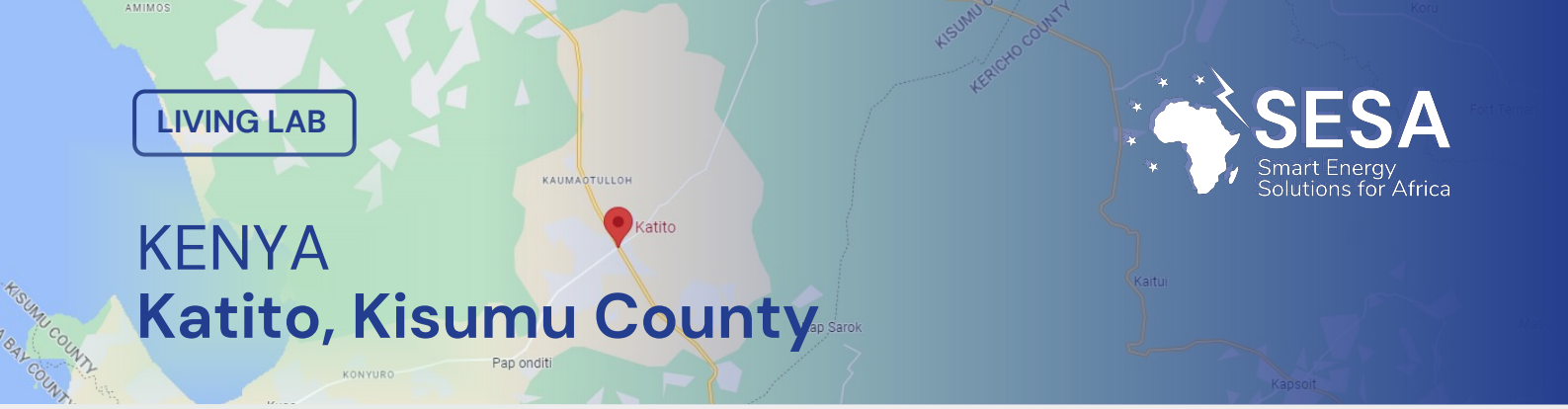
The Solar energy hub in Katito aims to generate sustainable off-grid electricity, with sector linkages such as fishing, water pumping, water purification, and e-mobility, and combining energy solutions with local Info Spots for access to information, on energy, climate change and digital skills.

The solar charging hub houses PV modules, central Li-ion battery storage, and balance-of-system (BoS) to increase energy accessibility for a range of electrical needs within the local community.

Leading Partners

WeTu

wetu.com



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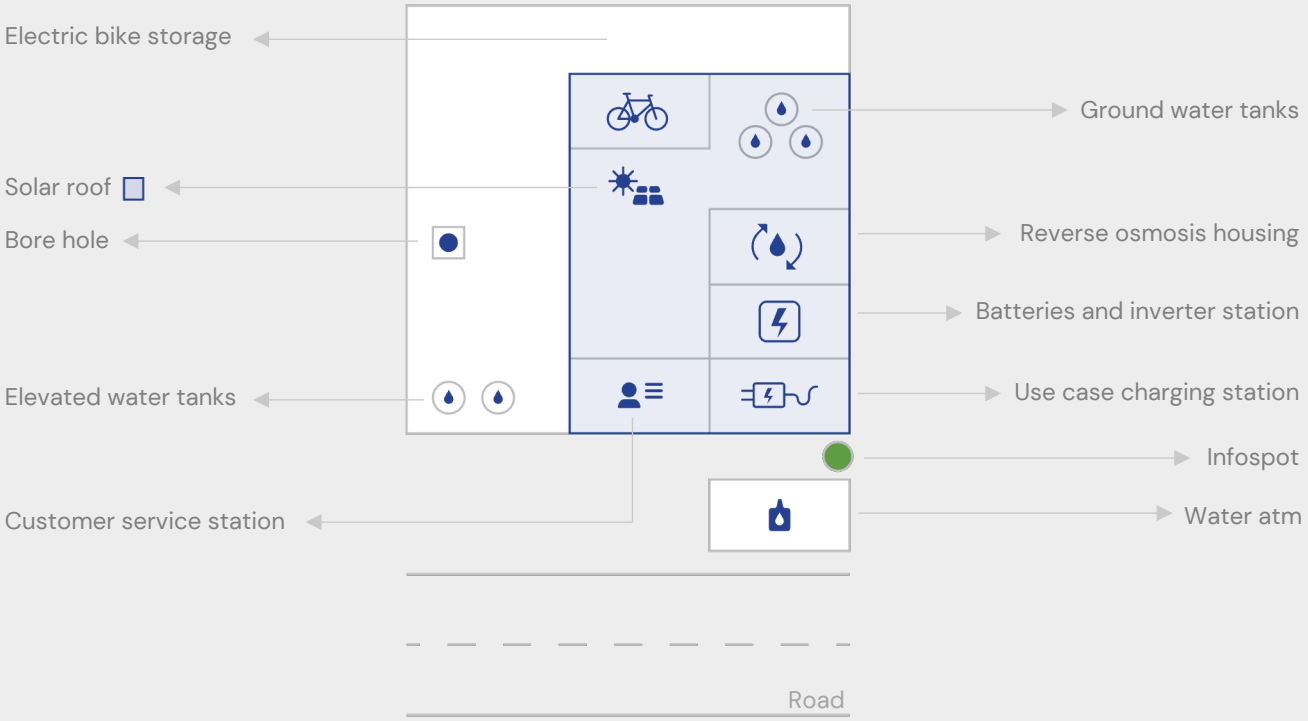
Smart Energy Solutions for Africa

KENYA
Katito, Kisumu County



Asset(s)	Total number	Specifications
Solar roof	64	33.992 kWp
Batteries	24	106.8 kWh
Water pump	1	Submersible pump
Water tanks	5	50,000 L
Reverse Osmosis instalation	1	6 cubic meters per hour reverse osmosis drinking water purification system
Water ATM	5	20 liters for 15 kshs
E motorbikes	6	Electric converted rive train powered by 48V DC , 4.6 kWp lithium-ion batteries

