ABSOLICON
SOLAR COLLECTORS

GREENLINE AFRICA
SUSTAINABLE ENERGY SOLUTIONS

GREEN BUILDING COUNCIL SA
MEMBER ORGANISATION

ABSOLICON
SOLAR COLLECTORS

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Developing Africa with Green Technology.

The only concentrated thermal collector that can achieve 160°C, with 76% thermal efficiency, and has Solar Keymark Certification.

Greenline Africa has partnered with Absolicon Sweden to manufacture, market and install the Absolicon Solar Collectors in Sub-Saharan Africa under the name Absolicon

Introducing the GreenLine Africa

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GreenLine Africa has a collective experience of over 18 years in sustainability, specializing in matching the most innovative technologies to the most pressing energy needs in society. The team was successful in implementing several solar thermal installations in the Hospitality sector.

A few larger installations are; The Vineyard Hotel, Radisson Park Inn Cape Town, 15 On Orange Marriot Group of Hotels and The Hilton in Cape Town

David Fortune

DEVELOPMENT DIRECTOR

A branded Social Entrepreneur, Ashoka Fellow, David cut his teeth at Solarus Sunpower focused on hospitality and has a vision for bringing sustainability to Africa

David Volkwyn

SALES & MARETING DIRECTOR

A sales Director, David has been in business all his life and believes alternative energy is the answer to people, profit and planet

Henning Brand

TECHNOLOGY DIRECTOR

An enigmatic Sustainability Expert, Henning honed his skills as a student of The Blue Economy, under Professor Gunther Pauli

Introducing the Forethought team

Forethought Capital is a development and investment services company that has advanced its interest in the investment and development of sustainable infrastructure opportunities, particularly in renewable energy, energy efficiency through developing, raising capital, financing, and implementing alternative energy solutions and other opportunities for achieving sustainable growth. We take particular interest in sectors that lend themselves to having high impact.

Forethought Africa
Meaningful Development

GreenLine Africa has teamed up with Forethought Capital in building the Business for the Absolicon SA Production Line Collector.

Methuli Mbanjwa –

Methuli Mbanjwa is a multi-disciplinary professional with 17 years' experience in industrial consulting, technology management, large scale commercial project development, project management, infrastructure financing and stakeholder engagement.

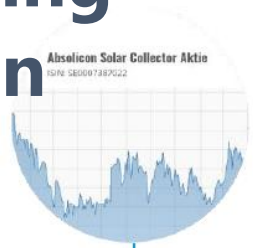
Lukhanyo Ndube –

Recently served as CEO of the Kouga Wind Farm, with responsibility for construction, finalisation, commissioning and operations management. I have gained invaluable leadership and management skills together with the delivery of high-quality projects on time and within budget.

Introducing Absolicon

2002 The Idea
Joakim Byström founded Absolicon Solar Collector AB

2006 Pilots
More than 20 pilots worldwide



2016 Public Company
Listed in the stock market

2018 Sold 1st Production Line
First robotic production line sold to China

2005 Prototype
First solar collector prototype MT10

2013 T160
Solar Thermal collector

2017 Develop Robotic Production line
Offering all know-how necessary to industrial partners willing to establish a local production line

2019 Solar Keymark 011-7S2902 S

T160 Collector Data Sheet

Solar collector data

Brand name: T160

Collector type: Parabolic trough collector with one-axis tracking device

Length: 5490 mm

Width: 1056 mm

Weight (excl. tracking mechanism): 148 kg

Heat transfer fluid, recommended: Water, antifreeze

Operation temperature: 60-160°C

Operation pressure: 1-10 bar

Receiver data

Receiver material: Stainless steel

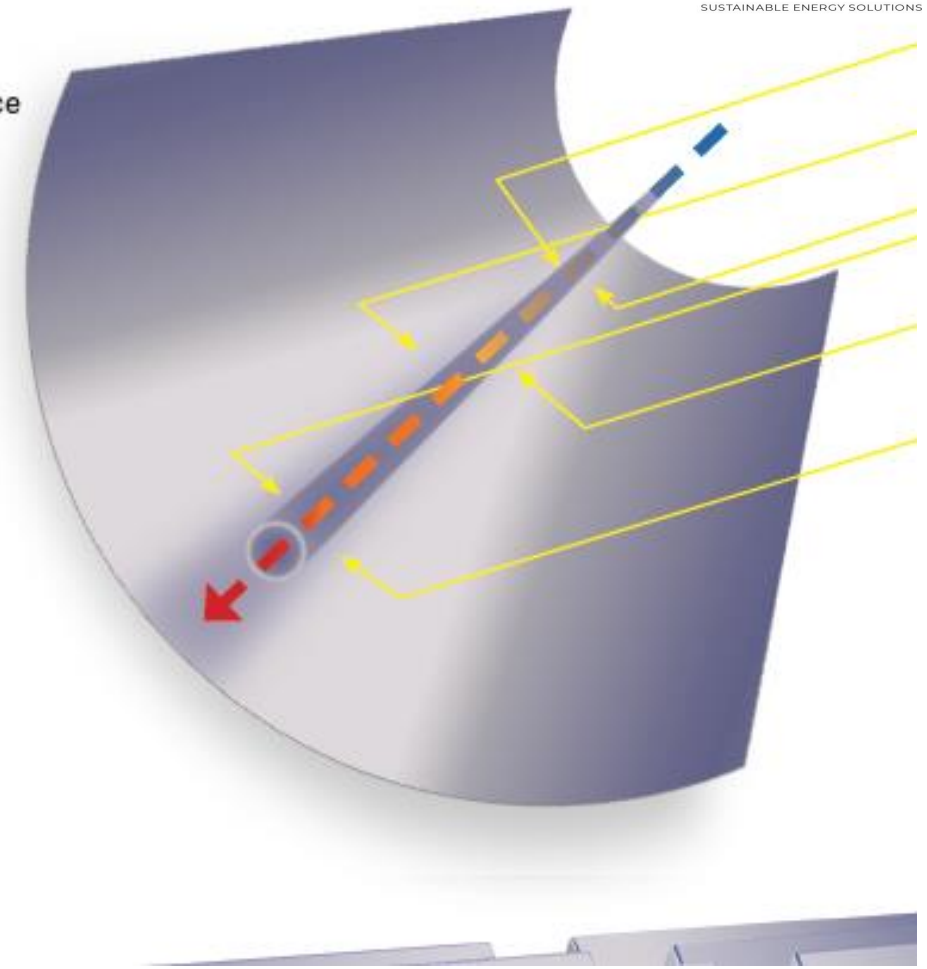
Receiver absorptance: 0.95

Receiver emissivity: 0.15

Glass data

Glass transmission: 0.95

Glass treatmeant: AR



The Absolicon T160 Characteristics

- a highly efficient Concentrated Solar Thermal Collector
- an efficiency factor of 76%
- designed to supply industrial processes with temperatures of up to 160°C
- collector uses a single axis tracking system which follows the sun, enabling it to produce maximum output throughout the day.
- suitable for supplying large industrial-scale volumes of heat throughout the year.

