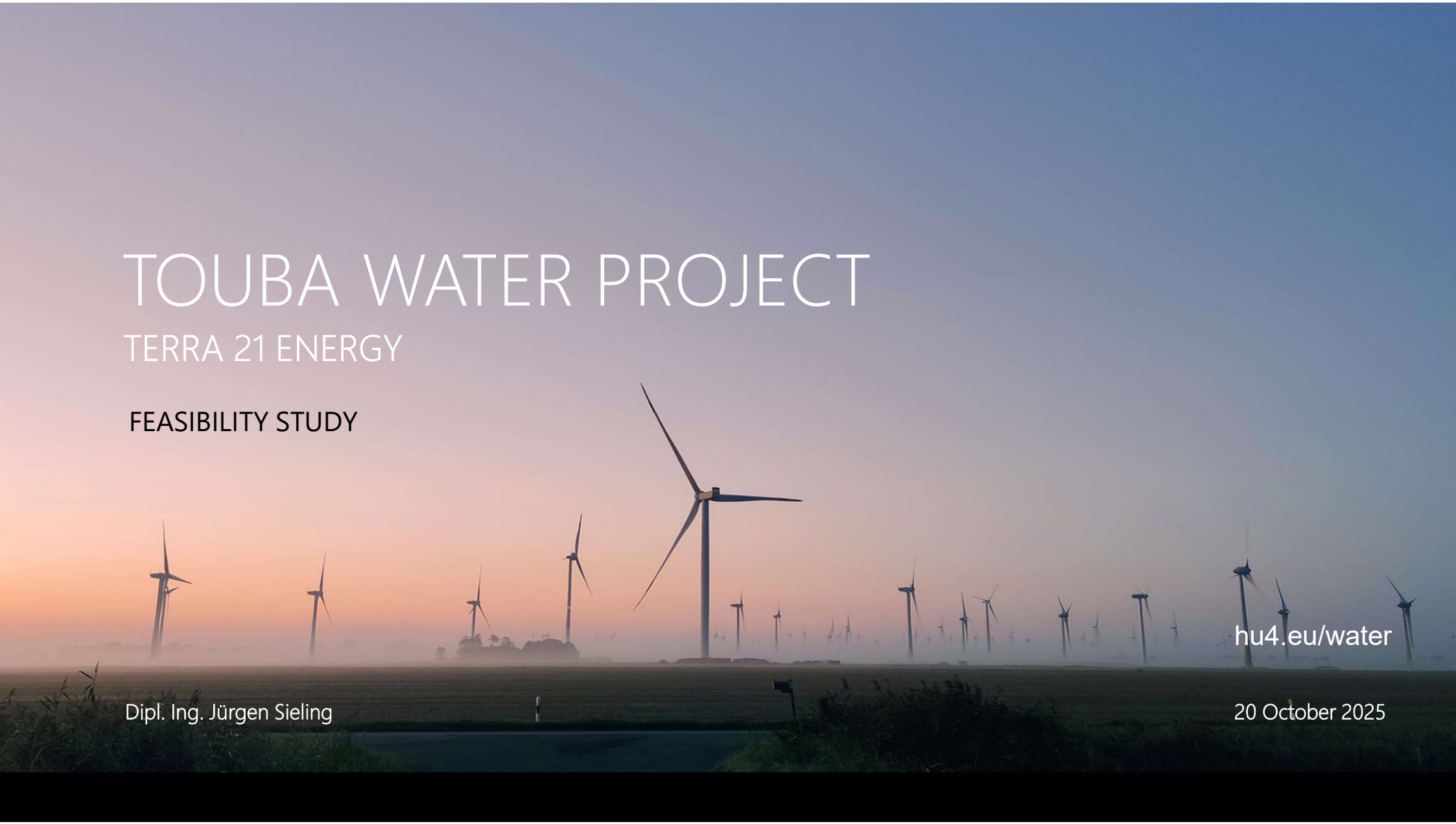


TOUBA WATER PROJECT

TERRA 21 ENERGY

FEASIBILITY STUDY

hu4.eu/water

Dipl. Ing. Jürgen Sieling

20 October 2025

Touba water project – water supply for Touba

WME technology

TERRA 21 ENERGY

FEASIBILITY STUDY

up to 200.000 m³ drinking water / day

Timeframe: 5 to 6 years for implementation

- Sustainable water supply for Touba region
- Financed by an Investment Group from Kuwait
- TERRA 21 ENERGY as supplier and exporter

WME technology for large-scale drinking water production

The MVC (Mechanical Vapor Compression) distillation process is used. This is an energy-efficient process for water treatment through distillation, in which steam is compressed. This thermal evaporation process is ideal for separating water from impurities.