Water is pumped from the borehole and purified using the reverse osmosis system using solar energy. The clean purified water is stored in the elevated freshwater tank and further treated using UV treatment before dispensing through the water ATM(s). There is an ATM network connected to the main hub. The network comprises 4ATMs (with further ATMs anticipated)

Living lab
Kenya

LIVING LAB

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Smart Energy Solutions for Africa

KENYA
Kisegi , Homabay county

Kisegi – Solar energy hub

The rural demonstration is taking place in Kisegi village, Homabay county, Kenya (latitude: -0.6402, 34.0612). It is located in Kenya's Lake Victoria region. In the community, there is one public primary and one public secondary school, as well as a sub-district hospital. The nearest beach is Nyangwethe beach, which is 3 kilometers away along a difficult dirt road. Kisegi has a population of around 6000 people. The main economic activities in Kisegi are fishing, subsistence farming and small-scale horticultural farming.
The energy system's concept in Kisegit houses PV modules, central battery storage, and balance-of-system (BoS). The system aims to power the many use cases as well as the battery storage system. The system size requirements, pricing, performance, and dependability are all addressed while selecting modules for the energy hub system sizing.

The Kisegi, Humabay Solar Energy Hub

Technologies tested

The Solar energy hub in Katito aims to generate sustainable off-grid electricity, with sector linkages such as fishing, water pumping, water purification, and e-mobility, and combining energy solutions with local Info Spots for access to information, on energy, climate change and digital skills.

The solar charging hub houses PV modules, central Li-ion battery storage, and balance-of-system (BoS) to increase energy accessibility for a range of electrical needs within the local community.

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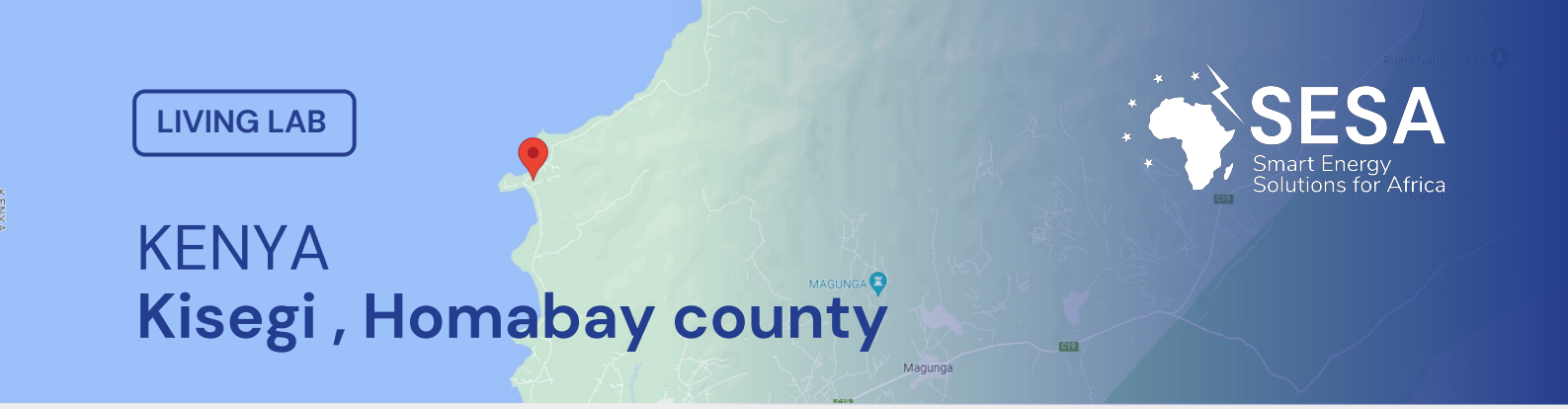
KENYA
Kisegi , Homabay county



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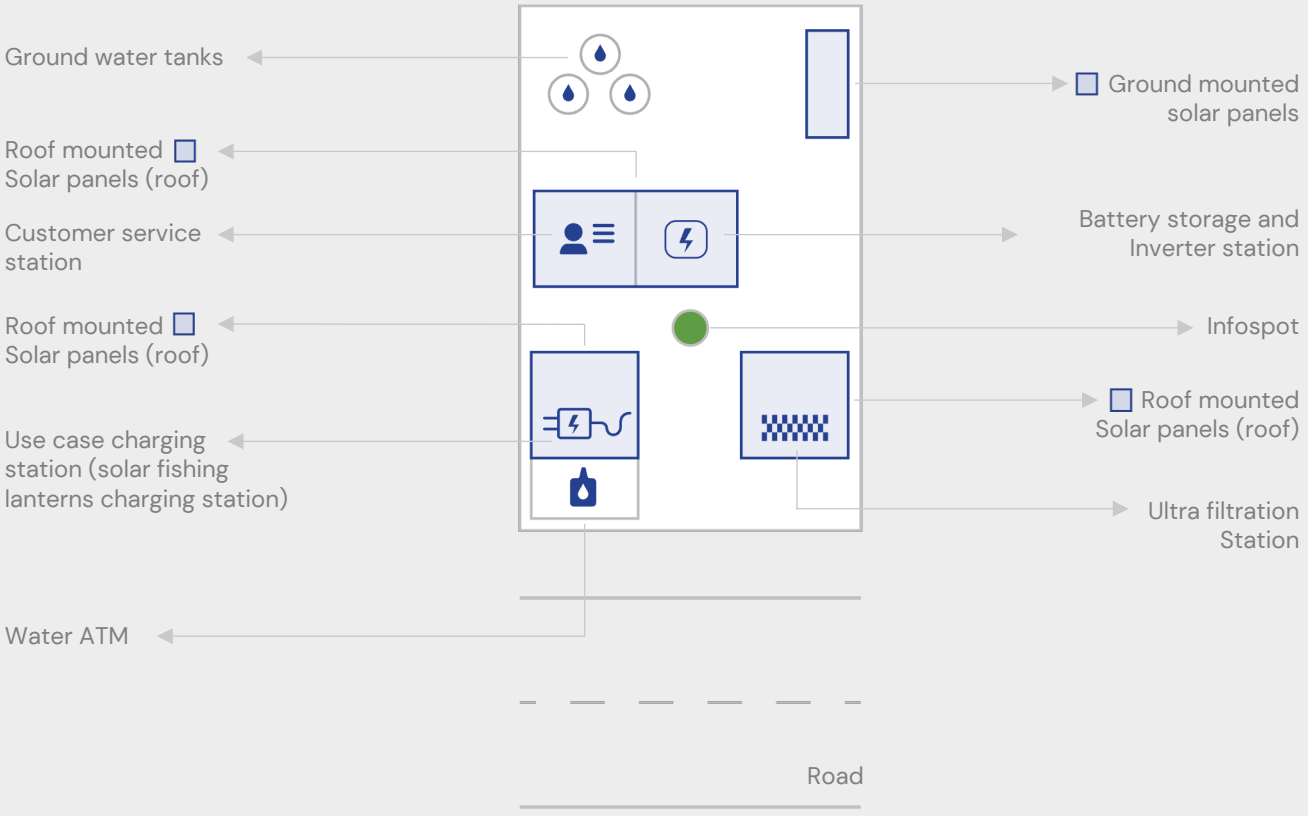

