Sun meets Water

WEBINAR

Join us

to learn about solutions combini
solar energy and water and chang
the lives of millions across Africa

Tuesday 23 February 11 AM CAT

AFSIA
Africa Solar Industry Association

Live recording

Franco Traverso
Genius Watter

Laura Corcoran
Aptech Africa

Kamar Mehdi
InfraCo Africa

Michel Chatelin
Eversheds Sutherland

organized by AFSIA Africa Solar Industry Association · GENIUS WATTER · AptechAfrica · InfraCo AFRICA · EVERSHEDS SUTHERLAND

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AFRICA SOLAR OUTLOOK 2021

A COUNTRY-BY-COUNTRY REVIEW OF THE STATUS OF SOLAR IN AFRICA

FEBRUARY 2021

BROUGHT TO YOU BY

AFSIA
Africa Solar Industry Association

WITH THE SUPPORT OF

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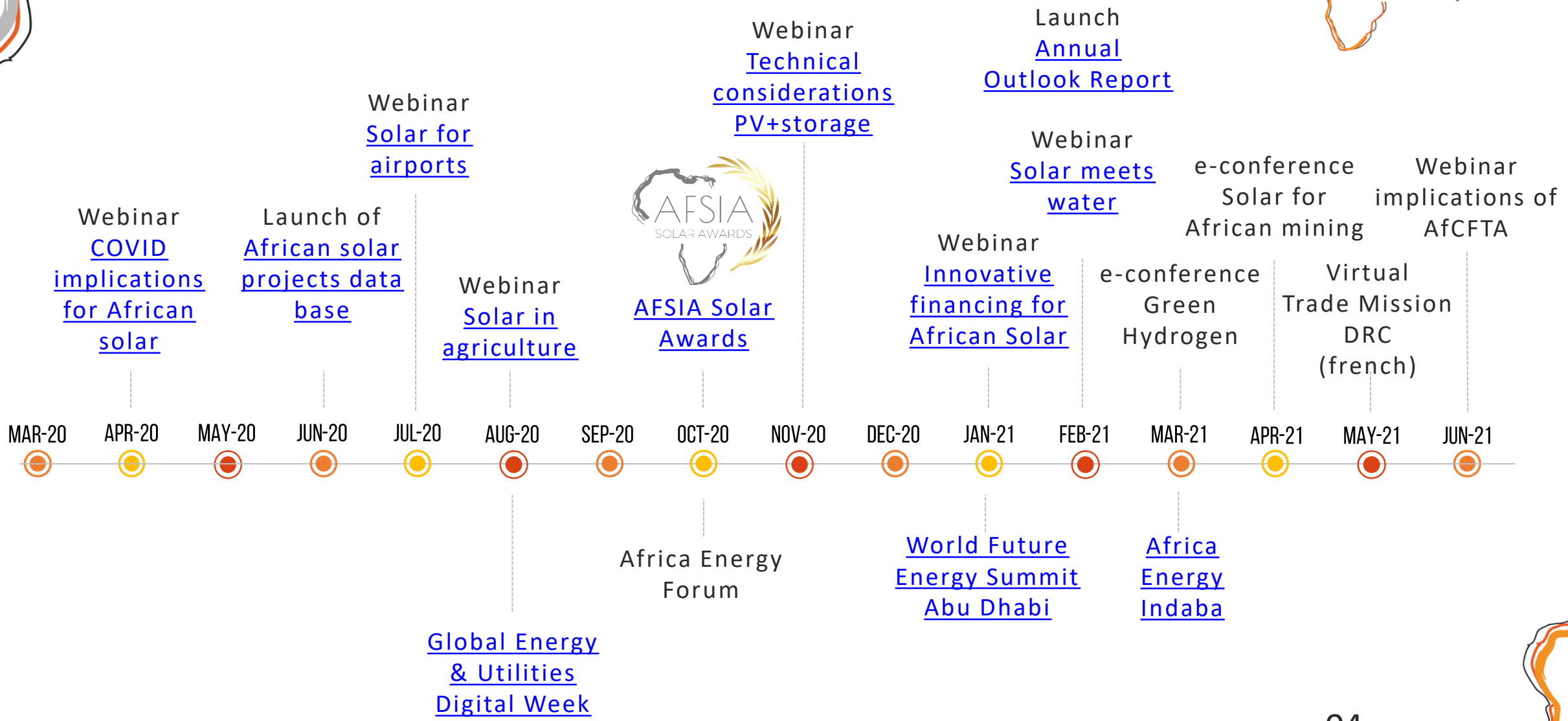
Download the report here

AFSIA ACTIVITIES HIGHLIGHTS



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Franco Traverso
Founder and CTO
Italy

GENIUS WATTER

AFSIA
Africa Solar Industry Association

- **30+ years experience in solar across 4 continents and multiple segments**
- **Serial solar entrepreneur with focus on technology development**
- **Former pilot who has discovered Africa from the sky**

Sun Meets Water

How Genius Watter manages to deliver drinkable water in the most extreme environments thanks to solar energy

Panelist: **Franco Traverso**
f.traverso@geniuswatter.com

GENIUS WATTER

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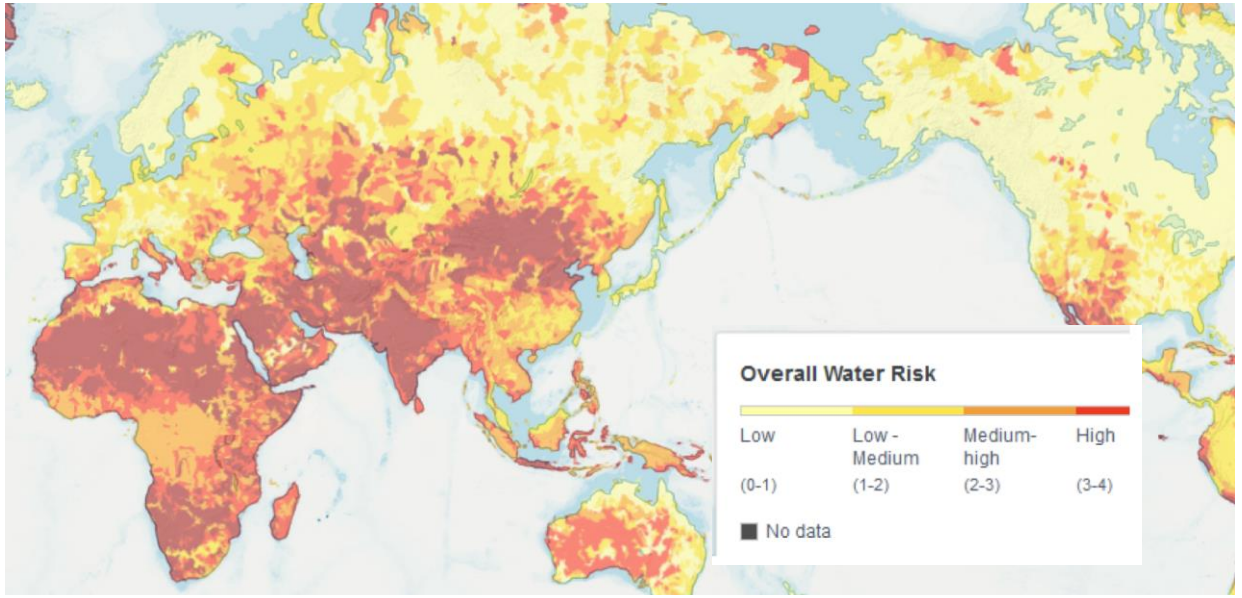
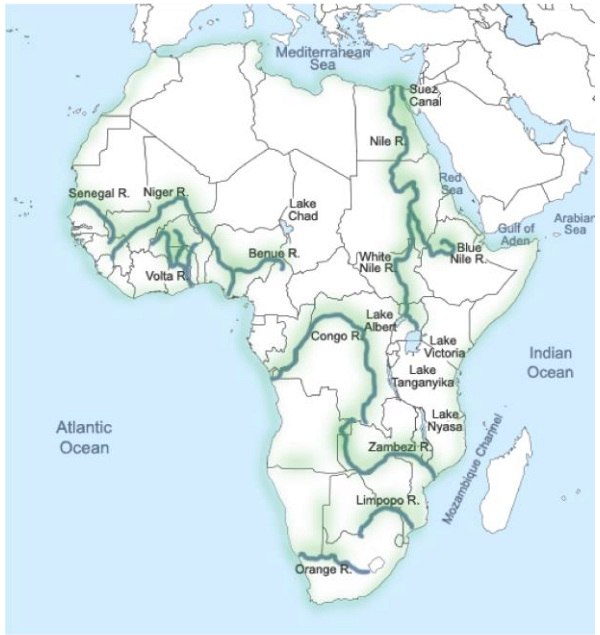
World Wide Water Stress

1. **2.2 billion people lack access to drinking water.**

2. **Agriculture is deeply suffering from draught and the issue is rapidly worsening**

3. **Africa is the continent most exposed to the water stress**





Only coastal areas are served by big reverse osmosis desalinators, but water cost and its transportation to mainland is too expensive.