Touba water project – water supply for Touba

PoC project

TERRA 21 ENERGY

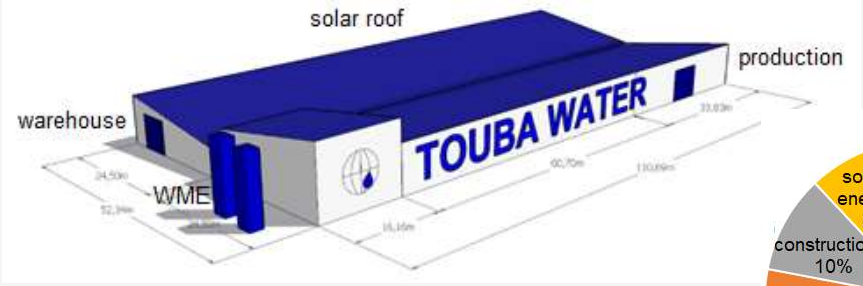
Proof of Concept (PoC), drinking water

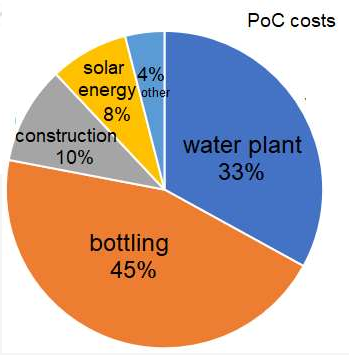
up to 500 m³ drinking water / day (in 12 hours)

- 2 WME Seawater desalination plant, 40.000 Ltr/h
- KRONES-line capacity of 25.000 bph still water (PET 0,5 ltr)
- TERRA 21, construction production hall and warehouse
- TERRA 21, solar 1.044 kWp + battery storage 2,4 MWh

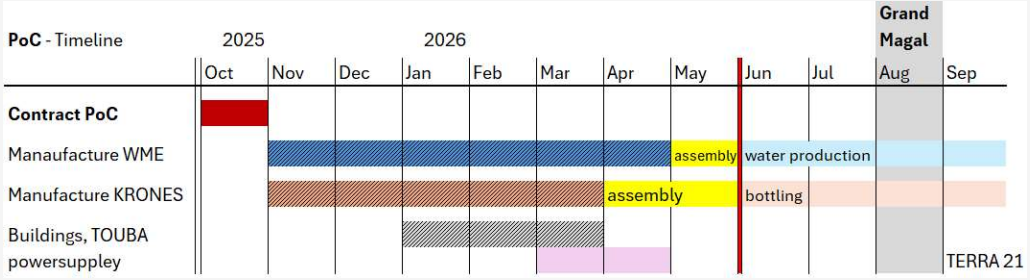
PoC project , commissioning of plant in june 2026

Budget 15.500.000 EUR
to demonstrate the advantages of seawater distillation





Drinking water with TOUBA brand.
Water pipe to the mosque of Touba.