Asset(s)	Total number	Specifications
Solar roof	1	38.16 kWp
Batteries	12	55.2 kWh
Waterpump	1	Portable solar water pump (surface pump)
Water tanks	3	25,000 L
Ultra Filtration system	1	2 cubic meters per hour drinking water purification system
Water ATM	1	20 liters for 10 Kshs
Lanters/lantern charging system	300	Solar powered lanterns

Where is the water coming from?
The source of water is Lake Victoria which is approximately about 200m away. The water is pumped using a portable solar pump powered by a lithium ion battery and purified using an ultrafiltration system and UV treatment before dispensing at the water ATM all these are powered by solar energy.

Where are the motorbikes parked?
There are no motorbikes in the rural living lab. Currently, two use cases are being piloted which are: solar fishing lanterns for Omena night fishing and clean potable water.

Living lab
South Africa

LIVING LAB

SOUTH AFRICA
Alicedale

SESA
Smart Energy Solutions for Africa

Containerised off-grid solar system

The validation demo in close cooperation with the selected SME GREEN Solar Academy will test, validate and evaluate the performance of a containerised off-grid solar energy system comprising PV panels in combination with second-life EV batteries for energy stationary storage, for community energy access, and to charge a small fleet of micro utility EVs. Information Spots will extend The energy hubs by providing free access to information on energy usage, maintenance and business opportunities. A significant aim of the project is to investigate the performance of these batteries, the technical and financial viability of such systems, and the scalability and replicability of this use case. The demonstration will also identify the commercial case for local authorities to invest in these solutions and study the repurposing potential of retired EV batteries for energy storage and as a means to create new jobs.
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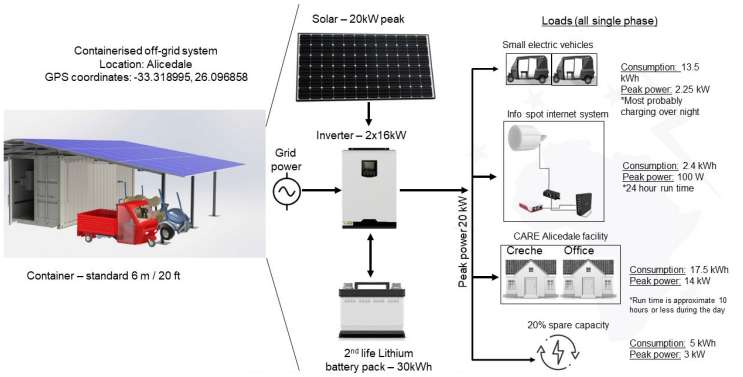

Containerised system and passenger vehicle

Technologies tested

The Container size: 20 ft / 6 m; the Inverter capacity: 2 x 16kW, hybrid, single phase

The PV canopy (mounted off container for additional shelter below): 20 kWp

The Second life EV battery: 30 kWh

The Containerised system is completed with InfoSpot component.

The containerised system includes an e-mobility component _ Utility vehicles and person transport.

Leading Partners

UYILO E-MOBILITY PROGRAMME

Strategic Partners: NELSON MANDELA UNIVERSITY, eNtsa

The national uYilo eMobility Programme is as an initiative of the Technology Innovation Agency (Act No. 26 of 2008), hosted by Nelson Mandela University's engagement entity, eNtsa