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Water to Rural Areas

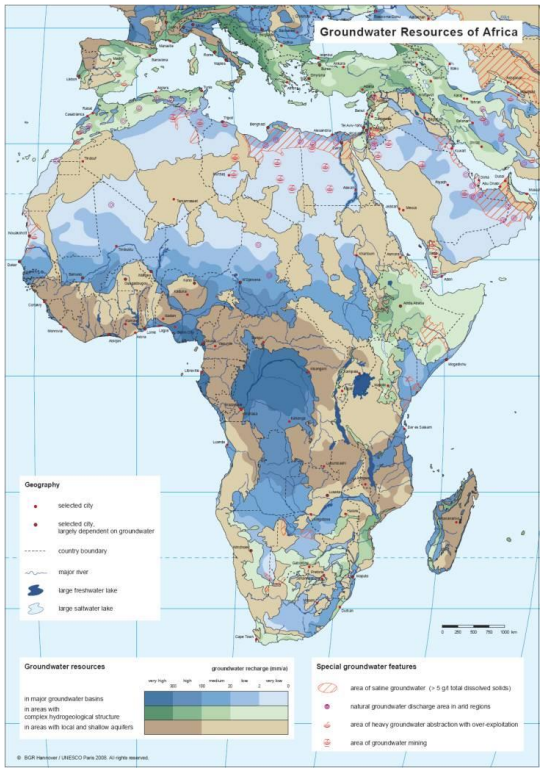
Drought and high water demand is increasing across inland areas

Too high costs to transport water into the mainland

Water stress to population

Migration to big cities

But groundwater is however available.



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Does a solution exist?

Experience, Competence, Technology

↓

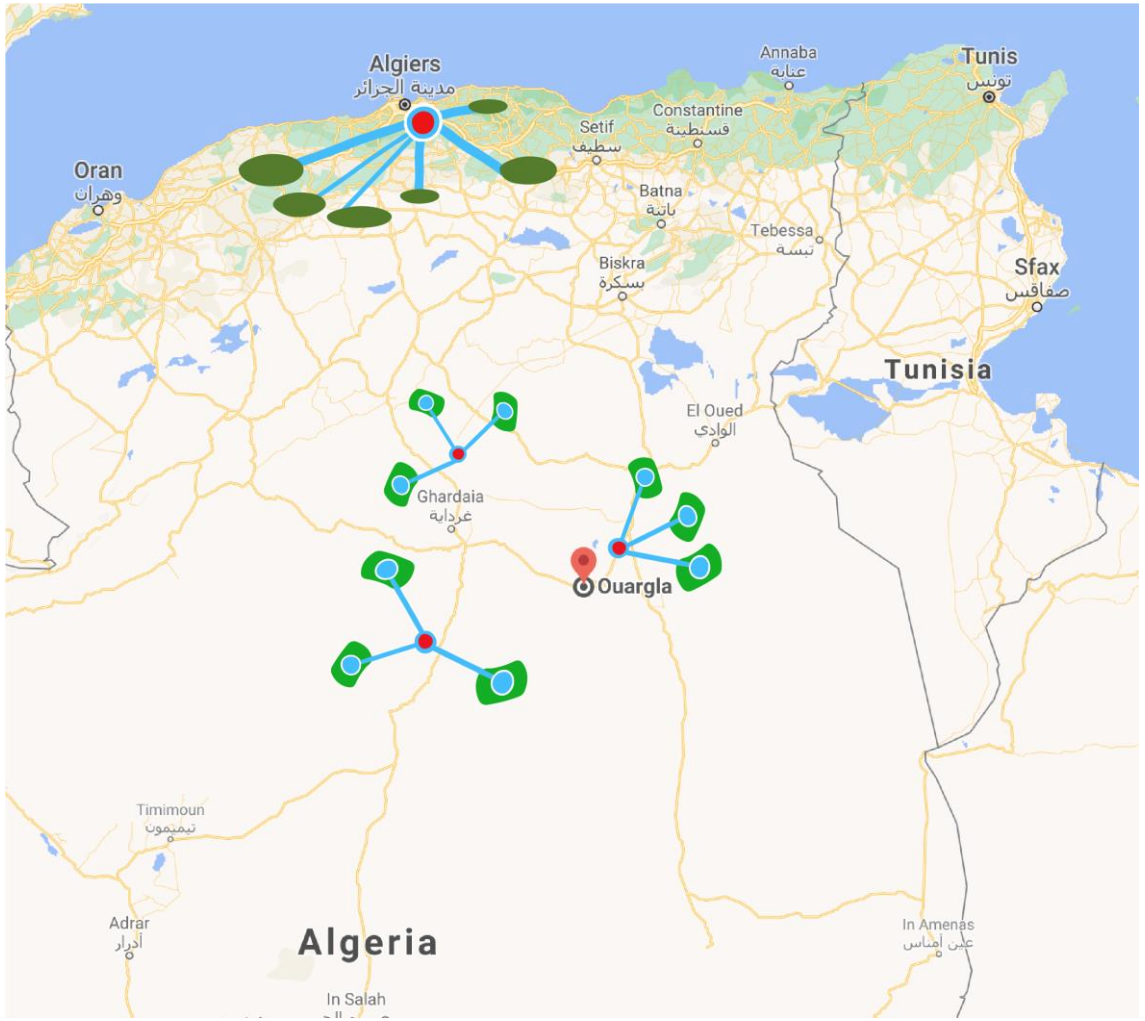
Pumping, Desalination, Potabilization and Distribution systems. Resilient and capable to autonomously work in rural areas for 30+ years.

Today, a sustainable solution exists, thanks to:

1. GROUNDWATER SEARCH
2. PHOTOVOLTAIC ENERGY
3. INNOVATIVE RO (REVERSE OSMOSIS)
4. WATER DISTRIBUTION
5. REMOTE MANAGEMENT
6. WATER AS A SERVICE MARKET APPROACH

↓

Sustainable & affordable water for the next 30+ years



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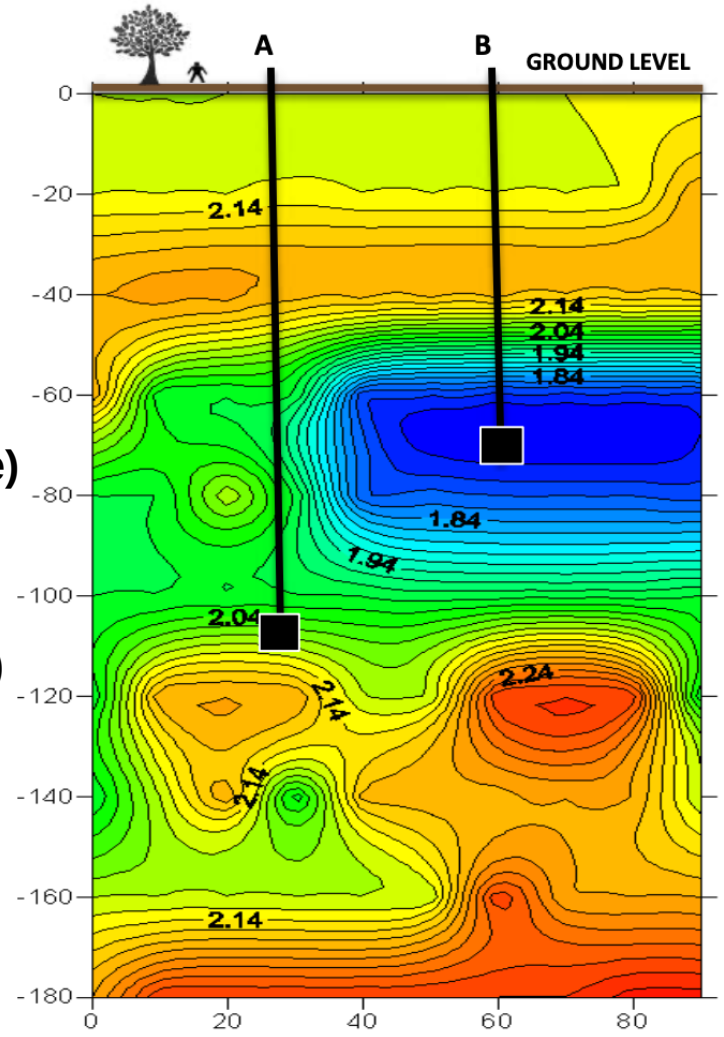
Groundwater Search

Nowadays solutions allow to detect:

- **Presence of existing underground aquifers (sweet or brackish waters)**
- **GPS position of the aquifers (where to drill the borehole)**
- **Exact aquifers depth**
- **Aquifers water volume**
- **Existence of other aquifers in the area (extra reservoirs)**
- **Expected water salinity**



Cost effective water search, with over 95 % success rate

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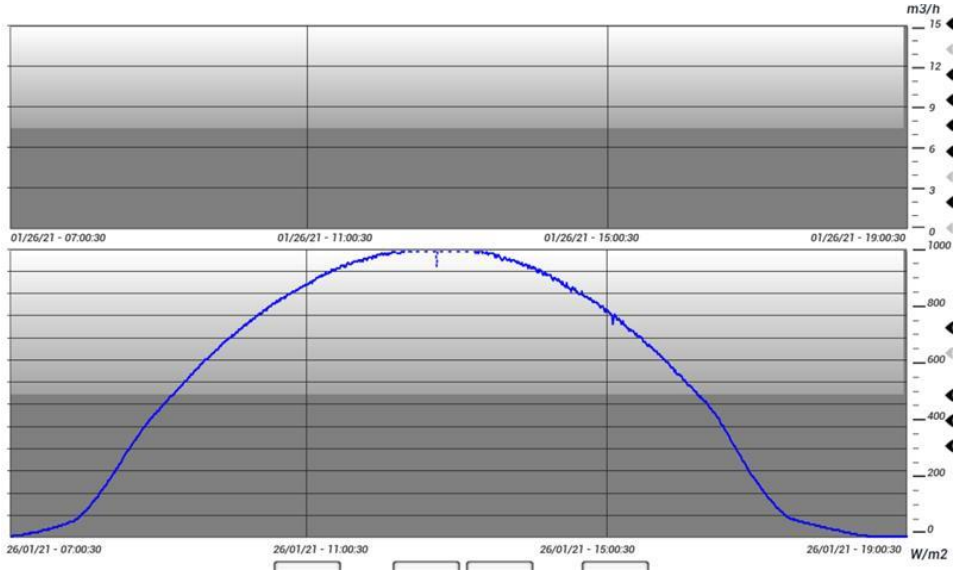
Photovoltaic Energy