The Absolicon T160 Collector in series of 4

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Roof Mounted – Tracking system visible

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Roof-mounting the T160 Collector

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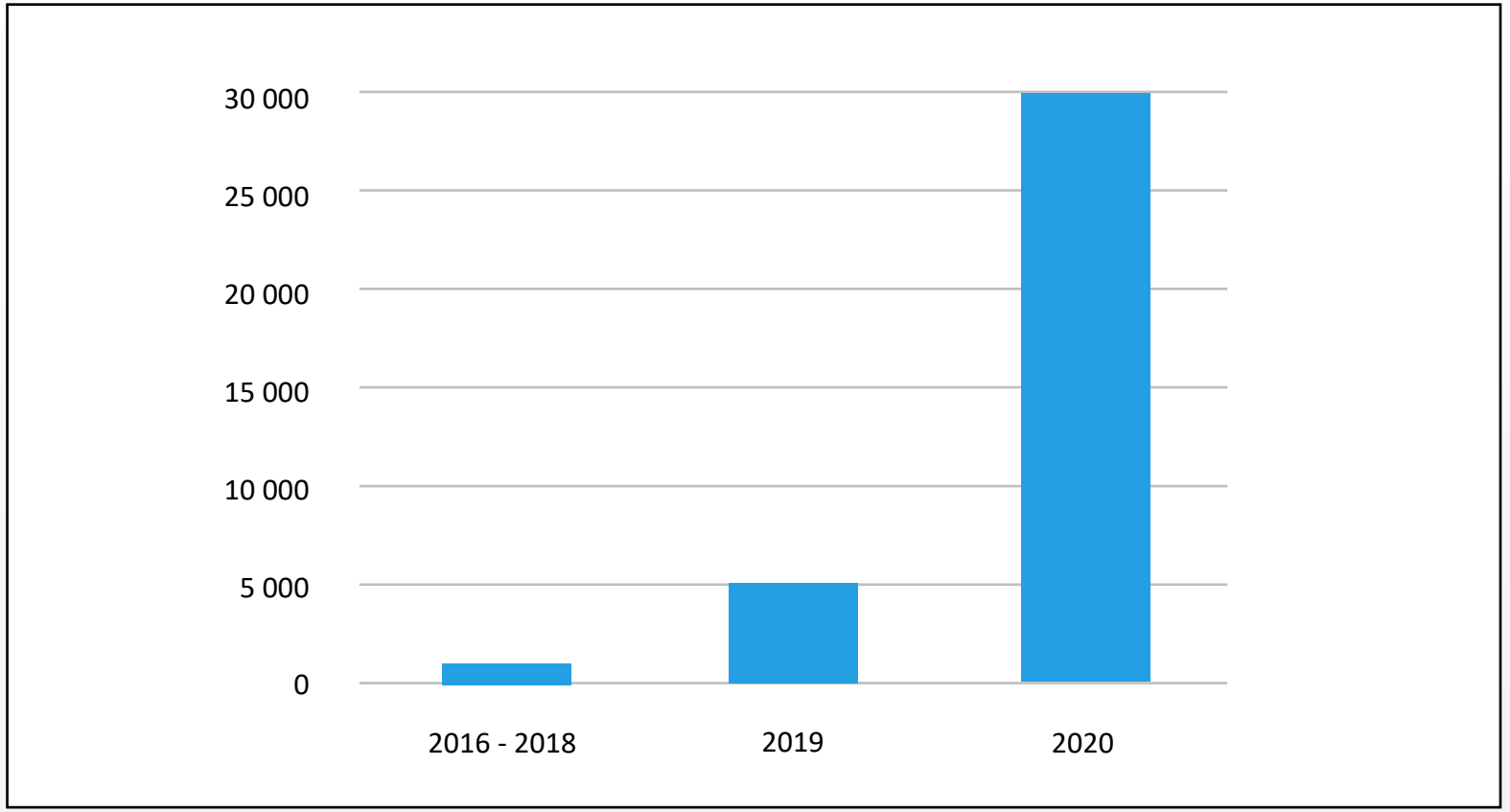
Ground Mounted

Industries, sectors and processes covered by the Absolicon solar thermal collector technology