uyilo.org.za

GREEN Solar Academy

solar-training.org

LIVING LAB

SOUTH AFRICA
Alicedale

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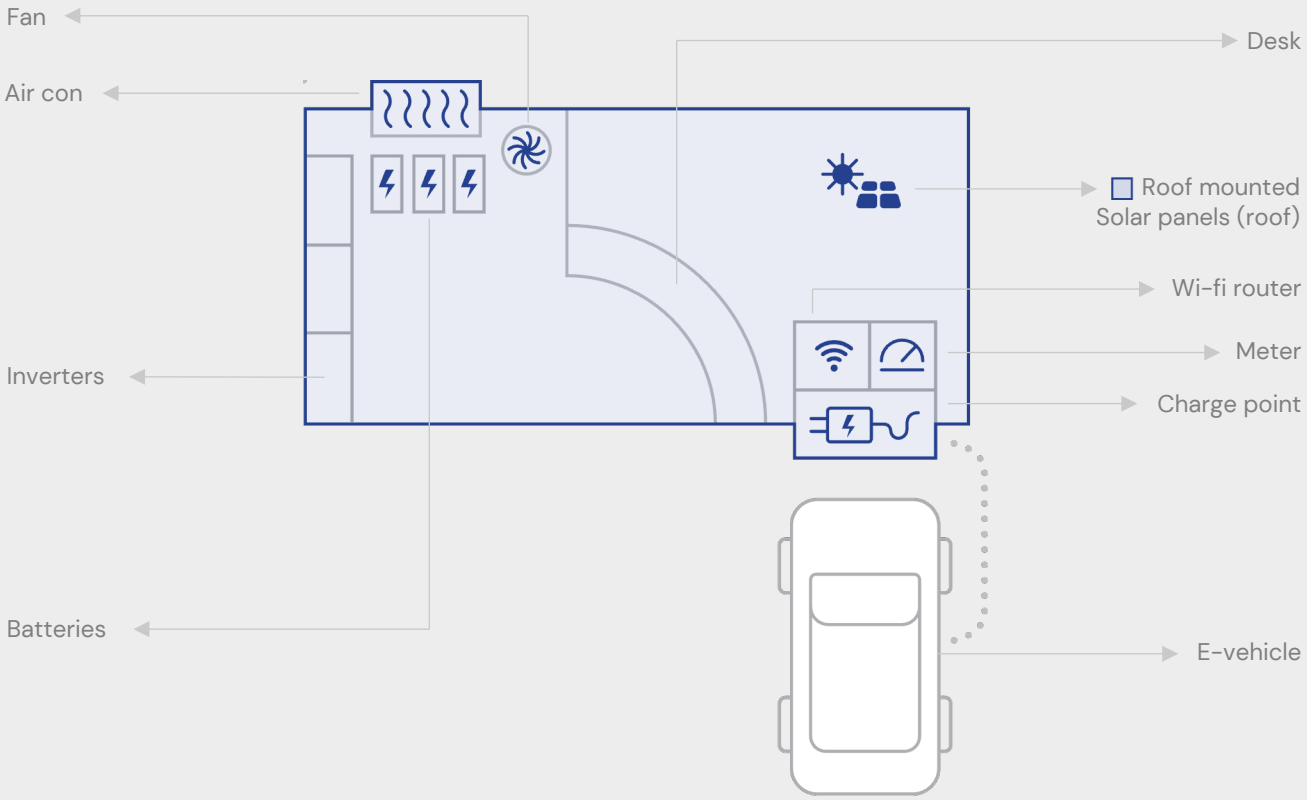
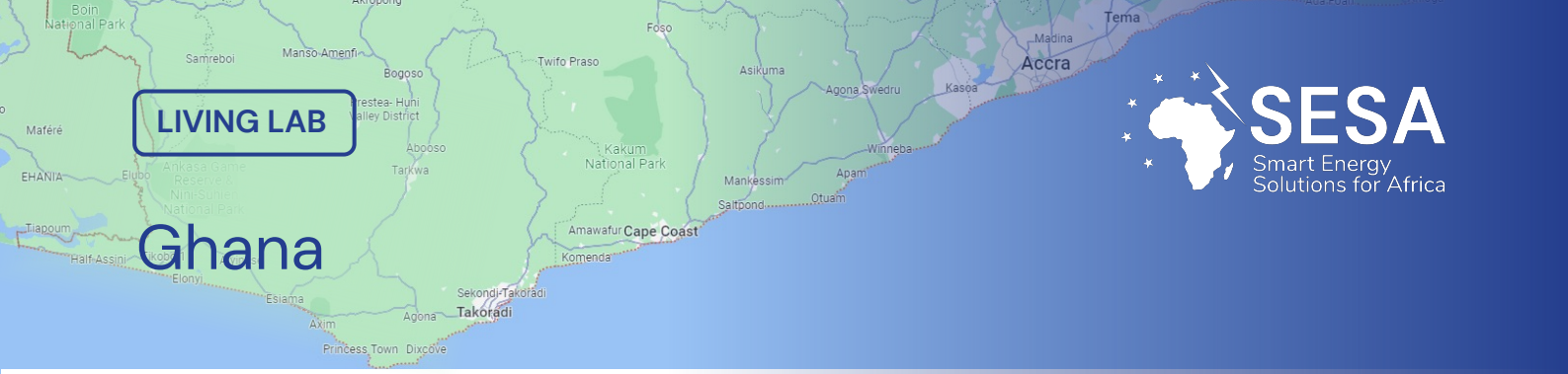


Asset(s)	Total number	Specifications
Revov Battery energy storage system	—	30 kWh
Solar system	—	16.32 kWp
Inverters	—	15 kW

The solar roof will charge 2 electric vehicles that are for rent. Power will also be provided to any business partner in the Centre. Surplus of energy is stored in the 30 kWh 2nd life battery energy storage system, originating from EV battery packs.

Living lab
Ghana



Clean cooking, second life batteries and off-grid solar system

The validation demo will explore clean cooking through waste-to-energy solutions and solar lighting. The demo actions comprise waste-to-energy bioethanol and stove for cooking in three schools, and solar micro grid systems with second life battery for lighting in rural communities and InfoSpots.

The solutions will encompass business models, capacity building on the construction and maintenance of the microgrid, and other activities to deliver a complete value chain. It is expected that the demonstration activities will help provide clean and reliable energy for cooking and ensure adequate availability of electricity for productive use in rural communities including lighting for night-time learning activities and illuminating streets to ensure security at night in rural communities. The free access to information through school portals will foster knowledge uptake on energy and support digital literacy. The demo action (Bioethanol stove) can be replicated in all Senior High Schools in Ghana and the micro grid solar system could be replicated in rural communities across Ghana and elsewhere in Africa.

Bioethanol for clean cooking and solar and second life batteries for solar off-grid system

Technologies tested

The Ghana living labs are developed in cooperation with two companies: Nastech and Econexus.

