SPIRE: *a PV Plant with Thermal Cogeneration*
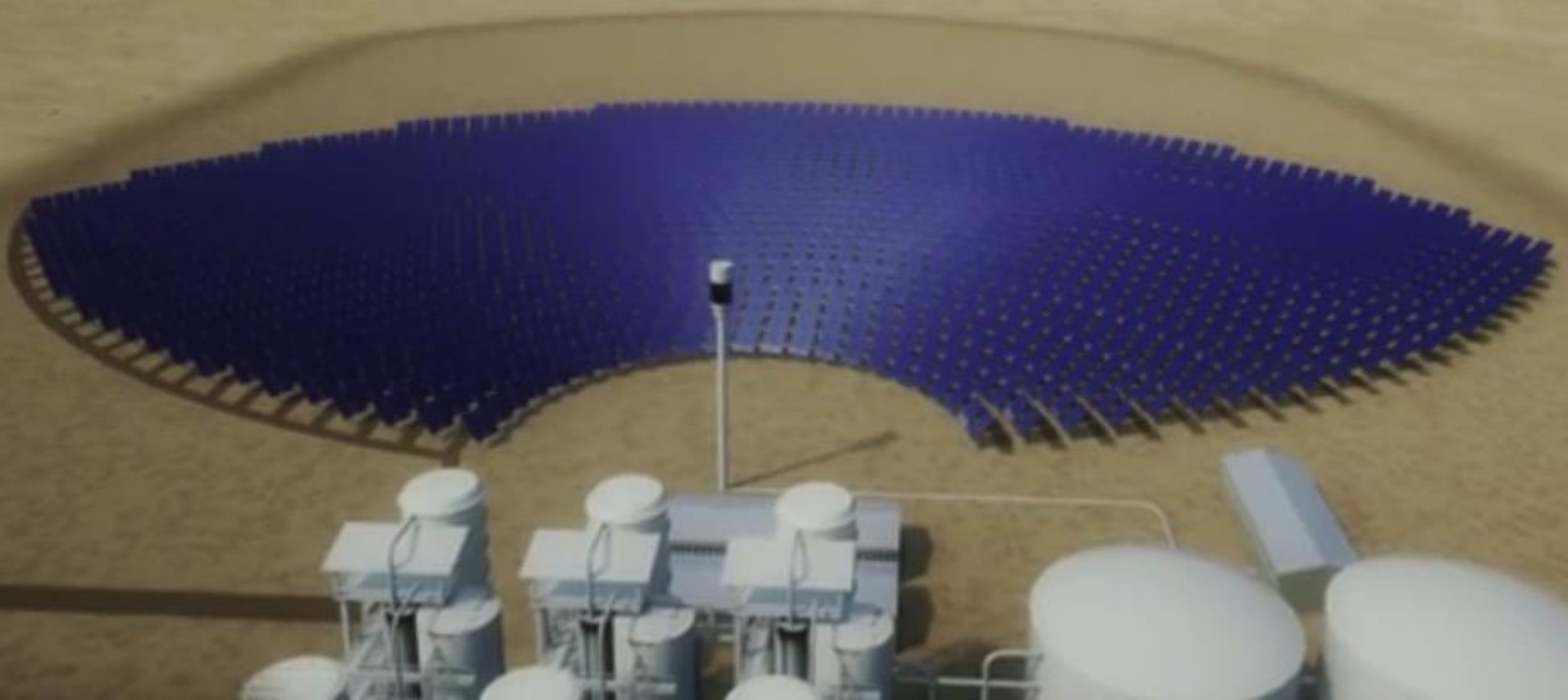
CAPSUN

- Technological startup founded in 2017
- Highly qualified personnel coming from Abengoa Solar R&D and Centro Superior Investigaciones Científicas (CSIC).
- Core knowledge in optical technologies for Solar Applications (both Photovoltaic – PV – and Concentrated Solar Power – CSP -).
- Business Model oriented to design and manufacturing of the optical light selective filter
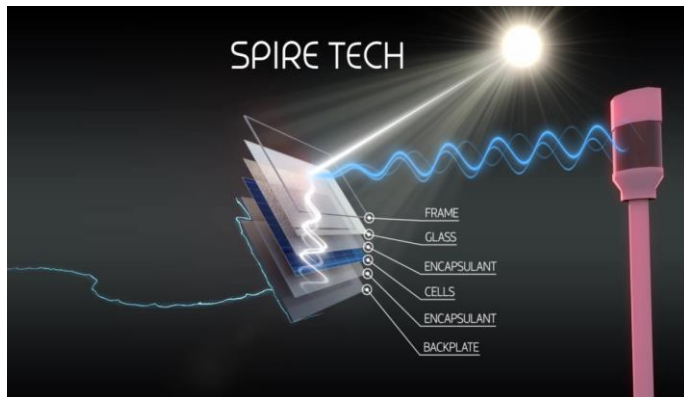
SPIRE Filters