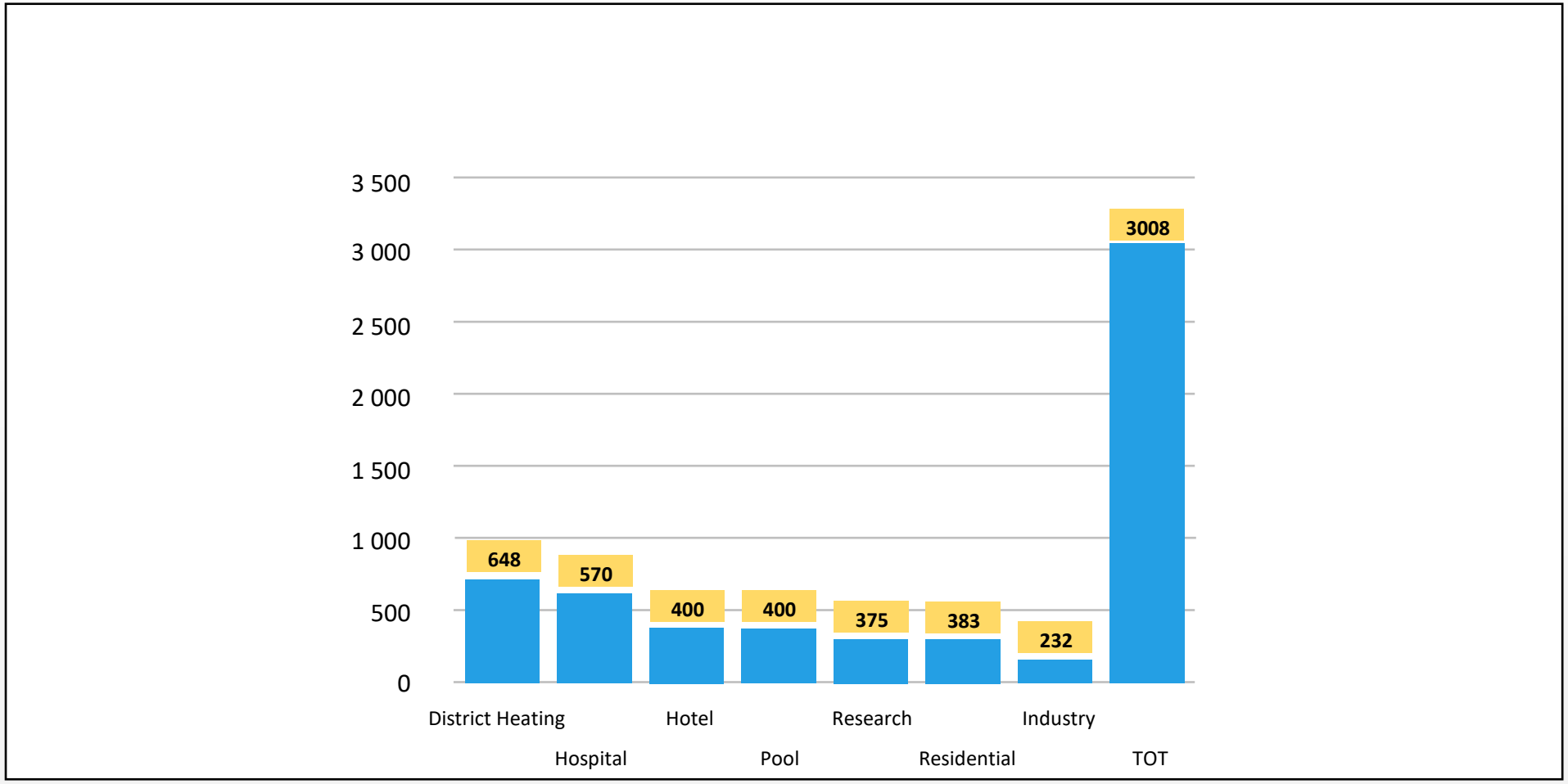
Distell - Food & Beverage

	Food & Beverage	Pharmaceutical	Dairy	Pulp & Paper	Automobile	Tea	Tobacco	Textile	Plastics	Chemical	Districts	Hotels	Hospitals	Swimming pools
	Steam-Air	Steam-Air	Water-Steam	Steam	Water-Steam-Air	Water - Air	Water - Air	Water-Steam	Steam	Steam-Air	Water	Wate	Water-Steam-Air	Water
Boiling	+			+	+			+		+			+	
Drying	+		+	+	+	+	+	+	+	+			+	
Pasteurization	+		+											
Cooling	+				+						+	+	+	
Sterilization	+	+	+										+	
Distillation	+	+	+						+	+			+	
Bleaching				+				+						
Heat treatment					+			+	+	+				
Washing	+		+	+	+	+	+	+				+		
Cip	+		+					+		+			+	
Hot Water	+	+	+	+	+	+	+	+	+	+	+	+	+	+

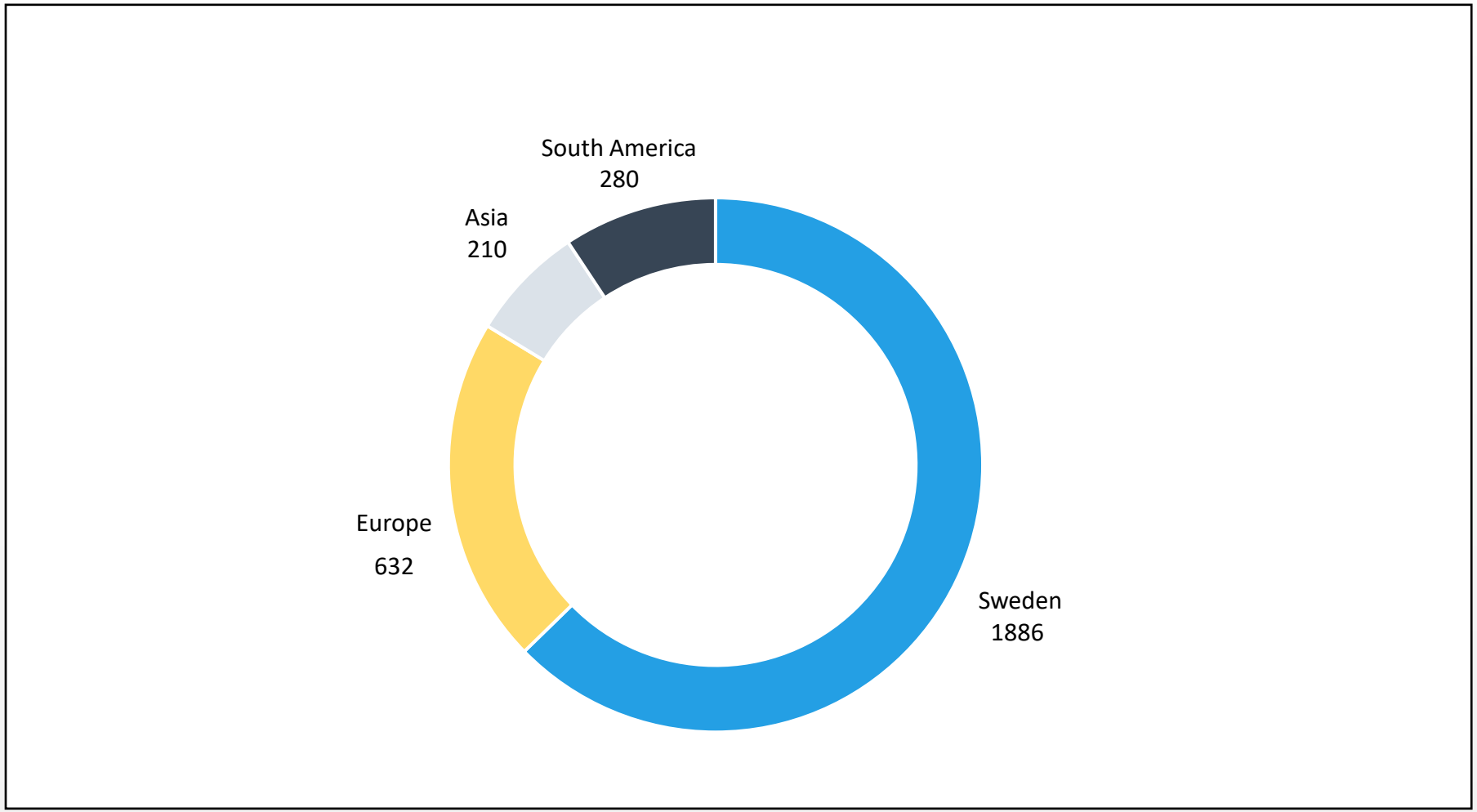
Absolicon installations made by Swedish Production Line (sqmts)