Econexus will develop three cook stove prototypes for testing at three high schools

Nastech will provide support and maintenance and further scale up of existing solar system at St. Johns Grammar School and Amasaman Day Senior High Technical School

Leading Partners

AKENTEN APPIAH-MENKA UNIVERSITY of Skills Training and Entrepreneurial Development

aamusted.edu.gh

ECONEXUS VENTURES

econexusventures.net

Nastech POWER SOLUTIONS

nastechpowersolutions.com

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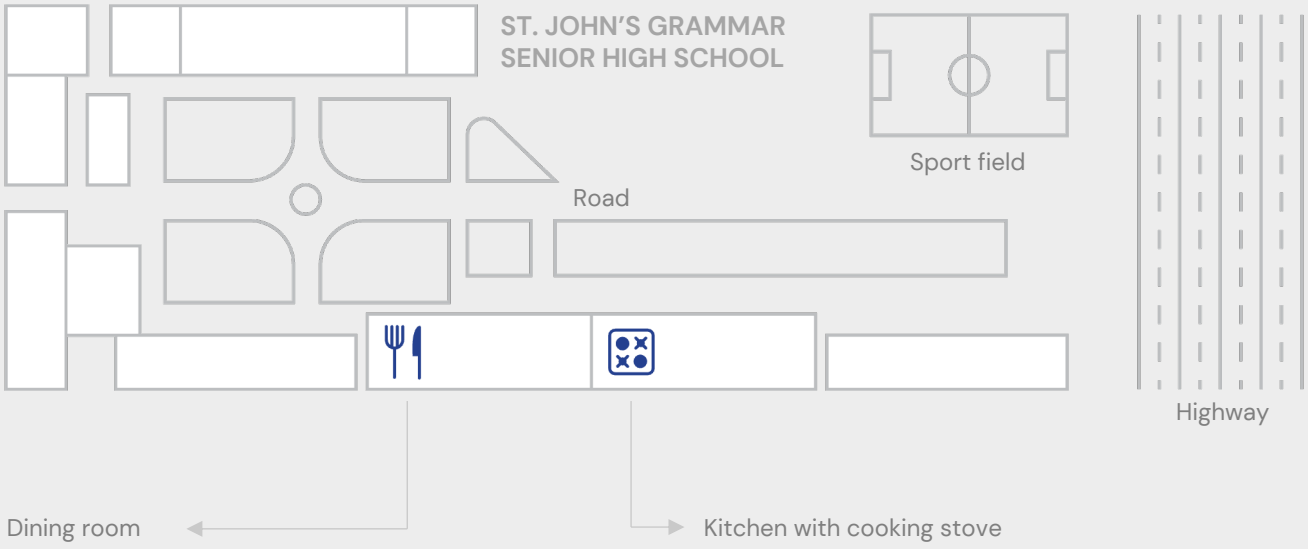
SESA
Smart Energy Solutions for Africa

GHANA
Schools (Accra & Atwima)

Organic waste streams (green, 2 locations) are shipped to the Econexus distillery. From here, the biogels and biofuels are shipped (grey) To 1 school in Accra (visual below) and 2 schools on the left side of Kumasi



Local organic waste (pineapple and other feedstock) is collected at the Econexus Facility. At this facility, industrial cooking stoves are manufactured and a distillery to produce biogels and biofuels. These fuels are supplied to one school in Accra, and two schools in Kumasi.

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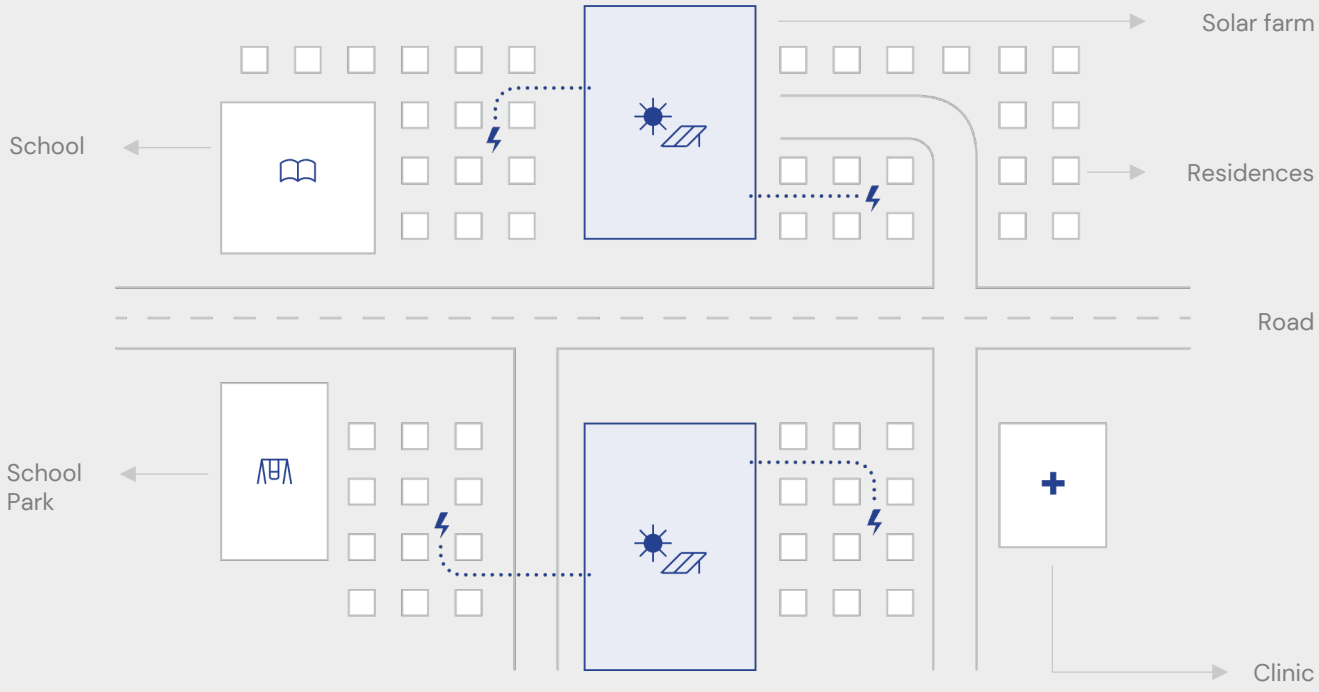
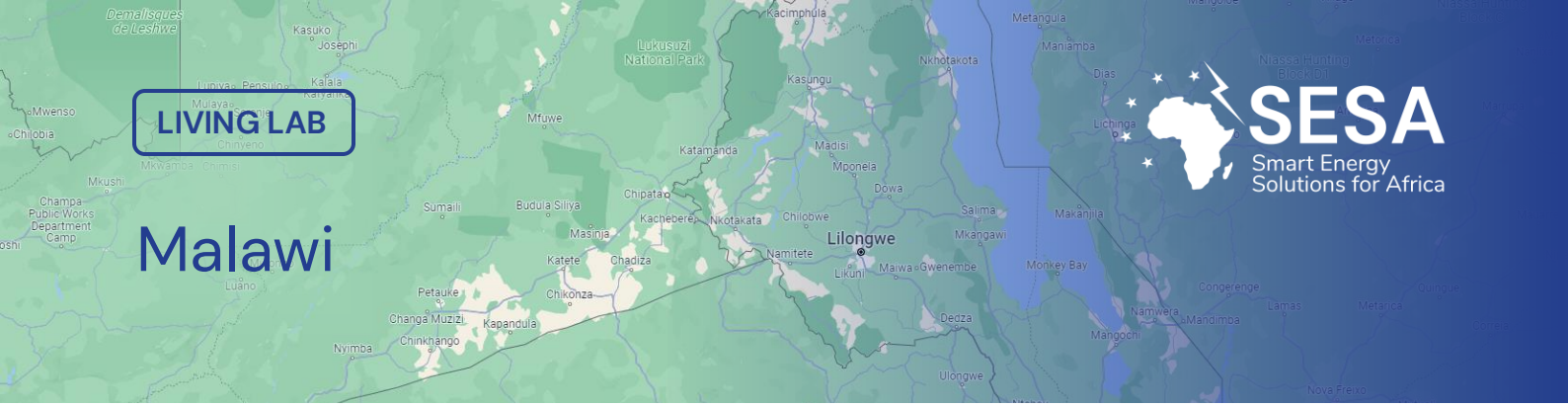
GHANA
Rural communities