HCPV

GHENOVA

- ▸ Integrated Engineering Services

- ▸ Spanish leadership. International presence

- ▸ > 22 M€ Sales

- ▸ > 2/3 out of Spain

- ▸ ~ 400 profesionals

- ▸ Differential Business Model

CP SOLNOVA 1 Y 3

CP SOLNOVA 4

BIOETHANOL ROTTERDAM

CC AIN BENI MATHAR

TP PS 50

CP HELIOENERGY 1 Y 2

CP SOLACOR 1 Y 2

CP HELIOS 1 Y 2

CP SOLABEN

CP SHAMS I

HY SOLANA

CP MOJAVE

TP SOLUGAS

CP KAXU SOLAR I

TP KHI SOLAR I

SPIRE TECHNOLOGY CONCEPT

Explanatory Video

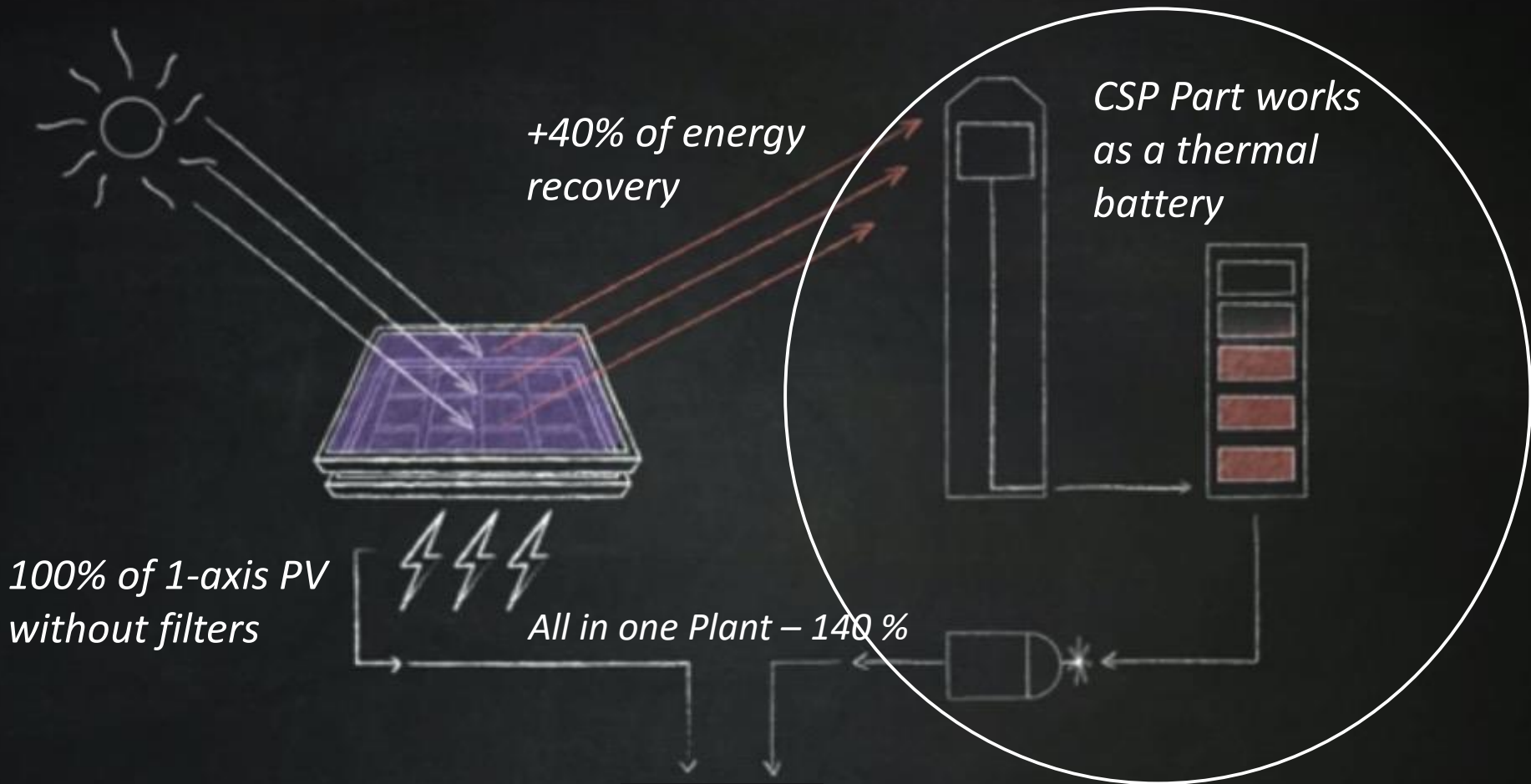http://iplayerhd.com/player/video/700f32da-b9d2-4aa8-8911-e563c17172d6/share