- **Low cost of the kWh (LCOE)**
- **Longest durability (over 30 years)**
- **Low maintenance needed**

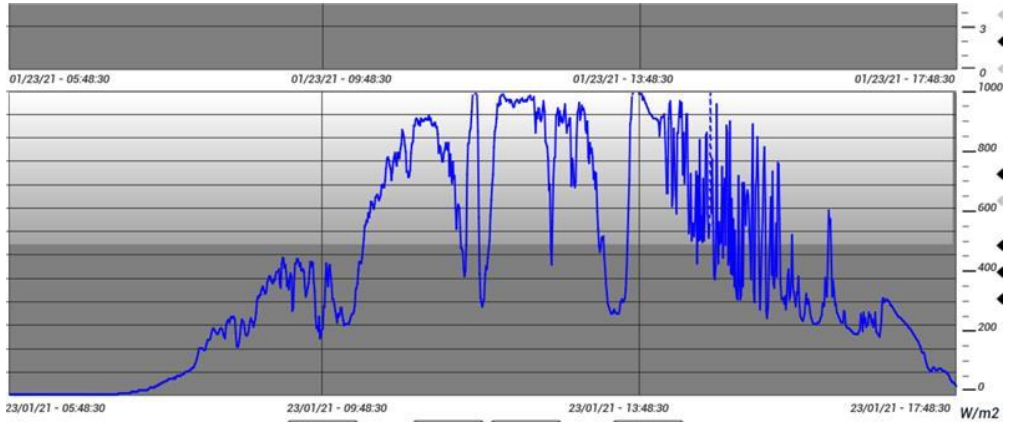
Sunny day



But:

- Limited to only sunny hours
- Daily, monthly, seasonal variability
- Energy storage with batteries? NO
- High CAPEX required

Cloudy day



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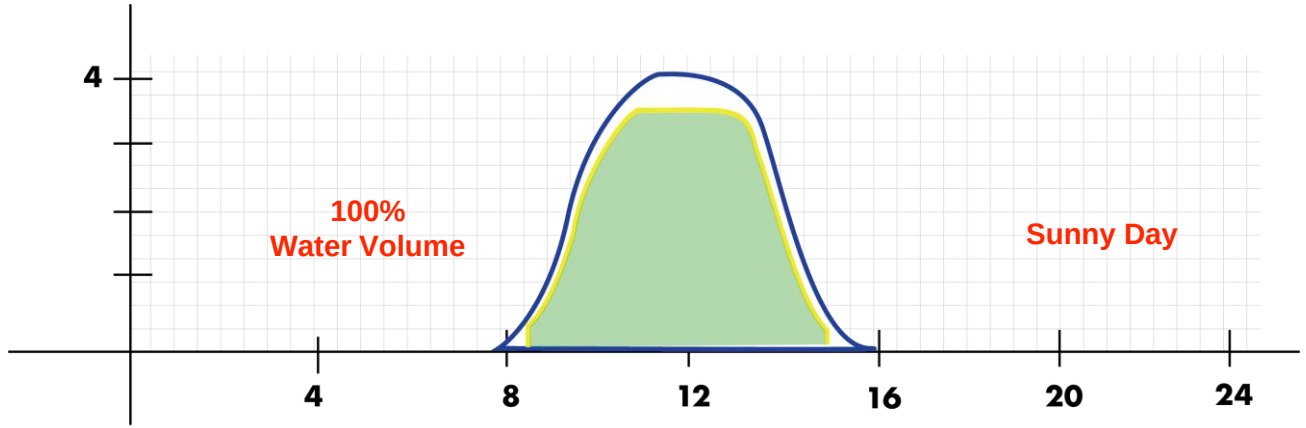
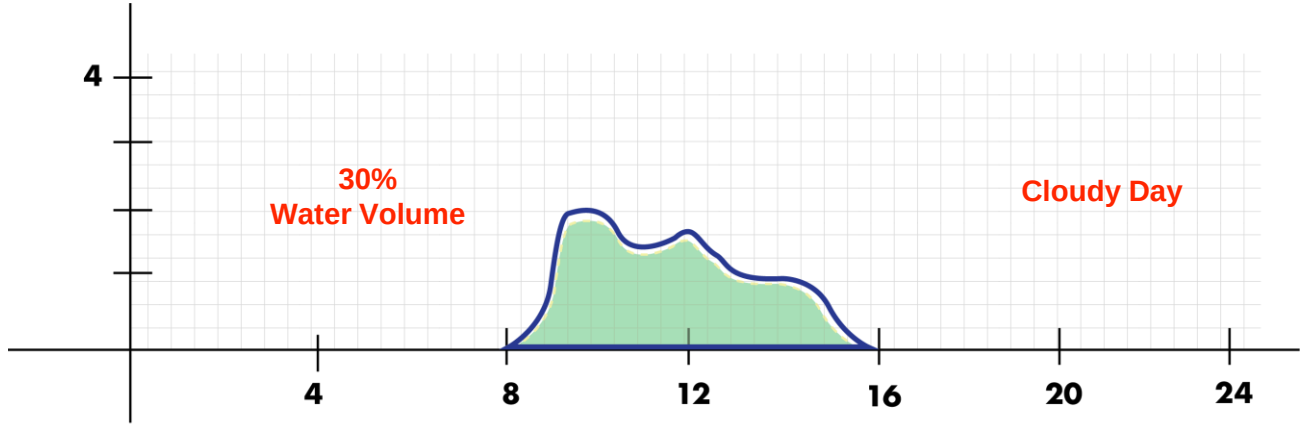
Innovative - Solar Powered Reverse Osmosis

- **Stand Alone**
- **100% solar powered**
- **Battery free**
- **Variable frequency process**
- **Fully microprocessor controlled**
- **Remotely managed**



Green area represents
desalinated water volumes



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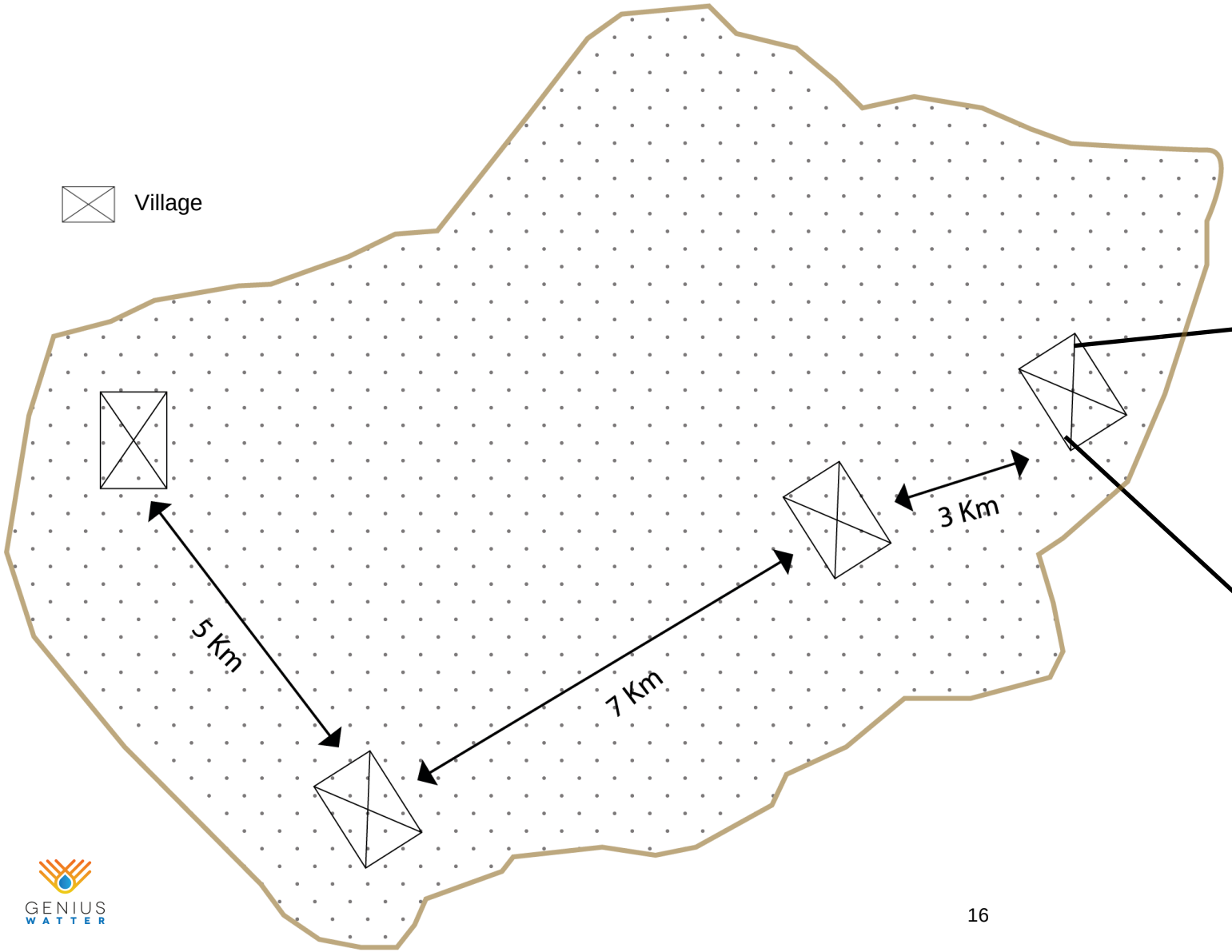
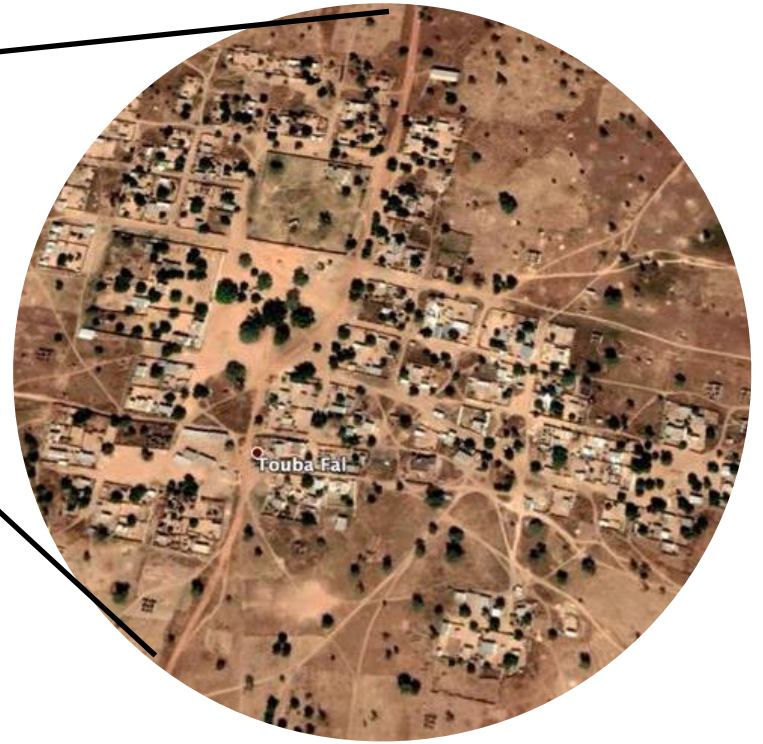
Example of water stressed semi-arid area





