



**THE NEW POWER
TO FUEL OUR FUTURE**

While the sun offers more energy in four hours than the human race consumes in an entire year, ...



... we continue to consume fossil fuels that produce large amounts of CO₂, killing our planet.

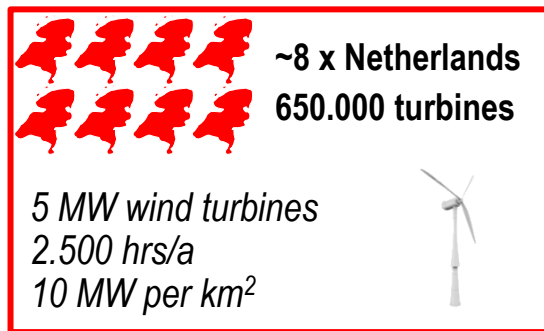
Power Solar, a new kind of company, makes clean and affordable energy widely available, doing good for the world as well as to local communities



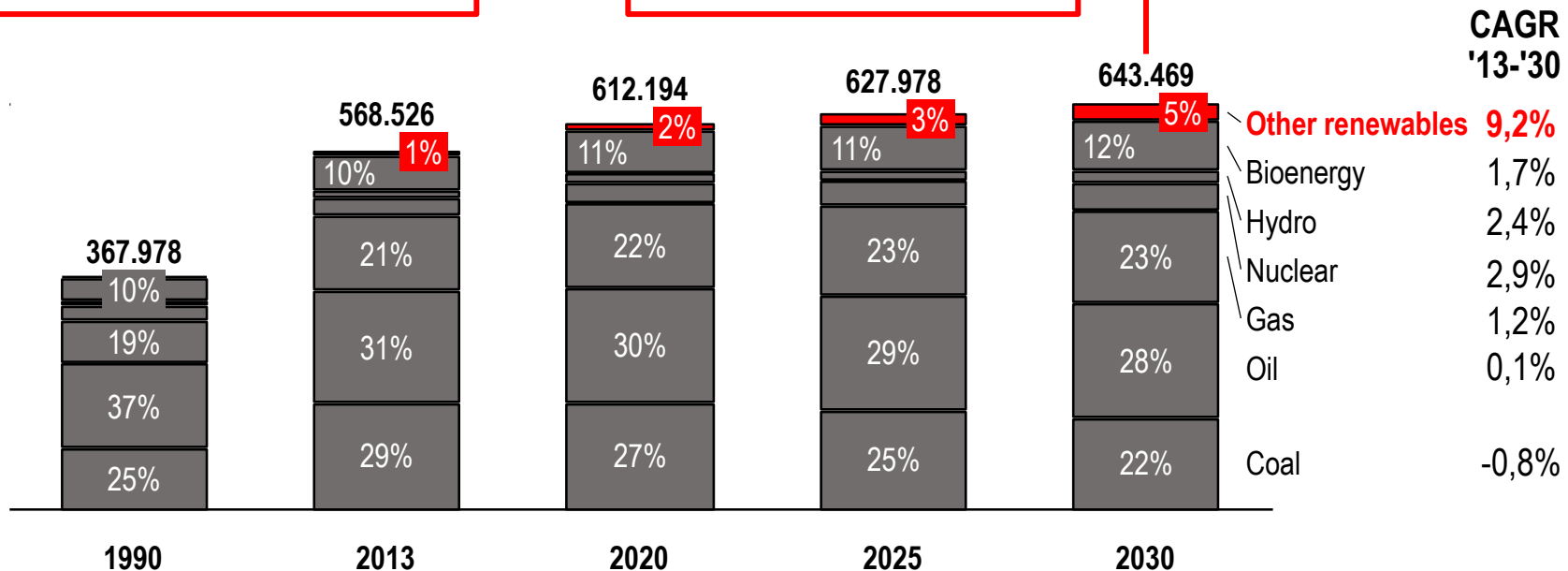
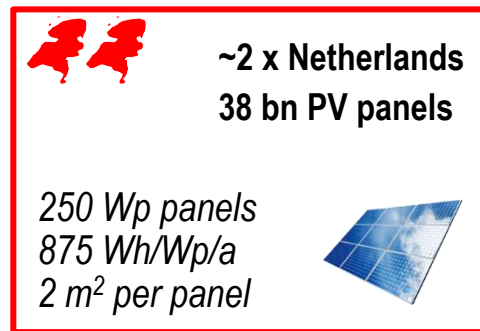
The Market

The transition towards sustainable energy use is driving the demand for and growth in the development of renewable energy

Sustainable energy transition [PJ]