SPIRE Technology project has been financed by CDTI - Spanish Ministry of Economy under INNTERCONECTA 2016 call (ITC-20161132)

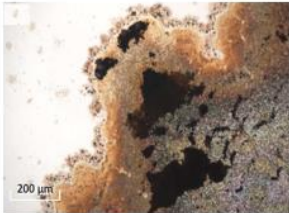**CDTI grant: 948.274,00 €**
Total investment: 1.761.230,00 €

+40% of energy recovery

CSP Part works as a thermal battery

100% of 1-axis PV without filters

All in one Plant – 140 %

PV simplicity and competitiveness for electricity direct generation

SPIRE

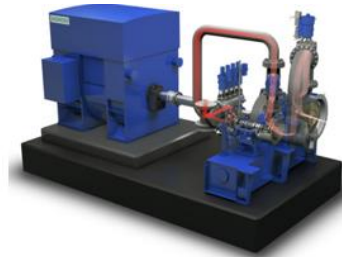CSP storage of heat for electricity dispatching and other uses of heat
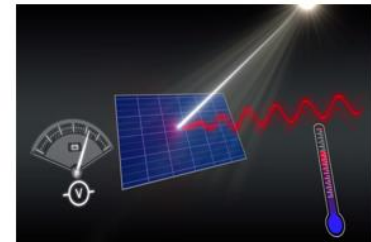
SPIRE Plant Main Technical Strengths

No corrosion or degradation. Inorganic materials

Optimal design using complex genetic algorithm

Fast response turbines. Power delivered when required. Reliability up to 40 years

Heat out in solar panels. Better temperature performance and less degradation
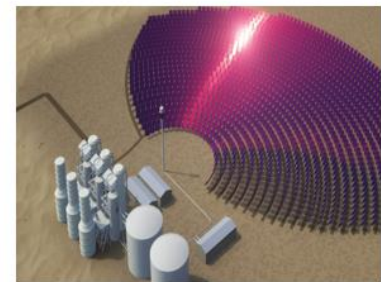
No dumped energy . Better attenuation: infrared travels better in dusty and damp environments