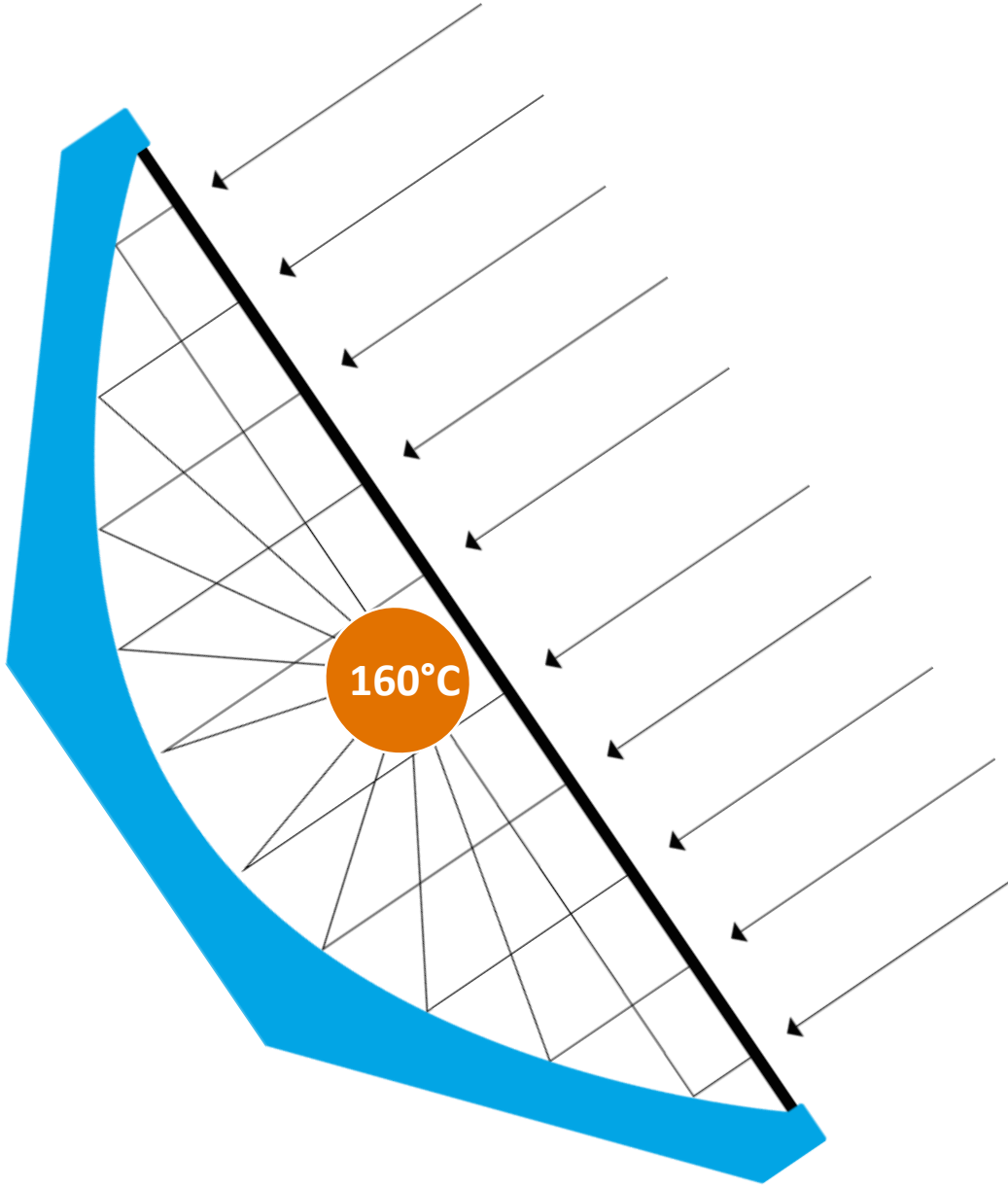
Absolicon installations size / sector
2009 - 2020 (sqmts)



Absolicon installations geography (sqmt)