- OR -

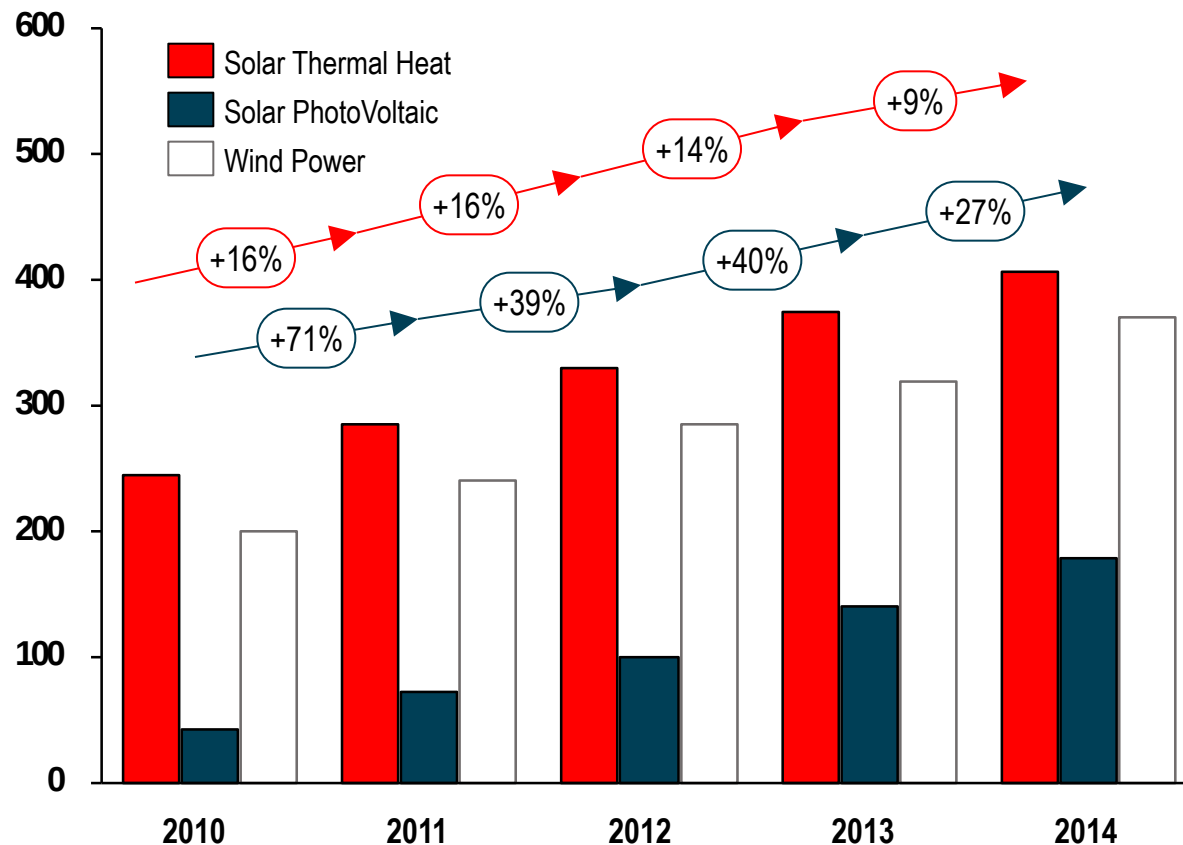


The Opportunity

Solar has emerged as one of the key enabling technologies, despite its limitations to utilize incident light efficiently

Global solar emergence

GW_{th,el} operational



Solar PhotoVoltaic

Prices of electricity producing PV panels have decreased rapidly due to cost reductions, but **electrical efficiency is still "only" 12-20%** of incident light due to material limitations



Solar Thermal Heat

80% efficiency of solar collectors is much higher than PV, but only capable of **producing heat** (for tap water or space heating applications) and relatively expensive