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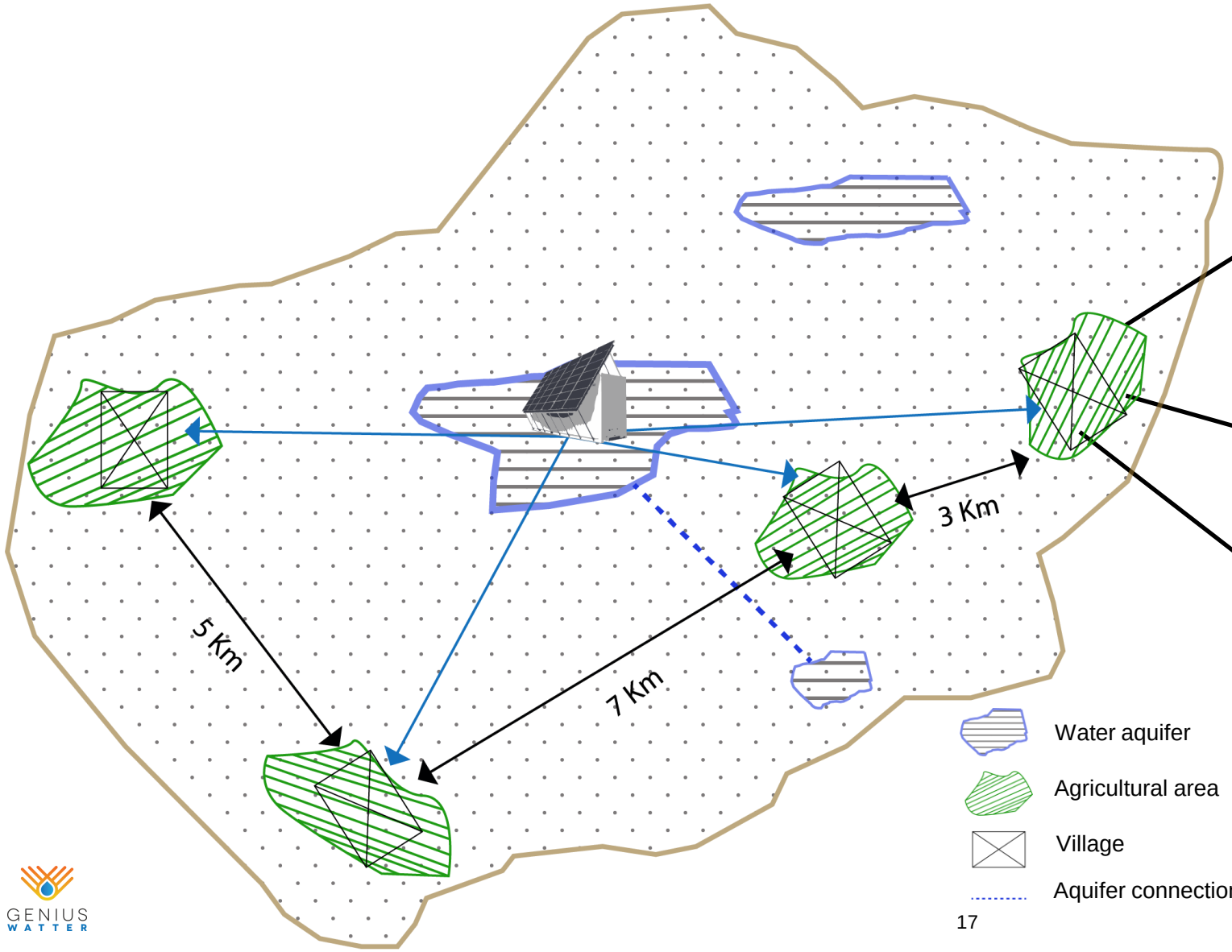
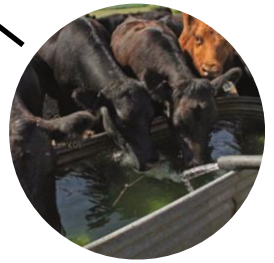
Self sufficient, solar desalination plant for multiple villages



Drinking Water

Drip Irrigation



Livestock Watering

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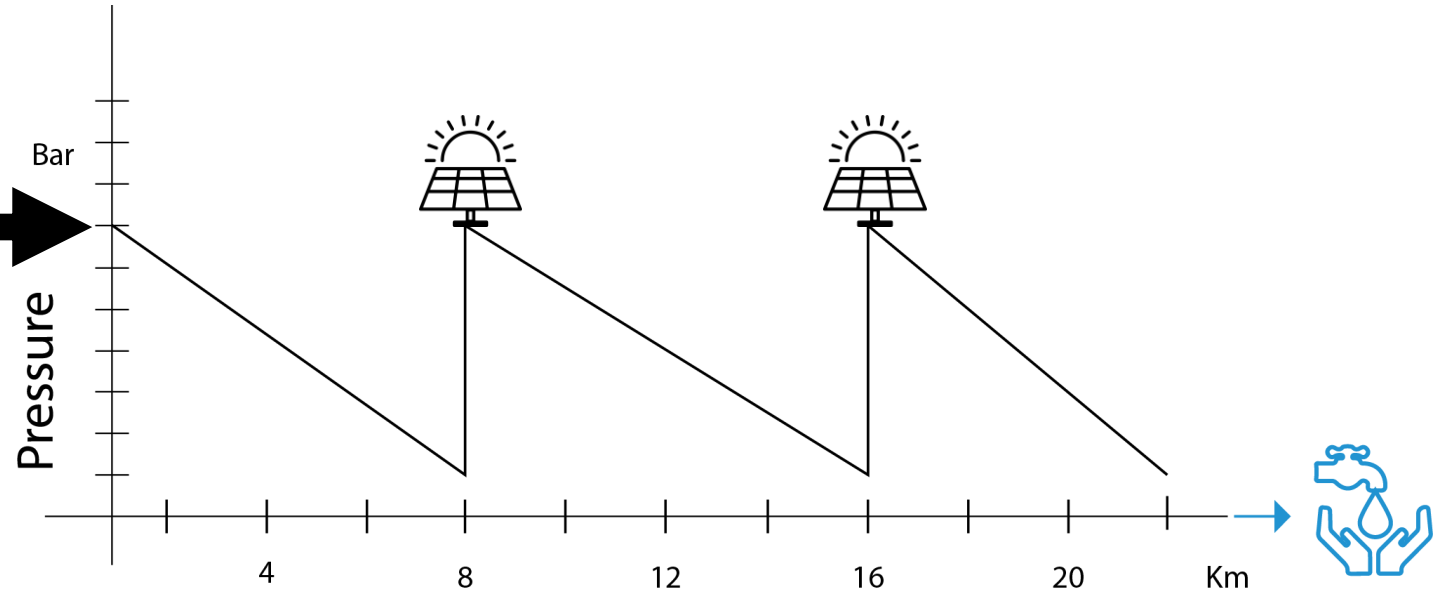
Distribution

Treated water distribution through solar powered pumping systems without batteries.