Asset(s)	Total number	Specifications
Microgrids		
Solar plant	—	20 kWp
Battery Storage	—	30 kWh
Inverter	—	20 kW

Three villages (Beposo, Bedabour and Kwame Daah), will get a microgrid, including solar system, and a battery storage. These microgrids will supply energy to a number of individual homes.



Biomass briquettes, clean cooking and solar powered irrigation

The validation demo will develop a new value chain and a business model for local entrepreneurs by producing fuel briquettes from new biomass alternatives as sunflower stalks to reduce deforestation, adapt and validate a clean cooking stove called MIG BioCooker, explore the possibility to manufacture and assembly the MIG BioCooker and starting with 20 stoves, as well as produce and distribute biomass briquettes to the MIG BioCooker users and other cooking stove users in the region.

The validation demo will improve security for solar powered irrigation and ease of use among smallholder farmers. Smart Energy Enterprise is selling the solar powered irrigation system to small farmers as rice growers. 25 system will be installed and operational in the project.

Biomass briquettes, assembling of MIG BioCooker and solar powered irrigation system under testing

Technologies tested

The living lab In Malawi developed by MIG, GG, SEE and RISE. The validation of MIG BioCooker includes testing in lab and in field by end-users. MIG BioCooker is an advanced combustion cookstove using a fan to give good air supply. The fan is run by a power bank and a solar panel. When the stove is not used the power bank, and a solar panel can be used for mobile phones or flashlights.

Shredders and briquetting technologies was tested in lab before installation and testing at site. The Briquetting press is a Falach Cube 20. Various designs and systems of solar powered irrigation technology have been tested as systems on a house to portable systems.

Leading Partners

RI.SE — www.ri.se

GOING GREEN — goinggreenmw.com

MAKE IT GREEN — makeitgreen.net

SEE SMART ENERGY ENTERPRISE — smartenergyenterprisesee.websites.co.in

LIVING LAB

MALAWI
Kabuthu/Waliranji

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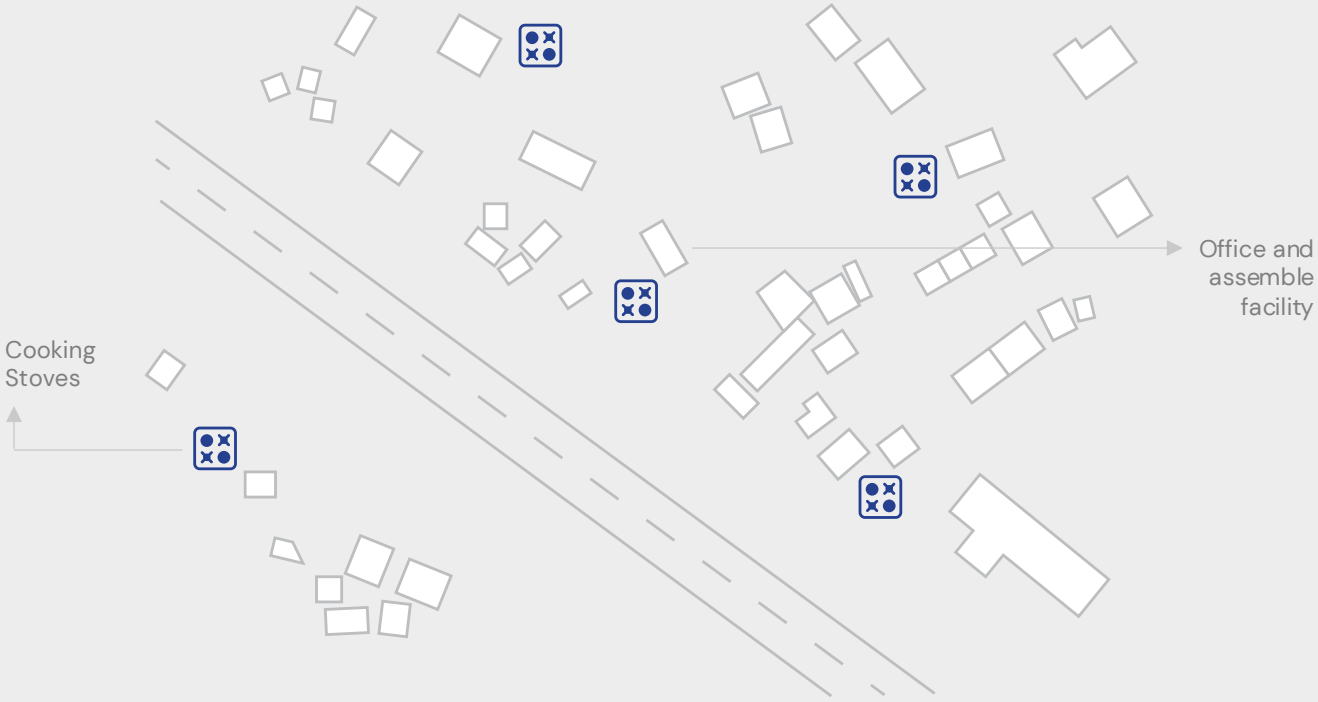
Smart Energy Solutions for Africa