**INTERESTED IN
HARNESSING THAT POWER?**

**INTERESTED IN
A REALLY EXCITING NEW SOLAR CATEGORY?**

**AT POWER SOLAR CREATIVE THINKING AND
INNOVATIVE TECHNOLOGY HAVE RESULTED IN
THE MOST EFFICIENT SOLUTION YET.**





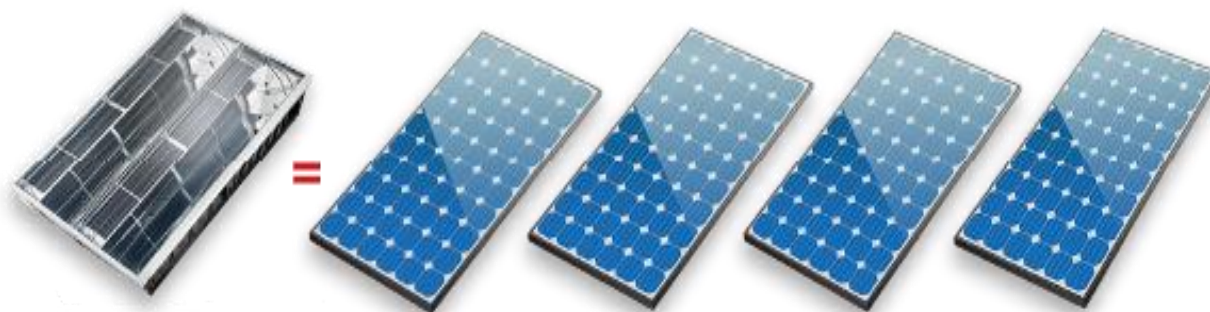
THE NEW POWER TO
FUEL OUR FUTURE

The **POWER** **COLLECTOR**

4 TIMES MORE POWER THAN
CONVENTIONAL PV SOLAR PANELS



The PowerCollector is the third generation solar technology with a major competitive advantage over the first and second generations



FOUR TIMES MORE POWER

COST-EFFECTIVE PROPRIETARY C-PVT TECHNOLOGY

PRICE PER INSTALLED Wp 50% LESS THAN NORMAL PV PANEL

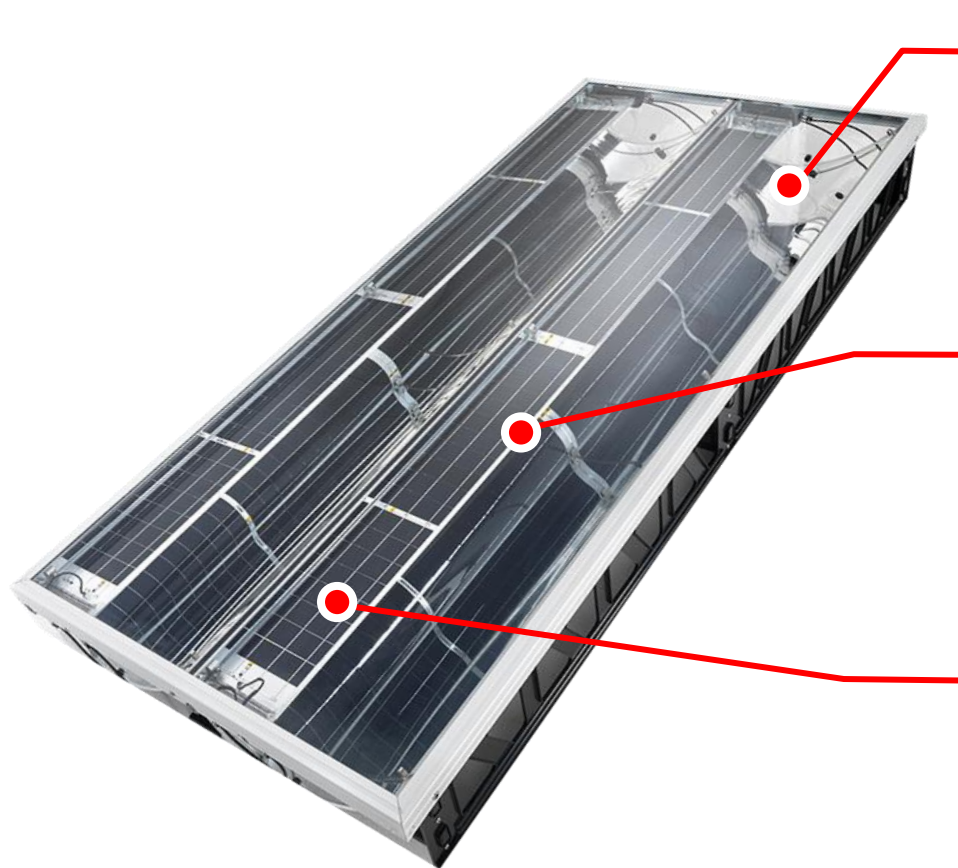
ESTABLISHED PARTNERSHIPS

CUSTOMIZED DECENTRALIZED SOLUTIONS

PATENTED TECHNOLOGY

The PowerCollector Power Solar now introduces a hybrid electrical and thermal Solar panel, cheaper and more efficient than any alternative

The Power Solar Product – highly efficient, high electrical and thermal output Solar panel



Solar concentrator

Parabolic reflector, capable of capturing sun light from high to low angles and redirecting the light to the receiver to improve thermal and electrical output and efficiency (up to 70%¹⁾), thus requiring less panel and component area

Receiver thermal collector

Thermal collector, sandwiched between top and bottom PV cells, captures more heat with less absorber material, and is capable of generating significantly high(er) and sustained hot water volumes (typically 60°C or higher – usable in many domestic/professional applications)