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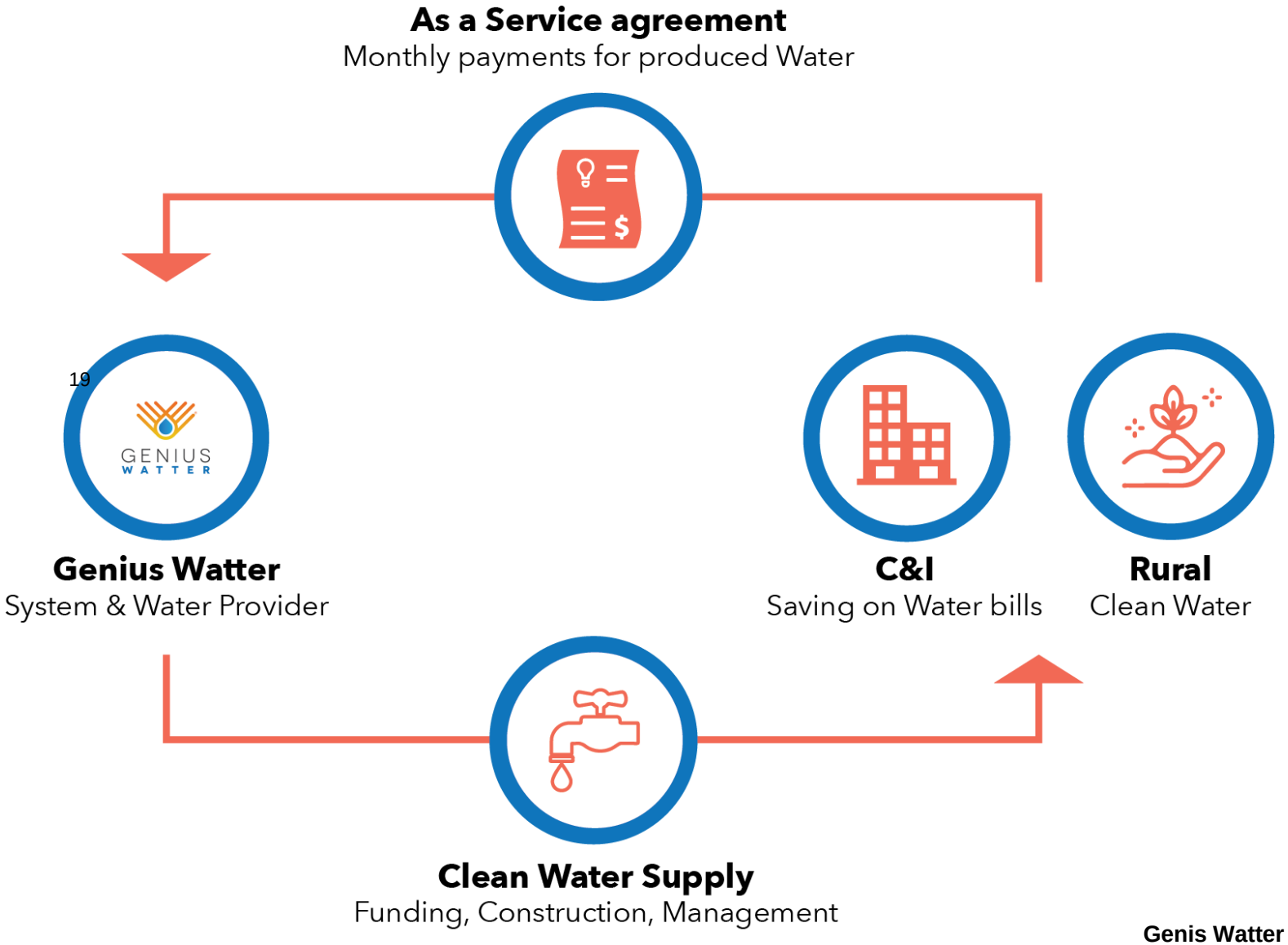
Water as a Service



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Case: Solar RO - Cape Verde

PROBLEM

- Water scarcity
- Poor water quality
- High cost of water
- Soil contamination

20

SOLUTION

An off-grid solar powered desalination system providing **75 m3/day** of clean and affordable water :

Objective_1: 58m3/day water sustainable for agriculture
Objective_2: 17m3/day potable water for the community

Project Data

Island: Boa vista, Cape Verde

Investment: € 330.000

Source of water: Borehole

Water type: Brackish 6.000 ppm

Tot area: 400 m^2

Funding: Genius Watter

Construction: 25/11/20

Commissioned:: 25/12/20

GENIUS WATTER

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Case: Solar RO - Cape Verde

Sustainable Water for Agriculture
Water sustainable for agriculture

	Current	Genius - RO
Water Quantity (m^3/day)	30	58
Water Quality (ppm)	6.000	1.000
Water Storage (m^3)	20	100
Cultivated Land (m^2)	800	1.600
Water Cost (€/m^3)	Diesel powered	0,91

Potable water for the community

	Current	Genius - RO
Water Quantity (m^3/Week)	30	120
Water Quality	Poor	Potable
Transport	Truck	Piping (3,5 Km)
Water Cost (€/m^3)	14,55 (10,0 subsidized)	2,0 (Flat price for 20 years)

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Case: Solar RO - Cape Verde

1.

Benefits for the farmers

- Increase in crops quality, land productivity and cultivated area
- Secured access to clean and affordable water suitable for agriculture

2.

Benefits for the community

- € 1.235.000 saved on water costs in 20 years *
- Secured access to safe drinking water

3.

Sustainability

- 1.523 tons of CO2 emissions saved in 20 years*
- ZERO diesel fuel consumption
- ZERO environmental impact

*Amount calculated on added water volumes

GENIUS WATTER

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Thank You

Q&A

Available to answer questions or for any clarifications

GENIUS WATTER

Panelist: **Franco Traverso**
Chairman
f.traverso@geniuswatter.com

www.geniuswatter.com

Laura Corcoran
Director Business Development
Uganda

AptechAfrica

AFSIA
Africa Solar Industry Association

- **6 years experience in solar and irrigation EPC in Africa**
- **Acquainted with some of the most challenging locations in Africa (Central African Republic, Sierra Leone, Eritrea, Niger, South Sudan, …)**
- **Combining passion for solar and for health & youth**
- **Masters from Ohio State University**

AptechAfrica

Introducing Aptech Africa Ltd.

PAY-N-PUMP

We are a Solar EPC company operating in 7 countries across Sub-Saharan Africa with 10 years of experience in the solar sector.

❑ OUR SERVICES

We offer complete assessments, design, supply, installation, and after sales services by our expert team of engineers and technicians.

❑ OUR APPLICATIONS

We offer solar off-grid and hybrid solutions, energy storage technology, borehole drilling, water pumping, water treatment, irrigation, power transmission, among others.

❑ OUR CLIENTS

We work with UN agencies/NGOs, C&I, International Companies, Individuals, & Farmers

AptechAfrica

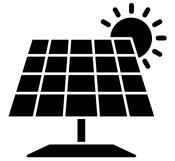
Summary of Concept

Climate Change has resulted in unpredictable rain patterns killing crops and livestock

- *Core Problem*

PAY-N-PUMP: PAYG/pre-payed enabled Solar Powered Water Pump

- *Solution*



PAY-N-PUMP

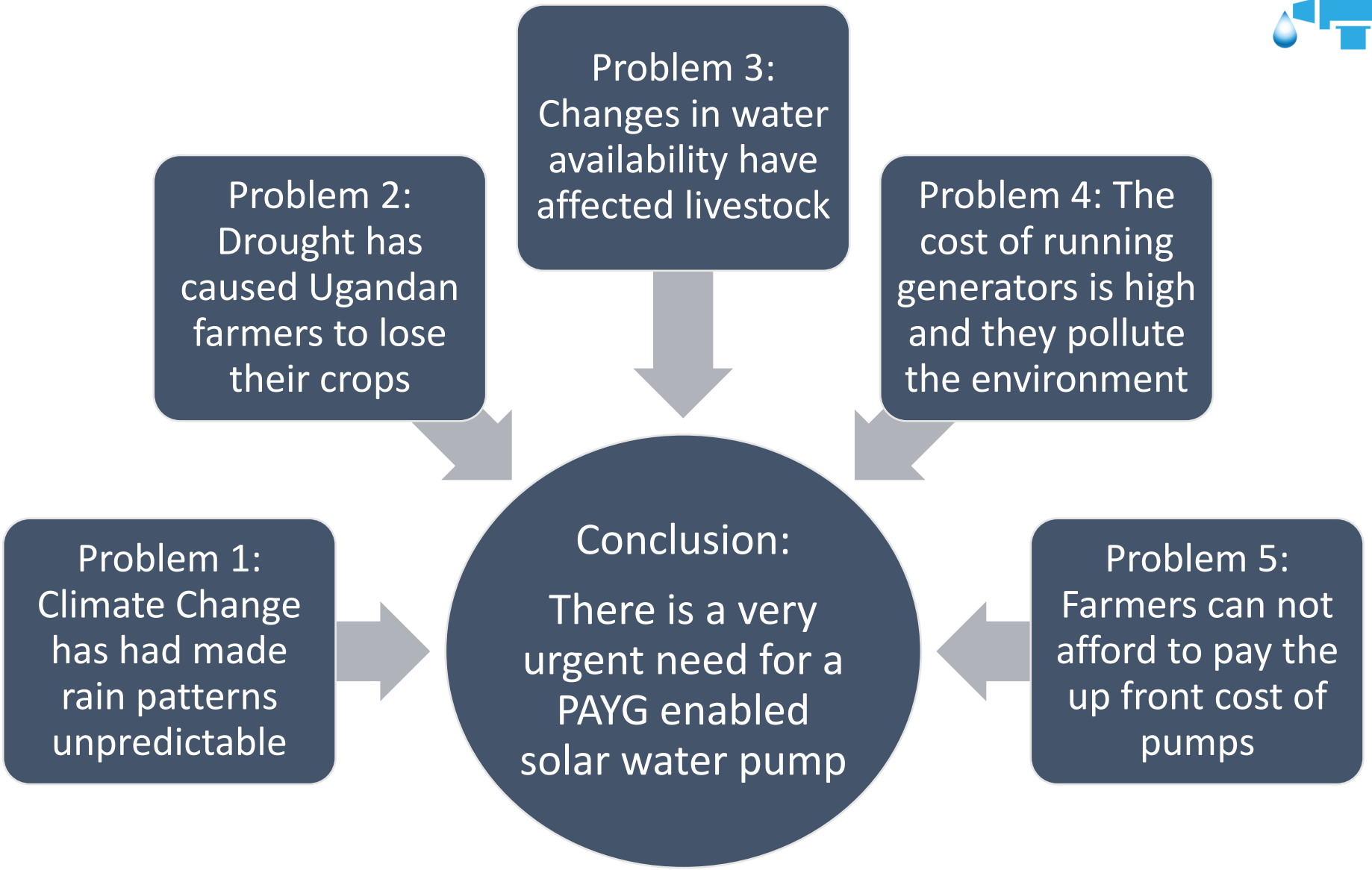
African Farmers with yield +

Income +

Socioeconomic status +

- *Vision*

The Problem Expanded



AptechAfrica

PAY-N-PUMP

Our Product

- PAY-N-PUMP is tailored specifically to meet the needs of farmers because they have a need for water, but do not have the financing to pay for the whole system up front.
- The pumps are big enough to supply multiple households and farms, depending on the size of land and crop being irrigated. Solution comes with both surface and submersible options and irrigation equipment.