Sunflower production around Kabuthu, shipped to Waliranji. This is also where the briquetting production and cooking stove assembly takes place.

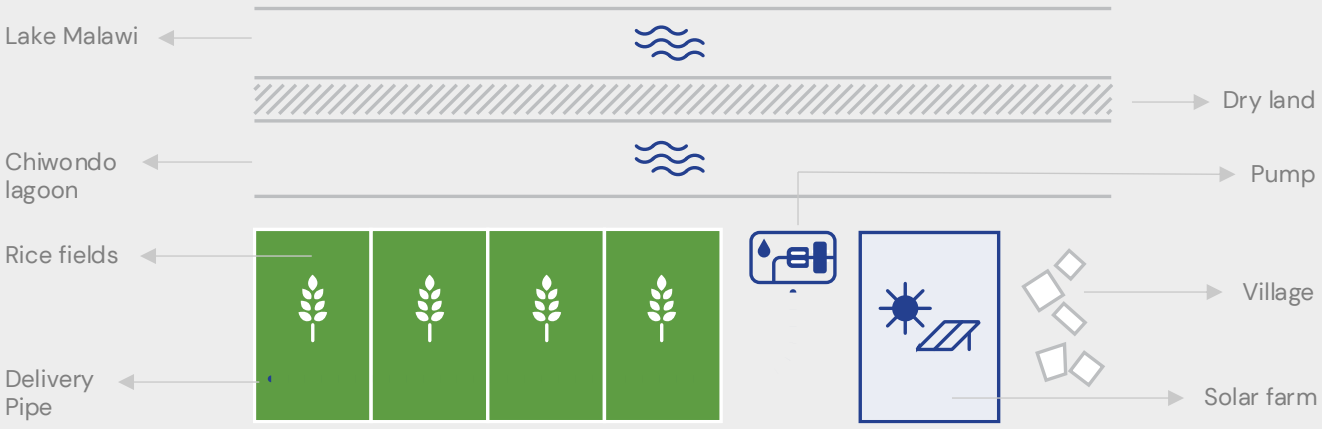


Deployment of cooking stoves across the villages of Waliranji and Kabuthu

- Sunflower cooking oil production, the waste from farmers production is turned into briquettes (in same facility as oil production)
- Assembly of cooking stoves (in same facility as oil production)
- Cooking stoves used in communities (20)

LIVING LAB

MALAWI
Karonga



Asset(s)	Total number	Specifications
PV panels	4	41 volt, 455 Watts
Solar Pump	—	50 cubic meters/h, max 17 meters. Power of 1500 watts
Flood irrigation	—	(rice fields)
Pump controller	—	210 volts max current of 17 amps
No battery	—	—

Smart Energy Enterprise, selling the solar powered irrigation system to small farmers. Targeting rice growers. Some individually, some in groups of 2. now farmers in groups, 5 to 10. 10 installed and operational. Up to 25 in the project. Targeting 375. System is assembled at the office.

Living lab
Morocco

LIVING LAB

Morocco

Solar energy

The validation demo will validate the integrated systems approach of renewables and energy storage systems by implementing a solar off-grid network (cost- and energy-efficient PV panels) coupled with lithium-ion batteries for energy storage, and a sustainable model housing unit that will demonstrate domestic use cases. In view of the circular economy, the end-of-life management of lithium-ion batteries will be explored. Via R&D, testing and teaching, while the potential for green transition will be explored via the deployment of electric motorcycles operated by women.
Moroccan demonstration actions occur on two sites: an urban context in which e-mobility is being launched and a rural site where an off-grid solar component is planned to be deployed. In cooperation with the NGO Act4community, GEP and involved stakeholders are planning the construction of the solar energy system, distribution and access, and business model, which will allow for the project's sustainability.
In the urban context the e-mobility concept is now well advanced, and will be in full service by the end of May 2023. With POGO as a business partner and an NGO, the female student association, Dar Attaliba, the procured e-mopeds, which in the first hand will be used by the female students, are assembled and ready to be distributed on the sites that have been selected.

Overview of the selected rural site

Technologies tested

For the urban living lab 40 e-scooters and corresponding Lithium-Ion batteries (greater or equal to 1.3 KWh) are deployed in the city of Marrakech. Scooters' mileage is 50 – 60 km.