Touba water project – water supply for Touba

PoC project

TERRA 21 ENERGY

WME, with 2 water distillation plant for the PoC project

up to 500 m³ drinking water / day (with 12 hours solar power in daytime)

- Production of 100% clean drinking water in large quantity
- The **MVC** (Mechanical Vapor Compression) distillation process is used
- Energy efficient and environmentally friendly, no chemicals
- Basis for the production of **hydrogen**

WME`s Desalination Technology

PoC project, commissioning of the plant in June 2026

expert of WME: Mr. Sascha Meyer

Touba water project – water supply for Touba

PoC project

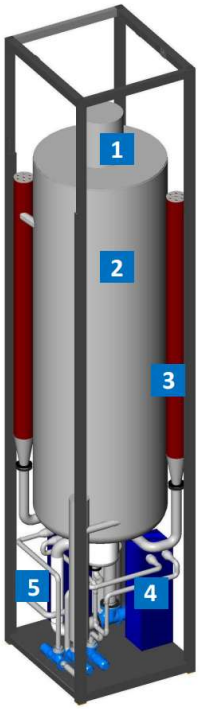
TERRA 21 ENERGY

WME, with 2 water distillation plant for the PoC project

up to 500 m³ drinking water / day (with 12 hours solar power in daytime)

Salient features of the plant

⇒ Long-time tested standard components
⇒ With a life cycle of more than 25 years
⇒ No copper or other heavy metal discharge in sea
⇒ Pollution free and environmentally safe
⇒ No greenhouse gas production issues
⇒ No use of chemicals
⇒ Excellent water quality
⇒ No cleaning required for scaling etc.
⇒ Running/operating cost almost nil
⇒ Minimal maintenance
⇒ Remote controlled, easy to operate and monitor
⇒ Once shut down, plant can be started immediately without any preparation
⇒ Proven technology and standalone unit
⇒ Runs on all types of renewable energies as well as on power grid
⇒ Works independent of the feed water composition
⇒ No occurrence of disturbing factors such as fouling, scaling and corrosion
⇒ High quality salt as value-added share
⇒ No post or pre-treatment



Evaporation system

1. Compressor
2. Evaporator / condenser unit
3. Heater
4. Heat exchanger
5. Distillate (drinking water)

Dimension 1 UNIT	Desalination tower (l/w/h) 2,900 x 2,440 x 12,200 mm container, 2 pieces (l/w/h) 12,200 x 2,440 x 2,900mm
Area	50 m²
Weight	about 25,000 kg
Electrical Supply	3 x 400V three phase current, 50Hz
Distillate produced	23m³/h (max. depending on salt concentration)
Potable water	salt content < 10 ppm (WHO standard < 480 ppm, appropriate as potable water)
Sea water (feed water) flow (inlet)	34,5m³/h (max. depending on salt concentration)
Brine flow (outlet)	11,5 m³/h (max. depending on salt concentration)
Brine	10% salt concentration
Electrical conductivity	< 10 µS/cm
Total dissolved solids	≤ 1 mg/l
Material of construction (MC)	Titanium and patented stainless steel (1.4565 S) and other stainless steel
Operation	completely automatic
Monitoring	with modem
Electrical and machining components	Corresponding to German regulations - VDE and VDI

Touba water project – water supply for Touba

PoC project

TERRA 21 ENERGY

KRONES, bottling

KRONES-line capacity of 25.000 bph still water 0,5 ltr

- Highly efficient systems featuring the latest technology, high performance, energy efficient
- Training on the equipment with commissioning of the plant
- 24/7 support, KRONES-Casablanca
- The following plants will have a capacity of up to 100,000 bph. Bottling of juices, milk and hot beverages (up to 80,000 bph)