Receiver PV solar cells

Double sided high quality (conventional) PV solar cells, capture both direct sun light and concentrator reflected sun light - thermal collector cooling significantly increases PV cells efficiency, generating high(er) electrical output

The Company PowerCollector technology, developed by Vattenfall, was spun out into Power Solar to be made ready for commercialization

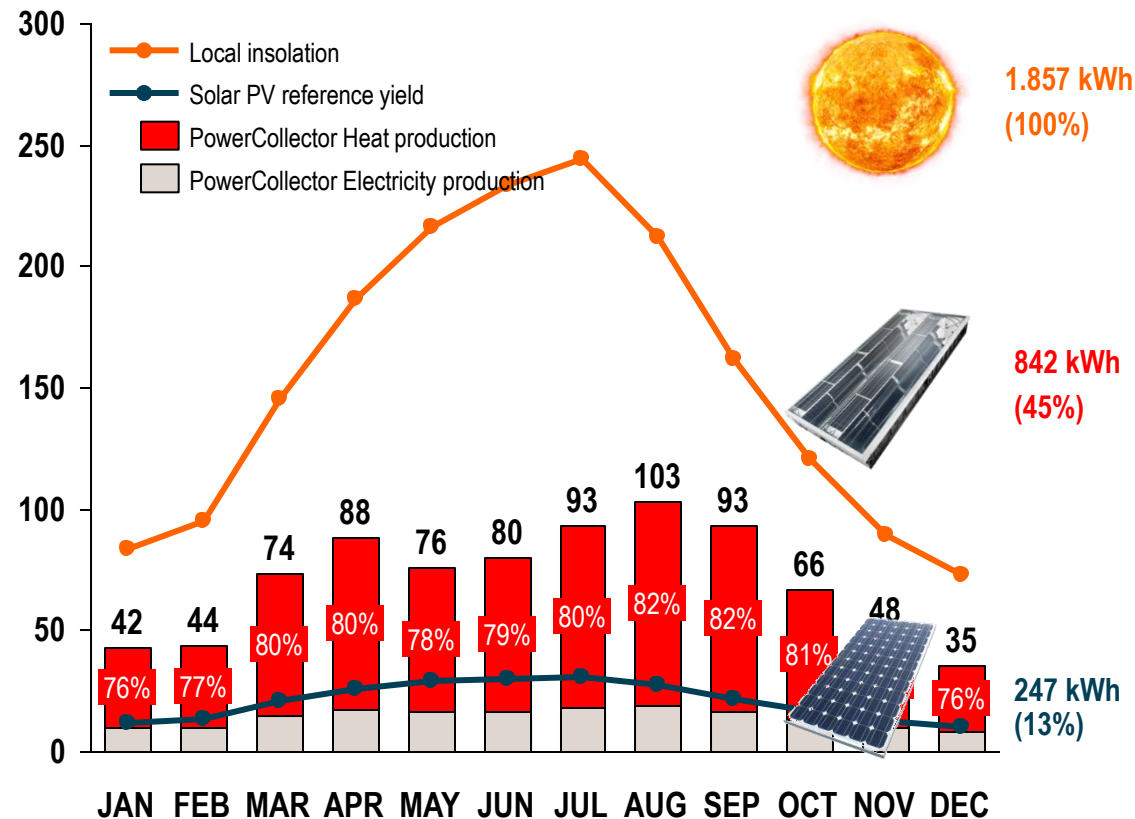
Company development timeline

The Performance

Power Solar' PowerCollector captures considerably more sunlight, producing more and 'constant' energy year round

Average year round relative performance in Murcia, Spain (illustrative location)

Monthly energy production [kWh/m²/month]



- > **Irradiation**
Irradiation in specific location depends on time-of-year and local weather conditions – conditions in Murcia are quite favorable, with irradiation peaks in July of ~244 kWh/m². Total irradiation ~1.850 kWh/m²/year
- > **Power Solar PowerCollector (3.0)**
PowerCollector produces electricity (~171 kWh/m²/year) and hot tap water (~671 kWh/m²/year @ 60 °C)¹⁾, achieving an average efficiency of 45%, with a fairly 'constant' production profile year round, reducing need for backup energy assets (e.g. boilers)
- > **Photo Voltaic Solar panels**
Typical panel performance increases with irradiation, but deteriorates with panel temperature (0,5% per °C). Performance of typical PV panel in Murcia ~247 kWh/m²/year (13%)

1) Final energy efficiency depends on mode and temperature of hot tap water production being replaced.
Typical offset of electrical boilers used to produce hot tap water, results in higher effective efficiency of the PowerCollector