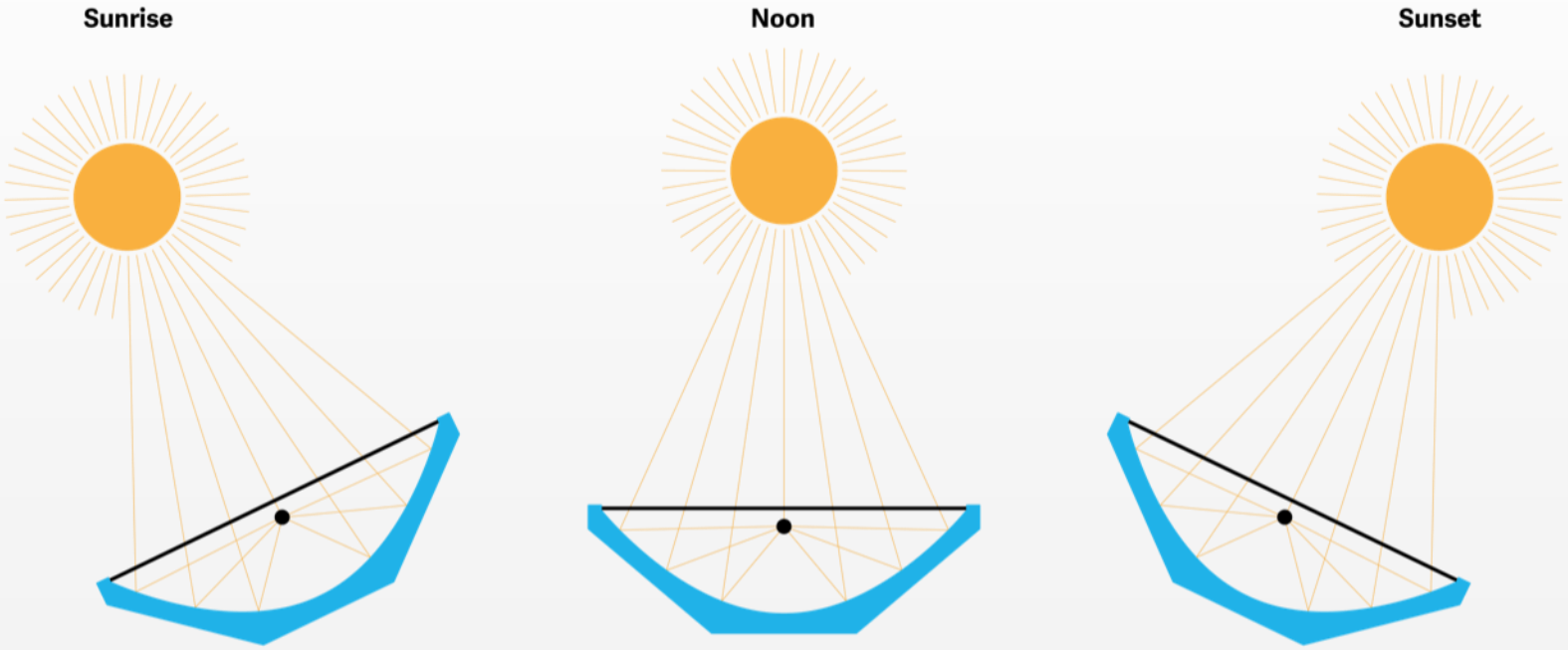


Absolicon T160 heat and steam up to 160°C

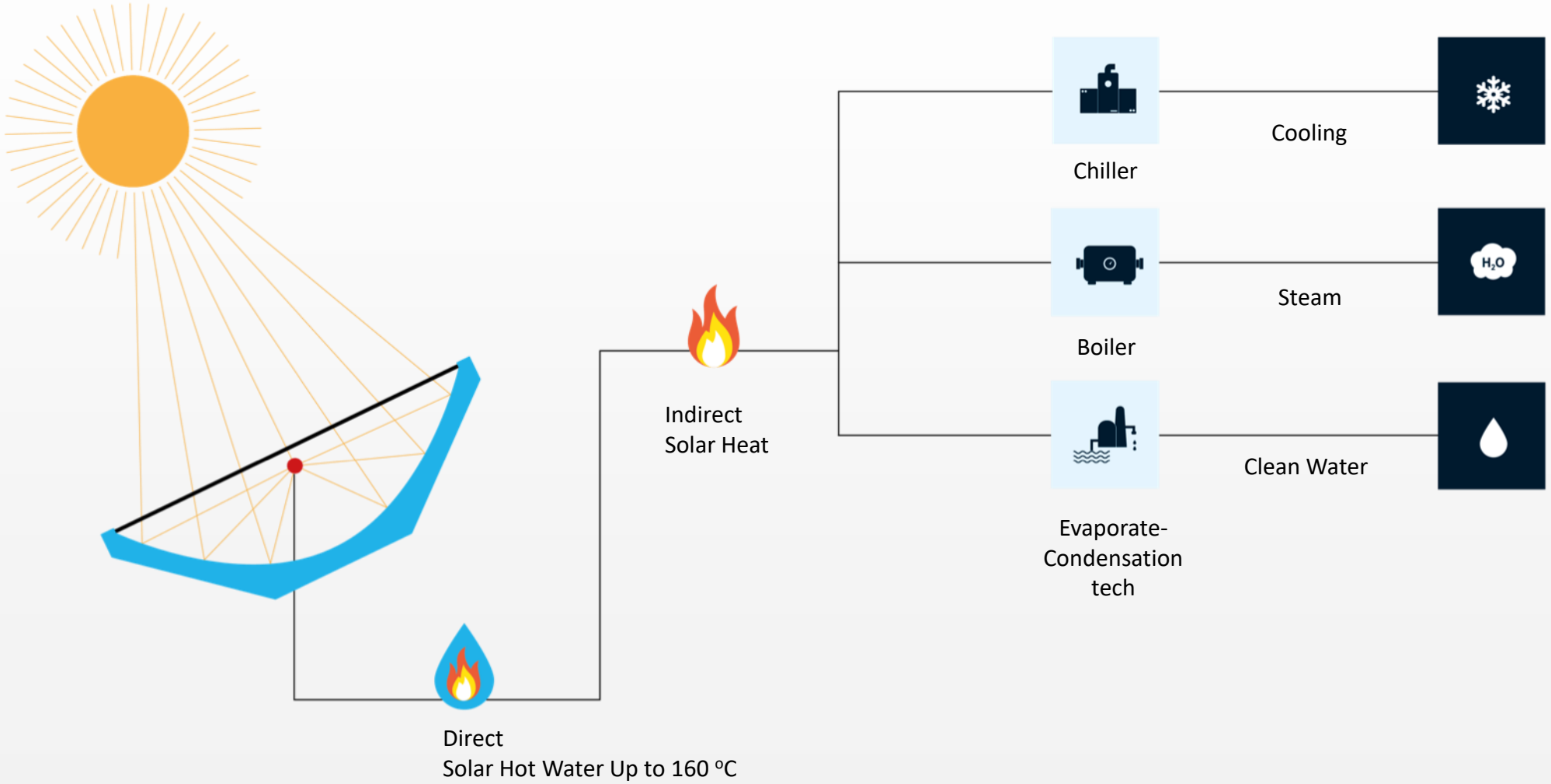


1. Protective glass cover with self-cleaning surface
2. No vacuum tubes that may leak
3. No moving parts in the hydraulic system
4. Components with no measurable degradation over time