For the rural living lab – Two sites are selected in the rural areas of Benguerir municipality. The off-grid energy system will provide rural households with electricity (lighting and household daily use of energy). Other uses related to outdoor activities are also planned as water pumping, Infospots, etc

Leading Partners

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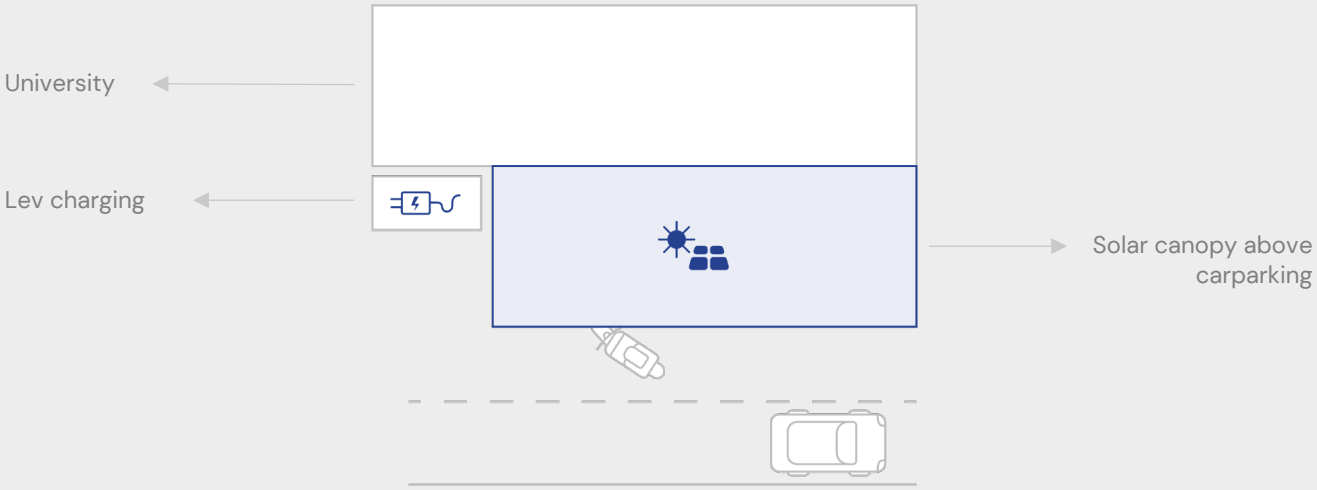
MOROCCO
Marrakech (Urban)



Asset(s)	Total number	Specifications
Charging hubs	10	—
Solar canopy (6 panels)	1	—
E-mopeds	40	—
AC charging stations	—	—

Across the city are 10 charging hubs for 40 (shared?) e-mopeds. The AC charging stations are grid connected, except for the hub at the University which is solar powered. In the future, Pogo will develop a battery swapping system.

LIVING LAB

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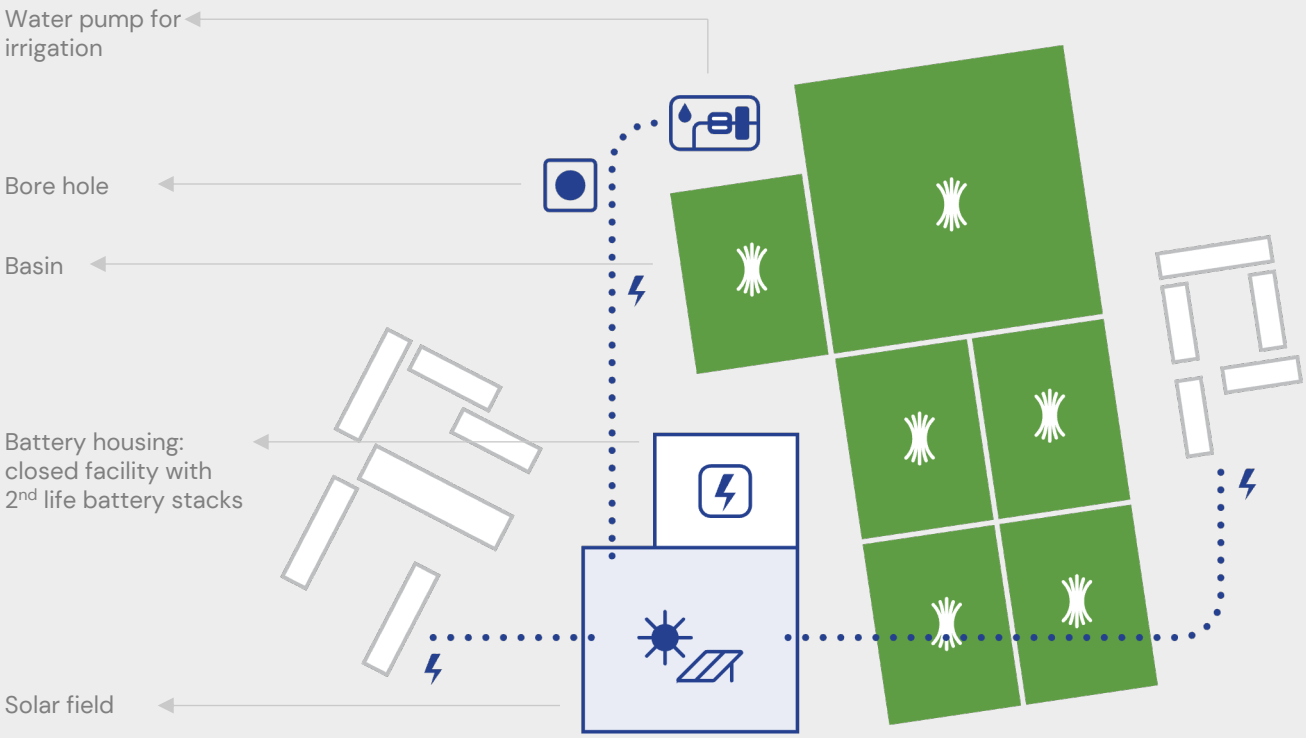
MOROCCO
Ben Guerir (Rural living lab)



Asset(s)	Total number	Specifications
Site	1	—
Solar park	1	20-30 kWp
Battery	1	—

Rural community in Morocco. A solar field of 20-30 kWp will supply power to nearby houses and a water pump to pump water from the water bore hole for irrigation purposes. A (2nd life?) battery storage system serves as an energy buffer.