PoC project, commissioning of the plant in June 2026

expert of KRONES: Mr. Vincent Parsy

KRONES - PET line

Touba water project – water supply for Touba

PoC project

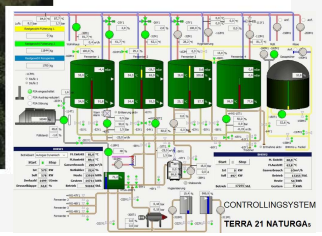
TERRA 21 ENERGY

ENERGY SUPPLEY - self-sufficient power supply

Solar power 1.044 - roof solar installations and solar tracker

- Solar power system of 1044 kWp for self-sufficient power supply
- Battery storage 2,4 MWh
- The daily operating time of the systems is 12 hours, later 24 hours operating time

PoC project , commissioning of the plant in june 2026



TERRA 21 ENERGY, installation and support of all systems
Training of local technicians

Biogas plants in the next stage of expansion

TERRA 21 ENRGY
“ for green energy”

Touba water project – water supply for Touba

PoC project

TERRA 21 ENERGY

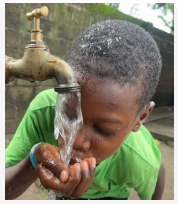
LOGISTICS - use of existing supply chains for water distribution

The construction of warehouses and stainless-steel-tanks for water storage

- KRONES bottling, labelling with Touba brand. Stacking on pallets for delivery.
- Filling 20-litre canisters. Canisters are exchanged, cleaned and refilled.
- IBC-Cubes are transported to water distribution points in the city of Touba and exchanged at regular intervals. And the use of tanker trucks
- Water pipes to the houses, initially to the mosques for a constant water supply

PoC project , commissioning of the logistics <u>in june 2026</u>

Specialized in the manufacture of plastic food packaging, as well as all types of plastic production.



for clean drinking water

Touba water project – water supply for Touba

FEASIBILITY STUDY

TERRA 21 ENERGY

The TOUBA WATER PROJECT consists of:

A **High-quality bottled water**. Cleanest drinking water delivery in 20-liter canisters. Through WME seawater desalination using the MVC process - for high quality drinking water.
The processes are only costly in the initial phase and will be optimized in the coming years.

B **Production of service water in large quantities** (Sones / OFOR) at low cost. The water does not have the same quality as in point A. Water purification will be set up in the same way as in Europe using sewage treatment plants, biological water purification, and filtration.

The Investment Group Kuwait is financing in a comprehensive water project, the TOUBA WATER PROJECT.

Far larger amounts are available to finance the TOUBA WATER PROJECT.
New waterworks will be established and fully financed in the city of Touba.

Prerequisite:
The project is supported by the Government of Senegal.
The city of TOUBA, with its waterworks, will become the owner of all facilities.