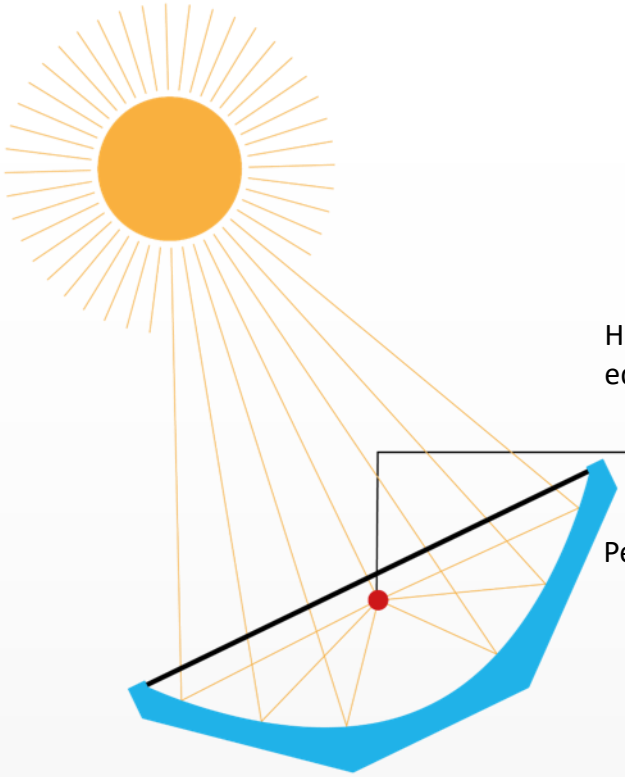
Parabolic trough tracking system – follows the sun's path



Integrating to various applications for different processes



Fossil fuel displaced annually by one T160 Collector



Heat From one T160 Collector is equivalent to a yearly saving

Peak power= 3 kW $_{thermal}$

Diesel, LPG

550 litres

Wood

2 tonnes

Coal

1.5 tonnes

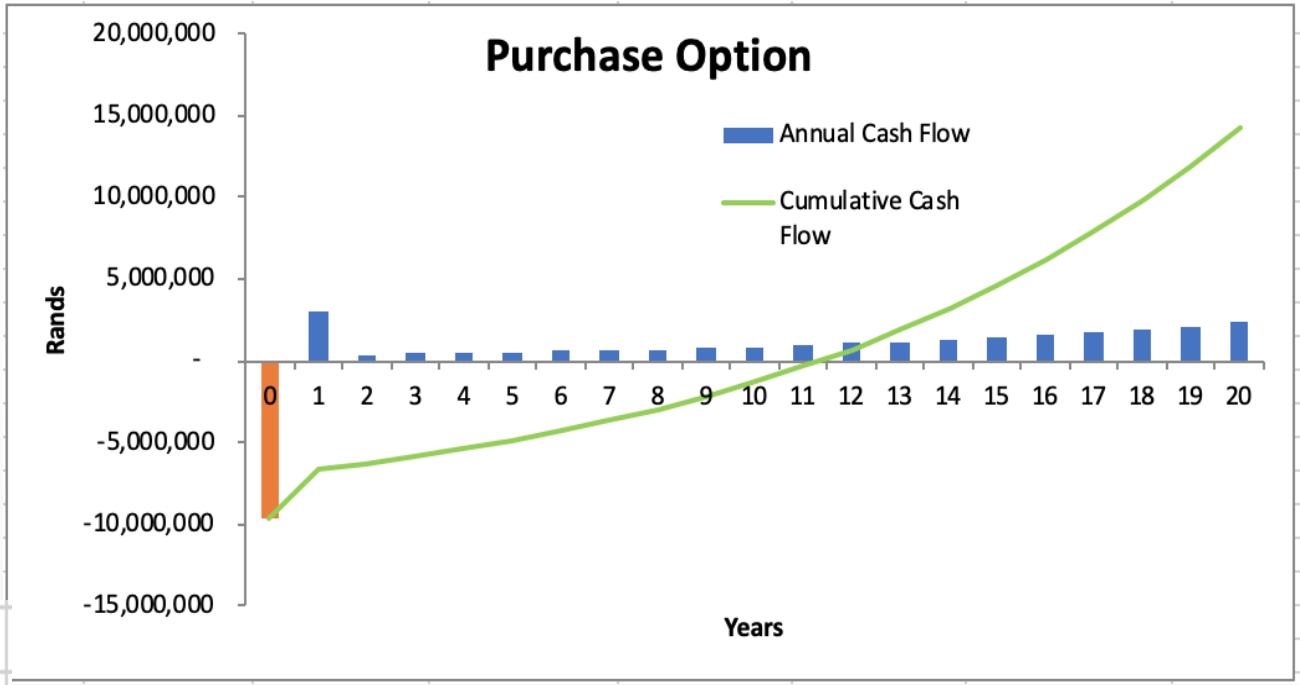
DNI= 2000 kWh/m^2
Operating temperature= 100 ^oC