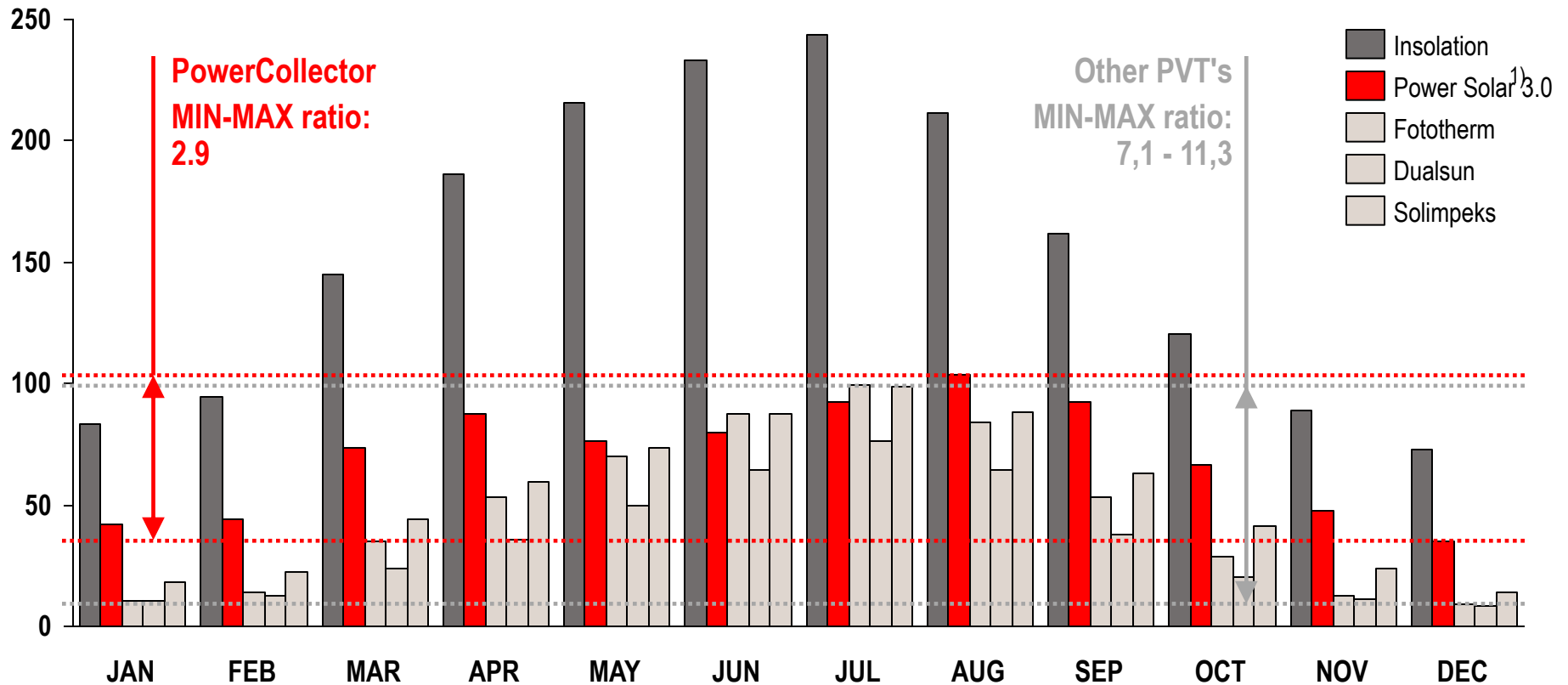
PVT Competition The Power Solar PowerCollector is one of the first PVT panels to hit the market – many competitors still under development

Main competing Photo Voltaic Thermal (PVT) panels

Constant PVT Performance The PowerCollector not only performs better, it also produces energy more constant year round than "peers"

Main competing Photo Voltaic Thermal (PVT) panels (Murcia, Spain)

Monthly energy production [kWh/m²/month]



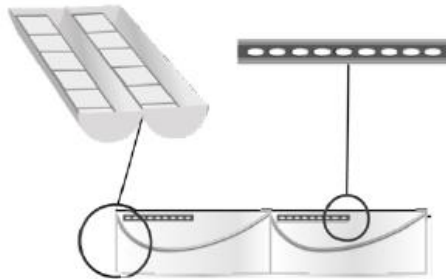
1) PowerCollector 3.0 performance improves 0.9 performance with on average 23% electrical and 13% heat output

PowerCollector Competitive Edge

Power Solar outperforms the competition by making use of 3 core technologies in its offering