AptechAfrica

Irrigation System

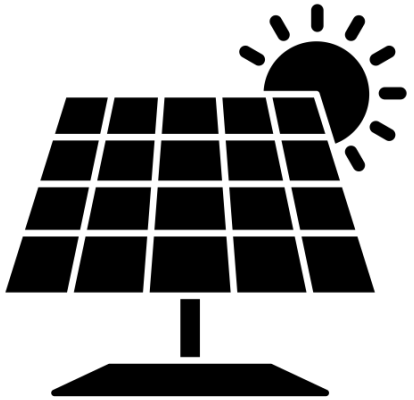
- Irrigation packages are set up for 1-2 acres of horticulture crops
- Use sprinkler systems due to cost, simplicity to use
- Farmers are able to share system

AptechAfrica

Payment Model

PAY-N-PUMP

The pump's pay-as-you-go capability allows us to install the system with no up front cost to the farmer. Farmers preload money and pay for water on per liter basis. Also offer a lease-to-own solution.



Since solar powered water pumps do not require a battery, which is the weakest part of the system, the system is durable and the panels can last up to 20 years without additional cost. Aptech provides maintenance for the systems

AptechAfrica

PAY-N-PUMP

The Role of Agronomists

- For PAY-N-PUMP to succeed, our farmers need to succeed
- Increase in crop yield is not just dependent on irrigation
- Need for experts within the communities where we are deploying these units
- Need for continuous follow up and support

AptechAfrica

PAY-N-PUMP - Impact

PAY-N-PUMP

Our PAY-N-PUMP solution has a positive impact on the living conditions of low income people, especially women and children.

Economic saves farmers time, increases household income from increased yield/off-season/third season harvest, insulates clients from fluctuating costs of diesel, can be used for both livestock and agriculture applications

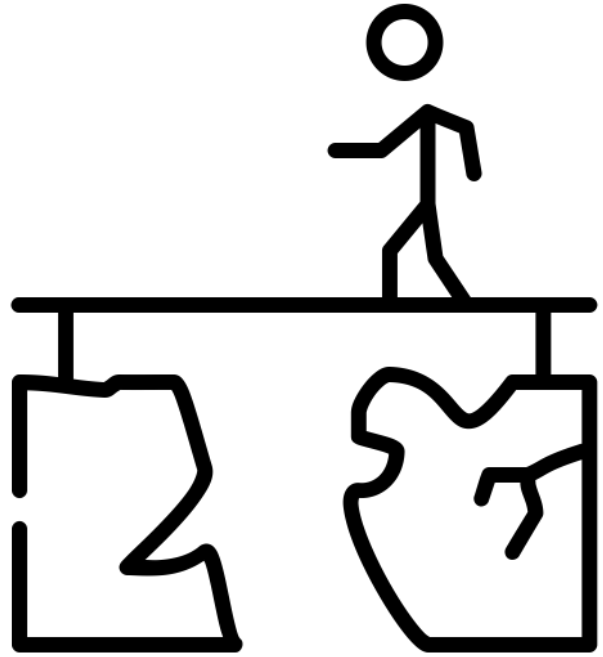
Environment significant reduction of carbon emissions, reduces use of fossil fuels (a similar sized diesel system would produce up to 200 kg of CO_2 per year); increase crop resilience

Gender allows easier access to water for women, reduce the burden on women who traditionally carry water

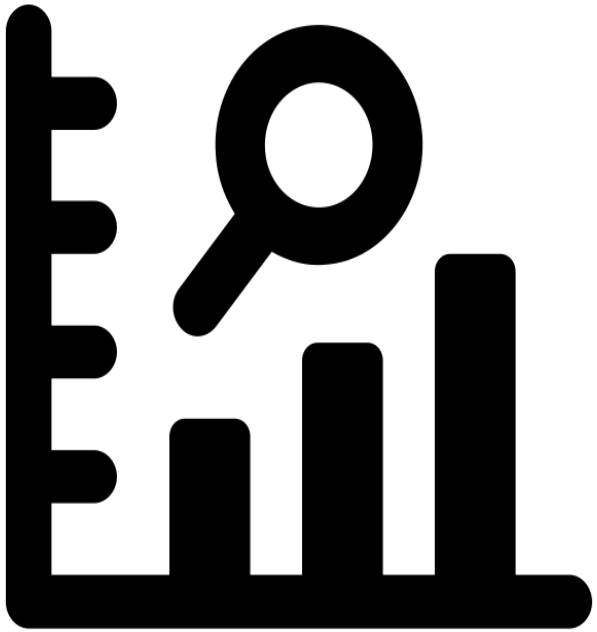
Social irrigation can be used to successfully grow nutrient dense foods such as fruits and vegetables, increased household income can be used for medical expenses/improved health/education

Challenges

- Water source critical to system, not everyone has
- Misuse of pumping system and irrigation lines
- Lack of awareness and knowledge about SWP and irrigation
- Payment behaviors
- Cheaper but lower quality products on market that spoil SWP reputation
- Lack of market research regarding SWP



Insights



- There is still a huge gap in awareness and knowledge with farmers on SWP and irrigation
- Sales agents need to be knowledgeable and experts in the community
- There is a need for more demonstration gardens within communities
- There is a need to have additional support for farmers throughout the entire agriculture value chain
- Security of the system is a big challenge

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Michel Chatelin
Partner
The Netherlands

EVERSHEDS SUTHERLAND

AFSIA
Africa Solar Industry Association

- **25+ years experience in legal focused on energy law, anti-trust and EU, with specialization on energy transition and renewable energy projects**
- **Advised multiple public and private clients globally on solar projects, has outspoken interest for floating solar**
- **International Public and European Law from Leiden University (The Netherlands)**

EVERSHEDS SUTHERLAND

AFSIA: Sun meets Water

Floating solar: global market overview

23 February 2021

Michel Chatelin

Introduction

Introduction

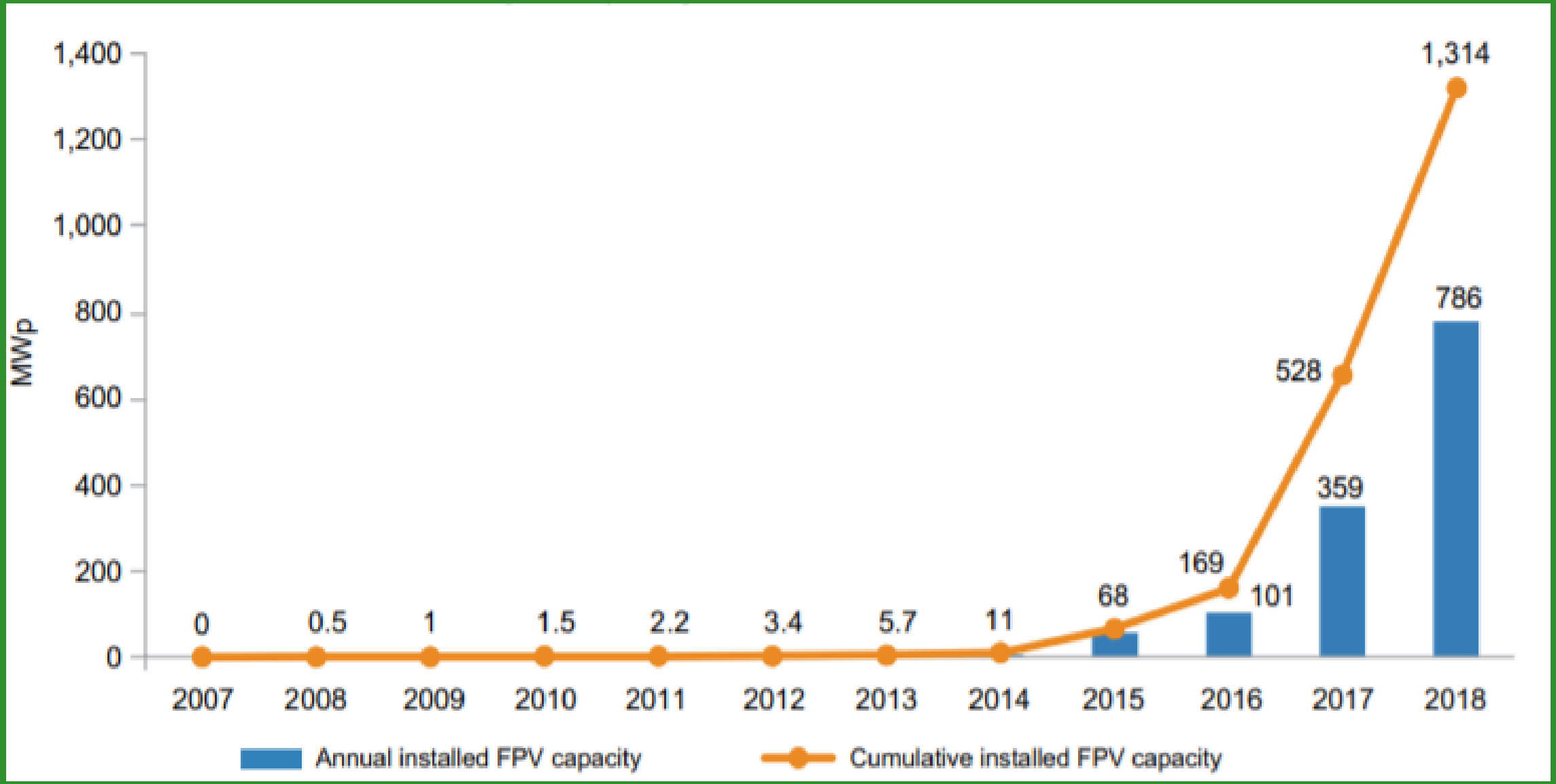
- Energy partner at global law firm Eversheds Sutherland