Heat Purchase Agreement - 29 % Solar Fraction proposal for Nederburg

Year	System Cost	Electricity Savings	Operations and Maintenance	Tax Advantage 12B	Tax Advantage 12L	Annual Cash Flow Positive	Cumulative Cash Flow
0	-9,678,348	-	-	-		-9,678,348	-9,678,348
1	-	420,672	-77,427	2,709,937	-	3,053,183	-6,625,165
2		462,739	-82,072	-		380,667	-6,244,499
3	-	509,013	-86,997	-		422,016	-5,822,482
4	-	559,914	-92,217	-		467,698	-5,354,784
5	-	615,906	-97,750	-		518,156	-4,836,628
6	-	677,496	-103,615	-		573,882	-4,262,746
7	-	745,246	-109,831	-		635,415	-3,627,331
8	-	819,771	-116,421	-		703,349	-2,923,982
9	-	901,748	-123,407	-		778,341	-2,145,641
10	-	991,923	-130,811			861,112	-1,284,529
11	-	1,091,115	-138,660	-		952,455	-332,074
12	-	1,200,226	-146,979	-		1,053,247	721,173
13	-	1,320,249	-155,798	-		1,164,451	1,885,624
14	-	1,452,274	-165,146	-		1,287,128	3,172,752
15	-	1,597,501	-175,055	-		1,422,447	4,595,199
16	-	1,757,251	-185,558	-		1,571,694	6,166,893
17	-	1,932,976	-196,691	-		1,736,285	7,903,178
18	-	2,126,274	-208,493	-		1,917,781	9,820,959
19	-	2,338,902	-221,002	-		2,117,899	11,938,859
20	-	2,572,792	-234,262	-		2,338,529	14,277,388
Total	**-9,678,348**	**24,093,989**	**-2,848,190**	**2,709,937**	**-**	**14,277,388**	

Project Returns and Payback – without EEP Grant

	Cash Purchase	Rental Option
Total Proj. Net Cash Flow (20 YEARS)	14,277,388	-
Initial Investment	9,678,348	n/a
Total Annual Elec. Savings – Year 1	420,672	420,672
Internal Rate of Return (IRR)	9%	n/a
Undiscounted Payback Period (years)	11.3	n/a
Return on investement	148%	0%



Tax Advantage (section 12B)	28.0%	
Tax Advantage (section 12L)	0	R/kWh

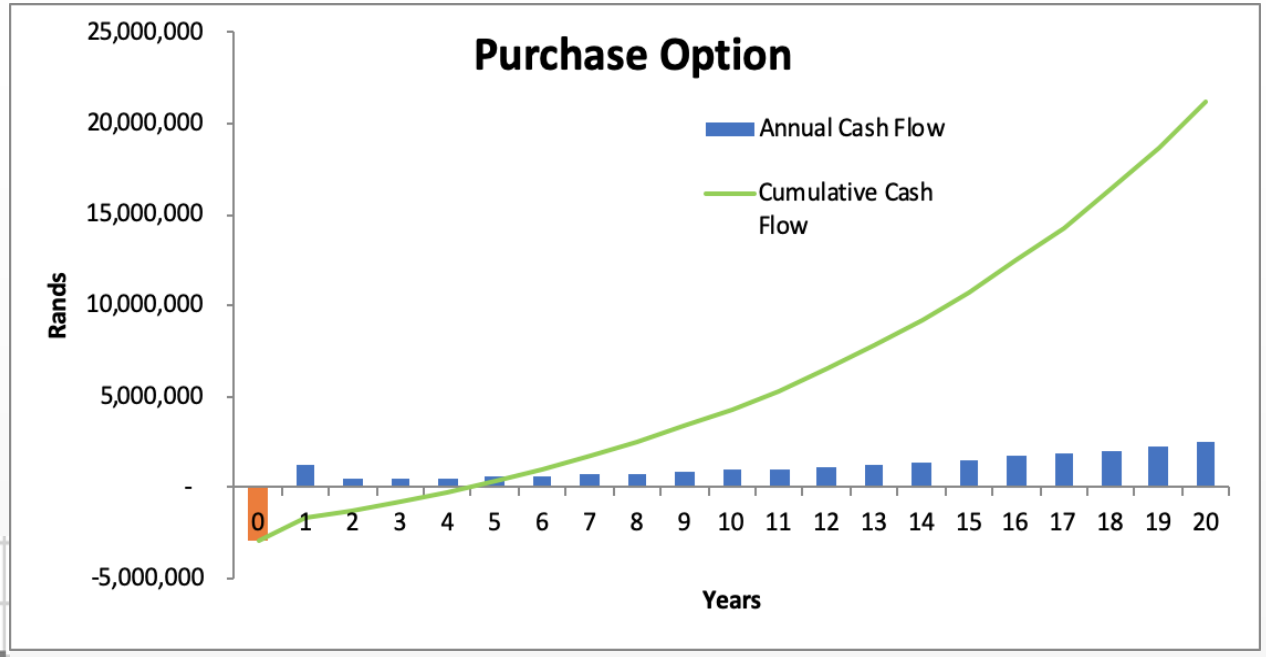
System Output		
Energy saved by heating with Solar Year 1, with 110m2 Pilot system	626,000	kWh/year
Current cost of heating with electricity	0.67	R/kWh
Total Savings year 1, Pilot Field @1mWh / M2	420,672	R/year
Total Savings in 20 years	24,093,989	R/year

Heat Purchase Agreement - 29% Solar Fraction proposal for Nederburg

Year	System Cost	Electricity Savings	Operations and Maintenance	Tax Advantage 12B	Tax Advantage 12L	Annual Cash Flow Positive	Cumulative Cash Flow
0	-2,896,357	-	-	-		-2,896,357	-2,896,357
1	-	420,672	-23,171	810,980	-	1,208,481	-1,687,876
2		462,739	-24,561	-		438,178	-1,249,698
3	-	509,013	-26,035	-		482,978	-766,719
4	-	559,914	-27,597	-		532,318	-234,402
5	-	615,906	-29,253	-		586,653	352,252
6	-	677,496	-31,008	-		646,489	998,740
7	-	745,246	-32,868	-		712,378	1,711,118
8	-	819,771	-34,840	-		784,930	2,496,048
9	-	901,748	-36,931	-		864,817	3,360,865
10	-	991,923	-39,147			952,776	4,313,641
11	-	1,091,115	-41,495	-		1,049,619	5,363,261
12	-	1,200,226	-43,985	-		1,156,241	6,519,502
13	-	1,320,249	-46,624	-		1,273,625	7,793,126
14	-	1,452,274	-49,422	-		1,402,852	9,195,978
15	-	1,597,501	-52,387	-		1,545,114	10,741,093
16	-	1,757,251	-55,530	-		1,701,721	12,442,814
17	-	1,932,976	-58,862	-		1,874,114	14,316,928
18	-	2,126,274	-62,394	-		2,063,880	16,380,808
19	-	2,338,902	-66,137	-		2,272,764	18,653,572
20	-	2,572,792	-70,106	-		2,502,686	21,156,258
Total	**-2,896,357**	**24,093,989**	**-852,354**	**810,980**	**-**	**21,156,258**	