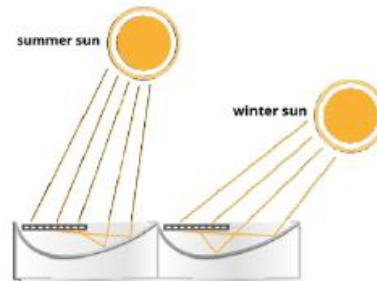
Unique product technologies

1 Active cell cooling



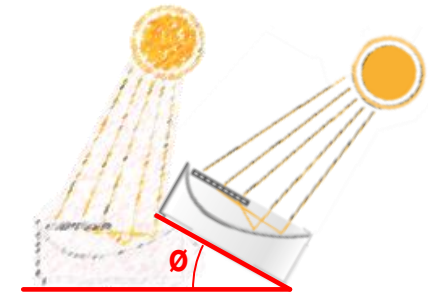
The PowerCollector uses **water-glycol to draw away heat** from the solar PV cells, resulting in **improved electrical performance of up to 40%** and extended cell longevity

2 Maximum reflector concentration



The PowerCollector uses a **curved mirror** – technically an asymmetrical parabolic trough – which **reflects** as much **concentrated sunlight on the receiver** as possible, no matter the sun's angle

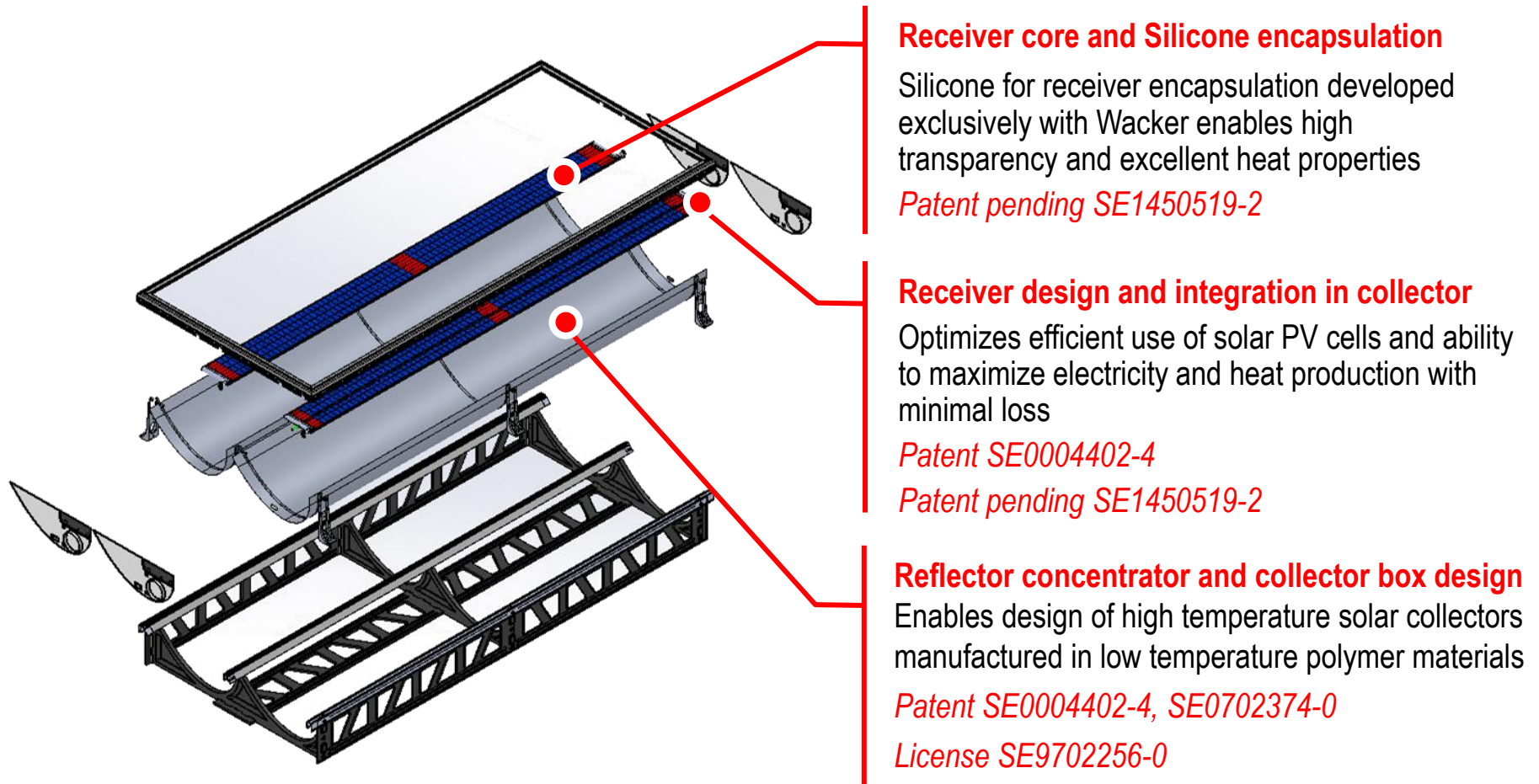
3 Winter Boost Technology



The PowerCollector can be **customized according to local needs**, making it possible to **double the production during the winter**. The PowerCollector thermal output during the winter is the highest in the world