- Recent involvement in the largest floating solar park in Europe: the 27,4 MW “Bomhofsplas”

Countries which currently have FPV installations realised

source: pv-magazine.com (22 September 2020)

Worldwide FPV growth



Source: World Bank Group, ESMAP and SERIS. 2019. Where Sun Meets Water: Floating Solar Market

FPV market potential

Continent	Total surface area available (km^2)	Number of water bodies assessed	FPV potential (GWp)			Possible annual energy generation (GWh/year)		
			Percentage of total surface area used			Percentage of total surface area used		
			1%	5%	10%	1%	5%	10%
Africa	101,130	724	101	506	1,011	167,165	835,824	1,671,648
Middle East and Asia	115,621	2,041	116	578	1,156	128,691	643,456	1,286,911
Europe	20,424	1,082	20	102	204	19,574	97,868	195,736
North America	126,017	2,248	126	630	1,260	140,815	704,076	1,408,153
Australia and Oceania	4,991	254	5	25	50	6,713	33,565	67,131
South America	36,271	299	36	181	363	58,151	290,753	581,507
Total	**404,454**	**6,648**	**404**	**2,022**	**4,044**	**521,109**	**2,605,542**	**5,211,086**

Source: SERIS calculations based on the Global Solar Atlas © World Bank Group (2019) and the GRanD database, © Global Water System Project (2011).

Note: GWh = gigawatt-hour; GWp = gigawatt-peak; km^2 = square kilometers; PV = photovoltaic.

Hydropower-connected FPV systems

Dam/reservoir	Country	Reservoir size (km²)	Hydropower (GW)	Percentage of reservoir area required for FPV to match dam's hydropower capacity (%)
Bakun Dam	Malaysia	690	2.4	3
Lake Volta	Ghana	8,500	1.0	<1
Guri Dam	Venezuela	4,250	10.2	2
Sobradinho "Lake"	Brazil	4,220	1.0	<1
Aswan Dam	Egypt	5,000	2.0	<1
Attaturk Lake and Dam	Turkey	820	2.4	3
Narmada Dam	India	375	1.5	4

Source: World Bank Group, ESMAP and SERIS. 2019. Where Sun Meets Water: Floating Solar Market

Hydropower-connected FPV systems – potential in Africa

Overview of potential Hydropower-connected FPV locations according to EC study

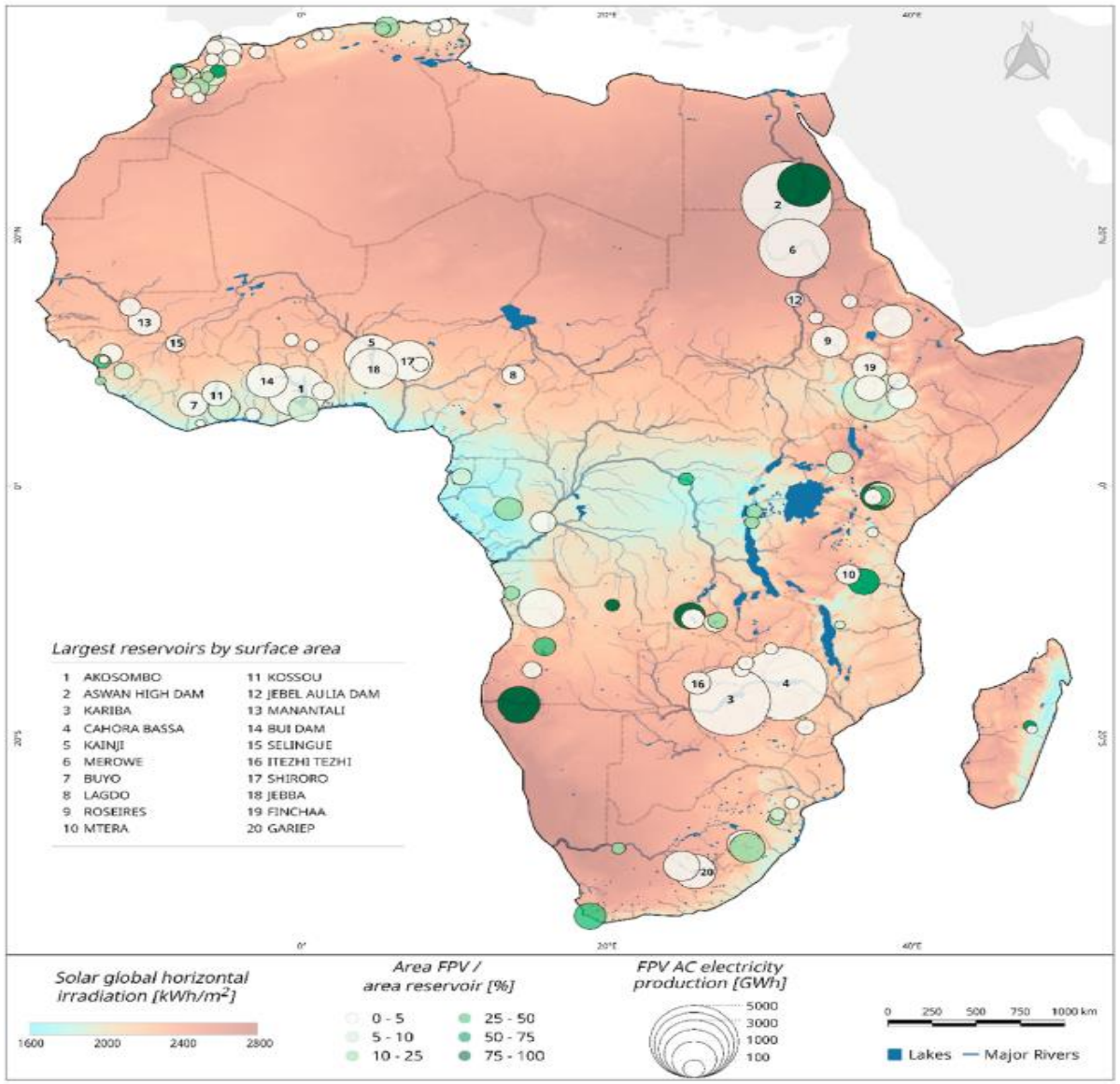


Fig. 3. Map indicating the reservoir location, FPV coverage and FPV annual electricity production for the EQIC case (FPV and hydropower equal installed capacity).

EVERSHEDS SUTHERLAND

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This information pack is intended as a guide only. Whilst the information it contains is believed to be correct, it is not a substitute for appropriate legal advice. Eversheds Sutherland can take no responsibility for actions taken based on the information contained in this pack.

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Kamar Mehdi

Business Development Analyst

Morocco

InfraCo AFRICA

AFSIA
Africa Solar Industry Association

- **6 years experience in renewable energy and electrical engineering**
- **Prior to InfraCo Africa, worked on project development of large-scale solar and wind with Gaia Energy Holding and Voltalia**
- **Dual degree in State Engineering from Ecole des Mines Rabat (Morocco) and Energy & Environmental Engineering from INSA Lyon (France)**

Sun meets Water Webinar

Bonergie Irrigation project

February 23, 2021

Kamar Mehdi, Business Development Analyst

InfraCo AFRICA

InfraCo Africa is part of the Private Infrastructure Development Group

Contents

- InfraCo Africa and PIDG Presentation
- Bonergie Presentation
- Project Background
- Collaboration Rationale
- Project Outcomes
- Project impact

InfraCo Africa and PIDG

COMPANY PRESENTATION (1/3)

- InfraCo Africa is part of the Private Infrastructure Development Group, specialized in **early-stage project development capital and expertise**.

- PIDG is an innovative finance organisation funded by the governments of the UK, the Netherlands, Switzerland, Australia, Sweden, Germany and the IFC.