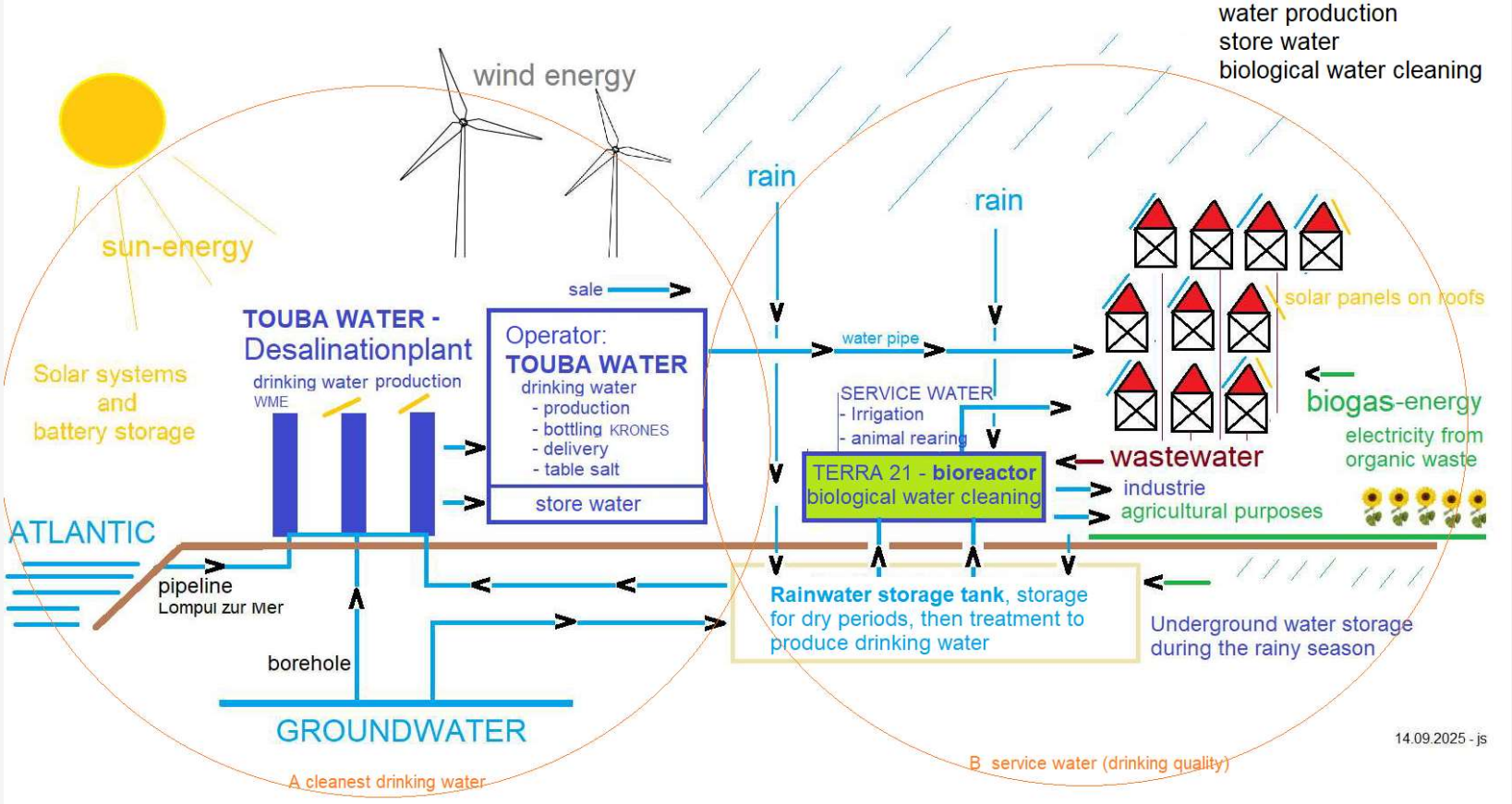
WME`s Desalination Technology

Touba water project – water supply for Touba

FEASIBILITY STUDY

Water cycle, with renewable energy

TERRA 21 ENERGY



Touba water project – water supply for Touba

pipeline construction

In the 3. year of the project, pipeline construction from Atlantic to Touba

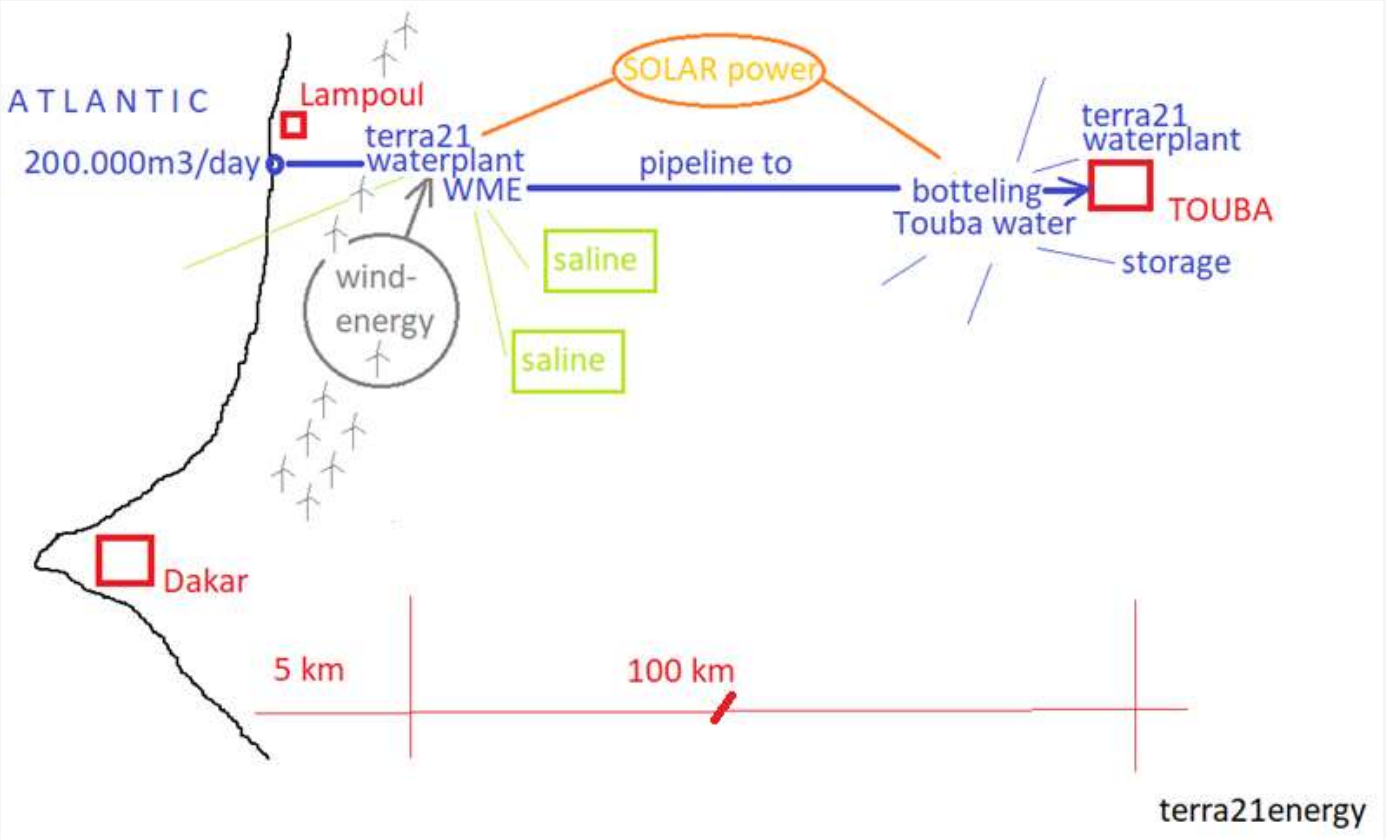
TERRA 21 ENERGY

Feasibility study

A water supply for Touba with up to 200,000 m³ of drinking water per day is to be implemented in the coming years. The TERRA 21 ENERGY feasibility study has developed the following system solution:

- Construction of seawater desalination plants using Atlantic water
- Energy generation through solar, wind and biogas plants
- Installation of pipelines and pump systems
- Bottling station by KRONES
- Production of table salt

Up to 40 water desalination plants with energy systems are to be delivered annually and built gradually.