The Intellectual Property PowerCollector's unique and patented IP, makes it difficult for others to develop a similar performing offering

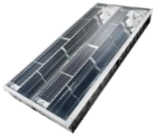
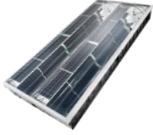
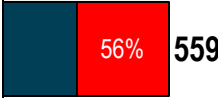
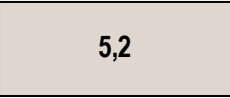
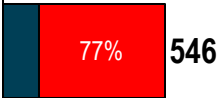
PowerCollector Intellectual Property



The Competition

The Power Solar PowerCollector performs better than any known alternative product and offers outstanding value-for-money

Performance and economic comparison of alternative products

Competition	Output [kWh/m ²] ¹⁾	Payback [Yrs] ¹⁾	Comments
Power Solar PowerCollector (0.9) 			> EUR 426/m² (turnkey investment) > Produced heat replaces electrically boiled hot tap water
Power Solar PowerCollector (3.0) 			> EUR 396/m² (turnkey investment) > Produced heat replaces electrically boiled hot tap water
Alternative PVT (Fototherm)²⁾ 			> EUR 663/m² (turnkey investment)²⁾ > Most PVT's produce low temp heat only, requiring booster heating for most applications
Solar PV panel + Thermal solar collector 			> EUR 447/m² (turnkey investment) > Due to separate PV and T panels, lower overall efficiency, resulting in lower kWh/m²
Solar PV (conventional panel) 			> EUR 315/m² (turnkey investment) > No production of hot water – requires electrical boiler to produce hot tap water

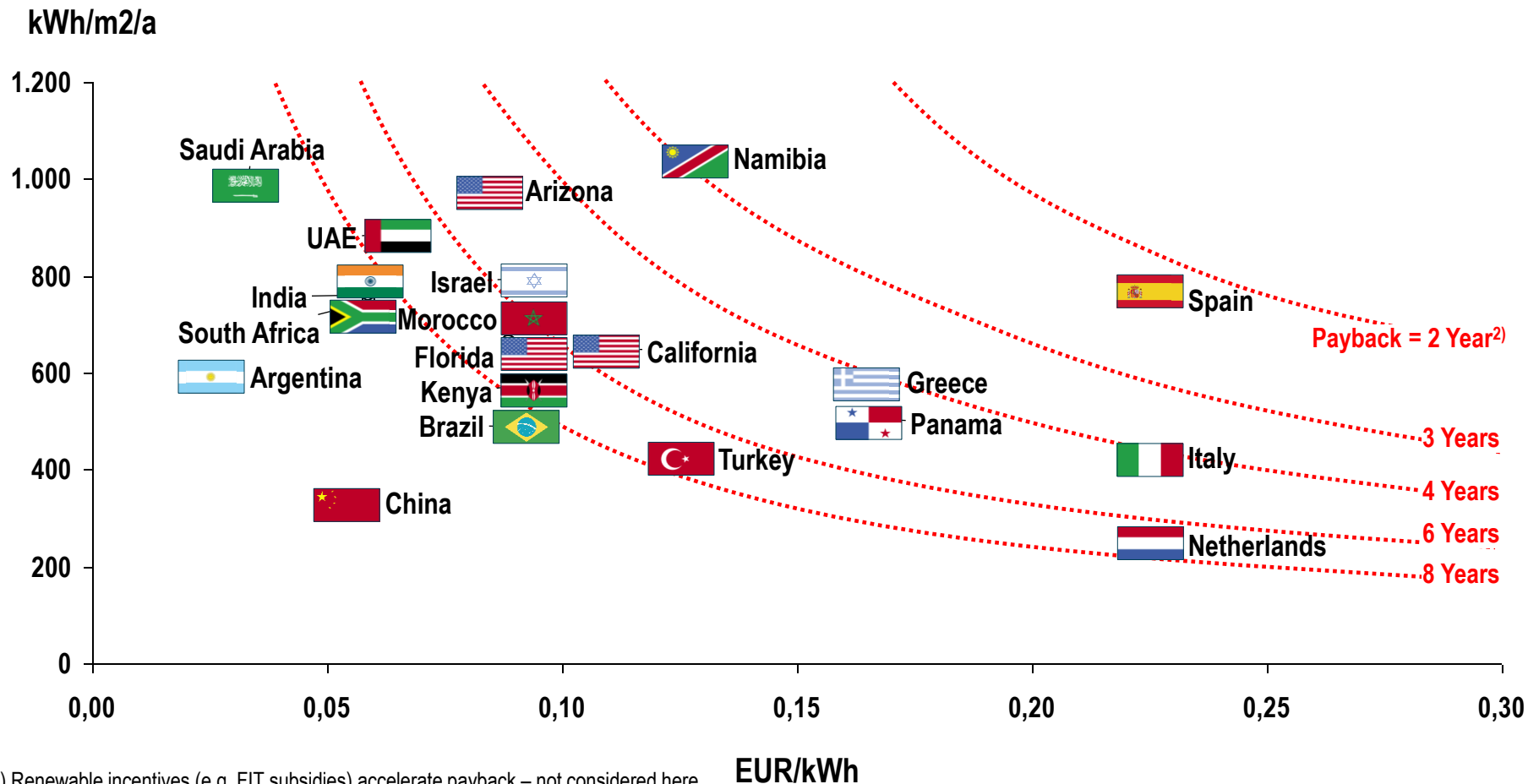
1) Based on calculations for Murcia region (Spain), Energy revenues @ EUR 0,23/kWh (incl. replacing heat from electrical boilers)