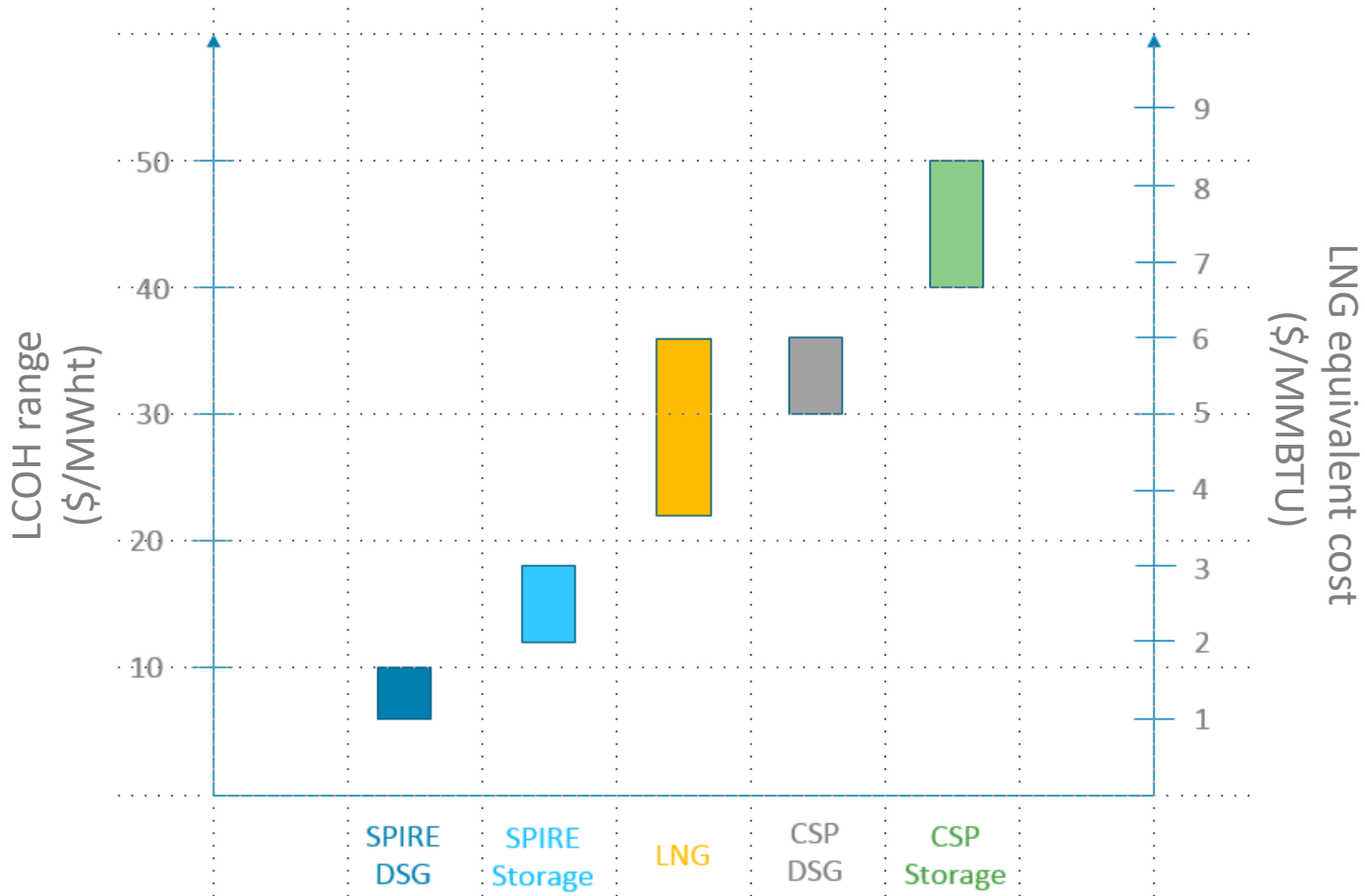Works well in lower DNI locations. Panels take diffuse irradiation

Better power density. Saves 40% of land due to a better utilization of solar spectrum
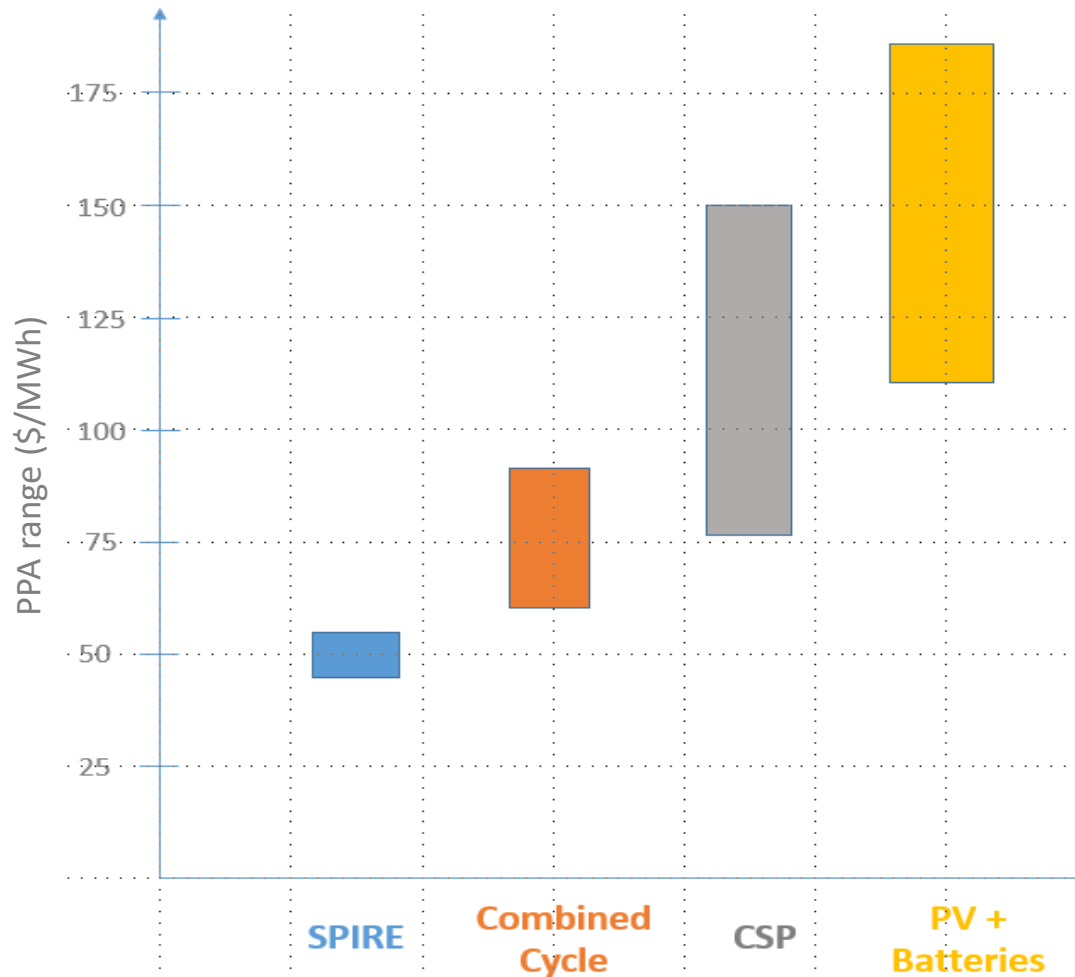
Modular and Scalable concept. Thermal Tower per 20 – 30 MW of PV