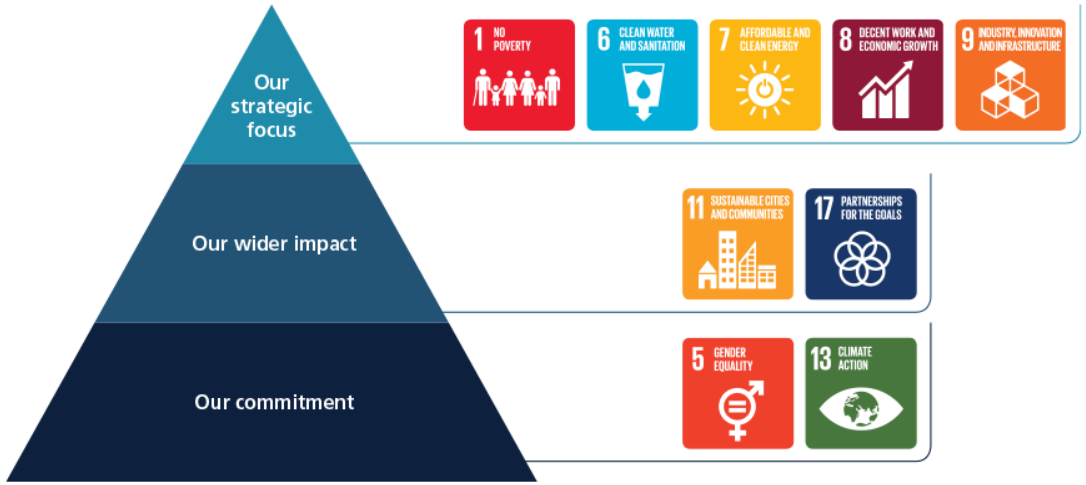
UKaid from the British people
Ministry of Foreign Affairs of the Netherlands
Schweizerische Eidgenossenschaft Confédération suisse Confederazione Svizzera Confederaziun svizra
Sweden Sverige
Australian Aid
FMO Entrepreneurial Development Bank
KFW
IFC International Finance Corporation WORLD BANK GROUP
InfraCo AFRICA

InfraCo AFRICA

InfraCo Africa and PIDG

COMPANY PRESENTATION (2/3)

- Our purpose is to **combat poverty in the poorest and most fragile countries** through pioneering infrastructure to help economies grow and change people's lives
- PIDG focuses solely on infrastructure, which is critical to the achievement of the SDGs.
- **Additionality** criteria are key for project selection.



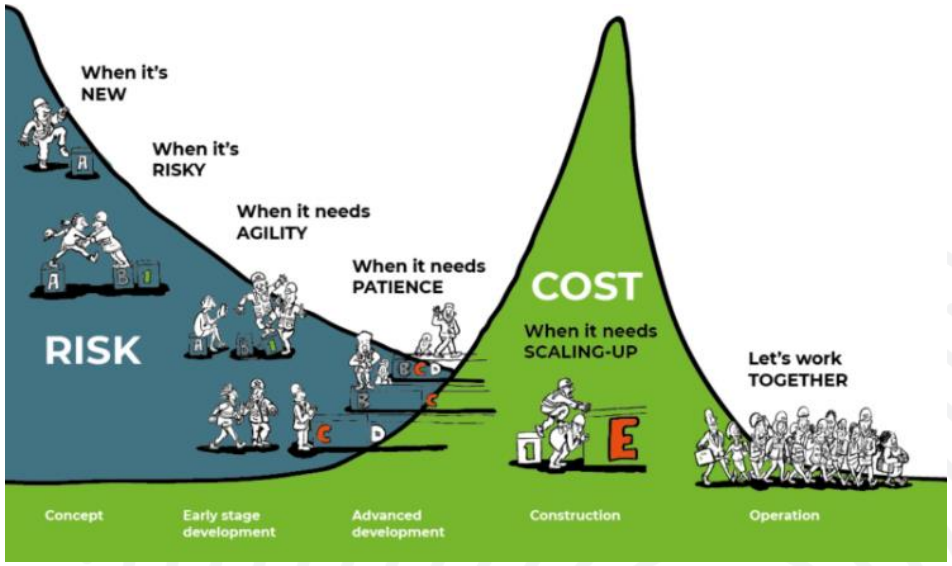
InfraCo Africa and PIDG

COMPANY PRESENTATION (3/3)

- InfraCo Africa is a **catalyst for the private sector** to invest in sustainable infrastructure projects in sub-Saharan Africa.

- Our involvement **reduces the risks and costs associated with project development**, **ensures international standards are met**, and **facilitates private sector investment**.

- In terms of **Geography**, We prioritise Least Developed Countries (LDC), Other Low-Income Countries (OLIC) and Fragile or Conflict-Affected States (FCAS) – as defined by the OECD.
- **Sectors** we cover are:
  - ✓ Agri-Infrastructure
  - ✓ Power and Energy
  - ✓ Water, Sanitation and Sewerage
  - ✓ Transport and logistics
  - ✓ Social Infrastructure
  - ✓ Capital Markets Development



Bonergie

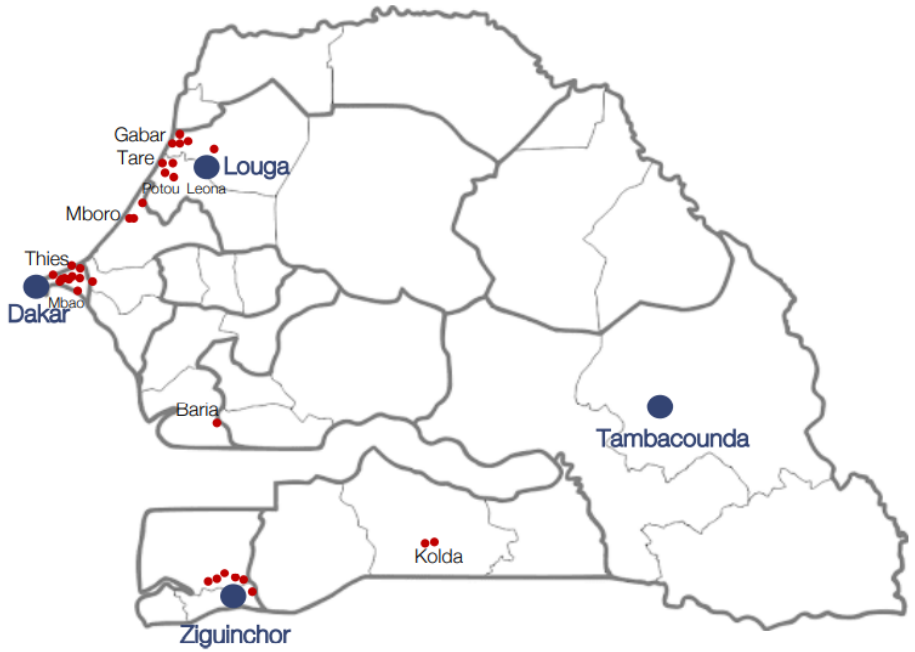
BONERGIE
energy for your ideas

COMPANY PRESENTATION

- Operational since 2010 in Senegal, Bonergie delivers solar solutions for productive use along the value chain of agricultural production, SME's and households, in most of the cases on a pay-to-own credit base.

- **Bonergie has 3 lines of business:**
  - ✓ Water (Solar Water Pumps and drip irrigation systems)
  - ✓ Electricity and Lighting (Modular Solar Home Systems)
  - ✓ Solar end devices (Refrigerators, Freezers, Fruit dryers, etc.)

- **Bonergie's key features:**
  - ✓ High quality / sustainable products
  - ✓ Proximity to end-users with sale points across the country and maintenance services
  - ✓ Financing solution fitting the revenue seasonality of farmers
  - ✓ Mobile payment possible via the PAYG system implemented
  - ✓ Ecosystem approach, partnering with NGOs and Government entities



Regional offices (**Blue**) and sales across the country (**Red**)

InfraCo AFRICA

Bonergie Irrigation project

PROJECT BACKGROUND

- Access to water and energy are key for Senegalese farmers, especially small holder and medium ones
- There is an opportunity in increasing productivity in the agricultural sector with the use of solar energy
- Discussions on the project between InfraCo Africa and Bonergie as well as Due Diligence started in 2019, with a focus on Irrigation activities
- The Pilot (Phase I) was then launched in 2020 with the objective to deploy 100 solar-powered irrigation systems (SPIS) across Senegal; Equity Investment in the Pilot is **US$ 320,000**
- Possibility to expand to Phase II with the objective to deploy **1,900 additional solar pumps and drip irrigation systems** across the country, subject to satisfactory outputs from the Pilot

Bonergie Irrigation project

COLLABORATION RATIONALE

- **For Bonergie:**
  - ✓ Securing funds to scale irrigation activities in Senegal
  - ✓ Having an institutional investor (InfraCo Africa) on board to boost activity and implement Best Practices
  - ✓ De-risking the project (irrigation activities) and attracting funds for future rounds of equity and debt funding

- **For InfraCo Africa :**
  - ✓ Senegal is focus country (Least Developed Countries)
  - ✓ Water (irrigation) is programmatic sector
  - ✓ Impact on people and the planet expected as well as on the wider economy

Bonergie Irrigation project

KEY PILOT OUTCOMES

- A **third-party** assessment of the Pilot has been undertaken including a customer survey
- The overall feedback from customers contacted is **positive**:
  - ✓ High value for money invested
  - ✓ Higher productivity
  - ✓ Savings on diesel costs
  - ✓ Positive image of Bonergie and its employees (safety, efficiency, after sale service, etc.)
- Bonergie has proven its **ability to deliver** by reaching the deployment target of the Pilot
- **Demand from the market exists:** Market opportunity related to irrigation in Senegal is estimated to be + US$ 55 million considering a significant expansion of the area under irrigation
- There is a demand for SPIS but also for **drip irrigation systems** or a combined offer.
- With a clear **marketing strategy** and **competitive advantages** (high end brand recognised in the market, PAYG), Bonergie has good potential to scale up activities within the next years

Bonergie Irrigation project

EXPECTED IMPACT

- Impact on **people (End users and Workers)**
  - Improving farmers revenues and lives while providing access to water for irrigation and drinking
  - Creating jobs with expertise in the field of solar/drip irrigation, trained by renowned international leaders (Lorentz, Netafim)
- Impact on **the planet**
  - Reducing the use of fuel by progressively replacing diesel-powered pumps by solar ones
  - Preserving water resources while improving its quality
- Impact on **Bonergie**
  - De-risking and exiting a stable company and a viable business
  - Implementing Best Practices (HSES, Gender policies, etc.)
- Impact on **the wider economy**
  - Promoting sustainable irrigation methods
  - Mobilising private sector investment into these systems

InfraCo AFRICA

Thank you

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InfraCo AFRICA

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