2) Best competing and market ready product known, investment cost based on RFQ response

The End-user Case

Payback time of improved PowerCollectors can be as quick as 2½ years, depending on location and energy prices

PowerCollector 3.0 payback per location¹⁾



1) Renewable incentives (e.g. FIT subsidies) accelerate payback – not considered here

2) Iso-payback lines based on investment of EUR 396/m² turnkey installation (PC 3.0) – generic installations >20 PC's

Target Segments The PowerCollector targets larger customers with a "mixed" energy profile, requiring both electricity and hot tap water

Target segment profiles and examples in South Africa

Hospitality

PowerCollector is ideally suited to be employed in **hospitality industry**, where there is an **attractive electricity/heat usage profile**.

Typical **segment customers** include:

- Hotels (hot water, swimming pool, ..)
- Hospitals and nursing homes
- Community facilities (swimming pools, sporting halls, town-halls, etc.)

Vineyard Hotel, Cape Town



Electricity
35 MWh/a

Heat
50 GJ/a

- 60 Collectors ordered in first batch
- Project under development

Domestic housing

Large scale **project development in domestic housing** offer outstanding opportunities to incorporate PowerCollectors (even off-grid configurations).

Typical **applications** include:

- New build housing projects
- Large scale renovations

120 estates, Johannesburg



Electricity
480 MWh/a

Heat
600 GJ/a

- 20 Collectors per estate, total 2.400 PC's
- First estate under development

Industry

Medium sized industry with **heat demand for their operational processes**, offer ideal opportunities to integrate PowerCollectors into their energy portfolio.

Typical **segment customers** include:

- Food industry
- Metal processing
- Various

Floorworx, New London



Electricity
2.940 MWh/a

Heat
717 GJ/a

- 464 Collectors ordered
- Project under development

Summing Up Power Solar An impact investment in a leading, market-ready, next generation solar company, offering outstanding returns

Seven good reasons to invest in Power Solar

- I. **Leading in next generation solar** – Power Solar rides the emerging PV Solar technology and market, but offers a significant improvement: substantially **higher combined electricity and heat production** at much **higher efficiencies per m² irradiation**, paving the way for the next generation in solar energy
- II. **Outperforming competition** – Power Solar PowerCollector typically **outperforms competing PVT products**, with a **higher yield** product that is **market-ready** at a **lower price** point. Substantially **lower pay-back times** makes for a **more attractive** end-user product and consequently **increased market demand**
- III. **Well protected lead** – The PowerCollector is built on nearly **20 years experience in solar collector and PVT technology** and on **patented core IP**, making it difficult for competitors to copy or achieve similar product performance
- IV. **Ready to roll-out** – All pre-market **R&D and product development has been done**, and initial sales activities demonstrate **substantial product demand** and market-readiness, greatly **de-risking upcoming investments**
- V. **Enabling local entrepreneurship** – Power Solar business model **enables and leverages local entrepreneurship**, both **contributing to local economic development** and **scalability in ramping-up international sales**
- VI. **Resilient business model** – Power Solar' **twofold and variable business model** of selling **assembly lines** and selling **Collector components**, makes it very **resilient to accommodate a wide range of demand scenario's**
- VII. **Attractive investor proposition** – Expecting cash flow **break even in 2017** and **rapidly increasing in profitability** through local assembler model, investors stand to make an attractive **return on equity of xx%**

THE NEW POWER TO FUEL OUR FUTURE

www.powersolar.com.tr



info@powersolar.com.tr