Technology Comparative: Levelized Cost of Heat (LCOH) parameter

**CSP: Concentrated Solar Power Generation. DSG: Direct Steam Generation.

Comparative Typical PPAs Electrical Dispatchable Technologies (I)

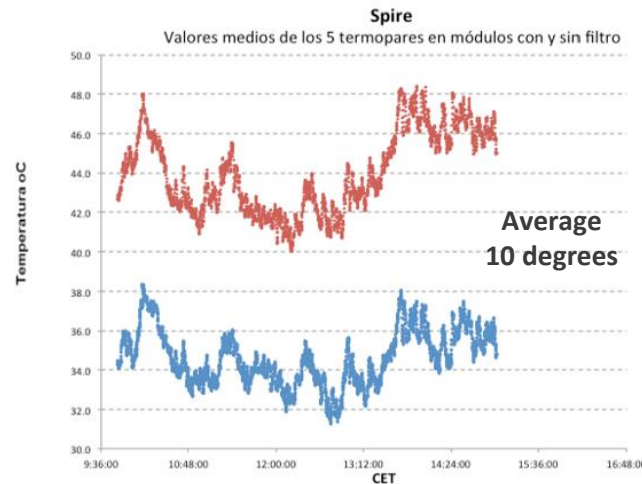# Proof of concept successfully tested in real environment – TRL7/8

Technology tested in lab (CSIC, Fraunhofer and DEKRA) and validated in a real Power Plant at Plataforma Solar de Almería

Sample with filter

Average 10 degrees

Temperature measurements. T= 15 degrees. Wind = 3.2 m/s

Specular reflection – 39% filter. Distance 157m on 12 x 12 m target

Installation on PSA heliostat

Pilot Plant features

Plant Specifications		
Power of PV solar field	315 KW	Assuming 250 W per module x 1260
Thermal output per day	2100 Kwht	kWht/day; this energy is wasted because the hot fluid is cooled down and recirculated
Fluid	HTF at 380º	Could be direct steam but preferably with HTF to test storage possibilities
Electricity per year	590 MWh	Assumes 0.83 PR due to better operating T and 0.9 cosine factor and 5.4 kwh/mw/day
Investment	$3 M	Plant financing depending on agreement with partner
Project duration	9 months	Power on after 9 month
Cost of electricity (c$/kWh)	To be agreed with final user	Depending on financial conditions.
Cost of steam (c$/KWht)	To be agreed with final user if heat is finally used	Depending of financial conditions
Operation & Maintenance (O&M)	To be agreed with final user	Depending on system scalability to be agreed with partner
Land	5-10	Ha

Pilot Plant scheme