Project Returns & Payback with EEP Grant

	Cash Purchase	Rental Option
Total Proj. Net Cash Flow (20 YEARS)	21,149,008	-
Initial Investment	2,903,504	n/a
Total Annual Elec. Savings – Year 1	420,672	420,672
Internal Rate of Return (IRR)	27%	n/a
Undiscounted Payback Period (years)	4.4	n/a
Return on investement	728%	0%



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Tax Advantage (section 12L)	0	R/kWh

System Output		
Energy saved by heating with Solar Year 1, with 110m2 Pilot system	626,000	kWh/year
Current cost of heating with electricity	0.67	R/kWh
Total Savings year 1, Pilot Field @1mWh / M2	420,672	R/year
Total Savings in 20 years	24,093,989	R/year

EEP Funding	Rand	Euro
Total Investment	9,678,348	587,992
Initial Investment Client	2,903,504	176,398
Investmen contribution EEP	6,774,844	411,594

082002-00 Technical and Commercial Proposal

T160 Absolicon Parabolic Trough Process Heat Collector

Prepared for

Distell (for Greenline Africa)

Paarl, South Africa

Prepared by

Absolicon Solar Collector AB

Carlo Semeraro

carlo.semeraro@absolicon.com

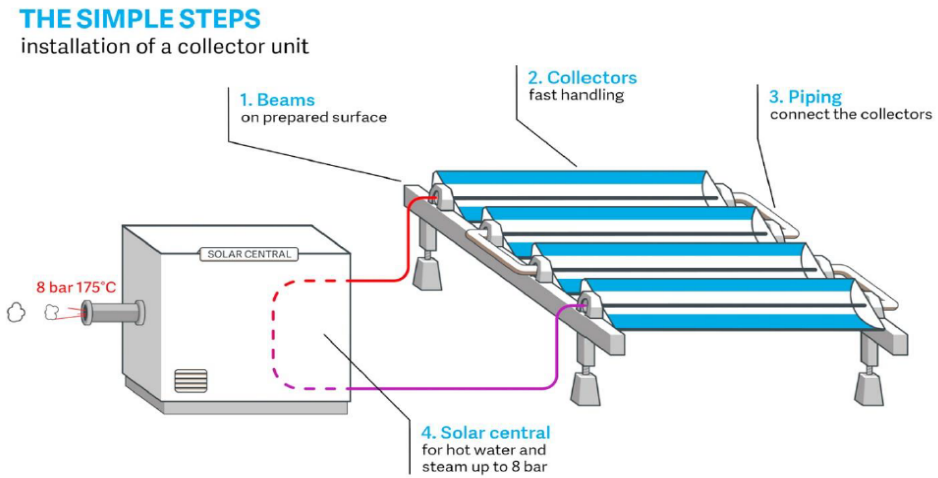
Tel: +46 73 988 89 85

Date: February 25, 2020

1 Collector Design

Absolicon T160 Solar Collectors are mounted in units of 4 collectors on a pair of beams. These beams are a necessary part of an Absolicon Solar Collector group, providing support and allowing 265° rotation of the collectors as they track the sun.

One of the beams, the active beam, contains a linear actuator and other equipment needed to control the rotation of a collector group. The other beam, passive beam, provides support.



One or several groups will form an Absolicon T160 Solar Collector field.
Groups can be placed out in parallel or serial or in any configuration of choice and in any direction.

The final layout of a field will mostly be based on the available area, the preferred orientation(s) and the preferred fluid circuit(s).

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871 33 Härnösand, Sweden

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Solar field Layout

Number of T160 groups[8]	11	
Thermal peak power[4]	352	kW_{th}
Solar field size	704	m^2
Footprint area	1 408	m^2
Medium Delivered	Saturated Hot Water	
Pressure Delivered	4	bar
Annual Electricity consumption	850	kWh
Heat storage size	10	m^3
Heat storage pressure	4	bar abs

Results

Yearly system production	626	MWh_{th}
Heat directly utilized during sun hours	535	MWh_{th}
Heat discharged during no sun hours	91	MWh_{th}
Heat not utilized[5]	32	MWh_{th}
Field Yield[6]	1,87	$MWh_{th}/KW_{th}/y$
Solar fraction[7]	29	%
CO_2 annual saving vs. current fossil fuel	228	Tons

4Under reference conditions 500 W/m²
5 Heat produced by the T160 collector but not utilized by the end user, it is called "Capacity reserve"
6 Amount of energy production produced by the T160 per kW_{th} (Capacity reserve + Directly utilized + Storage discharge)
7 Yearly available solar production
8 One group of T160 = 3 Units of T160 = 12 collectors T160

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3 Warranties

Products warranties:

Item	Description	Warranty
T160 collectors	Glass covered parabolic trough	IEC/ISCO certified, 5 years for mechanical parts
Tracking System	Astrasys Z tracking system	IEC/ISCO certified, 5 years for mechanical parts
Beams	Supporting structures	IEC/ISCO certified, 5 years for mechanical parts
Solar central	Pump station	IEC/ISCO certified, 2 years for mechanical parts

Performance warranties:

Period	Warranty
0-10 years	95% of yearly system production
11-25 years	90% of yearly system production

Lifetime: 25 years

The T160 parabolic trough has been certified by Solar Keymark institute (011-752902 C) according with the ISO 9806, ISO 17025 and EN 12975 standards.

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Absolicon South Africa Robotic Production line being setup in South Africa in 2020

1 Solar Collector every 6 minutes

Production capacity = 100 000m2 or 55MW Thermal /annually

GREENLINE AFRICA

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GREEN BUILDING COUNCIL SA

MEMBER ORGANISATION

TELL US YOUR SUSTAINABILITY NEED

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