Project planning and development

Touba Water project

Project planning for continuous development begins

1

Phase 1 -Proof of Concept (PoC) - Location Touba

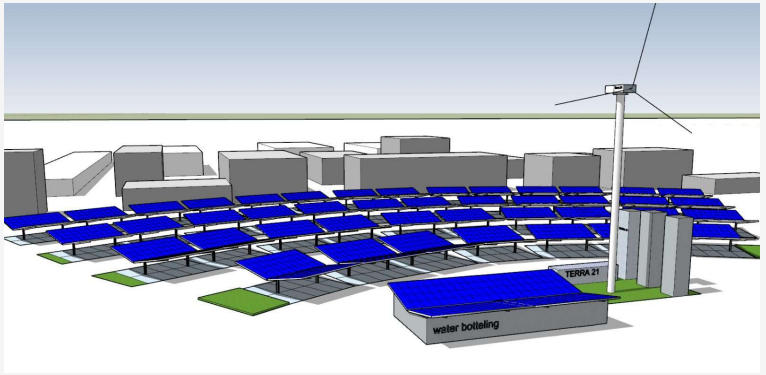
ground water of Touba

demonstrate the technical and economic viability of seawater distillation

Components: 2 WME-distillation plants: 44 m^3/h (44.000 ltr/h), up to 500 m^3 drinking water per day
Solar power 1044 kWp + battery storage 2,4 MWh - self-sufficient power supply
KRONES bottling plant 25.000 bph, PET 0,5 ltr

This pilot plant lays the foundation for rapid expansion throughout the country.

Budget 15.500.000 EUR



2

Phase 2 – Year One: Deployment and Water Park Scale-Up

Components: 6 distillation plants WME: 132 m^3/h (132.000 ltr/h)
Solar power: 3 MWp + battery storage + windcraft
KRONES bottling plant 100.000 bph

Budget 30.000.000 EUR **70% of Touba's drinking water needs covered, 100% can be covered in two years**

Project team is formed and plans further developments with the construction of a pipeline (Lompul), salt works and large-scale energy supply.

Project planning and development

Touba Water project 2/2

Project planning for continuous development begins

3

Phase 3 – Annual Expansion Plan
18 New Desalination Plants annually capacity: 400 m^3/h (400,000 ltr/hour)
KRONES bottling plant 80.000 bph with logistics for delivery
Full energy autonomy and integrated infrastructure.
Start Pipeline to the Atlantic (Lompul)

Budget 100.000.000 EUR for 2027

Biogas plants for 24/7 power supply, operated with manure from livestock farming, waste from slaughterhouses, and biologically recyclable residues.

4

Phase 4 – Project planning for large-scale water supply, self-sufficient energy supply
Water supply for all houses, cleaning used water, construction of biogas plants and wind parks.
Delivery of up to 35 water systems per year. **"Implementing the water cycle"**
Start agricultural production dairy farming with year-round water supply.
Dairies, slaughterhouses, and cold storage facilities are being built.

Budget 105.000.000 EUR in 2028
Budget 105.000.000 EUR in 2029

PROJECT COSTS

Investment in water systems
97 WME water towers
Drinking water up to 51,696 m^3/day
Costs approx. €130,000,000

Total project costs
Water systems / Energy / Infrastructure etc.
Costs approx. €534,000,000

TERRA 21 ENERGY – specializes in

CO_2 quota

TERRA 21 ENERGY

Project planning | Project management | Execution

- **SEAWATER DESALINATION**

– 100% clean drinking water without the use of chemicals
– drinking water, extraction from sea and river water by WME

- **BIOGAS**

– Planning and construction of biogas plant; Recycling of biological waste
– Material cycles / renewable energy / Wastewater treatment / fully biological fertilizer
– Training in Biogas

- **BIOLOGICAL WATERCLEANING**

– Bioreactor; Water treatment and biological water cleaning
– Project planning slaughterhouses and water treatment
– Irrigation water agriculture

- **TRAINING IN AGRICULTURAL ENGINEERING**

German Agricultural Engineering Training Institute
– Training in plant production
– Training on machines

- **DAIRY FARMING AND DAIRY**

– Development of dairy farming and feed production
– Dairy production and preservation of dairy products

- **SOLAR AND WIND ENERGY**

– Energy supply and grid expansion
– Control technology and engineering, Monitoring
– Hydrogen technology, the new energy

CO_2 quota


Plus d'informations sur notre site Internet:
Further information from our website:
FEASIBILITY STUDY
hu4.eu/water
Merci beaucoup pour votre intérêt
Thank you very much for your interest
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